FINAL | DEC 2023

2024 Water & Wastewater Master Plan

Oxford County

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RVA

Post-30-Day Review Period

Council endorsed the 2024 Water and Wastewater Master Plan (W/WW MP) on October 11, 2023. The 30-day review period began on November 1, 2023, when the W/WW MP and associated background reports were made available for public review online at Speak Up, Oxford! (https://speakup.oxfordcounty.ca/wwwmp). The public review period ended November 30, 2023.

Comments on the W/WW MP were received from four (4) individuals, agencies, and First Nations during the public review. The comments included general requests for clarification, revisions to wording in the associated November 1, 2023 Public Notice, endorsement of the consistency of the Master Plan with the MCEA process, and general questions on water quality and consultation.

Two extensions were granted. The Ministry of Citizenship and Multiculturalism requested an extension of the deadline to forward comments and their comments were received on December 5, 2023. The Chippewa of the Thames First Nation (COTTFN) requested an extension of the deadline to forward comments and their comments were received on December 6, 2023.

At the conclusion of the 30-day review period, the W/WW MP report was updated to address comments where applicable. Table R.1 includes the full compilation of comments received, responses provided and information regarding any actions resulting from those comments. Appendix 2.8 provides copies of the correspondence letters and responses provided if required by the County.

Table R.1 Comments Received During 30-Day Review Period of Master Plan

From	Comment	Response
CJDL Consulting Engineers	November 2, 2023, Email from Peter Penner, CJDL Consulting Engineers: "Hi Don, I have had clients inquire about the scope of work proposed included in the County's Water and Wastewater Master Plan for Tillsonburg. I believe the report only lists the project values to coincide with the various project names which in some cases describe the project scope reasonably well. However, there are a few projects such as the North End Watermain Looping or the Watermain looping VanNorman St watermain loop (off HWY 3) what are less specific about the scope. Does the County have any concept sketches that would better show the scope of what is being contemplated?"	November 3, 2023, Email Response from Don Ford, Oxford County: "Peter, my staff sketched those noted projects (attached) at a conceptual level for you if that helps. The Master Plan followed Approach #1 of the MECA process which involves a broad scope and a high level of assessment of the projects and is intended to fulfill the Class EA requirements for Exempt projects that are identified and to outline additional work that will be required for any identified Schedule B and C projects. The future projects within the report will still need to be approved by County Council in the Capital budget process and be subject to engineering design. Hope this is helpful, thanks."
MECP	November 14, 2023, Email from Mark Badali, Senior Project Evaluator Environmental Assessment Program Support | Environmental Assessment Branch: "Good morning, Thank you for sharing the attached Notice with the ministry. Please note that, as per section 4.5 of Appendix 4 of the Municipal Class EA parent document, the final notice for a Master Plan following Approach #1 should be called a "Notice of Master Plan", and should not be called a "Notice of Completion". One reason for this is to be clear that no Schedule B or C projects have been completed through the issuance of the notice. In order to comply with the requirements of the Municipal Class EA process, the ministry advises that this Notice should be revised and reissued with this corrected title. At the proponent's discretion, this reissuance need not impact the duration or end date of the 30-day public review period. When reissuing this Notice, the proponent could consider adding text to the section about requests to the ministry for a higher level of study, to indicate that the minister could only make an order with respect to Schedule B or C projects identified in the Master Plans and cannot make an order with respect to Exempt projects. While it is not a requirement of the Municipal Class EA process to include this information, the proponent may consider including it as a proactive risk-management measure to provide clarification up-front to any recipients of the notice who are considering submitting a request to the ministry for a higher level of study."	Oxford County undertook the following actions: 1. Reissued the Notice on November 15, 2023; 2. Changed the notice title in the reissued notice from "Notice of Study Completion" to "Notice of Master Plan;" 3. Revised wording in 3rd paragraph of "Public Comment Perion" section from: "A request may be made to the Ministry of the Environment, Conservation and Parks for an order requiring a higher level of study, or that conditions be imposed, only on the grounds that the requested order may prevent, mitigate or remedy adverse impacts on constitutionally protected Aboriginal and treaty rights. Requests on other grounds will not be considered." to "The Minister of the Environment, Conservation and Parks can only issue an order with respect to Schedule B or C projects identified in the Master Plan requiring a higher level of study, or that conditions be imposed, only on the grounds that the requested order may prevent, mitigate or remedy adverse impacts on constitutionally protected Aboriginal and treaty rights. Requests on other grounds will not be considered. The Minister cannot make an order with respect to Exempt projects identified in the Master Plan."
Ministry of Citizenship and Multiculturalism (MCM)	Email request on November 30, 2023, to allow time for MCM response and December 5, 2023, letter to County from Joseph Harvey, Heritage Planner: "MCM has reviewed the above referenced Master Plan document and finds that it is consistent with the requirements, guidance and standards of the Municipal Class EA and with best practice guidance prepared by MCM."	Correspondence to be filed in the final Master Plan document.
Chippewa of the Thames First Nation (COTTFN)	Email request on November 30, 2023, to allow time for COTTFN response and December 6, 2023, letter to County from Erna Leclair, Consultation Analyst	County did not object to receiving COTTFN comments post November 30, 2023. RVA prepared and submitted response on December 15, 2023, to COTTFN December 6, 2023 letter.

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RVA 21063

December 15, 2023

Oxford County
21 Reeve Street
P.O. Box 1614
Woodstock, ON 4S 7Y3

Attention: Don Ford, BA, CMM III, C.Tech., Manager of Water and Wastewater Services

Dear Sir:

Re: 2024 Oxford County Water and Wastewater Master Plan – Final Report

R.V. Anderson Associates Ltd. is pleased to present to Oxford County the Final 2024 Water and Wastewater Maser Plan.

If you have any questions regarding this report, please do not hesitate to contact the undersigned.

Yours very truly,

R.V. ANDERSON ASSOCIATES LIMITED

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2024 Oxford Water and Wastewater Master Plan

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EXECUTIVE SUMMARY

Introduction

The County of Oxford ("the County") has commenced the 2024 Water and Wastewater Master Plan (W/WW MP) in order to develop, evaluate and determine a long term water and wastewater approach to manage current servicing needs as well as accommodate future projected population and employment growth to the year of 2046.

Background

The County owns 17 municipal drinking water systems and 11 municipal wastewater systems which includes, but is not limited to, approximately 735 km of distribution watermains, 34 water treatment plants, 42 water reservoirs/storage towers, 6 water booster stations, 61 active groundwater supply wells, 600+ km of sewers and forcemains, 36 sewage pumping stations, 9 wastewater treatment plants, SCADA systems, 4 bulk water stations and a biosolids management facility.

The County holds full municipal authority and is responsible for all water and wastewater system services, including water treatment, wastewater treatment, water distribution and wastewater collection, as per Section 11(11) of the Municipal Act, 2001.

Master Plan Goals

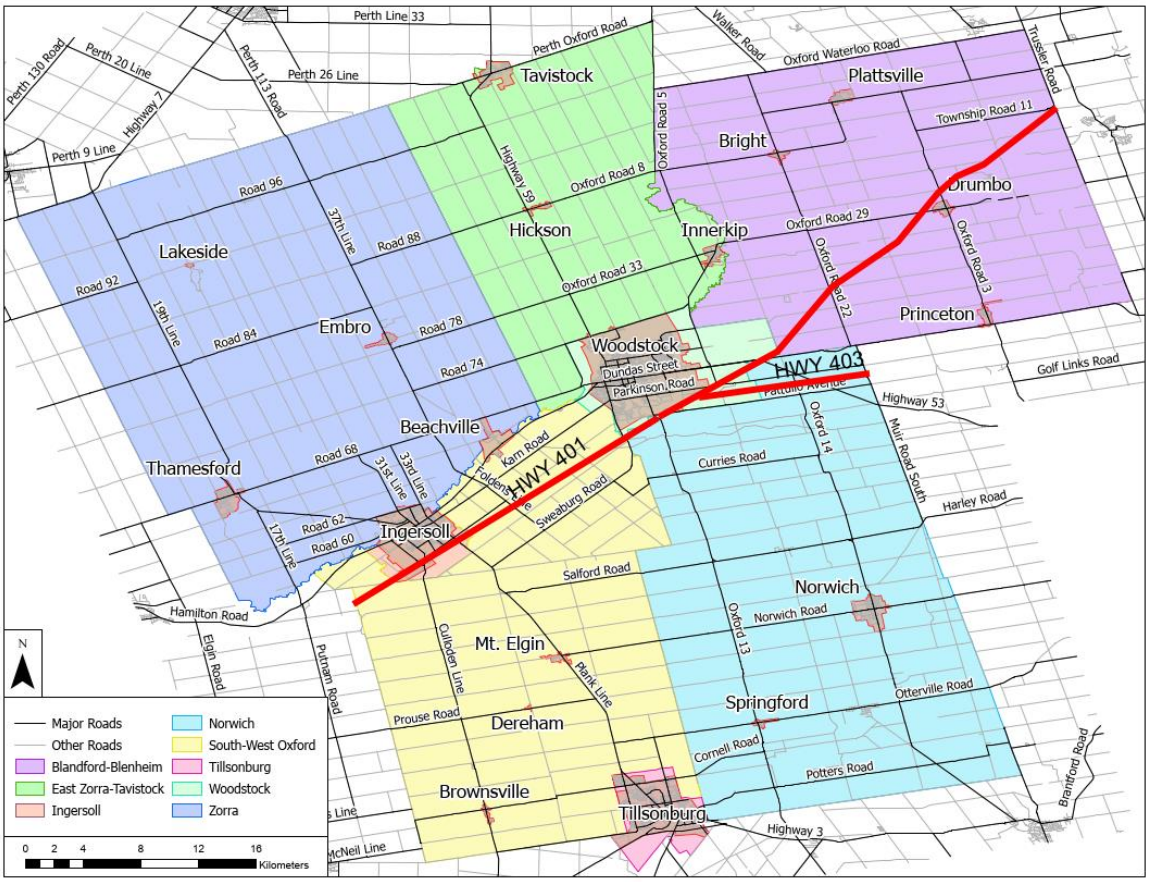
The following goals were developed for the W/WW MP:

1. Provide water and wastewater strategies to service existing settlement areas and growth to the year 2046;
2. Develop water and wastewater strategies that are consistent with and conform to Provincial policies/legislation and support the County's Official Plan and strategic initiatives;
3. Identify options for optimizing the effectiveness of the existing water and wastewater infrastructure; and
4. Develop an integrated multi-year water and wastewater capital implementation plan which affords infrastructure reliability, redundancy, and sustainability.

Study Area

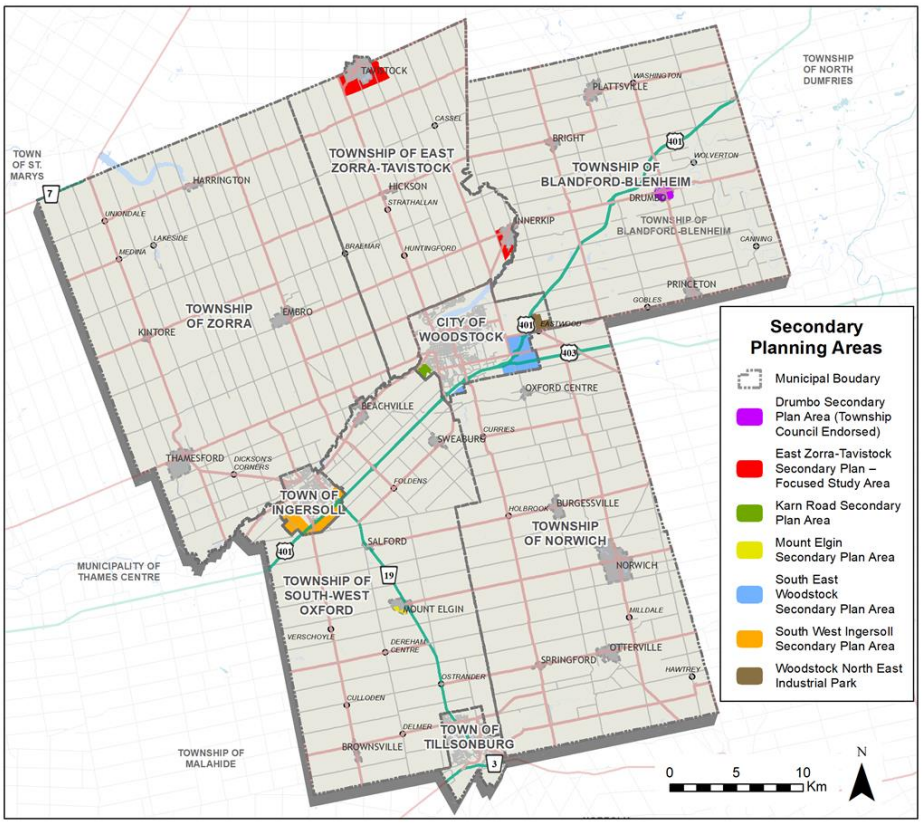
The Study Area below incorporates the County's entire geographical region which includes its eight Area Municipalities - Township of Blandford-Blenheim, Township of East Zorra-Tavistock, Town of Ingersoll, Township of Norwich, Township of South-West Oxford, Town of Tillsonburg, City of Woodstock, and Township of Zorra. The Study Area is made up of rural areas, settlement clusters and smaller urban centres which cover approximately 2,000 km^2 as shown in Figure ES 1.1.

Figure ES 15.1: Water and Wastewater Master Plan Study Area



In order to provide the necessary land use planning and servicing basis for the settlement expansions that are required to accommodate this growth, the County and some Area Municipalities have recently initiated and/or completed a number of Secondary Plans. The Secondary planning processes are shown in Figure ES 1.2.

Figure ES 1.2: Oxford County's Secondary Planning Areas



Master Planning Process

Class Environmental Assessment and Master Plan Process

The Master Plan process provides the basis for developing long-range water and wastewater servicing plans which integrates infrastructure requirements for existing / future land use and evaluates all reasonable servicing alternatives with considerations to natural, social, and economic environments ("triple bottom line").

The W/WW MP was developed following Approach #1 of the Class Environmental Assessment Municipal Engineers Association, 2023 (MCEA). The MECA is an approved planning and design process under the Ontario Environmental Assessment Act. The process provides the framework for planning of municipal infrastructure projects to fulfill the requirements of Ontario Environmental Assessment Act for a class or category of infrastructure projects. Projects are divided into schedules based on the type of projects and activities. Schedules are categorized as Exempt, B and C with reference to the magnitude of their anticipated environmental impact.

Approach #1 of the MECA process which involves a broad scope and a high level of assessment of the projects identified in the Study Area. This Master Plan is intended to fulfill the Class EA requirements for Exempt projects that are identified and to outline additional work that will be required for any identified Schedule B and C projects.

Problem and Opportunity Statement

The County has defined the following as its statement of the problem/opportunity to be addressed by the W/WW MP:

> *To identify preferred water and wastewater servicing strategies to meet Oxford's growth needs to 2046 as well as provide effective on-going continuity to existing serviced settlement areas across Oxford County as appropriate.*

The W/WW MP will afford on-going servicing continuity for the communities (designated as settlement areas in the Oxford County Official Plan), including fully serviced (municipal) large urban centres and villages, which are intended to be the primary focus for future growth and development, as well as partially serviced villages. The W/WW MP was directed to assume that any rural villages that are privately serviced and/or rural clusters will remain on such servicing given growth is limited to minor infilling in these areas.

The 2024 W/WW MP was developed to service planned population and employment growth forecasts to the year 2046 which are based on the approved 2020 Oxford County Phase 1 Comprehensive Review. As part of the water and wastewater servicing assessment, a sensitivity analysis was also undertaken to evaluate the potential impacts of higher than forecasted growth on the County's water and wastewater infrastructure needs. The purpose of this analysis was to provide the County with additional information and direction necessary to adjust the infrastructure improvement plans to accommodate higher than forecasted growth should it be identified through upcoming forecast updates, or otherwise materialize over the planning period.

Public Consultation and Engagement

In keeping with the principles of the MCEA process, the W/WW MP featured a high degree of public and stakeholder involvement. The MCEA process requires stakeholder consultation to incorporate input from interested or impacted groups. Potential stakeholders included but were not limited to public, review agencies, Indigenous Communities, Oxford County Internal staff and Council departments, Area Municipality Councils and staff, and Railways, Transit Agencies, Utilities, etc.

The following summarizes the public announcements and consultation opportunities for public and agency input and participation in the study:

- Notice of Study Commencement in March 2022;
- News releases, radio ads, and social media posts;
- Two virtual Public Consultation Centres, in September 2022 and June 2023;
- Six in person consultation events at Canada's Outdoor Farm Show in Woodstock (September 2022), Ribfest in Tillsonburg (September 2022), Ingersoll Town Council Chambers (September 2022, March 2023), Oxford Council Chambers in Woodstock (March 2023), and Tillsonburg Council Chambers (March 2023);
- Updates and references to the study through the Oxford County website and "Speak-Up Oxford" (https://oxfordcounty.ca/wwwmp);
- Five advisory committee meetings with the Internal Technical Review Committee (InTAC) (April 2022, April & May 2023) and External Technical Review Committee (ExTAC) (April 2022, June 2023);
- Two presentations to Oxford County Council were made on November 9, 2022, and July 12, 2023;
- At the July 12, 2023 Council meeting, Council passed a motion that the draft Master Plan report be circulated to area municipalities and posted to Speak Up Oxford for feedback from the public within 75 days (to September 25, 2023); and
- A Report to Council titled 2024 Water and Wastewater Master Plan – Extended Consultation October 11, 2023 summarized the input received from the 75-day draft review period. This report is attached as Appendix 2.2.5.

Agencies, stakeholders, and Indigenous Communities were notified at key points in the study process, and they were encouraged to provide any information they felt was necessary for the Project Team to consider during the study. All comments received from agencies, stakeholders and Indigenous Communities were recorded and considered throughout the Master Plan process. Appendix 2 provides the complete record of public consultation for the W/WW MP.

Master Planning Principles

To review the issues and opportunities in the County with regards to water and wastewater servicing to the period to 2046, the following principles shown in the table below were developed by the County.

Table ES-1: Oxford County Water and Wastewater Master Planning Principles

2024 Water and Wastewater Master Plan
Integrate growth management planning and infrastructure servicing in a manner which ensures alignment with County's Official Plan and Strategic Initiatives
Offer infrastructure solutions that recognize potential for growth beyond current planning horizons
Develop infrastructure systems which meet the County's established asset level of service framework and MECP legislative requirements
Maximize the use of available existing capacity in infrastructure, while considering sustainable infrastructure expansions
Provide reliability, redundancy, and security in the infrastructure systems, including consideration of reserve capacity
Optimize pumping and storage infrastructure to maintain level of service under emergency conditions
Recommend proven, reliable, financially, and sustainable technologies that meet long-term servicing requirements
Recognize water conservation and efficiency measures to support environmental sustainability
Consider infrastructure operating and maintenance costs, including full lifecycle costing, to evaluate overall long-term financial implications and sustainability

Water and Wastewater Servicing Strategy Development

The process of determining Oxford County's long term water and wastewater servicing needs involved a number of tasks and evaluation processes that were undertaken as part of the W/WW MP process. Some of the key tasks undertaken included:

- Analyzing planning information and undertaking growth sensitivity analyses;
- Establishing existing system conditions;
- Identifying issues and constraints for each system;
- Developing design criteria and projections of future water demands and wastewater flows;
- Assessing existing and future infrastructure capacity;
- Assessing risk;
- Developing servicing evaluation criteria;
- Developing alternative servicing concepts;
- Evaluating alternative servicing strategies; and
- Determining preferred servicing strategy, implementation, and phasing.

There are potential considerations that will influence the County's ability to provide water and wastewater services with its current infrastructure and these will have to be considered in planning existing and future works as summarized in Table ES-4.

Table ES-2: Summary of Major Water and Wastewater System Considerations

Water System	Wastewater System
• Changes in water quality requirements • Variability in individual well yields • Power Interruptions • Climate Change – lowering of water table • Source water protection – human impacts on water quality and quantity	• Changes to regulated effluent quality • Changes in discharge requirements due to the receiving stream's assimilative capacity. • Power Interruptions • Climate Change – increased sewer infiltration/inflow, flood levels impacting facilities

Preferred Water Servicing Strategy

Overall Water Strategy Summary

The preferred water servicing strategy is intended to assist the County's municipal drinking water systems to have adequate water supply, water treatment capacity, sufficient water system storage and pumping/transmission capabilities to the year 2046. The strategy was based on a combination of servicing alternatives which included:

- Optimizing existing well supply and water distribution conveyance infrastructure.
- Extending existing water distribution systems (watermain extensions, new booster pumping stations, new storage facilities, system interconnections) to service infill areas and employment lands.
- Developing new well supplies and expanding existing water treatment plant capacities.
- Ongoing source water protection initiatives and continuation of water conservation best management practices.
- Focusing growth and development within designated settlement areas, including fully serviced (municipal) large urban centers and villages as well as partially serviced (municipal) villages.

Specific alternatives for each drinking water system were then further developed based on the type of issue found within each system as summarized in Table ES-5.

Table ES-3: Summary of Solutions Reviewed for Water Issues

Issues	Servicing Solutions Reviewed
Water Supply	• Additional standby production well • Interconnection with another system • Specialized well rehabilitation • Water conservation
Water Treatment	• Treatment at well site • Treatment at centralized site (multiple wells) • Treatment technologies (as applicable)
Water Distribution and Booster Pumping	• Refurbish/upsize existing watermains • New watermains • Refurbish existing or build new Booster Pumping Station (BPS)/standpipe • Revise existing or create new pressure zones

Issues	Servicing Solutions Reviewed
Water Storage	• In-ground Storage (and associated BPS) • Elevated Storage
Risk	• Backup power generation • Source water protection and emerging water quality threats • System redundancy and reliability

Servicing Requirements by System

As detailed in Appendix ES-1 (located on page ES-13), the preferred water servicing strategy has identified numerous water capital projects which are required to service existing needs and anticipated growth (infill areas, current/future secondary planning areas) in Oxford County to the year 2046. The overall water capital program from 2024 to 2046 has been estimated to be approximately $243 million (2023 dollars).

Key servicing requirements for each municipal drinking water system (DWS) are as follow:

- Ingersoll DWS
    - Water efficiency/buyback program;
    - Groundwater modeling;
    - Rehabilitation projects;
    - Trunk watermain extensions/upsizing;
    - New booster pumping station;
    - New elevated water storage; and
    - Water Quality Improvement pilot project.
- Tillsonburg DWS
    - Water efficiency/buyback program;
    - Rehabilitation projects;
    - Upgrades to Wells 3 and Well 7A treatment facilities;
    - Replacements of Wells 1A and 2, 6A, and 11;
    - Standby Power;
    - Water storage expansion;
    - Trunk watermain extensions/upsizing; and
    - Source Water Protection.
- Woodstock DWS

  - Water efficiency/buyback program;
  - Rehabilitation, replacement, and facility retirement projects;
  - Standby power;
  - Southside WTP replacement;
  - Feedermain Twinning;
  - Upgrades to Wells 6 and 9;
  - Trunk watermain extensions/upsizing;
  - New Water Booster Pumping Stations;
  - Pressure Zone Boundary Adjustments; and
  - Source Water Protection.

- Blandford Blenheim
  - Drumbo-Princeton DWS
    - Standby power to existing well;
    - Trunk watermain extensions/upsizing;
    - New well supply; and
    - New WTP plant with filtration.
  - Plattsville DWS
    - WTP filtration upgrades;
    - Standby power to existing well; and
    - New standby well supply.
  - Bright DWS
    - Plattsville to Bright Water system interconnection; and
    - Well 5 decommissioning.

- Oxford South DWS (Norwich, Springford and Otterville)
  - Well rehabilitation;
  - Water quality improvements;
  - Watermain replacements/extensions/upsizing;
  - Norwich Well 4 WTP filtration upgrades and storage; and
  - New standby well supply.
- South-West Oxford
  - Mount Elgin DWS
    - Mount Elgin WTP Optimization; and

        - Trunk watermain interconnection planning and design (to Ingersoll Water System).
    - Beachville DWS
        - Water quality improvements; and
        - New standby well supply and water storage.
    - Brownsville DWS
        - Water quality improvements; and
        - Well rehabilitation.
    - Dereham Centre DWS
        - Water quality improvements.

- East-Zorra Tavistock
    - Innerkip DWS
        - To address the Innerkip DWS needs to 2046, the following general servicing strategies were developed and include:
        - Water infrastructure refurbishment.
    - Tavistock DWS
        - Water efficiency/buyback program;
        - Rehabilitation projects;
        - New well supply;
        - New WTP with onsite storage;
        - Trunk watermain extensions/upsizing;
        - WTP filtration upgrades; and
        - Water tower rehabilitation.
    - Hickson DWS
        - Well rehabilitation.

- Zorra
    - Thamesford DWS
        - Trunk watermain extensions; and
        - Water reservoir contact time enhancements (reallocation to Storage).
- Embro DWS
    - Water storage enhancements at Embro WTP.

- Lakeside DWS
    - Well rehabilitation and infrastructure refurbishment.

Preferred Wastewater Servicing Strategy

Overall Strategy Description

The preferred water servicing strategy is intended to assist the County's municipal drinking water systems to have adequate water supply, water treatment capacity, sufficient water system storage and pumping/transmission capabilities to the year 2046. The strategy was based on a combination of servicing alternatives which included:

- Optimizing existing wastewater collection and treatment plant infrastructure;
- Extending existing wastewater collection systems (sewer mains extensions, new/upsized forcemains, new/upgraded sewage pumping stations, and system interconnections) to service infill areas and employment lands.
- Rehabilitating aging trunk sewers and initiating sewer system inflow and infiltration reduction best management practices.
- Expanding existing water treatment plant capacities.
- Focusing growth and development within designated settlement areas, including fully serviced (municipal) large urban centers and villages as well as partially serviced (municipal) villages.

Specific alternatives for each wastewater system were then further developed based on the type of issue found within each system as summarized in Table ES-6.

Table ES-4: Summary of Solutions Reviewed for Wastewater Issues

Component	Solutions Reviewed
Wastewater Collection and Conveyance	Trunk Sewers and Local Gravity Sewers Sanitary Pumping Station Forcemain Siphon (gravity flow underneath river) Infiltration and Inflow Control and Reduction

Component	Solutions Reviewed
Wastewater Treatment	Headworks and Septage receiving facilities Liquid Treatment of wastewater (primary and secondary treatment) Tertiary Treatment (if required) to reduce nutrients in wastewater Wastewater effluent disinfection Biosolids Management (treatment, storage, disposal) Wet weather flow treatment (in some cases)

Detailed Servicing Requirements

As detailed in Table ES-7.2 the preferred wastewater servicing strategy has identified numerous wastewater capital projects which are required to service existing needs and anticipated growth (infill areas, current/future secondary planning areas) in Oxford County to the year 2046. The overall wastewater 2024 - 2046 capital program is estimated at approximately $321 million (2023 dollars).

Key servicing requirements for each municipal wastewater system (WWS) are as follow:

- Ingersoll WWS
    - Trunk sewer extensions/upsizing;
    - New SPS;
    - New Forcemains, new trunk sewer river crossing; and
    - WWTP Upgrades.
- Tillsonburg WWS
    - WWTP Capacity Expansion (Phase 2);
    - Trunk sewer rehabilitation;
    - New/Upgraded SPSs;
    - Forcemain Upgrades;
    - Trunk sewer extensions/upsizing; and
    - Sewer Inflow and Infiltration Reduction.
- Woodstock WWS
    - Trunk sewer extensions/upsizing;
    - New Forcemains;
    - New/Upgraded SPSs;
    - WWTP Upgrades;

    - Brick Pond Trunk sewer realignment; and
    - Sewer Inflow and Infiltration Reduction.

- Blandford Blenheim
    - Plattsville WWS
        - WWTP Optimization;
        - Lagoon biosolids removal and berm repair;
        - Trunk sewer extensions; and
        - Forcemain twinning and capacity review.
    - Drumbo WWS
        - WWTP Capacity Expansion (Phase 2); and
        - WWTP Optimization.

- Norwich WWS
    - WWTP Capacity Expansion;
    - Lagoon biosolids removal and berm repair; and
    - Sewer rehabilitation.

- South-West Oxford
    - Mount Elgin WWS
        - WWTP Capacity Expansion (Phase 3 / 4);
        - Sewer/forcemain upsizing; and
        - Ingersoll to Mount Elgin Wastewater System Interconnection (Forcemain).

- East-Zorra Tavistock
    - Innerkip WWS
        - Upsizing/twinning of forcemain to Woodstock.
    - Tavistock WWS
        - WWTP Capacity Expansion (Phase 2);
        - SPS capacity upgrades;
        - Sewer rehabilitation/extensions/upsizing;
        - Sewer System Inflow and Infiltration Reduction.

- Zorra
    - Thamesford WWS
        - WWTP Upgrades.
    - Embro WWS
        - Upsizing/twining of forcemain to Woodstock; and
        - SPS enhancements.

Supporting Policy and Strategic Projects

In addition to water and wastewater capital projects identified, a number of supporting policies and strategies were also identified to be developed over the first 10-years of the Master Plan period as shown in Table ES-5.

Table ES-5: Total Cost of Policy Development and Strategic Projects

Project ID	Project Description	Total	1-5 Year	6-10 Year
TBD	Fire Rated Systems Policy	$50,000	$50,000	
TBD	Backup Power Prioritization Policy	$35,000	$35,000	
TBD	Servicing Upgrades Policy	$75,000	$75,000	$150,000
TBD	Connected Systems Rate Servicing Policy	$75,000	$75,000	$75,000
900025 WWW Master Plan	Water and Wastewater Master Plan (2028 and 2033)	$900,000	$450,000	$450,000
900026 Development Charges (DC) Technical Study W/WW	2029 DC W/WW Technical Study (2029)	$100,000		$100,000
	TOTAL	$1,235,000	$685,000	$775,000

Implementation

The preferred short and long term water and wastewater servicing strategies will be implemented in accordance with each project's respective MCEA schedule:

- Exempt (formerly Schedule A/A+) projects will move directly forward to design and construction based on the designated schedule.
- Schedule B projects identified will proceed through separate stand-alone studies (a Project File Report will be completed for public filing) or as part of an integrated planning process under the Planning Act in order to satisfy MCEA requirements.
- Schedule C projects identified will continue to Phases 3 and 4 of the MCEA process and have an Environmental Study Report (ESR) completed for public filing. It is anticipated that these Schedule C projects will review and update Phases 1 and 2 of the MCEA process as part of the project scope.

During the subsequent steps of project implementation, primarily during detailed design, the following requirements will be considered:

- Finalization of property requirements;
- Refinement of infrastructure alignment, sizing, facility siting and costing;
- Refinement of construction methodologies;
- Completion of additional supporting investigations as required such as geotechnical, hydro-geotechnical and site specific environmental studies;
- Review and mitigation of potential construction related impacts; and
- Completion of all approval requirements including, but not limited to, provincial approvals (MECP, MNR), local municipality approvals (site plans, building permits), and conservation authority approvals.

Given the growth-related nature of the servicing strategies, these capital programs will also form the foundation for the water and wastewater components of Oxford County's Development Charges (DC) By-Law as part of the County's Integrated Growth Management Process. Along with the Water and Wastewater Development Charges Technical Report, the 2024 Water and Wastewater Master Plan provides recommendations, provides supporting information, and identifies the capital requirements for the Oxford County DC By-Law which will be updated for 2024.

The respective projects identified in the 2024 W/WW MP will also provide a baseline for Oxford County's future capital budgets.

Appendix ES-1 – Water Projects Identified

Ingersoll

Project ID	Project Description	Presumed MCEA Schedule[1]	Cost	2024-2028	2029-2033	2034 - 2046
CAPACITY						
1-260000-26006-6019	Water Efficiency/Buy-Back Program	Exempt	$ 50,000	$50,000		
960307 ING	Groundwater Modelling	Exempt	$170,000	$170,000		
960317 ING	Water Quality Improvements	Exempt	$700,000	$350,000	$350,000	
260300 ING	Operation Minor Capital less well rehab	Exempt	$2,327,000	$602,000	$1,725,000	
260300 ING	Specialized Well Rehabilitation Program	Exempt	$321,000	$100,000	$6,000	$215,000
960310 ING	Well 11 Upgrades	Exempt	$1,803,000	$1,802,802		
DISTRIBUTION - VACANT LANDS WITHIN URBAN BOUNDRY						
960325 ING	Watermain Replacements Town Projects	Exempt	$29,361,000	$7,985,000	$6,682,000	$14,694,000
960315 ING	Watermain Replacements County Projects	Exempt	$100,000			$100,000
960302 ING	Thames Street South Trunk Watermain Extension from CNR to Holcroft	Exempt	$383,000	$383,000		
SOUTH THAMES RESIDENTIAL AREA						

Project ID	Project Description	Presumed MCEA Schedule[1]	Cost	2024-2028	2029-2033	2034 - 2046
960303 ING	Watermain on Hamilton/King St. from boundary to existing water distribution system (Oakwood)	Exempt	$691,000	$691,000		
DISTRIBUTION - EMPLOYMENT AREAS						
WALLACE LINE INDUSTRIAL PARK						
960338 ING	Wallace Line Trunk Watermain from Robinson Road to Thomas St.	Exempt	$2,516,000	$2,516,000		
SOUTHWEST INDUSTRIAL PARK						
960337 Ing	Wallace Line Second Feedermain from Robinson Road to Hwy 401	Exempt	$48,000		$48,000	
960337 Ing	Second Feedermain Hwy 401 Crossing - Wallace Line to Union Street	Exempt	$1,298,000	$44,000	$1,254,000	
960337 Ing	Union Road Trunk Watermain from Hwy 401 crossing to Curry Road	Exempt	$1,514,000		$1,514,000	
960337 Ing	Curry Road Trunk Watermain from Union Road to future water tower site	B[2]	$3,446,000		$3,446,000	
960337 Ing	Elevated Water Storage Tank	Exempt	$3,409,000			$ 3,409,000
		TOTAL	**$46,334,000**	**$12,891,000**	**$15,025,000**	**$18,418,000**

Notes

1. Subject to further review and confirmation when project is initiated
2. Projects that are identified as eligible for screening, subject to the archaeological screening process

Tillsonburg

Project ID	Project Description	Presumed MCEA Schedule[1]	Cost	2024-2028	2029-2033	2034 - 2046
CAPACITY						
1-260000-26006-6019	Water Efficiency/Buy-Back Program	Exempt	$50,000	$50,000		
260200 WATER TBURG	Operations Minor Capital less well rehab	Exempt	$1,212,000	$543,000	$669,000	
260200 WATER TBURG	Specialized Well Rehabilitation Program	Exempt	$560,000	$240,000	$320,000	
960200 TBURG	Well 7A - Filtration Upgrades Design (D)/Construction (C)	Exempt	$2,010,000	$2,010,000		
960201 TBURG	Well 3 Facility Upgrade (D) (C)	Exempt	$3,015,000	$3,015,000		
960220 TBURG	Backup Power for North Street Pumphouse	Exempt	$465,000	$465,000		
960202 TBURG	Replacement of Well 6A	Exempt	$150,000	$150,000		
960211 TBURG	Broadway Secondary Transmission Main Feed	Exempt	$2,249,000	$2,249,000		
960203 TBURG	Mall Rd Replacement Wells for Wells 1a and 2	Exempt	$465,000		$465,000	
960204 TBURG	Bell Mill Replacement Well for Well 11	Exempt	$642,000	$ 642,000		
960206 TBURG	Well 12 capacity increase feasibility study	Exempt	$321,000			$321,000
DISTRIBUTION - VACANT LANDS WITHIN URBAN BOUNDARY						

Project ID	Project Description	Presumed MCEA Schedule[1]	Cost	2024-2028	2029-2033	2034 - 2046
960230 TBURG	Secondary Elevated Storage	B[2]	$2,273,000			$2,273,000
960250 TBURG	Watermain West Town Line from Simcoe Street to Potters Rd.	Exempt	$755,000		$755,000	
960235 TBURG	Watermain Replacements Town	Exempt	$21,518,000	$7,678,000	$5,280,000	$8,560,000
960247 TBURG	Watermain Replacements County	Exempt	$115,000	$15,000		$100,000
960251 TBURG	Victoria Wood Subdivision Watermain on Street I from Westin Drive to Street F	Exempt	$351,000	$351,000		
960251 TBURG	Victoria Wood Subdivision Watermain on Grandview Drive (near Quarter Townline) West to Street A then N to Concession Street W.	Exempt	$797,000	$797,000		
960213 TBURG	Cranberry Road Watermain Extension from Beckett Blvd North to Town Limits (C)	Exempt	$1,492,000	$1,492,000		
960245 TBURG	North End Watermain Looping	Exempt	$ 2,020,000	$2,020,000		
DISTRIBUTION - EMPLOYMENT AREAS						
Innovation Park Industrial Lands						
960245 TBURG	Watermain looping VanNorman St watermain loop (off HWY 3)	Exempt	$540,000			$ 540,000
Rokeby Sideroad Industrial Lands						

Project ID	Project Description	Presumed MCEA Schedule[1]	Cost	2024-2028	2029-2033	2034 - 2046
960252 TBURG	Vienna Road Watermain Extension from Rouse Street to South on Vienna Rd.	Exempt	$321,000		$ 321,000	
		TOTAL	**41,321,000**	**21,717,000**	**$7,810,000**	**11,794,000**

Notes

1. Subject to further review and confirmation when project is initiated
2. Projects that are identified as eligible for screening, subject to the archaeological screening process

Woodstock

Project ID	Project Description	Presumed MCEA Schedule[1]	Cost	2024-2028	2029-2033	2034 - 2046
CAPACITY						
1-260000-26006-6019	Water Efficiency/Buy-Back Program	Exempt	$100,000	$100,000		
930197	Strik Drain Stormwater Management Facility	Exempt	$580,000	$580,000		
260100 WDSTK	Operations Minor Capital less Well Rehab	Exempt	$1,434,000	$769,000	$665,000	
260100 WDSTK	Specialized Well Rehabilitation Program	Exempt	$869,000	$590,000	$279,000	
960159 WDSTK	Thornton to Woodstock Feedermain Replacement	Exempt	$10,620,000	$10,620,000		
960144 WDSTK	Zone 1 Pressure Control Valve and Control Building to Southside Supply	B[2]	$354,000	$12,000	$342,000	

Project ID	Project Description	Presumed MCEA Schedule[1]	Cost	2024-2028	2029-2033	2034 - 2046
960166 WDSTK	Thornton to HWY 401 crossing Feedermain Upgrade (RELINING 401 CROSSING)	Exempt	$1,206,000	$1,206,000		
960125 WDSTK	Thornton WTP High Lift Pumping Upgrades	Exempt	$100,000	$100,000		
960145 WDSTK	Well 9 and Well 6 upgrades at Southside WTP	Exempt	$350,000		$350,000	
960146 WDSTK	Southside WTP Revitalization Study	Exempt	$200,000		$200,000	
960147 WDSTK	Tower Generators	Exempt	$300,000		$300,000	
960124 WDSTK	East Woodstock Water Tower Rehab	Exempt	$4,000,000			$4,000,000
DISTRIBUTION						
Karn Rd Secondary Plan Area						
960154 WDSTK	Karn Rd (Zone 6) Booster Pumping Station (C)	Exempt	$4,500,000	$4,500,000		
960149	Oversized WM Projects for Developments in City Limits	Exempt	$413,000	$313,000	$100,000	
960134 WDSTK	Watermain from Karn Rd Booster Pumping Station west to Anderson Street, east along Karn Road and looping back to Booster Pumping Station	Exempt	$650,000	$650,000		
Existing Distribution						
960120 WDSTK	Bowerhill Reservoir Decommissioning	Exempt	$855,000		$855,000	

Project ID	Project Description	Presumed MCEA Schedule[1]	Cost	2024-2028	2029-2033	2034 - 2046
960141 WDSTK	Watermain Replacements (City)	Exempt	$40,125,000	$11,248,000	$9,877,000	$19,000,000
960153 WDSTK	Watermain Replacements (County)	Exempt	$13,240,000	$3,310,000	$3,310,000	$6,620,000
960155 WDSTK	Zone 3 Booster Pumping Station (D)	Exempt	$100,000		$100,000	
960155 WDSTK	Zone 3 Booster Pumping Station (C)	Exempt	$2,858,000		$2,858,000	
960164 WDSTK	11th Line Watermain Replacement (C)	Exempt	$659,000		$659,000	
960127 WDSTK	Zone 3 Pressure Control Valve and Control Building to northern Zone 1 area (near Nellis Booster Pumping Station)	B[2]	$354,000		$354,000	
East Woodstock Secondary Plan Area						
960128 WDSTK	Township Rd 3 Waterman from Oxford Road 4 to EPA woodlot area	Exempt	$1,464,000	$1,464,000		
North East Industrial Park						
960135 WDSTK	Toyota Easement Watermain from Elevated Storage tower to west side of Hwy 401 (C)	Exempt	$1,096,000	$1,096,000		
960135 WDSTK	Toyota Easement Hwy 401 Watermain Crossing (C)	Exempt	$1,116,000	$1,116,000		
960135 WDSTK	Easement Watermain from east side of Hwy 401 to west limit of Corlett site (C)	Exempt	$431,000	$431,000		

