

Public Utilities Commission for the Municipality of Chatham-Kent

Water and Wastewater Master Plan (Approach 1) DRAFT

Chatham-Kent Public Utilities Commission

60692652

November 2023

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Executive Summary

The Municipality of Chatham-Kent completed a Water and Wastewater Master Plan in 2012 (updated further with an Addendum in June 2018) with the following objectives:

- Use the revised population growth and planning estimates for the municipality, for both urban and rural areas within the 20-year planning horizon to 2031.
- To conduct a technical review of previously identified needs; and,
- To update the infrastructure improvements and capital costs for the planning period.

The outcome from the above study allowed the Municipality to undertake and implement some of the recommended projects.

Further to the above study, Chatham-Kent through its local board the Chatham-Kent Public Utilities Commission issued a Request for Proposal to undertake a municipal wide water and wastewater master plan (Municipal Class Environmental Assessment Master Plan “Approach 1”) that will layout a project road map for a 30-year planning horizon – including near term (2022 - 2027), interim (up to 2032) and long term (2051) requirements – to service the future growth needs.

The Public Utilities Commission for the Municipality of Chatham-Kent provides water and wastewater service to primary and secondary urban area residents residing in the Municipality of Chatham-Kent in addition to larger water users such as greenhouses.

The Official Plan of Chatham-Kent identifies that water shapes the Municipality of Chatham-Kent in many ways. Potable water and treated wastewater returned to the environment, are two of them. The Chatham-Kent Public Utilities Commission, by undertaking periodic master plan studies, and associated updates such as Official Plan updates, wants to ensure that the linear and vertical infrastructures associated with both water and wastewater systems are available and reliable to the Municipality of Chatham-Kent and its customers.

The project road map is a combination of the planning process, analysis of existing water and wastewater linear and vertical infrastructures’ capability to meet the current and progressive projected growth, investigation and assessment of existing water, and wastewater treatment facilities which will help determine future water and sewer rates and provide input for Development Charges and rate setting process. This study is also a critical component in the development planning process and is intended to meet the Chatham-Kents objectives with respect to water and wastewater servicing. They are as follows:

- A cost effective and adequate potable water supply is provided to support, enhance, and sustain existing and future residents and businesses in the Municipality; and,
- A cost effective and adequate sewage treatment is provided to support, enhance, and sustain existing and future residents and business in the Municipality.

The Master Plan outcome is a summary of new infrastructure recommendations to improve both water and wastewater servicing for the existing as well as the projected growth horizon, improve system reliability with respect to climate change and changing water quality, efficiency in terms of operation, delivery and energy management, consolidate operating systems and thus achieve optimization, manage effluent quality with respect to current and potential future regulatory requirements, as well changing work force environment.

The Chatham-Kent Public Utilities Commission retained AECOM to complete the Water and Wastewater Master Plan study.

Master Planning Process

All municipalities in Ontario, including the Chatham-Kent Public Utilities Commission, are subject to the provisions of the Environmental Assessment Act and its requirements to prepare a Municipal Class Environmental Assessment (MCEA) for applicable public works projects. The MCEA is a five-phase planning process, with the Master Plan projects addressing MCEA Phases 1 and 2. This study is based on “Approach 1” which generally sets the problem or opportunity statement (Phase 1) and identifies and evaluates alternative solutions (Phase 2). The MCEA defines three types of projects and the processes required for each (referred to as Exempt (Formerly Schedule A, A+), Schedule B, or Schedule C). The selection of the appropriate schedule is dependent on the anticipated level of environmental impact, and for some projects, the anticipated construction costs. The study provides a basis for future investigations for Schedule B and C projects as identified in the Master Plan report.

Communications and Consultation Overview

Several steps have been undertaken to engage and inform government agencies, Indigenous communities, and the local community. The following summarizes the activities undertaken:

- Development of a contact list at the onset of the study that was regularly updated to notify key review agencies, stakeholders, Indigenous communities and interested members of the public
- Issuance of the following notifications: Notice of Commencement, Notice of Public Information Centres, and Notice of Completion

- Advertising of the above noted notifications in local newspapers (refer to **Section 12** of the main report for a list of newspapers).
- Posting of key information to the Municipality's website (<https://www.letstalkchatham-kent.ca/chatham-kent-water-and-wastewater-master-plan>) and social media platforms
- Issuance of notifications to the local Indigenous communities and sharing of information, as requested.
- Hosting two virtual Public Information Centres to provide stakeholders, key review agencies, the public and Indigenous communities an opportunity to learn about the study and provide feedback.

Study Area

The Municipality of Chatham-Kent is a single tier municipality located in Southwestern Ontario, comprising both urban and rural communities. It has a population of approximately 104,000 and an area of $\pm 2,500$ square kilometres. The municipality is bordered on the west side by the Town of Lakeshore and Municipality of Leamington, on the east by Municipalities of Southwest Middlesex and West Elgin, on the North by Townships of St. Clair and Dawn-Euphemia, and on the South by Lake Erie.

The Lower Thames River runs through Chatham-Kent to Lake St. Clair to the west, while the Sydenham River flows through Wallaceburg and Dresden. The municipality has approximately 88 kilometres of shoreline along Lake Erie and 24 kilometres along Lake St. Clair.

This Master Plan study covers the entire Municipality.

Planning Projections

The current and projected populations for the Municipality of Chatham-Kent are taken from the (draft) version of 2022 Municipal Comprehensive Review provided by the Chatham-Kent Public Utilities Commission. The projected population showed a decrease from the population used in the 2011 Master Plan study.

Table below shows the existing (2021) population and the projected population for the year 2051, separated by Municipality of Chatham-Kent communities.

Community	Population 2021 ¹	Population 2051 ¹
Primary Urban Centre	-	-
Blenheim	4,600	5,500

¹ Population includes net Census undercount of 2.7%. Figures may not add precisely due to rounding.
Source: Watson and Associates, Draft Municipal Comprehensive Review (June 2023)

Chatham	47,100	58,100
Dresden	2,500	3,100
Ridgetown	3,000	3,200
Tilbury	4,900	5,300
Wallaceburg	10,600	11,600
Wheatley	3,600	4,800
Secondary Urban Centres	-	-
Bothwell	1000	1,100
Thamesville	800	800
Charing Cross	700	800
Merlin	800	800
Mitchell's Bay	400	500
Pain Court	600	700
Rural Areas	-	-
Total Rural Areas	26,600	26,000
Municipality of Chatham-Kent Total	107,100	122,300

Master Plan Goals

The goals are defined as follows:

- Identify at a high level the near-term, interim-term and long-term needs of linear and vertical infrastructure for both water and wastewater for the identified planning period of (2022 –2051); and
- Establish an understanding of the financial requirements of the identified near-term, interim-term and long-term needs, that will help the Municipality to plan for such expenses.

Master Plan Objectives

The objectives are defined as follows:

- Establish a basis of design criteria for the water and wastewater infrastructure;
- Undertake a field-testing program for the municipality wide wastewater collection system including real rainfall events;

- Build and complete water and wastewater model and calibrate for both the existing and future population to identify the corresponding water demand and supply, and wastewater collection and disposal;
- Assess and determine a servicing strategy, and implementation approach for industrial demand especially for Greenhouses;
- Identify the adequacy of existing treatment facilities for both water and wastewater for current and future growth;
- Verify environmental compliance with new and emerging regulations;
- Prepare high level opinion of probable capital costs for the identified alternatives under both water and wastewater;
- Assess required potable water treatment capacity for the future Southwest Chatham Secondary plan area; and
- Assess required wastewater treatment capacity for the future Southwest Chatham Secondary plan area.

Servicing Requirements

The following describes the water and wastewater servicing requirements that guided Phases 1 and 2 of the Master Plan study.

Water

- Water demand criteria were developed for each service area based on existing utility billing records.
- Water treatment plants were visited, existing performance reports were reviewed, and capacities were assessed. Except for the Chatham Water Treatment Plant (WTP), all other plants appear to be adequate as far as capacities with the projected population growth during the 30-year planning period.
- Existing storage capacity of water supply systems, for emergency storage and for fire protection, were assessed and indicate that adequate water storage exists within the municipality for each water system, with the exception of Chatham WTP water storage system.
- An alternative water supply for the communities of Ridgetown and Highgate from the South East Chatham-Kent WTP is recommended to improve water quality and quantity, address long-term sustainable supply, to reduce operational costs and allow for growth in the Community.
- The new Wallaceburg WTP and accessories were considered in the analysis.
- New watermains are recommended to integrate water supply systems, improve reliability, optimise use of existing capacity, address future servicing needs for long-term sustainability, improve water quality and quantity of supply, and to reduce overall operational costs.

Wastewater

- Average annual wastewater generation rates were developed for existing wastewater service areas through field testing program.
- New wastewater servicing has been identified to address anticipated industrial, commercial, and residential growth within the Municipality of Chatham-Kent.
- New wastewater infrastructure and improvements have been identified to address current and future regulatory requirements.
- Budget costs for recommended wastewater collection and treatment infrastructure to improve system performance and comply with regulatory requirements over the 30-year planning period have been developed.
- Recommendations for future replacement of the Merlin Lagoon system with a mechanical treatment plant have been included.
- Recommendations for decommissioning of Mitchell's Bay Lagoon and system, and new infrastructure to convey the generated sewage through a Sewage Pumping Station to the Chatham water pollution control plant has been identified.
- Recommendations to continue with the Chatham combined sewer separations program to minimise Inflow/Infiltration and ensure both the existing and future infrastructure operate only for the design purpose remains a priority.

Recommendations

The Master Plan study recommends a strategy to meet the Municipality's objective to provide cost effective and sustainable water and wastewater servicing through implementation of the following projects identified in the following tables (Tables EX1, EX2 and EX3) and figures (Figures EX1 and EX2).

Table EX1: Recommended Projects for the Chatham-Kent Water System

Water System	Project Description	Purpose	Implementation Timing	Cost	Cost/Anum	Future Municipal Class Environmental Assessment Study Required
Raw Water Pumping Station	Increase pumping capacity by replacing existing Pump No.3 (267L/s) to larger capacity (527L/s).	Increase South Chatham Kent Water Treatment Plant Highlift pump capacity to meet future greenhouse demands.	Long Term >10 Years	\$3,557,250	\$177,862/yr.	Exempt
Chatham	11 kms of new 600mm transmission main from existing Water Treatment Plant Highlift pumping station to the Southwest area of Chatham Water System (Partial Ring TM). Refer to Figure 10-1	Improves system pressures.	Long Term >10 Years	\$38,208,788	\$1910,439/yr.	Schedule B Class Environmental Assessment
Chatham	Increase storage capacity at the existing Chatham Water Treatment Plant. Refer to Figure 7-4	To increase to the required storage capacity.	Short Term 0-5 Years	\$19,400,000	\$3,880,000/yr.	Exempt
Chatham	Increase treatment capacity at the existing Chatham Water Treatment Plant. Refer to Figure 7-1	To meet future water demands.	Interim Term 5-10 Years	\$206,700,000	\$20,670,000/yr.	Schedule C Class Environmental Assessment
Chatham	Increase pumping capacity at the existing Chatham Water Treatment Plant Highlift Pumping Station.	To meet future water demands.	Interim Term 5-10 Years	\$3,091,500	\$309,150/yr.	Exempt
Chatham	Conduct condition assessment for existing raw water transmission main.	To ensure watermain capacity is maintained at design level.	Short Term 0-5 Years	\$1,500,000	\$300,000/yr.	N/A
Chatham /Bothwell	300mm watermain from Thamesville Elevated Tank to Zone 6 Rd. Refer to Figure 10-2	To service future growth east of Thamesville.	Interim Term 5-10 Years	\$7,200,000	\$720,000/yr.	Schedule B Class Environmental Assessment has been completed.
Chatham /Bothwell	Zone 6 Road to Delaware Nation 200mm watermain Refer to Figure 10-2	To provide treated water to Delaware Nation	Interim Term 5-10 Years	\$1,150,000	\$115,000/yr.	Schedule B Class Environmental Assessment has been completed
Chatham /Bothwell	New Booster Pump Station at the Northeast corner of Zone 5 Road and Baseline. Refer to Figure 10-2	To provide adequate pressure for Northeast Water Distribution system.	Interim Term 5-10 Years	\$300,000	NA	Schedule B Class Environmental Assessment has been completed
Chatham /Bothwell	New 300mm watermain from Zone 6 Rd and Baseline to Bothwell. Refer to Figure 10-2	To service future growth east of Thamesville and provide water to Bothwell.	Long Term >10 Years	\$9,720,000	\$486,000/yr.	Schedule B Class Environmental Assessment has been completed
Chatham /Bothwell	Replace the Thamesville Standpipe with a 2.3ML Standpipe. Refer to Figure 10-2	To increase top water levels and provide adequate pressure to Kent-Bridge	Interim Term 5-10 Years	\$5,000,000	\$500,000/yr.	Schedule B Class Environmental Assessment has been completed
Ridgetown / Highgate	300mm Integration Transmission Main for Blenheim and Ridgetown. Refer to Figure 10-3	Deliver water supply from South Chatham Kent Water System to Ridgetown-Highgate Water System	Interim Term 5-10 Years	\$24,425,625	\$2,442,562/yr.	Schedule B Class Environmental Assessment

Table EX1: Recommended Projects for the Chatham-Kent Water System

Water System	Project Description	Purpose	Implementation Timing	Cost	Cost/Anum	Future Municipal Class Environmental Assessment Study Required
Ridgetown / Highgate	Retrofitting existing water treatment plant as pumping station for Ridgetown.	Utilize existing Ridgetown Water Treatment Plant for receiving treated water from South Chatham Kent Water System and deliver treated water to Ridgetown-Highgate Water Systems	Interim Term 5-10 Years	\$5,070,000	\$507,000/yr.	Exempt
Ridgetown / Highgate	Replacement / Rehabilitation of the existing Ridgetown Elevated Tank.	Ensure the existing elevated tank will be functioning properly for future.	Interim Term 5-10 Years	\$ 2,000,000	\$200,000/yr.	Exempt
Wallaceburg	New Water Treatment Plant for Wallaceburg-Dresden Integrated Water System.	To replace existing Wallaceburg WTP.	Short Term 0-5 Years	\$ 39,300,000	\$7,860,000/yr.	Schedule C Class Environmental Assessment has been completed
Wallaceburg	New storage reservoir (56ML).	On-site storage facility for new Wallaceburg WTP.	Short Term 0-5 Years	\$27,600,000	\$5,520,000/yr.	Schedule C Class Environmental Assessment has been completed
Wallaceburg	New intake and lowlift pumping station for new Wallaceburg Water Treatment Plant.	Withdraw raw water for new Wallaceburg WTP.	Short Term 0-5 Years	\$ 7,900,000	\$1,580,000/yr.	Schedule C Class Environmental Assessment has been completed
Wallaceburg	New raw water transmission main.	Deliver raw water to new Wallaceburg WTP.	Short Term 0-5 Years	\$9,500,000	\$1,900,000/yr.	Schedule C Class Environmental Assessment has been completed
Wallaceburg	600mm Treated water transmission main. Refer to Figure 10-4	Deliver treated water from Wallaceburg WS to Dresden WS.	Interim Term 5-10 Years	\$32,800,000	\$3,280,000/yr.	Schedule C Class Environmental Assessment has been completed
South Chatham-Kent	2.6 km New Charing Cross Road 600mm transmission main. Refer to Figure 10-5	To increase transfer capacity for filling Blenheim Reservoir	Interim Term 5-10 Years	\$7,730,600	\$773,060/yr.	Schedule B Class Environmental Assessment
South Chatham-Kent	5.6 km of new 200mm local distribution system Looping. Refer to Figure 10-6	To improve the overall system pressures	Interim Term 5-10 Years	\$7,214,063	\$721,406/yr.	Exempt
South Chatham-Kent	Increase pumping capacity at the existing South Chatham Kent Water Treatment Plant Highlift Pumping Station.	To meet the future water demands	Interim Term 5-10 Years	\$1,113,005	\$111,300/yr.	Exempt
Wheatley / Tilbury	New Booster Pumping Station to transfer water supply from Wheatley WS to Tilbury WS. Refer to Figure 10-7	To increase transfer capacity for filling Tilbury Elevated Tank	Interim Term 5-10 Years	\$ 2,410,250	\$241,025/yr.	Schedule B Class Environmental Assessment

Table EX1: Recommended Projects for the Chatham-Kent Water System

Water System	Project Description	Purpose	Implementation Timing	Cost	Cost/Anum	Future Municipal Class Environmental Assessment Study Required
Wheatley / Tilbury	New local booster pumping station for east of Wheatley WS. Refer to Figure 10-7	To improve the local system pressures	Short Term 0-5 Years	\$1,951,250	\$390,250/yr.	Schedule B Class Environmental Assessment
Wheatley / Tilbury	Decommissioning of Tilbury inground reservoir and pumping station.	To minimize the overall operational complexity and reduce the long term O&M costs	Interim Term 5-10 Years	\$ 2,025,000	\$202,500	Exempt
All Systems	Various Investigative Studies -PFAS Presence and Baseline Removal (WTPs Only) and response plan -Source water algae monitoring and response plans -Distribution system biological stability study to assess potential regrowth in the system -Emerging contaminants monitoring including 1,4-dioxane, VOCs, trace metals -Manganese removal assessment study for Surface Water and Ground Water systems to meet new HC guidelines	To meet changing water quality demands and operational improvements	Short Term 0-5 Years	\$750,000	\$150,000/yr.	Exempt
All Systems	Preventative Maintenance of the Composite Elevated Tanks, Stand Pipes and Spheroid Tanks, and their replacement.	To meet and maintain the required local system pressures.	On an individual system basis	On an individual system basis	NA	Exempt

Table EX2: Recommended Projects for the Chatham-Kent Wastewater Collection System

Servicing Growth and Existing Capacity Issues

Wastewater Service Area	Project Description	Implementation Timing	Cost	Cost per Annum	Future Municipal Class Environmental Assessment Study Required
Chatham Collection System	Pumping Station Upgrades to Chatham SPS-103 (Campus Parkway/Grand Ave Area) (Figure 10-12) - Short Term Additional Pumping Capacity - Twin Forcemain to Water Pollution Control Plant - Long Term Complete Station Upgrade	Short Term 0-5 Years Interim Term 5-10 Years Long Term >10 Years	\$300,000 \$5,000,000 \$1,700,000	NA \$500,000/yr. \$85,000/yr	Exempt Schedule B Class Environmental Assessment Exempt
Chatham Collection System	Pumping station upgrades to Chatham main lift station to WPCP (Figure 10-13) - Pumping Upgrades, increasing firm capacity to 800L/s - Twin 750mm Forcemain Section	Short Term 0-5 Years Interim Term 5-10 Years	\$1,7,000,000 \$900,000	\$85,000/yr. \$90,000/yr.	Exempt Schedule B Class Environmental Assessment

Pumping Station Upgrades Addressing Overflows and Frequency of Surcharge of Upstream Areas

Wastewater Service Area	Project Description	Implementation Timing	Cost	Cost Per Annum	Future Municipal Class Environmental Assessment Study Required
Wallaceburg	Pumping station upgrades to Wallaceburg SPS-405 (Dundas St/ Thomas Ave Area) - Upsizing Pumps to 185 L/s Firm Capacity - Twin 250mm Forcemain	Interim Term 5-10 Years Long Term >10 Years	\$500,000 \$1,000,000	NA \$50,000/yr.	Exempt Schedule B Class Environmental Assessment
Wallaceburg	Pumping station upgrades to Wallaceburg SPS-402 (Arnold St / Biden St Area) Upsizing Pumps to 140 L/s Firm Capacity	Interim Term 5- 10 Years	\$500,000	NA	Exempt
Wallaceburg	Pumping station upgrades to Wallaceburg SPS-401 (Bill McDougall Park) - Upsizing Pumps to 240 L/s - Twin 350mm Forcemain	Interim Term 5- 10 Years Long Term >10 Years	\$400,000 \$3,000,000	NA \$150,000	Exempt Schedule B Class Environmental Assessment

Table EX2: Recommended Projects for the Chatham-Kent Wastewater Collection System

Sewer Upgrades Addressing Surcharge During Large Storms

Wastewater Service Area	Project Description	Implementation Timing	Cost	Cost per Annum	Future Municipal Class Environmental Assessment Study Required
Ridgetown	Erie Street / Tecumseh Street 600mm (Figure 10-8)	Long Term >10 Years	\$1,600,000	\$80,000/yr.	Exempt
Ridgetown	West Street 300mm (Figure 10-8)	Long Term >10 Years	\$450,000	NA	Exempt
Blenheim	Marlborough Street / Industrial Avenue 525mm (Figure 10-9)	Long Term >10 Years	\$4,000,000	\$200,000/yr.	Exempt
Wallaceburg	Elgin Street 450mm (Figure 10-10)	Long Term >10 Years	\$1,400,000	\$70,000/yr.	Exempt
Dresden	Brown Street / Main Street / Tecumseh Street 600mm (Figure 10-11)	Long Term >10 Years	\$4,000,000	\$200,000/yr.	Exempt
Dresden	Lorne Avenue / Holden Street / Fuller Street 600mm (Figure 10-11)	Long Term >10 Years	\$3,000,000	\$150,000/yr.	Exempt
Tilbury	Pearl Street / Queen Street N / Centre Street E / Dufferin Street N 750mm (Figure 10-12)	Long Term >10 Years	\$3,600,000	\$180,000/yr.	Exempt
Tilbury	Lyon Avenue 900mm (Figure 10-12)	Long Term >10 Years	\$4,000,000	\$200,000/yr.	Exempt

Pumping Station Upgrades Addressing Surcharge During Large Storms

Wastewater Service Area	Project Description	Implementation Timing	Cost	Cost Per Annum	Future Municipal Class Environmental Assessment Study Required
Wheatley	SPS – 602 Pumping Upgrade	Interim Term 5- 10 Years	\$400,000	NA	Exempt

Additional Servicing Improvements

Wastewater Service Area	Project Description	Implementation Timing	Cost	Cost Per Annum	Future Municipal Class Environmental Assessment Study Required
Mitchell’s Bay	Decommissioning of Mitchell’s Bay Lagoon, Pumping and Forcemain to Chatham Water Pollution Control Plant	Long Term >10 Years	\$9,250,000	\$462,000	Exempt

Additional Studies

Wastewater Service Area	Project Description	Implementation Timing	Cost	Cost Per Annum	Future Municipal Class Environmental Assessment Study Required
Tilbury	Inflow and Infiltration Reduction Study	Short Term 0-5 Years	\$300,000	NA	Exempt
Dresden	Inflow and Infiltration Study	Short Term 0-5 Years	\$300,00	NA	Exempt

Combined Sewer Separation

Wastewater Service Area	Project Description	Implementation Timing	Cost	Cost Per Annum	Future Municipal Class Environmental Assessment Study Required
Chatham	Optimizing capacity of the combined sewer trunks / interceptors	To be determined on an individual Project Basis	\$75,000,000	\$7,500,000/year for the next 10 years	Exempt
Chatham	Continuing Sewer Separation Program for Chatham Targeting largest Downstream Sewers Feeding the Trunk / Interceptor	To be determined on an individual Project Basis	\$150,000,000	\$15,000,000/year for the next 10 years	Exempt

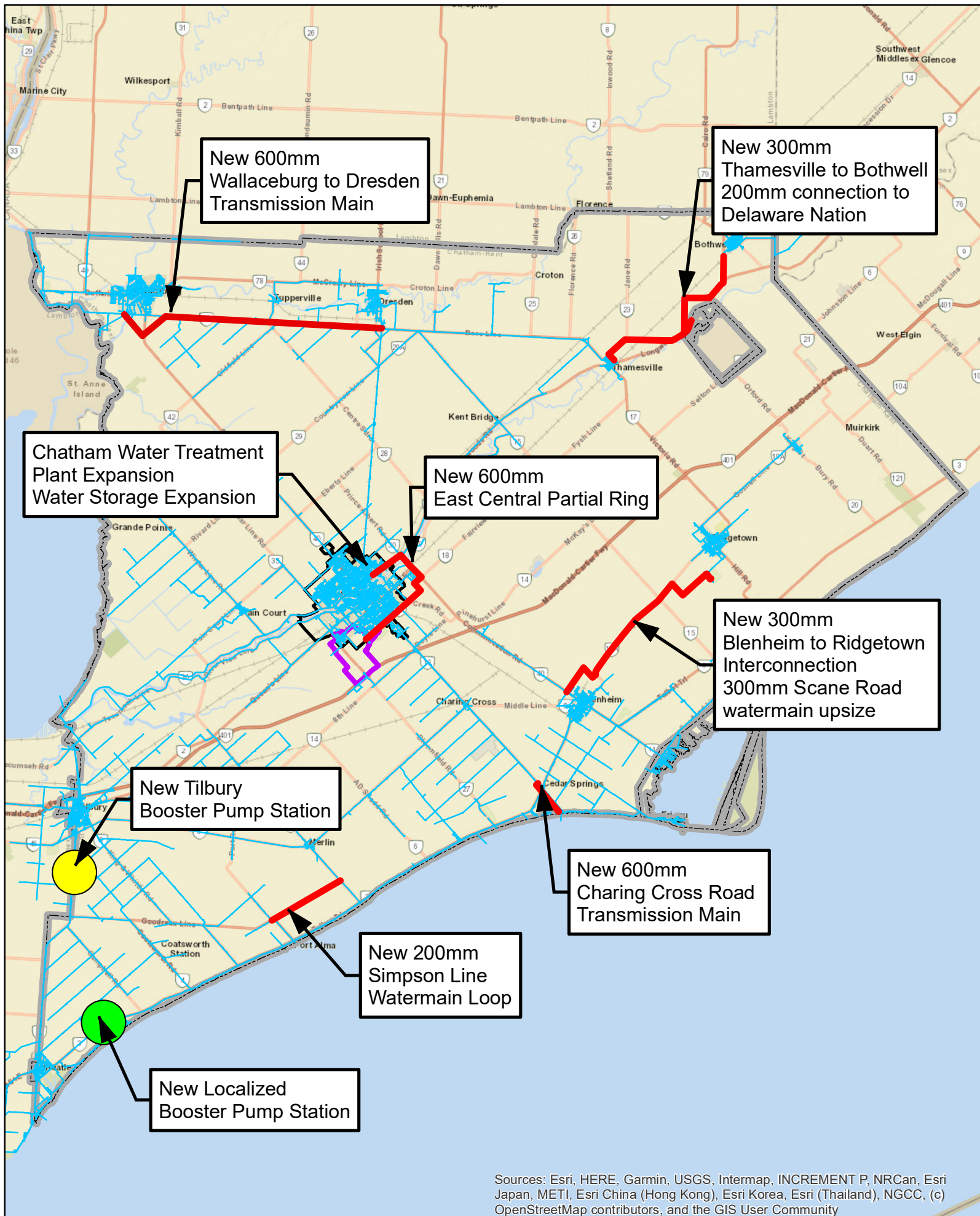
Table EX3: Recommended Projects for the Chatham-Kent Wastewater Treatment System

Wastewater Treatment System	Project Description	Short Term 0-5 Year Implementation Cost	Interim Term 5-10 Year Implementation Cost	Long Term >10 Year Implementation Cost	Future Municipal Class Environmental Assessment Study Required
Chatham Water Pollution Control Plant	Improve effluent quality with better disinfection & better regional sludge management system. Operational improvements as part of State of Good Repair and preventative maintenance. State of Good Repair due to age of the infrastructure including major process equipment.	\$19,405,100	\$4,481,300	\$76,880,400	Exempt
Wallaceburg Water Pollution Control Plant	Operational improvements through Instrumentation & Control. Operational improvements as part of State of Good Repair and investigative studies. State of Good Repair due to age of the infrastructure including major process equipment.	\$419,350	\$1,912,600	\$48,841,650	Exempt
Blenheim Water Pollution Control Plant	Operational improvements through Instrumentation & Control. Operational improvements as part of State of Good Repair and investigative studies. State of Good Repair due to age of the infrastructure including major process equipment.	\$2,343,400	\$2,137,850	\$9,204,300	Exempt
Dresden Water Pollution Control Plant	Operational improvements through Instrumentation & Control. Operational improvements as part of State of Good Repair and investigative studies. State of Good Repair due to age of the infrastructure including major process equipment.	\$657,800	\$4,277,527	\$9,044,750	Exempt
Merlin Water Pollution Control Plant	Operational improvements as part of State of Good Repair and preventative maintenance. Implementation of a Mechanical treatment facility to improve effluent quality.	\$32,890	\$0	\$13,088,600	Exempt
Mitchell's Bay Water Pollution Control Plant	Operational improvements as part of State of Good Repair and preventative maintenance. Decommissioning of Mitchell's Bay Lagoon, Pumping and forcemain to Chatham WPCP	\$32,900	\$82,200	\$0	Schedule B Class Environmental Assessment

Table EX3: Recommended Projects for the Chatham-Kent Wastewater Treatment System

Wastewater Treatment System	Project Description	Short Term 0-5 Year Implementation Cost	Interim Term 5-10 Year Implementation Cost	Long Term >10 Year Implementation Cost	Future Municipal Class Environmental Assessment Study Required
Ridgetown Water Pollution Control Plant	Operational improvements as part of State of Good Repair and Investigative studies.	\$246,700	\$65,800	\$9,949,200	Exempt
	Operational improvements as part of State of Good Repair.				
	State of Good Repair due to age of the infrastructure including major process equipment.				
Tilbury Water Pollution Control Plant	Operational improvements as part of State of Good Repair and Investigative studies.	\$263,100	\$6,199,800	\$9,886,700	Exempt
	Operational improvements as part of State of Good Repair and preventative maintenance.				
	State of Good Repair due to age of the infrastructure including major process equipment.				
Wheatley Water Pollution Control Plant	Operational improvements as part of State of Good Repair and Investigative studies.	\$235,000	\$1,248,000	\$6,325,000	Exempt
	Operational improvements as part of State of Good Repair and preventative maintenance.				
	State of Good Repair due to age of the infrastructure including major process equipment.				

EX1: Major Water Infrastructure Recommended Projects



EX2: Major Wastewater Infrastructure Recommended Projects

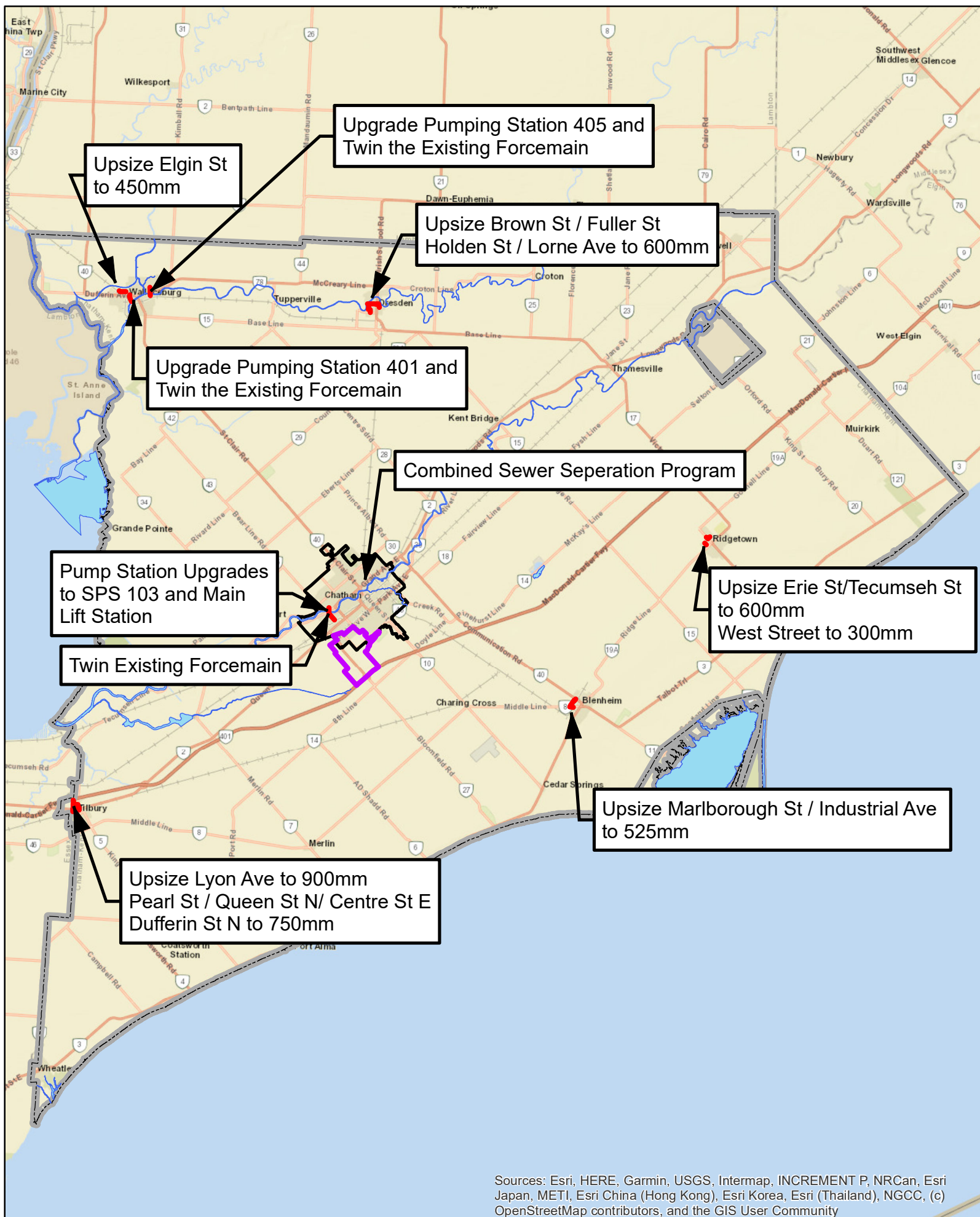


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Appendix B. Background Information / Technical Memorandum

- B.1 Criteria and Needs Assessment

1. Introduction

1.1 Background

The Municipality of Chatham-Kent was formed in 1998 by the amalgamation of 23 municipalities including the former County of Kent. At this time, the Chatham-Kent Public Utilities Commission was created with a mandate to supply water and wastewater services to the Municipality.

After many years of low to negative growth, Chatham-Kent is experiencing unexpected growth during the last couple of years which is driving demands for improvements and upgrades to local water and wastewater infrastructure.

The Public Utilities Commission retained AECOM Canada Ltd. to prepare a Master Plan to develop strategies for water and wastewater servicing to accommodate existing service areas and future growth up to the 2051 planning horizon.

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

This Master Plan addresses the requirements of the first two phases of the Municipal Class Environmental Assessment manual (March 2023), which is approved under the Ontario Environmental Assessment Act.

1.2 Study Purpose and Objectives

The purpose of this Master Plan study is to provide a comprehensive and environmentally sound planning process, which is open to public participation, to identify capital projects and upgrades needed to provide sustainable water and wastewater servicing to accommodate service areas and future growth to the 2051 planning horizon.

The objectives of this study include:

- Provide an opportunity to identify water supply issues within the existing Chatham-Kent water systems.
- Provide an opportunity to identify wastewater servicing issues within the existing Chatham-Kent wastewater service areas.

- Provide strategies to address water and wastewater servicing needs of the Municipality.
- Consult with affected and interested agencies, Indigenous Communities, Key Stakeholders, and the Public.
- Identify strategies that can address water and wastewater system issues.
- Identify measures needed to mitigate any impacts associated with the recommended solutions.
- Provide a 'suite' of projects that will address identified water and wastewater needs. This list will include future studies required (i.e. Schedule B or C projects), estimated costs and implementation timing and triggers.
- Prepare a Master Plan report that documents the consultation process followed and satisfies Phases 1 and 2 of the Municipal Class Environmental Assessment planning process.

1.3 Project Team Organization

To address all aspects of the environment, the full range of technical issues, and the requirements of the Master Plan process, this study was carried out by a project team consisting of staff from the Public Utilities Commission and AECOM. Key members of the project team included the following individuals listed in Table 1.1.

Table 1-1: Study Team

Chatham-Kent Public Utilities Commission	AECOM Canada Ltd.
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Rob Bernardi, P.Eng – Director of Engineering Jeannie Medeiros, CET – Engineering Technologist	Karl Grueneis – Senior Environmental Planner Paul Adams – Environmental Planner Benny Wan – Hydraulic Modelling Engineer (Water) Kevin Sze – Hydraulic Modelling Engineer (Water) Brian Richert – Hydraulic Modelling Engineer (Wastewater) Amy Reimer - Hydraulic Modelling Support (Wastewater) Ahmed Elhadidy – Water Process Engineer

2. Planning Process

2.1 Municipal Class Environmental Assessment Process

All municipalities in Ontario, including the Chatham-Kent Public Utilities Commission, are subject to the provisions of the Environmental Assessment Act and its requirements to prepare an Environmental Assessment for applicable public works projects. The Ontario MEA “Municipal Class Environmental Assessment” document (March 2023) provides municipalities with a five-phase planning procedure, approved under the Environmental Assessment Act, to plan and undertake all municipal sewage, water, storm water management and transportation projects that occur frequently, are usually limited in scale and have a predictable range of environmental impacts and applicable mitigation measures.

In Ontario, infrastructure projects such as improvements to the Chatham-Kent water and wastewater systems are subject to the Municipal Class Environmental Assessment process and must follow a series of steps as outlined in the Municipal Class Environmental Assessment guide. The Municipal Class Environmental Assessment consists of five phases as summarized below:

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

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

2.1.1 Project Planning Schedules

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

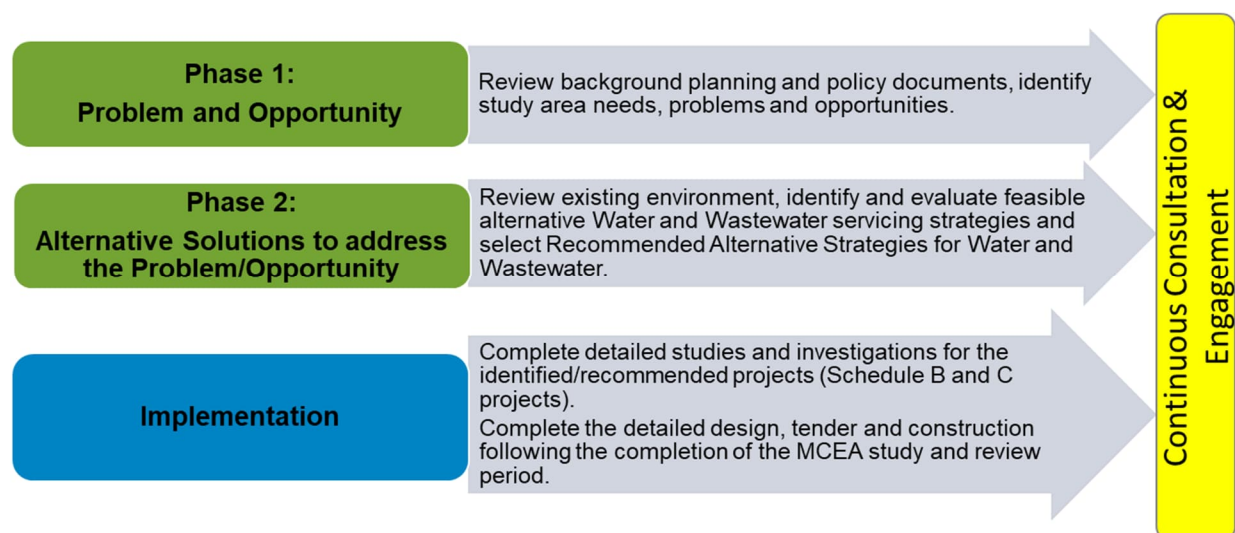
Exempt (Formerly Schedule A and A+): Projects are limited in scale, have minimal adverse environmental effects, and include a number of municipal maintenance and operational activities. These projects are exempt from the Municipal Class Environmental Assessment planning process.

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

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

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

Figure 2-1: Municipal Class Environmental Assessment Planning Process



2.1.2 Municipal Class Environmental Assessment Master Planning Process

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

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

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

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

2.1.3 Public Review of this Report and Next Steps

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

This Master Plan Report is available for public review and comment for a period of 30 calendar days starting on **November 20th 2023** and ending on **January 10 2024**. A public notice (Notice of Completion) was published to announce commencement of the review period. To facilitate public review of this document, copies are available at the following locations:

Digital / Online: <https://www.letstalkchatham-kent.ca/chatham-kent-water-and-wastewater-master-plan>

Interested persons may provide written comments to the project team by **January 10, 2024**. All comments and concerns should be sent directly to the Project Managers:

Dhana Niriella, PhD., P.Eng

Project Manager

Chatham-Kent Public Utilities Commission
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2.1.4 Requesting a Section 16 Order

A request may be made to the Ministry of the Environment, Conservation and Parks for an order requiring a higher level of study (i.e. requiring an individual/ comprehensive environmental assessment approval before being able to proceed), or that conditions be imposed (e.g. require further studies), only on the grounds that the requested order may prevent, mitigate or remedy adverse impacts on constitutionally protected aboriginal and treaty rights and only for specific future projects (e.g. Schedule B and C studies)

identified in the Master Plan, not the Master Plan itself. This is called a **Section 16 Order** process.

2.2 Municipal and Provincial Planning Studies and Policy Context

2.2.1 Provincial Policy Statement

The 2020 Provincial Policy Statement¹ (PPS) provides policy direction on matters of provincial interest related to land use planning and development. As a key part of Ontario's policy-led planning system, the PPS sets the policy foundation for regulating the development and use of land. It provides for appropriate development while protecting resources of provincial interest, public health and safety, and the quality of the natural environment.

Key policies relevant to this project include the following:

- 1.6: Infrastructure and Public Service Facilities.
- 1.8: Energy Conservation, Air Quality and Climate Change.
- 2.1: Wise Use and Management of Resources, Natural Heritage.
- 2.2: Wise Use and Management of Resources, Water.
- 2.6: Wise Use and Management of Resources, Cultural Heritage and Archaeology.

Relevance to Study: Investment in water and wastewater servicing infrastructure within the Municipality for a Master Plan of this nature, will have regard for the range of planning objectives of the PPS. In addition, future project specific Schedule B and Schedule C Environmental Assessments recommended by this Master Plan will consider and address impacts involving natural heritage, cultural heritage, water resources and climate change.

2.2.2 Climate Change

The Ministry of Environment, Conservation and Parks' guide "Consideration of Climate Change in Environmental Assessments in Ontario" was finalized in October 2017 and, therefore requires that all Municipal Class Environmental Assessments consider this within the scope of the project. Two approaches for consideration and addressing climate change in project planning include:

¹ Provincial Policy Statement. Ontario Ministry of Municipal Affairs and Housing, 2020.

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

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

2.2.3 Source Water Protection

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

The Thames - Sydenham & Region Drinking Water Source Protection Plan is the relevant SPP for this project and contains policies that address current and potential threats to municipal drinking water supply.

There are four types of vulnerable areas covered by the SPP:

1. Intake protection zones (IPZs) – An IPZ is the area around a surface body of water where water is drawn in and conveyed for municipal drinking water.
2. Highly vulnerable aquifers (HVAs) – Aquifers are underground layers of water that supply wells. HVAs are susceptible to contamination due to their proximity to the ground surface or where the types of materials in the ground around it are highly permeable.
3. Significant groundwater recharge areas (SGRAs) - SGRAs are characterized as having porous soils (e.g. sand or gravel), which allow for water to easily seep into the ground and flow to an aquifer.
4. Wellhead protection areas (WHPAs) – WHPAs are areas of land around a municipal well where land use activities have the greatest potential to affect the quality of water flowing into the well.

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

2.2.4 Lower Thames Valley Conservation Authority

A portion of the study area is located within the Lower Thames Valley Conservation Authority (LTVCA) jurisdiction.

Ontario Regulation 152/06 is the local regulation for the LTVCA watershed. This regulation fulfils the general purpose of ensuring public safety and preventing property damage and social disruption, due to natural hazards such as flooding and erosion within regulated areas.

Relevance to Study: The preferred water and wastewater servicing strategies and subsequent projects may require a permit from LTVCA.

2.2.5 St Clair Region Conservation Authority

A portion of the study area is located within the St. Clair Region Conservation Authority (SCRCA) jurisdiction.

Ontario Regulation 171/06 is the local regulation for the SCRCA watershed. This regulation fulfils the general purpose of ensuring public safety and preventing property damage and social disruption, due to natural hazards such as flooding and erosion within regulated areas.

Relevance to Study: The preferred water and wastewater servicing strategies and subsequent projects may require a permit from SCRCA.

2.2.6 Chatham-Kent Municipal Comprehensive Review

The Municipality of Chatham-Kent is drafting a new Municipal Comprehensive Review in accordance with the requirements of the Provincial Policy Statement. This document examines future populations and employment growth potential and corresponding land needs over a 25-year planning horizon.

Relevance to the Study: The Municipal Comprehensive Review provides growth forecasts for the entire municipality that in turn can be used to forecast water demands and wastewater generation to the year 2051. AECOM used this draft report to allocate future growth scenarios to model future water demands and wastewater generation.

2.2.7 Chatham-Kent Official Plan Action Toward Sustainability

The Municipality of Chatham-Kent Official Plan outlines the general policies for future land use and planning goals, that guides future development. This Master Plan study has regard for and complies with the following relevant policies:

Section 1.6 Public Works and By-Laws

Section 2.3 Growth Management

Section 2.4.7 Wastewater Services

Section 2.4.8 Water Servicing

Section 2.4.10 Allocation and Phasing of Services

Section 4.3-4.4 Natural Heritage

Section 7.1.2 Growth Management

Relevance to the Study: This Municipal Class Environmental Assessment has been conducted with regard to the policies of the Chatham-Kent Official Plan.

2.2.8 2012 (Addended in 2019) Chatham-Kent Water and Wastewater Master Plan

In 2012 The Municipality of Chatham-Kent completed a Water and Wastewater Master Plan. Since the completion of this Master Plan, there have been several recommended projects completed to address growth and economic development. These Master Plans are reviewed and updated every five (5) years to determine the need for updates in the servicing strategies. Since the Addendum in 2019, several changes have occurred such as population growth and greenhouse development which impact the assumptions used to prepare the Master Plan.

Relevance to the Study: The 2012 (updated in 2019) Master Plan was reviewed and the previous recommendations that have not been implemented yet were considered during the process of completing this Master Plan. It is noted that many of the projects identified in the previous master plan remain valid and have been updated in this Master Plan study.

3. Problem and Opportunity Statement

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

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

Problem:

- Chatham-Kent has been experiencing an increased rate of growth over the last couple of years.
- Increased growth is driving demands for improvements and upgrades to local Water and Wastewater infrastructure to service existing and new customers.
- Chatham-Kent is receiving increased number of Water service request applications for expansion of or new Greenhouses and other high-volume users such as food processing plants.
- Water / Wastewater quality regulations are changing and becoming more stringent.
- There is a continued need to separate combined sewers.
- Existing Water and Wastewater assets are aging and require regular maintenance for reliable operation of the facilities.
- Chatham-Kent requires many sewage pump stations (approximately 60) to manage sewage conveyance due to the relatively flat topography.
- High Sewer Inflow and Infiltration is using up Wastewater management capacity in some of Chatham-Kent's communities.
- Climate change has influenced and increased the rainfall intensity resulting in Localized flooding, sewer surges and wastewater bypassing Wastewater Pollution Control Plants.
- Climate change may influence source water quality.
- New Pollutants in Ontario Waters through Wastewater – Contaminants of Emerging Concern: Pharmaceuticals, Antibiotics, Perfluoro Alkyl and Poly Fluoro Alkyl Substances (PFAS), and Microplastics.
- Future regulations for Treated Effluent from Wastewater Pollution Control Plants are likely to be more stringent thus expecting a higher performance demand from Wastewater Pollution Control Plants.