Project ID	Project Description	Presumed MCEA Schedule[1]	Cost	2024-2028	2029-2033	2034 - 2046
960135 WDSTK	Street C Watermain from Corlett site to Blandford Road (C)	Exempt	$123,000	$123,000		
960135 WDSTK	400 mm watermain internal to development - oversizing	Exempt	$308,000	$308,000		
960135 WDSTK	Blandford Rd Watermain from Street C to Township Road #2 (C)	Exempt	$230,000	$230,000		
South East Industrial Park						
906135 WDSTK		PHASE II				
	WM 400 mm on Pattullo (~ 150 m east of Alyea Street/ opposite SPS to Southwest Limit of study area) 790 meters & WM 400 mm on Pattullo (Southwest Limit of study area to Middletown Line) 944 meters (C)	Exempt	$1,639,000		$1,639,000	
	Middletown Line Watermain from Pattullo Avenue to Street A (C)	Exempt	$72,000		$72,000	
		TOTAL	$90,346,000	$38,766,000	$21,960,000	$29,620,000

Notes

1. Subject to further review and confirmation when project is initiated
2. Projects that are identified as eligible for screening, subject to the archaeological screening process

Blandford Blenheim

Project ID	Project Description	Presumed MCEA Schedule[1]	Cost	2024-2028	2029-2033	2034 - 2046
CAPACITY						
260400 Townships	Specialized Well Rehab	Exempt	$263,000	$133,000	$130,000	
BRIGHT						
960457	Bright to Plattsville Interconnecting Watermain	Exempt	$5,390,000		$5,390,000	
New	Bright Well 5 Abandonment Study	Exempt	$150,000			$150,000
PLATTSVILLE						
960429 Manganese Filtration Townships	Manganese Filtration (Townships) - Plattsville	B[2]	$2,065,000		$2,065,000	
960429-PLAT	Land Acquisition for new WTF for Manganese Treatment	B[2]	$200,000		$200,000	
New	New Well Supply	B[2] (if on municipal property, C otherwise)	$1,572,000			$1,572,000
960404-PLAT	Backup Generation at WTF	Exempt	$428,000		$428,000	
960461-PLAT	Plattsville Water Tower Rehab	Exempt	$4,000,000			$4,000,000
DRUMBO-PRINCETON						
960429-Manganese Filtration Townships	Manganese Filtration (Townships) - Drumbo	B[2]	$2,163,000			$2,163,000

Project ID	Project Description	Presumed MCEA Schedule[1]	Cost	2024-2028	2029-2033	2034 - 2046
960420-DRUMBO	New Well Supply	B[2] (if on municipal property, C otherwise)	$1,698,000		$1,698,000	
960421-DRUMBO	Backup generation to Wells 1 and 2A	Exempt	$300,000	$150,000	$150,000	
960425-DRUMBO	Water Treatment Plant Land Acquisition	B[2]	$200,000			$200,000
960425-DRUMBO	Water Treatment Plant Relocation	B[2]	$5,377,000			$5,377,000
DISTRIBUTION - VACANT LANDS WITHIN URBAN BOUNDARY						
960406 TWSP	Linear R/R CR Project	Exempt				
960400 Townships	Watermain Replacements (Townships) Projects 10-year plan	Exempt				
PLATTSVILLE						
960459 PLAT	Plattsville N Boundary Trunk Watermain Extension Hoffstetter Rd North to limit	Exempt	$394,000			$394,000
960458-PLAT	Applewood Trunk Watermain Upsizing	Exempt	$77,000			$77,000
		TOTAL	$ 24,277,000	$ 283,000	$ 10,061,000	$13,933,000

Notes

1. Subject to further review and confirmation when project is initiated
2. Projects that are identified as eligible for screening, subject to the archaeological screening process

Norwich

Project ID	Project Description	Presumed MCEA Schedule[1]	Cost	2024-2028	2029-2033	2034 - 2046
CAPACITY						
1-260000-26006-6019	Water Efficiency/Buy-Back Program	Exempt	$25,000	$25,000		
260400 Water Townships	Specialized Well Rehabilitation Program	Exempt	$60,000		$60,000	
NORWICH						
960432 NORWICH	New Standpipe at Main St WTF (Well 4)	B	$ 2,501,000	$228,000	$ 2,273,000	
960429 Manganese Filtration Townships	New Filtration Land acquisition	B[2]	$200,000		$200,000	
960429 Manganese Filtration Townships	New Filtration Facility at Main St WTF	B[2]	$2,272,000	$75,000	$2,197,000	
NEW	New Water Supply	B[2] (if on municipal property, C otherwise)	$1,572,000			$1,572,000
DISTRIBUTION - VACANT LANDS WITHIN URBAN BOUNDARY						
960406 TWSP	Linear R/R County Road Projects	Exempt				

Project ID	Project Description	Presumed MCEA Schedule[1]	Cost	2024-2028	2029-2033	2034 - 2046
960400 Township Distribution Replacement	Watermain Replacements (Townships)	Exempt	$ 2,087,000	$2,087,000		
		TOTAL	$8,717,000	$2,415,000	$4,730,000	$1,572,000

Notes

1. Subject to further review and confirmation when project is initiated
2. Projects that are identified as eligible for screening, subject to the archaeological screening process

South-West Oxford

Project ID	Project Description	Presumed MCEA Schedule[1]	Cost	2024-2028	2029-2033	2034 - 2046
CAPACITY						
260400 Water Townships	Specialized Well Rehabilitation Program	Exempt	$401,000	$74,000	$327,000	
960422 TWSP	Water Quality Improvements (Brownsville)	Exempt	$150,000	$150,000		
MOUNT ELGIN						
960403 Mount Elgin	Graydon Facility Enhancement / Optimization	Exempt	$200,000	$200,000		
NEW	Ingersoll to Mt Elgin Watermain Connection (D)	B	$1,094,000			$1,094,000
BEACHVILLE						
960470 Beachville	Additional Well Supply and Standpipe	C	$2,130,000		$2,130,000	
		TOTAL	$3,975,000	$424,000	$2,457,000	$1,094,000

Notes

1. Subject to further review and confirmation when project is initiated
2. Projects that are identified as eligible for screening, subject to the archaeological screening process

East-Zorra Tavistock

Project ID	Project Description	Presumed MCEA Schedule[1]	Cost	2024-2028	2029-2033	2034 - 2046
CAPACITY						
1-260000-26006-6019	Water Efficiency/Buy-Back Program	Exempt	$25,000			
260400 Water Township	Specialized Well Rehabilitation Program	Exempt	$40,000			
960429 Manganese Filtration Tavistock	Land Acquisition Manganese Filtration	B[2]	$200,000			
960429 Manganese Filtration Tavistock	Manganese Filtration Tavistock (EA)(D)(C)	B[2]	$3,670,000			
TAVISTOCK						
960462-TAVI	Tower CT Enhancement Study		$30,000	$30,000		
960437-TAV	New Well Supply - Land Acquisition	B[2] (if on municipal property, C otherwise)	$400,000			

Project ID	Project Description	Presumed MCEA Schedule[1]	Cost	2024-2028	2029-2033	2034 - 2046
960437-TAV	New Well Supply - Well #4 and Storage	C (in process)	$ 6,548,000	$6,548,000		
960462-TAV	Water Tower Rehabilitation and Repainting	Exempt	$4,000,000		$4,000,000	
DISTRIBUTION - VACANT LANDS WITHIN URBAN BOUNDARY						
960400 Township Distribution Replacement	Watermain Replacements (Townships) Tavistock	Exempt	$2,014,000	$606,000	$408,000	$1,000,000
960406 TWSP - LINEAR R/R CR PROJ	LINEAR R/R CR PROJ (County) Tavistock	Exempt	$358,000	$358,000		
		TOTAL	$ 16,527,000	$11,119,000	$ 4,408,000	$ 1,000,000

Notes

1. Subject to further review and confirmation when project is initiated
2. Projects that are identified as eligible for screening, subject to the archaeological screening process

Zorra

Project ID	Project Description	Presumed MCEA Schedule[1]	Cost	2024-2028	2029-2033	2034 - 2046
CAPACITY						
260400 Water Townships	Specialized Well Rehabilitation Program	Exempt	$46,000	$40,000	$6,000	
THAMESFORD						

Project ID	Project Description	Presumed MCEA Schedule[1]	Cost	2024-2028	2029-2033	2034 - 2046
960411	Reservoir and Tower CT Enhancement Upgrades	Exempt	$300,000	$300,000		
EMBRO						
960451	Reservoir CT Enhancement Upgrades	Exempt	$330,000		$330,000	
NEW	Embro - Storage Expansion	B[2]	$569,000			$569,000
DISTRIBUTION - VACANT LANDS WITHIN URBAN BOUNDARY						
960400 Township Distribution Replacement	Watermain Replacements (Townships) - Thamesford	Exempt	$3,506,000	$951,000	$ 905,000	$1,650,000
960424	Watermain Trunk Extension	Exempt	$1,189,000	$1,189,000		
		TOTAL	**$ 5,940,000**	**$2,480,000**	**$1,241,000**	**$2,219,000**

Notes

1. Subject to further review and confirmation when project is initiated
2. Projects that are identified as eligible for screening, subject to the archaeological screening process

Appendix ES-2 – Wastewater Projects Identified

Ingersoll

Project ID	Project Description	Presumed MCEA Schedule[1]	Cost	2024-2028	2029-2033	2034 - 2046
CAPACITY						
950303 ING	Sanitary Trunk Sewer Infiltration and Inflow Reduction	Exempt	$ 127,000		$127,000	
250300 ING	Operations Minor Capital	Exempt	$1,998,000	$972,000	$1,026,000	
NEW	WWTP Headworks Upgrades	Exempt	$14,000,000			$14,000,000
950308 ING	Digester Biogas Project	Exempt	$450,000	$450,000		
COLLECTION - VACANT LANDS WITHIN URBAN BOUNDRY						
950330 ING	Sanitary Sewer Replacements - Town Projects	Exempt	$20,981,000	$5,951,000	$5,030,000	$10,000,000
950334 ING	Sanitary Sewer Replacements - County Projects	Exempt	$100,000			$100,000
950332 ING	Sanitary Sewer Relining - County Relining	Exempt	$2,427,000	$427,000	$500,000	$1,500,000
950329 ING	Second Sanitary Trunk Crossing of Thames River	Exempt or B[2] (depending on crossing methodology)	$2,429,000	$2,429,000		
South Thames Residential Area						
950336 - ING	Wallace Line Sanitary Sewer from Midblock Industrial Site to north of CNR to Hamilton	Exempt	$3,456,000	$3,456,000		

Project ID	Project Description	Presumed MCEA Schedule[1]	Cost	2024-2028	2029-2033	2034 - 2046
950336 - ING	Hamilton Road Sanitary Sewer from service lands to east of Ingersoll Street and north to existing 675 mm Trunk Sewer	Exempt	$ 1,775,000	$1,775,000		
950336 - ING	Union Road Sanitary Sewer from Culloden Line to Curry Road	Exempt	$ 623,000		$623,000	
950336 - ING	Curry Road Sanitary Sewer from Union Road to west limit of CPR	Exempt	$1,138,000		$1,138,000	
950336 - ING	CPR Easement Sanitary Sewer from Curry Road to West Sewage Pumping Station - south of Hwy 401	Exempt	$ 681,000	$23,000	$658,000	
950336 - ING	West Sewage Pumping Station - south of Hwy 401	B[2]	$1,928,000	$75,000	$1,853,000	
950336 - ING	Easement Forcemain Hwy 401 crossing from West Sewage Pumping Station to Clarke Road area (existing system)	Exempt or B[2] (depending on crossing methodology)	$2,249,000		$2,249,000	
950336 - ING	Curry Road Sanitary Sewer from east limit of CPR to Plank Line	Exempt	$1,090,000		$1,090,000	
950336 - ING	Plank Line Sewage Pumping Station (south of Hwy 401)	B[2]	$1,136,000		$1,136,000	
950336 - ING	Easement Forcemain from Plank Line Sewage Pumping	Exempt	$1,093,000		$1,093,000	

Project ID	Project Description	Presumed MCEA Schedule[1]	Cost	2024-2028	2029-2033	2034 - 2046
	Station to West Sewage Pumping Station					
		TOTAL	$ 57,681,000	$ 15,558,000	$16,523,000	$25,600,000

Notes

1. Subject to further review and confirmation when project is initiated
2. Projects that are identified as eligible for screening, subject to the archaeological screening process

Tillsonburg

Project ID	Project Description	Presumed MCEA Schedule[1]	Cost	2024-2028	2029-2033	2034 - 2046
Capacity						
250200 TBURG	Operation Minor Capital		$1,851,000	$492,000	$1,359,000	
950250 TBURG	Sanitary Trunk Sewer Infiltration and Inflow Reduction	Exempt	$218,000	$208,000	$10,000	
950200 TBURG	Tillsonburg Wastewater Treatment Plant Phase I Capacity Expansion (C)	Exempt	$600,000	$600,000		
950203 TBURG	Tillsonburg Wastewater Treatment Plant Phase II Capacity Expansion (C)	Exempt	$15,262,000			$15,262,000
NEW	Climate change resiliency study (flooding/barricades)	Exempt	$150,000			$ 150,000
COLLECTION - VACANT LANDS WITHIN URBAN BOUNDARY						
950226 TBURG	Sanitary Sewer Replacements Town	Exempt	$15,873,000	$4,856,000	$3,539,000	$7,478,000

Project ID	Project Description	Presumed MCEA Schedule[1]	Cost	2024-2028	2029-2033	2034 - 2046
950229 TBURG	Sanitary Sewer Replacements County	Exempt	$117,000			$100,000
950225 TBURG	Stoney Creek Trunk Sewer Rehabilitation from Quarter Town Line to Concession Street West	Exempt	$600,000	$200,000	$400,000	
950222 TBURG	John Pound forcemain replacement and upsizing	Exempt	$1,151,000	$1,151,000		
950220 TBURG	John Pound SPS capacity enhancements	Exempt or B[2] (depending on scope of work)	$214,000	$332,000		
950216 TBURG	Cranberry Road Sanitary Trunk extension on Tillson Ave from North of Beckett Blvd to North Town Limit	Exempt	$1,297,000	$1,297,000		
950224 TBURG	Loraine Ave Sanitary Trunk Upsizing	Exempt	$578,000			$578,000
COLLECTION – EMPLOYMENT LANDS						
Rokeby Sideroad Industrial Lands						
950218 TBURG	Rouse St SPS upgrades	B[2]	$1,959,000	$154,000	$1,806,000	
TOTAL			$40,096,000	$9,516,000	$7,114,000	$23,568,000

Notes

1. Subject to further review and confirmation when project is initiated
2. Projects that are identified as eligible for screening, subject to the archaeological screening process

Woodstock

Project ID	Project Description	Presumed MCEA Schedule[1]	Cost	2024-2028	2029-2033	2034 - 2046
CAPACITY						
950170 WDSTK	Sanitary Trunk Sewer Infiltration and Inflow Reduction	Exempt	$223,000	$213,000	$10,000	
950103 WDSTK	Woodstock WWTP Operational Upgrades	Exempt	$14,750,000	$0	$14,750,000	
950128 WDSTK	Thames Valley SPS (C)	Exempt or B[2] (depending on work scope)	$3,086,000	$103,000	$2,983,000	
250100 WDSK	Operation Minor Capital	Exempt	$2,094,000	$863,000	$1,231,000	
950159 WDSTK	Brick Pond Sanitary Trunk Sewer Re-alignment	B	$5,010,000		$5,010,000	
950173 WDSTK	Sanitary Sewer Replacement (OR 59 & Fairway) - (C)	Exempt	$266,000	$266,000		
950174 WDSTK	Sanitary Sewer Replacements - County Projects	Exempt	$6,370,000	$3,070,000	$1,100,000	$2,200,000
950158 WDSTK	Sanitary Sewer Replacements - City Projects	Exempt	$41,120,000	$10,645,000	$10,475,000	$20,000,000
950162 WDSTK	11th Line Sanitary Sewer (C)	Exempt	$1,189,000		$1,189,000	
950140 WDSTK	Northwest Trunk Upsizing	Exempt	$500,000	$500,000		
COLLECTION - VACANT LANDS WITHIN URBAN BOUNDARY						
Karn Rd Secondary Plan Area						
New	Gravity / Siphon Upsize	Exempt	$545,000	$545,000		

Project ID	Project Description	Presumed MCEA Schedule[1]	Cost	2024-2028	2029-2033	2034 - 2046
East Woodstock Secondary Plan Area						
950164 WDSTK	Lansdowne Sewer Ext. 300 meters of 300 mm	Exempt	$400,000	$400,000		
950163 WDSTK	Extension of East Trunk Sewer	Exempt	$884,000	$884,000		
950163 WDSTK	Lansdowne Sewage Pumping Station (C)	B[2]	$7,500,000	$7,500,000		
950163 WDSTK	West Trunk Sewer	Exempt	$847,000	$847,000		
COLLECTION – EMPLOYMENT LANDS						
North East Industrial Park						
950150 WDSTK	Sewage Pumping Station A	B[2]	$2,228,000	$2,228,000		
950150 WDSTK	Dundas Street Forcemain from Houser's Lane (MH SA 992) to Water Tower site	Exempt	$2,101,000	$2,101,000		
950150 WDSTK	Toyota Easement Forcemain from Water Tower Site to west side of Hwy 401	Exempt	$425,000	$425,000		
950150 WDSTK	Hwy 401 Forcemain Crossing	Exempt	$425,000	$425,000		
950150 WDSTK	Street C Forcemain from east side of Hwy 401 to SPS A (Blandford Road)	Exempt	$903,000	$903,000		
950150 WDSTK	Blandford Road Forcemain from Street C to SPS A	Exempt	$200,000	$200,000		

Project ID	Project Description	Presumed MCEA Schedule[1]	Cost	2024-2028	2029-2033	2034 - 2046
950150 WDSTK	Southeast Sanitary Trunk Oversizing Capacity Assessment	Exempt	$100,000	$100,000		
South East Industrial Park						
950152 WDSTK		*PHASE II*				
	Patullo Avenue Sanitary main from Alyea SPS to southwest limit of South East Secondary Plan Area (C)	Exempt	$1,017,000		$1,017,000	
	Patullo Avenue Sanitary main from South East Secondary Plan Area to Middletown Line (C)	Exempt	$481,000		$481,000	
	Middletown Line Sanitary main from Patullo Avenue to Street A (C)	Exempt	$169,000		$169,000	
	Southeast Trunk Sanitary Condition assessment	Exempt	$100,000		$100,000	
	Patullo Avenue South East Sanitary Trunk Oversizing from South Trunk Sewer (MH SA754367) to South Trunk Sewer (MH SA755111) (C)	Exempt	$2,090,000			$2,090,000
		TOTAL	$98,365,000	$32,218,000	$38,515,000	$27,632,000

Notes

1. Subject to further review and confirmation when project is initiated

2. Projects that are identified as eligible for screening, subject to the archaeological screening process

Blandford Blenheim

Project ID	Project Description	Presumed MCEA Schedule[1]	Cost	2024-2028	2029-2033	2034 - 2046
CAPACITY						
PLATTSVILLE						
250600 PLAT	Plattsville Wastewater Operations Minor Capital	Exempt	$638,000	$190,000	$448,000	
950607-PLAT	Plattsville Lagoon Biosolids Clean-out	Exempt	$900,000	$900,000		
950608-PLAT	Plattsville Lagoon Berm Repair	Exempt	$100,000	$100,000		
950609-PLAT	Plattsville WWTP Operational Enhancement	Exempt	$1,240,000	$1,240,000		
950173 WDSTK	Sanitary Sewer Replacement (OR 59 & Fairway) - (C)	Exempt	$266,000	$266,000		
DRUMBO						
250800 DRUMBO	Drumbo Wastewater Operation Minor Capital	Exempt	$88,000	$14,000	$74,000	
950810 DRUMBO	Drumbo Wastewater Treatment Capacity Expansion (Phase I)	Exempt	$250,000	$250,000		
950810-DRUMBO	Drumbo Wastewater Treatment Capacity Expansion (Phase II)	C - underway	$400,000	$400,000		
COLLECTION - VACANT LANDS WITHIN URBAN BOUNDARY						
PLATTSVILLE						

Project ID	Project Description	Presumed MCEA Schedule[1]	Cost	2024-2028	2029-2033	2034 - 2046
950650-PLAT	Plattsville Sanitary Sewer Replacements - Township	Exempt				
950611-PLAT	Plattsville FM Twinning and SPS capacity review	Exempt	$125,000		$125,000	
		TOTAL	$3,103,000	$2,904,000	$199,000	

Notes

1. Subject to further review and confirmation when project is initiated
2. Projects that are identified as eligible for screening, subject to the archaeological screening process

Norwich

Project ID	Project Description	Presumed MCEA Schedule[1]	Cost	2024-2028	2029-2033	2034 - 2046
CAPACITY						
NORWICH						
250400	Norwich Wastewater Operations Minor Capital	Exempt	$1,890,000	$1,844,000	$46,000	
950413-NOR	Sanitary Trunk Sewer Infiltration and Inflow Reduction	Exempt	$64,000	$64,000		
950409-NOR	Norwich Lagoon Biosolids Clean-out	Exempt	$1,045,000	$1,045,000		
950410 - NOR	Norwich Lagoon Berm Repair	Exempt	$100,000	$100,000		
COLLECTION - VACANT LANDS WITHIN URBAN BOUNDARY						
NORWICH						
950450-NOR	Sanitary Sewer Replacements - Township	Exempt	$2,147,000	$2,147,000		

Project ID	Project Description	Presumed MCEA Schedule[1]	Cost	2024-2028	2029-2033	2034 - 2046
950417-NOR	Linear R/R CR PROJ - County	Exempt				
		TOTAL	$16,046,000	$6,000,000	$10,046,000	

Notes

1. Subject to further review and confirmation when project is initiated
2. Projects that are identified as eligible for screening, subject to the archaeological screening process

South-West Oxford

Project ID	Project Description	Presumed MCEA Schedule[1]	Cost	2024-2028	2029-2033	2034 - 2046
CAPACITY						
MOUNT ELGIN						
950905 MT ELGIN	Mt. Elgin Wastewater Treatment Plant Capacity Expansion Phase 3 and 4 (C)	Exempt	$2,020,000	$2,020,000		
250900 MT ELGIN	Mt Elgin Minor Capital	Exempt	$55,000	$37,000	$18,000	
NEW	Sanitary Forcemain Connection to Ingersoll	B	$10,990,000			$10,990,000
950410 - NOR	Norwich Lagoon Berm Repair	Exempt	$100,000	$100,000		
COLLECTION - VACANT LANDS WITHIN URBAN BOUNDARY						
MOUNT ELGIN						
950906 Mount Elgin	Sanitary Sewer Upgrades	Exempt	$400,000	$100,000	$100,000	$200,000

Project ID	Project Description	Presumed MCEA Schedule[1]	Cost	2024-2028	2029-2033	2034 - 2046
950907 Mount Elgin	Forcemain Upsizing	Exempt	$892,000	$892,000		
		TOTAL	$14,357,000	$3,049,000	$118,000	$11,190,000

Notes

1. Subject to further review and confirmation when project is initiated
2. Projects that are identified as eligible for screening, subject to the archaeological screening process

East-Zorra Tavistock

Project ID	Project Description	Presumed MCEA Schedule[1]	Cost	2024-2028	2029-2033	2034 - 2046
CAPACITY						
TAVISTOCK						
950502-TAVI	Sanitary Trunk Sewer Infiltration and Inflow Reduction	Exempt	$64,000	$64,000		
950504-TAV	Tavistock Wastewater Treatment Plant Capacity Expansion	C	$36,220,000	$36,220,000		
250500 TAVI	Operation Minor Capital	Exempt	$817,000	$205,000	$612,000	
950507-TAV	Tavistock Lagoon Cell Clean Out	Exempt	$500,000			$500,000
TAVISTOCK						

Project ID	Project Description	Presumed MCEA Schedule[1]	Cost	2024-2028	2029-2033	2034 - 2046
951105-TAVI	Woodstock to Innerkip Interconnecting Sanitary Forcemain Twinning	Exempt	$7,647,200	$259,200	$7,388,000	
COLLECTION - VACANT LANDS WITHIN URBAN BOUNDARY						
TAVISTOCK						
950550-TAV	Tavistock Sanitary Sewer Replacements - Township	Exempt	$1,723,000	$1,723,000		
950551-TAVI	William St Gravity Sewer Replacement and Upsizing	Exempt	$504,450	$505,000		
950513-TAV	William Street Sewage Pumping Station Capacity Expansion	B[2]	$7,250,000	$7,250,000		
		TOTAL	$54,726,200	$46,226,200	$8,000,000	$500,000

Notes

1. Subject to further review and confirmation when project is initiated
2. Projects that are identified as eligible for screening, subject to the archaeological screening process

Zorra

Project ID	Project Description	Presumed MCEA Schedule[1]	Cost	2024-2028	2029-2033	2034 - 2046
CAPACITY						
THAMESFORD						
250700 THAMES	Operations Minor Capital	Exempt	$ 476,000	$63,000	$413,000	
950718 THAMES	Thamesford WWTP Upgrades (D) (C)	Exempt	$4,800,000	$4,800,000		

Project ID	Project Description	Presumed MCEA Schedule[1]	Cost	2024-2028	2029-2033	2034 - 2046
EMBRO						
NEW	Woodstock to Embro Interconnecting Sanitary Forcemain	B	$11,625,000			$11,625,000
NEW	Embro SPS - enhancements	Exempt	$750,000			$750,000
	TOTAL		$ 17,651,000	$4,863,000	$ 413,000	$12,375,000

Notes

1. Subject to further review and confirmation when project is initiated
2. Projects that are identified as eligible for screening, subject to the archaeological screening process

1.0 INTRODUCTION

1.1 Background

Located in the heart of southwestern Ontario, Oxford County has a population of approximately 125,000 residents per the 2021 Census (Statistics Canada, 2023). Oxford County (County) is comprised of eight Area Municipalities, comprising of; Township of Blandford-Blenheim, Township of East Zorra-Tavistock, Town of Ingersoll, Township of Norwich, Township of South-West Oxford, Town of Tillsonburg, City of Woodstock, and Township of Zorra.

The County has undertaken the 2024 Water and Wastewater Master Plan (W/WW MP) to comprehensively develop, evaluate and select preferred long-term water and wastewater servicing strategies to support existing servicing needs and to accommodate future projected population and employment growth to the year 2046.

1.2 Water and Wastewater Master Plan Goals

The W/WW MP was developed based on the following key goals:

- Provide water and wastewater strategies to service existing settlement areas and growth to the year 2046;
- Develop water and wastewater strategies that are consistent with and conform to Provincial policies, legislation and support the County's Official Plan and strategic initiatives;
- Identify options for optimizing the effectiveness of the existing water and wastewater infrastructure; and
- Develop an integrated multi-year water and wastewater capital implementation plan which affords infrastructure reliability, redundancy, and sustainability.

Key undertakings of the W/WW MP included the following:

- Comprehensive background review of water and wastewater services, water supplies, water distribution, wastewater collection, treatment facilities, storage towers, etc.;
- Analysis of the County's existing and future water & wastewater needs, projected population/employment growth, development, social and economic conditions, facilities, and land use planning initiatives;

- Development of updated water consumption demand and wastewater generation flow criteria;
- Development of water and wastewater servicing alternatives;
- Development of County-wide water and wastewater servicing recommendations and associated capital projects; and
- Full public consultation and engagement.

2.0 MASTER PLANNING PROCESS

2.1 Class Environmental Assessment Process

The Class Environmental Assessment Municipal Engineers Association, 2023 (MCEA) is an approved planning and design process under the Ontario Environmental Assessment Act. The process provides the framework for planning of municipal infrastructure projects to fulfill the requirements of Ontario Environmental Assessment Act for a class or category of infrastructure projects. Projects are divided into schedules based on the type of projects and activities. Schedules are categorized as Exempt, B and C with reference to the magnitude of their anticipated environmental impact. These are described briefly in the following paragraphs. Appendix 1: Project Tables, Table B: Municipal Water and Wastewater Projects of the current MCEA document provides guidance in the project schedules for typical water and wastewater municipal projects.

Exempt projects include various municipal maintenance, operational activities, rehabilitation works, minor reconstruction or replacement of existing facilities, and new facilities that are limited in scale and have minimal adverse effects on the environment. These projects are exempt from the requirements of the *Environmental Assessment Act*. Most Exempt projects were formerly classified as Schedule A and A+ projects.

Schedule B projects are those which have a potential for adverse environmental effects. A screening process must be undertaken which includes consultation with directly affected public and relevant review agencies. Projects generally include improvements and minor expansions to existing facilities. The project process must be filed, and all documentation prepared for public and agency review.

Schedule C projects have the potential for significant environmental effects and must follow the full planning and documentation procedures specified in the MCEA process. An Environmental Study Report (ESR) must be prepared and filed for review by public and review agencies. Projects generally include the construction of new facilities and major expansions to existing facilities.

Depending on the siting, construction method and environment sensitivity, similar projects may have a different schedule requirements or be exempt. At the outset of a project, the County should confirm which schedule applies.

There are five key elements in the MCEA planning process. These include:

1. Phase 1 – Identification of problem (deficiency) or opportunity;

2. Phase 2 – Identification of alternative solutions to address the problem or opportunity. Public and review agency contact is mandatory during this phase and input received along with information on the existing environment is used to establish the preferred solution. It is at this point that the appropriate Schedule (B or C) is chosen for the undertaking. If Schedule B is chosen, the process and decisions are then documented in a Project File. Schedule C projects proceed through the following Phases;

3. Phase 3 – Examination of alternative methods of implementing the preferred solution established in Phase 2. This decision is based on the existing environment, public and review agency input, anticipated environmental effects and methods of minimizing negative effects and maximizing positive effects;

4. Phase 4 – Preparation of an Environmental Study Report summarizing the rationale, planning, design, and consultation process of the project through Phases 1-3. The ESR is then to be made available to agencies and the public for review; and

5. Phase 5 – Completion of contract drawings and documents. Construction and operation to proceed. Construction to be monitored for adherence to environmental provisions and commitments. Monitoring during operation may be necessary if there are special conditions.

The overall process is shown in Figure 2.1.

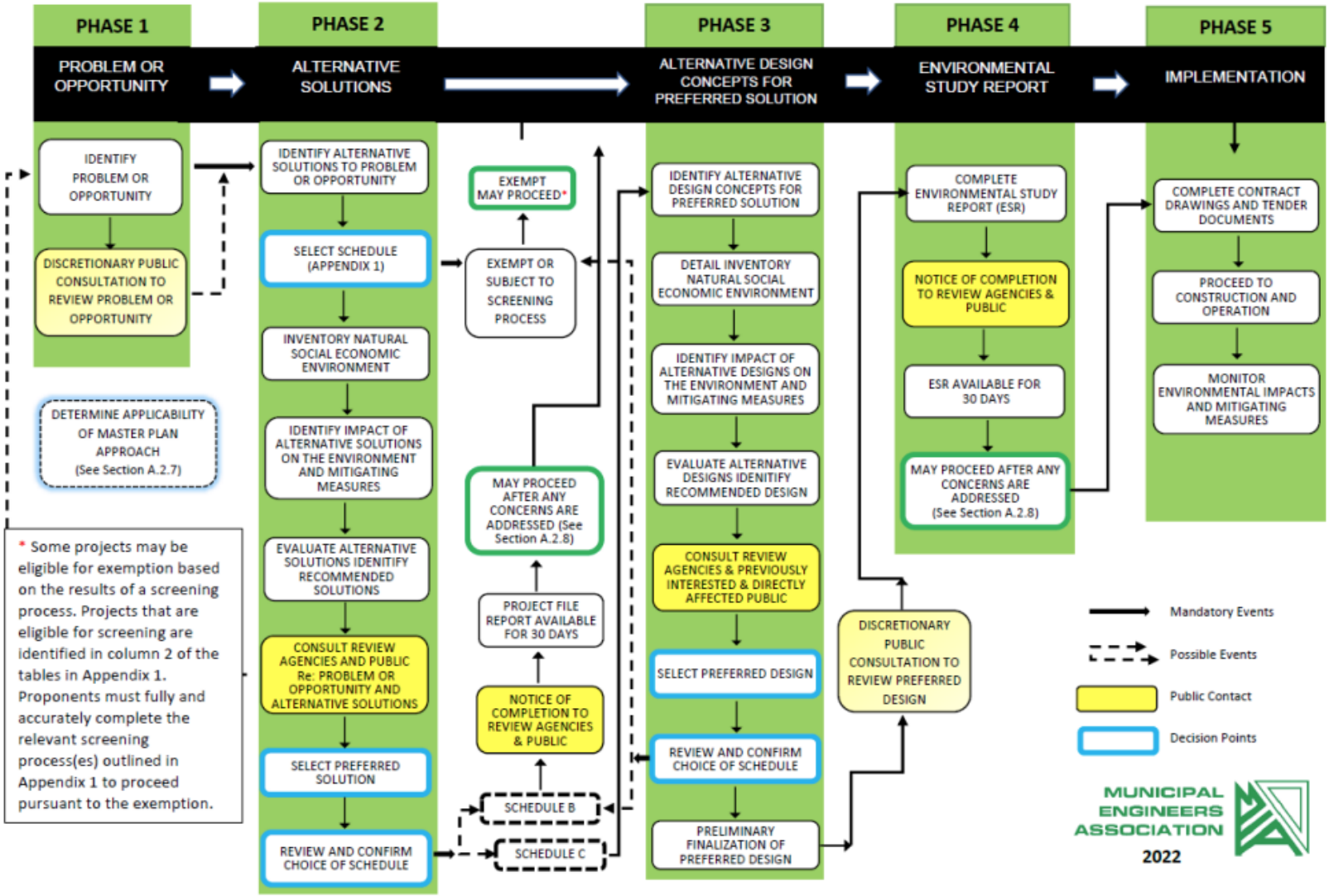
2.2 Master Plan Process

The Master Plan Process provides the basis for developing a long-range water and wastewater servicing plans which integrate infrastructure requirements for existing / future land use and evaluate all reasonable servicing alternative solutions with considerations to natural, social, and economic environments (“triple bottom line”).

The Oxford County W/WW MP was developed following Approach #1 of the MECA process which involves a broad scope and a high level of assessment of the projects identified in the Study Area. This Master Plan is intended to fulfill the MCEA requirements for Exempt projects that are identified and to outline additional work that will be required for any identified Schedule B and C projects. At a minimum, the W/WW MP must satisfy the requirements of Phases 1 and 2 of the MCEA process and incorporate the five key principles of environmental planning which include:

- Public and agency consultation,

Figure 2.1: MCEA Planning and Design Process



- Consideration of a reasonable range of alternatives,
- Identification and consideration of each alternative on all aspects of the environment (natural, social, cultural, economic, technical),
- Systematic evaluation of alternatives and net environmental impacts, and
- Full documentation of the planning process.

Specific projects recommended in the W/WW MP become part of a larger management system and are distributed geographically throughout the Study Area. Implementation of these projects will occur over an extended time frame and certain projects (Schedule B and C projects) will require more detailed investigation to fulfill additional MCEA requirements.

2.3 Study Area

2.3.1 General

The Study Area (Figure 2.2) encompasses the County's entire geographical region which includes its eight Area Municipalities - Township of Blandford-Blenheim, Township of East Zorra-Tavistock, Town of Ingersoll, Township of Norwich, Township of South-West Oxford, Town of Tillsonburg, City of Woodstock, and Township of Zorra.

The Study Area covers approximately 2,000 km^2 and is comprised of rural areas, various rural and urban settlement areas. It includes the crossroads of Highways 401 and 403, CN, CP and Short Line Railways and a mix of farming and industrial land uses.

2.3.2 Secondary Planning Areas

The County's Official Plan outlines a comprehensive secondary planning process to identify and assess areas within which detailed land use planning and infrastructure planning is undertaken. Secondary planning helps to ensures a 25-year supply of growth land can be maintained in each Area Municipality. The process allows for the identification of phasing strategies for the implementation of servicing capacity and municipal services required for a 25 year period and, if deemed necessary, beyond.

The County has identified a number of Area Municipalities that will require additional residential and/or employment land supply to accommodate their forecasted future population and/or employment growth for the current 25-year planning period. To provide the necessary land use planning and servicing basis for the settlement expansions required to accommodate this growth, the County and applicable Area Municipalities have recently initiated and/or completed a number of Secondary Plans as shown in Figure 2.3.

Figure 2.2: Study Area

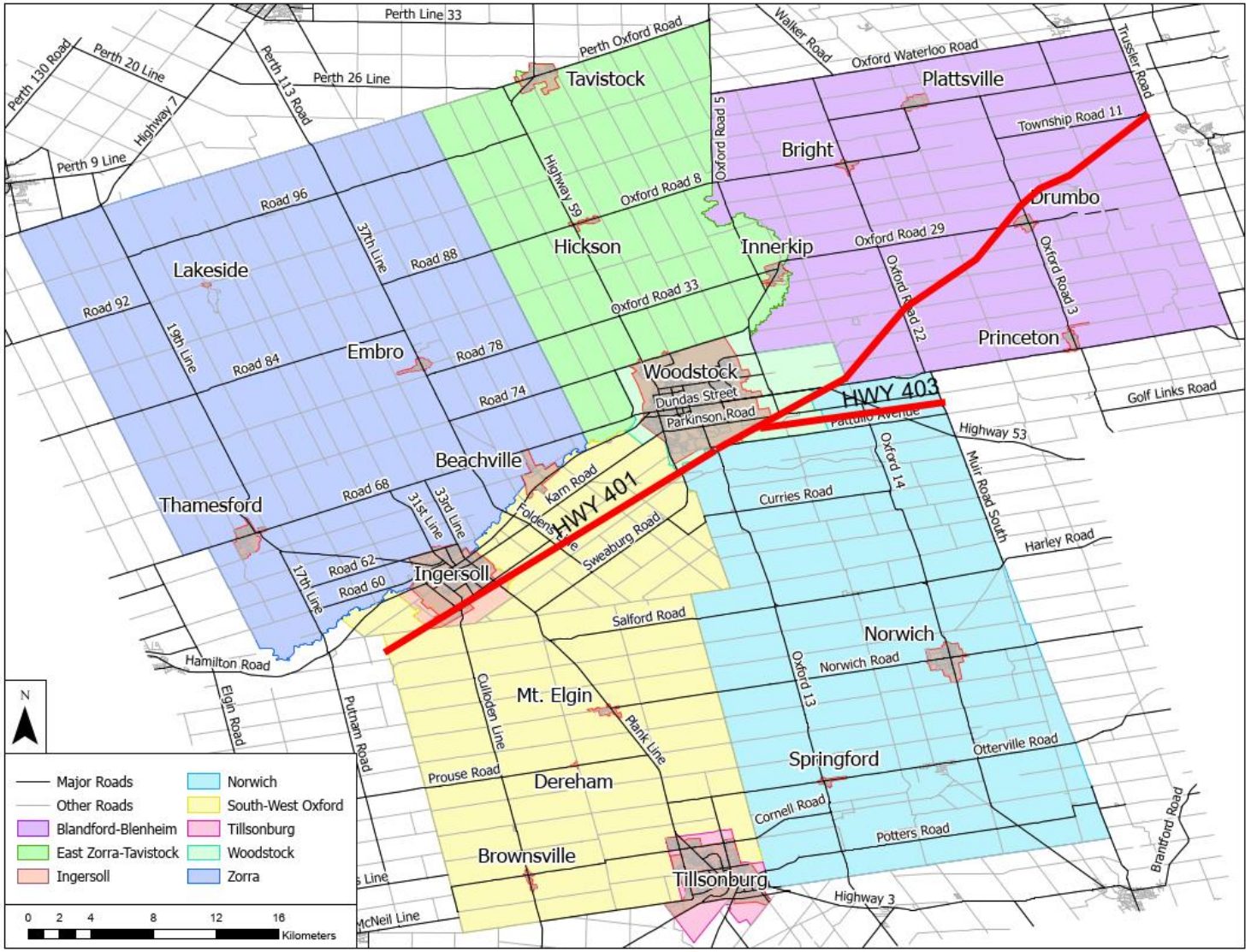
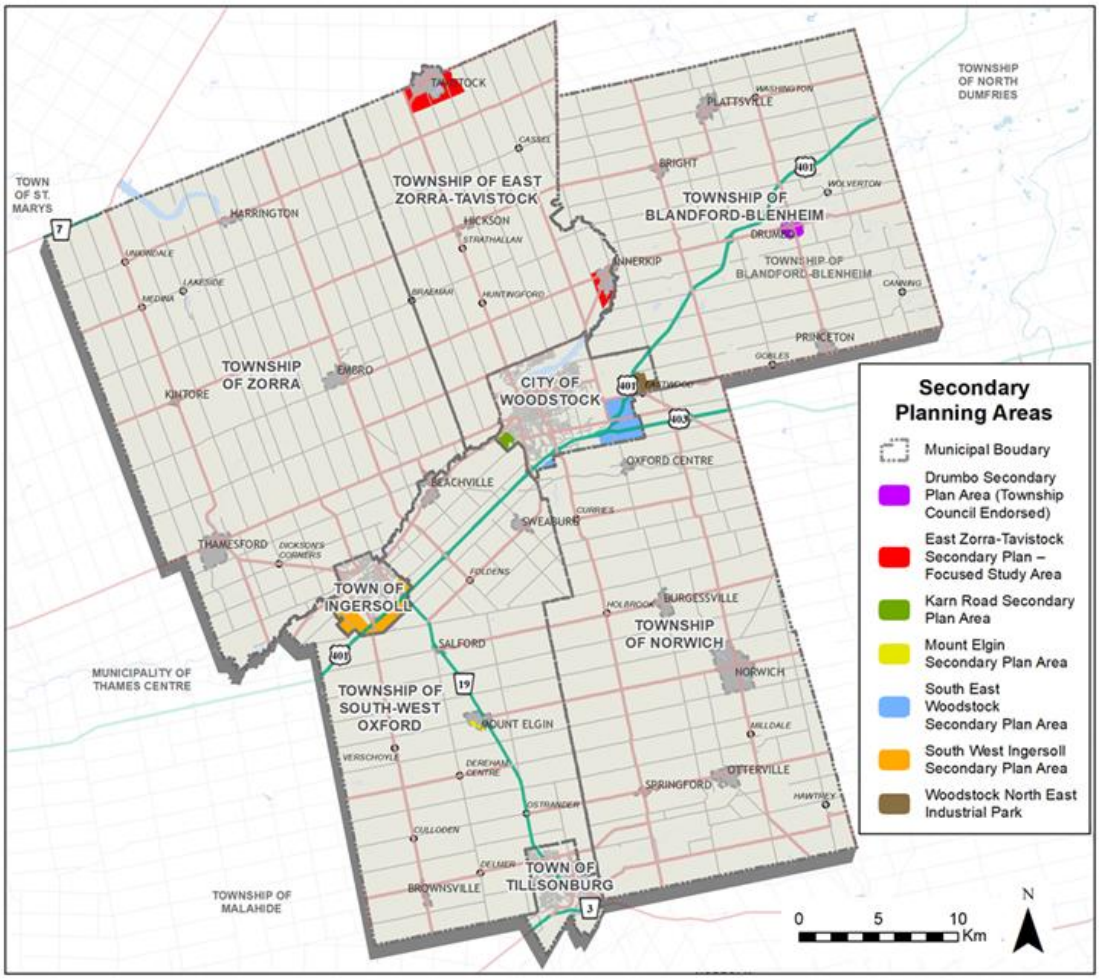


Figure 2.3: Oxford County's Secondary Planning Areas



2.3.2.1 South-West Ingersoll Secondary Plan Area

In 2022, the Town of Ingersoll annexed approximately 330 ha of land, located to the south, east and west of Ingersoll, from the Township of South-West Oxford. As illustrated in Figure 2.3, a secondary plan is being developed which includes a servicing strategy to incorporate these lands into Ingersoll's designated settlement boundary and to ensure servicing can accommodate the residential and employment growth forecasted in the Town.