Opportunity – The Municipal Class Environmental Assessment process provides the Chatham-Kent Public Utilities Commission the opportunity to:

- Develop and assess a range of Water and Wastewater servicing strategies to support existing servicing and accommodate sustainable near and long-term future growth demands.
- Increase water security and reliability of each water distribution system through interconnection.
- Examine and improve the available fire flow within Urban Centre limits.
- Improve the level of service of Water and Wastewater systems.
- Optimize the existing Wastewater pumping stations and Water booster pumping stations.
- Identify future upgrades for the Water and Wastewater systems and build redundancies and increase treatment efficiencies.
- Develop a capital works plan that will support upcoming Development Charges study and future infrastructure planning and budgeting, including funding opportunities.
- Consult the public, Indigenous Communities, regulatory and utility agencies and solicit feedback to select the best strategy for the future.

4. Current and Projected Populations, Water / Wastewater Demand Forecasts and Design Criteria

4.1 Current and Projected Populations

The current and projected populations for the Municipality of Chatham-Kent are taken from the draft 2022 Municipal Comprehensive Review prepared by Watson & Associates. Table 4.1 shows the existing (2021) population and the projected population for the year 2051 separated by Municipality of Chatham-Kent communities.

Table 4-1: Current and Projected Chatham-Kent Populations

Community	Population 2021 ²	Population 2051 ²
Primary Urban Centre	-	-
Blenheim	4,600	5,500
Chatham	47,100	58,100
Dresden	2,500	3,100
Ridgetown	3,000	3,200
Tilbury	4,900	5,300
Wallaceburg	10,600	11,600
Wheatley	3,600	4,800
Secondary Urban Centres	-	-
Bothwell	1000	1,100
Thamesville	800	800
Charing Cross	700	800
Merlin	800	800
Mitchell's Bay	400	500
Pain Court	600	700
Rural Areas	-	-

² Population includes net Census undercount of 2.7%. Figures may not add precisely due to rounding.
Source: Watson and Associates, Draft Municipal Comprehensive Review (June 2023)

Community	Population 2021 ²	Population 2051 ²
Total Rural Areas	26,600	26,000
Municipality of Chatham-Kent Total	107,100	122,300

Using the population forecast from the underway 2022 Municipal Comprehensive Review it has been confirmed that the majority of projected future growth is planned to occur within the Chatham Urban Centre. The forecasted population growth was distributed within the 6 Water Distribution Systems and 10 wastewater service areas and then used in the Water and Wastewater Hydraulic Models to estimate water demand and Wastewater Generation rates based on the updated urban and rural residential and employment forecasts this also included large water users such as greenhouses.

4.2 Water Demand Forecast

The projected water demand for each of the Chatham-Kent Public Utilities Commission water distribution systems was estimated based on the following information:

- Existing and Future Population data obtained from 2022 Municipal Comprehensive Review for urban and rural residential and employment forecasts in each Chatham-Kent Public Utilities Commission water distribution system (WDS)
- Latest approved existing and future urban and rural water unit consumption rates for Residential and Employment in each Chatham-Kent Public Utilities Commission Water Distribution System, presented in the Technical Memorandum 2: Criteria and Needs Assessment. **(Appendix B)**
- Design demand peaking factor (Maximum Day Demand peaking factor of 2.0)

Based on the above information, the maximum day demand projections for each Chatham-Kent Public Utilities Commission Water Distribution System were estimated up to the 2051 planning horizon. Table 4.2 summarizes the Maximum Day Demand projections that were utilized for water servicing strategy evaluation purposes.

Table 4-2: Maximum Day Demands for the Chatham-Kent Public Utilities Commission Water Distribution Systems

Water System	Existing (L/s)	2026 (L/s)	2031 (L/s)	2036 (L/s)	2041 (L/s)	2046 (L/s)	2051 (L/s)
Bothwell	11.05	11.22	11.99	11.96	11.93	11.90	11.87
Chatham	610.75	644.31	664.38	683.38	697.83	708.60	716.75
Ridgetown	33.51	34.15	34.31	34.95	34.95	34.95	34.95
South Chatham	179.37	184.41	188.83	192.73	195.29	197.47	199.73

Wallaceburg	105.97	108.93	111.07	112.21	113.60	113.86	114.13
Wheatley-Tilbury	175.33	180.44	184.54	188.56	192.20	194.60	196.97
Total	1115.99	1163.46	1195.11	1223.78	1245.80	1261.38	1274.40

4.3 Water Design Criteria

The water infrastructure capacity assessment for the Chatham-Kent Public Utilities Commission water systems was completed based on the following evaluation criteria:

Water Treatment Capacity Requirement:

- Rated capacity of a water treatment plant = Maximum Day Demand (MDD)
- Capacity expansion is required when projected Maximum Day Demand exceeds 90% of the rated capacity.

Water Storage Capacity Requirement:

- Storage capacity requirement is the sum of Equalization Storage, Fire Storage and Emergency Storage; where:
 - Equalization Storage - 25% of Maximum Day Demand
 - Fire Storage – based on equivalent service population (residential plus employment) for each Chatham-Kent Public Utilities Commission water service area; suggested fire flow and duration for the service population included in the Ministry of Environment Conservation and Parks water design guideline. Note that based on the information provided by the Chatham-Kent Public Utilities Commission, fire protection (fire storage) only required in urban area and rural area should be excluded.
 - Emergency Storage - 25% of Equalization Storage plus 25% of Fire Storage

Pumping Capacity Requirement:

- Available pumping capacity is rated on the firm capacity based on the total installed station capacity minus the capacity for a single pump with the largest capacity.
- Required water supply based on maximum day demand while floating storage capacity is sufficient to meet the requirement by gravity feed.
- Required water supply based on peak hour demand while no or inadequate floating storage is available.

- Pump capacity expansion is required when the required Maximum Day Demand exceeds the available pumping capacity.

Water Network Capacity Requirement:

- Ability to maintain system pressure of 40 psi to 100 psi under normal operating conditions.

4.4 Wastewater Generation Forecast

Wastewater demand criteria were established for the existing and future demands. In order to do so the existing historic water consumption data (from billing records for a fixed period) was obtained and reviewed and compared with recommendations made in the Ministry of Conservation and Parks (Ministry of Environment) guidelines (2008). These analyses, along with comparison to other municipalities, lead to the development of wastewater generation rate and design criteria recommendations. The following sections summarized the criteria used. The wastewater generation criteria listed below were used to develop alternative wastewater design strategies.

The Chatham-Kent Public Utilities Commission has undertaken an area wide sewage flow monitoring and rainfall monitoring program (started in Feb 2023 with a finishing timeline of June 2023) to collect data for both dry and wet weather flows as part of this study. The existing dry weather flows in the model are largely based on dry weather flows measured by the flow gauges.

Population estimates for each billing point were initially obtained by:

1. Determining average water demand per person (by dividing total demand by the known existing population).
2. Determining the average demand at each billing address from billing records.
3. Dividing the average demand at each billing address by the average water demand per person to obtain population at each billing address.

4.4.1 Existing Wastewater Dry Weather Flow Estimate

Existing wastewater average day flows were applied in the system in the following way:

1. The catchment area upstream of each flow monitor was defined, and the population upstream of each flow monitor was defined by adding the population at each billing address (3, above).
2. The daily dry weather flow volume was obtained from the flow monitor data. This was split into sewage flow and baseflow (based on observed flow in periods of expected minimal demand in the middle of the night).
3. Dividing dry weather flow volume by upstream population to obtain the per capita flow for population upstream of each gauge.

4. For areas that were not upstream of any flow monitors, the average per capita flow in the entire system was used.
5. The existing wastewater average dry weather flow at each node was then obtained by multiplying the population by the derived per capita flow rate.

4.4.2 Growth Area Wastewater Dry Weather Flow Estimates

Wastewater flow in growth areas were estimated using derived populations and average per capita flow rates derived from flow monitoring in the existing areas. Note that this resulted in a rate of 230 L/c/d, which is smaller than typical design standards, and smaller than the previous master plan (340 L/c/d). While this likely reflects actual future demands, growth scenarios using higher per capita flow rates were reviewed. Peaking factors (daily peak Dry Weather Flow divided by average daily Dry Weather Flow) were derived from flow monitor data.

Total growth in 5-year increments was taken from the 'draft' version of Municipal Comprehensive Review (Watson & Associates, 2022). The location of growth was also based on land needs assessments and classifications provided by Watson & Associates; growth was initially assumed to occur in areas with draft or registered plan status, or on lands otherwise identified as potentially servicing growth. Population within each identified growth area was initially based on an assumed density of 35 people per hectare.

4.5 Wastewater Design Criteria

4.5.1 Linear Collection System - Sewers

The sewer system is sized to convey peak instantaneous (peak wet weather) flows. Wastewater flows are made up of discharges from residential, and Industrial, Commercial and Institutional establishments, plus extraneous flow components such as groundwater and surface runoff (Infill and Infiltration).

The sewer system is evaluated under existing conditions using the following design criteria:

- **Minimum velocities:** In addition to being able to convey peak flow, flows shall be able to generate and maintain sufficient velocity to transport the wastewater solids to avoid deposition and the development of nuisance conditions under lower flow conditions. The minimum acceptable flow velocity in sewers is 0.6 m/s (Ministry of the Environment, 2008).
- **Sewer capacity:** To identify hydraulic bottlenecks in the system, AECOM applied the following system performance criteria for hydraulic capacity.
- For growth areas AECOM identified the residual capacity that would cause downstream sewers to reach full flowing gravity capacity.

- For existing areas not servicing growth, AECOM identified problem areas according to surcharge state, risk of basement flooding, and risk of overflows. This was done using the following criteria:
 - o The Hydraulic Grade Line (HGL) in the wastewater system shall not be less than 1.8 m below the surface elevation, which coincides with the assumed basement elevation for homes with direct basement connections to the sanitary sewer.
 - o Shallow sewers with an obvert within 1.8 m of the ground shall not exhibit any surcharge during 10-year storm event.
 - o Overflows identified and characterized by their expected frequency and volume and assessed in light of the provincial F-5-5 (Determination of Treatment Requirements for Municipal and Private Combined and Partially Separated Systems)- policy for sewage overflows.

Besides the Ministry of Environment Conservation and Parks (Ministry of Environment) Guidelines for Sewage Works, the sewer system is evaluated under Part C of the Chatham-Kent Public Utilities Commission Watermain and Sanitary Design Manual.

4.5.2 Sewage Pumping Stations

The firm capacity of the pumping or lift station (while the largest pump is out of service) must allow pumping of peak wet weather flows corresponding to its catchment area Ministry of Environment Conservation and Parks (Ministry of Environment) Design Guidelines for Drinking Water Systems (2008).

At design pumping rates, a cleansing velocity of at least 0.6 m/s should be maintained or a range of between 0.6 and 1.1 m/s; the maximum velocity should be limited to 4.0 m/s. Ministry of Environment, Conservation and Parks (Ministry of Environment) Design Guidelines for Sewage Works (2008).

Chatham-Kent Public Utilities Commission Watermain and Sanitary Design Manual says that friction loss determination shall be based on the Hazen-Williams formula using appropriate “C” factor values as follows:

- C=120, Low water level in the wet well
- C=130, Median water level in the wet well and normal operating condition
- C=140, High water level in the wet well

4.5.3 Wastewater Treatment Plants

A wastewater treatment plant is designed to meet the current and planned needs, and eliminate bypasses and overflows as well as handle the Average Daily Flow (ADF) or

Sewage Treatment Plants (STPs) are designed for a 40- 50 -year service life, with equipment life ranging between 15 – 20 years.

The plant's treatment capacity, first at conceptual is established through a planning process (MEA' Class Environmental Assessment) and later confirmed as the proposed during the design stage.

The "rated capacity (otherwise known as ADF)" is the highest annual average flow during which the WWTP can consistently meet the site-specific effluent quality criteria (MOE Design Guidelines for Sewage Works 2008)

A plant's treatment capability is established by effluent limits and objectives as identified in the Certificate of Approval or Environmental Compliance approval, as issued by the Ministry of Environment, Conservation and Parks, for each facility.

Typically, potential capacity expansion of a wastewater treatment plant is reviewed when projected Average Daily Flows starts to near or go over 80% of the rated capacity.

The Chatham-Kent Public Utilities Commission manages their existing wastewater treatment plant facilities through a preventative and maintenance inspection program which include periodic TV camera inspections and field inspections implemented to assure system integrity, no disruption to operations and reliability. In addition to that with an ongoing facilities maintenance and improvements program, the wastewater treatment plants, and support structures are upgraded and updated with construction improvements such as equipment refurbishment and replacement, installation of SCADA communications systems, new online instrumentation for process performance.

The Chatham-Kent Public Utilities Commission inventory consists of both mechanical wastewater treatment facilities and passive systems such as Sewage Lagoons.

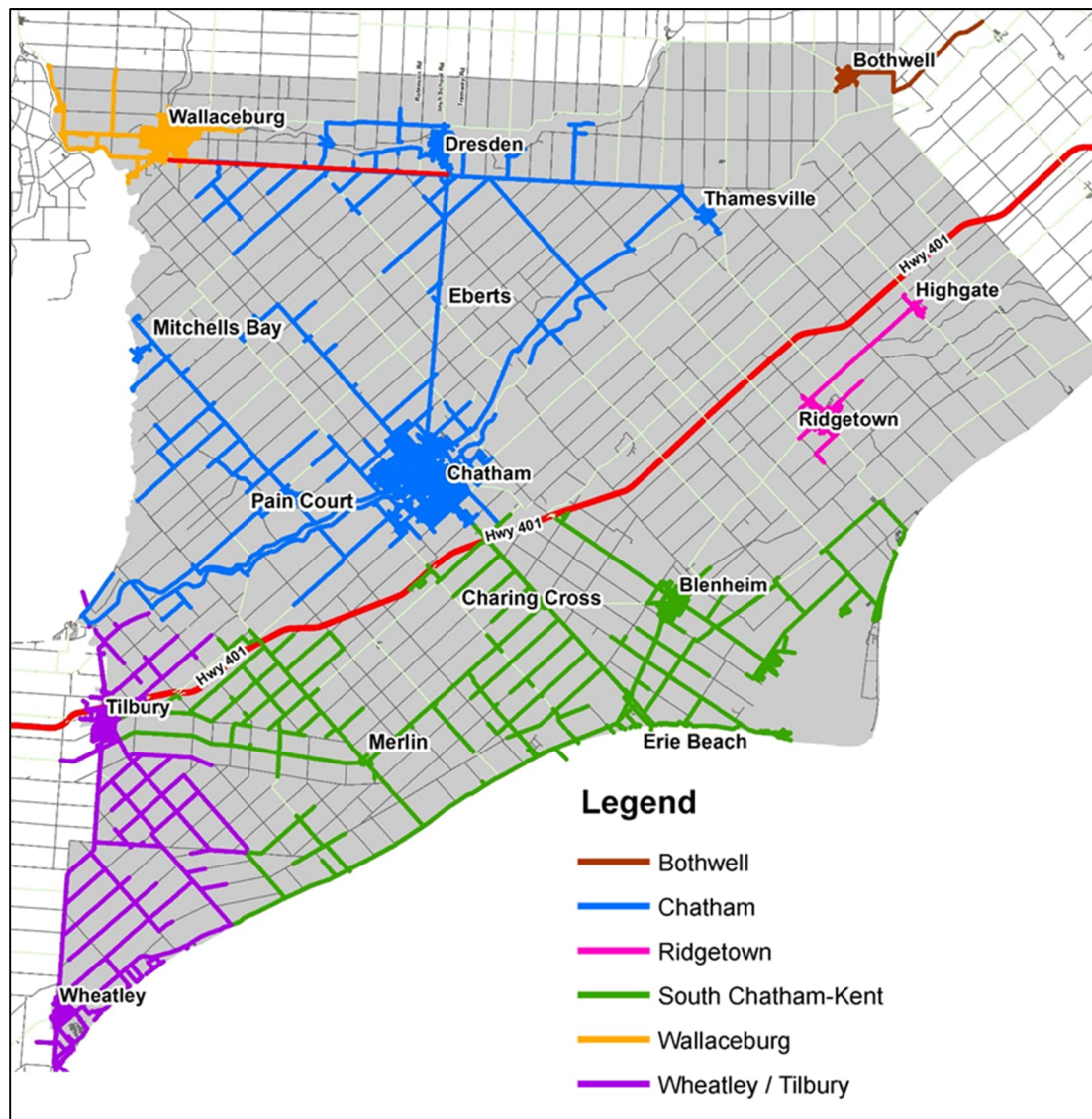
5. Existing Water System

The following section describes the Chatham-Kent water system, separated by each community system.

5.1 Existing Water Systems Description

The Chatham-Kent Public Utilities commission has six (6) water distribution systems providing potable water to its residents, businesses, and industries. **Refer to Figure 5-1.**

Figure 5-1: Chatham-Kent Water Distribution Systems

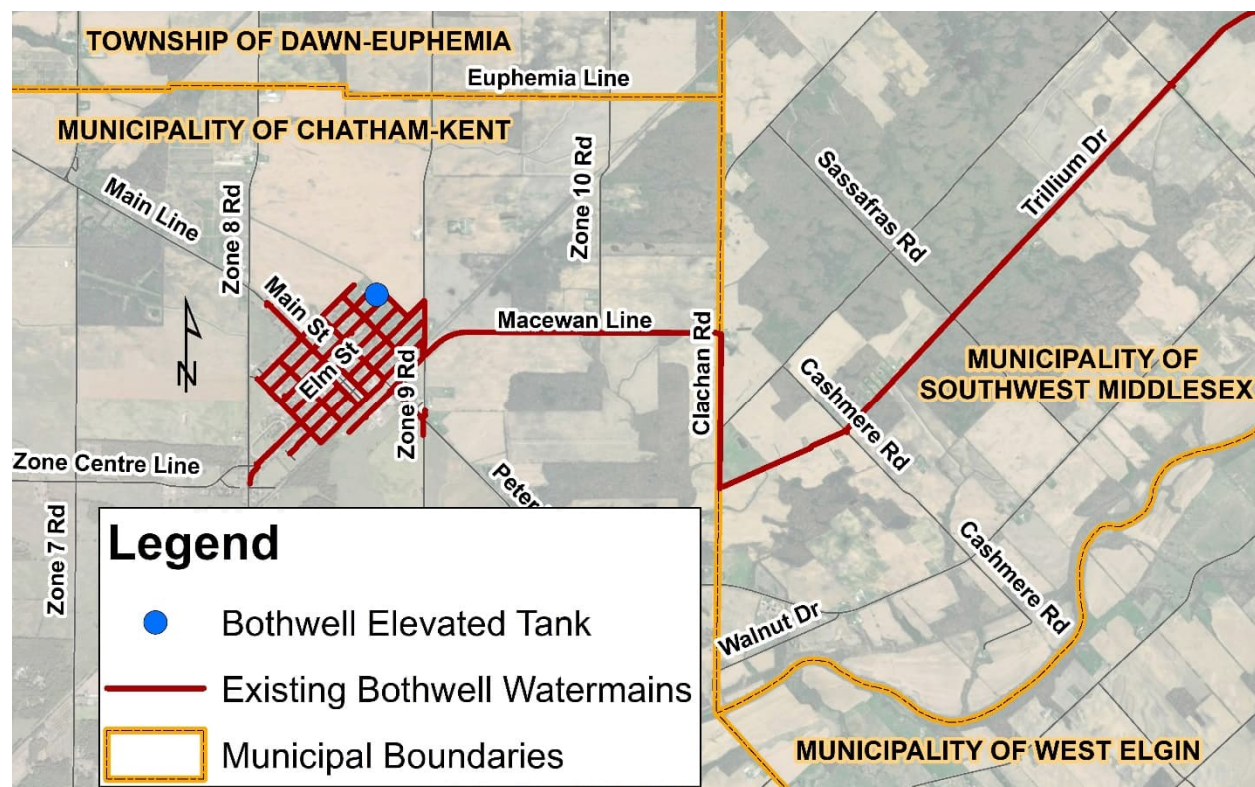


5.1.1 Bothwell Water System

The existing Bothwell water distribution system is a stand-alone distribution system that receives treated potable water from the West Elgin (Tri-County) primary water system that treats water from Lake Erie. The system has:

- Approximately 26.5 km of watermains
- 1 Elevated Tank

Figure 5-2: Bothwell Water System



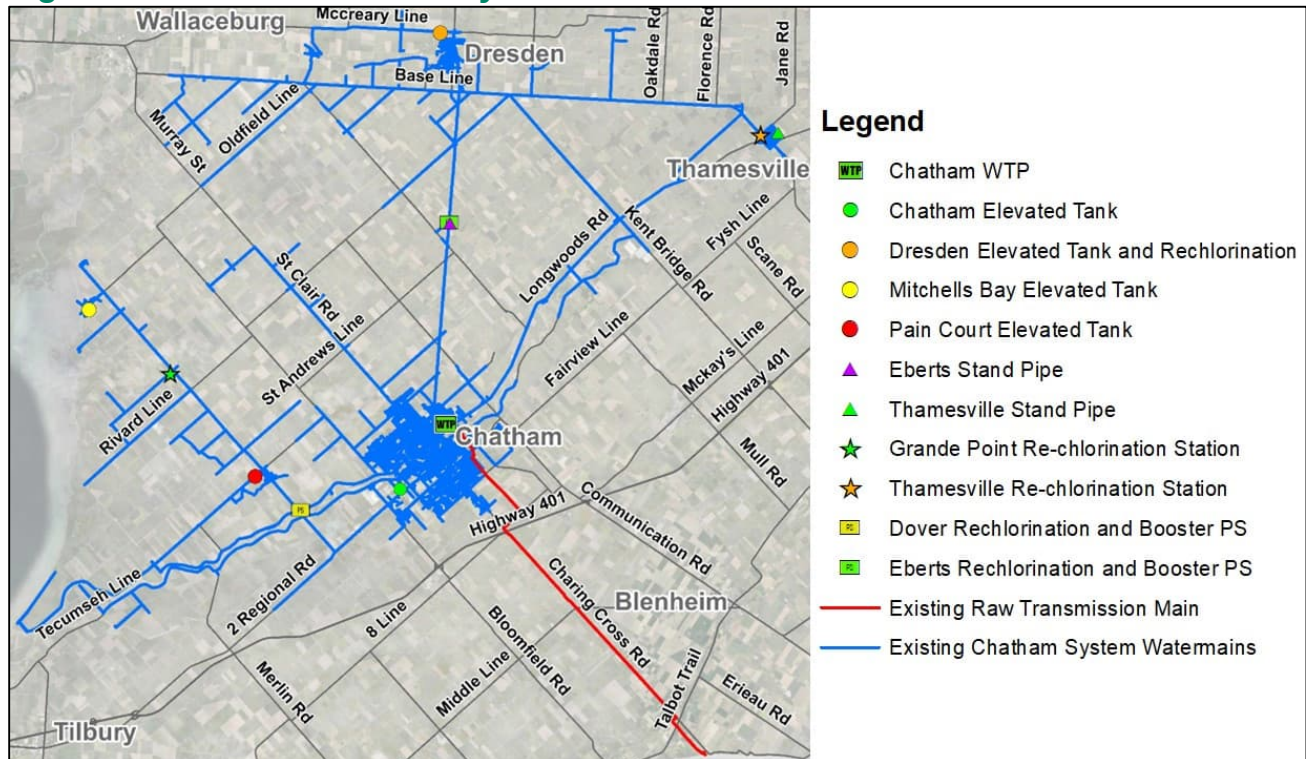
5.1.2 Chatham Water System

The Chatham water system includes the following components:

- Raw water standpipe at Cedar Springs (receives water from the Chatham and South Chatham-Kent Raw Water Pumping Station).
- 21.7 km long raw water transmission line.
- Approximately 670 km of watermains (not including non-potable and abandoned pipes).
- Raw water Surge Tower (Grand Avenue East)
- Chatham water treatment plant.
- Chatham Elevated Tower

- Dresden Elevated Tower and Re-chlorination Station
- Mitchell's Bay Elevated Tower
- Pain Court Elevated Tower
- Dover Re-chlorination and Booster Pumping Station
- Eberts Re-chlorination and Booster Pumping Station
- Grand Point Re-chlorination Station
- Thamesville Re-chlorination Station
- Eberts Standpipe
- Thamesville Standpipe

Figure 5-3: Chatham Water System



5.1.3 Ridgetown Water System

The Ridgetown water system is groundwater based and includes the following components:

- Approximately 54km of watermains (excluding non-potable and abandoned pipes)
- Erie Street Groundwater Wells and Treatment Plant (3 existing wells and 1 future well.)
- Scane Road Groundwater Wells and Treatment Plant (2 Wells)
- Ridgetown Elevated Tower
- Highgate Reservoir and Pumping Station

Figure 5-4: Ridgetown Water System

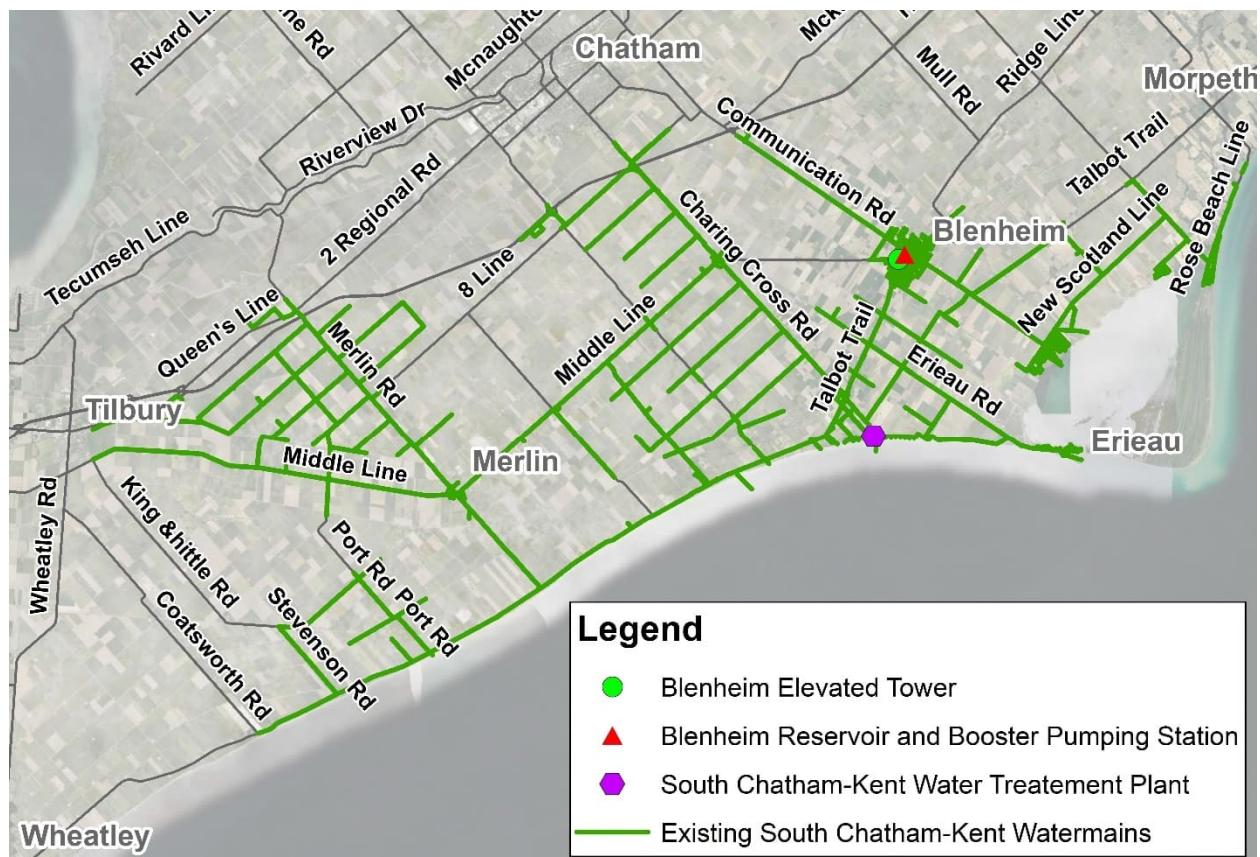


5.1.4 South Chatham-Kent Water System

The South Chatham-Kent water system includes the following components:

- Approximately 417km of watermains (excluding non-potable and abandoned pipes)
- South Chatham-Kent Water Treatment Plant
- Blenheim Elevated Tower
- Blenheim Reservoir and Booster Pumping Station

Figure 5-5: South Chatham-Kent Water System

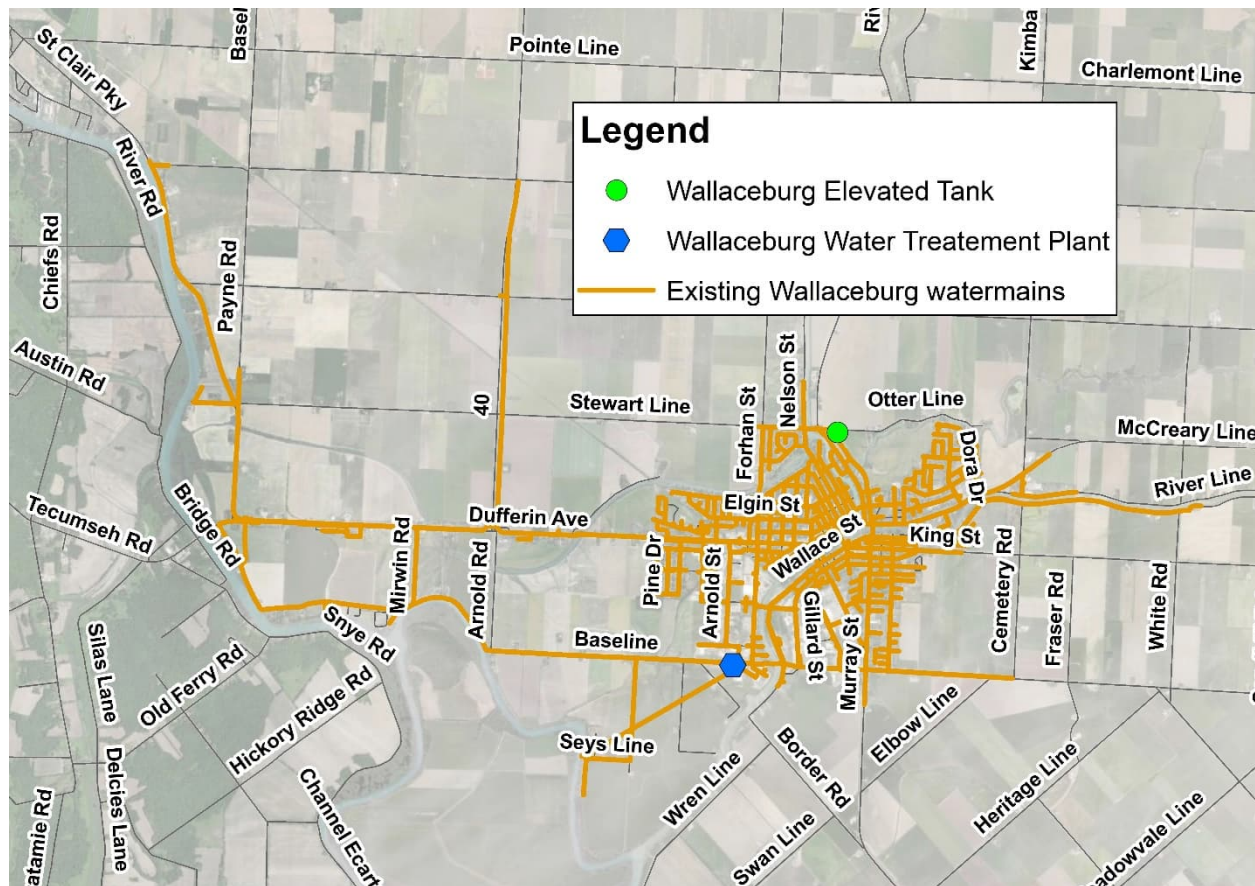


5.1.5 Wallaceburg Water System

The Wallaceburg water system includes the following components:

- Approximately 114km of watermains (Excluding non-potable and abandoned pipes)
- Wallaceburg Water Treatment Plant.
- Wallaceburg Elevated Tower.

Figure 5-6: Wallaceburg Water System

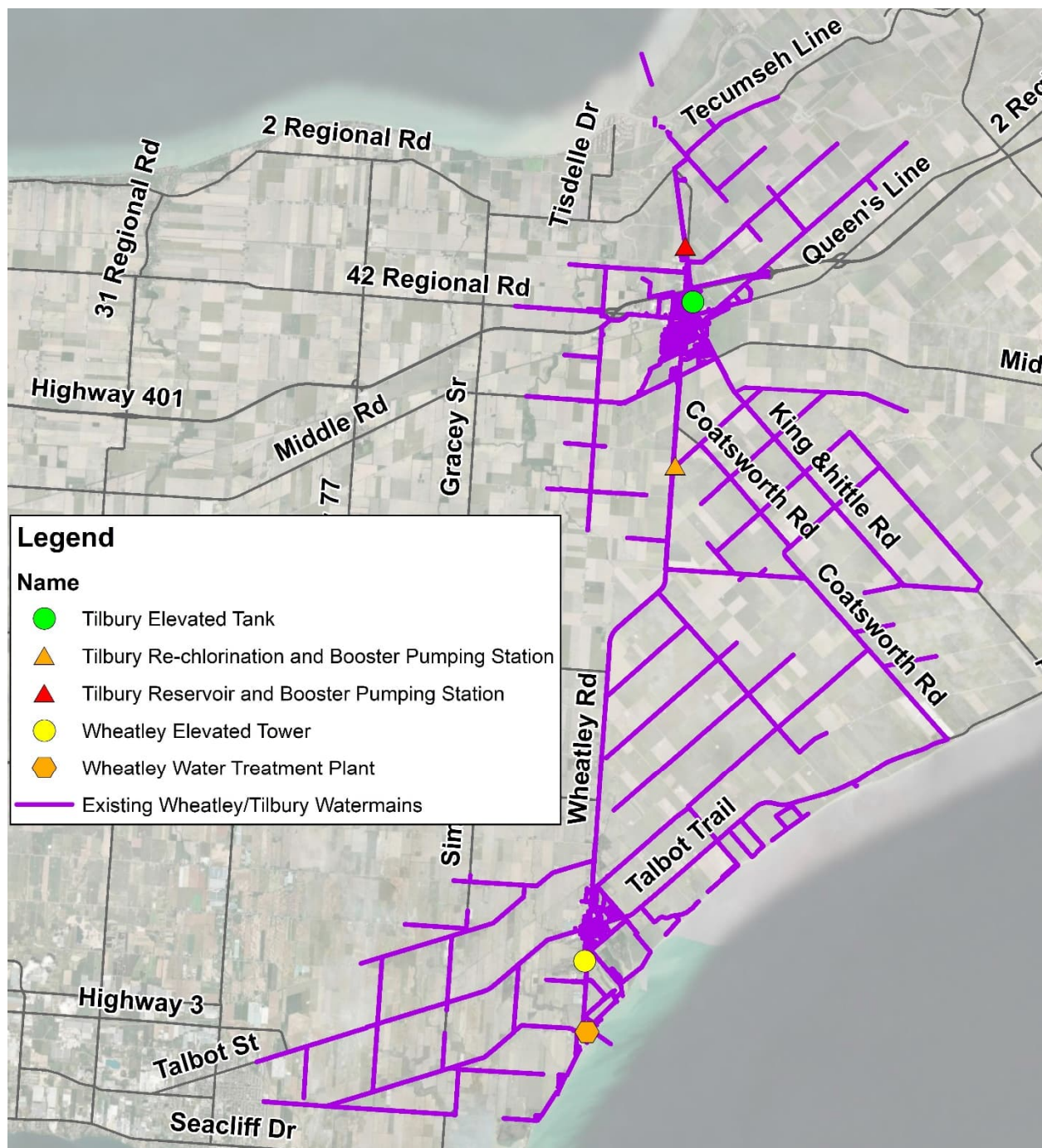


5.1.6 Wheatley / Tilbury Water System

The Wheatley Tilbury Water system includes the following components:

- Approximately 355km of watermains (Excluding non-potable and abandoned pipes)
- Wheatley Water Treatment Plant.
- Wheatley Elevated Tower.
- Tilbury Elevated Tower.
- Tilbury Re-chlorination Station.
- Tilbury Reservoir, Re-chlorination and Booster Pumping Station.

Figure 5-7: Wheatley / Tilbury Water System



5.2 Neighbouring Water Systems

There are other water systems interconnected to the Chatham-Kent Public Utilities Commission water distribution systems including:

- Lambton Area Water Supply System (LAWSS): interconnected to the Wallaceburg Water Distribution System that provides an emergency water supply.
- Lakeshore Water System: interconnected and serviced from the Tilbury Water Distribution System
- Leamington Water System: interconnected and serviced from the Wheatley Water Distribution System
- West Elgin (Tri-County) Water Supply System: interconnected and provided water supply to the Bothwell water system

5.3 Water Supply for Existing and Future Greenhouses

Tables 5-1 and 5-2 summarizes the maximum day demands for existing and future greenhouses serviced by the Chatham-Kent Public Utilities Commission water distribution systems.

Table 5-1: Existing Greenhouses in Chatham-Kent

Chatham-Kent Water Distribution System	Existing Greenhouse	Address	Maximum Day Demand (l/s)
Chatham	Greenhill Produce (KBR)	23282 Kent Bridge Rd, Kent Bridge	32.0
Chatham	Greenhill Produce (Huff)	23532 Huffs Side Rd, Kent Bridge	3.667
Chatham	Laprise Farms #1	7359 Maple Line, Pain Court	0.625
Chatham	Laprise Farms #2	7841 Maple Line, Pain Court	0.625
Chatham	Cedarline	11080 Baseline Rd, Dresden	3.333
Chatham	Mambo Produce	8383 Dover Centre Line, Dover Centre	1.667

Chatham-Kent Water Distribution System	Existing Greenhouse	Address	Maximum Day Demand (l/s)
Chatham	Peppertree	29025 Connection Rd, Tupperville	2.467
Chatham	Medisun Inc.	6640 Rivard Line, Grande Pointe	3.667
Chatham	Truly Green Farms	162 Bloomfield Rd, Chatham	15.0
South Chatham-Kent	De Temporada Farms	4891 Talbot Trail, Blenheim	2.60
South Chatham-Kent	Platinum Produce	21037 Communication Rd., Blenheim	7.91
Wheatley-Tilbury	Hacienda North Farms	2961 Talbot Trail, Coatsworth	9.45
Wheatley-Tilbury	N. Sawatzy Farms Inc	923 Talbot Rd W, Leamington	8.13
Wheatley-Tilbury	WJI Farms #1	433 Erie St. S, Wheatley	2.21
Wheatley-Tilbury	WJI Farms #2	2400 Hickson Rd., Wheatley	2.17

Table 5-2: Future Greenhouses in Chatham-Kent

Chatham-Kent Water Distribution System	Future Greenhouse	Address	Maximum Day Demand (l/s)
Chatham	Future Greenhouse	Near Baseline Rd and Dawn Mills Road, Dresden	40.0
Chatham	Future Greenhouse	Smoke Line and Kent Bridge Rd.	40.0
Chatham	Future Greenhouse	Near Baseline Rd and Kent Bridge Rd, Dresden	40.0
Chatham	Future Expansion	Near Bloomfield Rd, Chatham	40.0
Wallaceburg	Future Greenhouses	Around Tupperville area on Base Line (between Wallaceburg and Dresden)	100.0
South Chatham-Kent	Future Greenhouse	Near Talbot Trail and Askew Road, Merlin	32.0
Wheatley-Tilbury	Future Greenhouse	Near Wheatley Rd and Goodreau Line., Tilbury	18.0
Wheatley - Tilbury	Future Expansion	Near Hickson Rd and Erie St., Leamington	25.6

5.4 Water Storage and Fire Protection

The existing water storage capacity of the Chatham-Kent Public Utilities Commission water distribution systems were reviewed to determine whether the system storages meet the “Design Guidelines for Drinking-Water Systems 2008 by Ontario Ministry of Environment Conservation and Parks (MECP)” to provide the required equalization storage, fire storage and emergency supply, as detailed in Section 4.3.

The required storage was compared with the existing storage capacity for each Chatham-Kent Public Utilities Commission water system in order to determine the storage capacity surplus/deficit for accommodating future growth in the systems.

5.5 Water Systems Needs Assessment

The water demand projections in each Chatham-Kent Public Utilities Commission water distribution system were used to evaluate the system infrastructure needs for intake pipe capacity, raw water transmission capacity, water treatment capacity, water storage capacity, pumping capacity and water network capacity. In addition to the assessment of the water infrastructures under existing and future demand conditions, system water quality conditions were reviewed based on annual water quality reports. The following sub-sections detail the evaluation and review results.

5.5.1 Bothwell Water System

Currently the system provides water quality that meets the Ontario Drinking Water Quality Standards (ODWQS) with an annual average THMs concentration of 70.1 µg/L with only one quarterly sample exceeding the 100 µg/L according to the 2022 water systems annual report by the Chatham-Kent Public Utilities Commission. Similar results were reported for previous annual water quality reports between 2018 and 2022.

No major issues were observed within the Water Distribution System and adequate water quality had been maintained. This Water Distribution System can also be supplied by water through a future watermain from the North Kent Water system from Moraviantown to Bothwell once the Tri-County Water Distribution System Agreement has expired.

5.5.2 Chatham Water System

The system design meets the current treatment targets and has been providing good performance. Some observations include:

- There were instances of elevated filter effluent turbidity with a maximum turbidity higher than 0.7 NTU between 2018 to 2022 as reported in the annual water quality reports.
- THMs and HAAs annual averages were well below the Ontario Drinking Water Quality Standards limits.

A key concern with this water system is the reliability and redundancy of the raw water supply system. The Chatham Water Treatment Plant shares the raw water low lift pumping system with the South Chatham Water Treatment Plant. Additional redundancy is required to secure this raw water supply system which is providing majority of the total treated water supply for the Chatham-Kent Public Utilities

Commission water systems. There has been significant corrosion observed in the pipe gallery of the raw water pumping station. This can be addressed by twinning the existing raw water discharge header from the raw water pumping station directly to the Chatham Water Treatment Plant including a new surge protection system. In case of any severe algae events impacting the raw water system, both Water Treatment Plants and associated distribution systems will be greatly impacted.

It is also recommended that the Public Utilities Commission conduct future studies to optimize and improve the water quality in the distribution system, aiming to improve water biological stability including modeling water age in the distribution system.

5.5.3 Ridgetown Water System

The system design meets the current treatment targets and has been providing good performance. Some observations include:

- THMs and HAAs annual averages were well below the Ontario Drinking Water Quality Standards limits.

It is also recommended that the Public Utilities Commission conduct future studies to optimize and improve the water quality in the distribution system, aiming to improve water biological stability including modeling water age in the distribution system.

5.5.4 South Chatham-Kent Water System

The system design meets the current treatment targets and has been providing good performance. Some observations include:

- There were instances of elevated filter effluent turbidity with a maximum turbidity higher than 0.8 NTU between 2018 to 2022 as reported in the annual water quality reports.
- THMs and HAAs annual averages were well below the Ontario Drinking Water Quality Standards limits (THM -0.100 mg/L and HAA- 0.08 mg/L).

The raw water pumping station needs to be maintained to keep the system in a state of good repair. Corrosion has been observed on multiple assets within the station. It is recommended to conduct a condition assessment on the station to better determine any required upgrades.

It is also recommended that the Public Utilities Commission conduct future studies to optimize and improve the water quality in the distribution system, aiming to improve water biological stability including modeling water age in the distribution system.

5.5.5 Wallaceburg Water System

The system design meets the current treatment targets and has been providing good performance. Some observations include:

- There were instances of elevated filter effluent turbidity with a maximum turbidity higher than 0.6 NTU between 2018 to 2022 as reported in the annual water quality reports.
- THMs and HAAs annual averages were well below the ODWQS limits (THM - 0.100 mg/L and HAA- 0.08 mg/L).

The Water Treatment Plant infrastructure is approaching its end of life, and the Chatham-Kent Public Utilities Commission is currently in the process of conceptualising the new plant expansion (Refer to Wallaceburg Water Treatment Servicing Class Environmental Assessment Study Report, February 2023). The new design should investigate the observed issues to ensure the treated water quality will be improved to eliminate those incidents.

5.5.6 Wheatley/Tilbury Water System

The system design meets the current treatment targets and has been providing good performance. Some observations include:

- There were instances of elevated filter effluent turbidity with a maximum turbidity higher than 0.9 NTU between 2018 to 2022 as reported in the annual water quality reports.
- THMs and HAAs annual averages were well below the Ontario Drinking Water Quality Standards limits ((THM -0.100 mg/L and HAA- 0.08 mg/L).

The plant experiences naturally occurring manganese on a seasonal basis which varies from year to year when it happens. These spikes might trigger the need for some process upgrades to meet proposed Health Canada Maximum Acceptable Concentration of 0.12 mg/L and an aesthetic objective (AO) of 0.02 mg/L.

The plant raw water supply can also be impacted by harmful algae events in Lake Erie especially that it has a single raw water screen ahead of the low lift pumps followed by 35-micron strainers.

Other minor upgrades at the plant would include filter upgrades and raw water clarifiers at the end of their service life.

It is also recommended that the Public Utilities Commission conduct future studies to optimize and improve the water quality in the distribution system, aiming to improve water biological stability including modeling water age in the distribution system.

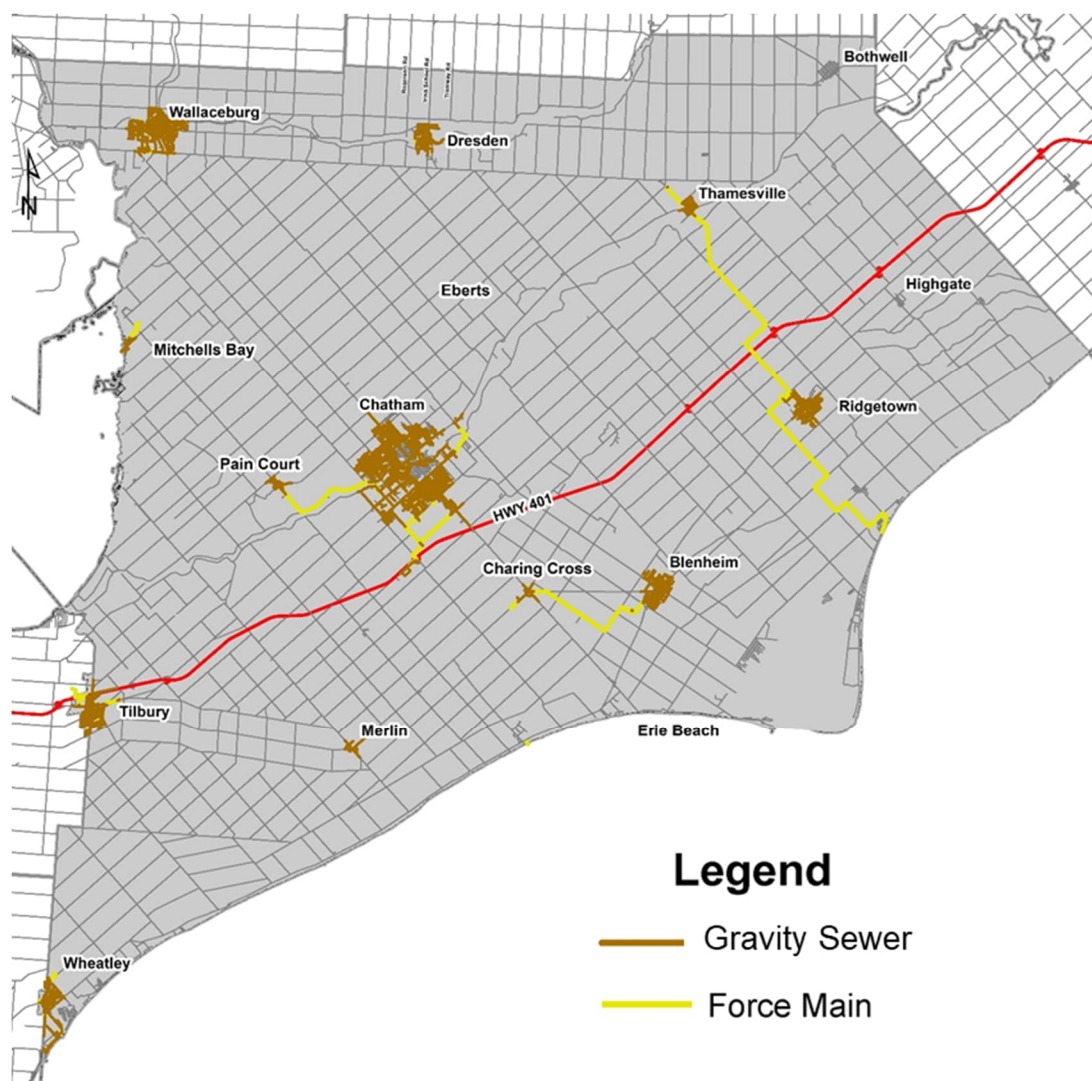
6. Existing Wastewater Systems

The following section describes the Chatham-Kent wastewater systems, separated by each service area.