2.3.2.2 Southeast Woodstock Secondary Plan Area

In January 2018, the City of Woodstock annexed approximately 620 ha of land from the Township of Norwich to provide additional land opportunities for industrial employment growth (outlined in Figure 2.3). A Settlement Expansion Justification, Secondary Plan and Servicing Strategy for the Southeast Woodstock Study Area was previously completed to

provide the necessary planning and servicing justification to amend the County's Official Plan to incorporate these lands into the City's designated settlement boundary so that they will be available to accommodate the City's forecasted employment growth.

2.3.2.3 Karn Road Secondary Plan Area

In April 2023, planning was initiate to re-designate lands previously annexed into the City of Woodstock from the Township of South-West Oxford (refer to Figure 2.3) for low, medium, and high density residential development. A Functional Servicing Report was prepared for the development of these lands, and has been reviewed by the UTRCA, the County Staff, and the City of Woodstock.

2.3.2.4 East Zorra-Tavistock Secondary Plan – Focused Study Area

A secondary plan (which includes a servicing strategy) is currently also underway for the communities of Tavistock and Innerkip in the Township of East Zorra-Tavistock. As part of this secondary planning process, both Villages' existing residential and industrial employment land supply will be assessed to determine how much additional land will need to be designated as settlement to accommodate the Townships' forecasted residential and employment growth and how those lands will be serviced. As this study is still underway, there has been no public disclosure of the final study results to date.

2.3.2.5 Drumbo Secondary Plan

The Township of Blandford-Blenheim recently endorsed a new secondary plan for the Village of Drumbo to provide more detailed planning and community design direction for development of lands within the village, including the phasing of development to correspond with available servicing capacity.

2.3.2.6 Mount Elgin Secondary Plan

A secondary plan was recently approved for the Village of Mount Elgin in the Township of South-West Oxford to expand the settlement boundary in a southerly direction to incorporate additional lands for residential development to accommodate the Township's forecasted residential growth.

2.3.2.7 Woodstock North-East Industrial Park

A new industrial park is currently under development on lands located in northeast Woodstock that were originally identified as part of the East Woodstock Secondary Plan, but only recently designated as settlement as part of the Official Plan amendment to implement

the South-East Woodstock Secondary Plan. This industrial park will assist in accommodating some of the City's forecasted employment growth.

2.4 Natural Environment

2.4.1 Overview

A high-level Natural Environment Review (NER) was undertaken to identify and characterize the significance and sensitivity of natural heritage and hydrological features within the County. A NER report was prepared which documents the methodology and results of the review, and ultimately provides a general indication of the environmental constraints that will need to be considered in the design/locational alternatives for future water/wastewater projects within the County. The report is attached to Appendix 1 and a general overview has been provided in this Section.

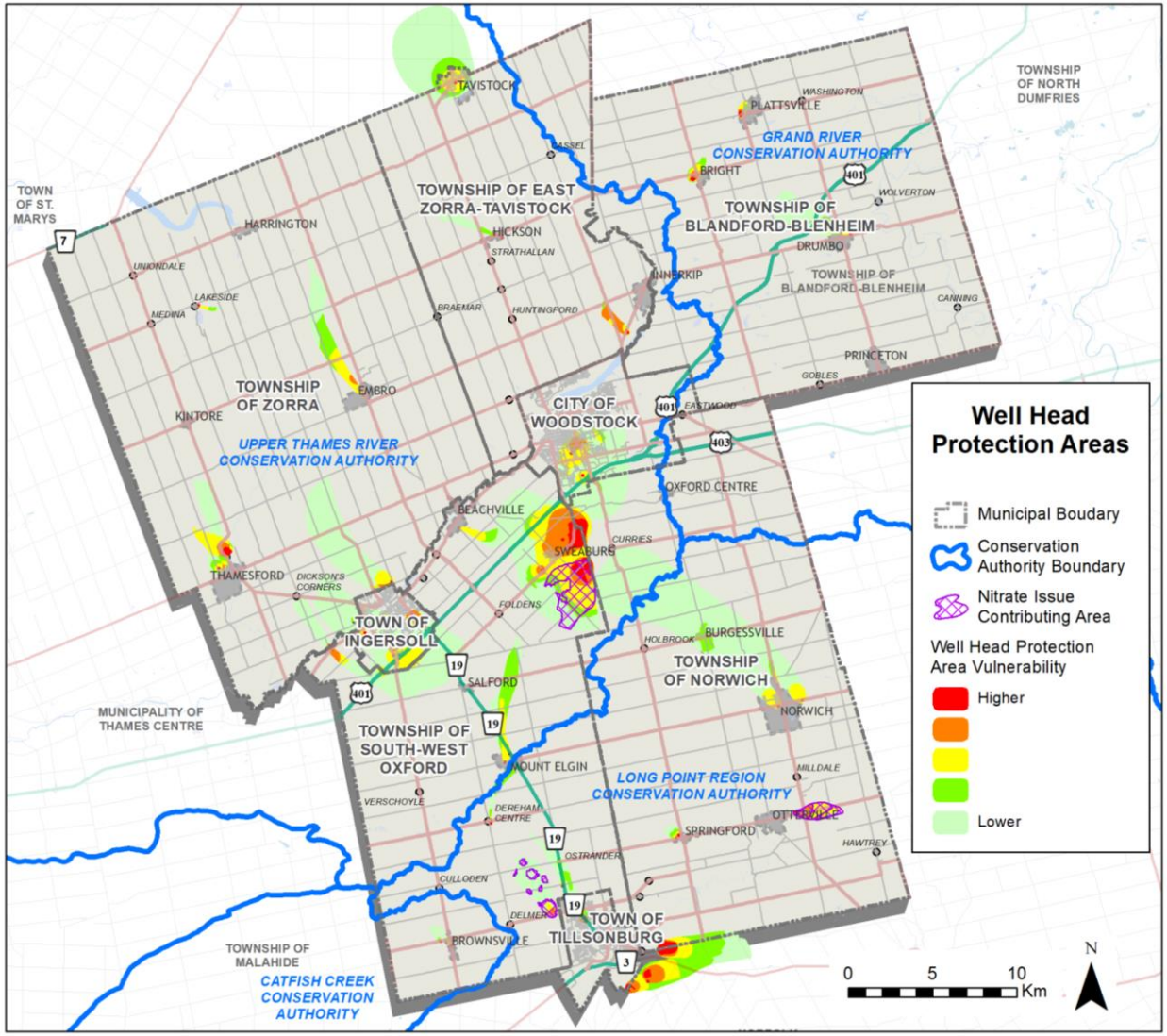
2.4.2 Conservation Authorities Act

Section 28(1) of the *Conservation Authorities Act* (Government of Ontario 1990b) empowers Conservation Authorities with the ability to make regulations governing development that can have an impact on watercourses and waterbodies, including wetlands. The Study Area is located within four Conservation Authorities (Figure 2.5); the Upper Thames River Conservation Authority (UTRCA), Grand River Conservation Authority (GRCA), Long Point Region Conservation Authority (LPRCA), and Catfish Creek Conservation Authority (CCCA) watersheds, with areas regulated under the Regulation of Development, Interference with Wetlands and Alterations to Shorelines and Watercourses, Ontario Regulations (O.Reg.) 157/06, 150/06, 178/06, and 146/06.

2.4.3 Watersheds and Well Head Protection Areas

Figure 2.5 shows the locations of the County's municipal drinking water wells and the vulnerable areas that contribute water to the drinking water systems. The vulnerable areas around municipal wells are designated as wellhead protection areas and issue contributing areas. Wellhead protection areas have been given scores and ratings based on their vulnerability and susceptibility to contamination. It is these localized areas that need to be protected and managed to reduce the risk to drinking water. All municipal drinking water systems in the County are groundwater fed, resulting in well head protection areas for each of the 61 active wells.

Figure 2.5: Conservation Authority and Well Head Protection Area Map of Oxford County



2.4.4 Natural Environment Features

The master plan study area is located within the Niagara Section of the Great Lakes-St. Lawrence Lowlands Forest Region (Rowe, 1972). The natural environmental features identified within the study area are detailed further in the NER report (Appendix 1). The analysis recommends that future water and wastewater infrastructure projects assess and implement alternatives that avoid, or where avoidance is not possible, otherwise minimize any negative impact on natural heritage features and areas, surface water and ground water features and their ecological and/or hydrological functions. Mitigation measures are to follow established best practices and include consideration for restoration and enhancement where appropriate opportunities exist. A map depicting the natural heritage features is shown below in Figure 2.6.

2.5 Public Consultation and Engagement

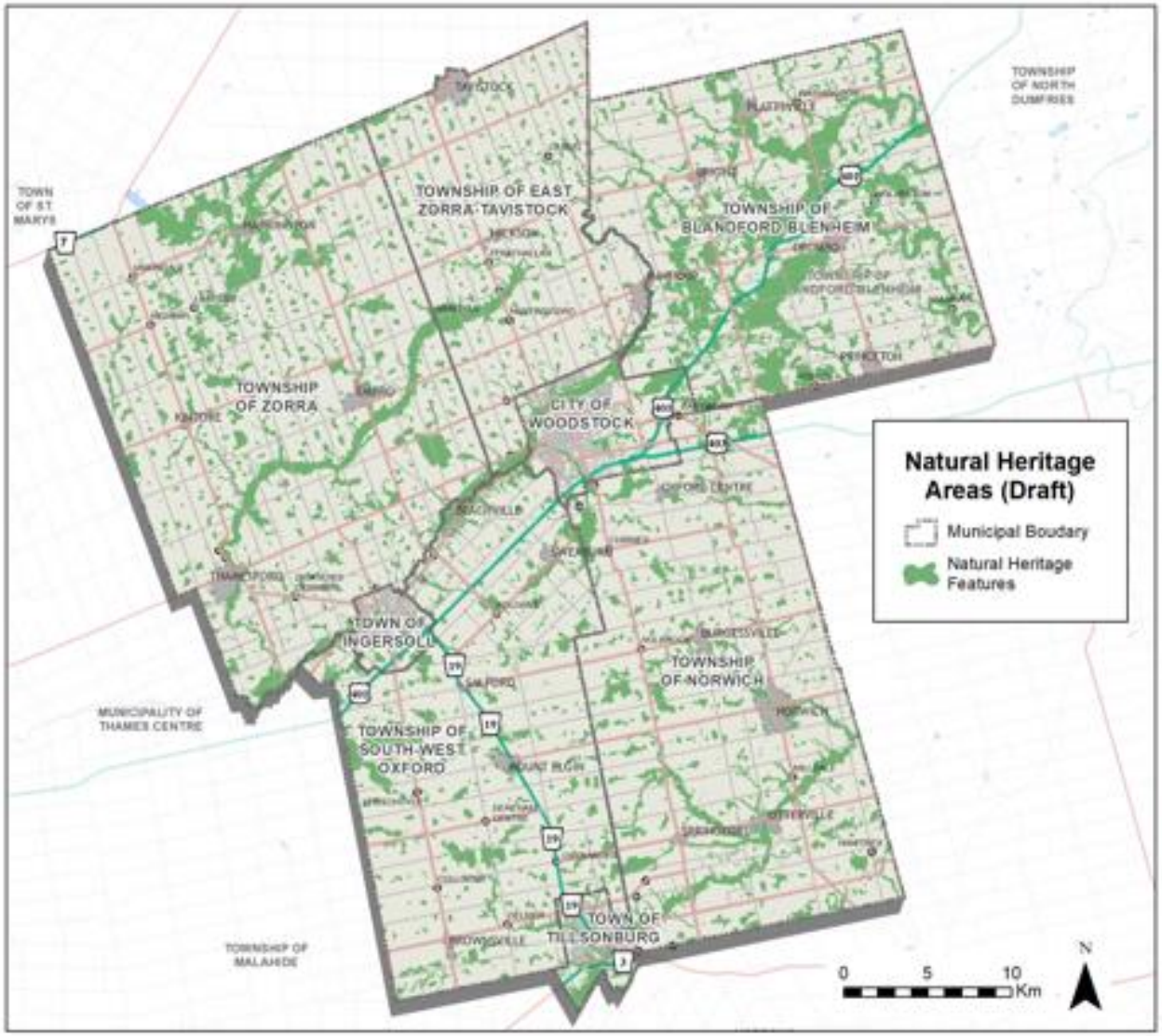
2.5.1 Introduction

The consultation process is an integral component of the MCEA process for the W/WW MP. At the onset of the Master Plan, a Public Consultation and Communication Plan was developed with the primary goal to carry out meaningful consultation, solicit community and regulatory input, and provide the general public, Councils, Area Municipalities, review agencies, Indigenous Communities, and other interested stakeholders with regular opportunities to participate in the Study process.

All Notices associated related to the W/WW Master Plan Study, including the Notice of Commencement and Notices of Public Consultation Centres were shared with Oxford County Council and the eight Area Municipalities. The notices were also published by print in newspaper ads and shared publicly on the 'Speak Up, Oxford' project page at the following address: https://oxfordcounty.ca/wwwmp .

The Notice of Commencement and Notice of Public Consultation Centers were sent out to identified agencies and interested parties by mail, email and via local newspapers informing them that the W/WW MP Study was being undertaken. Copies of the notices are included

Figure 2.6: Natural Heritage Areas Map of Oxford County



in Appendix 2.2. Registrants that signed up for project notifications received emails related to upcoming Public Consultation presentations and project milestones.

2.5.2 Stakeholder Consultation

The MCEA process requires stakeholder consultation to incorporate input from interested or impacted groups. Stakeholders included but were not limited to:

- Public – This includes individual members of the public including property owners who may be affected by the project, individual citizens who may have a general interest in the project, special interest groups, community representatives, and developers;
- Review agencies – This includes government agencies who represent the policy positions of their respective departments, ministries, authorities, or agencies;
- Oxford County Internal staff (Public Works, Corporate Services, Community Planning, and Office of Strategic Initiatives) and Council departments;
- Area Municipality Councils and staff; and
- Railways, Transit Agencies, Utilities, etc.

2.5.3 Indigenous Consultation

Based on discussions and recommendations provided by the Ministry of the Environment, Conservation and Parks (MECP) regional office, RVA on behalf of Oxford County confirmed Indigenous communities and in addition contacted Crown-Indigenous Relations and Northern Affairs Canada (CIRNAC) and the Ministry of Indigenous Affairs (MIA) separately from the general notifications sent to review agencies. The purpose of the contact was to request which, if any, Indigenous communities may be potentially affected by the Master Plan. The Information provides the basis for appropriate communication with Indigenous Communities through inclusion in the contact lists for the duration of the W/WW MP project. Contact was made with the following Indigenous groups:

- Aamjiwnaang First Nation;
- Bkejwanong First Nation (Walpole Island);
- Caldwell First Nation;
- Chippewas of the Thames First Nation;

- Delaware Nation at Moraviantown;
- Haudenosaunee Confederacy Chiefs Council;
- Kettle and Stony Point First Nation;
- Mississaugas of the Credit First Nation;
- Munsee-Delaware Nation;
- Oneida Nation of the Thames; and
- Six Nations of the Grand River.

On June 2, 2022, the Master Plan team was invited to a relationship building session with the Haudenosaunee Confederacy (Six Nation) at which a presentation of the Master Plan was made. The Indigenous agency contact letters and the June 2022 presentation are in Appendix 2.3. Responses were received and reviewed, and these are documented in the Indigenous Communities Consultation Record shown in Appendix 2.5.

2.5.4 Public Consultation Centre (PCC)s

As part of the fulfillment of MCEA consultation requirements, the County undertook two mandatory contact points to inform, engage and consult with all study participants noted above. This section details the consultation process followed during the W/WW MP Study.

A Public Consultation Centre (PCC) is a method to communicate with the public, interested parties and review agencies. For this project, two PCCs were held to present the Problem and Opportunity Statement, background information collected, a review of the servicing strategies being evaluated, present the evaluation criteria, the preliminary preferred solution, and the project timeline.

PCC 1 was held as a virtual (online) event from 5:00 PM – 7:00 PM on Thursday, September 29, 2022, at which a presentation was made and representatives from the County and its consultants were present to answer questions and discuss the next steps in the study. The PCC 1 presentation was available starting on September 29, 2022, and is to remain available until the completion of the study. Stakeholders were given until October 19, 2022, to provide comments.

In addition to PCC 1, members of the County Project Team attended local events to engage directly with members of the community. These events were advertised via social media,

"Speak Up Oxford!" and local media prior to the events. In person consultation opportunities included:

- Wednesday, September 14: Canada's Outdoor Farm Show in Woodstock;
- Friday, September 23, and Saturday September 24: Ribfest in Tillsonburg; and
- September 26: Ingersoll Town Hall.

PCC 2 was held as a virtual (online) event from 6:00 PM – 8:00 PM on Tuesday, June 27, 2023, at which a presentation was made and representatives from the County and its consultants were present to answer questions and discuss the next steps in the study. The PCC 2 presentation was available starting on June 28, 2023, and will remain available until the completion of the study. Stakeholders were given until July 12, 2023, to provide comments.

As part of the engagement strategy for the first phase of consultation a feedback response form (survey) was created and posted on the SUO project page at the end of August. Residents could fill out the survey form to provide feedback on current water and wastewater services until October 19, 2022. A summary of the feedback survey results can be found in Appendix 2.4.

2.5.5 Speak Up, Oxford Project Webpage

All Notices, PCC presentation material and other information on the W/WW MP has been published on the "Speak Up, Oxford" (https://speakup.oxfordcounty.ca/) project page at the following address: https://oxfordcounty.ca/wwwmp.

2.5.6 Internal Technical Advisory Committee (InTAC) Meetings

Three (3) Internal Technical Review Committee (InTAC) meetings were held over the course of the project. The Technical Review Committee was made up of staff from various County departments, and incorporated study of key findings, technical issues, and identification of opportunities or concerns. The meetings allowed the team to narrow down on a commonly preferred approach to meet their interests and requirements. Comments from each of the meetings were addressed. These meetings were held on April 6, 2022, April 5, 2023; and May 30, 2023.

2.5.7 External Technical Advisory Committee (ExTAC) Meetings

An External Technical Advisory Committee (ExTAC) was established at the onset of the Master Plan project, with the objective of providing technical input into existing conditions and proposed opportunities for the project, and to provide input into the alternatives. Two (2) meetings were held; on April 20, 2022, and on June 21, 2023.

2.5.8 Oxford County Council Review of Master Plan

The Project Team made a presentation to Oxford County Council on November 9, 2022, and July 12, 2023. These presentations are attached as Appendix 2.6.

At the July 12, 2023 Council meeting, Council passed the following motion:

> "Resolved that the recommendations contained in Report No. PW 2023-33, titled '2024 Water and Wastewater Master Plan', be received as information;
>
> And further, that the draft report be circulated to area municipalities requesting their feedback within 75 days (September 25, 2023);
>
> And further that the draft report be posted to Speak Up Oxford for feedback from the public for 75 days (September 25, 2023);
>
> And further that all comments received be provided in a report for council's consideration when considering the draft report."

This motion is attached as Appendix 2.2.4.

At the October 11, 2023 Council meeting, Council passed a motion adopting the final 2024 Water and Wastewater Master Plan. This motion is attached as Appendix 2.2.5.

2.5.9 Incorporating Consultation Input

A project stakeholder list is presented in Appendix 2.1.

Input and information gathered from consultation with the public, Area Municipalities, review agencies and Indigenous Communities or acquired during the PCCs, InTAC and ExTAC meetings, and from project webpage and surveys were reviewed by the project team and considered in the development of the W/WW MP. Responses were received and reviewed as documented in Appendix 2.5.

Where no unresolved objections arise through the review of this Master Plan, the MCEA requirements for the Exempt projects will be deemed to have been met. The identified projects may then proceed into design and construction without further public consultation.

3.0 MASTER PLANNING AND POLICY CONTEXT

3.1 Planning Context

3.1.1 2020 Provincial Policy Statement

The Provincial Policy Statement (PPS), 2020 (Ministry of Municipal Affairs and Housing [MMAH], 2020) sets out the Provincial policy direction for land use planning in Ontario, including managing growth, using, and managing natural resources, protecting the environment, and ensuring public health and safety.

The vision of the policy recognizes that Ontario's long-term prosperity, environmental health and social well-being depend on promoting efficient land use and development patterns. Efficient development patterns also optimize the use of land, resources and public investment in infrastructure and public service facilities and support sustainability by promoting strong, liveable, healthy, and resilient communities, protecting the environment and public health and safety, and facilitating economic growth.

The policies indicate that settlement areas shall be the focus of growth and development, and that municipalities plan for a full range of and mix of land uses and housing options to meet current and future needs over a 25 year planning horizon. Land use patterns within settlement areas shall be based on densities and a mix of land uses which:

- Efficiently use land and resources;
- Are appropriate for, and efficiently use, the infrastructure and public service facilities which are planned or available; and
- Avoid the need for their unjustified and/or uneconomical expansion.

The PPS policies require that planning for sewage and water services shall:

a) Accommodate forecasted growth in a manner that promotes the efficient use and optimization of:
    i. Existing municipal sewage services and municipal water services; and
    ii. Existing private communal sewage services and private communal water services, where municipal sewage services and municipal water services are not available or feasible.

b) Ensure these systems are provided in a manner that:

i. can be sustained by the water resources upon which such services rely;
ii. prepares for the impacts of a changing climate;
iii. is feasible and financially viable over their lifecycle; and
iv. protects human health and safety, and the natural environment;

c) Promote water conservation and water use efficiency;
d) Integrate servicing and land use considerations at all stages of the planning process; and
e) Be in accordance with the servicing hierarchy in the policies

All planning decisions and Official Plan policies (including those related to infrastructure) are required to be 'consistent with' the policies of the PPS (2014). As such, the W/WW MP is developed on the premises of the above described PPS policies, including specific policies:

- Building Strong and Healthy Community;
- 1.2 Coordination;
- 1.6 Infrastructure and Public Service Facilities, which covers policy 1.66 Sewage Water and Stormwater;
- 1.7 Long Term Economic Prosperity; and
- Wise Use and Management of Resources, which covers policies 2.1 Natural Heritage and 2.2 Water.

3.1.2 Oxford County Official Plan

The Oxford County Official Plan was originally adopted in 1995 and has had numerous comprehensive updates since that time. It is a requirement under the *1990 Planning Act* which sets out the rules for land use planning in Ontario, that local land use planning direction must be set forth in an official plan for every municipality. The Act states that Official Plans must 'contain goals, objectives and policies established primarily to manage and direct physical change and the effects on the social, economic, and natural environment of the municipality'.

In accordance with this requirement, the County's Official Plan provides policy direction on various land use related matters including, but not limited to, natural resource management, growth management, infrastructure and public services, land use, and implementation measures. The plan directs planned growth and development primarily to settlements serviced by centralized wastewater and water supply facilities to ensure efficient use of land,

protection of natural resources and public health, and the development of complete communities that can support a range and mix of housing, employment, and services.

The County's strategic planning principles related to servicing state that municipal water and/or wastewater treatment services will be provided in a manner that: can be sustained by the water resources on which said services rely; promotes water conservation and water use efficiency; is feasible, financially viable and complies with all regulatory requirements; and protects human health and the natural environment.

The hierarchy of servicing options outlined in the Section 5.0 of the plan indicates that the County's growth strategy is based on existing servicing levels, the feasibility of expansions to existing systems and potential for cost-effective servicing solutions given growth pressures and physical and environmental constraints. The policies direct that new development will be evaluated and approved based on the following hierarchy of servicing options:

1. Servicing extended from existing centralized water and wastewater treatment facilities; or
2. Individual septic systems and private wells; and
3. The extension of servicing from an existing centralized water supply system.
4. The extension of communal wastewater or water supply facilities beyond the designated limits of fully or partially serviced is generally prohibited. Further, development shall be directed to areas that allow for logical extensions to existing water and sanitary sewerage systems in an economic and practical manner within the financial capabilities of the County or Area Municipality.

The policies above are designed to ensure that development approvals are consistent with total system capacity and that sufficient lead time is available for the construction of new facilities. Hence, new development on centralized water or wastewater treatment facilities are only to be considered if adequate uncommitted reserve capacity is available and if plant performance is within acceptable standards range.

Section 5.0 Functional Support Elements of the plan also directs that the County prepare water supply and wastewater treatment master plans providing detailed servicing strategy for anticipated growth in a cost-effective manner. Specifically, the Official Plan requires that wastewater masterplans must provide the following:

- Evaluation of existing wastewater treatment infrastructure capacity and condition;

- Identification of management options available for wastewater treatment and the disposal of biosolids; and
- Priority setting and financing of wastewater treatment infrastructure improvements required to meet environmental objectives and accommodate population and employment growth.

Likewise, the water supply masterplan must provide the following:

- Identification of means to conserve water and to reduce requirements for additional water supply;
- Evaluation of the existing water supply infrastructure capacity and condition;
- Consideration of the quantity and quality of ground water resources; and
- Identification, costing, priority setting, and financing of major water supply infrastructure improvements required to accommodate population and employment growth.

Appendix 3 provides county specific policies that were used to develop this Master Plan.

3.1.2.1 Designated Settlement Areas

Of the County's eight Area Municipalities, Ingersoll, Tillsonburg and Woodstock are classified as Large Urban Centres from an OP settlement hierarchy perspective. Most of the County's residential and employment growth is concentrated in these three urban centres. The OP policies generally require that all new development in the Large Urban Centre settlement designation be fully serviced by centralized wastewater and water supply facilities.

3.1.2.2 Privately Serviced Villages and Rural Clusters

The remaining five Area Municipalities, or Townships, contain a range of fully serviced, partially serviced, and un-serviced settlements. The rural settlement hierarchy and associated servicing requirements is, generally, as follows:

- Rural Clusters – these are the smallest of the designated rural settlements in the County, with growth limited to minor infilling that does not extend the length of depth of the existing settlement. Servicing is generally to be by private individual wells and private sewage treatment systems;

- Villages - somewhat larger rural settlements that are characterized by a broader range of land uses and activities. Growth in these settlements is limited to infilling and minor rounding out of existing development within the limits of the current settlement designation as identified in the OP. Servicing in these settlements is predominantly by individual private sewage disposal systems and private wells, or existing centralized municipal water supply facilities; and
- Serviced Villages – rural settlements that are characterized by a broad range of uses and activities and generally serve as the primary growth centres in their respective Township's. New development in these settlements is to be serviced by both municipal water and wastewater.

This Masterplan focuses on the three large urban centres, and the fully serviced settlements (and partially serviced settlements to a lesser degree) in the five Townships. These serviced settlements in the five Townships are referred to as villages in this Masterplan.

3.1.1 Phase I Comprehensive Review

The Oxford County Comprehensive Review – Phase 1 prepared by Hemson Consulting and approved by the County in 2020 provides a County-wide and per Area Municipality population, household and employment forecasts, and a land need analysis. Part of the review includes an assessment of the Area Municipality's vacant lands, which allows identifying the potential to accommodate forecasted growth up to 2046. The Land Needs Assessment was used by Hemson to apply the distribution of the forecasted growth to designated fully serviced communities within the Area Municipalities as per the policy direction in the PPS and County Official Plan.

Per the Review, the County is expected to undergo significant population and economic growth over the next 30 years. By 2046, the County is expected to have a permanent population of 163,000 and an employment population of 78,400.

3.1.2 Population and Employment Projections

The distribution of population and employment growth among the primary geographic regions within the County Study Area to the year 2046 were prepared through the 2020 Comprehensive Review – Phase 1 for both residential (Table 3.1) and employment growth (Table 3.2). Appendix 4 provides detailed calculation tables and results.

Table 3.1: Forecasted Residential Population Growth

Municipality	Estimated Annual Population Growth [1]						Growth (2021-46)
	2021[2]	2026	2031	2036	2041	2046	
Woodstock	47,965	51,825	55,815	59,825	63,595	67,295	19,330
Tillsonburg	19,120	20,020	20,980	21,980	22,960	23,890	4,770
Ingersoll	14,065	14,955	15,915	16,895	17,855	18,785	4,720
Blandford-Blenheim	7,770	8,090	8,440	8,810	9,190	9,550	1,780
East Zorra-Tavistock	8,050	8,530	9,040	9,560	10,050	10,510	2,460
Norwich	11,450	11,920	12,420	12,960	13,490	13,990	2,540
South-West Oxford	7,785	8,025	8,295	8,555	8,765	8,975	1,190
Zorra	8,860	9,110	9,370	9,650	9,950	10,240	1,380
Oxford County	125,065	132,475	140,275	148,235	155,855	163,235	38,170

1 Values may not add precisely due to rounding. Where a Township contains more than one fully serviced settlement area, assumptions regarding the allocation of the Township's total forecasted growth to each settlement will also be used to inform the study findings for each system.

2 2021 Census Population with preliminary correction for undercount of approximately 3%

Table 3.2: Forecasted Employment Population Growth

Municipality	Estimated Annual Employment Growth [1]						Growth (2021-46)
	2021[2]	2026	2031	2036	2041	2046	
Woodstock	28,440	30,040	31,690	33,720	36,050	38,730	10,290
Tillsonburg	9,060	9,320	9,600	9,950	10,360	10,810	1,750
Ingersoll	9,710	10,080	10,470	10,950	11,510	12,150	2,440
Blandford-Blenheim	1,910	1,950	1,990	2,050	2,120	2,210	300

Municipality	Estimated Annual Employment Growth [1]						Growth (2021-46)
	2021[2]	2026	2031	2036	2041	2046	
East Zorra-Tavistock	2,950	3,020	3,100	3,200	3,320	3,450	500
Norwich	4,200	4,280	4,360	4,470	4,600	4,740	540
South-West Oxford	2,920	2,960	2,990	3,040	3,090	3,150	230
Zorra	2,890	2,920	2,960	3,010	3,080	3,150	260
Oxford County	62,080	64,570	67,160	70,390	74,130	78,390	16,310

1 Values may not add precisely due to rounding.

3.1.2.1 Residential Population

It is the intention of the County to direct population growth and development primarily to settlements serviced by municipal drinking water and wastewater treatment systems, per the policies set in the Oxford County Official Plan. Population forecasts for the year 2046 are based on Hemson's 2020 Oxford County Phase 1 Comprehensive Review, adjusted to reflect the population from the 2021 Census (Note: these adjustments did not change the forecasted growth for the planning period). For the Townships, growth is to be directed to the fully serviced villages and to a lesser extent partially serviced villages.

Population growth in Townships with more than one serviced village was split based on several factors, including available land supply and Drinking Water System (DWS) and Wastewater Treatment System (WWTS) capacity.

Although partially serviced villages are expected to have limited growth, some residential development continues to be approved within the existing settlement areas and will be included in the DWS's committed capacity for these villages. It is noted that some of this development includes infill lots that need to be further assessed for development viability, lack of which can increase the available capacity.

3.1.2.2 Employment Population

The employment or non-residential population forecasts from the Hemson report are provided on an Area Municipality basis. To obtain the non-residential population for the individual serviced villages in the five Townships, the following method was used:

- The ratio of the residential population to residential metered water demand volumes is obtained; and
- The historical and current non-residential population is then estimated using this same ratio, based on the assumption that the non-residential water consumption per non-residential consumer will be the same as the water consumption per residential consumer. This results in the historical Average Daily [water] Demand (ADD) per residential user ratio, to equal that of the non-residential user.

Although these ratios are used for projection calculations, the actual non-residential average daily [water] demand is obtained by multiplying this ratio by the non-residential population which mitigates any skewed impact of these assumptions.

3.2 Problem / Opportunity Statement

As the first step in Phase 1 of the MCEA process, the County must identify and describe the problem or opportunity which outlines the need and justification for the overall project and establishes the general parameters, or scope, of the study. The County has defined the following as its statement of the problem/opportunity to be addressed by the Master Plan:

> "To identify preferred water and wastewater servicing strategies to meet Oxford's growth needs to 2046 as well as provide effective ongoing continuity to existing serviced settlement areas across Oxford County as appropriate."

The W/WW MP will afford on-going servicing continuity for the communities (designated as settlement areas in the Oxford County Official Plan), including fully serviced (municipal) large urban centres and villages, which are intended to be the primary focus for future growth and development, as well as partially serviced villages. The W/WW MP assumes that any rural villages that are privately serviced and/or rural clusters will remain on such servicing given growth is limited to minor infilling in these areas.

3.3 Master Planning Principles

To review the issues and opportunities in the County with regards to water and wastewater servicing to the period to 2046, the following principles shown in Table 3.3 were developed by the County.

Table 3.3: Oxford County Water and Wastewater Master Planning Principles

2024 Water and Wastewater Master Plan
Integrate growth management planning and infrastructure servicing in a manner. which ensures alignment with County's Official Plan and Strategic Initiatives
Offer infrastructure solutions that recognize potential for growth beyond current planning horizons
Develop infrastructure systems which meet the County's established asset level of service framework and MECP legislative requirements
Maximize the use of available existing capacity in infrastructure, while considering sustainable infrastructure expansions
Provide reliability, redundancy, and security in the infrastructure systems, including consideration of reserve capacity
Optimize pumping and storage infrastructure to maintain level of service under emergency conditions
Recommend proven, reliable, financially, and sustainable technologies that meet long-term servicing requirements
Recognize water conservation and efficiency measures to support environmental sustainability
Consider infrastructure operating and maintenance costs, including full lifecycle costing, to evaluate overall long-term financial implications and sustainability

3.4 Legislative Context

The W/WW MP references the several Provincial regulations for the analysis of the County's drinking water and wastewater systems, which are summarized in this section.

3.4.1 Environmental Assessment Act (EAA)

The EAA is the legislation which allows the MCEA process to be followed by municipalities so that they can plan, design, construct, maintain, rehabilitate, and/or retire municipal road, water, wastewater, and transit projects. This allows these projects to proceed without having to obtain project-specific approval under the EAA provided that the MCEA process is followed.

3.4.2 Ontario Water Resources Act (OWRA)

The purpose of this Act is to provide for the conservation, protection, and management of Ontario's waters and for their efficient and sustainable use, to promote Ontario's long-term environmental, social, and economic well-being. For use of a water supply for municipal

drinking water, an application for a Permit to Take Water (PTTW) issued by the Ministry of the Environment, Conservation and Parks (MECP) under Section 34 of the OWRA is required.

3.4.3 Nutrient Management Act (NMA)

The General Regulation Ontario Regulation (O. Reg.) 267/03 made under the Nutrient Management Act governs the requirements for land application of biosolids, e.g., seasonal storage requirement. For wastewater treatment plants (WWTP) which were not phased in under the *Nutrient Management Act*, requirements are set out in the Environmental Compliance Approval (ECA), based on the MECP and the Ministry of Agriculture, Food and Rural Affairs (OMAFRA) Guidelines for the Utilization of Biosolids and Other Wastes on Agricultural Land, 1996. Part II of the NMA requires the County to ensure that their biosolids land application program meets the requirements of the Act and complies with the requirements for land application for non-agricultural source materials (NASM).

3.4.4 Environmental Protection Act (EPA)

The intent of the EPA is to protect the Ontario environment from an "adverse effect" which is defined as the following:

- Impairment of the quality of the natural environment for any use that can be made of it;
- Injury or damage to property or to plant or animal life;
- Harm or material discomfort to any person;
- An adverse effect on the health of any person;
- Impairment of the safety of any person;
- Rendering any property or plant or animal life unfit for human use;
- Loss of enjoyment of normal use of property; and
- Interference with the normal conduct of business.

Regulations from the Act which may impact or have bearing on the operation or construction of water and wastewater systems are shown below in Table 3.4.

Table 3.4: EPA Regulations impacting Water and Wastewater Systems

Regulation	Title
O. Reg. 406/19	On-Site and Excess Soil Management
O. Reg. 208/19	Environmental Compliance Approval in Respect of Sewage Works
O. Reg. 1/17	Registrations Under Part ii.2 of the Act - Activities Requiring Assessment of Air Emissions
O. Reg. 63/16	Registrations Under Part ii.2 of the Act - Water Taking
O. Reg. 351/12	Registrations Under Part ii.2 of the Act - Waste Management Systems
O. Reg. 255/11	Applications for Environmental Compliance Approvals
O. Reg. 224/07	Spill Prevention and Contingency Plans
O. Reg. 222/07	Environmental Penalties
O. Reg. 153/04	Records of Site Condition - Part xv.1 of the Act
O. Reg. 675/98	Classification And Exemption of Spills and Reporting of Discharges
O. Reg. 524/98	Environmental Compliance Approvals - Exemptions from Section 9 of the Act
O. Reg. 232/98	Landfilling Sites
O. Reg. 206/97	Waste Disposal Sites, Waste Management Systems And Sewage Works Subject to Approval Under or Exempt from the Environmental Assessment
O. Reg. 101/94	Recycling and Composting of Municipal Waste
R.R.O. 1990, Reg. 360	Spills

3.4.5 Safe Drinking Water Act (SDWA)

The *Safe Drinking Water Act* was implemented following the Walkerton Water Crisis (2000), at which time there was no formal regulation of drinking water treatment, operation, record taking, and remedial actions for unsafe drinking water in Ontario. Ontario Regulation 170 (O. Reg 170) under the SDWA provides the requirement for municipal water supply systems which includes reference to the Ten State Standards and the MECP document titled *Procedure for Disinfection of Drinking Water*. The MECP *Design Guidelines for Drinking-Water Systems* (Water GL) is used for the analysis of the County's supply and distribution systems; but it is understood that the guidelines do allow some individual municipal

discretion on items such as municipal fire protection. The guidelines will be the foundational basis for risk assessments, supply and distribution planning, fire flow determination, design system pressures and calculation of future water supply.

Schedule 22 and Section 11 of O. Reg 170/03 under the Act requires that an annual status summary report on the performance of the County's 17 municipal drinking water systems be provided to the Council and be reviewed per the guidelines established by the MECP. The Act categorizes municipal DWS based on types of consumers (residential versus non-residential) and production rate; all drinking water systems in the County are classified as either Large or Small Municipal Residential System.

The sampling, testing, monitoring, and pumping of the water supplied by the wells must follow the requirements set by Permits to Take Water (PTTW), the Municipal Drinking Water License, and Drinking Water Works Permit for the subject systems. The Sustainable Water and Sewage Systems Act (SWSS) (2002) indicates that regulated entities are required to submit a report detailing the provision of water services and wastewater services including an inventory of and management plan for the associated infrastructure. The management of the above requirements is detailed in the Drinking Water Quality Management System (DWQMS) report prepared annually by OC.

3.4.5.1 Drinking Water Quality Management Standard (DWQMS)

As per the requirements of the Ontario DWQMS (2017) and SDWA, Oxford County maintains one drinking water quality management system which is integrated within three different Operation Plans to oversee the operation and maintenance of the County's various water systems. Implementation of the Operational Plans is the responsibility of Oxford County, as the Owner, who ensure that customers are provided with safe, potable drinking water that consistently meets or exceeds regulatory requirements in the interest of protecting public health.

3.4.6 Clean Water Act (CWA)

The *Clean Water Act* (CWA) is a law enacted by the Legislative Assembly of Ontario, Canada to protect existing and future sources of drinking water. The CWA (2006) is a major part of the Ontario government's commitment to ensuring that every Ontarian has access to safe drinking water. Key regulations enabling the work and authority for Source Water Protection are:

- O. Reg. 284/07 Source Protection Areas and Regions delineates source water protection areas within the province;
- O. Reg. 287/07 General mandates the terms of reference and requirements for source water protection plans; and
- O. Reg. 288/07 Source Protection Committees under the CWA constitutes and mandates Source Projection Committees

> "When municipal raw water demonstrates an exceedance of an Ontario Drinking Water Quality standard or increasing trend of a contaminant of concern, the CWA allows local Source Protection Authorities (SPAs) to designate municipal wellhead protection areas as Issues Contributing Areas (ICA). An ICA delineates an area where certain current or past land use have or are likely inferred to contribute to the elevated contaminant concentration in raw water supplies."

3.4.7 Sustainable Water and Sewage Systems Act (2002)

The *Sustainable Water and Sewage Systems Act* (SWSSA) mandates that all municipalities (regulated entity) operate their water and wastewater systems on a full cost recovery basis where the system cost is borne by the system users. Every municipality that provides water services to the public has to prepare and approve a plan describing how the entity intends to pay the full cost of providing those services. This Act has no enabling regulations and was implemented following the Walkerton Water Crisis which occurred in 2000.

3.4.8 O.Reg. 588/17: Asset Management Planning for Municipal Infrastructure

On January 1, 2018, O.Reg. 588/17: Asset Management Planning for Municipal Infrastructure came into effect. This regulation was made under the Infrastructure for Jobs and Prosperity Act, 2015. This regulation sets out requirements for municipal asset management planning. This regulation included the following deadlines:

- By July 1, 2019, all municipalities had to have in place a Strategic Asset Management Policy (SAMP) which has to be reviewed and updated every 5 years;
- By July 1, 2022, all municipalities had to have in place an Asset Management Plan (AMPs) for "core municipal infrastructure assets" (includes water, wastewater, stormwater, roads and bridges and structural culverts) that address current service

levels, asset performance, condition, age and replacement cost and the 10-year lifecycle costs and funding required to maintain those service levels; and

- By July 1, 2024 AMPs for all "other municipal infrastructure assets" (including green infrastructure assets) that address current service levels, asset performance, condition, age, and replacement cost and the 10-year life-cycle costs and funding required to maintain those service levels.

3.4.9 Species at Risk Act

At a federal level, Species at Risk (SAR) designations for species occurring in Canada are initiated by the completion of a comprehensive Status Report by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC). If approved by the federal Minister of the Environment, species are added to the federal List of Wildlife Species at Risk (Government of Canada 2002).

Species that are included on Schedule 1 as Endangered or Threatened are afforded both individual and critical habitat protection on federal lands under the *Species at Risk Act* (SARA). On private or provincially owned lands, only aquatic species listed as Endangered, Threatened or Extirpated are protected under SARA, unless ordered by the Governor in Council.

3.4.10 Endangered Species Act

At the provincial level, SAR and their habitats are protected under the *Endangered Species Act* (ESA, Government of Ontario 2007) which is administered by the Ministry of Environment, Conservation and Parks (MECP). SAR designations for species in Ontario are initiated by the completion of a comprehensive Status Report by the Committee on the Status of Species at Risk in Ontario (COSSARO), and if approved by the provincial Minister of the Environment, Conservation and Parks, species are added to the Species at Risk in Ontario (SARO) List (O. Reg. 230/08) under the ESA. Section 9(1) of the ESA, 2007 prohibits the killing, harming, harassment, capture, taking, possession, transport, collection, buying, selling, leasing, trading, or offering to buy, sell, lease or trade species listed as Extirpated, Endangered, or Threatened on the SARO List. Section 10(1) prohibits damaging or destroying habitat of Endangered or Threatened species on the SARO List and may apply to Extirpated species through special regulations. General habitat protection applies to all Endangered and Threatened species, with some species having 'categorized habitat', which protects areas within specific distances from known records. Some SARs are afforded a more precise habitat protection through a habitat regulation (regulated habitat),

as identified in Ontario Regulation 242/08. Species designated as Special Concern are not protected under the Act.

The ESA, 2007 does include provisions for permits under Section 17(2)(c) that would otherwise contravene the Act. Projects which propose impacts to SAR or their habitat would require a permit or other process (e.g., registration) to proceed without contravening the Act.

3.4.11 Federal Fisheries Act

The *Fisheries Act* (Government of Canada 1985) is administered by Fisheries and Oceans Canada (DFO) and provides a framework for the proper management and control of fisheries as well as the conservation and protection of fish and fish habitat, including the prevention of pollution. In June of 2019, Canada modernized the *Fisheries Act;* the new provisions and stronger protections aim to better support the sustainability of Canada's fish and fish habitat for future generations. In particular, Section 34.4 prohibits any work, undertaking or activity (other than fishing) that results in the death of fish; Section 35.1 prohibits the harmful alteration, disruption, or destruction of fish habitat (HADD); and Section 36 prohibits the deposit of deleterious substances.

The Fisheries Act requires that projects avoid causing death of fish or HADD of fish habitat unless authorized by DFO or a designated representative. Proponents are responsible for planning and implementing works, undertakings or activities in a manner that avoids harmful impacts to fish and fish habitat. Should proponents believe that their work, undertaking or activity will result in harmful impacts to fish and fish habitat, a Request for Review (RFR) must be submitted, and the DFO will work with them to assess the risk and provide advice and guidance on how to comply with the *Fisheries Act*.

3.5 Other Considerations

3.5.1 Climate Change and Sustainability

In the 2018 report, Delivering the Vision Strategic Plan Progress Report 2015 – 2018, the County's Future Oxford Community Sustainability Plan set as Goal # 3 the following:

- Protect and restore the ecosystem;
- Move away from fossil fuels and enhance low carbon transportation;
- Achieve Zero waste in Oxford; and

- Ensure long-term protection of all source water.

To ensure that Oxford is recognized as a leader in environmental action and achieves these goals, the County has developed a series of interconnected plans: Green Fleet Plan (2021-2025) Transportation Master Plan (2019), Made-in-Ontario Environment Plan (2019), 100% Renewable Energy Plan (2018), Managed Forest Plan (2018), and the Zero Waste Plan (2018). The implementation strategy of these plans is described further in the County Policies section in Appendix 3. Climate resiliency and adaptation measures were considered as part of the planning for long term water and wastewater servicing recommendations.

3.5.2 Natural Heritage

Part V of the 2020 PPS focuses on Natural Heritage and the protection and management of natural heritage systems and features. A natural heritage system is defined by the Province of Ontario as:

> "A system made up of natural heritage features and areas, and linkages intended to provide connectivity (at the regional or site level) and support natural processes which are necessary to maintain biological and geological diversity, natural functions, viable populations of indigenous species and ecosystems. These systems can include natural heritage features and areas, federal and provincial parks and conservation reserves, other natural heritage features, lands that have been restored or have the potential to be restored to a natural state, areas that support hydrologic functions and working landscapes that enable ecological functions to continue." (MMAH 2020).

Natural heritage features of significance are described in the Natural Heritage Reference Manual (MNR, 2010) and include:

- Significant wetlands;
- Significant coastal wetlands;
- Fish habitat;
- Significant woodlands;
- Significant valleylands in Ecoregions 6E and 7E (excluding islands in Lake Huron and the St. Mary's River);

- Habitat of endangered and threatened species;
- Significant wildlife habitat; and
- Significant areas of natural and scientific interest (ANSIs).

Development and site alteration is not permitted in:

- Significant wetlands in Ecoregions 5E, 6E and 7E and significant coastal wetlands;
- Significant wetlands in the Canadian Shield north of Ecoregions 5E, 6E and 7E, Significant woodlands and significant valleylands in Ecoregions 6E and 7E (excluding islands in Lake Huron and the St. Mary's River), significant wildlife habitat, significant ANSIs, and coastal wetlands in Ecoregions 5E, 6E and 7E that are not subject to policy 2.1.4(b), unless it has been demonstrated that there will be no negative impacts on the natural features or their ecological functions; and
- Fish habitat or habitat of endangered and threatened species except in accordance with provincial and federal requirements.

3.5.3 Water Conservation and Efficiency

Various provincial land use planning statutes, policies, and plans set out direction relating to water conservation and efficiency best management practices, including the *OWRA, CWA* and *Water Opportunities and Water Conservation Act, 2010*.

The OWRA (Water Taking and Transfer Regulation O. Reg 387/04) requires a permit to withdraw more than 50,000 litres per day of ground or surface water, and the Taking and Transfer Regulation requires the Director to consider issues related to the use of water. The Province of Ontario – 2021 Water Conservation and Efficiency Program assesses water conservation measures in accordance with best water management standards and practices. Additionally, the *Water Opportunities and Water Conservation Act* (WCA) sets out a framework to encourage Ontarians to use water more efficiently. Ontario has a range of programs to manage water supply and demand, such as establishing water efficiency standards, and requires local planning authorities to protect water quality and promote green infrastructure. Water takers are required to monitor and report data annually, and Ontario programs and initiatives support improved monitoring and standardized data reporting.

In alignment with the County's suitability goals, several water conservation initiatives have been developed on the premises of the WCA. Residential rebates exist for homeowners

seeking to upgrade washing machines or toilets to newer water efficient models. A water capacity buy back program is in place that reimburses non-residential and multi-residential end users for facility upgrades and improvements that result in water savings. Finally, a water conservation By-law is in place to reduce peak demand on the drinking water system during dry weather conditions. Each of these programs allows the County to utilize their water capacity to the fullest and encourage environmentally sustainable choices throughout the serviced comminutes.

3.5.4 Sanitary Infiltration and Inflow Control

Inflow from rainfall and infiltration from groundwater (I&I) regularly enter sanitary sewers to various degrees. Excessive I&I can increase operation and maintenance costs and can consume the collection system and the wastewater treatment plant's hydraulic capacity.

As such, the Municipal Wastewater Design Guidelines (Wastewater GL) requires that all sewer construction should exclude inflow and infiltration to the greatest extent possible. Although sanitary sewer systems are not designed to receive the bulk of stormwater flows, exposure to inflows and infiltrations may occur at vulnerable locations including pipe joints, and indirect sources such as service connections. These additional flows may cause exceedance from the wastewater treatment plant's capacity, stressing the individual system and leading to plant bypassing. The Wastewater GL provides and I&I allowance factor for the sanitary collection and treatment system capacities to address these concerns.

I&I control is recommended by the Wastewater GLs via proper design, construction, and maintenance. Other measures include undergoing an MCEA process to identify the extent of the exposure and the alternative mitigation measures. These can be implemented via a *Pollution Prevention and Control Plan* (PPCP). The 1984 MECP Wastewater GL indicate that if infiltration, based upon the highest weekly average within a 12-month period, is less than 0.14 L/(mm·d)/m (litres per millimetre of pipe diameter per day per linear metre of sewer length), rehabilitation of the sewer system will not be economical.

3.6 County Policy Review

County policies governing the county's water and wastewater infrastructures were reviewed to establish policy context for the Masterplan. Using the following County policies, the County's goals relating to asset management, community development, and climate change and sustainability were identified:

- Business Plan and Budget;

- Oxford County Official Plan;
- Public Works Strategy Road Map;
- Future Oxford Community Sustainability Plan;
- Asset Management Plan;
- Asset Management System Review;
- Energy Management Plan;
- 2019 Transportation Master Plan; and
- Water and Wastewater Specific Policies.

These are detailed in Appendix 3.

3.7 Water and Wastewater Plan Methodologies

The process of determining the County's long term water and wastewater servicing needs involved a number of tasks and evaluation processes that were undertaken as part of the W/WW MP process. Some of the key tasks undertaken included:

- Analyzing planning information and undertaking growth sensitivity analyses;
- Establishing existing system conditions;
- Identifying issues and constraints for each system;
- Developing design criteria and projections of future water demands and wastewater flows;
- Assessing existing and future infrastructure capacity;
- Assessing risk issue;
- Developing evaluation criteria;
- Developing alternative servicing concepts;
- Evaluating alternative servicing strategies; and
- Determining preferred servicing strategy, implementation, and phasing.

3.7.1 Growth Sensitivity Analysis

Some serviced regions in the County have recently experienced higher growth than forecasted in the 2020 Comprehensive Review – Phase 1; as demonstrated in the recent 2021 Census.

Accordingly, a sensitivity analysis was undertaken to identify the potential impacts of higher than forecasted growth on the County's water and wastewater infrastructure. The purpose of this analysis was to provide additional information and direction to be able to adjust infrastructure plans as necessary to account for higher than forecasted growth, should such growth be identified through upcoming forecast updates, or otherwise materialize over the study period.

3.7.2 Risk Considerations

There are potential risk factors that will influence the County's ability to provide water and wastewater services with its current infrastructure and these will have to be considered in planning new works. The current water and wastewater system design guidelines and regulatory permitting systems are intended to ensure systems are operated in a safe manner that limits environmental impacts. However, there are potential risks that are outside of the design, construction and operation of these systems that can impact the level of service and have consequences to the County as summarized in Table 3.5.

Table 3.5: Summary of Major Water and Wastewater System Risks

Water System	Wastewater System
• Changes in water quality requirements • Variability in individual well yield production • Power Interruptions • Climate Change – lowering of water table • Source water protection – human impacts on water quality and quantity • Future changes to regulation impacting existing DWS	• Changes to regulated effluent quality • Changes in discharge requirements due to the receiving stream's assimilative capacity. • Power Interruptions • Climate Change – increased infiltration/inflow higher flood levels impacting facilities • Future changes to regulation impacting existing WWS

4.0 County Water Supply, Treatment & Distribution System

4.1 County Drinking Water System Infrastructure

The County owns all 17 municipal drinking water systems (DWS) currently serving 21 communities which includes but is not limited to, the following:

- >700 km of distribution watermains;
- 34 Water Treatment Facilities (WTF)
- 39 water reservoirs/storage towers;
- 7 water booster pumping stations;
- 61 active groundwater wells;
- 5 bulk water stations, and
- SCADA systems to control operations.

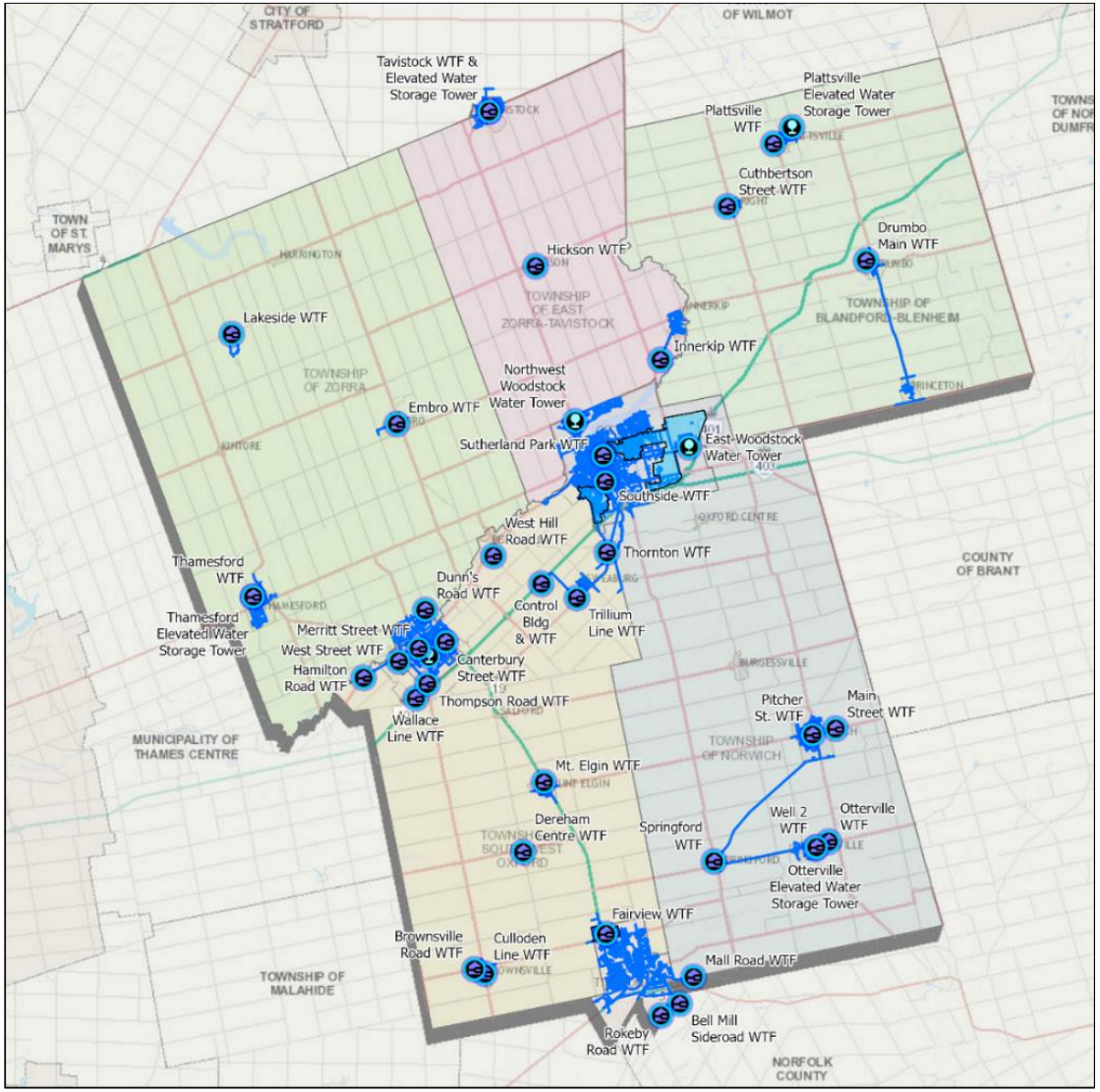
Figure 4.1 provides an illustration of the respective DWS's across the County.

An overview of each system is described in Section 4.3. GIS maps providing details such as well and facility locations, and watermain routes are provided in Appendix 5. Appendix 6 contains detailed descriptions of the infrastructure for each DWS.

4.1 Drinking Water Treatment Overview

All raw water undergoes the general water treatment required to meet the minimum disinfection requirements per Ontario Drinking Water Standards (ODWS), which involves disinfection via chlorination for all water sources, additional UV treatment for ground water under direct influence of surface water (GUDI), and provision of contact time. If the groundwater in the wells is susceptible to surface water, the drinking water guidelines requires specific treatment as detailed in Section 4.2.2. System specific treatment is then applied to ensure treated water does not exceed any maximum acceptable concentrations (MAC) for parameters identified in ODWS.

Figure 4.1: County Water Systems Infrastructure Overview



4.1.1 Iron, Manganese and Sulfide Treatment

Some County wells experience high concentrations of iron, manganese and/or Hydrogen Sulfide (H_2S)and undergo additional treatment to meet aesthetic objectives. The treatment ranges from:

- Mixing water with lower concentration wells to reduce the overall concentrations;
- Sequestration of iron via addition of sodium silicate;
- Filtration using solid manganese dioxide media.

4.1.2 Disinfection Treatment Categories of Groundwater Supplies

Per O.Reg. 170/03 groundwater sources for the purposes of disinfection are categorized into one of three categories:

- Groundwater;
- Groundwater Under Direct Influence (GUDI) of Surface Water with Effective Filtration; and
- And Groundwater Under Direct Influence (GUDI) of Surface Water.

For Groundwater, the MECP Design GL state:

> "The minimum treatment for groundwater … is disinfection. This treatment process must achieve an overall performance that provides, in accordance with the Disinfection Procedure, a minimum of 2-log (99%) removal and/or inactivation of viruses before the water is delivered to the first consumer."

Currently, the MECP practice is to require all new non-GUDI wells to be treated for a minimum of 4-log removal/inactivation of virus.

For GUDI water sources with Effective Filtration, the MECP Design GL state:

> "This treatment process must achieve an overall performance that provides, in accordance with the Disinfection Procedure, a minimum of 2-log (99%) removal and/or inactivation of Cryptosporidium oocysts, 3-log (99.9%) removal and/or inactivation of Giardia cysts and 4-log (99.99%) removal and/or inactivation of viruses before the water is delivered to the first consumer."

For GUDI water sources, the MECP Design GL state:

> "…should have a treatment process that is capable of producing water of equal or better quality than a combination of well operated, chemically assisted filtration and disinfection processes would provide. This treatment process must achieve an overall performance that provides, in accordance with the Disinfection Procedure, a minimum of 2-log (99%) removal and/or inactivation of Cryptosporidium oocysts, 3-log (99.9%) removal and/or inactivation of Giardia cysts and 4-log (99.99%) removal and/or inactivation of viruses before the water is delivered to the first consumer."

The treatment level of existing wells was established in the early 2000's for existing wells following the predecessor to O.Reg. 170, O. Reg. 459/00: DRINKING WATER PROTECTION - LARGER WATER WORKS under *Ontario Water Resources Act*. This was brought into service since and requires an initial GUDI assessment to confirm which category of disinfection treatment is required.

At present, all groundwater wells servicing the County are either considered groundwater or GUDI with effective filtration and are provided with the required level of disinfection treatment to meet Ontario Drinking Water Standards.

4.1.3 Other Treatment Requirements

Some individual wells may have water that is above a MAC for certain ODWS parameters. In this case, the County will either:

- Not have the well in service; or
- Provide the ability to blend one or more well sources to lower a parameter below a MAC prior to introducing the water into the water distribution system.
- Provide appropriate treatment such as filtration using solid manganese dioxide media which is used in some locations to reduce arsenic concentrations.

4.1.4 Water System Supply Capacity

The supply capacities of the existing DWSs are obtained from their respective Drinking Water Works Permits (DWWP) and Municipal Drinking Water Licenses (MDWL). Specifically, the DWWP Capacity of each WTF is taken as the lower of the Well pump and the WTF's High Lift Pumping System (HLPS) capacity.

4.1.5 Water System Capacities

The firm capacity of the DWSs will equal the supply capacity with the highest production well out of service. Firm capacity of the system should, therefore, exceed the projected

maximum day water demand of the drinking-water system, which is the maximum volume of water required in any 24-hour period during the design period (usually, the next 20 years). The rated capacity of a water treatment plant is the net drinking water production rate (i.e., rate of overall drinking water production minus the sum of all in-plant losses and/or demand).

Discussions with the County staff determined that some DWSs were facing the following challenges:

1. Wells in some areas are subject to seasonally decreased production due to proximity of water taking for agricultural purposes;
2. Water quality in some wells may degrade over a period of time due to high intensity agricultural activities in the well vicinity;
3. Wells may require extensive well maintenance to be undertaken every few years to restore full supply capacity;
4. Water quality in some wells may be above maximum acceptable concentration (MAC) due to changes in the in-drinking water standards and may require dilution with other well sources; and
5. Some treatment facilities are not able to operate at full capacity.

As a result, the dynamic supply and dynamic firm capacity was determined for each DWS that incorporates the limitations of the supply and treatment components. The dynamic firm capacity and dynamic supply capacity may not be permanent and may change depending on weather conditions, proximate land use or the degree of maintenance undertaken. For smaller systems the dynamic firm capacity may differ from the dynamic supply capacity as it will include the provision of trucked in water.

The associated water system capacities for each of the 17 DWS's are identified in Section 8.

4.2 Oxford County Drinking Water Systems Overview

The following subsections provide an overview of the County's DWSs components and their capacities.

4.2.1 Ingersoll DWS

The Ingersoll DWS is classified as a Large Municipal Residential Water System which is also designed for fire protection. It is supplied by seven wells and seven water treatment facilities (WTFs). Two of the subsystems – Well 7 supplying the West Street WTF and Well 11

supplying the Wallace Line WTF – are not currently in operation. Of note, Well 7 will be brought back on-line by the County once current 2023 upgrades are completed. The Merritt Street WTF, Dunn's Road WTF, and the Thompson Road WTF are equipped with diesel generators that supply power in an emergency. Ingersoll services one primary pressure zones, with sub-pressure zones fed through isolated supply points. The Ingersoll DWS is designed for fire protection.

4.2.2 Tillsonburg DWS

The Tillsonburg DWS is classified as Large Municipal Residential Water System which is also designed for fire protection. It consists of five WTFs securing water from ten production wells, of which five are classified as GUDI. One of the subsystems – Plank Line WTF— is not currently in operation. The Well 3 facility is currently planned to be brought back on-line while upgrades to Well 7A are being designed. The DWS has two pressure zones, with a BPS on Fairview Street. Standby generators are available to the Mall Road, Fairview, and Bell Mill Sideroad WTFs.

4.2.3 Woodstock DWS

The Woodstock DWS is classified as a Large Municipal Residential Water System which is also designed for fire protection. It consists of four treatment facilities securing raw water from eleven wells, of which six are classified as GUDI with effective in-situ filtration. The City currently has four distinct pressure zones:

- Sweaburg water distribution system regulated by the Thornton and Trillium Line WTFs;
- Athlone Booster Station regulates pressures in the southwest corner of the city;
- Bower Hill reservoir regulates the main pressure zone, which operates the majority of the city; and
- North Pittock, Nellis and Commerce Way Booster Stations service the pressure zone on the east side of the city.

A fifth pressure zone will be introduced as part of the Karn Road development (Section 2.3.2.3). The Thornton WTF and Southside WTF are equipped with diesel generators that supply power in an emergency.

4.2.4 Blandford-Blenheim – Bright DWS

The Bright DWS is classified as a Large Municipal Water system. It secures groundwater from two wells which supply one treatment facility. It is not designed for fire protection.

4.2.5 Blandford-Blenheim – Drumbo – Princeton DWS

The Drumbo-Princeton DWS is a Large Municipal Water. It has three wells supplying to one WTF located in Drumbo. The DWS provides treated water to Princeton via a 6.7 km long transmission main. The onsite standby generator is connected to the WTF only, and not to the well pumphouses. Treated water is received at the Pressure Regulating Station in Princeton, where pressure is regulated before water is discharged to the Princeton Distribution Standpipe. The Drumbo-Princeton DWS is not designed for fire protection.

4.2.6 Blandford-Blenheim – Plattsville DWS

The Plattsville DWS is classified as a Large Municipal Residential Water System. The DWS has two production wells supplying to one treatment facility. A standby generator is available to run the facility in the event of a power failure. The Plattsville DWS designed for fire protection.

4.2.7 Oxford South (Norwich – Otterville - Springford Combined System)

The Oxford South Water System is a Large Municipal Water system which services the villages of Norwich, Springford and Otterville. The communities are connected by two transmission mains which connect Norwich to Springford and Springford to Otterville. There is no direct connection between Norwich and Otterville. In total there are 7 wells and 4 WTF in the drinking water system. Norwich has three wells which supply water to the Pitcher Street and Main Street WTFs. Otterville and Springford each have two supply wells supplying water their respective WTF. The system provides fire protection to the villages of Norwich and Otterville only.

4.2.8 South-West Oxford – Beachville DWS

The Beachville DWS is classified as a Small Municipal Water system. The DWS has a single well. Beachville is not designed for fire protection.

4.2.9 South-West Oxford – Brownsville DWS

The Brownsville DWS is classified as a Large Municipal Water system. Its WTF is supplied by two wells. The Brownsville DWS is not designed to provide fire protection.

4.2.10 South-West Oxford - Dereham Centre DWS

The Dereham Centre DWS is classified as a Small Municipal Water system. It has one well supplying its WTF. Dereham Centre DWS is not designed for fire protection.

4.2.11 South-West Oxford - Mount Elgin DWS

The Mt. Elgin DWS is classified as a Large Municipal Residential Water System. The system has two supply wells supplying one WTF each. The second well and WTF was brought online in 2022 response to growing water demands. The Mt. Elgin DWS is not designed to provide fire protection.

4.2.12 East Zorra-Tavistock – Hickson DWS

The Hickson Water System is a Small Municipal Water system. It has only one well connected to one WTF. The Hickson DWS system is not designed for fire protection.

4.2.13 East Zorra-Tavistock – Innerkip DWS

The Innerkip DWS is classified as a Large Municipal Residential Water. It has two supply wells connected to its WTF. A standby generator is available to run the facility in the event of a power failure. The Innerkip DWS is not designed for fire protection.

4.2.14 East Zorra-Tavistock – Tavistock DWS

The Tavistock DWS is classified as a Large Municipal Residential Water System which is also designed for fire protection. It is supplied by three wells connected to one WTF. Two of its wells switch operationally, as they both cannot operate simultaneously.

4.2.15 Zorra - Thamesford DWS

The Thamesford DWS is classified as a Large Municipal Residential Water System. It has four supply wells connected to its WTF, of which three share the same aquifer. The system is designed for fire protection.

4.2.16 Zorra – Embro DWS

The Embro DWS is classified as a Large Municipal Residential Water. The DWS consists of one facility supplied by two wells. A standby generator is available to run the facility in the event of a power failure. Operationally, only one well can operate at a time. The system is not designed for fire protection.

4.2.17 Zorra - Lakeside DWS

The Lakeside DWS is classified as a Large Municipal Water system. It is supplied by one well which supplies one WTF. The Lakeside DWS is not designed for fire protection.

5.0 DRINKING WATER SYSTEM DESIGN CRITERIA

5.1 Drinking Water System Planning

The County's Official Plan states the following regarding its responsibilities towards Water Management:

> "The quality and quantity of water will be protected, improved, and restored by identifying important groundwater features, hydrologic functions, natural heritage features and areas and surface water features, maintaining the linkages and related functions among such features and minimizing potential negative impacts from single, multiple or successive development or site alteration activities."

As such, the strategic aim of the W/WW MP is to provide a framework for the assessment of the existing water systems (supply, storage, transmission, redundancy, regulatory compliance) and provide a planning roadmap for meeting future servicing needs (sizing and phasing of linear and vertical water infrastructure) to address existing constraints and accommodate population and employment growth to 2046.

5.2 Drinking Water System Design Criteria

5.2.1 Standards and Design Guidelines

The criteria used to obtain and analyse the water treatment components is compiled from the following standards and guidelines:

- Ontario Design Guidelines for Drinking Water Systems (Water GL) which provides guidance for designers and Approvals Engineers for DWSs in Ontario; and
- Great Lakes - Upper Mississippi River Board of State and Provincial Public Health and Environmental Managers (10 States Standards) Recommended Standards for Water Works. This standard is referred to in the Ontario Regulation 170 under the Safe Drinking Water Act.

The guidelines are prescriptive on some topics but allow some individual municipal discretion on other topics such as municipal fire protection. The Section 4.5.1 Wells Design of the Water GL state:

> "The design objectives for a well should be to provide a hydraulically efficient and structurally sound well that will produce the required water quantity on a continuous basis, and which is protected from external contamination."

The 10 States Standards have a number of requirements that directly impact Oxford County as follows:

> "The total developed groundwater source capacity, unless otherwise specified by the reviewing authority, shall equal or exceed the design maximum day demand with the largest producing well out of service." (Section 3.2.1.1)
>
> "A minimum of two sources of groundwater shall be provided, unless otherwise specified by the reviewing authority. Consideration should be given to locating redundant sources in different aquifers or different locations of an aquifer." (Section 3.2.1.2)
>
> "Plants designed to treat surface water, groundwater under the direct influence of surface water, or for the removal of a primary drinking water contaminant shall have a minimum of two units each for coagulation, flocculation, and solids removal." (Section 4.2)

It is therefore standard practice that each municipal DWS should be provided with standby wells or else have a contingency arrangement to supply water (such as trucked water for very small systems). Ideally, each groundwater-based system should have a measure of redundancy so that groundwater sources are from different aquifers or separated by space within the same aquifer.

These policies, standards and design guidelines set the foundation for the development of the water portion of the W/WW MP.

5.2.2 System Components

DWSs are composed of supply, treatment, pumping, transmission and distribution and storage infrastructure. Each DWS will be assessed for these components using the methodology provided in this section. The components and their sub-components are provided in Table 5.1.

Table 5.1: Components and Sub-Components

Component	Sub-Components
Water Supply	Groundwater well(s) Pumping
Water Treatment	Treatment at Well House Centralized Treatment (multiple wells)
Water Distribution and Booster Pumping	Watermains Booster Pumping Stations (BPS) Pressure Zones
Water Storage	In-ground Storage (associated BPS)

Component	Sub-Components
	Elevated Storage

5.3 Drinking Water System Design Considerations

5.3.1 Water Demand Sources

Oxford County's water is consumed by a number of different sources and is classified into Metered and Non-metered water demand for analysis purposes.

Metered water sources consist of residential and non-residential properties referred to as Base Demand, bulk water stations, and water treatment processes that are metered.

Water treatment facilities are typically also metered; including metering of the backwash water used for cleaning. The generated demand records consist of:

- Well pump records to determine water pumped from production wells;
- Water discharged from the water treatment facilities;
- Water sent from the distribution system to provide to the water treatment process (such as filter backwashing); and
- Water meter records to determine how much water was consumed by residential and non-residential customers.

These are then used to determine non-metered water volumes, which allow for assessing the system efficiency and upgrade requirements. Non-metered water consumption generally arises from firefighting use, flushing distribution mains, water treatment process that are not metered, and water loss in the distribution system through pipe or reservoir leakage or illegal hydrant water taking.

5.3.2 Water Loss

Non-metered consumed water leads to water loss. The Water GL directs that where flow records or estimates for an existing distribution system show that unaccounted-for-water exceeds 15% of average daily demand, then an average value within the range of 270 to 450 L/(capita*day) should be considered and the cause of the unaccounted-for-water determined and reduced or eliminated as much as is practical.

For the County DWSs, the water loss per system is identified by calculating the difference between the total distributed volume of water (less the backwash water volume) and the

total metered water volume per system (with the bulk water volume added, as it is metered separately). This difference produces the volume of water that is not accounted for and contributes to overall water loss in the system.

5.3.3 Water System Design Parameters

5.3.3.1 Average Daily Water Demand

The Average Day Demand (ADD) from the serviced population is taken as the average of all daily recorded water demand over a given year. The ADD for each DWS was obtained from the annual Daily Water Consumption (excel) data provided by County. For each DWS, it was attempted to review multiple years of historical water consumption data. Any anomalous, absent, or suspect data was removed from the analysis.

5.3.3.2 Water Treatment Supply Capacity

The Water GL requires that as a minimum, the water supply/treatment facility should be designed to meet the projected maximum daily flow requirement of the service area with peak hourly, outdoor use and fire demands met from storage. Where it is possible to develop the source of supply to meet more than the projected maximum daily flow, the storage volume can be reduced accordingly.

Maximum Day Demand (MDD) is further defined as the water usage on the maximum day. When actual water demand data are available, the designer should review the data and eliminate statistical outliers (e.g., excessive water demands that occurred because of a major trunk main break, and erroneous metering or recording) before selecting a value.

In adherence to the above direction, the annual average historical MDD (MDD_{AVG}) is estimated by eliminating statistical outliers from each individual DWS's historical data sets on the following basis:

- Fire events, as they lead to spikes in water demand and are not metered. Fire events from 2016 to 2021 for each DWS that is providing fire protection are collected from online sources. Since it is highly improbable to identify the total water volume used for the fire event only, the water consumption on the incident day is eliminated from the data if it caused a significant spike. If the ADD on the incident day is within range of the preceding and succeeding day, the day is analyzed normally;
- Routine flushing of the watermains as noted in the County's *Annual Water Reports* (AWR). These events are only removed for the Ingersoll, Tillsonburg and Woodstock

DWSs. For Township DWSs – that is, systems servicing the serviced villages in the five Townships -, flushing events are not removed from the data set because smaller systems will experience higher stress if regular maintenance (watermain flushing) occurs and the DWS is not capable of compensating it, as noted in the Water GL:

> "The designer should be particularly careful in designing small treatment plants since in-plant water use can be a significant portion of total production." (Section 3.4.1);

- In addition, for systems with fewer than 500 users such as Dereham Centre, Beachville, and Hickson, the demand during peak hours is to be met from storage. However, none of these systems are designed for fire protection; meaning that their storage capacity may not be sufficient to meet the peak demand as noted in the Water GL:

  > "It is essential that the source of supply and the distribution system be capable of meeting these maximum and peak demand rates without overtaxing the source or resulting in excessive pressure loss in the distribution system. Small systems [also] have higher peaking factors for maximum day and peak hour demand than large systems." (Section 3.4.5)

  Hence, it is essential that water demand spikes occurring due to flushing are not removed from the water demand estimations for Township systems. They are removed from larger systems only; and.

- Water losses due to watermain leaks. The water demand data from these days are removed from the examined dataset.

The annual historical MDD is then selected from this refined dataset based on the size classification of the DWS as follows:

- The three highest annual pumped volumes (m^3) per day from the distribution facility are compared to account for large variances, which are indicators of other outliers or uncommon events.
  - If the three values are similar in size, then
    - For Township DWSs, the largest MDD from the three values is taken as the final MDD for each DWS,

- For the three Large Urban Centres (Ingersoll, Tillsonburg, and Woodstock), the largest MDD is taken as the average of the three largest MDDs; and

- If the three values are not within range, such that the highest pumped volume in a day is substantially larger than the remaining days in the week or than the other two maximum day values, then

  - For Township municipal water treatment systems, the average of the three values will be taken as the MDD,

  - For the three Large Urban Centres, the same approach as in the previous scenario will be taken.

The selected MDD is then used to obtain the Maximum Day Peaking Factor (MDPF), which is a ratio of the MDD to the ADD. The ADD comprises of the average Base Demand and unaccounted water. Historical MDPF and ADD were calculated separately for residential and non-residential demands to provide more precision in analysing water consumption trends and projections.

5.3.3.3 Peak Hour Demand (PHD)

The Water GL states that:

> "Minimum rate, maximum day and peak rate factors for the system should be based on existing flow data, where available. Table 3.1 provides peaking factors for use with average day demand when actual data are not available or are unreliable."

In the absence of flow data, the Water GL provides MDPF and peak day peaking factors (PDPF) which can be used to obtain the PHD of the system. The factors provided are categorized corresponding to the serviced population.

Due to the interaction between elevated storage, on ground storage and PS and WTF pumping, it is not possible to confirm peak day flows based on the current available methods of monitoring (estimates could be made through the use of hydraulic modeling). Therefore, the values in the Water GL are used for establishing PHD.

5.3.4 County DWS Design Criteria

This section provides the above described design parameters (ADD, MDD, PDPF for the 2021 population, and Water Loss) derived for each of County's DWSs as shown in Sections 5.3.4.1 to 5.3.4.17 respectively.

5.3.4.1 Ingersoll DWS

Parameter	2024 W/WW MP Value
Average Day Demand (L/capita/day)[1]	
Residential	185
Non-Residential	160
Max Day PF	1.6
Peak Day PF[1]	
Residential	3
Non-Residential	3
Non-Revenue Water (%)[1]	17

1: Historical data is based on the 2021 water demand data only.