6.1 Existing Wastewater Systems Description

The Chatham-Kent Public Utilities commission has ten (10) wastewater service areas collectively referred to as the Chatham, Wallaceburg, Dresden, Thamesville, Ridgetown, Blenheim, Merlin, Wheatley, Tilbury, and Mitchell's Bay service areas.

Figure 6-1: Chatham-Kent Wastewater Service Areas

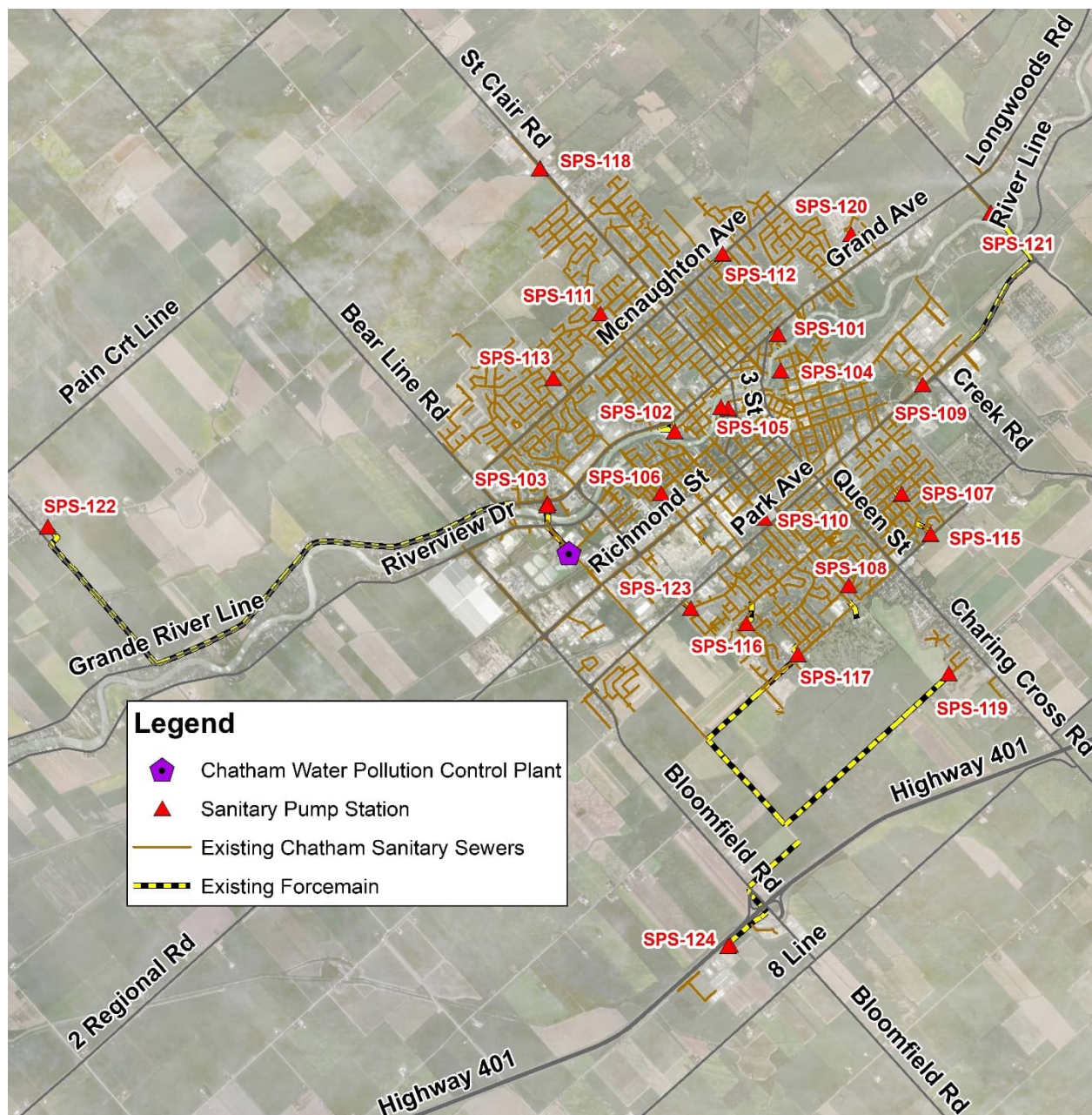


6.1.1 Chatham Wastewater Service Area

The Chatham wastewater system consists of:

- 440 km of sanitary and combined sewers, ranging from 150 mm to 1350 mm.
- A serviced residential population of approximately 48,100 and an employment population of 19,900
- 23 pumping stations
- The Chatham Water Pollution Control Plant

Figure 6-2: Chatham Wastewater Service Area

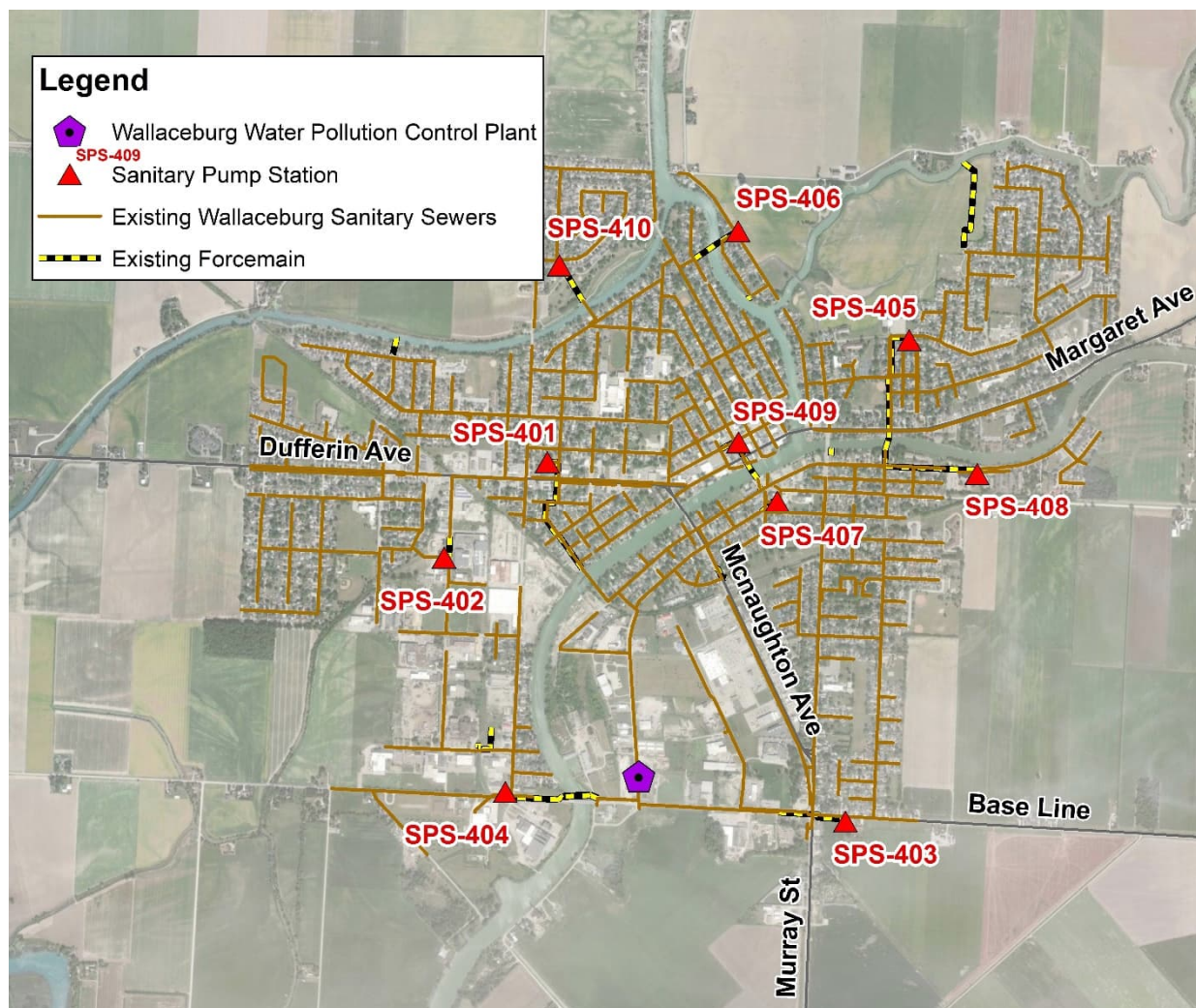


6.1.2 Wallaceburg Wastewater Service Area

The Wallaceburg wastewater system consists of:

- 73 km of sanitary sewers, ranging from 150 mm to 900 mm.
- A serviced residential population of approximately 10,040 and an employment population of 2910
- 10 pumping stations, 6 of which convey flow across one of the rivers.
- The Wallaceburg Water Pollution Control Plant (conventional activated sludge)

Figure 6-3: Wallaceburg Wastewater Service Area

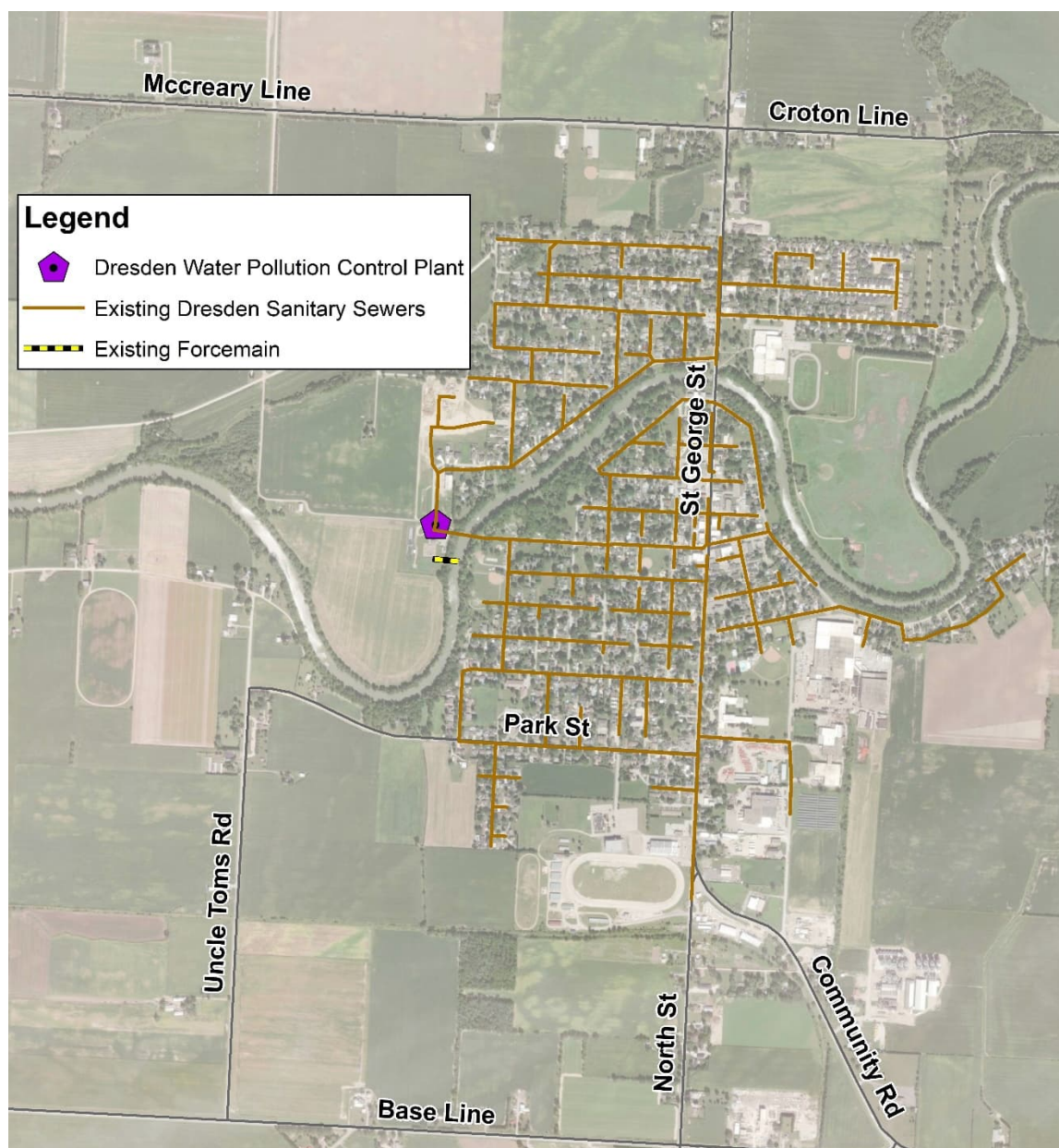


6.1.3 Dresden Wastewater Service Area

The Dresden wastewater system consists of:

- 22 km of sanitary sewers, ranging from 150 mm to 600 mm.
- A serviced residential population of approximately 2390 and an employment population of 2790
- A siphon conveying flows from the south side of the river to the north side
- The Dresden Wastewater Treatment Plant (extended aeration)

Figure 6-4: Dresden Wastewater Service Area



6.1.4 Thamesville Wastewater Service Area

The Thamesville wastewater system consists of:

- 9 km of sanitary sewers, ranging from 125 mm to 400 mm.
- A serviced residential population of approximately 710 and an employment population of 200
- 4 pumping stations: Station SPS-502 conveys the area north of Cromwell Cr to the south side of the creek, SPS-501 conveys flow from all of Thamesville to SPS-504, and SPS-504 convey it to the Ridgetown Wastewater Treatment Plant

Figure 6-5: Thamesville Wastewater Service Area



6.1.5 Ridgetown Wastewater Service Area

The Ridgetown wastewater system consists of:

- 20 km of sanitary sewers, ranging from 100 mm to 525 mm.

- A serviced residential population of approximately 2840 and an employment population of 2120.
- 4 pumping stations, the final of which that conveys the entire Ridgetown system to the wastewater treatment plant (including SPS-304 on Rose Beach Line ± 9 km south of Ridgetown off the shore of Lake Erie).
- The Ridgetown Wastewater Treatment Plant, which also services flow pumped from Thamesville.

Figure 6-6: Ridgetown Wastewater Service Area

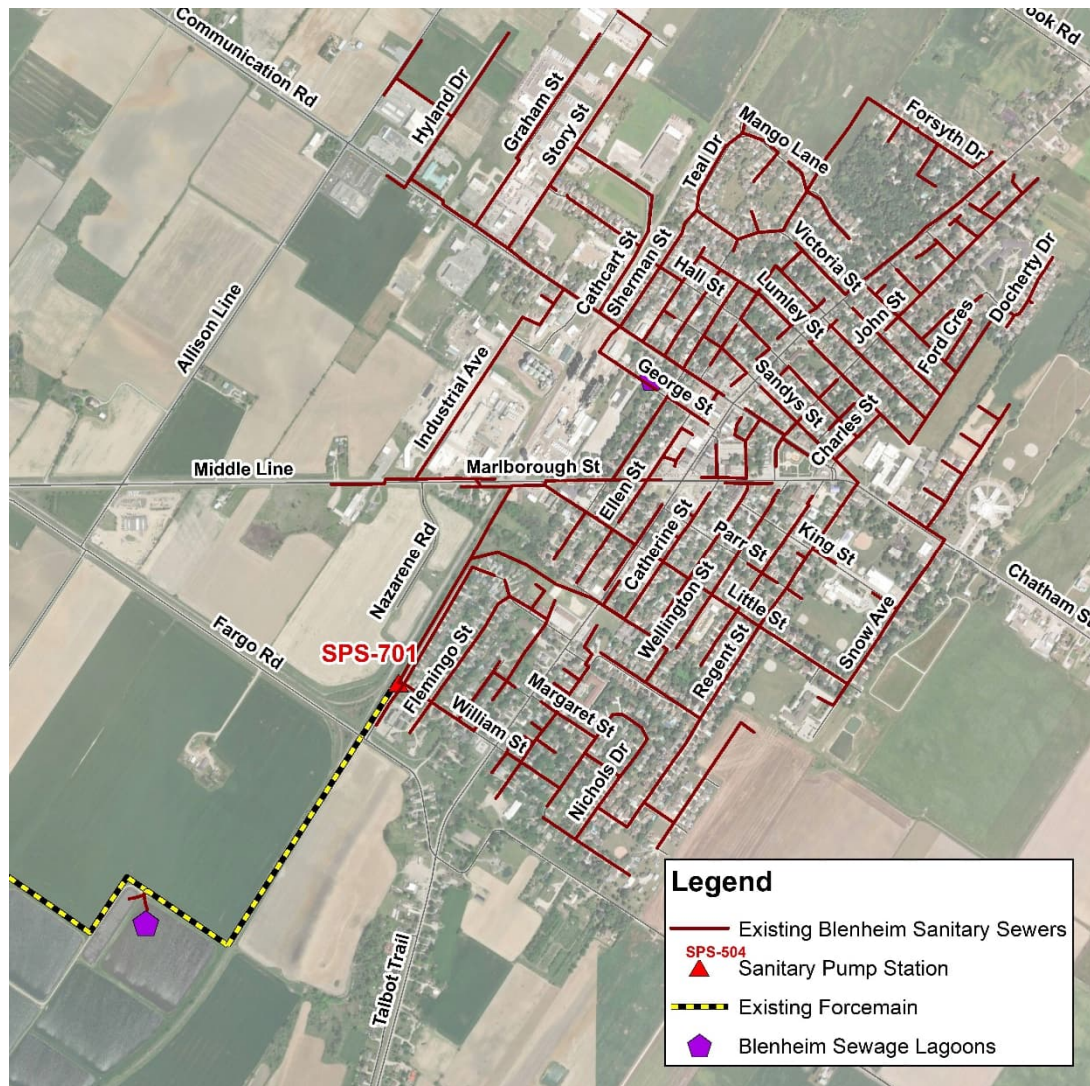


6.1.6 Blenheim Wastewater Service Area

The Blenheim wastewater system consists of:

- 30 km of sanitary sewers, ranging from 150 mm to 450 mm.
- A serviced residential population of approximately 3540 and an employment population of 2120
- A single pumping station that conveys the entire Blenheim system to the wastewater lagoons
- The Blenheim treatment lagoons, which also services Charing Cross

Figure 6-7: Blenheim Wastewater Service Area



6.1.7 Merlin Wastewater Service Area

The Merlin wastewater system consists of:

- 5 km of sanitary sewers, ranging from 200 mm to 375 mm.

- A serviced residential population of approximately 620 and an employment population of 100
- A single pumping station that conveys the entire system to the sewage lagoons
- The Merlin Sewage Lagoons

Figure 6-8: Merlin Wastewater Service Area



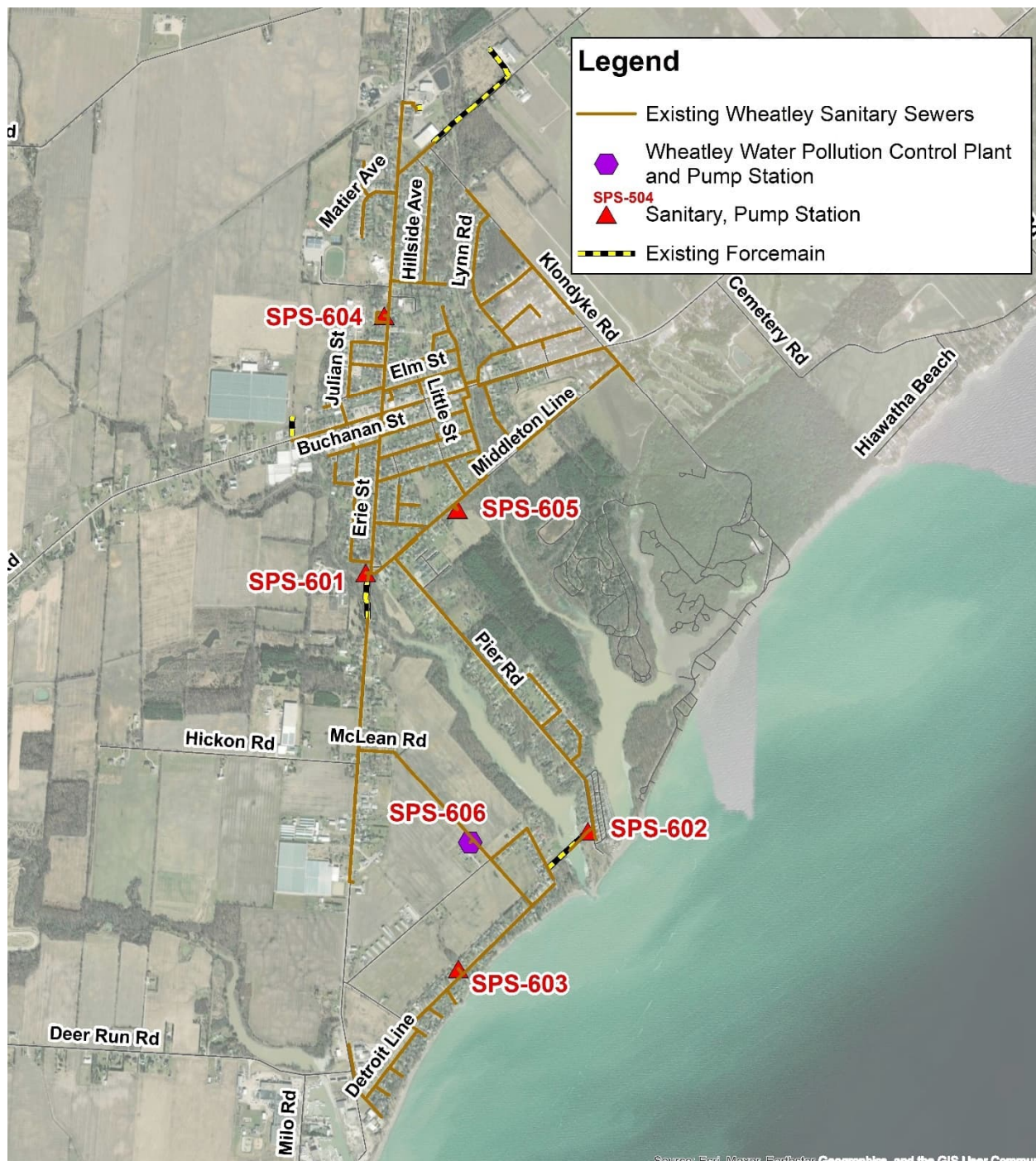
6.1.8 Wheatley Wastewater Service Area

The Wheatley wastewater system consists of:

- 25 km of sanitary sewers, ranging from 100 mm to 800 mm.

- A serviced residential population of approximately 1680 and an employment population of 810
- 5 pumping stations plus the water pollution control plant effluent pump to Lake Erie
- The Wheatley Water Pollution Control Plant

Figure 6-9: Wheatley Wastewater Service Area

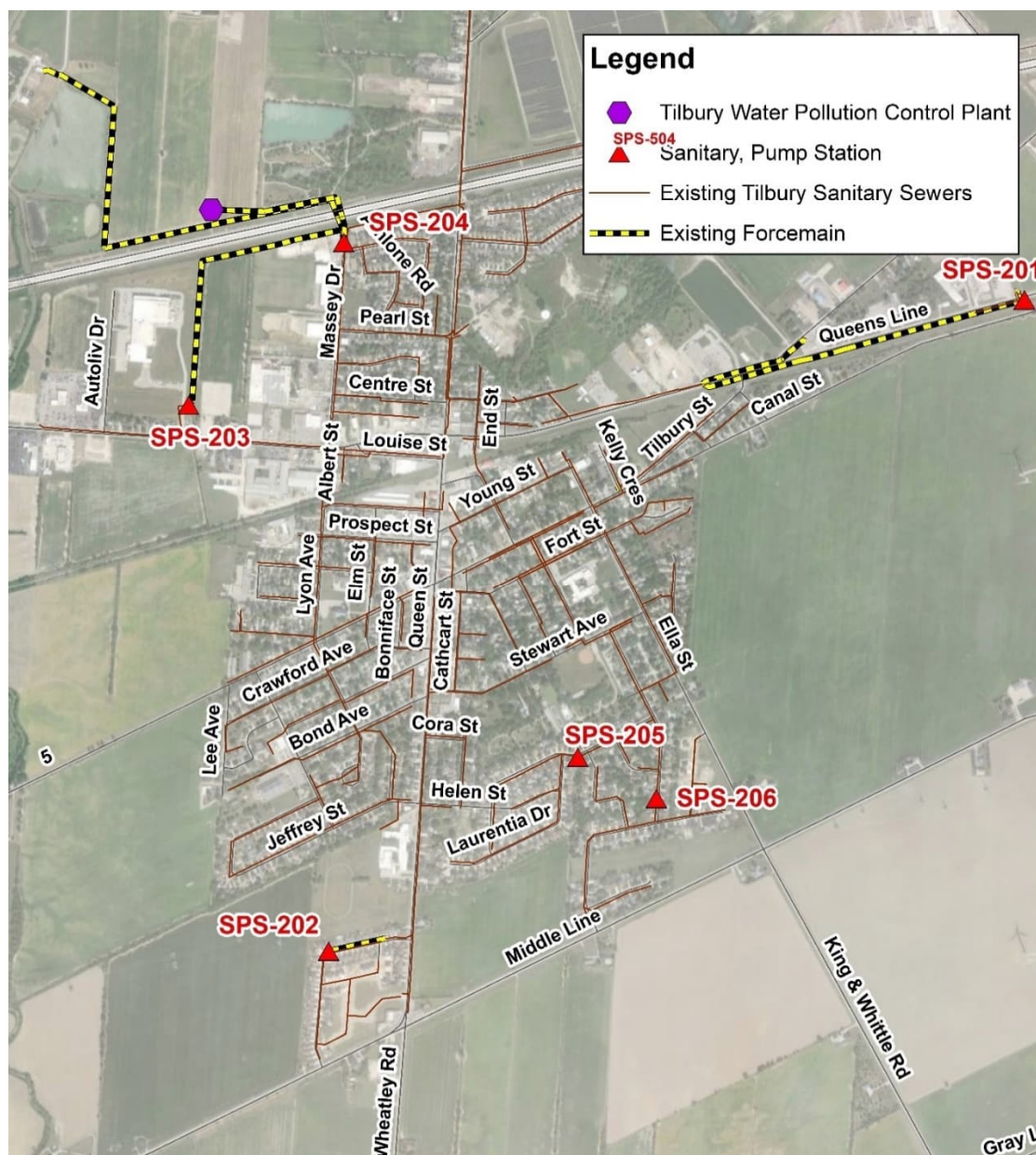


6.1.9 Tilbury Wastewater Service Area

The Tilbury wastewater system consists of:

- Approximately 100km of sanitary sewers, ranging from 125 mm to 1200 mm.
- A serviced residential population of approximately 1920 and an employment population of 520
- 6 pumping stations, including the final station SPS-204 that pumps the entire Tilbury system to the water pollution control plant
- The Tilbury Water Pollution Control Plant

Figure 6-10: Tilbury Wastewater Service Area



6.1.10 Mitchell's Bay Wastewater Service Area

The Mitchell's Bay wastewater system consists of:

- 4 km of sanitary sewers, ranging from 200 mm to 300 mm.
- A serviced residential population of approximately 400 and an employment population of 90
- A single pumping station that pumps the entire system to the sewage lagoons
- The Mitchell's Bay Sewage Lagoon System

Figure 6-11: Mitchell's Bay Wastewater Service Area



6.2 Wastewater System Needs Assessment

6.2.1 Wastewater System Needs

The wastewater system needs are broken into the following aspects:

- Pumping station capacity needs: related to the ability to pump the wet weather inflow to the station, and frequency that the pumping capacity is exceeded.
- Hydraulic capacity of the sewer collection system under existing conditions: related to the available pipe capacity and potential surcharge when conveying peak wet weather flows.
- Wastewater treatment system needs related to the ability to adequately treat sewage in accordance with current guidelines, and the frequency of any treatment bypass during wet weather.
- The ability of the existing pumping stations, sewer systems, and treatment systems to service forecasted growth in Chatham-Kent.

The needs assessment related to each are discussed in the following sections.

6.2.2 Assessment of Pumping Station Capacity Needs

The pumping station needs are assessed in terms of the frequency that peak sewage inflow to the station is expected to exceed the existing firm capacity at the station (defined as the capacity with the largest pump out of service). A secondary consideration is the maximum capacity of the station with all available pumps running. The firm capacity of each station was provided by the Chatham-Kent PUBLIC UTILITIES COMMISSION. The peak sewage inflow to each station was assessed with the calibrated hydraulic model developed for the study.

The calibrated hydraulic model was run for events ranging from a 10-year storm to a rainfall event that occurs 20-times per year, and the pumping stations were ranked by how many times per year the inflow to the station exceeds the firm capacity. The stations were then ranked by priority for improvements, with the highest priority based on frequency of overflows, high flows and overflows, servicing a large population, and whether they are required to service growth.

Results are provided in **Table 6-1**.

Table 6-1: Pumping Capacity Needs

PUMP STATION	Location	Frequency of overflows	Priority	Pump Capacity (L/s)	2-Year PS Peak Inflow (L/s)	Overflow (L/s)	10-year PS Peak Inflow (L/s)	Overflow (L/s)
Main Lift	Chatham-- Inflow to WPCP	20 times/yr	2					
SPS-103	Chatham-- Crossing River to WPCP	20 times/yr	1	260	800	577	930	707
SPS-402	Wallaceburg- West side	20 times/yr	4	38	183	145	247	209
SPS-405	Wallaceburg - NE area	20 times/yr	3	41	185	144	278	237
SPS-603	Wheatley - S area on lakefront	20 times/yr	7	22	43	21	54	32
SPS-801	Merlin - pump to lagoon	20 times/yr	8	22	76	54	114	92
SPS-105_NEW	Chatham - combined area S of river	10 times/yr	2	175	1200	378	838	417
SPS-108	Chatham - S side	10 times/yr	9	23	69	46	95	71
SPS-401	Wallaceburg - Central pump N across river	7 times/yr	5	139	402	194	565	357
SPS-410	Wallaceburg – Pumps South across river	7 times/yr	5	20	50	30	75	55
SPS-122	Pain Court	4 times/yr	6	23.8*	44	20	68	41
SPS-409	Wallaceburg - Central pump N across river	4 times/yr	6	33	169	68	249	115
SPS-407	Wallaceburg – Water Tower Park Northeast of Queen St/Herbert St	3 times/yr	7	44	77	33	116	72
SPS-602	Wheatley – Pumps W across the river	3 times/yr	7	15	28	13	42	19
SPS-107	Chatham – Jasper Ave	2 times/yr	8	38	53	15	79	41
SPS-110	Chatham – Park Ave	2 times/yr	8	327	563	135	752	324
SPS-119	Chatham – 7 th Line E	2 times/yr	8	41.5	64	22	98	53
SPS-203	Tilbury – Mill St W	2 times/yr	8	44	67	23	86	41
SPS-204	Tilbury – Pumps N across Hwy 401	2 times/yr	8	369	422	52	456	86
SPS-303	Ridgetown – Pumps from Erie St to WPCP	2 times/yr	8	149	290	86	310	106
SPS-601	Wheatley – Erie St S – Pumps from N Wheatley to S Wheatley	2 times/yr	8	66	355	18	366	42
SPS-605	Wheatley Middleton Line	2 times/yr	8	22	33	11	48	26
SPS-702	Charing Cross Pumps to Blenheim Lagoon	2 times/yr	8	25	37	11	54	29
SPS-102	Chatham – Grand Ave W	2 years	9	441	657	78	806	355
SPS-111	Chatham – Oxley Dr/Sandy's St	2 years	9	99	125	26	228	129

Table 6-1: Pumping Capacity Needs

PUMP STATION	Location	Frequency of overflows	Priority	Pump Capacity (L/s)	2-Year PS Peak Inflow (L/s)	Overflow (L/s)	10-year PS Peak Inflow (L/s)	Overflow (L/s)
SPS-501	Thamesville – Pumps S to SPS 504	2 years	9	25	59	15	89	46
SPS-701	Blenheim – Pumps S to Blenheim Lagoon	2 years	9	200	220	20	271	71
SPS-116	Chatham – Pumps N across Mud Creek	10 years	10	9	8	0	13	3
SPS-403	Wallaceburg – Base Line/Old Glass Rd – Pumps E across Sydenham River	10 years	10	44-101	193	0	188	25
SPS-404	Thamesville – Pumps S to Ridgetown WPCP	10 years	10	19-137	80	0	121	20
SPS-504	Thamesville – Pumps S to Ridgetown WPCP	10 years	10	32	42	0	43	10
SPS-604	Wheatley – Park Crescent	10 years	10	22	18	0	26	4
SPS-901	Mitchell's Bay – Allan Rd	10 years	10	20	29	0	43	12
SPS-101	Chatham – Pumps W on Grand Ave E	< 10 years	10	135	171	0	239	0
SPS-106	Chatham – Merrit Ave/King St W	< 10 years	10	1020	932	0	1074	0
SPS-109	Chatham – Park Ave E – Pumps W across Thames River	< 10 years	10	95	49	0	73	0
SPS-112	Chatham – Pumps W on McNaughton Ave	< 10 years	10	113	63	0	93	0
SPS-113	Chatham – Baldoon Rd	< 10 years	10	36	0	0	0	0
SPS-115	Chatham – Indian Creek Rd E – Pumps N across Indian Creek	< 10 years	10	9	0	0	0	0
SPS-117	Chatham – Indian Creek Rd W	< 10 years	10	21	0	0	0	0
SPS-118	Chatham – St Clair St	< 10 years	10	29	1	0	2	0
SPS-120	Chatham – Landings Pass	< 10 years	10	9	0	0	0	0
SPS-121	Chatham – Communication Rd – Pumps SW to Park Ave E	< 10 years	10	27.6*	5	0	7	0
SPS-123	Chatham – Bristol Dr/Keil Dr S	< 10 years	10	31.3	16	0	24	0
SPS-124	Chatham – 7 th Line W – Pumps NW across Hwy 401	< 10 years	10	126	183	0	183	0
SPS-201	Tilbury – Queens Line	< 10 years	10	18.9	0	0	0	0
SPS-202	Tilbury – Homesteads Dr	< 10 years	10	7.5	0	0	0	0
SPS-205	Tilbury – Rose Ave	< 10 years	10	6	0	0	0	0
SPS-206	Tilbury Park Lane	< 10 years	10	6	0	0	0	0

Table 6-1: Pumping Capacity Needs

PUMP STATION	Location	Frequency of overflows	Priority	Pump Capacity (L/s)	2-Year PS Peak Inflow (L/s)	Overflow (L/s)	10-year PS Peak Inflow (L/s)	Overflow (L/s)
SPS-301	Ridgetown – Marsh Street	< 10 years	10	10	0	0	0	0
SPS-304	S of Ridgetown – Rose Beach Line pumps N to Ridgetown	< 10 years	10	14.4	0	0	0	0
SPS-406	Wallaceburg – Peter St/Water St – Pumps N to Ridgetown	< 10 years	10	26.3	10	0	16	0
SPS-408	Wallaceburg – Wallace St	< 10 years	10	36	12	0	19	0
SPS-502	Thamesville – Lamila St	< 10 years	10	13	7	0	10	0
SPS-503	Thamesville – Industrial Rd	< 10 years	10	19	0	0	0	0
SPS-606	Wheatley – 1 st Concession Line	< 10 years	10	98	109	0	124	0

6.2.3 Assessment of Sewer System Hydraulic Capacity Needs

The wastewater system needs assessment is based on a hydraulic evaluation of the system capacity under dry weather and wet weather conditions, using the evaluation criteria discussed in Section 4.5. The hydraulic capacity is reviewed for existing sanitary and combined sewers, and existing pumping stations. Deficiencies/needs are identified and prioritized.

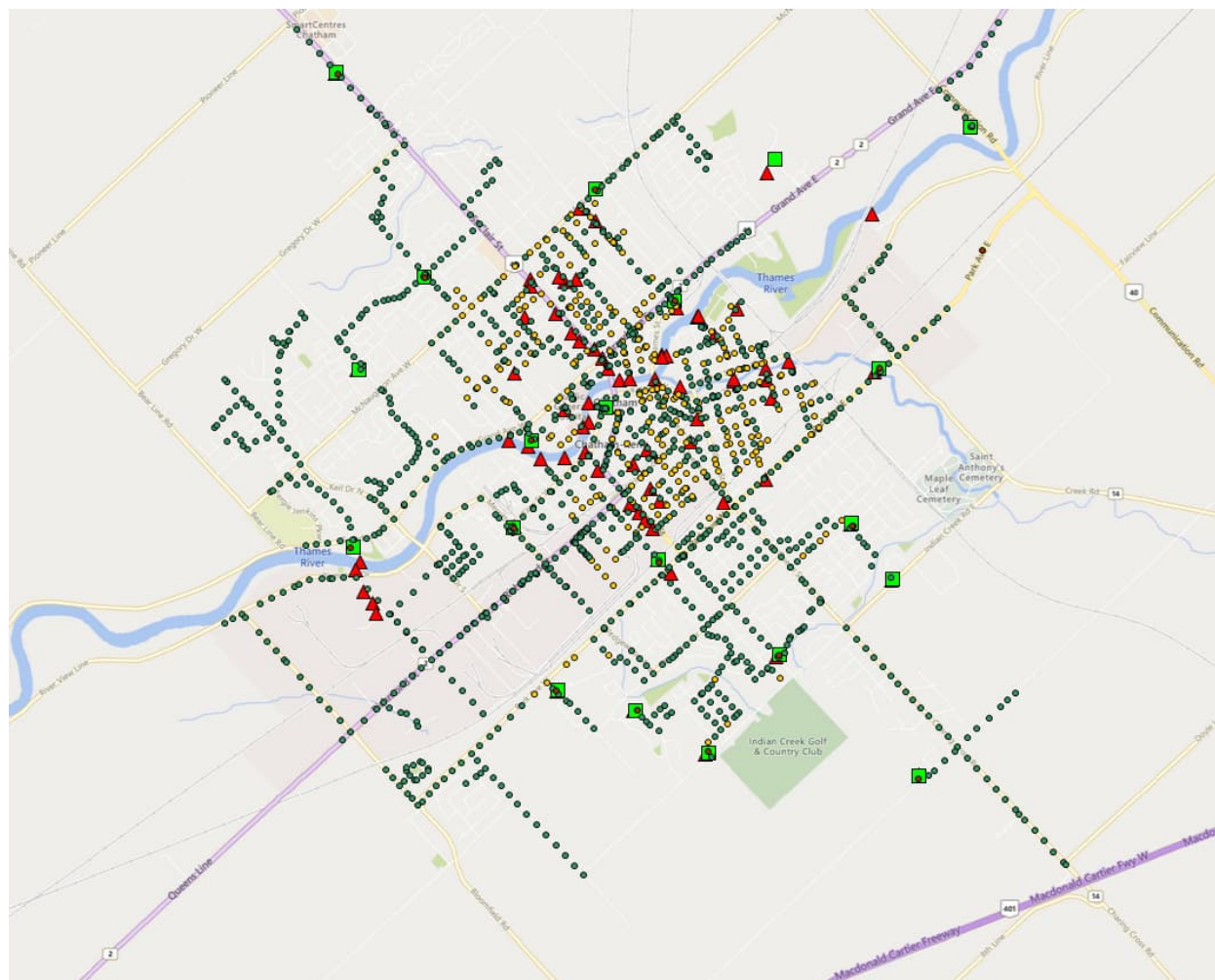
The following figures show the hydraulic evaluation of the collection system for each local system for a 10-year wet weather event. The results show:

- **Peak flow divided by pipe capacity:** the results are colour coded, with
 - $Q_{10yr} / Q_{cap} > 1.0$ shown in red
 - Q_{10yr} / Q_{cap} between 0.7 and 1.0 shown in yellow
 - $Q_{10yr} / Q_{cap} < 0.7$ shown in green
- **The hydraulic grade line (HGL) at the MHs:** the results are colour coded, with
 - HGL within 0.3 m of the ground, MHs shown in red
 - HGL between 1.8 and 0.3 m of the ground, MHs shown in yellow
 - HGL > 1.8 m from the ground, MHs shown in green

The HGL results provide the initial assessment of areas most at risk for problems due to surcharging; the pipe capacity results indicate the downstream causes/bottlenecks that create the problems.

6.2.3.1 Chatham Wastewater Service Area

Figure 6-12: Chatham Existing Storm Sewer Performance: 2-Year Storm



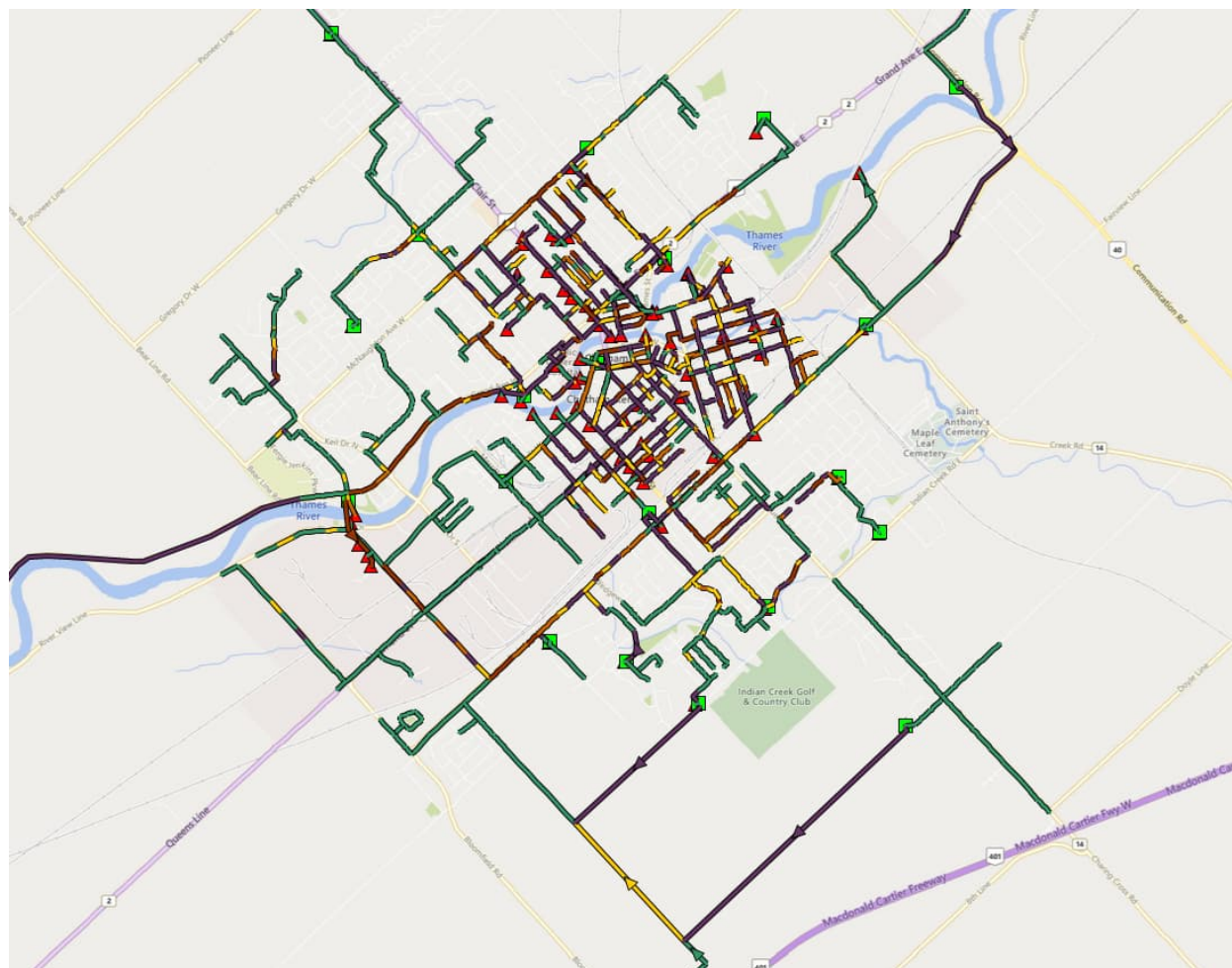
Legend

DEPTH OF HGL BELOW GROUND

- Above Surface
- 0 – 1.8m
- > 1.8m

STORM SEWER PEAK FLOW RELATIVE TO CAPACITY

- Q Peak/Q Full < 50%
- Q Peak/Q Full 50% - 80%
- Q Peak/Q Full 80% - 100%
- Q Peak/Q Full 100% - 120%
- Q Peak/Q Full > 120%



Legend

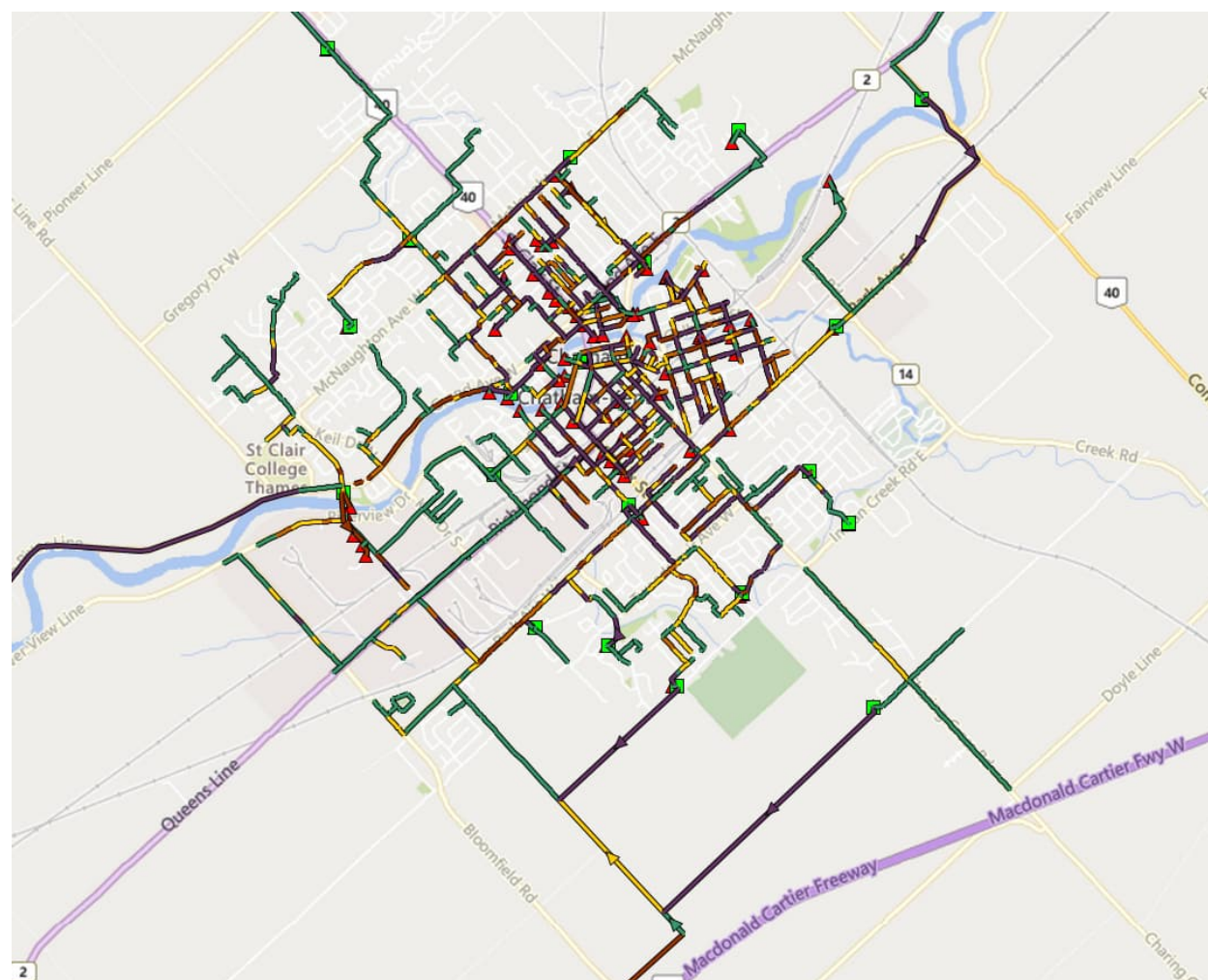
DEPTH OF HGL BELOW GROUND

- Above Surface
- 0 – 1.8m
- > 1.8m

STORM SEWER PEAK FLOW RELATIVE TO CAPACITY

- Q Peak/Q Full < 50%
- Q Peak/Q Full 50% - 80%
- Q Peak/Q Full 80% - 100%
- Q Peak/Q Full 100% - 120%
- Q Peak/Q Full > 120%