5.3.4.2 Tillsonburg DWS

Parameter	2024 W/WW MP Value
Average Day Demand (L/capita/day)	
Residential	175
Non-Residential	230
Max Day PF	1.6
Peak Day PF	
Residential	3
Non-Residential	3
Non-Revenue Water (%)	11

5.3.4.3 Woodstock DWS

Parameter	2024 W/WW MP Value
Average Day Demand (L/capita/day)	
Residential	180
Non-Residential	250
Max Day PF	1.5
Peak Day PF	
Residential	3
Non-Residential	3
Non-Revenue Water (%)	15

5.3.4.4 Blandford Blenheim: Bright DWS

Parameter	2024 W/WW MP Value
Average Day Demand (L/capita/day)[1]	
Residential	160
Max Day PF	2.3
Peak Day PF	
Residential	4
Non-Revenue Water (%)	10

1: The village of Bright does not have a historical recorded non-residential population

5.3.4.5 Blandford Blenheim: Drumbo-Princeton DWS

Parameter	2024 W/WW MP Value
Average Day Demand (L/capita/day)	
Residential	165
Non-Residential	160
Max Day PF	1.8
Peak Day PF	
Residential	4
Non-Residential	4
Non-Revenue Water (%)	10

5.3.4.6 Blandford Blenheim: Plattsville DWS

Parameter	2024 W/WW MP Value
Average Day Demand (L/capita/day)[1]	
Residential	175
Non-Residential	175
Max Day PF	2.2
Peak Day PF	
Residential	3
Non-Residential	3
Non-Revenue Water (%)	14

1: $ADD_{RES} = ADD_{NON-RES}$

5.3.4.7 Norwich: Oxford South DWS

Parameter	2024 W/WW MP Value
Average Day Demand (L/capita/day)	
Residential	170
Non-Residential	140
Max Day PF	2.0
Peak Day PF	
Residential	3
Non-Residential	4
Non-Revenue Water (%)	16

5.3.4.8 Zorra: Thamesford DWS

Parameter	2024 W/WW MP Value
Average Day Demand (L/capita/day)[1]	
Residential	210
Non-Residential	210
Max Day PF	2.0
Peak Day PF	
Residential	3
Non-Residential	4
Non-Revenue Water (%)	24

1: $ADD_{RES} = ADD_{NON-RES}$

5.3.4.9 Zorra: Embro DWS

Parameter	2024 W/WW MP Value
Average Day Demand (L/capita/day)[1]	
Residential	140
Non-Residential	140
Max Day PF	1.8
Peak Hour PF	
Residential	4
Non-Residential	4
Non-Revenue Water (%)	28

1: $ADD_{RES} = ADD_{NON-RES}$

5.3.4.10 Zorra: Lakeside DWS

Parameter	2024 W/WW MP Value
Average Day Demand (L/capita/day)[1]	
Residential	140
Non-Residential	140
Max Day PF	2.5
Peak Hour PF	
Residential	4
Non-Residential	4
Non-Revenue Water (%)	14

1: $ADD_{RES} = ADD_{NON-RES}$

5.3.4.11 East-Zorra Tavistock: Tavistock DWS

Parameter	2024 W/WW MP Value
Average Day Demand (L/capita/day)[1]	
Residential	190
Non-Residential	230
Max Day PF	1.7
Peak Hour PF	3
Non-Revenue Water (%)	6

5.3.4.12 East-Zorra Tavistock: Innerkip DWS

Parameter	2024 W/WW MP Value
Average Day Demand (L/capita/day)[1]	
Residential	195
Non-Residential	195
Max Day PF	2.0
Peak Hour PF	
Residential	4
Non-Residential	4
Non-Revenue Water (%)	11

1: $ADD_{RES} = ADD_{NON-RES}$

5.3.4.13 East-Zorra Tavistock: Hickson DWS

Parameter	2024 W/WW MP Value
Average Day Demand (L/capita/day)[1]	
Residential	175
Non-Residential	175
Max Day PF	2.8
Peak Hour PF	
Residential	4
Non-Residential	4
Non-Revenue Water (%)	11

1: $ADD_{RES} = ADD_{NON-RES}$

5.3.4.14 South-West Oxford: Mount Elgin DWS

Parameter	2024 W/WW MP Value
Average Day Demand (L/capita/day)[1]	
Residential	185
Non-Residential	185
Max Day PF	2.3
Peak Hour PF	
Residential	4
Residential	4
Non-Revenue Water (%)	16

1: $ADD_{RES} = ADD_{NON-RES}$

5.3.4.15 South-West Oxford: Beachville DWS

Parameter	2024 W/WW MP Value
Average Day Demand (L/capita/day)	
Residential	155
Non-Residential	130
Max Day PF	2.3
Peak Hour PF	
Residential	4
Non-Residential	4
Non-Revenue Water (%)	14

5.3.4.16 South-West Oxford: Brownsville DWS

Parameter	2024 W/WW MP Value
Average Day Demand (L/capita/day)	
Residential	150
Non-Residential	160
Max Day PF	2.1
Peak Hour PF	
Residential	4
Non-Residential	4
Non-Revenue Water (%)	7

5.3.4.17 South-West Oxford: Dereham Centre DWS

Parameter	2024 W/WW MP Value
Average Day Demand (L/capita/day)	
Residential	105
Non-Residential	110
Max Day PF	3.4
Peak Hour PF	
Residential	4
Non-Residential	4
Non-Revenue Water (%)	21

5.3.5 Water Treatment and Supply System Sizing

5.3.5.1 Water Transmission Sizing

Section 10.2.2.1 of the Water GLs directs that watermain sizing are to be sized using hydraulic analysis involving flow demands and maintaining a minimum pressure of 140 kPa (20 psi) under MDD plus fire flow conditions. Normal operating pressures in the distribution system should be within 350 to 480 kPa (50 – 70 psi) and they are neither to be less than 275 kPa (40 psi) and nor exceed 700 kPa (100 psi). This maximum operating includes the transient pressure that can occur during regular operation of the pipes and joints in the piping system and can cause negative pressures in the piping system.

However, pressures can vary depending on the distribution size and topography of the serviced area. Section 2.4.1.2 of the Water GLs states that in addition to the above, watermain design is to be based on several factors including nature and population of the area served. Specifically, transmission mains are sized as follows:

- For systems designed to provide fire protection, minimum size of watermains should be 150mm. Pipe size can reduce to 25mm beyond the last hydrant on cul-de-sacs. The minimum pipe size can, however, vary to allow withdrawing the required fire flow while maintaining the minimum pressure;
- For systems not designed for fire protection, minimum watermain diameter is recommended to be 75mm, but may vary depending on available equipment for cleaning watermains.

- Flushing velocity for both the above scenarios should be maintainable at 0.8m/s.

5.3.5.2 Booster Pumping Stations

The MECP Water Design Guidelines referenced in the last section provides the following recommendations for determining the pumping requirements of a system:

- The drinking water system should be designed to satisfy the greater of maximum day demand plus fire flow (where fire protection is to be provided), or the peak hour demand;
- In systems without floating storage:
- Pumping capacity should be sized for the greater of peak hour, or maximum day demand plus fire flow;
- The firm pumping capacity should be calculated based on the assumption that the two largest pumps are out-of-service especially when there is only one source of supply in the area; and
- In systems with floating storage for fire protection and balancing:
    - Pumping capacity should be sized for maximum day demands, provided that the floating storage is capable of providing peak hour and fire flow demands; firm capacity assumes that the largest pump is out of service.

Table 5.2 provides a summary of the design criteria of each water servicing system component per the MECP guidelines.

Table 5.2: Design Criteria for Water Servicing Components

Water System Component	Criteria	Methodology
Pumping Stations	With adequate zone storage available	Maximum day demand to zone and all subsequent zones
	Without adequate storage available	Greater of Peak hour flow to zone or Max Day plus Fire demand to all subsequent zones
Storage	A – Equalization	25% of maximum day demand
	B – Fire	Fire flow and duration based on population per Water GL
	C – Emergency	Minimum of 25% of (A+B)
	Total	= A+B+C
Fire Flow	Minimum flow (residential)	Not presently specified. Dependent on DWS level of fire protection.
	Minimum flow (industrial/ commercial/institutional)	Not presently specified. Dependent on DWS level of fire protection.

Water System Component	Criteria	Methodology
System Pressure	Normal Operating conditions	280 kPa (40 psi) to 700 kPa (100 psi)

5.3.5.3 Water Storage Capacity

Water storage is required to support a number of demand sources:

- Peak flows that are higher than the MDD are generally supplied by the storage system. These can either generally occur during peak demand periods within a day by regular consumers, or during fires which use hydrants to supply the large water flow; and
- Short term emergency supply for situations including temporary equipment shut down, power failures, watermain break, equipment malfunction, and to provide water during extreme short-term challenges with raw water.

The Water GL requires treated water storage to be designed to satisfy the greater of the following demands: MDD plus fire flow or PHD. The fire flow requirements are population dependent and the suggested fire flows corresponding to the system's serviced population is provided in Table 8-1 of the Water GL. Per Section 8.4.2 of the Water GL:

$$\text{Water Storage Requirement} = A + B + C$$

Where A is the required fire storage based on the recommended fire flow, B is the equalization storage (25% of maximum day demand), and C is the emergency storage (25% of the sum of A and B).

Per Section 8.4.3 of the Water GL, for communities not provided with fire protection, the volume of the storage should be 25% of the design year maximum plus 40% of the design year average day.

Storage capacities for each of the DWSs are revised to remove the capacity used for treatment processes. The portion of the capacities used for strictly storage only are taken as the available storage capacity of the systems and are termed 'Usable'. The usable water storage must also be in a location or the infrastructure itself must be able to supply with adequate pressure and have the firm capacity required to draw down the storage during the peak demand conditions.

6.0 COUNTY WASTEWATER COLLECTION AND TREATMENT SYSTEM

6.1 County Wastewater Collection and Treatment System Infrastructure

The County owns 9 wastewater treatment plants (WWTPs) and 11 wastewater collection systems (WWCSs) currently servicing 11 communities. The County wastewater system is comprised of the following associated components, including but not limited to:

- 11 municipal sewage collection systems;
- Embro and Innerkip sewage is conveyed by force mains into the Woodstock wastewater collection system
- 600 km of sewers & force mains;
- 36 sewage pumping stations;
- 1 odour control facility each for the Embro and Innerkip forcemains;
- 9 wastewater treatment plants-
    - Three Conventional Activated Sludge (CAS) WWTPs at Ingersoll, Tillsonburg, Woodstock,
    - One Extended Aeration WWTP at Thamesford,
    - Three Lagoons Systems at Norwich, Plattsville, Tavistock,
    - One Recirculating Sand Filter at Mount Elgin,
    - One Sequencing Batch Reactor (being converted to a Membrane Bioreactor) in Drumbo;
- One biosolids management facility; and
- SCADA systems to control operations.

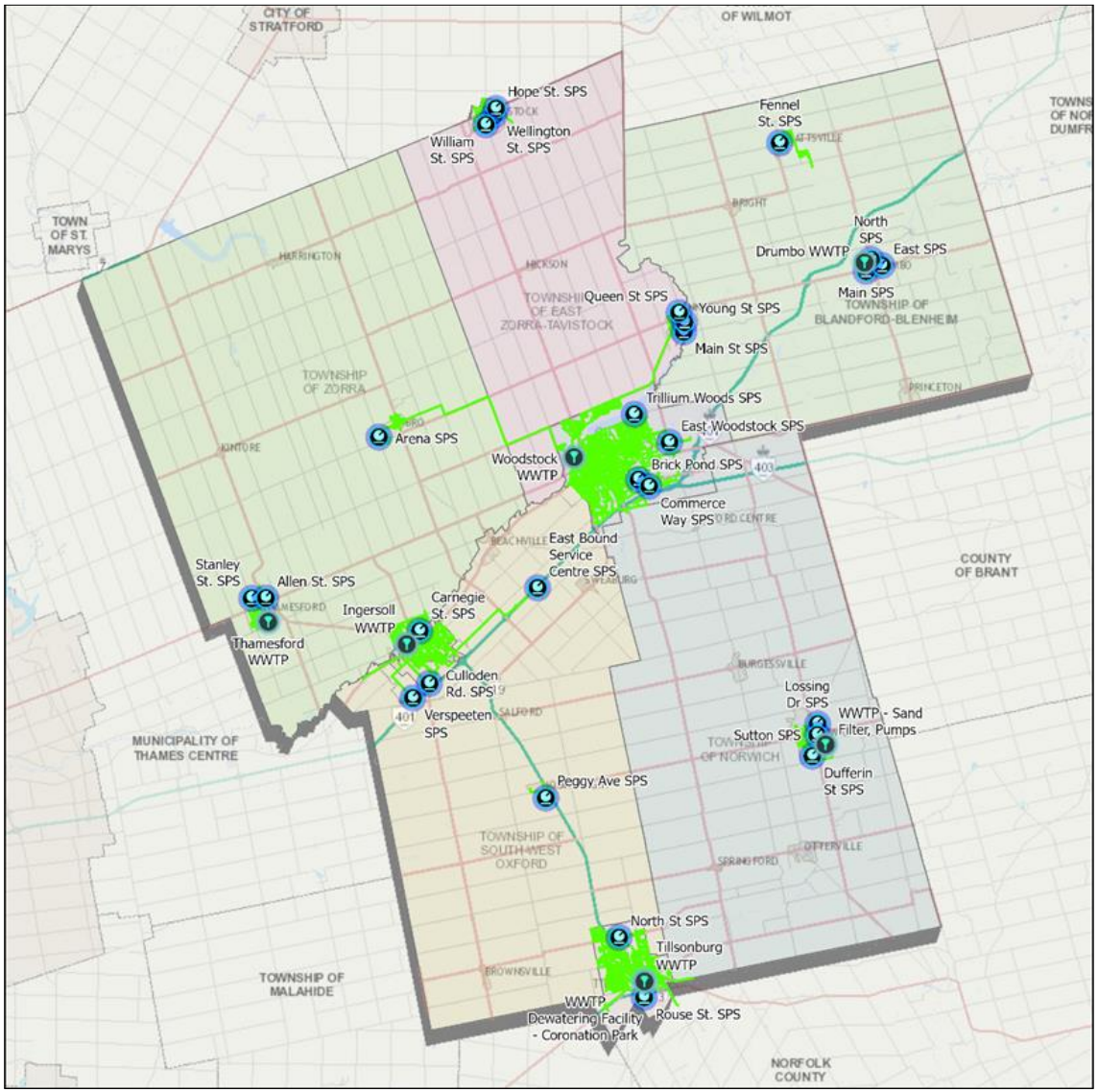
Figure 6.1 provides an illustration of the WWTSs and their components spanning across Oxford County. A detailed description of the subcomponents of each of the WWTSs is

Figure 6.1: Existing Oxford County Wastewater Infrastructure

provided in Appendix 7. GIS maps providing location details for the collection (including sewer mains) and treatment infrastructure are provided in Appendix 8.

Section 6.3 provides the wastewater design criteria and calculation methodologies used to estimate historic flows and projection parameters that is listed for each WWTS in this Section 6.0.

Figure 6.2: Existing Oxford County Wastewater Infrastructure



6.2 Wastewater Treatment Overview

6.2.1 Design Considerations

General design considerations for WWTP and SPSs include:

- Wastewater flows and loadings from current and planned development;
- Eliminate bypasses and overflows;
- Consideration for operation and maintenance including providing backup capacity for critical equipment;
- Flood protection where the WWTP is not located at an elevation higher than the 100 year flood;
- Provide for enhanced reliability and redundancy for peak hydraulic flows, equipment failure and maintenance shut down; and
- Provisions for future expansion.

6.2.2 Effluent Quality Requirements

All of Oxford County's WWTPs provide a minimum of secondary treatment, per the following Wastewater GLs:

> *The normal level of treatment required for municipal and private sewage treatment works discharging to surface waters is secondary treatment or equivalent.*

The Procedure B-1-5, Deriving Receiving-Water Based, Point Source Effluent Requirements for Ontario Waters outlines the framework within which effluent requirements for contaminant loadings and concentrations for each WWTP is set. Maximum compliance limits for secondary treatment in Ontario 25 mg/L or better (lower) of $CBOD_5$ and TSS in effluent. Sewage treatment lagoons have the following compliance limits:

- To be considered providing secondary treatment, effluent quality from Lagoons limit $CBOD_5$ to below 25 mg/L and TSS to below 30 mg/L;
- Lagoons using batch chemical dosing for phosphorus removal have limits for $CBOD_5$ of 25 mg/L or lower and TSS of 25 mg/L or lower.

Additional compliance limits maintained include total phosphorus (TP) concentration of 1 mg/L (when phosphorus removal is required) and a monthly mean density of 200 *E. coli* organisms per 100 mL if disinfection is required. Additional compliance limits objectives are implemented on a per scenario basis and is listed for each WWTP in Section 6.3.

6.2.3 Bypass and Overflows

Ministry WWTP guidelines require SPSs and treatment works to be designed such that bypasses and overflows are eliminated. Overflows are referred to discharge to the environment from a sewage treatment works at a location other than the final effluent outfall or downstream of the sampling point in the final effluent outfall.

Bypass designs of any treatment processes within the treatment plant are recommended to enable return of the bypassed flows to the influent point of the plant, so that discharge to the environment through the final effluent outfall is minimized.

The Wastewater GLs require metering of bypass flows and overflows at the plant and SPS. Any overflows within the sanitary sewer systems and overflow/bypasses at the treatment plant are to be designed for emergency and unavoidable conditions only.

6.3 County Wastewater Treatment Systems

6.3.1 Ingersoll WWTS

The Ingersoll WWTP is a Conventional Activated Sludge (CAS) mechanical plant with two standby generators. It receives flows from four SPSs in the Town that discharge to one on-site SPS at the treatment facility. In addition, the WWTP also provides treatment for septic tank waste from the Village of Mount Elgin, partially digested biosolids from the Thamesford WWTP, as well as landfill leachate, hauled waste and holding tank waste from across the County.

The plant consists of two treatment trains consisting of primary and secondary treatment that merge into a common disinfection system prior to the final effluent discharge to the Thames River. Sludge management involves anaerobic digestion followed by dewatering to produce stabilized biosolids for land application. Table 6.1 provides the WWTP's effluent limits and objectives.

Table 6.1: Ingersoll WWTP Effluent Objectives and Limits

Effluent Parameter (mg/L)	Effluent Limits (Average Concentration)	Effluent Objectives (Average Concentration)
$CBOD_5$	15.0	10.0
Total Suspended Solids	15.0	10.0
Total Phosphorus	0.6	0.4
Total Ammonia Nitrogen	2.0 (May 1 to Nov. 30) 6.0 (Dec. 1 to Apr. 30)	1.5 (May 1 to Nov. 30) 4.0 (Dec. 1 to Apr. 30)

Effluent Parameter (mg/L)	Effluent Limits (Average Concentration)	Effluent Objectives (Average Concentration)
E.Coli (monthly geometric mean density)		100 Organisms/100 mL

6.3.2 Tillsonburg WWTS

The Tillsonburg WWTP is a CAS treatment plant. It receives wastewater flows from three SPSs in the Town, There is no on-site SPS at the WWTP. Treatment consists of mechanical screening and grit removal, primary clarification, secondary treatment, final clarification, and UV disinfection prior to final effluent discharge to Big Otter Creek. Sludge management involves aerobic digestion followed by centrifuge dewatering to produce stabilized biosolids for land application.

Table 6.2: Tillsonburg WWTP Effluent Objectives and Limits

Effluent Parameter (mg/L)	Effluent Limits (Average Concentration)	Effluent Objectives (Average Concentration)
$CBOD_5$	15.0	10.0
Total Suspended Solids	15.0	10.0
Total Phosphorus	0.6	0.4
Total Ammonia Nitrogen	2.0 (May 1 to Nov. 30) 6.0 (Dec. 1 to Apr. 30)	1.5 (May 1 to Nov. 30) 4.0 (Dec. 1 to Apr. 30)
E.Coli (monthly geometric mean density)		100 Organisms/100 mL

6.3.3 Woodstock WWTS

The Woodstock WWTP is a CAS mechanical treatment plant. The system provides wastewater treatment to the City of Woodstock and to the villages of Embro and Innerkip. In addition, it also receives partially digested biosolids from the Drumbo WWTP, landfill leachate, septic tank waste, hauled waste, and holding tank waste from within Oxford County. Seven SPSs are connected to the WWTP, including one SPS each in Embro and Innerkip that deliver sewage flows to the Woodstock collection system.

Treatment consists of preliminary treatment including grit removal, screening, and scum removal. This is followed by primary clarification, secondary treatment via CAS process, secondary clarification, and ultimately disinfection via chlorination. The effluent is de-chlorinated with the addition of sodium bisulphite prior to being discharged to the Thames River.

Sludge management involves anaerobic digestion followed by dewatering to produce stabilized biosolids for land application. A standby generator is available to run the entire Woodstock WWTP and onsite Thames Valley Lift Station in the event of a power failure. A secondary backup generator is available and dedicated to Thames Valley Lift Station in case of emergency.

Table 6.3: Woodstock WWTP Effluent Objectives and Limits

Effluent Parameter (mg/L)	Effluent Limits (Average Concentration)	Effluent Objectives (Average Concentration)
$CBOD_5$	15.0 (May 1 – Nov 30) 20.0 (Dec 1 – Apr 30)	12.0
Total Suspended Solids	15.0	12.0
Total Phosphorus	0.75	0.5
Total Ammonia Nitrogen	3.0 (May 1 – Nov 30) 5.0 (Dec 1 – Apr 30)	2.0 (May 1 – Nov 30) 3.0 (Dec 1 – Apr 30)
E.Coli (monthly geometric mean density)	200 CFU/100 mL	150 CFU/100 mL

6.3.4 Blandford-Blenheim

6.3.4.1 Drumbo WWTS

The Drumbo WWTP currently provides wastewater treatment via sequencing batch reactor. It received flows from three SPS. Tertiary treatment consisting of two alternating sequential batch reactors, mixed media pressure filters, and UV disinfection followed by discharge to the Cowan Drain is provided. Phosphorus removal involves chemical treatment via aluminum sulfate. Sludge management involved temporarily storage of solids prior to routinely being transported to the Woodstock WWTP for digestion.

Table 6.4: Drumbo WWTP Effluent Objectives and Limits

Effluent Parameter (mg/L)	Effluent Limits (Average Concentration)	Effluent Objectives (Average Concentration)
$CBOD_5$	9.3	4.7
Total Suspended Solids	9.3	4.7
Total Phosphorus	0.46	0.27
Total Ammonia Nitrogen	2.7 (May 1 – Oct 31) 4.5 (Nov 1 – Apr 30)	1.8 (May 1 – Oct 31) 3.6 (Nov 1 – Apr 30)
E.Coli (monthly geometric mean density)	200 CFU/100 mL	150 CFU/100 mL

A standby generator is dedicated to both the onsite WTF and the WWTP in the event of a power failure. Phase 1 expansion of the WWTP to 450 m^3/d is currently underway which will change the WWTP to a Membrane Bioreactor (MBR) treatment system and is presently estimated to be completed by 2024. A MCEA Study and Assimilative Capacity Study (ACS) for the second capacity expansion to 660 m^3/day is currently underway.

6.3.4.2 Plattsville WWTS

The Plattsville WWTP is a lagoon-based treatment system consisting of two aerated ponds and two waste stabilization ponds. This is followed by filtration via four intermittent sand filters and discharge to the Nith River. Discharge primarily occurs during spring and late fall, and no discharge occurs from December 1st to March 31st each year. Phosphorus removal is achieved via aluminum sulphate dosing. The biosolids are stored in the lagoons for usually between 15 to 20 years prior to being land applied. The WWTS receives sewage from one SPSs in the village.

Table 6.5: Plattsville Lagoons Effluent Objectives and Limits

Effluent Parameter (mg/L)	Effluent Limits (Average Concentration)	Effluent Objectives (Average Concentration)
$CBOD_5$	10.0	5.0
Total Suspended Solids	10.0	5.0
Total Phosphorus	0.5	0.3
Total Ammonia Nitrogen	2.0 (Non-Freezing Period) 5.0 (Freezing Period)	1.0 (Non-Freezing Period) 3.0 (Freezing Period)
E.Coli (monthly geometric mean density)	200 CFU/100 mL	150 CFU/100 mL

6.3.5 East Zorra-Tavistock

6.3.5.1 Tavistock WWTS

The Tavistock WWTP is a lagoon-based treatment system. The treatment system consists of three aerated lagoon cells, a polishing pond, and an intermittent sand filter. Phosphorus removal is achieved by aluminum sulphate dosing. The collection system has three SPSs. Biosolids are stored in the lagoon for 15 to 25 years before being hauled for land application. A MCEA Study and Assimilative Capacity Study to expand the capacity of this WWTP is currently underway.

Table 6.6: Tavistock Lagoons Effluent Objectives and Limits

Effluent Parameter (mg/L)	Effluent Limits (Average Concentration)	Effluent Objectives (Average Concentration)
$CBOD_5$	15.0	10.0
Total Suspended Solids	15.0	10.0
Total Phosphorus	0.5 (May – Nov) 0.8 (May – Nov)	0.3 (May – Nov) 0.5 (May – Nov)
Total Ammonia Nitrogen	7.0 mg/L (January) 10.0 mg/L (February) 8.5 mg/L (March) 8.0 mg/L (April) 1.0 mg/L (May-Nov) 3.0 mg/L (December)	6.0 mg/L (January) 9.0 mg/L (February) 7.5 mg/L (March) 7.0 mg/L (April) 0.8 mg/L (May-Nov) 1.5 mg/L (December)

6.3.5.2 Innerkip WWTS

The village of Innerkip is serviced by the Woodstock WWTP. The Innerkip wastewater collection system comprises of an odour control facility comprising of hydrogen sulphide removal from the sanitary forcemain, and its main SPS is designed for a sewage demand from Innerkip of 20 L/s but the installed pumps have a firm capacity of 25.5 L/s to maintain minimum flow velocity in forcemain.

6.3.6 Norwich

6.3.6.1 Norwich WWTS

The Norwich WWTP is a lagoon-based treatment system consisting of two facultative lagoons, four intermittent sand filters, and an aluminum sulphate injection system for phosphorus removal. The lagoons receive wastewater from four SPSs. Treated effluent discharges to the Otter Creek. The biosolids are stored in the lagoons for usually between 15 to 20 years prior to being land applied.

A Municipal MCEA Study and Assimilative Capacity Study is underway for the capacity expansion of the Norwich WWTP to approximately 2,600 m^3/day.

Table 6.7: Norwich Lagoons Effluent Objectives and Limits

Effluent Parameter (mg/L)	Effluent Limits (Average Concentration)	Effluent Objectives (Average Concentration)
$CBOD_5$	10.0	5.0
Total Suspended Solids	10.0	5.0
Total Phosphorus	0.5 (Non-Freezing Period) 1.0 (Freezing Period)	0.3 (Non-Freezing Period) 0.8 (Freezing Period)
Total Ammonia Nitrogen	3.0 (Non-Freezing Period)	2.0 (Non-Freezing Period)

Effluent Parameter (mg/L)	Effluent Limits (Average Concentration)	Effluent Objectives (Average Concentration)
	5.0(Freezing Period)	4.0(Freezing Period)
E.Coli (monthly geometric mean density)	200 CFU/100 mL	150 CFU/100 mL

6.3.7 South-West Oxford

6.3.7.1 Mount Elgin WWTS

The Mount Elgin WWTP treats black/grey water via recirculation sand filters at a common drainage field. The serviced homes each have holding tanks that undergo septage removal by the County, every 3 to 5 years. Septage is hauled to the Ingersoll or Woodstock WWTP. In the septic tanks, sewage is pretreated to remove solids and grease before being discharged to the collection system, which transports the primary treated wastewater to an onsite SPS. At the plant, the influent is pumped to a recirculating sand filter, from which 20% of flow through sand filter is dosed to disposal beds, and 80% of flow through sand filter is recycled back into recirculation tank for further treatment.

Table 6.8: Mt. Elgin WWTP Effluent Objectives

Effluent Parameter (mg/L)	Effluent Objectives (Average Concentration)
$CBOD_5$	5.0
Total Suspended Solids	5.0

6.3.8 Zorra

6.3.8.1 Thamesford WWTS

The Thamesford WWTS consists of a Class II chlorination/de-chlorination based disinfection WWTP. The treated effluent is discharged to the Thames River. Sludge produced is temporarily stored within the plant and intermittently hauled to the Ingersoll WWTP for further treatment prior to final discharge. The sewage collection system comprises of four pumping stations, two of which are located at the WWTP.

In response to a shutdown of a major industrial plant which decreased the ADF by 50%, the WWTP reconfigured some of its unit processes. It is currently undergoing design for renewing its approved capacity and also implementing a headworks facility.

Table 6.9: Thamesford WWTP Effluent Objectives and Limits

Effluent Parameter (mg/L)	Effluent Limits (Average Concentration)	Effluent Objectives (Average Concentration)
$CBOD_5$	10.0 (May 1 - Nov 30) 15.0 (Dec 1 – Apr 30)	5.0
Total Suspended Solids	10.0 (May 1 - Nov 30) 15.0 (Dec 1 – Apr 30)	5.0
Total Phosphorus	0.2 (May 1 - Nov 30) 5.0 (Dec 1 – Apr 30)	0.1
Total Ammonia Nitrogen	2.0 (May 1 - Nov 30) 5.0 (Dec 1 – Apr 30)	1.2 (May 1 - Nov 30) 4.0 (Dec 1 – Apr 30)
E.Coli (monthly geometric mean density)	200/100 mL	-

6.3.8.2 Embro Odour Control Facility

The village of Embro is serviced by the Woodstock WWTP. The Embro wastewater collection system comprises of an odour control facility, sanitary forcemain, and three SPSs designed for peak flows of 3.6 L/s, 0.9 L/s and 2.1 L/s.

6.3.8.3 Biosolids Management Solids Facility

The County owns an offsite Biosolids Centralized Storage Facility that houses dewatered biosolids with a minimum storage capacity of 240 days. Biosolids may be stored for periods such as winter months when the dewatered product cannot be directly land applied.

7.0 WASTEWATER SYSTEM DESIGN CRITERIA

7.1 Wastewater Service Planning

The County's Official Plan requires that wastewater servicing planning provide the following:

- Evaluation of existing wastewater treatment infrastructure capacity and condition;
- Identification of management options available for wastewater treatment and the disposal of biosolids; and
- Priority setting and financing of wastewater treatment infrastructure improvements required to meet environmental objectives and accommodate population and employment growth.

The above directions are the foundation of Wastewater portion of the W/WW MP.

7.2 Wastewater Service Design Criteria

7.2.1 Standards and Design Guidelines

The criteria used to obtain and analyse the wastewater flows and treatment components are compiled from the following standards and guidelines:

- Ontario Design Guidelines for Sewage Works (Wastewater GL);
- Recommended Standards for Wastewater Facilities; Wastewater Committee of the Great Lakes – Upper Mississippi River (10 States); and
- Wastewater Treatment Fundamentals published by Water Environment Federation (WEF).

A key direction from the above standards that is used as the foundation of the wastewater treatment capacity analysis is:

Whenever there are existing sewage treatment plants, the flow rates and sewage characteristics should be determined using real data in both wet and dry conditions. Analysis should include determining the average and peak infiltration and inflow for the design year.

7.2.2 System Components

Wastewater Collection and Treatment Systems are comprised of various subcomponents which are provided in Table 7.1.

Table 7.1: Wastewater Treatment System Components

Components	Subcomponents	Capacity Measurement
Wastewater Collection	• Gravity Collection Systems • Siphons • Sewage Pumping Stations • Forcemains	• L/s for collection systems, siphons and forcemains • L/s at a specified TDH (m) for pumping stations
Wastewater Treatment	• Treatment Capacity • Rated Capacity • Peak Capacity	• m^3/day

7.3 Wastewater Service Design Considerations

7.3.1 Wastewater Sources

Wastewater sources include:

1. Wastewater from residential sources (metered);
2. Wastewater from non-residential sources (metered); and
3. Infiltration from groundwater and inflow from rain, termed extraneous flows (not metered).

7.4 Wastewater System Design Criteria

7.4.1 Wastewater Capacity

The capacities of each WWTS will be evaluated as follows:

1. Plant Rated Capacity: the average daily flow (ADF) which the treatment plant has been approved to handle.
2. Plant Utilizable Capacity: denotes the effective capacity of the facility. The industry best practice recommends taking 90% of the rated capacity as utilizable, to prevent

risk of organic and hydraulic peak loadings which may result in exceedances of effluent criteria.

3. Residual Utilizable Capacity: denotes the residual capacity available for growth. This is calculated by subtracting the current utilized capacity which is taken as the recent ADFs and therefore not available, from the plant utilizable capacity.

4. The rated capacity of the plant includes its ability to treat organic parameters within sewage, manage hydraulic loading and meet effluent objectives.

7.4.2 Wastewater Design Standards

7.4.2.1 Wastewater Treatment Plant

Monthly residential and non-residential wastewater flows are metered by the County and are referenced to as Base Flows (BF) in this TM. The Wastewater GL provides average BFs in Ontario that can be used in lieu of insufficient data; these range from 225 L/cap/day to 450 L/cap/day.

Commercial and institutional non-residential wastewater flows are assessed on an average equivalent population density basis. The Wastewater GL recommends using 85 population per hectare (p.p.ha) for Master planning purposes in lieu of insufficient data. For industrial flows, the GL recommend using field data for existing areas, and provides flow ranges for future industrial areas that can be used based on industry type.

The Wastewater GL directs to include allowances for leakage of surface and ground water (extraneous flows) into sewer pipes, but also to minimize this contribution through effective design, construction, and maintenance practices. Existing systems are to be assessed based on actual recorded flow data, and newer systems should incorporate allowances provided in the GL. The GL direct that peak extraneous flow is to be no less than 0.1 Litres per millimeter of diameter per meter length of sewer pipe (L/mm*d/m).

7.4.2.2 Wastewater Collection System

Collection systems are designed for peak flows which are established using peaking factors. In absence of recorded data, peaking factors for flows from the residential population is calculated using the Harmon formula:

$$\text{Harmon Peak Factor 'M'} = 1 + \frac{14}{4+P^{\frac{1}{2}}}$$

Where M = ratio of peak flow to average flow and P = tributary population in thousands.

The same formula is used for computing the commercial and institutional non-residential peak flows using an equivalent non-residential population. Typical industrial peaking factors are provided in the Wastewater GL for heavy and light industries. To estimate peak sewage flows, the average domestic flow rate is to be multiplied by the Harmon factor, then the peak extraneous flows should be added.

7.4.2.3 Sewage Pumping System

Sewage pumping stations (SPS) are designed for peak instantaneous sewage flows from its tributary area. The Wastewater GLs recommend designing for future projected flows by including provisions for future capacity expansion such as pumps or forcemain. The structure and its equipment it so be protected from the 100-year design flood event, and the SPS is to remain fully operational and accessible during the 25-year flood event.

7.4.2.4 Sanitary Sewers and Forcemains

Sanitary sewers are designed for peak instantaneous sewage flow from its tributary area, which may be beyond the defined municipal limits. Typically, a design period of 20 years is taken which includes population growth and development plans.

Forcemains are to maintain a flowrate of at least 0.6 m/s (2 ft/s), or a range of between 0.6 and 1.1 m/s (2 to 3.6 ft/s); the maximum velocity should be limited to 3 m/s (10 ft/s). As a note, good engineering practice is to have a minimum velocity of 0.8 m/s for non-continuous pumping. The minimum forcemain diameter should not be less than 100 mm. The pipe diameter and velocities are to be confirmed via hydraulic modelling.

7.4.3 Wastewater Design Parameters

7.4.3.1 Wastewater Flows

Wastewater GL directs that existing sewers and sewage treatment plants, flow rates, and sewage strengths is to be determined in both wet and dry weather conditions, and the WWTS to be designed using the resulting parameters which consist of:

- Average Daily Flow (ADF)
    - ADF is the cumulative total sewage flow to the treatment system during a calendar year, divided by the number of during which sewage was flowing to the sewage treatment works that year.
- Maximum Daily Flow (MDF)

    - MDF is the largest volume of flow to be received during a one-day period expressed as a volume per unit time.

- Average and Peak extraneous flows in design year.

The ratio of the MDF to the ADF is termed MDPF. The Wastewater GLs provide typical ranges of MDPF for historical average ADF values that a plant may ideally receive. This allows determining the system's exposure to extraneous flows and allows identifying atypical conditions that may need rectification.

7.4.3.2 Extraneous Flows

In accordance with the Wastewater GL, which provide typical *inflow and infiltration* (I&I) flows on a per area basis, the historical I&I rates to each of Oxford County's WWTP are analysed on existing residential and non-residential areas. The areas are obtained from GIS shape files provided by the county, which provide the total area (ha) of currently occupied residential and non-residential lands and their land use type. These files were used to obtain the following information:

- Total currently occupied lands, labelled $Area_{TOTAL}$;
- % of $Area_{TOTAL}$ that is designated residential, labelled $Area_{RES}$; and
- % of $Area_{TOTAL}$ that is designated non-residential, labelled $Area_{NON\text{-}RES}$.

Flows during dry weather are labelled Average Dry Weather Flows (ADWF) and are taken as the lowest 24 hour flow volume in a calendar year. In this scenario, typically only groundwater infiltration adds to the BFs received by the system with minimal inflows from rain. The volume of this I&I flows is then calculated by subtracting BF from ADWF and is labelled $ADWF_{I\&I}$, denoting the average I&I received by the system during dry weather. The I&I received during wet weather or maximum day flows (MDF) and received on average annually (ADF) are denoted $MDF_{I\&I}$ and $ADF_{I\&I}$ respectively and are calculated likewise as indicated below:

- $ADWF_{RES*I\&I}\left(\frac{L}{\frac{ha}{s}}\right) = \left(\frac{ADWF_{I\&I}\frac{L}{day}}{\%\ of\ Area_{RES}\ x\ Area_{TOTAL} x\ 86400}\right)$
- $ADWF_{NON-RES*I\&I}\left(\frac{L}{\frac{ha}{s}}\right) = \left(\frac{ADWF_{I\&I}\frac{L}{day}}{\%\ of\ Area_{NON-RES}\ x\ Area_{TOTAL} x\ 86400}\right)$
- $ADWF_{RES*I\&I}\left(\frac{L}{\frac{capita}{day}}\right) = \left(\frac{\left[ADWF_{RES*I\&I}\left(\frac{L}{day}\right)\right] x\ \%\ of\ Area_{RES}}{Population_{RESIDENTIAL}}\right)$

- $ADWF_{NON-RES*I\&I}\left(\frac{L}{\frac{capita}{day}}\right) = \left(\frac{\left[ADWF_{NON-RES*I\&I}\left(\frac{L}{day}\right)\right] x\ \%\ of\ Area_{NON-RES}}{Population_{NON-RESIDENTIAL}}\right)$

These values can be compared to the suggested values in the Wastewater GL to validate that they are within range. The residential and non-residential $\mathrm{ADF_{I\&I}}\left(\frac{\mathrm{L}}{\frac{\mathrm{capita}}{\mathrm{day}}}\right)$ and $\mathrm{MDF_{I\&I}}\left(\frac{\mathrm{L}}{\frac{\mathrm{capita}}{\mathrm{day}}}\right)$ are obtained likewise:

- $ADF_{RES*I\&I}\left(\frac{L}{\frac{ha}{s}}\right) = \left(\frac{ADF_{I\&I}\frac{L}{day}}{\%\ of\ Area_{RES}\ x\ Area_{TOTAL} x\ 86400}\right)$
- $ADF_{NON-RES*I\&I}\left(\frac{L}{\frac{ha}{s}}\right) = \left(\frac{ADF_{I\&I}\frac{L}{day}}{\%\ of\ Area_{NON-RES}\ x\ Area_{TOTAL} x\ 86400}\right)$
- $ADF_{RES*I\&I}\left(\frac{L}{\frac{capita}{day}}\right) = \left(\frac{\left[ADF_{RES*I\&I}\left(\frac{L}{day}\right)\right] x\ \%\ of\ Area_{RES}}{Population_{RESIDENTIAL}}\right)$
- $ADF_{NON-RES*I\&I}\left(\frac{L}{\frac{capita}{day}}\right) = \left(\frac{\left[ADF_{NON-RES*I\&I}\left(\frac{L}{day}\right)\right] x\ \%\ of\ Area_{NON-RES}}{Population_{NON-RESIDENTIAL}}\right)$
- $MDF_{RES*I\&I}\left(\frac{L}{\frac{ha}{s}}\right) = \left(\frac{MDF_{I\&I}\frac{L}{day}}{\%\ of\ Area_{RES}\ x\ Area_{TOTAL} x\ 86400}\right)$
- $MDF_{NON-RES*I\&I}\left(\frac{L}{\frac{ha}{s}}\right) = \left(\frac{MDF_{I\&I}\frac{L}{day}}{\%\ of\ Area_{NON-RES}\ x\ Area_{TOTAL} x\ 86400}\right)$
- $MDF_{RES*I\&I}\left(\frac{L}{\frac{capita}{day}}\right) = \left(\frac{\left[MDF_{RES*I\&I}\left(\frac{L}{day}\right)\right] x\ \%\ of\ Area_{RES}}{Population_{RESIDENTIAL}}\right)$
- $MDF_{NON-RES*I\&I}\left(\frac{L}{\frac{capita}{day}}\right) = \left(\frac{\left[MDF_{NON-RES*I\&I}\left(\frac{L}{day}\right)\right] x\ \%\ of\ Area_{NON-RES}}{Population_{NON-RESIDENTIAL}}\right)$

For systems where insufficient flow data or data discrepancies exists, the Wastewater GL (1984) provides an extraneous flow allowance for pumping stations or treatment facilities on a per capita and per ha basis as follows:

- 0.043 - 0.107 L/ha/s (average to peak); and
- 90 L/cap/day – 227 L/cap/day (average to peak).

In these cases, projection calculations are then made using the above recommended rates.

Table 7.2 provides a summary overview of the design parameters of a WWTS' subcomponents.

Table 7.2: Wastewater Treatment System Design Parameters

Components	Subcomponents	Design Parameter
Wastewater Collection	Gravity Collection Systems	• Peak Instantaneous Flows
	Sewage Pumping Stations	• Peak Instantaneous Flows
	Forcemains	• Peak Instantaneous Flows
Wastewater Treatment	Wastewater Treatment Plant	• Average Daily Flows • Individual process units in the treatment plant are designed for different flows depending on the type of flow exposure of the unit.

Source: MOE Design Guidelines for Sewage Works (2008) as currently modified

7.4.4 County WWTS Design Criteria

This section provides the above described design parameters (ADWF, ADF, and Peak Flows for the 2021 population) derived for each of County's WWTS's as shown in Sections 7.4.4.1 to 7.4.4.7 respectively.

7.4.4.1 Ingersoll

Wastewater Treatment Plant	
Parameter	Values (L/capita/day)
Residential Flows	
ADF_{RES}	315
ADWF *excluding I/I	140
I/I Allowance	175
Non-Residential Flows	
$ADF_{NON-RES}$	415

Wastewater Collection System	
Parameter	Values
Residential Flows	
ADF_{RES} x M_{RES} (L/capita/day)	895
I/I_{PEAK} allowance (L/s/ha)	0.072
Non-Residential Flows	
$ADF_{NON-RES}$ x M (L/capita/day)	1,190
I/I_{PEAK} allowance (L/s/ha)	0.078

7.4.4.2 Tillsonburg

Wastewater Treatment Plant	
Parameter	Values
Residential Flows (L/capita/day)	
ADF_{RES}	200
ADWF *excluding I/I	160
I/I Allowance	40
Non-Residential Flows	
$ADF_{NON-RES}$	225

Wastewater Collection System	
Parameter	Values
Residential Flows	
ADF_{RES} x M_{RES} (L/capita/day)	545
I/I_{PEAK} allowance (L/s/ha)	0.02
Non-Residential Flows	
$ADF_{NON-RES}$ x M (L/capita/day)	715
I/I_{PEAK} allowance (L/s/ha)	0.01

7.4.4.3 Woodstock

Wastewater Treatment Plant	
Parameter	Values (L/capita/day)
Residential Flows	
ADF_{RES}	220
ADWF *excluding I/I	150
I/I Allowance	70
Non-Residential Flows	
$ADF_{NON-RES}$	310

Wastewater Collection System	
Parameter	Values
Residential Flows	
ADF_{RES} x M_{RES} (L/capita/day)	635
I/I_{PEAK} allowance (L/s/ha)	0.037
Non-Residential Flows	
$ADF_{NON-RES}$ x M (L/capita/day)	1000
I/I_{PEAK} allowance (L/s/ha)	0.036

7.4.4.4 Norwich

Wastewater Treatment Plant	
Parameter	Values
Residential Flows (L/capita/day)	
ADF_{RES}	175
ADWF *excluding I/I	120
I/I Allowance	55
Non-Residential Flows	
$ADF_{NON-RES}$	300

Wastewater Collection System	
Parameter	Values
Residential Flows	
ADF_{RES} x M_{RES} (L/capita/day)	740
I/I_{PEAK} allowance (L/s/ha)	0.040
Non-Residential Flows	
$ADF_{NON-RES}$ x M (L/capita/day)	1650
I/I_{PEAK} allowance (L/s/ha)	0.039

7.4.4.5 Blandford Blenheim: Drumbo

Wastewater Treatment Plant	
Parameter	Values (L/capita/day)
Residential Flows	
ADF_{RES}	260
ADWF *excluding I/I	160
I/I Allowance	105
Non-Residential Flows	
$ADF_{NON-RES}$	385

Wastewater Collection System	
Parameter	Values
Residential Flows	
ADF_{RES} x M_{RES} (L/capita/day)	940
I/I_{PEAK} allowance (L/s/ha)	0.060
Non-Residential Flows	
$ADF_{NON-RES}$ x M (L/capita/day)	685
I/I_{PEAK} allowance (L/s/ha)	0.008

7.4.4.6 Blandford Blenheim: Plattsville

Wastewater Treatment Plant	
Parameter	Values (L/capita/day)
Residential Flows	
ADF_{RES}	225
ADWF *excluding I/I	155
I/I Allowance	70
Non-Residential Flows	
$ADF_{NON-RES}$	75

Wastewater Collection System	
Parameter	Values
Residential Flows	
ADF_{RES} x M_{RES} (L/capita/day)	800
I/I_{PEAK} allowance (L/s/ha)	0.040
Non-Residential Flows	
$ADF_{NON-RES}$ x M (L/capita/day)	275
I/I_{PEAK} allowance (L/s/ha)	0.005

7.4.4.7 East-Zorra Tavistock: Tavistock

Wastewater Treatment Plant	
Parameter	Values
Residential Flows (L/capita/day)	
ADF_{RES}	245
ADWF *excluding I/I	140
I/I Allowance	105
Non-Residential Flows	
$ADF_{NON-RES}$	185

Wastewater Collection System	
Parameter	Values
Residential Flows	
ADF_{RES} x M_{RES} (L/capita/day)	1,060
I/I_{PEAK} allowance (L/s/ha)	0.085
Non-Residential Flows	
$ADF_{NON-RES}$ x M (L/capita/day)	715
I/I_{PEAK} allowance (L/s/ha)	0.064

7.4.4.8 Zorra: Thamesford

Wastewater Treatment Plant	
Parameter	Values
Residential Flows (L/capita/day)	
ADF_{RES}	165
ADWF *excluding I/I	150
I/I Allowance	15
Non-Residential Flows	
$ADF_{NON-RES}$	75

Wastewater Collection System	
Parameter	Values
Residential Flows	
ADF_{RES} x M_{RES} (L/capita/day)	600
I/I_{PEAK} allowance (L/s/ha)	0.015
Non-Residential Flows	
$ADF_{NON-RES}$ x M (L/capita/day)	315
I/I_{PEAK} allowance (L/s/ha)	0.002

7.4.4.9 South-West Oxford: Mount Elgin

Based on available data, the design criteria of the system could only be computed for the base residential and non-residential metered flows (ADWF excluding I/I). Due to the unconfirmed current non-residential population data, the collection system design criteria was only confirmed for the residential flows.

Wastewater Treatment Plant	
Parameter	Values
Residential Flows (L/capita/day)	
ADWF *excluding I/I	135
Non-Residential Flows	
ADWF *excluding I/I	1,280

Wastewater Collection System	
Parameter	Values
Residential Flows	
ADF_{RES} x M_{RES} (L/capita/day)	565
I/I_{PEAK} allowance (L/s/ha)	0.07

8.0 WATER SYSTEM EXISTING AND FUTURE INFRASTRUCTURE ASSESSMENT

8.1 Water System Issues and Constraints

This section summarizes findings from the analysis of the performance of the existing water systems and assessment of future servicing needs. The approach focused on identifying existing system opportunities and constraints and layering on growth to determine future servicing requirements.

Opportunities and constraints were identified for each DWS through field visits to water operations sites, discussions with County staff and based on the ability of each DWS to provide adequate levels of service currently and in the future.

The general opportunities and constraints across the County's DWS are as follows:

- Provisions for security of supply (i.e. standby power to water facilities, specialized well rehabilitation, water blending, feedermain twinning, water efficiency and conservation, etc.);
- Enhancements to system redundancy (i.e. new well supplies to increase firm capacity, inter-system water connections, watermain looping, etc.);
- Pressure zone boundary adjustments;
- Impacts due to new areas requiring servicing (i.e., infill and intensification, new employment lands, secondary units, etc.);
- Water production and system operational issues (i.e. pressure, fire flow, filtration backwash frequencies, etc.);
- Infrastructure capacity limitations (i.e. high lift pumps, feedermains, well yields, etc.);
- Source water quality (i.e. nitrates, iron, manganese, naturally occurring arsenic, strontium, etc.); and
- Unaccounted system water loss.

8.2 Water System Demand Projection Methodology

8.2.1 Committed Capacity

Committed capacity is defined as the existing demand from the system that it must supply. This includes existing serviced connections and future confirmed connections from approved developments. Identifying the existing committed capacity allows for determining the remaining capacity or the *Uncommitted Capacity* of the DWS (as per MOE Procedure D-5.1: Calculating and Reporting Uncommitted Reserve Capacity at Sewage and Water Treatment Plants) after capacity is reserved for all approved residential and non-residential developments. Approval for future development applications then becomes contingent on the uncommitted capacity available to support growth. In addition, the trigger point of the system for expansion or upgrades can be identified in advance.

8.2.2 Water Demand Projection Methodology

Water demand projections to 2046 were calculated using the historical residential and non-residential MDPF multiplied by the ADD for each DWS in Section 4. To account for varying seasonal conditions, the average historical ADD from 2018 to 2021 is used to project water demand in proportion to the population at each 5-year increment, under the assumption that water use and loss will increase linearly with the population growth.

8.3 Water System Demands Projections

Water system demand requirements were developed for each DWS to identify any potential supply deficiencies. The baseline starting point (January 1, 2022) from which future water demand projections were applied to was established using a rolling four year average of historical MDD between 2018 and 2021 for each DWS. Based on the population and employment growth forecast to 2046, MDD projections and pumping/storage requirements for each DWS was quantified using the above methodology.

8.3.1 Ingersoll DWS

8.3.1.1 Projected Water Demand

The water demand and required storage capacity from both sectors combined (residential and non-residential) and its comparison to the DWS's firm capacity from Chapter 4 are shown in Table 8.1 and Table 8.2.

Table 8.1: Ingersoll DWS Forecasted MDD

Parameter	2026	2031	2036	2041	2046
Dynamic Supply Capacity[1] (m^3/day)	13,910				
Dynamic Firm Capacity[1] (m^3/day)	9,675				
ADD (m^3/day)	4,355	4,595	4,580	5,115	5,390
MDD (m^3/day)	6,945	7,325	7,735	8,160	8,595
MDD% of Dynamic Supply Capacity[1]	50%	53%	56%	59%	62%

1 Reflective of DWS State in 2023

Table 8.2: Ingersoll DWS Projected Storage Requirements

Parameter	2026	2031	2036	2041	2046
Storage Capacity[1] (m^3)	5,700				
Required Storage (m^3)	5,005	5,225	5,460	6,740	7,010
Surplus / (Deficit) (m^3)	685	475	240	(1,040)	(1,310)

1 Reflective of DWS State in 2023

8.3.1.2 System Issues

As seen in Table 8.1, the Ingersoll DWS's dynamic supply capacity can supply the water demand arising to the year 2046. Additionally, demand growth will require investments in improving the dynamic firm capacity of the well supply (i.e. any periods when the largest producing well - Thompson Road may need to be temporarily removed from service) to enhance the reliability of the DWS. However, a storage capacity deficit will be approached nearing 2041 as seen in Table 8.2. Before 2036, the storage volume required will surpass 85% of the available capacity, marking the trigger point for expansion that will be needed to continue supporting growth.

Included in the future demand will be the provision of water supply to the Southwest Industrial Secondary Plan Area (south of Highway 401,Wallace Line area) as well as areas of infill growth of vacant lands within the urban boundary. This will require BPS, additional storage, and trunk watermain infrastructure.

Ingersoll does have capacity to provide water to other DWSs but this has not been included in the forecast demand in Table 8.1. Any projects to supply water to other DWS should

consider the impact to Ingersoll's supply and any changes that may be necessitated in the Ingersoll DWS distribution system to accommodate this.

8.3.2 Tillsonburg DWS

8.3.2.1 Projected Water Demand

The water demand and required storage capacity from both residential and non-residential sectors combined and its comparison to the DWS capacity is shown in Table 8.3 provides the forecasted water demand. The firm capacity includes Well 3, under the assumption that it will commence operation by 2024.

Table 8.3: Tillsonburg DWS Forecasted MDD

Parameter	2026	2031	2036	2041	2046
Dynamic Supply Capacity[1] (m^3/day)	9,505				
Dynamic Firm Capacity[1] (m^3/day)	8,380				
ADD (m^3/day)	5,640	5,875	6,130	6,395	6,660
MDD (m^3/day)	8,795	9,160	9,560	9,975	10,390
MDD% of Dynamic Supply Capacity[1]	93%	96%	101%	105%	109%

1 Reflective of DWS State in 2023

Table 8.4 provides the current usable and required storage capacity of the Tillsonburg DWS.

Table 8.4: Tillsonburg DWS Projected Storage Requirements

Parameter	2026	2031	2036	2041	2046
Storage Capacity[1] (m^3)	9,225				
Required Storage (m^3)	7,620	7,850	8,095	8,345	8,590
Surplus / (Deficit) (m^3)	1,605	1,375	1,130	880	635

1 Reflective of DWS State in 2023

By 2036, the MDD is forecasted to approach the current state dynamic supply capacity of the Tillsonburg DWS while adequate storage exists approaching 2046.

8.3.2.2 System Issues

Included in the future demand will be the provision of water supply to the infill growth areas (i.e. north / south side of the Town). Ongoing servicing provisions will require BPS, storage, and trunk watermain infrastructure. Additionally, demand growth will require investments in improving well dynamic firm capacity to enhance DWS reliability.

8.3.3 Woodstock DWS

8.3.3.1 Projected Water Demand

The water demand and required storage capacity from both residential and non-residential sectors combined and its comparison to the DWSs capacity is shown is shown in Tables 8.5 and Table 8.6 respectively.

Table 8.5: Woodstock DWS MDD Forecast

Parameter	2026	2031	2036	2041	2046
Dynamic Supply Capacity[1] (m^3/day)	54,000				
Dynamic Firm Capacity[1] (m^3/day)	44,065				
ADD (m^3/day)	16,760	17,875	19,090	20,335	21,655
MDD (m^3/day)	25,025	26,690	28,500	30,360	32,330
MDD% of Dynamic Supply Capacity[1]	46%	49%	53%	56%	60%

1 Reflective of DWS State in 2023

Table 8.6: Woodstock DWS Required Storage Volume Forecast

Parameter	2026	2031	2036	2041	2046
Storage Capacity[1] (m^3)	34,760				
Required Storage (m^3)	18,025	18,545	19,110	19,695	20,310
Surplus / (Deficit) (m^3)	16,735	16,215	15,650	15,065	14,450

1 Reflective of DWS State in 2023

As seen above, the Woodstock DWS has ample water supply and storage capacity to support growth to the year 2046.

8.3.3.2 System Issues

Included in the future demand will be the provision of water supply to the Secondary Plan Areas referenced in section 2.3.2 as well as areas of infill growth. Ongoing servicing provisions will require BPS and trunk watermain infrastructure, along with expansion of certain pressure zones and additional measures to enhance the reliability of the water supply feedermain from the Thornton Well field.

Woodstock does have capacity to provide water to other DWSs but this has not been included in the forecast demand in Table 8.5. Any projects to supply water to other DWS should consider the impact to Ingersoll's supply and any changes that may be necessitated in the Woodstock DWS distribution system to accommodate this.

8.3.4 Bright DWS

8.3.4.1 Projected Water Demand

Bright is not planned to accommodate further residential growth, beyond potential minor infill development, subject to available service capacity. The water demand and required storage capacity is assumed to be steady state to 2046 is shown in Tables 8.7 and 8.8.

Table 8.7: Bright DWS MDD Forecast

Parameter	2046
Dynamic Supply Capacity[1] (m^3/day)	325
Dynamic Firm Capacity[1] (m^3/day)	185
ADD (m^3/day)	90
MDD (m^3/day)	200
MDD% of Dynamic Supply Capacity[1]	61%

1 Reflective of DWS State in 2023

Table 8.8: Bright DWS Required Storage Volume Forecast

Parameter	2046
Storage Capacity[1] (m^3)	245
Required Storage (m^3)	85
Surplus / (Deficit) (m^3)	160

1 Reflective of DWS State in 2023

8.3.4.2 SYSTEM ISSUES

While the Bright DWS has ample water supply and storage capacity to 2046, its reliability of supply is primarily limited to one single production well and/or provisions for trucked-in potable water as/if required. This risk is proposed to be addressed through an inter-community watermain connection to the Plattsville DWS.

8.3.5 Drumbo-Princeton DWS

8.3.5.1 Projected Water Demand

The forecasted water demand and storage required for the Drumbo-Princeton DWS is provided in Tables 8.9 and 8.10 respectively.

Table 8.9: Drumbo – Princeton DWS MDD Forecast

Parameter	2026	2031	2036	2041	2046
Dynamic Supply Capacity[1] (m^3/day)	1,330				
Dynamic Firm Capacity[1] (m^3/day)	710				
ADD (m^3/day)	325	365	405	450	485
MDD (m^3/day)	595	665	740	820	890
MDD% of Dynamic Supply Capacity[1]	45%	50%	56%	62%	67%

1 Reflective of DWS State in 2023

Table 8.10: Drumbo-Princeton DWS Required Storage Volume Forecast

Parameter	2026	2031	2036	2041	2046
Storage Capacity[1] (m^3)	700				
Required Storage (m^3)	295	330	365	400	430
Surplus / (Deficit) (m^3)	405	370	335	300	270

1 Reflective of DWS State in 2023

While adequate dynamic water supply capacity and storage exists to 2046, the MDD is forecasted to approach 94% of the dynamic firm capacity of the Drumbo-Princeton DWS by 2031.

8.3.5.2 System Issues

Included in the future demand will be the provision of water supply to the infill growth within the settlement. An additional well supply and possible relocation of the current water treatment plant could be investments for ensuring improvements to the dynamic firm capacity of the DWS. As well, this DWS lacks dedicated standby power for two of its production wells.

8.3.6 Plattsville DWS

8.3.6.1 Projected Water Demand

Forecasted water demand and its comparison to the firm capacity is provided in Tables 8.11 and 8.12.

Table 8.11: Plattsville DWS Forecasted MDD

Parameter	2026	2031	2036	2041	2046
Dynamic Supply Capacity[1] (m^3/day)	2,290				
Dynamic Firm Capacity[1] (m^3/day)	1,295				
ADD (m^3/day)	440	465	495	525	545
MDD (m^3/day)	940	1,000	1,055	1,125	1,160
MDD% of Dynamic Supply Capacity[1]	41%	44%	46%	49%	51%

1 Reflective of DWS State in 2023

Table 8.12: Plattsville Forecasted Storage Requirements

Parameter	2026	2031	2036	2041	2046
Storage Capacity[1] (m^3)	1,825				
Required Storage (m^3)	1,150	1,190	1,230	1,270	1,295
Surplus / (Deficit) (m^3)	675	635	595	555	530

1 Reflective of DWS State in 2023

The Plattsville DWS has adequate water supply capacity and storage exists to 2046 at which time the MDD is forecasted to approach 90% of the dynamic firm capacity.

8.3.6.2 System Issues

Included in the future demand will be the provision of water supply to the infill growth areas within the community. The need for additional water supply capacity will require additional well supply, enhanced water treatment plant filtration and watermain infrastructure, along with provisions for dedicated backup power generation.

8.3.7 Oxford South DWS

8.3.7.1 Projected Water Demand

Oxford South DWS's forecasted water demand and required storage capacity and its comparison to the system's capacities are shown in Tables 8.13 and 8.14.

Table 8.13: Oxford South's Forecasted MDD

Parameter	2026	2031	2036	2041	2046
Dynamic Supply Capacity[1] (m^3/day)	6,055				
Dynamic Firm Capacity[1] (m^3/day)	3,290				
ADD (m^3/day)	1,495	1,605	1,720	1,840	1,950
MDD (m^3/day)	2,945	3,165	3,400	3,625	3,845
MDD% of Dynamic Supply Capacity[1]	51%	52%	56%	60%	64%

1 Reflective of DWS State in 2023

Table 8.14: Oxford South DWS Projected Storage Requirements

Parameter	2026	2031	2036	2041	2046
Storage Capacity[1] (m^3)	2,200				
Required Storage (m^3)	3,140	3,255	3,385	3,510	3,630
Surplus / (Deficit) (m^3)	(935)	(1,055)	(1,185)	(1,310)	(1,430)

1 Reflective of DWS State in 2023

While the Oxford South DWS has adequate dynamic water supply to 2046, the MDD is forecasted to approach 90% of the dynamic firm capacity by 2026. A storage capacity deficit is noted approaching 2026.

8.3.7.2 System Issues

Included in the future demand will be the provision of water supply to the infill growth areas within the community. Provisions for additional water to improve dynamic firm capacity and storage capacity will require a new well supply, CT enhancements to re-allocate to storage, new storage infrastructure, enhanced water treatment plant filtration and watermain infrastructure.

8.3.8 Beachville DWS

8.3.8.1 Projected Water Demand

Beachville is not planned to accommodate significant additional residential growth. The projected MDD to the year 2046 based on the assumption that no further significant growth is expected, beyond minimal infilling, based on the available service capacity. The projected MDD and storage requirements are expected to remain steady state to the year 2046 is shown in Tables 8.15 and 8.16.

Table 8.15: Beachville DWS Future MDD Forecast

Parameter	2046
Dynamic Supply Capacity[1] (m^3/day)	655
Dynamic Firm Capacity[1] (m^3/day)	100
ADD (m^3/day)	45
MDD (m^3/day)	105
MDD% of Dynamic Supply Capacity[1]	16%

1 Reflective of DWS State in 2023

Table 8.16: Beachville DWS Projected Storage Requirements

Parameter	2046
Storage Capacity[1] (m^3)	20
Required Storage (m^3)	45
Surplus / (Deficit) (m^3)	(25)

1 Reflective of DWS State in 2023

8.3.8.2 System Issues

While the Beachville DWS has adequate water supply to 2046 with a minor storage capacity deficit, its reliability of supply is limited to one single production well and/or provisions for trucked-in potable water as required. Additional standby well and storage infrastructure will be required to address this risk.

8.3.9 Brownsville DWS

8.3.9.1 Projected Water Demand

Brownsville is not planned to accommodate significant additional residential growth. The projected MDD to the year 2046 and required storage capacity is expected to remain steady state to 2046 as shown in Tables 8.17 and 8.18.

Table 8.17: Brownsville DWS Future MDD Forecast

Parameter	2046
Dynamic Supply Capacity[1] (m^3/day)	365
Dynamic Firm Capacity[1] (m^3/day)	100
ADD (m^3/day)	90
MDD (m^3/day)	185
MDD% of Dynamic Supply Capacity[1]	51%

1 Reflective of DWS State in 2023

Table 8.18: Brownsville DWS Projected Storage Requirements

Parameter	2046
Storage Capacity[1] (m^3)	210
Required Storage (m^3)	80
Surplus / (Deficit) (m^3)	130

1 Reflective of DWS State in 2023

8.3.9.2 System Issues

While the Brownsville DWS has adequate water supply and storage to 2046, its dynamic firm capacity is limited to either single production well or trucked-in potable water as currently both wells are required to be operational to provide adequate mixing to meet ODWS for Arsenic. Enhanced water treatment filtration infrastructure and will be required to mitigate this risk to improve the dynamic firm capacity.

8.3.10 Dereham Centre DWS

8.3.10.1 Projected Water Demand

Dereham Centre is not planned to accommodate significant additional residential growth. The projected MDD and required storage is expected to remain steady state to 2046 as shown in Tables 8.19 and 8.20Table .

Table 8.19: Dereham Centre DWS Future MDD Forecast

Parameter	2046
Dynamic Supply Capacity[1] (m^3/day)	50
Dynamic Firm Capacity[1] (m^3/day)	50
ADD (m^3/day)	10
MDD (m^3/day)	30
MDD% of Dynamic Supply Capacity[1]	60%

1 Reflective of DWS State in 2023

Table 8.20: Dereham Centre DWS Required Storage Volume Forecast

Parameter	2046
Storage Capacity[1] (m^3)	30
Required Storage (m^3)	10
Surplus / (Deficit) (m^3)	20

1 Reflective of DWS State in 2023

8.3.10.2 System Issues

Given the size of the Dereham Centre DWS, any temporary disruption in water supply can be addressed through trucking water to the system. Therefore, in this context this DWS is considered to have an adequate water supply and storage capacity to 2046 with no issues noted.

8.3.11 Mount Elgin DWS

8.3.11.1 Projected Water Demand

Mount Elgin's forecasted water and storage demand data is provided in Tables 8.21 and 8.22.

Table 8.21: Mount Elgin DWS MDD Forecast

Parameter	2026	2031	2036	2041	2046
Dynamic Supply Capacity[1] (m^3/day)	760				
Dynamic Firm Capacity[1] (m^3/day)	430				
ADD (m^3/day)	180	235	290	335	380
MDD (m^3/day)	410	535	660	760	865
MDD% of Dynamic Supply Capacity[1]	54%	70%	87%	100%	114%

1 Reflective of DWS State in 2023

Table 8.22: Mount Elgin MDWS Required Storage Volume Forecast

Parameter	2026	2031	2036	2041	2046
Storage Capacity[1] (m^3)	315				
Required Storage (m^3)	155	200	245	280	315
Surplus / (Deficit) (m^3)	160	115	70	35	0

1 Reflective of DWS State in 2023

By 2041, the MDD is forecasted to approach the dynamic supply capacity of the Mount Elgin DWS while storage capacity remains adequate to 2046.

8.3.11.2 System Issues

Included in the future demand will be the provision of water supply to the infill growth areas within the community. Provisions for additional water supply capacity will require water treatment plant optimization and an inter-community watermain connection to the Ingersoll DWS. These projects will also increase the dynamic firm capacity and improve the reliability of the DWS.

8.3.12 Hickson DWS

8.3.12.1 Projected Water Demand

Hickson is not planned to accommodate significant additional residential growth. The forecasted water capacity and storage capacity is expected to remain steady state to 2046 as shown in Tables 8.23 and 8.24.

Table 8.23: Hickson DWS MDD Forecast

Parameter	2046
Dynamic Supply Capacity[1] (m^3/day)	300
Dynamic Firm Capacity[1] (m^3/day)	100
ADD (m^3/day)	20
MDD (m^3/day)	60
MDD% of Dynamic Supply Capacity[1]	60%

1 Reflective of DWS State in 2023

Table 8.24: Hickson DWS Required Storage Forecast

Parameter	2046
Storage Capacity[1] (m^3)	40
Required Storage (m^3)	20
Surplus / (Deficit) (m^3)	20

1 Reflective of DWS State in 2023

Given the size of the Hickson DWS, any temporary disruption in water supply can be addressed through trucking water to the system. Therefore, in this context this DWS is considered to have an adequate water supply and storage capacity to 2046 with no issues noted.

8.3.13 Innerkip DWS

8.3.13.1 Projected Water Demand

The forecasted water demand for the Innerkip DWS to 2046 and storage required for the growing serviced population is listed in Tables 8.25 and 8.26.

Table 8.25: Innerkip DWS MDD Forecast

Parameter	2026	2031	2036	2041	2046
Dynamic Supply Capacity[1] (m^3/day)	1,295				
Dynamic Firm Capacity[1] (m^3/day)	1,295				
ADD (m^3/day)	380	445	490	530	550
MDD (m^3/day)	750	880	970	1,060	1,095
MDD% of Dynamic Supply Capacity[1]	58%	68%	75%	82%	85%

1 Reflective of DWS State in 2023

Table 8.26: Innerkip DWS Required Storage Volume Forecast

Parameter	2026	2031	2036	2041	2046
Storage Capacity[1] (m^3)	635				
Required Storage (m^3)	285	335	365	395	405
Surplus / (Deficit) (m^3)	350	300	270	240	230

1 Reflective of DWS State in 2023

As seen above, the Innerkip DWS has ample water supply and storage capacity to support growth to the year 2046.

8.3.13.2 System Issues

Included in the future demand will be the provision of water supply to the infill growth areas within the community which will require ongoing watermain replacements and/or upgrades.

8.3.14 Tavistock DWS

8.3.14.1 Projected Water Demand

The water demand and required storage capacity from both residential and non-residential sectors combined and its comparison to the DWS capacity is shown in Tables 8.27 and 8.28.

Table 8.27: Tavistock DWS Forecasted MDD

Parameter	2026	2031	2036	2041	2046
Dynamic Supply Capacity[1] (m^3/day)	5,615				
Dynamic Firm Capacity[1] (m^3/day)	4,060				
ADD (m^3/day)	1,940	1,985	2,030	2,075	2,150
MDD (m^3/day)	3,535	3,685	3,840	3,985	4,120
MDD% of Dynamic Supply Capacity[1]	63%	66%	68%	71%	71%

1 Reflective of DWS State in 2023

Table 8.28: Tavistock DWS Forecasted Storage Requirements

Parameter	2026	2031	2036	2041	2046
Storage Capacity[1] (m^3)	790				
Required Storage (m^3)	1,640	1,730	1,820	1,905	1,185
Surplus / (Deficit) (m^3)	(890)	(940)	(1,030)	(1,115)	(1,195)

1 Reflective of DWS State in 2023

By 2026, the MDD is forecasted to approach the dynamic firm capacity of the DWS by 2046, while the storage capacity of the Tavistock DWS is currently in deficit.

8.3.14.2 System Issues

Included in the future demand will be the provision of a new water supply and storage facility to service the infill growth areas within the community as well as enhanced water treatment plant filtration and watermain infrastructure.

8.3.15 Thamesford DWS

8.3.15.1 Projected Water Demand

The forecasted water demand and storage required is provided in Tables 8.29 and 8.30.

Table 8.29: Thamesford DWS Forecasted MDD

Parameter	2026	2031	2036	2041	2046
Dynamic Supply Capacity[1] (m^3/day)	5,390				
Dynamic Firm Capacity[1] (m^3/day)	4,320				
ADD (m^3/day)	795	840	890	940	990
MDD (m^3/day)	1,605	1,700	1,800	1,905	2,010
MDD% of Dynamic Supply Capacity[1]	30%	32%	34%	35%	37%

1 Reflective of DWS State in 2023

Table 8.30: Thamesford DWS Forecasted Storage Requirements

Parameter	2026	2031	2036	2041	2046
Storage Capacity[1] (m^3)	1,040				
Required Storage (m^3)	1,440	1,490	1,545	1,605	1,665
Surplus / (Deficit) (m^3)	(400)	(450)	(505)	(565)	(625)

1 Reflective of DWS State in 2023

the Thamesford DWS to 2046; however, a storage capacity deficit will exist nearing 2026.

8.3.15.2 System Issues

Included in the future demand will be the provision of water supply to the infill growth areas within the community. The need for additional storage capacity will be met through CT optimization and may require additional storage undertakings.

8.3.16 Embro DWS

8.3.16.1 Projected Water Demand

Tables 8.31 and 8.32 provide the water demand and storage required, respectively.

Table 8.31: Embro DWS Forecasted MDD

Parameter	2026	2031	2036	2041	2046
Dynamic Supply Capacity[1] (m^3/day)	915				
Dynamic Firm Capacity[1] (m^3/day)	915				

Parameter	2026	2031	2036	2041	2046
ADD (m^3/day)	220	230	245	255	270
MDD (m^3/day)	430	455	475	500	525
MDD% of Dynamic Supply Capacity[1]	47%	50%	52%	55%	57%

1 Reflective of DWS State in 2023

Table 8.32: Embro DWS Projected Storage Requirements

Parameter	2026	2031	2036	2041	2046
Storage Capacity[1] (m^3)	155				
Required Storage (m^3)	195	205	215	225	235
Surplus / (Deficit) (m^3)	(40)	(50)	(60)	(70)	(80)

1 Reflective of DWS State in 2023

The Embro DWS has ample water supply to 2046 and will be approaching a storage capacity deficit approaching 2026.

8.3.16.2 System Issues

Included in the future demand will be the provision of water supply to the infill growth areas within the community. The need for additional storage capacity will require additional storage infrastructure.

8.3.17 Lakeside DWS

8.3.17.1 Projected Water Demand

Lakeside is not planned to accommodate significant additional residential growth. The forecasted water capacity and storage capacity is expected to remain steady state to 2046 as shown in Tables 8.33 and 8.34.

Table 8.33: Lakeside DWS Forecasted MDD

Parameter	2046
Dynamic Supply Capacity[1] (m^3/day)	270
Dynamic Firm Capacity[1] (m^3/day)	100
ADD (m^3/day)	50
MDD (m^3/day)	115
MDD% of Dynamic Supply Capacity[1]	43%

1 Reflective of DWS State in 2023

Table 8.34: Lakeside DWS Projected Storage Requirements

Parameter	2046
Storage Capacity[1] (m^3)	125
Required Storage (m^3)	45
Surplus / (Deficit) (m^3)	80

1 Reflective of DWS State in 2023

8.3.17.2 System Issues

Given the size of the Lakeside DWS, any temporary disruption in water supply can be addressed through trucking water to the system. Therefore, in this context this DWS is considered to have an adequate water supply and storage capacity to 2046 with no issues noted.

9.0 WASTEWATER SYSTEM EXISTING AND FUTURE INFRASTRUCTURE ASSESSMENT

9.1 Wastewater System Issues and Constraints

This section summarizes findings from the analysis of the performance of the existing wastewater systems and assessment of future servicing needs. The approach focused on identifying existing system opportunities and constraints and layering on growth to determine future servicing requirements.

Opportunities and constraints were identified for each WWTS through field visits to wastewater operations sites, discussions with County staff and based on the ability of each WWTS to provide adequate levels of service currently and in the future.

The general opportunities and constraints across the County's WWTS are as follows:

- Security of conveyance and treatment (i.e., standby power to pumping stations and WWTPs, need for facility resilience due to climate change, etc.);
- System redundancy (i.e., treatment train flexibility, solids handing capacity at WWTP (centrifuges) and lagoons, forcemain twinning, Additional trunk sewer redundancy, etc.);
- Impacts due to new areas requiring servicing;
- Collection system expansion (i.e., infill and intensification, new employment lands, secondary units, etc.);
- Wastewater treatment and Sewage Pumping Station operational issues (i.e., wet weather events, odour control, maintenance of discharge criteria etc.);
- Infrastructure capacity limitations;
- Changing regulations and treatment requirements due to limitations of capacity of receiving streams (i.e., nutrients, etc.), emerging contaminants; and
- Physical capacity limits (i.e., pumping station capacity, sewer and forcemain capacity, treatment train refurbishment, etc.); and
- Collection system inflow and infiltration.

9.2 Wastewater System Flow Projection Methodology

9.2.1 Committed Capacity

The MOE D-5-1 Calculating and Reporting Uncommitted Reserve Capacity at Sewage and Water Treatment Plants procedure was used as a means for determining uncommitted reserve capacity of each County Wastewater Treatment Plant. The process involves establishing existing WWTP capacity baseline and adding projected flows to 2046.

9.2.2 Wastewater Flow Projection Methodology

Wastewater flow projections is calculated using the historical residential and non-residential per capita ADF multiplied by the population generated for each WWTS in Section 7. To account for varying seasonal conditions, the average historical ADF from 2018 to 2021 (four year rolling average) was used to generate a baseline starting point (January 1, 2022). Future wastewater flow projections to 2046 were applied to this starting point in proportion to the population growth, under the conservative assumption that wastewater flows will increase linearly with the population growth.

9.3 Wastewater System Flow Projections

Wastewater flows were developed for each WWTS to identify existing and potential future conveyance and treatment deficiencies. Based on the population and employment growth forecast to 2046, average day flow (ADF) projections for each WWTS were quantified using the above methodology.

9.3.1 Ingersoll WWTS

9.3.1.1 Projected Sewage Flows

Table 9.1 provides the projected wastewater ADWF, ADF, and MDF flows to 2046. The projected flows are assumed to cover the growth expected from infill within vacant lands inside the urban boundary and new employment lands. As shown in Table 9.1, the Ingersoll WWTS has ample wastewater treatment capacity to 2046. The capacities of the SPSs in the Ingersoll WWCS is listed in Table 9.2.

Table 9.1: Ingersoll WWTS Projected Wastewater Flows

Parameter (m^3/day)	2026	2031	2036	2041	2046
WWTP Rated Capacity	12,945				
ADWF	6,704	7,055	7,439	7,842	8,263
ADF	9,040	9,510	10,025	10,570	11,135
ADF % of WWTP Rated Capacity[1]	70%	73%	77%	82%	86%

1 Reflective of WWTP capacity as of 2023

Table 9.2: Ingersoll SPS Rated Capacities

Sewage Pumping Station	Capacity (L/s)[1]
Carnegie Street	35.7
Culloden Road	20.0

1 Reflective of SPS capacity as of 2023

9.3.1.2 System Opportunities

The existing digester has significant residual capacity that can be beneficially utilized in treating organic wastes like Fats Oils and Grease (FOG) as demonstrated by a recently completed co-digestion pilot-study. Going forward, this can be implemented on a full-scale. As part of this implementation, an additional boiler will need to be added to utilize the additional biogas production.

The peak day flow peaking factor is 2.54 compared to an expected factor of 2.2 per the WEF guidelines for the current average flows. The observed peaking factor is 15% higher than the WEF guideline. While not too significant for current flows, this higher than expected I&I can become an issue at future higher flows. Trunk sewer infiltration reduction measures should be undertaken to reduce extraneous flows into the WWTP which unnecessarily consume part of the overall treatment capacity.

9.3.1.3 System Issues

Process specific issues noted regarding the WWTP headworks with respect to inadequate grit removal. Inefficient screening and grit removal can have a ripple effect on the capacity of downstream systems aeration system (due to diffuser fouling) and anaerobic digester (due to grit accumulation).

A second trunk sewer crossing of the Thames River is recommended to reduce risk issues given all lands south of Thames River currently converge into a single trunk sewer crossing of the Thames River prior to the WWTP.

To address the need to convey future flows to the WWTP, there will be a need to provide local sanitary sewers, trunk sewers, sewage pumping station and forcemain infrastructure to service infill areas and new employment lands.

9.3.2 Tillsonburg WWTS

9.3.2.1 PROJECTED SEWAGE FLOWS

Projected flow growth for Tillsonburg is provided in Table 9.1. Based on allocated committed capacity allocations, the Tillsonburg WWTP will require capacity expansion to accommodate future growth beyond 2041.

Table 9.3: Tillsonburg WWTS Projected Wastewater Flows

Parameter (m^3/day)	2026	2031	2036	2041	2046
WWTP Rated Capacity	8,108				
ADWF	5,133	5,347	5,582	5,824	6,066
ADF	6,140	6,395	6,670	6,960	7,250
ADF % of WWTP Rated Capacity[1]	75%	78%	82%	85%	89%

1 Reflective of WWTP capacity as of 2023

Table 9.4: Tillsonburg SPS Capacities

Sewage Pumping Station	Capacity (L/s)[1]
Rouse Street	39.0
North Street	69.7

1 Reflective of SPS capacity as of 2023

9.3.2.2 System Issues

As noted above, a WWTP capacity expansion will be required to accommodate growth towards the later part of the planning horizon as the Tillsonburg WWTP is expected to reach 85% of its capacity around 2041.

The WWTP and the John Pound PS are both located in the regulated area which means future works should consider resiliency measures due to increased flood levels due to

climate change. Figure 9.1Figure shows the site map with the red hatch indicating the vulnerable areas. Component-specific issues are identified in the following subsections.

The peak day flow peaking factor is 2.07 compared to an expected factor of 2.4 per the WEF guidelines for the current average flows. A lower-than-expected peaking factor indicates that the I&I is in the collection system is within the expected range. However, the County have noted that continued study of infiltration is to be undertaken to assess options for long term reductions of inflow.

To address the need to convey future flows to the WWTP, there will be a need to provide local sanitary sewers, trunk sewers, sewage pumping station and forcemain infrastructure to service infill growth areas within the Town.

Figure 9.1: Current Regulated Area in Vicinity of Tillsonburg WWTP

9.3.3 Woodstock WWTS

9.3.3.1 Projected Sewage Flows

Projected flow growth for Woodstock is provided in Table 9.5. The projections include flows from Embro WWTS and Innerkip WWTS to 2046. There is ample WWTP capacity to service infill and employment land areas over the planning period.

Table 9.5: Woodstock WWTS Projected Wastewater Flows

Parameter (m^3/day)	2026	2031	2036	2041	2046
WWTP Rated Capacity	33,000				
ADWF	16,851	18,015	19,256	20,527	21,845
ADF	21,450	22,930	24,505	26,125	27,805
ADF % of WWTP Rated Capacity[1]	65%	69%	74%	79%	84%

1 Reflective of WWTP capacity as of 2023

Table 9.6: Woodstock SPS Capacities

Sewage Pumping Station	Capacity (L/s)[1]
Brick Pond	7.0
Commerce Way	35.0
Woodstock East	160.0
Trillium Woods	21.0
Pattullo	41.5

1 Reflective of SPS capacity as of 2023

9.3.3.2 System Issues

Heavy I&I infiltration with recorded peak day flows up to 90,000 m^3/day. This is possibly due to old, combined sewers. The peak day flow peaking factor is 3.4 compared to the expected peaking factor of 1.7 for the current average flows per the WEF guidelines. The system is also vulnerable to sewage overflow during storm events and contaminating stormwater.

The lack of proper screening at the front of the plant causes hydraulic issues in the liquid train and is causing significant maintenance and treatment issues in the digesters. Unremoved screenings eventually end up in the digester through primary and waste activated sludge and primary clarifier scum. New headworks and dedicated septage receiving station is recommended.

The Thames Valley SPS needs to have its capacity reviewed and upgraded to provide for growth in the flow to the WWTP. The Brick Pond Sanitary Trunk sewer needs to be realigned as a recent temporary fix of the sewer running through soft ground is not a long term solution and a 1.5 km realignment is required for security and to address future growth.

The sewage pumping stations and/or forcemains from Embro WWTS and Innerkip WWTS require increased capacity due to growth within these communities (projects are reported under their respective townships). The existing forcemains are at greater risk of failure with additional sewage (pressure) loading.

To address the need to convey future flows to the WWTP, there will be a need to provide local sanitary sewers, trunk sewers, sewage pumping stations and forcemain infrastructure to service infill areas and new employment lands.

9.3.4 Drumbo WWTS

9.3.4.1 Projected Sewage Flows

Projected flow growth for Drumbo is provided in Table 9.7. Based on allocated committed capacity allocations, the Drumbo WWTP will require capacity expansion to service on hold development and accommodate future growth beyond 2031.