Figure 6-13: Chatham Existing Storm Sewer Performance: 10-Year Storm



Legend

DEPTH OF HGL BELOW GROUND

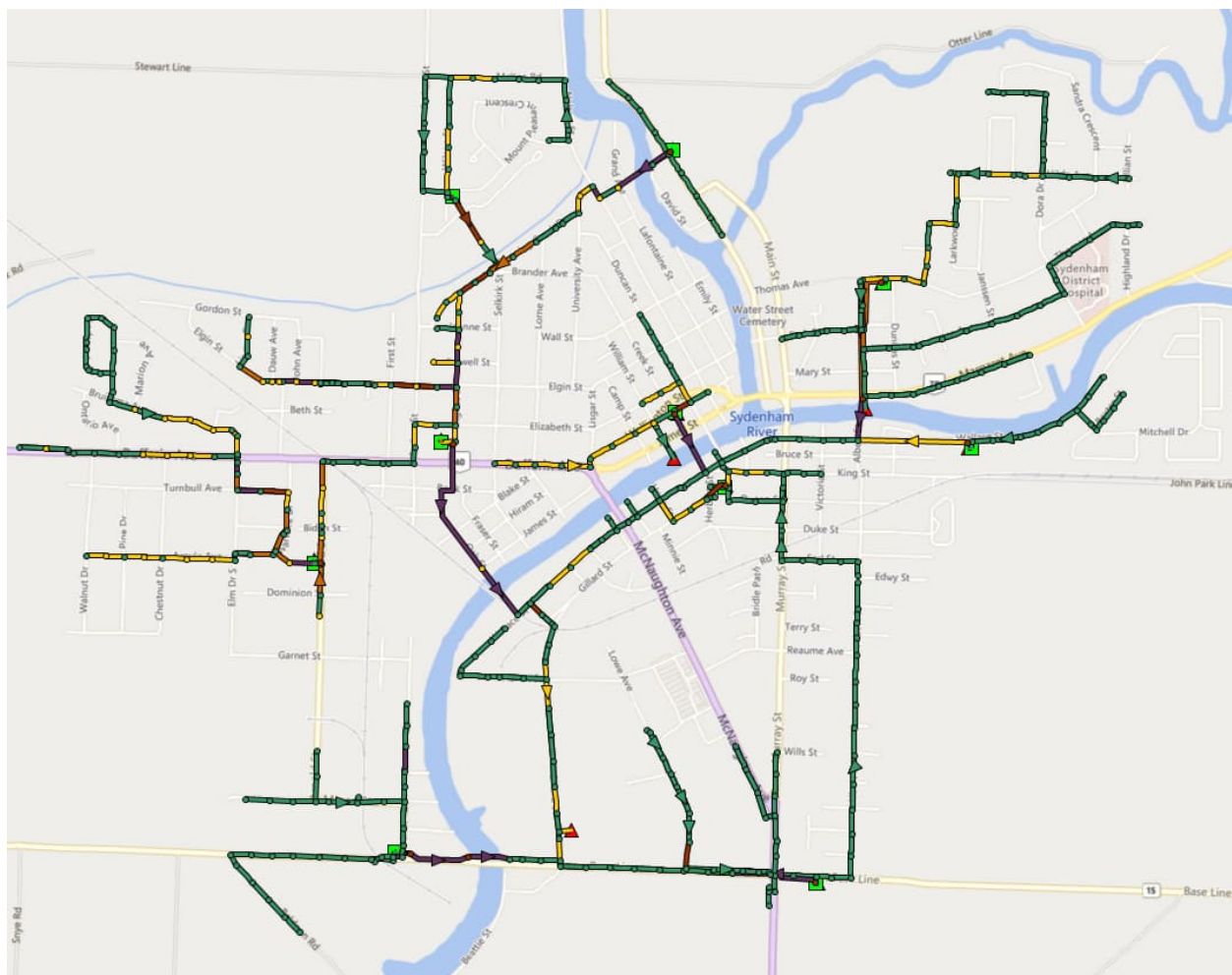
- Above Surface
- 0 – 1.8m
- > 1.8m

STORM SEWER PEAK FLOW RELATIVE TO CAPACITY

- Q Peak/Q Full < 50%
- Q Peak/Q Full 50% - 80%
- Q Peak/Q Full 80% - 100%
- Q Peak/Q Full 100% - 120%
- Q Peak/Q Full > 120%

6.2.3.2 Wallaceburg Wastewater Service Area

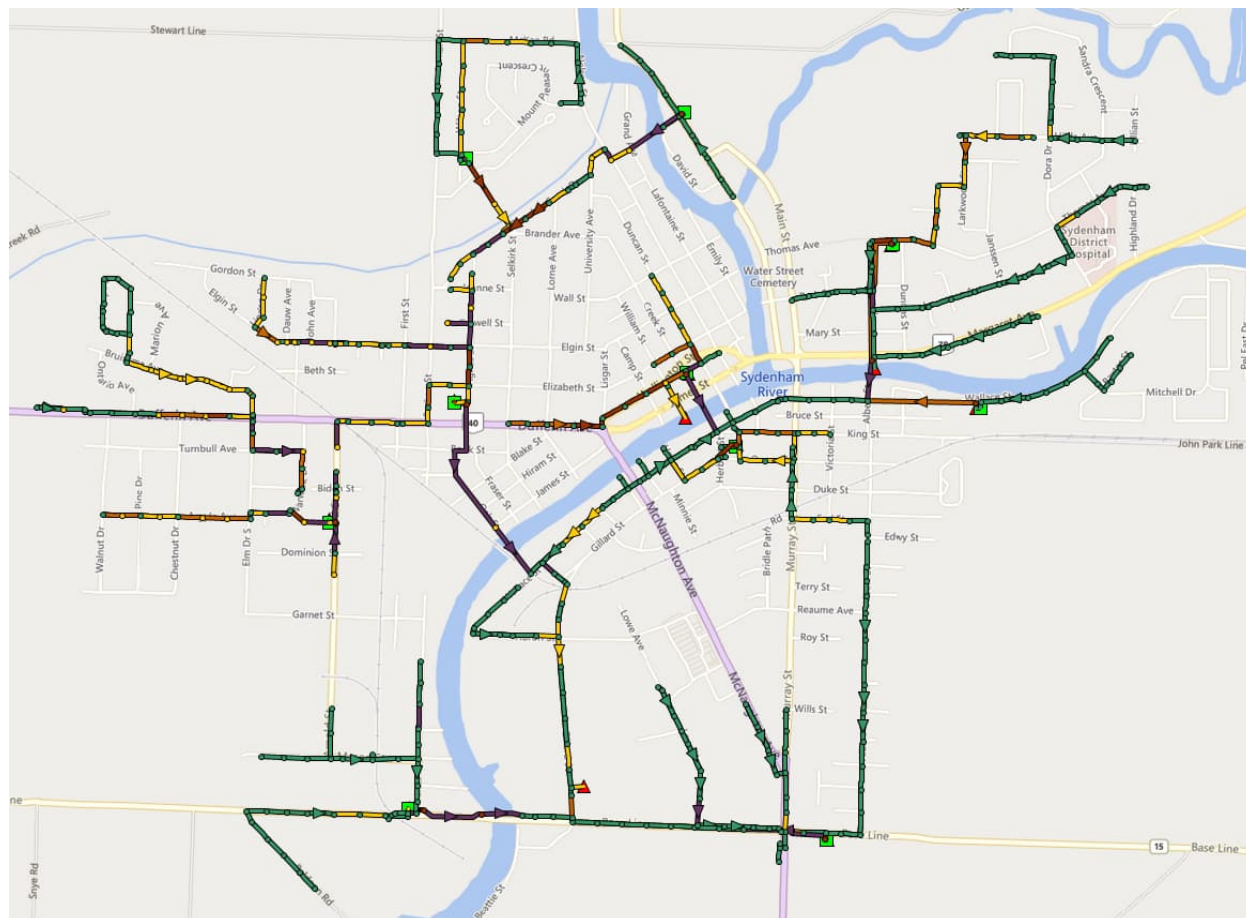
Figure 6-14: Wallaceburg Existing Storm Sewer Performance: 2-Year Storm



Legend

DEPTH OF HGL BELOW GROUND	STORM SEWER PEAK FLOW RELATIVE TO CAPACITY
● Above Surface	— Q Peak/Q Full < 50%
● 0 – 1.8m	— Q Peak/Q Full 50% - 80%
● > 1.8m	— Q Peak/Q Full 80% - 100%
	— Q Peak/Q Full 100% - 120%
	— Q Peak/Q Full > 120%

Figure 6-15: Wallaceburg Existing Storm Sewer Performance: 10-Year Storm



Legend

DEPTH OF HGL BELOW GROUND

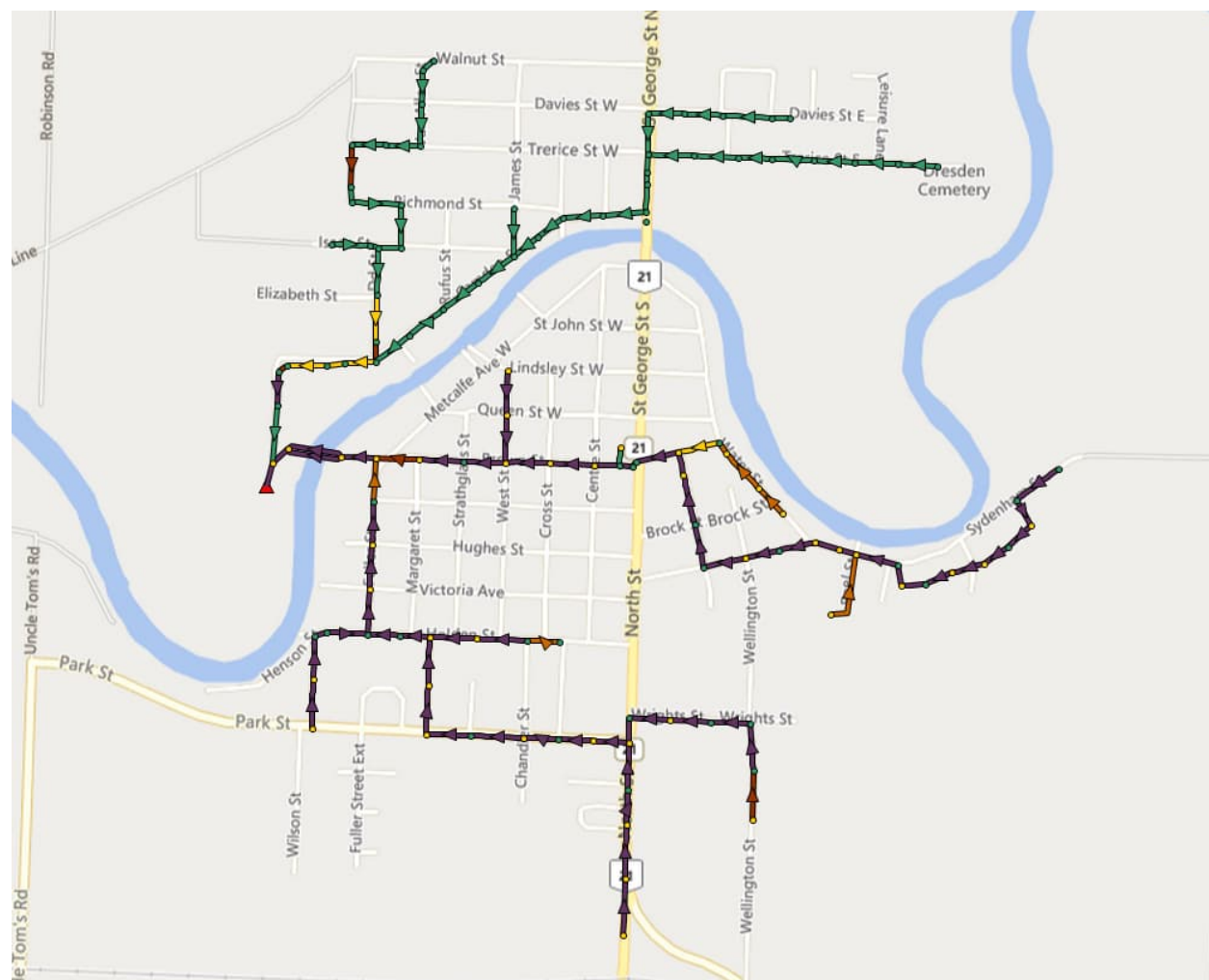
- Above Surface
- 0 – 1.8m
- > 1.8m

STORM SEWER PEAK FLOW RELATIVE TO CAPACITY

- Q Peak/Q Full < 50%
- Q Peak/Q Full 50% - 80%
- Q Peak/Q Full 80% - 100%
- Q Peak/Q Full 100% - 120%
- Q Peak/Q Full > 120%

6.2.3.3 Dresden Wastewater Service Area

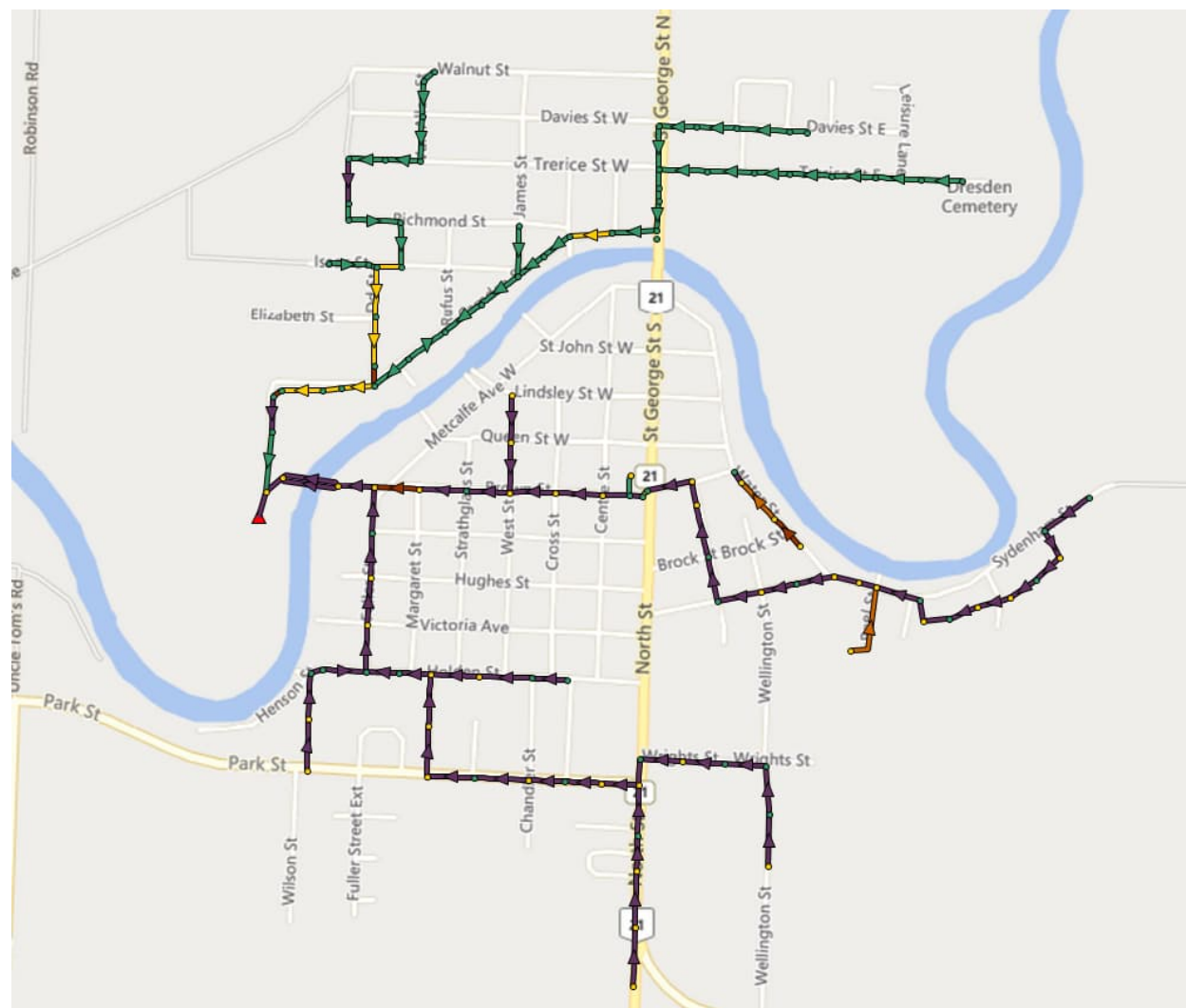
Figure 6-16: Dresden Existing Storm Sewer Performance: 2-Year Storm



Legend

DEPTH OF HGL BELOW GROUND	STORM SEWER PEAK FLOW RELATIVE TO CAPACITY
● Above Surface	— Q Peak/Q Full < 50%
● 0 – 1.8m	— Q Peak/Q Full 50% - 80%
● > 1.8m	— Q Peak/Q Full 80% - 100%
	— Q Peak/Q Full 100% - 120%
	— Q Peak/Q Full > 120%

Figure 6-17: Dresden Existing Storm Sewer Performance: 10-Year Storm



Legend

DEPTH OF HGL BELOW GROUND

- Above Surface
- 0 – 1.8m
- > 1.8m

STORM SEWER PEAK FLOW RELATIVE TO CAPACITY

- Q Peak/Q Full < 50%
- Q Peak/Q Full 50% - 80%
- Q Peak/Q Full 80% - 100%
- Q Peak/Q Full 100% - 120%
- Q Peak/Q Full > 120%

6.2.3.4 Thamesville Wastewater Service Area

Figure 6-18: Thamesville Existing Storm Sewer Performance: 2-Year Storm

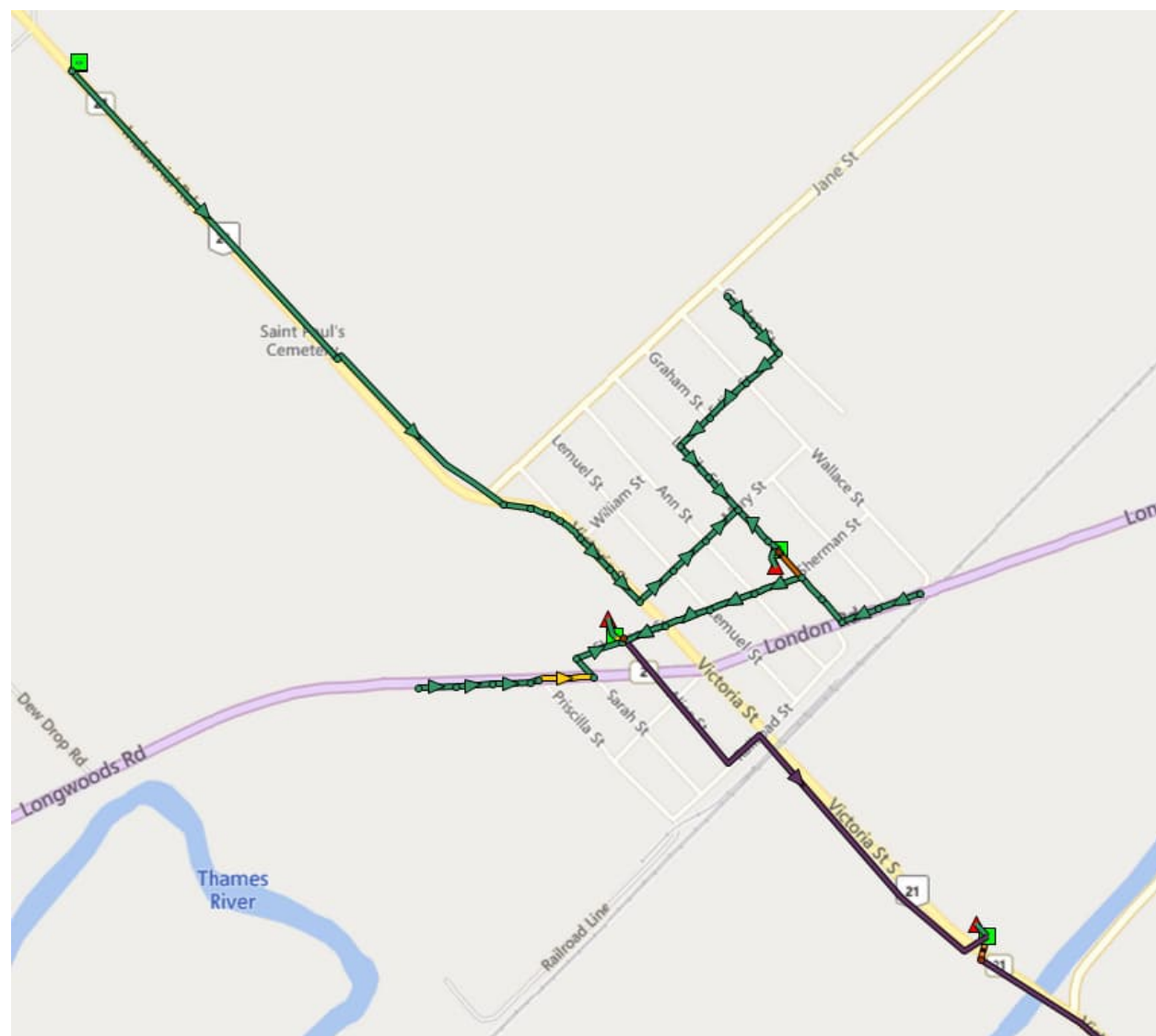
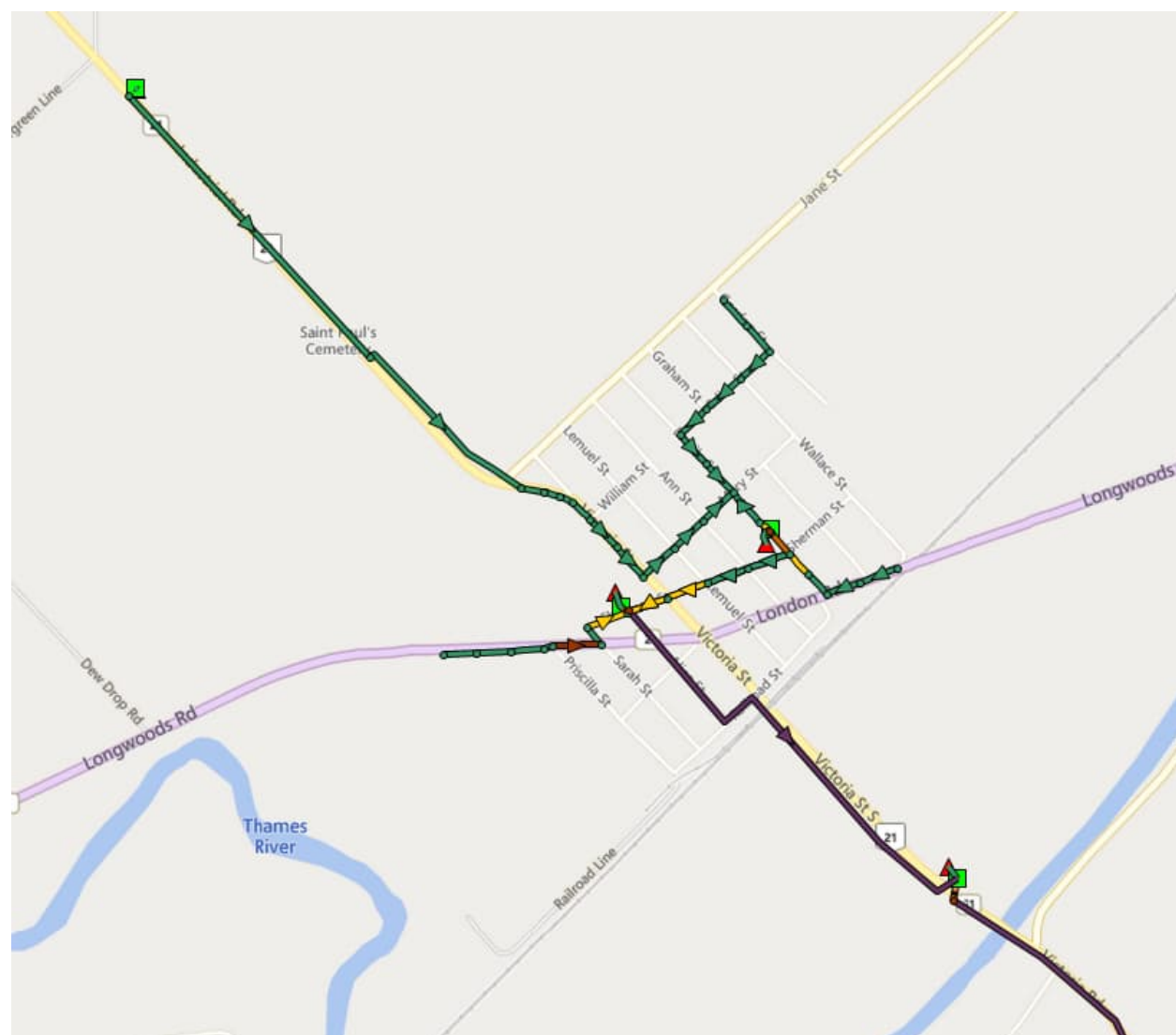