Table 9.7: Drumbo WWTS Projected Wastewater Flows

Parameter (m^3/day)	2026	2031	2036	2041	2046
WWTP Rated Capacity	450				
ADWF	273	323	375	429	477
ADF	355	425	490	560	625
ADF % of WWTP Rated Capacity[1]	79%	94%	109%	125%	139%

1 Following completion of Drumbo WWTP Phase I capacity expansion to 450 m^3/day (in-progress)

Table 9.8: Drumbo SPS Capacities

Sewage Pumping Station	Capacity (L/s)[1]
Drumbo North	7.5
Drumbo East	5.4
Drumbo	11.7

1 Reflective of SPS capacity as of 2023

9.3.4.2 System Issues

As noted above, a second WWTP capacity expansion will be required to accommodate on hold development and future growth. The expansion limit will ultimately be determined by the capacity of the receiving watercourse (Nith River) to accept higher WWTP discharge flows and loading.

9.3.5 Plattsville WWTS

9.3.5.1 Wastewater Flow Projections

Projected flow growth for Plattsville is provided in Table 9.9. There is adequate WWTP capacity to service infill areas over the planning period.

Table 9.9: Plattsville WWTS Projected Wastewater Flows

Parameter (m^3/day)	2026	2031	2036	2041	2046
WWTP Rated Capacity	800				
ADWF	379	406	432	461	479
ADF	490	520	555	595	615
ADF % of WWTP Rated Capacity[1]	61%	65%	69%	74%	77%

1 Reflective of WWTP capacity as of 2023

The Plattsville WWCS is serviced by the Fennell Street SPS only, which has a capacity of 35.5 L/s.

9.3.5.2 System Issues

The Plattsville wastewater collection system is currently undersized in certain areas and has experienced excessive hydraulic loading during extreme weather events. It has been noted that the existing sewage pumping station and forcemain to the lagoon is unreliable and require capacity upsizing.

The treatment system has historically experienced difficulty in keeping the effluent TSS below the objective, notably during the fall. The 2018 – 2022 Annual Wastewater Treatment Report notes occurrences of effluent TSS exceeding compliance limits due to high amounts of algae present in waste stabilization ponds, which increased the TSS and TSS loading. In the last four years, the TSS as exceeded the effluent objectives three time. Accordingly, operational enhancements to the WWTP lagoon system are required to accommodate future growth.

9.3.6 Norwich WWTS

9.3.6.1 Wastewater Flow Projections

Projected flow growth for Norwich is provided in Table 9.10. Based on allocated committed capacity allocations, the Norwich WWTP will require capacity expansion to service on hold development and accommodate future growth beyond 2036.

Table 9.10: Norwich WWTS Projected Wastewater Flows

Parameter (m^3/day)	2026	2031	2036	2041	2046
WWTP Rated Capacity	1,530				
ADWF	885	971	1,064	1,266	1,242
ADF	1,270	1,325	1,450	1,570	1,685
ADF % of WWTP Rated Capacity[1]	79%	86%	95%	103%	110%

1 Reflective of WWTP capacity as of 2023

Table 9.11: Norwich SPS Capacities

Sewage Pumping Station	Capacity (L/s)[1]
Sutton Street	88.0
Herb Street	7.3
Lossing Drive	9.0
Dufferin Street	20.5

1 Reflective of SPS capacity as of 2023

9.3.6.2 System Issues

As noted above, a WWTP capacity expansion will be required to accommodate on hold development and future growth. The expansion limit will ultimately be determined by the capacity of the receiving watercourse (Otter Creek) to accept higher WWTP discharge flows and loading. The historical average MDPF is 3.5, which is much higher compared to the typical MDPF of 2.7 for its current ADFs. Hence, the WWTS is currently receiving higher than normal I&I flows. An inflow and infiltration reduction program is recommended to line sewers on an ongoing basis, in complement to the ongoing replacement of aging sanitary sewers.

9.3.7 Mt. Elgin WWTS

9.3.7.1 Wastewater Flow Projections

Projected flow growth for Mt. Elgin is provided in Table 9.12, with the % ADF shown at current capacity of 191 m^3/day. Based on allocated committed capacity allocations, the Mt. Elgin WWTP will require capacity expansion to service on hold development and accommodate future growth beyond 2036.

Table 9.12: Mount Elgin WWTS Projected Wastewater Flows

Parameter (m^3/day)	2026	2031	2036	2041	2046
WWTP Rated Capacity	191				
ADWF	89	110	137	170	210
ADF	100	125	155	195	240
ADF % of WWTP Rated Capacity[1]	53%	66%	82%	101%	126%

1 Reflective of WWTP capacity as of 2023

The Mt. Elgin WWCS is serviced by the Peggy Avenue SPS only, which has a capacity of 2.2 L/s.

9.3.7.2 System Issues

As noted above, a WWTP capacity expansion (Phases 3 and 4) will be required to accommodate on hold development and future growth. Further expansion beyond this may require consideration of a new mechanical WWTP in Mt Elgin or conveying flows to the Ingersoll WWTS.

To address the need to convey future flows to the WWTP, there will be a need to new and/or replacement sanitary sewers and the upsizing of the current forcemain on Plank Line.

9.3.8 Tavistock WWTS

9.3.8.1 Wastewater Flow Projections

Projected flow growth for Tavistock is provided in Table 9.13. Based on committed capacity allocations and local industry growth, a WWTP capacity expansion will be required around 2026.

Table 9.13: Tavistock WWTS Projected Wastewater Flows

Parameter (m^3/day)	2026	2031	2036	2041	2046
WWTP Rated Capacity	2,935				
ADWF	2,489	2,602	2,731	2,867	3,008
ADF	3235	3380	3545	3720	3905
ADF % of WWTP Rated Capacity[1]	128%	134%	140%	147%	155%

1 Reflective of WWTP capacity as of 2023

Table 9.14: Tavistock SPS Capacities

Sewage Pumping Station	Capacity (L/s)[1]
Hope Street	42.0
William Street (three pumps running)	98.0

1 Reflective of SPS capacity as of 2023

9.3.8.2 System Issues

As noted above, the expected additional industrial flows will require capacity expansion of the WWTP within the near term horizon.

The existing Peak Day flow peaking factor is 3.6 compared to a factor of 2.4 per for the current average flow per the WEF guidelines. The high I&I sources include a series of older subdivisions which allowed foundation weepers into the sanitary sewer system.

To address the need to convey future flows to the WWTP, there will be a need for sewage pumping station upsizing and ongoing replacement of aging sanitary sewers.

9.3.9 Thamesford WWTS

9.3.9.1 Wastewater Flow Projections

Projected flows and wastewater capacity % use for Thamesford WWTS is provided in Table 9.15. There is adequate WWTP capacity to service infill areas over the planning period.

Table 9.15: Thamesford WWTS Projected Wastewater Flows

Parameter (m^3/day)	2026	2031	2036	2041	2046
WWTP Rated Capacity	2,500				
ADWF	447	535	567	601	638
ADF	525	570	605	640	680
ADF % of WWTP Rated Capacity[1]	21%	23%	24%	26%	27%

1 Reflective of WWTP capacity as of 2023

Table 9.16: Thamesford SPS Capacities

Sewage Pumping Station	Capacity (L/s)[1]
Allen Street	15.1
Stanley Street	6.2

1 Reflective of SPS capacity as of 2023

9.3.9.2 System Issues

Due to its age, the WWTP plant requires ongoing upgrades to service existing needs and future growth within the Thamesford community. WWTP upgrades are planned for the pre-treatment and screening systems.

10.0 WATER SERVICING ALTERNATIVE SOLUTIONS

10.1 Class EA Alternative Solutions

The MCEA process requires that a reasonable range of management alternatives be developed with the W/WW MP as potential solutions to meet the W/WW MP Opportunity and Problem Statement (Section 3.2) and to address the water servicing constraints identified in Chapter 8. All DWSs are assessed against the following alternative solutions:

1. Do-Nothing;
2. Limit community growth;
3. Water conservation, efficiency, and source protection;
4. Optimize existing well supply and water distribution conveyance infrastructure;
5. Extend existing water distribution systems; and
6. Develop new well supplies and/or expand existing water treatment systems.

The alternative strategies proposed are based on best practices available to mitigate the identified issues and align with the County's overall asset management and municipal servicing goals. Sections 10.2 to 10.7 detail each alternative solution which is later evaluated in Section 12 in order to determine the preferred alternative solution(s).

10.2 Do Nothing

This alternative solution is a required baseline condition that considers the anticipated impacts if no remedial or mitigation measures are taken to address the identified issues. Under this scenario, no improvements or changes would be undertaken to address the current and future water supply and storage requirements.

10.3 Limit Community Growth

This alternative solution considers the anticipated impacts if community growth is limited to designated settlement areas based on their respective existing DWS capacities. Under this scenario, no improvements or changes would be undertaken to address the current and future water supply and storage requirements.

Consistent with the County's OP, growth and development is strategically focused in designated settlement areas, including fully serviced (municipal) large urban centers and villages and, to a more limited extent, partially serviced (municipal) villages which have various levels of carrying capacity to accommodate future growth.

Conversely, any growth directed to any current privately serviced (i.e. well systems) villages and/or rural clusters is limited to minor infilling. In certain cases, growth within in partially serviced settlements and the introduction of more development on private on-site sewage was purposely limited for various planning, operational risk, and other reasons.

10.4 Water Conservation, Efficiency and Source Protection

This alternative solution maintains the continuation of the County's regional water conservation, efficiency, and source water protection existing practices.

For water conservation and efficiency, the County water conservation By-law is in place to reduce peak maximum day demand on the drinking water system during dry weather conditions and peak seasonal outdoor water use periods. Residential rebates also exist for homeowners seeking to upgrade washing machines or toilets to newer water efficient models. A water capacity buy back program is in place that reimburses non-residential and multi-residential end users for facility upgrades and improvements that result in water savings. Purchase and use of rain barrels by community residents would also continue to be promoted in this alternative solution.

Under this alternative solution, ongoing source water quality and quantity protection measures would continue to be implemented for County-wide well supplies in accordance with the CWA, 2006, and four associated Source Protection Plans which have jurisdiction within Oxford County (Grand River, Upper Thames River, Long Point Region, Catfish Creek).

10.5 Optimize Existing Well Supply and Water Distribution Conveyance Infrastructure

Optimizing existing DWS infrastructure is an alternative solution to consider addressing growing system demands and to minimize risk to the system.

Optimization of the well supply and/or water treatment facilities includes the following general activities which are intended to improve dynamic water supply and/or firm capacities within a given DWS:

- Maintenance of surveillance of ground water quality and quantity trends;
- Modeling of groundwater supply to optimize supply system;

- Maintaining or improving water quality, including mixing of well supplies, addition of water treatment filtration, iron sequestration, removal of disinfection by-products, etc. where appropriate and feasible;
- Bringing dormant wells into production where viable and feasible;
- Rehabilitating wells to regain design capacity production yields to the degree possible as needed to address system demand;
- Replacing wells that have quantity or quality issues;
- Replacing aging watermains which may have reduced capacity in order to supply existing and new service areas; and
- Provision or expansion of back up power.

Optimization of the water distribution conveyance infrastructure includes the following general activities:

- Modeling of water distribution system to optimize service delivery through targeted improvements to booster pumping, establishment or alteration to pressure zones and upsizing system bottlenecks;
- Improvements to existing booster pumping stations to increase capacity;
- Upsizing or rehabilitating watermains to increase their flow capacity;
- Maintaining or improving water quality, such as iron sequestration, chlorine addition, etc.;
- Upgrading disinfection practices to allow for component of storage dedicated to disinfection to be repurposed to storage; and
- Provision or expansion of back up power.

10.6 Extend Existing Water Distribution Systems

Another alternative solution to address growing water system demands is the extension of existing water distribution infrastructure. Extending water distribution infrastructure includes the following general activities which are intended to maintain or improve existing water system pressures, flow capacity, water quality and fire fighting capabilities within a given DWS:

- Modeling of water distribution system to optimize new system and its overall efficiency of the DWS;
- Provision of new water Booster Pumping Stations to provide sufficient service pressures;
- Provision of new water storage reservoirs and/or standpipes;
- Constructing new watermains to service growth areas; and
- Affording sufficient redundancies in water system (i.e. back up power provisions, watermain looping, multiple supply points, major watercourse/highway infrastructure crossings.

10.7 Develop New Well Supplies and/or Expand Existing Water Treatment Systems

New water supply is an alternative solution which can also be considered to address growing system demands. This alternative solution includes adding new elements to existing water supplies where optimization is not sufficient on its own and includes the following general activities:

- Exploration to secure a viable well source of sufficient quality and quantity in proximity to a DWS;
- Construction of new water treatment facility at well source;
- Potential centralization of multiple water treatment facilities which serve several different existing wells and/or well fields;
- Expanding water treatment requirements are dependent on water source (s); and
- Interconnection to another water supply system via a transmission main.

11.0 WASTEWATER SERVICING ALTERNATIVE SOLUTIONS

11.1 Class EA Alternative Solutions

The W/WW MP will look at determining servicing solutions to the issues that have been identified for each wastewater system (WWS) to meet the W/WW MP Opportunity and Problem Statement (Section 3.2) and to address the water servicing constraints identified in Section 9. All WWSs were assessed against the following alternatives:

1. Do-Nothing;
2. Limit Community Growth;
3. WWTS Infiltration and Inflow Control and Reduction;
4. Optimize existing WWTS infrastructure;
5. Extend existing WWTS collection systems; and
6. Develop new WWTP capacity.

The alternative solution strategies proposed are based on best practices available to mitigate the identified issues and align with the County's overall asset management and municipal servicing goals.

11.2 Do Nothing

This alternative solution is a required baseline condition that considers the anticipated impacts if no remedial or mitigation measures are taken to address the identified issues. Under this scenario, no improvements or changes would be undertaken to address the current and future water supply and storage requirements.

11.3 Limit Community Growth

Similar to Section 10.3, this alternative solution considers the anticipated impacts if community growth is limited to designated settlement areas based on their respective existing WWTS capacities.

Consistent with the County's OP, growth and development is strategically focused in designated settlement areas, including fully serviced (municipal) large urban centers and villages and, to a more limited extent, partially serviced (municipal) villages which have various levels of carrying capacity to accommodate future growth.

Conversely, any growth directed to any current privately serviced (i.e. septic systems) villages and/or rural clusters is limited to minor infilling. In certain cases, growth within in partially serviced settlements and the introduction of more development on private on-site sewage was purposely limited for various planning, operational risk, and other reasons.

11.4 WWTS Infiltration and Inflow Control & Reduction

This alternative solution considers implementation of programs to reduce extraneous wastewater flows into the wastewater collection system. Exposure to extraneous flow can arise from the following:

- Groundwater infiltration into sewer pipes through cracked sewer pipes;
- Rainfall-derived inflow into sewer systems through foundation drain connections, roof eaves trough connections, manhole lids, storm sewers interconnections, etc., and;
- Rainfall-derived infiltration through cracked sewer pipes and manholes.

Reduction of extraneous WWTS infiltration and Inflow throughout Oxford County will help reduce future flow requirements, reduce sewage pumping and wastewater treatment plant operational costs and regain wastewater treatment plant capacity thereby extending its service life.

11.5 Optimize Existing WWTS Infrastructure

Optimizing existing WWTS infrastructure is an alternative solution to address growing wastewater flows and to minimize risk to the system.

Optimization of the collection system includes the following general activities:

- Flow monitoring and sewer modeling to confirm overflows, bottlenecks and reduce inflow and infiltration to sewers;
- Specific studies and targeted replacement or rehabilitation can be undertaken to reduce extraneous flows;
- Refurbish/upsize existing sewers;
- Refurbish and upsize existing Sewage Pumping Stations and forcemains;
- Backup power generation to address Sewage Pumping Station disruption;

- Afford system redundancy and reliability to address issues related to conveyance efficiency during maximum day flows, Sewage Pumping Station overflows, wet weather events, material reuse, etc.;
- Promote resiliency of facilities to climate change (frequency/severity of flooding, increased infiltration); and
- Revise existing or create sanitary sewer catchment areas to optimize the collection system.

Optimization of wastewater treatment includes the following general activities:

- WWTP modeling to improve treatment capacity, remove bottlenecks and reduce bypasses;
- Specific studies and targeted replacement or rehabilitation can be undertaken to improve treatment efficiency;
- Backup power generation to address WWTP disruption;
- Improvements to biosolids management and resource recovery to improve overall efficiency; and
- Resiliency of facilities to climate change (frequency/severity of flooding, increased infiltration).

11.6 Extend Existing WWTS Collection System

New wastewater collection and conveyance infrastructure is another alternative solution consideration to address growing system demands includes extending sanitary services to new areas of growth or to support infill areas where optimization is not sufficient on its own.

Extending wastewater collection and conveyance infrastructure includes the following general activities:

- Modeling of wastewater collection and conveyance to optimize new system and its overall efficiency of the WWTS;
- Addressing wet weather flow through approved side stream treatment;
- Constructing new sanitary sewers to service growth areas;
- Constructing new SPS and forcemains to provide sufficient conveyance;

- Addressing wastewater system resiliency and risk issues (i.e. back-up power provisions, critical system conveyance bottlenecks such as major infrastructure watercourse/highway crossings, trunk sewer inlets to wastewater treatment plants, etc.);
- Interconnection to other WWTS via gravity sewers and/or Sewage Pumping Stations/forcemains.

11.7 Develop New WWTP Capacity

New WWTP capacity increase is another alternative solution that may be required to address growing system demands where existing WWTP optimization is not sufficient on its own and includes the following general activities:

- Expand existing WWTP capacity or components;
- Constructing a new WWTP;
- Assess assimilative capacities of receiving watercourses to accept WWTP final (treated) effluent; and
- Address backup power, resiliency, and risk issues.

Treatment technologies options are dependent on what is being treated, site constraints and the assimilative capacity of the receiving stream.

12.0 EVALUATION OF WATER AND WASTEWATER SERVICING ALTERNATIVE SOLUTIONS

12.1 Water and Wastewater Servicing Evaluation Criteria

12.1.1 Evaluation Criteria

This sub-section of the W/WW MP reviews the alternative solutions to the challenges that have been identified with water supply and wastewater treatment. A MCEA based evaluation criteria is established and grouped in the following four categories:

- Technical;
- Social and Cultural;
- Environmental; and
- Economic.

The evaluation criteria were applied to each alternative solution (refer to Section 10 and 11) in order to assess each alternative solution's ability to address the W/WW MP's Problem and Opportunity statement, objectives, technical, social-cultural, environmental, and economic considerations while addressing the issues and the risks identified in Sections 8 and 9. The W/WW MP evaluation categories and criteria are illustrated below in Table 12.1.

Table 12.1: Water and Wastewater Servicing Evaluation Categories and Criteria

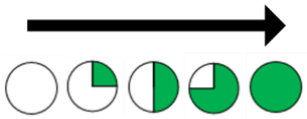
Category	Criteria
Technical	• Constructability • Improvement to operations • Infrastructure required • Approval requirements
Social and Cultural	• Public acceptance • Impact to built heritage resources and cultural heritage landscapes • Impact to archaeological resources
Environmental	• Impact to aquatic and terrestrial species and habitat • Impact to surface water quantity and quality • Climate change resiliency
Economic	• Capital costs • Operational and maintenance costs • User Value

The water and wastewater alternative solutions were qualitatively reviewed by RVA for benefit, cost and impact and assessed as high-level options to address water and wastewater servicing needs. From the findings of the evaluation, preferred servicing strategy alternative solution(s) were recommended for the County-wide DWS's and WWTS's (refer to Section 13 – Water and Section 14 - Wastewater).

12.1.2 Criteria Measurement

The proposed servicing concepts were rated for their fulfillment in each in the four categories based on the evaluation criteria. Table 2.12 illustrates the rating scale used. The visual rating provides a measure of the level of performance of each alternative and allows to select one that achieves the highest impact.

Table 12.2: Alternative Solutions Rating Scale

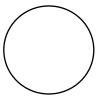
Legend		
Highest Impact (Most Negative Solution)		Lowest Impact (Most Positive Solution)

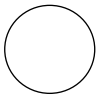
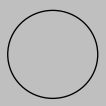
12.2 Application of Screening Criteria to Water Alternative Solutions

The following section illustrates the review undertaken for the various water servicing alternative solutions previously identified in Section 10 (water).

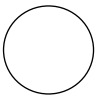
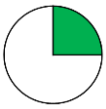
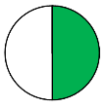
12.2.1 Evaluation of Water Servicing Alternative Solutions

12.2.1.1 Do Nothing

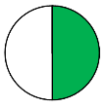
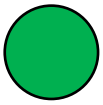
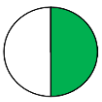
Evaluation Category	Criteria Evaluation	Rating
Technical	This does not address the requirement for a solution to the servicing issue.	
Social and Cultural	This does not address the requirement for a solution to the servicing issue and thus does not address any social or cultural concerns.	
Environment	This does not impact the environment in a positive or negative way.	

Evaluation Category	Criteria Evaluation	Rating
Economic	While not incurring cost, any economic opportunities to be gained from system expansion are not realized.	
Overall Rating	Not considered a realistic option for the County, as growth would be limited to the existing capacity limits, and the existing issues noted in Section 8 will continue to risk supply of water to the serviced population. It also does not meet the Problem and Opportunity statement of the 2024 W/WW MP; **therefore, it was not carried forward through evaluation.**	

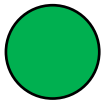
12.2.1.2 Limit Community Growth

Evaluation Category	Criteria Evaluation	Rating
Technical	For non-growth communities, this is an acceptable solution. For communities with planned growth this does not address the requirement for a solution to the servicing issue.	
Social and Cultural	For non-growth communities, this is an acceptable solution. For communities with planned growth this does not address the requirement for a solution to the servicing issue and thus does not address any social or cultural concerns.	
Environment	This does not impact the environment in a positive or negative way.	
Economic	For non-growth communities this is a viable alternative. For growth communities while not incurring cost, any economic opportunities to be gained from system expansion are not realized.	
Overall Rating	Based on current County planning policies, this is a viable alternative for non-growth communities but not a viable option for communities with planned growth. It can form part of the water implementation servicing strategy.	

12.2.1.3 Water Conservation, Efficiency and Source Protection

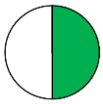
Evaluation Category	Criteria Evaluation	Rating
Technical	This is a viable strategy that will provide part of the solution to help enhance the efficiency of water supply operations and to somewhat moderate water demand and to protect the water supply.	
Social and Cultural	This strategy typically has broad public and water customer support.	
Environment	This strategy benefits the environment by putting less strain on groundwater supplies and source water protect measures generally will protect other aspects of the environment.	
Economic	This strategy can somewhat defer implementation of water system expansions and in general there is a moderate cost to implementing and enforcing source water protection measures.	
Overall Rating	This solution can form part of the water system implementation strategy, but it is not a complete approach on its own.	

12.2.1.4 Optimize Existing Well Supply and Water Distribution Conveyance Infrastructure

Evaluation Category	Criteria Evaluation	Rating
Technical	This is a viable strategy that can provide all or part of the solution. This solution is very community and site specific and needs to be evaluated at the next stage of project implementation.	
Social and Cultural	In general optimization has general public acceptance and any potential impacts are confined within existing public rights of ways or County properties where impacts can be effectively mitigated.	
Environment	Impacts are generally confined within existing public rights of ways or County properties where impacts to the natural environment can be minimized and effectively mitigated.	
Economic	This strategy can defer implementation of water system expansions and in general is pursued based on lower capital and operational costs compared to new infrastructure.	

Evaluation Category	Criteria Evaluation	Rating
Overall Rating	This solution can form part of the preferred strategy as it balances technical requirements, impacts, and costs and promotes sustainability.	

12.2.1.5 Extend Existing Water Distribution System

Evaluation Category	Criteria Evaluation	Rating
Technical	This is a viable strategy that can provide all or part of the solution if optimization alone is not sufficient. This solution is very community and site specific and needs to be evaluated at the next stage of project implementation.	
Social and Cultural	In general water distribution expansion has general public acceptance as it is approved through the MCEA or Planning process. Any potential impacts are confined within future or existing public rights of ways or County properties where impacts can be effectively mitigated.	
Environment	Potential impacts to the environment are typically well understood and mitigation approaches are generally affected and standard practice during construction.	
Economic	This strategy in general is pursued based on optimization not being able to fully provide the servicing required and will impose new capital and operational costs on the proponent.	
Overall Rating	This solution can form part of the preferred water implementation strategy where optimization of existing water distribution infrastructure cannot provide the required system capacity on its own.	

12.2.1.6 Develop New Well Supplies and/or Expand Water Treatment Systems

Evaluation Category	Criteria Evaluation	Rating
Technical	This is a viable strategy that can provide all or part of the solution if optimization alone is not sufficient. This solution is very community and site specific and needs to be evaluated at the next stage of project implementation.	
Social and Cultural	In general water treatment facility expansion has general public acceptance as it is approved through the MCEA or Planning process. Any potential impacts are confined within future or existing County properties. where impacts can be effectively mitigated.	
Environment	Potential impacts to the environment are typically well understood and mitigation approaches are generally affected and standard practice during construction.	
Economic	This strategy in general is pursued based on optimization not being able to fully provide the servicing required and will impose new capital and operational costs on the proponent.	
Overall Rating	This solution can form part of the preferred strategy where optimization of existing wells and treatment plants cannot provide the required system capacity on its own.	

12.3 Preferred Water Alternative Solution(s)

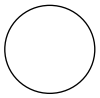
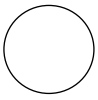
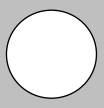
After evaluation of the proposed water alternatives in Section 12.2, a preferred water servicing strategy was recommended which carried forward a combination of alternatives as defined in Section 12.2.1.2 to 12.2.1.6. This approach most fully satisfies the W/WW MP Problem and Opportunity Statement while addressing many of the water system issues and risks previously noted in this report.

The preferred water servicing alternative solutions involve extending existing water distribution systems (watermain extensions, new booster pumping stations, new storage facilities) to service infill areas and employment lands, optimizing existing well supply yields, expanding existing water treatment plant capacities, developing new well supplies, ongoing source water protection initiatives and continuing water conservation best management practices.

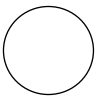
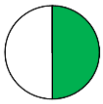
12.4 Application of Screening Criteria to Wastewater Alternative Solutions

The following section illustrates the review undertaken for the various wastewater servicing alternative solutions previously identified in Section 11 (wastewater).

12.4.1.1 Do Nothing

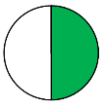
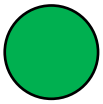
Evaluation Category	Criteria Evaluation	Rating
Technical	This does not address the requirement for a solution to the servicing issue.	
Social and Cultural	This does not address the requirement for a solution to the servicing issue and thus does not address any social or cultural concerns.	
Environment	This does not impact the environment in a positive or negative way.	
Economic	While not incurring cost, any economic opportunities to be gained from system expansion are not realized.	
Overall Rating	Not considered a realistic option for the County, as growth would be limited to the existing capacity limits, and the existing issues noted in Section 9 will continue to risk supply of water to the serviced population. It also does not meet the Problem and Opportunity statement of the 2024 W/WW MP; therefore, it was not carried forward through evaluation.	

12.4.1.2 Limit Community Growth

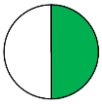
Evaluation Category	Criteria Evaluation	Rating
Technical	For non-growth communities, this is an acceptable solution. For communities with planned growth this does not address the requirement for a solution to the servicing issue.	
Social and Cultural	For non-growth communities, this is an acceptable solution. For communities with planned growth this does not address the requirement for a solution to the servicing issue and thus does not address any social or cultural concerns.	
Environment	This does not impact the environment in a positive or negative way.	
Economic	For non-growth communities this is a viable alternative. For growth communities while not incurring cost, any economic opportunities to be gained from system expansion are not realized.	

Evaluation Category	Criteria Evaluation	Rating
Overall Rating	Based on current County planning policies, this is a viable alternative for non-growth communities but not a viable option for communities with planned growth. It can form part of the wastewater implementation servicing strategy.	

12.4.1.3 WWTS Infiltration and Inflow Control & Reduction

Evaluation Category	Criteria Evaluation	Rating
Technical	While a viable strategy that will provide part of the solution to reduce flows to the WWTS, it is usually implemented over the long term and significant flow generally take years to realize.	
Social and Cultural	This strategy typically has broad public and water customer support. However, some strategies involve significant reconstruction activities.	
Environment	This strategy benefits the environment by putting less strain on groundwater supplies and source water protect measures generally will protect other aspects of the environment.	
Economic	This strategy can be expensive both for in-situ repairs or for replacement of sewers. It is therefore usually implemented over a long time period.	
Overall Rating	This solution forms part of the wastewater implementation strategy for all WWTS projects with significant infiltration issues and represents part of a longer-term strategy to be implemented over decades.	

12.4.1.4 Optimize Existing WWTS Infrastructure

Evaluation Category	Criteria Evaluation	Rating
Technical	This is a viable strategy that can provide all or part of the solution. This solution is very community and site specific and needs to be evaluated at the next stage of project implementation.	
Social and Cultural	In general optimization has greater public acceptance than expansion and potential impacts be effectively mitigated. WWTS can be more controversial than water projects.	
Environment	Impacts are generally confined within existing public rights of ways or County properties and discharge is to preauthorized levels in most cases.	

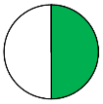
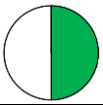
Evaluation Category	Criteria Evaluation	Rating
Economic	This strategy can defer implementation of WWTS expansions and in general is pursued based on lower capital and operational costs compared to new infrastructure.	
Overall Rating	This solution forms part of the preferred wastewater servicing strategy as it balances technical requirements, impacts, and costs and promotes sustainability.	

12.4.1.5 Extend Existing WWTS Collection System

Evaluation Category	Criteria Evaluation	Rating
Technical	This is a viable strategy that can provide all or part of the solution if optimization alone is not sufficient. This solution is very community and site specific and needs to be evaluated at the next stage of project implementation.	
Social and Cultural	In general collection system expansion has general public acceptance as it is approved through the MCEA or Planning process. Any potential impacts are confined within future or existing public rights of ways or County properties where impacts can be effectively mitigated. Greenfield SPS may require technical cultural heritage studies (e.g. and archaeological assessment, cultural heritage evaluation reports, heritage impact assessment) during preliminary design prior to any ground disturbing activities.	
Environment	Potential impacts to the environment are typically well understood and mitigation approaches are generally affected and standard practice during construction.	
Economic	This strategy in general is pursued based on optimization not being able to fully provide the servicing required and will impose new capital and operational costs on the proponent.	
Overall Rating	This solution supports part of the overall wastewater servicing strategy where optimization of the existing wastewater collection system cannot provide the required system capacity on its own.	

12.4.1.6 Develop New WWTP Capacity

Evaluation Category	Criteria Evaluation	Rating
Technical	This is a viable strategy that can provide all or part of the solution if optimization alone is not sufficient. This solution is	

Evaluation Category	Criteria Evaluation	Rating
	very community and site specific and needs to be evaluated at the next stage of project implementation.	
Social and Cultural	In general, WWTP expansion has general public acceptance as it is approved through the MCEA process. However, over time, in some cases residential and other sensitive land uses have developed closer to WWTPs which require consideration in this approach. Greenfield SPS may require technical cultural heritage studies (e.g. and archaeological assessment, cultural heritage evaluation reports, heritage impact assessment) during preliminary design prior to any ground disturbing activities.	
Environment	Effluent quality standards are typically stricter than in the past requiring a higher level of treatment. Potential impacts to the environment are typically well understood and mitigation approaches are generally affected and standard practice during construction.	
Economic	This strategy in general is pursued based on optimization not being able to fully provide the servicing required and will impose new capital and operational costs.	
Overall Rating	This solution can form part of the preferred strategy where optimization of existing treatment plants cannot provide the required system capacity on its own.	

12.5 Preferred Wastewater Alternative Solution(s)

After evaluation of the proposed wastewater alternatives in Section 12.2, a preferred wastewater servicing strategy was recommended which carried forward a combination of alternatives as defined in Section 12.4.1.2 to 12.4.1.6. This approach most fully satisfies the W/WW MP Problem and Opportunity Statement while addressing many of the wastewater system issues and risks previously noted in this report.

The preferred wastewater servicing strategy involves expanding existing wastewater collection systems (sewer mains extensions, new/upsized forcemains, new/upgraded sewage pumping stations) to service infill areas and employment lands, rehabilitating aging trunk sewers, expanding existing water treatment plant capacities, and initiating sewer system inflow and infiltration reduction best management practices.

13.0 PREFERRED WATER SERVICING STRATEGY

13.1 Overall Water Servicing Strategy Description

The preferred water servicing strategy identified in Section 12.3 is intended to meet the drinking water system requirements of Oxford County to 2046. The recommended solutions were established in consultation with the County on the basis of the Water and Wastewater Master Planning Principles that were established for this project.

The recommended strategy prioritized various implementation undertakings to provide for sufficient water supply. As well, the preferred water servicing alternative solution also serves to address risk (i.e. redundancy, reliability, etc.) within the County-wide municipal drinking water systems. The preferred servicing strategies are implemented on a timeline established in accordance with each project's MCEA schedule.

The anticipated timing of each project within the Preferred Strategy has been established based on the projected population and employment growth within the County. The timelines are categorized as following:

- Short – term period from 2024 to 2028;
- Medium-term period from 2029 to 2033; and
- Long-term period from 2034-2046.

Generally, when community water demands approach 85% of the capacity limit for a given water system, undertakings should be considered to expand/increase the DWS capacity. This industry standard benchmark is intended to help operators maintain sufficient operating capacities of the DWS as a whole and individual water system components.

Accordingly, the project schedule – which is subject to refinement – was developed such that new water system expansion projects will begin operation when the community water demands reach approximately 85 - 90% of the existing system capacity.

13.2 Detailed Water Servicing Strategy Requirements

13.2.1 Ingersoll DWS

To address the Ingersoll DWS needs to 2046, the following general servicing strategies were developed and include:

- Water efficiency/buyback program;
- Groundwater modeling;

- Rehabilitation projects;
- Trunk watermain extensions/upsizing;
- New booster pumping station;
- New elevated water storage; and
- Water Quality Improvement pilot project.

13.2.2 Tillsonburg DWS

To address the Tillsonburg DWS needs to 2046, the following general servicing strategies were developed and include:

- Water efficiency/buyback program;
- Rehabilitation projects;
- Upgrades to Wells 3 and Well 7A treatment facilities;
- Replacements of Wells 1A and 2, 6A, and 11;
- Standby Power;
- Water storage expansion;
- Trunk watermain extensions/upsizing; and
- Source Water Protection.

13.2.3 Woodstock DWS

To address the Woodstock DWS needs to 2046, the following general servicing strategies were developed and include:

- Water efficiency/buyback program;
- Rehabilitation, replacement, and facility retirement projects;
- Standby power;
- Southside WTP replacement;
- Feedermain Twinning;
- Upgrades to Wells 6 and 9;

- Trunk watermain extensions/upsizing;
- New Water Booster Pumping Stations;
- Pressure Zone Boundary Adjustments; and
- Source Water Protection.

13.2.4 Blandford Blenheim

13.2.4.1 Drumbo-Princeton DWS

To address the Drumbo-Princeton DWS needs to 2046, the following general servicing strategies were developed and include:

- Standby power to existing well;
- Trunk watermain extensions/upsizing;
- New well supply; and
- New WTP plant with filtration.

13.2.4.2 Plattsville DWS

To address the Plattsville DWS needs to 2046, the following general servicing strategies were developed and include:

- WTP filtration upgrades;
- Standby power to existing well; and
- New standby well supply.

13.2.4.3 Bright DWS

To address the Bright DWS needs to 2046, the following general servicing strategies were developed and include:

- Plattsville to Bright Water system interconnection; and
- Well 5 decommissioning.

13.2.5 Oxford South DWS (Norwich, Springford and Otterville)

To address the Oxford South DWS needs to 2046, the following general servicing strategies were developed and include:

- Well rehabilitation;

- Water quality improvements;
- Watermain replacements/extensions/upsizing;
- Norwich Well 4 WTP filtration upgrades and storage; and
- New standby well supply.

13.2.6 South-West Oxford

13.2.6.1 Mount Elgin DWS

To address the Mount Elgin DWS needs to 2046, the following general servicing strategies were developed and include:

- Mount Elgin WTP Optimization; and
- Trunk watermain interconnection planning and design (to Ingersoll Water System).

13.2.6.2 Beachville DWS

To address the Beachville DWS needs to 2046, the following general servicing strategies were developed and include:

- Water quality improvements; and
- New standby well supply and water storage.

13.2.6.3 Brownsville DWS

To address the Brownsville DWS needs to 2046, the following general servicing strategies were developed and include:

- Water quality improvements; and
- Well rehabilitation.

13.2.6.4 Dereham Centre DWS

To address the Dereham Centre DWS needs to 2046, the following general servicing strategies were developed and include:

- Water quality improvements.

13.2.7 East-Zorra Tavistock

13.2.7.1 Innerkip DWS

To address the Innerkip DWS needs to 2046, the following general servicing strategies were developed and include:

- Water infrastructure refurbishment.

13.2.7.2 Tavistock DWS

To address the Tavistock DWS needs to 2046, the following general servicing strategies were developed and include:

- water efficiency/buyback program;
- Rehabilitation projects;
- New well supply;
- New WTP with onsite storage;
- Trunk watermain extensions/upsizing;
- WTP filtration upgrades; and
- Water tower rehabilitation.

13.2.7.3 Hickson DWS

To address the Hickson DWS needs to 2046, the following general servicing strategies were developed and include:

- Well rehabilitation.

13.2.8 Zorra

13.2.8.1 Thamesford DWS

To address the Thamesford DWS needs to 2046, the following general servicing strategies were developed and include:

- Trunk watermain extensions; and
- Water reservoir contact time enhancements (reallocation to Storage).

13.2.8.2 Embro DWS

To address the Embro DWS needs to 2046, the following general servicing strategies were developed and include:

- Water storage enhancements at Embro WTP.

13.2.8.3 Lakeside DWS

To address the Lakeside DWS needs to 2046, the following general servicing strategies were developed and include:

- Well rehabilitation and infrastructure refurbishment.

13.3 Water Capital Implementation Plan

13.3.1 Level of Cost Opinions

ASTM E 2516 (Standard Classification for Cost Estimate Classification System) provides a five-level classification system based on several characteristics, with the primary characteristic being the level of project definition (i.e., percentage of design completion). The ASTM standard, shown in Table 13.1, illustrates the typical accuracy ranges that may be associated with the general building industries.

Table 13.1: ASTM E2516 Accuracy Range of Cost Opinions for General Building Industries

Cost Estimate Class	Expressed as % of Design Completion	Anticipated Accuracy Range as % of Actual Cost
5	0-2	-30 to +50
4	1-15	-20 to +30
3	10-40	-15 to +20
2	30-70	-10 to +15
1	50-100	-5 to +10

The cost estimates developed in this report would be best described as a Class 5 Cost Estimate which is typically used for high level study project.

In some cases, project cost estimates were supplied with greater levels of accuracy based on MCEA Study conceptual design, detailed designs, etc.

13.3.2 Water Projects Identified

Sections 13.3.2.1 to 13.3.2.8 summarize the wastewater projects that have been identified through the Oxford County 2024 W/WW MP.

13.3.2.1 Ingersoll

Project ID	Project Description	Presumed MCEA Schedule[1]	Cost	2024-2028	2029-2033	2034 - 2046
CAPACITY						
1-260000-26006-6019	Water Efficiency/Buy-Back Program	Exempt	$ 50,000	$50,000		
960307 ING	Groundwater Modelling	Exempt	$170,000	$170,000		
960317 ING	Water Quality Improvements	Exempt	$700,000	$350,000	$350,000	
260300 ING	Operation Minor Capital less well rehab	Exempt	$2,327,000	$602,000	$1,725,000	
260300 ING	Specialized Well Rehabilitation Program	Exempt	$321,000	$100,000	$6,000	$215,000
960310 ING	Well 11 Upgrades	Exempt	$1,803,000	$1,802,802		
DISTRIBUTION - VACANT LANDS WITHIN URBAN BOUNDRY						
960325 ING	Watermain Replacements Town Projects	Exempt	$29,361,000	$7,985,000	$6,682,000	$14,694,000
960315 ING	Watermain Replacements County Projects	Exempt	$100,000			$100,000
960302 ING	Thames Street South Trunk Watermain Extension from CNR to Holcroft	Exempt	$383,000	$383,000		
SOUTH THAMES RESIDENTIAL AREA						
960303 ING	Watermain on Hamilton/King St. from boundary to existing water distribution system (Oakwood)	Exempt	$691,000	$691,000		
DISTRIBTUION - EMPLOYMENT AREAS						
WALLACE LINE INDUSTRIAL PARK						

Project ID	Project Description	Presumed MCEA Schedule[1]	Cost	2024-2028	2029-2033	2034 - 2046
960338 ING	Wallace Line Trunk Watermain from Robinson Road to Thomas St.	Exempt	$2,516,000	$2,516,000		
SOUTHWEST INDUSTRIAL PARK						
960337 Ing	Wallace Line Second Feedermain from Robinson Road to Hwy 401	Exempt	$48,000		$48,000	
960337 Ing	Second Feedermain Hwy 401 Crossing - Wallace Line to Union Street	Exempt	$1,298,000	$44,000	$1,254,000	
960337 Ing	Union Road Trunk Watermain from Hwy 401 crossing to Curry Road	Exempt	$1,514,000		$1,514,000	
960337 Ing	Curry Road Trunk Watermain from Union Road to future water tower site	B[2]	$3,446,000		$3,446,000	
960337 Ing	Elevated Water Storage Tank	Exempt	$3,409,000			$ 3,409,000
		TOTAL	**$46,334,000**	**$12,891,000**	**$15,025,000**	**$18,418,000**

Notes

1. Subject to further review and confirmation when project is initiated
2. Projects that are identified as eligible for screening, subject to the archaeological screening process

13.3.2.2 Tillsonburg

Project ID	Project Description	Presumed MCEA Schedule[1]	Cost	2024-2028	2029-2033	2034 - 2046
CAPACITY						
1-260000-26006-6019	Water Efficiency/Buy-Back Program	Exempt	$50,000	$50,000		

Project ID	Project Description	Presumed MCEA Schedule[1]	Cost	2024-2028	2029-2033	2034 - 2046
260200 WATER TBURG	Operations Minor Capital less well rehab	Exempt	$1,212,000	$543,000	$669,000	
260200 WATER TBURG	Specialized Well Rehabilitation Program	Exempt	$560,000	$240,000	$320,000	
960200 TBURG	Well 7A - Filtration Upgrades (D)(C)	Exempt	$2,010,000	$2,010,000		
960201 TBURG	Well 3 Facility Upgrade (D) (C)	Exempt	$3,015,000	$3,015,000		
960220 TBURG	Backup Power for North Street Pumphouse	Exempt	$465,000	$465,000		
960202 TBURG	Replacement of Well 6A	Exempt	$150,000	$150,000		
960211 TBURG	Broadway Secondary Transmission Main Feed	Exempt	$2,249,000	$2,249,000		
960203 TBURG	Mall Rd Replacement Wells for Wells 1a and 2	Exempt	$465,000		$465,000	
960204 TBURG	Bell Mill Replacement Well for Well 11	Exempt	$642,000	$ 642,000		
960206 TBURG	Well 12 capacity increase feasibility study	Exempt	$321,000			$321,000
DISTRIBUTION - VACANT LANDS WITHIN URBAN BOUNDARY						
960230 TBURG	Secondary Elevated Storage	B[2]	$2,273,000			$2,273,000
960250 TBURG	Watermain West Town Line from Simcoe Street to Potters Rd.	Exempt	$755,000		$755,000	
960235 TBURG	Watermain Replacements Town	Exempt	$21,518,000	$7,678,000	$5,280,000	$8,560,000

Project ID	Project Description	Presumed MCEA Schedule[1]	Cost	2024-2028	2029-2033	2034 - 2046
960247 TBURG	Watermain Replacements County	Exempt	$115,000	$15,000		$100,000
960251 TBURG	Victoria Wood Subdivision Watermain on Street I from Westin Drive to Street F	Exempt	$351,000	$351,000		
960251 TBURG	Victoria Wood Subdivision Watermain on Grandview Drive (near Quarter Townline) West to Street A then N to Concession Street W.	Exempt	$797,000	$797,000		
960213 TBURG	Cranberry Road Watermain Extension from Beckett Blvd North to Town Limits (C)	Exempt	$1,492,000	$1,492,000		
960245 TBURG	North End Watermain Looping	Exempt	$ 2,020,000	$2,020,000		
DISTRIBTUION - EMPLOYMENT AREAS						
Innovation Park Industrial Lands						
960245 TBURG	Watermain looping VanNorman St watermain loop (off HWY 3)	Exempt	$540,000			$ 540,000
Rokeby Sideroad Industrial Lands						
960252 TBURG	Vienna Road Watermain Extension from Rouse Street to South on Vienna Rd.	Exempt	$321,000		$ 321,000	
		TOTAL	**41,321,000**	**21,717,000**	**$7,810,000**	**11,794,000**

Notes

1. Subject to further review and confirmation when project is initiated
2. Projects that are identified as eligible for screening, subject to the archaeological screening process

13.3.2.3 Woodstock

Project ID	Project Description	Presumed MCEA Schedule[1]	Cost	2024-2028	2029-2033	2034 - 2046
CAPACITY						
1-260000-26006-6019	Water Efficiency/Buy-Back Program	Exempt	$100,000	$100,000		
930197	Strik Drain Stormwater Management Facility	Exempt	$580,000	$580,000		
260100 WDSTK	Operations Minor Capital less Well Rehab	Exempt	$1,434,000	$769,000	$665,000	
260100 WDSTK	Specialized Well Rehabilitation Program	Exempt	$869,000	$590,000	$279,000	
960159 WDSTK	Thornton to Woodstock Feedermain Replacement	Exempt	$10,620,000	$10,620,000		
960144 WDSTK	Zone 1 Pressure Control Valve and Control Building to Southside Supply	B[2]	$354,000	$12,000	$342,000	
960166 WDSTK	Thornton to HWY 401 crossing Feedermain Upgrade (RELINING 401 CROSSING)	Exempt	$1,206,000	$1,206,000		
960125 WDSTK	Thornton WTP High Lift Pumping Upgrades	Exempt	$100,000	$100,000		
960145 WDSTK	Well 9 and Well 6 upgrades at Southside WTP	Exempt	$350,000		$350,000	
960146 WDSTK	Southside WTP Revitalization Study	Exempt	$200,000		$200,000	
960147 WDSTK	Tower Generators	Exempt	$300,000		$300,000	
960124 WDSTK	East Woodstock Water Tower Rehab	Exempt	$4,000,000			$4,000,000
DISTRIBUTION						
Karn Rd Secondary Plan Area						

Project ID	Project Description	Presumed MCEA Schedule[1]	Cost	2024-2028	2029-2033	2034 - 2046
960154 WDSTK	Karn Rd (Zone 6) Booster Pumping Station (C)	Exempt	$4,500,000	$4,500,000		
960149	Oversized WM Projects for Developments in City Limits	Exempt	$413,000	$313,000	$100,000	
960134 WDSTK	Watermain from Karn Rd Booster Pumping Station west to Anderson Street, east along Karn Road and looping back to Booster Pumping Station	Exempt	$650,000	$650,000		
Existing Distribution						
960120 WDSTK	Bowerhill Reservoir Decommissioning	Exempt	$855,000		$855,000	
960141 WDSTK	Watermain Replacements (City)	Exempt	$40,125,000	$11,248,000	$9,877,000	$19,000,000
960153 WDSTK	Watermain Replacements (County)	Exempt	$13,240,000	$3,310,000	$3,310,000	$6,620,000
960155 WDSTK	Zone 3 Booster Pumping Station (D)	Exempt	$100,000		$100,000	
960155 WDSTK	Zone 3 Booster Pumping Station (C)	Exempt	$2,858,000		$2,858,000	
960164 WDSTK	11th Line Watermain Replacement (C)	Exempt	$659,000		$659,000	
960127 WDSTK	Zone 3 Pressure Control Valve and Control Building to northern Zone 1 area (near Nellis Booster Pumping Station)	B[2]	$354,000		$354,000	
East Woodstock Secondary Plan Area						
960128 WDSTK	Township Rd 3 Waterman from Oxford Road 4 to EPA woodlot area	Exempt	$1,464,000	$1,464,000		

Project ID	Project Description	Presumed MCEA Schedule[1]	Cost	2024-2028	2029-2033	2034 - 2046
North East Industrial Park						
960135 WDSTK	Toyota Easement Watermain from Elevated Storage tower to west side of Hwy 401 (C)	Exempt	$1,096,000	$1,096,000		
960135 WDSTK	Toyota Easement Hwy 401 Watermain Crossing (C)	Exempt	$1,116,000	$1,116,000		
960135 WDSTK	Easement Watermain from east side of Hwy 401 to west limit of Corlett site (C)	Exempt	$431,000	$431,000		
960135 WDSTK	Street C Watermain from Corlett site to Blandford Road (C)	Exempt	$123,000	$123,000		
960135 WDSTK	400 mm watermain internal to development - oversizing	Exempt	$308,000	$308,000		
960135 WDSTK	Blandford Rd Watermain from Street C to Township Road #2 (C)	Exempt	$230,000	$230,000		
South East Industrial Park						
906135 WDSTK		PHASE II				
	WM 400 mm on Pattullo (~ 150 m east of Alyea Street/ opposite SPS to Southwest Limit of study area) 790 meters & WM 400 mm on Pattullo (Southwest Limit of study area to Middletown Line) 944 meters (C)	Exempt	$1,639,000		$1,639,000	
	Middletown Line Watermain from Pattullo Avenue to Street A (C)	Exempt	$72,000		$72,000	

Project ID	Project Description	Presumed MCEA Schedule[1]	Cost	2024-2028	2029-2033	2034 - 2046
		TOTAL	$90,346,000	$38,766,000	$21,960,000	$29,620,000

Notes

1. Subject to further review and confirmation when project is initiated
2. Projects that are identified as eligible for screening, subject to the archaeological screening process

13.3.2.4 Blandford Blenheim

Project ID	Project Description	Presumed MCEA Schedule[1]	Cost	2024-2028	2029-2033	2034 - 2046
CAPACITY						
260400 Townships	Specialized Well Rehab	Exempt	$263,000	$133,000	$130,000	
BRIGHT						
960457	Bright to Plattsville Interconnecting Watermain	Exempt	$5,390,000		$5,390,000	
New	Bright Well 5 Abandonment Study	Exempt	$150,000			$150,000
PLATTSVILLE						
960429 Manganese Filtration Townships	Manganese Filtration (Townships) - Plattsville	B[2]	$2,065,000		$2,065,000	
960429-PLAT	Land Acquisition for new WTF for Manganese Treatment	B[2]	$200,000		$200,000	
New	New Well Supply	B[2] (if on municipal property, C otherwise)	$1,572,000			$1,572,000
960404-PLAT	Backup Generation at WTF	Exempt	$428,000		$428,000	

Project ID	Project Description	Presumed MCEA Schedule[1]	Cost	2024-2028	2029-2033	2034 - 2046
960461-PLAT	Plattsville Water Tower Rehab	Exempt	$4,000,000			$4,000,000
DRUMBO-PRINCETON						
960429-Manganese Filtration Townships	Manganese Filtration (Townships) - Drumbo	B[2]	$2,163,000			$2,163,000
960420-DRUMBO	New Well Supply	B[2] (if on municipal property, C otherwise)	$1,698,000		$1,698,000	
960421-DRUMBO	Backup generation to Wells 1 and 2A	Exempt	$300,000	$150,000	$150,000	
960425-DRUMBO	Water Treatment Plant Land Acquisition	B[2]	$200,000			$200,000
960425-DRUMBO	Water Treatment Plant Relocation	B[2]	$5,377,000			$5,377,000
DISTRIBUTION - VACANT LANDS WITHIN URBAN BOUNDARY						
960406 TWSP	Linear R/R CR Project	Exempt				
960400 Townships	Watermain Replacements (Townships) Projects 10-year plan	Exempt				
PLATTSVILLE						
960459 PLAT	Plattsville N Boundary Trunk Watermain Extension Hoffstetter Rd North to limit	Exempt	$394,000			$394,000

Project ID	Project Description	Presumed MCEA Schedule[1]	Cost	2024-2028	2029-2033	2034 - 2046
960458-PLAT	Applewood Trunk Watermain Upsizing	Exempt	$77,000			$77,000
		TOTAL	$ 24,277,000	$ 283,000	$ 10,061,000	$13,933,000

Notes

1. Subject to further review and confirmation when project is initiated
2. Projects that are identified as eligible for screening, subject to the archaeological screening process

13.3.2.5 Norwich

Project ID	Project Description	Presumed MCEA Schedule[1]	Cost	2024-2028	2029-2033	2034 - 2046
CAPACITY						
1-260000-26006-6019	Water Efficiency/Buy-Back Program	Exempt	$25,000	$25,000		
260400 Water Townships	Specialized Well Rehabilitation Program	Exempt	$60,000		$60,000	
NORWICH						
960432 NORWICH	New Standpipe at Main St WTF (Well 4)	B	$ 2,501,000	$228,000	$ 2,273,000	
960429 Manganese Filtration Townships	New Filtration Land acquisition	B[2]	$200,000		$200,000	
960429 Manganese Filtration Townships	New Filtration Facility at Main St WTF	B[2]	$2,272,000	$75,000	$2,197,000	
NEW	New Water Supply	B[2] (if on municipal	$1,572,000			$1,572,000

Project ID	Project Description	Presumed MCEA Schedule[1]	Cost	2024-2028	2029-2033	2034 - 2046
		property, C otherwise)				
DISTRIBUTION - VACANT LANDS WITHIN URBAN BOUNDARY						
960406 TWSP	Linear R/R County Road Projects	Exempt				
960400 Township Distribution Replacement	Watermain Replacements (Townships)	Exempt	$ 2,087,000	$2,087,000		
		TOTAL	$8,717,000	$2,415,000	$4,730,000	$1,572,000

Notes

1. Subject to further review and confirmation when project is initiated
2. Projects that are identified as eligible for screening, subject to the archaeological screening process

13.3.2.6 South-West Oxford

Project ID	Project Description	Presumed MCEA Schedule[1]	Cost	2024-2028	2029-2033	2034 - 2046
CAPACITY						
260400 Water Townships	Specialized Well Rehabilitation Program	Exempt	$401,000	$74,000	$327,000	
960422 TWSP	Water Quality Improvements (Brownsville)	Exempt	$150,000	$150,000		
MOUNT ELGIN						
960403 Mount Elgin	Graydon Facility Enhancement / Optimization	Exempt	$200,000	$200,000		
NEW	Ingersoll to Mt Elgin Watermain Connection (D)	B	$1,094,000			$1,094,000
BEACHVILLE						

Project ID	Project Description	Presumed MCEA Schedule[1]	Cost	2024-2028	2029-2033	2034 - 2046
960470 Beachville	Additional Well Supply and Standpipe	C	$2,130,000		$2,130,000	
		TOTAL	$3,975,000	$424,000	$2,457,000	$1,094,000

Notes

1. Subject to further review and confirmation when project is initiated
2. Projects that are identified as eligible for screening, subject to the archaeological screening process

13.3.2.7 East-Zorra Tavistock

Project ID	Project Description	Presumed MCEA Schedule[1]	Cost	2024-2028	2029-2033	2034 - 2046
CAPACITY						
1-260000-26006-6019	Water Efficiency/Buy-Back Program	Exempt	$25,000			
260400 Water Township	Specialized Well Rehabilitation Program	Exempt	$40,000			
960429 Manganese Filtration Tavistock	Land Acquisition Manganese Filtration	B[2]	$200,000			
960429 Manganese Filtration Tavistock	Manganese Filtration Tavistock (EA)(D)(C)	B[2]	$3,670,000			
TAVISTOCK						
960462-TAVI	Tower CT Enhancement Study		$30,000	$30,000		
960437-TAV	New Well Supply - Land Acquisition	B[2] (if on municipal	$400,000			

Project ID	Project Description	Presumed MCEA Schedule[1]	Cost	2024-2028	2029-2033	2034 - 2046
		property, C otherwise)				
960437-TAV	New Well Supply - Well #4 and Storage	C (in process)	$ 6,548,000	$6,548,000		
960462-TAV	Water Tower Rehabilitation and Repainting	Exempt	$4,000,000		$4,000,000	
DISTRIBUTION - VACANT LANDS WITHIN URBAN BOUNDARY						
960400 Township Distribution Replacement	Watermain Replacements (Townships) Tavistock	Exempt	$2,014,000	$606,000	$408,000	$1,000,000
960406 TWSP - LINEAR R/R CR PROJ	LINEAR R/R CR PROJ (County) Tavistock	Exempt	$358,000	$358,000		
		TOTAL	$ 16,527,000	$11,119,000	$ 4,408,000	$ 1,000,000

Notes

1. Subject to further review and confirmation when project is initiated
2. Projects that are identified as eligible for screening, subject to the archaeological screening process

13.3.2.8 Zorra

Project ID	Project Description	Presumed MCEA Schedule[1]	Cost	2024-2028	2029-2033	2034 - 2046
CAPACITY						
260400 Water Townships	Specialized Well Rehabilitation Program	Exempt	$46,000	$40,000	$6,000	
THAMESFORD						
960411	Reservoir and Tower CT Enhancement Upgrades	Exempt	$300,000	$300,000		
EMBRO						

Project ID	Project Description	Presumed MCEA Schedule[1]	Cost	2024-2028	2029-2033	2034 - 2046
960451	Reservoir CT Enhancement Upgrades	Exempt	$330,000		$330,000	
NEW	Embro - Storage Expansion	B[2]	$569,000			$569,000
DISTRIBUTION - VACANT LANDS WITHIN URBAN BOUNDARY						
960400 Township Distribution Replacement	Watermain Replacements (Townships) - Thamesford	Exempt	$3,506,000	$951,000	$ 905,000	$1,650,000
960424	Watermain Trunk Extension	Exempt	$1,189,000	$1,189,000		
		TOTAL	**$ 5,940,000**	**$2,480,000**	**$1,241,000**	**$2,219,000**

Notes

1. Subject to further review and confirmation when project is initiated
2. Projects that are identified as eligible for screening, subject to the archaeological screening process

14.0 PREFERRED WASTEWATER SERVICING STRATEGY

14.1 Overall Wastewater Servicing Strategy Description

The preferred wastewater servicing strategy identified in Section 12.5 is intended to meet the wastewater collection and treatment requirements of Oxford County to 2046. The recommended solutions were established in consultation with the County on the basis of the Water and Wastewater Master Planning Principles that were established for this project.

The recommended strategy for the evaluation outputs is prioritized for implementation based on ensuring that sufficient wastewater treatment and conveyance capacity is always available. The strategies are implemented on a timeline established in accordance with each project's MCEA schedule.

The anticipated timing of each project within the Preferred Strategy has been established based on the projected population and employment growth within the County. The timelines are categorized as following:

- Short – term period from 2024 to 2028;
- Medium-term period from 2029 to 2033; and
- Long-term period from 2034-2046.

Generally, when community wastewater flows approach 85% of the capacity limit for a given wastewater system, undertakings should be considered to expand/increase the WWTP capacity. This industry standard benchmark is intended to help operators maintain sufficient operating capacities of the DWS as a whole and individual wastewater system components.

Accordingly, the project schedule – which is subject to refinement – was developed such that new wastewater system expansion projects will begin operation when the community wastewater flows reach approximately 85 - 90% of the existing system capacity.

14.2 Detailed Wastewater Servicing Strategy Requirements

14.2.1 **Ingersoll** WWS

To address the Ingersoll WWS needs to 2046, the following general servicing strategies were developed and include:

- Trunk sewer extensions/upsizing;
- New SPS;

- New Forcemains, new trunk sewer river crossing; and
- WWTP Upgrades.

14.2.2 Tillsonburg WWS

To address the Tillsonburg WWS needs to 2046, the following general servicing strategies were developed and include:

- WWTP Capacity Expansion (Phase 2);
- Trunk sewer rehabilitation;
- New/Upgraded SPSs;
- Forcemain Upgrades;
- Trunk sewer extensions/upsizing; and
- Sewer Inflow and Infiltration Reduction.

14.2.3 Woodstock WWS

To address the Woodstock WWS needs to 2046, the following general servicing strategies were developed and include:

- Trunk sewer extensions/upsizing;
- New Forcemains;
- New/Upgraded SPSs;
- WWTP Upgrades;
- Brick Pond Trunk sewer realignment; and
- Sewer Inflow and Infiltration Reduction.

14.2.4 Blandford Blenheim

14.2.4.1 Plattsville WWS

To address the Plattsville WWS needs to 2046, the following general servicing strategies were developed and include:

- WWTP Optimization;
- Lagoon biosolids removal and berm repair;
- Trunk sewer extensions; and

- Forcemain twinning and capacity review.

14.2.4.2 Drumbo WWS

To address the Drumbo WWS needs to 2046, the following general servicing strategies were developed and include:

- WWTP Capacity Expansion (Phase 2); and
- WWTP Optimization.

14.2.5 Norwich WWS

To address the Norwich WWS needs to 2046, the following general servicing strategies were developed and include:

- WWTP Capacity Expansion;
- Lagoon biosolids removal and berm repair; and
- Sewer rehabilitation.

14.2.6 South-West Oxford

14.2.6.1 Mount Elgin WWS

To address the Mount Elgin WWS needs to 2046, the following general servicing strategies were developed and include:

- WWTP Capacity Expansion (Phase 3 / 4);
- Sewer/forcemain upsizing; and
- Ingersoll to Mount Elgin Wastewater System Interconnection (Forcemain).

14.2.7 East-Zorra Tavistock

14.2.7.1 Innerkip WWS

To address the Innerkip WWS needs to 2046, the following general servicing strategies were developed and include:

- Upsizing/twinning of forcemain to Woodstock.

14.2.7.2 Tavistock WWS

To address the Tavistock WWS needs to 2046, the following general servicing strategies were developed and include:

- WWTP Capacity Expansion (Phase 2);

- SPS capacity upgrades;
- Sewer rehabilitation/extensions/upsizing;
- Sewer System Inflow and Infiltration Reduction.

14.2.8 Zorra

14.2.8.1 Thamesford WWS

To address the Thamesford WWS needs to 2046, the following general servicing strategies were developed and include:

- WWTP Upgrades.

14.2.8.2 Embro WWS

To address the Embro WWS needs to 2046, the following general servicing strategies were developed and include:

- Upsizing/twining of forcemain to Woodstock.
- SPS enhancements.

14.3 Wastewater Capital Implementation Plan

14.3.1 Level of Cost Opinions

ASTM E 2516 (Standard Classification for Cost Estimate Classification System) provides a five-level classification system based on several characteristics, with the primary characteristic being the level of project definition (i.e., percentage of design completion). The ASTM standard, shown in Table 14.1, illustrates the typical accuracy ranges that may be associated with the general building industries.

Table 14.1: ASTM E2516 Accuracy Range of Cost Opinions for General Building Industries

Cost Estimate Class	Expressed as % of Design Completion	Anticipated Accuracy Range as % of Actual Cost
5	0-2	-30 to +50
4	1-15	-20 to +30
3	10-40	-15 to +20
2	30-70	-10 to +15
1	50-100	-5 to +10

The cost estimates developed in this report would be best described as a Class 5 Cost Estimate which is typically used for high level study project.

In some cases, project cost estimates were supplied with greater levels of accuracy based on MCEA Study conceptual design, detailed designs, etc.

14.3.2 Wastewater Projects Identified

Sections 14.3.2.1 to 14.3.2.8 summarize the wastewater projects that have been identified through the Oxford County 2024 W/WW MP.

14.3.2.1 Ingersoll

Project ID	Project Description	Presumed MCEA Schedule[1]	Cost	2024-2028	2029-2033	2034 - 2046
CAPACITY						
950303 ING	Sanitary Trunk Sewer Infiltration and Inflow Reduction	Exempt	$ 127,000		$127,000	
250300 ING	Operations Minor Capital	Exempt	$1,998,000	$972,000	$1,026,000	
NEW	WWTP Headworks Upgrades	Exempt	$14,000,000			$14,000,000
950308 ING	Digester Biogas Project	Exempt	$450,000	$450,000		
COLLECTION - VACANT LANDS WITHIN URBAN BOUNDRY						
950330 ING	Sanitary Sewer Replacements - Town Projects	Exempt	$20,981,000	$5,951,000	$5,030,000	$10,000,000
950334 ING	Sanitary Sewer Replacements - County Projects	Exempt	$100,000			$100,000
950332 ING	Sanitary Sewer Relining - County Relining	Exempt	$2,427,000	$427,000	$500,000	$1,500,000
950329 ING	Second Sanitary Trunk Crossing of Thames River	Exempt or B[2] (depending on crossing methodology)	$2,429,000	$2,429,000		
South Thames Residential Area						
950336 - ING	Wallace Line Sanitary Sewer from Midblock Industrial Site to north of CNR to Hamilton	Exempt	$3,456,000	$3,456,000		
950336 - ING	Hamilton Road Sanitary Sewer from service lands to east of	Exempt	$ 1,775,000	$1,775,000		

Project ID	Project Description	Presumed MCEA Schedule[1]	Cost	2024-2028	2029-2033	2034 - 2046
	Ingersoll Street and north to existing 675 mm Trunk Sewer					
950336 - ING	Union Road Sanitary Sewer from Culloden Line to Curry Road	Exempt	$ 623,000		$623,000	
950336 - ING	Curry Road Sanitary Sewer from Union Road to west limit of CPR	Exempt	$1,138,000		$1,138,000	
950336 - ING	CPR Easement Sanitary Sewer from Curry Road to West Sewage Pumping Station - south of Hwy 401	Exempt	$ 681,000	$23,000	$658,000	
950336 - ING	West Sewage Pumping Station - south of Hwy 401	B[2]	$1,928,000	$75,000	$1,853,000	
950336 - ING	Easement Forcemain Hwy 401 crossing from West Sewage Pumping Station to Clarke Road area (existing system)	Exempt or B[2] (depending on crossing methodology)	$2,249,000		$2,249,000	
950336 - ING	Curry Road Sanitary Sewer from east limit of CPR to Plank Line	Exempt	$1,090,000		$1,090,000	
950336 - ING	Plank Line Sewage Pumping Station (south of Hwy 401)	B[2]	$1,136,000		$1,136,000	
950336 - ING	Easement Forcemain from Plank Line Sewage Pumping Station to West Sewage Pumping Station	Exempt	$1,093,000		$1,093,000	
		TOTAL	$ 57,681,000	$ 15,558,000	$16,523,000	$25,600,000

Notes

1. Subject to further review and confirmation when project is initiated
2. Projects that are identified as eligible for screening, subject to the archaeological screening process

14.3.2.2 Tillsonburg

Project ID	Project Description	Presumed MCEA Schedule[1]	Cost	2024-2028	2029-2033	2034 - 2046
Capacity						
250200 TBURG	Operation Minor Capital		$1,851,000	$492,000	$1,359,000	
950250 TBURG	Sanitary Trunk Sewer Infiltration and Inflow Reduction	Exempt	$218,000	$208,000	$10,000	
950200 TBURG	Tillsonburg Wastewater Treatment Plant Phase I Capacity Expansion (C)	Exempt	$600,000	$600,000		
950203 TBURG	Tillsonburg Wastewater Treatment Plant Phase II Capacity Expansion (C)	Exempt	$15,262,000			$15,262,000
NEW	Climate change resiliency study (flooding/barricades)	Exempt	$150,000			$ 150,000
COLLECTION - VACANT LANDS WITHIN URBAN BOUNDARY						
950226 TBURG	Sanitary Sewer Replacements Town	Exempt	$15,873,000	$4,856,000	$3,539,000	$7,478,000
950229 TBURG	Sanitary Sewer Replacements County	Exempt	$117,000			$100,000
950225 TBURG	Stoney Creek Trunk Sewer Rehabilitation from Quarter Town Line to Concession Street West	Exempt	$600,000	$200,000	$400,000	

Project ID	Project Description	Presumed MCEA Schedule[1]	Cost	2024-2028	2029-2033	2034 - 2046
950222 TBURG	John Pound forcemain replacement and upsizing	Exempt	$1,151,000	$1,151,000		
950220 TBURG	John Pound SPS capacity enhancements	Exempt or B[2] (depending on scope of work)	$214,000	$332,000		
950216 TBURG	Cranberry Road Sanitary Trunk extension on Tillson Ave from North of Beckett Blvd to North Town Limit	Exempt	$1,297,000	$1,297,000		
950224 TBURG	Loraine Ave Sanitary Trunk Upsizing	Exempt	$578,000			$578,000
COLLECTION – EMPLOYMENT LANDS						
Rokeby Sideroad Industrial Lands						
950218 TBURG	Rouse St SPS upgrades	B[2]	$1,959,000	$154,000	$1,806,000	
TOTAL			$40,096,000	$9,516,000	$7,114,000	$23,568,000

Notes

1. Subject to further review and confirmation when project is initiated
2. Projects that are identified as eligible for screening, subject to the archaeological screening process

14.3.2.3 Woodstock

Project ID	Project Description	Presumed MCEA Schedule[1]	Cost	2024-2028	2029-2033	2034 - 2046
CAPACITY						
950170 WDSTK	Sanitary Trunk Sewer Infiltration and Inflow Reduction	Exempt	$223,000	$213,000	$10,000	
950103 WDSTK	Woodstock WWTP Operational Upgrades	Exempt	$14,750,000	$0	$14,750,000	
950128 WDSTK	Thames Valley SPS (C)	Exempt or B[2] (depending on work scope)	$3,086,000	$103,000	$2,983,000	
250100 WDSK	Operation Minor Capital	Exempt	$2,094,000	$863,000	$1,231,000	
950159 WDSTK	Brick Pond Sanitary Trunk Sewer Re-alignment	B	$5,010,000		$5,010,000	
950173 WDSTK	Sanitary Sewer Replacement (OR 59 & Fairway) - (C)	Exempt	$266,000	$266,000		
950174 WDSTK	Sanitary Sewer Replacements - County Projects	Exempt	$6,370,000	$3,070,000	$1,100,000	$2,200,000
950158 WDSTK	Sanitary Sewer Replacements - City Projects	Exempt	$41,120,000	$10,645,000	$10,475,000	$20,000,000
950162 WDSTK	11th Line Sanitary Sewer (C)	Exempt	$1,189,000		$1,189,000	
950140 WDSTK	Northwest Trunk Upsizing	Exempt	$500,000	$500,000		
COLLECTION - VACANT LANDS WITHIN URBAN BOUNDARY						
Karn Rd Secondary Plan Area						
New	Gravity / Siphon Upsize	Exempt	$545,000	$545,000		
East Woodstock Secondary Plan Area						

Project ID	Project Description	Presumed MCEA Schedule[1]	Cost	2024-2028	2029-2033	2034 - 2046
950164 WDSTK	Lansdowne Sewer Ext. 300 meters of 300 mm	Exempt	$400,000	$400,000		
950163 WDSTK	Extension of East Trunk Sewer	Exempt	$884,000	$884,000		
950163 WDSTK	Lansdowne Sewage Pumping Station (C)	B[2]	$7,500,000	$7,500,000		
950163 WDSTK	West Trunk Sewer	Exempt	$847,000	$847,000		
COLLECTION – EMPLOYMENT LANDS						
North East Industrial Park						
950150 WDSTK	Sewage Pumping Station A	B[2]	$2,228,000	$2,228,000		
950150 WDSTK	Dundas Street Forcemain from Houser's Lane (MH SA 992) to Water Tower site	Exempt	$2,101,000	$2,101,000		
950150 WDSTK	Toyota Easement Forcemain from Water Tower Site to west side of Hwy 401	Exempt	$425,000	$425,000		
950150 WDSTK	Hwy 401 Forcemain Crossing	Exempt	$425,000	$425,000		
950150 WDSTK	Street C Forcemain from east side of Hwy 401 to SPS A (Blandford Road)	Exempt	$903,000	$903,000		
950150 WDSTK	Blandford Road Forcemain from Street C to SPS A	Exempt	$200,000	$200,000		
950150 WDSTK	Southeast Sanitary Trunk Oversizing Capacity Assessment	Exempt	$100,000	$100,000		

Project ID	Project Description	Presumed MCEA Schedule[1]	Cost	2024-2028	2029-2033	2034 - 2046
South East Industrial Park						
950152 WDSTK		*PHASE II*				
	Patullo Avenue Sanitary main from Alyea SPS to southwest limit of South East Secondary Plan Area (C)	Exempt	$1,017,000		$1,017,000	
	Patullo Avenue Sanitary main from South East Secondary Plan Area to Middletown Line (C)	Exempt	$481,000		$481,000	
	Middletown Line Sanitary main from Patullo Avenue to Street A (C)	Exempt	$169,000		$169,000	
	Southeast Trunk Sanitary Condition assessment	Exempt	$100,000		$100,000	
	Patullo Avenue South East Sanitary Trunk Oversizing from South Trunk Sewer (MH SA754367) to South Trunk Sewer (MH SA755111) (C)	Exempt	$2,090,000			$2,090,000
		TOTAL	$98,365,000	$32,218,000	$38,515,000	$27,632,000

Notes

1. Subject to further review and confirmation when project is initiated
2. Projects that are identified as eligible for screening, subject to the archaeological screening process

14.3.2.4 Blandford Blenheim

Project ID	Project Description	Presumed MCEA Schedule[1]	Cost	2024-2028	2029-2033	2034 - 2046
CAPACITY						
PLATTSVILLE						
250600 PLAT	Plattsville Wastewater Operations Minor Capital	Exempt	$638,000	$190,000	$448,000	
950607-PLAT	Plattsville Lagoon Biosolids Clean-out	Exempt	$900,000	$900,000		
950608-PLAT	Plattsville Lagoon Berm Repair	Exempt	$100,000	$100,000		
950609-PLAT	Plattsville WWTP Operational Enhancement	Exempt	$1,240,000	$1,240,000		
950173 WDSTK	Sanitary Sewer Replacement (OR 59 & Fairway) - (C)	Exempt	$266,000	$266,000		
DRUMBO						
250800 DRUMBO	Drumbo Wastewater Operation Minor Capital	Exempt	$88,000	$14,000	$74,000	
950810 DRUMBO	Drumbo Wastewater Treatment Capacity Expansion (Phase I)	Exempt	$250,000	$250,000		
950810-DRUMBO	Drumbo Wastewater Treatment Capacity Expansion (Phase II)	C - underway	$400,000	$400,000		
COLLECTION - VACANT LANDS WITHIN URBAN BOUNDARY						
PLATTSVILLE						
950650-PLAT	Plattsville Sanitary Sewer Replacements - Township	Exempt				
950611-PLAT	Plattsville FM Twinning and SPS capacity review	Exempt	$125,000		$125,000	

Project ID	Project Description	Presumed MCEA Schedule[1]	Cost	2024-2028	2029-2033	2034 - 2046
		TOTAL	$3,103,000	$2,904,000	$199,000	

Notes

1. Subject to further review and confirmation when project is initiated
2. Projects that are identified as eligible for screening, subject to the archaeological screening process

14.3.2.5 Norwich

Project ID	Project Description	Presumed MCEA Schedule[1]	Cost	2024-2028	2029-2033	2034 - 2046
CAPACITY						
NORWICH						
250400	Norwich Wastewater Operations Minor Capital	Exempt	$1,890,000	$1,844,000	$46,000	
950413-NOR	Sanitary Trunk Sewer Infiltration and Inflow Reduction	Exempt	$64,000	$64,000		
950409-NOR	Norwich Lagoon Biosolids Clean-out	Exempt	$1,045,000	$1,045,000		
950410 -NOR	Norwich Lagoon Berm Repair	Exempt	$100,000	$100,000		
950412-NOR	Norwich Wastewater Treatment Plant Capacity Expansion - Phase II	C	$10,800,000	$800,000	$10,000,000	$-
COLLECTION - VACANT LANDS WITHIN URBAN BOUNDARY						
NORWICH						
950450-NOR	Sanitary Sewer Replacements - Township	Exempt	$2,147,000	$2,147,000		
950417-NOR	Linear R/R CR PROJ - County	Exempt				

Project ID	Project Description	Presumed MCEA Schedule[1]	Cost	2024-2028	2029-2033	2034 - 2046
		TOTAL	$16,046,000	$6,000,000	$10,046,000	

Notes

1. Subject to further review and confirmation when project is initiated
2. Projects that are identified as eligible for screening, subject to the archaeological screening process

14.3.2.6 South-West Oxford

Project ID	Project Description	Presumed MCEA Schedule[1]	Cost	2024-2028	2029-2033	2034 - 2046
CAPACITY						
MOUNT ELGIN						
950905 MT ELGIN	Mt. Elgin Wastewater Treatment Plant Capacity Expansion Phase 3 and 4 (C)	Exempt	$2,020,000	$2,020,000		
250900 MT ELGIN	Mt Elgin Minor Capital	Exempt	$55,000	$37,000	$18,000	
NEW	Sanitary Forcemain Connection to Ingersoll	B	$10,990,000			$10,990,000
COLLECTION - VACANT LANDS WITHIN URBAN BOUNDARY						
MOUNT ELGIN						
950906 Mount Elgin	Sanitary Sewer Upgrades	Exempt	$400,000	$100,000	$100,000	$200,000
950907 Mount Elgin	Forcemain Upsizing	Exempt	$892,000	$892,000		
		TOTAL	$14,357,000	$3,049,000	$118,000	$11,190,000

Notes

1. Subject to further review and confirmation when project is initiated
2. Projects that are identified as eligible for screening, subject to the archaeological screening process

14.3.2.7 East-Zorra Tavistock

Project ID	Project Description	Presumed MCEA Schedule[1]	Cost	2024-2028	2029-2033	2034 - 2046
CAPACITY						
TAVISTOCK						
950502-TAVI	Sanitary Trunk Sewer Infiltration and Inflow Reduction	Exempt	$64,000	$64,000		
950504-TAV	Tavistock Wastewater Treatment Plant Capacity Expansion	C	$36,220,000	$36,220,000		
250500 TAVI	Operation Minor Capital	Exempt	$817,000	$205,000	$612,000	
950507-TAV	Tavistock Lagoon Cell Clean Out	Exempt	$500,000			$500,000
TAVISTOCK						
951105-INN	Woodstock to Innerkip Interconnecting Sanitary Forcemain Twinning	Exempt	$7,647,200	$259,200	$7,388,000	
COLLECTION - VACANT LANDS WITHIN URBAN BOUNDARY						
TAVISTOCK						
950550-TAV	Tavistock Sanitary Sewer Replacements - Township	Exempt	$1,723,000	$1,723,000		
950551-TAVI	William St Gravity Sewer Replacement and Upsizing	Exempt	$504,450	$505,000		
950513-TAV	William Street Sewage Pumping Station Capacity Expansion	B[2]	$7,250,000	$7,250,000		
		TOTAL	$54,726,200	$46,226,200	$8,000,000	$500,000

Notes

1. Subject to further review and confirmation when project is initiated
2. Projects that are identified as eligible for screening, subject to the archaeological screening process

14.3.2.8 Zorra

Project ID	Project Description	Presumed MCEA Schedule[1]	Cost	2024-2028	2029-2033	2034 - 2046
CAPACITY						
THAMESFORD						
250700 THAMES	Operations Minor Capital	Exempt	$ 476,000	$63,000	$413,000	
950718 THAMES	Thamesford WWTP Upgrades (D) (C)	Exempt	$4,800,000	$4,800,000		
EMBRO						
NEW	Woodstock to Embro Interconnecting Sanitary Forcemain	B	$11,625,000			$11,625,000
NEW	Embro SPS - enhancements	Exempt	$750,000			$750,000
	TOTAL		$ 17,651,000	$4,863,000	$ 413,000	$12,375,000

Notes

1. Subject to further review and confirmation when project is initiated

15.0 IMPLEMENTATION

15.1 Supporting Policy and Strategic Projects

In addition to water and wastewater capital projects identified, a number of supporting policies and strategies were also identified to be developed over the Master Plan period as shown in Table 15.1.

Table 15.1: Total Cost of Policy Development and Strategic Projects

Project ID	Project Description	Total	1-5 Year	6-10 Year
TBD	Fire Rated Systems Policy	$50,000	$50,000	
TBD	Backup Power Prioritization Policy	$35,000	$35,000	
TBD	Servicing Upgrades Policy	$75,000	$75,000	$150,000
TBD	Connected Systems Rate Servicing Policy	$75,000	$75,000	$75,000
900025 WWW Master Plan	Water and Wastewater Master Plan (2028 and 2033)	$900,000	$450,000	$450,000
900026 DC Technical Study W/WW	2029 DC W/WW Technical Study (2029)	$100,000		$100,000
	TOTAL	$1,235,000	$685,000	$775,000

15.2 Strategy Implementation

The preferred short- and long-term water and wastewater servicing strategies will be implemented in accordance with each project's respective MCEA schedule:

- At the commencement of specific project planning, the County should confirm which MCEA schedule applies as the schedule may very depending on the anticipated siting, construction method and environment sensitivity;
- Exempt projects will move directly forward to design and construction;

- Schedule B projects identified will proceed through separate stand-alone studies (a Project File Report will be completed for public filing) or as part of an integrated planning process under the Planning Act in order to satisfy MCEA requirements; and
- Schedule C projects identified will continue to Phases 3 and 4 of the MCEA process and have an Environmental Study Report (ESR) completed for public filing. It is anticipated that these Schedule C projects will review and update. Phases 1 and 2 of the MCEA process as part of the project scope.

During the subsequent steps of project implementation, primarily during detailed design, the following requirements will be considered:

- Finalization of property requirements;
- Refinement of infrastructure alignment, sizing, facility siting and costing;
- Refinement of construction methodologies;
- Completion of additional supporting investigations as required such as geotechnical, hydro-geotechnical and site specific environmental studies;
- Review and mitigation of potential construction related impacts; and
- Completion of all approval requirements including, but not limited to, provincial approvals (MECP, MNR), local municipality approvals (site plans, building permits), and conservation authority approvals.

Given the growth-related nature of the servicing strategies, these capital programs will also form the foundation for the water and wastewater components of Oxford County's Development Charges (DC) By-Law as part of the County's Integrated Growth Management Process shown below.

Along with the Water and Wastewater Development Charges Technical Report, the 2024 Water and Wastewater Master Plan provides recommendations, provides supporting information, and identifies the capital requirements for the Oxford County DC By-Law which will be updated for 2024.

The respective projects identified in the 2024 W/WW MP will also provide a baseline for Oxford County's future capital budgets.

Figure 15.1: Oxford County Integrated Growth Management Process