Figure 6-19: Thamesville Existing Storm Sewer Performance: 10-Year Storm



Legend

DEPTH OF HGL BELOW GROUND

- Above Surface
- 0 – 1.8m
- > 1.8m

STORM SEWER PEAK FLOW RELATIVE TO CAPACITY

- Q Peak/Q Full < 50%
- Q Peak/Q Full 50% - 80%
- Q Peak/Q Full 80% - 100%
- Q Peak/Q Full 100% - 120%
- Q Peak/Q Full > 120%

6.2.3.5 Ridgetown Wastewater Service Area

Figure 6-20: Ridgetown Existing Storm Sewer Performance: 2-Year Storm

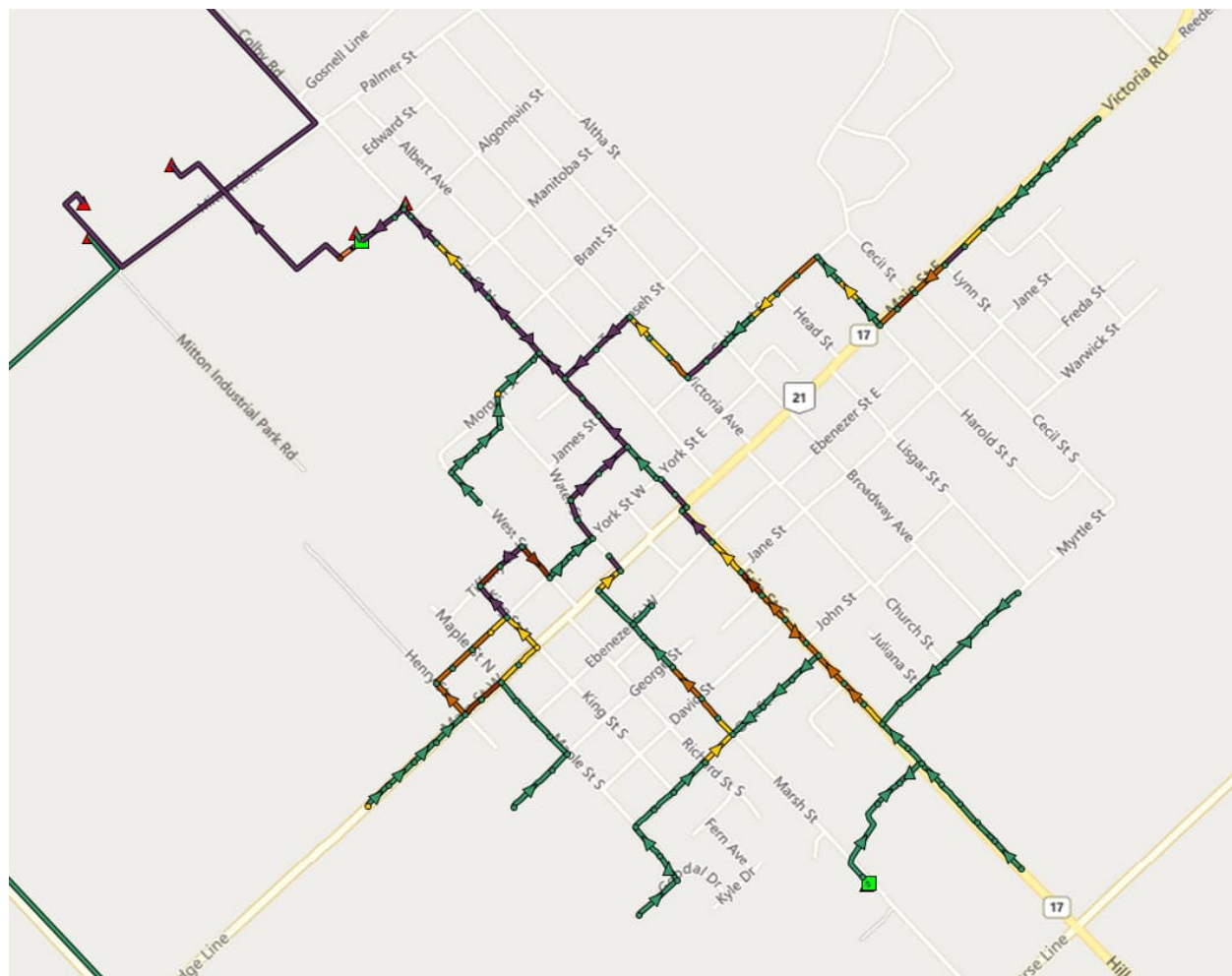
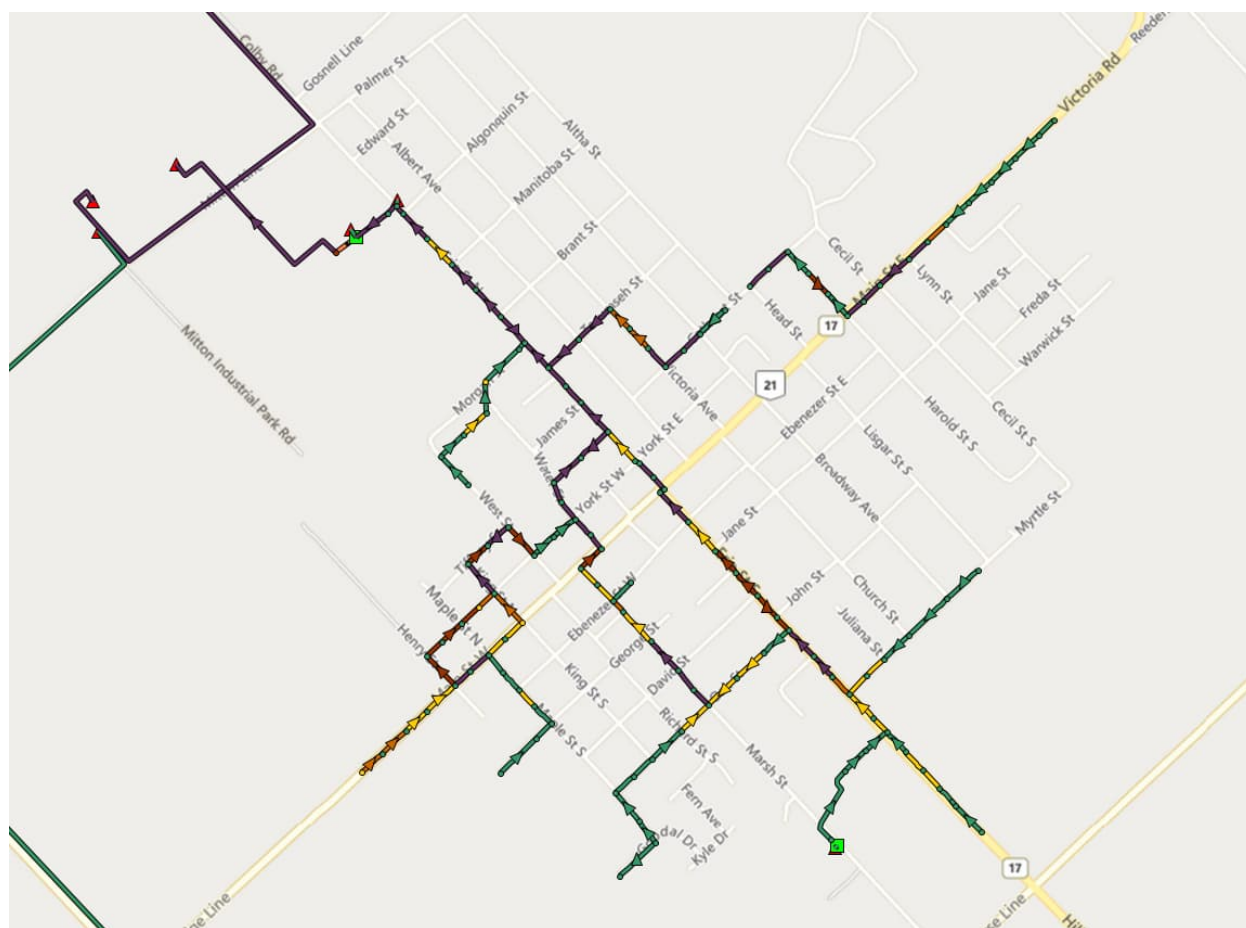


Figure 6-21: Ridgetown Existing Storm Sewer Performance: 10-Year Storm



Legend

DEPTH OF HGL BELOW GROUND

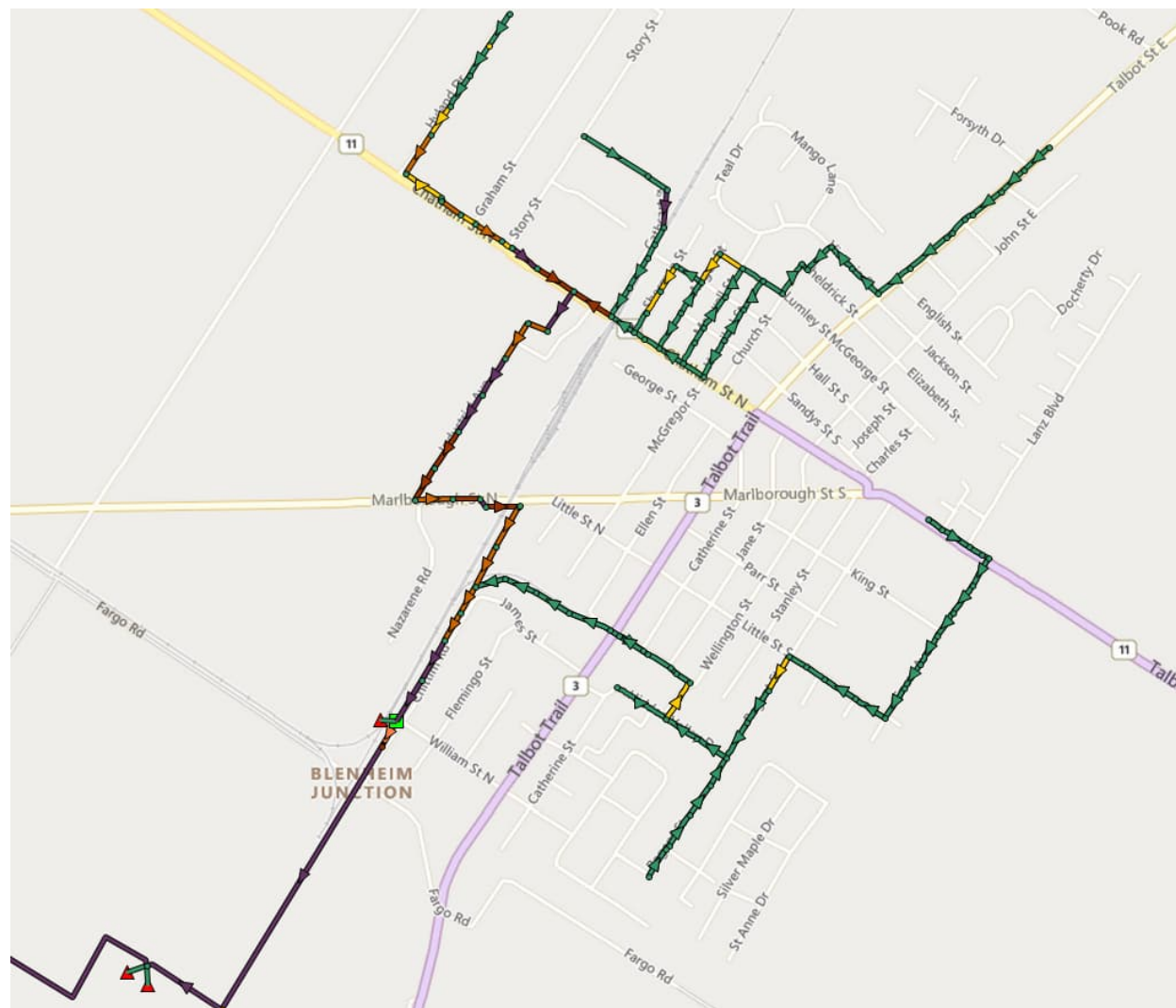
- Above Surface
- 0 – 1.8m
- > 1.8m

STORM SEWER PEAK FLOW RELATIVE TO CAPACITY

- Q Peak/Q Full < 50%
- Q Peak/Q Full 50% - 80%
- Q Peak/Q Full 80% - 100%
- Q Peak/Q Full 100% - 120%
- Q Peak/Q Full > 120%

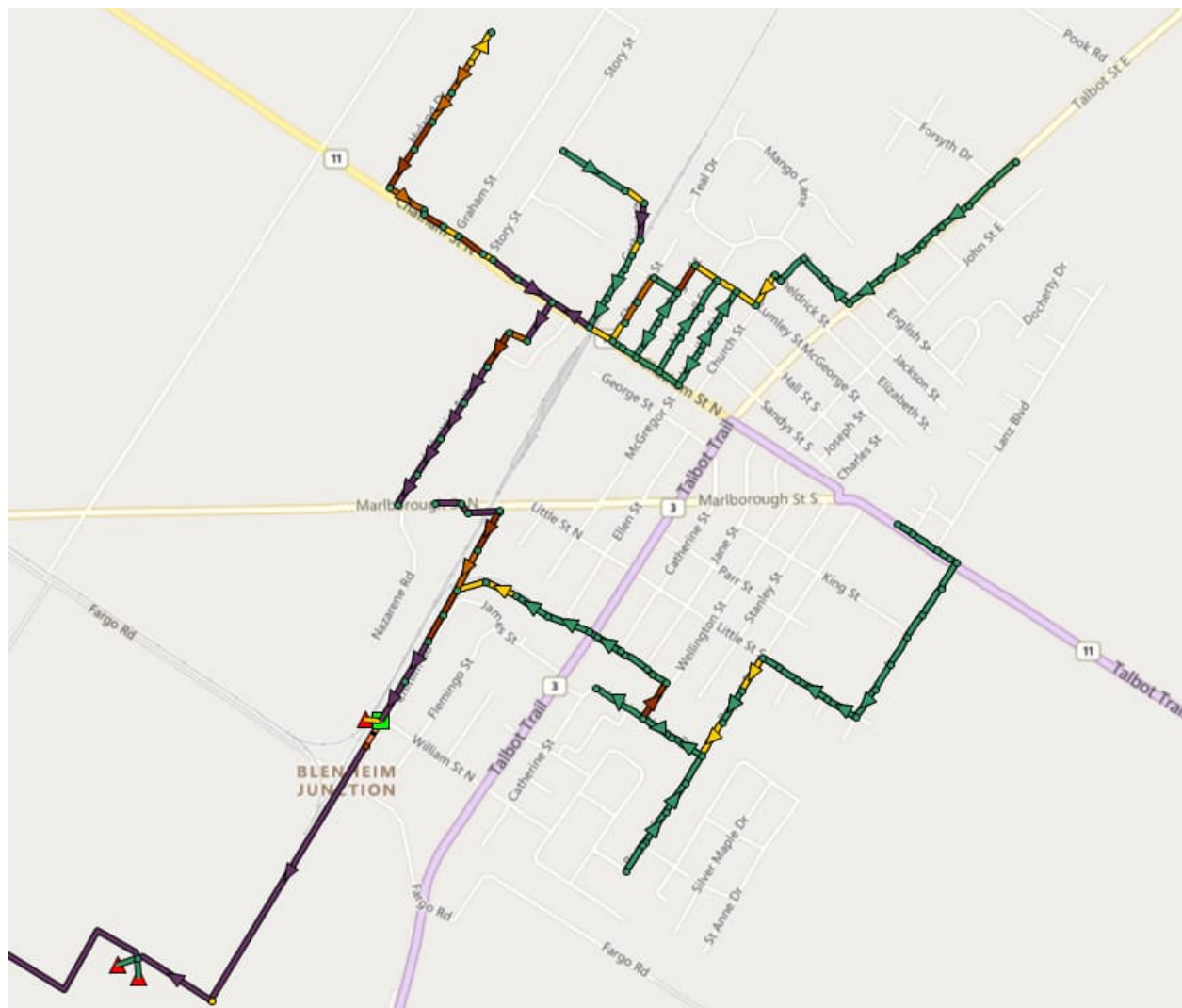
6.2.3.6 Blenheim Wastewater Service Area

Figure 6-22: Blenheim Existing Storm Sewer Performance: 2-Year Storm



DEPTH OF HGL BELOW GROUND	STORM SEWER PEAK FLOW RELATIVE TO CAPACITY
● Above Surface	— Q Peak/Q Full < 50%
● 0 – 1.8m	— Q Peak/Q Full 50% - 80%
● > 1.8m	— Q Peak/Q Full 80% - 100%
	— Q Peak/Q Full 100% - 120%
	— Q Peak/Q Full > 120%

Figure 6-23: Blenheim Existing Storm Sewer Performance: 10-Year Storm



Legend

DEPTH OF HGL BELOW GROUND

- Above Surface
- 0 – 1.8m
- > 1.8m

STORM SEWER PEAK FLOW RELATIVE TO CAPACITY

- Q Peak/Q Full < 50%
- Q Peak/Q Full 50% - 80%
- Q Peak/Q Full 80% - 100%
- Q Peak/Q Full 100% - 120%
- Q Peak/Q Full > 120%

6.2.3.7 Merlin Wastewater Service Area

Figure 6-24: Merlin Existing Storm Sewer Performance: 2-Year Storm

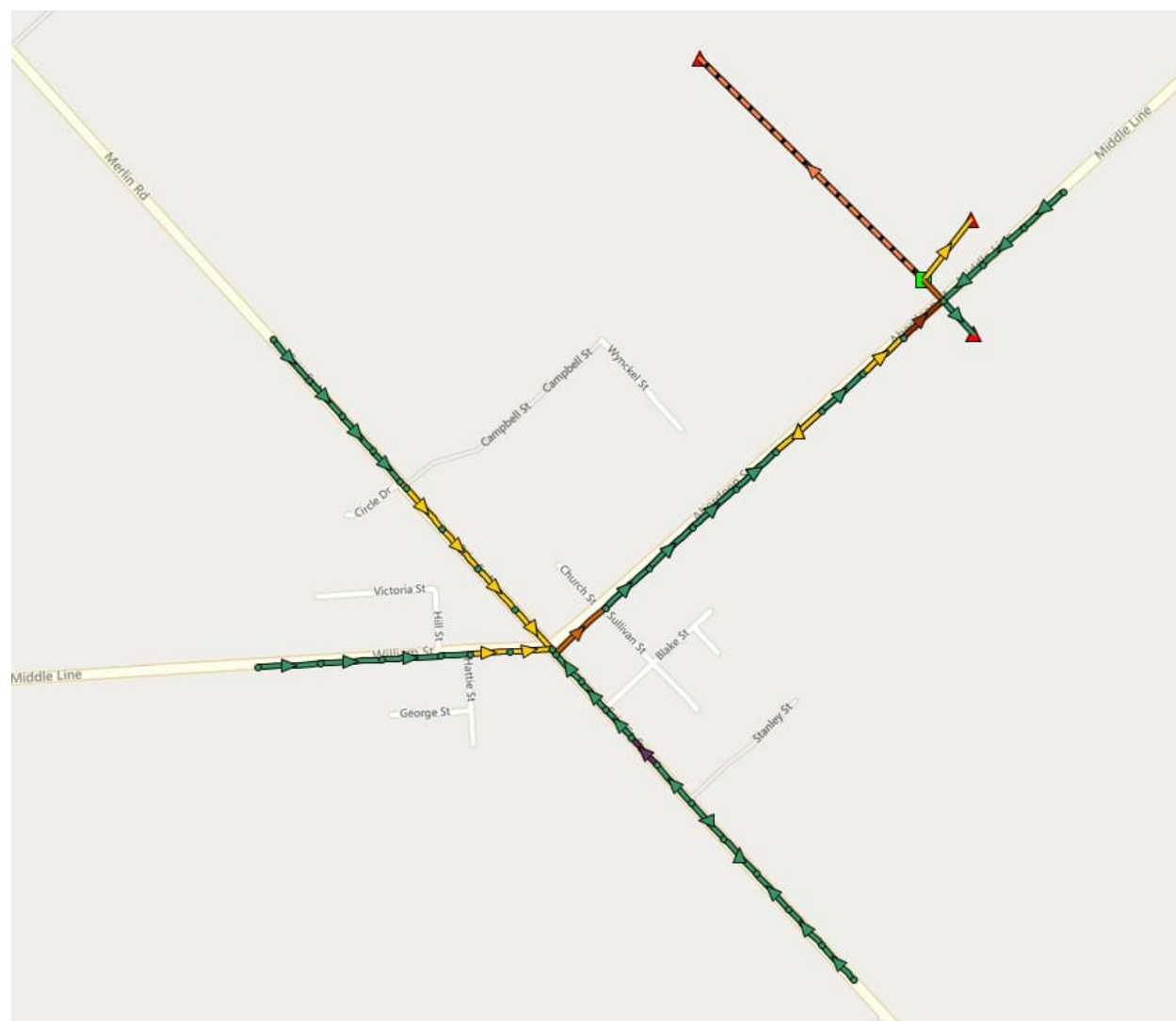
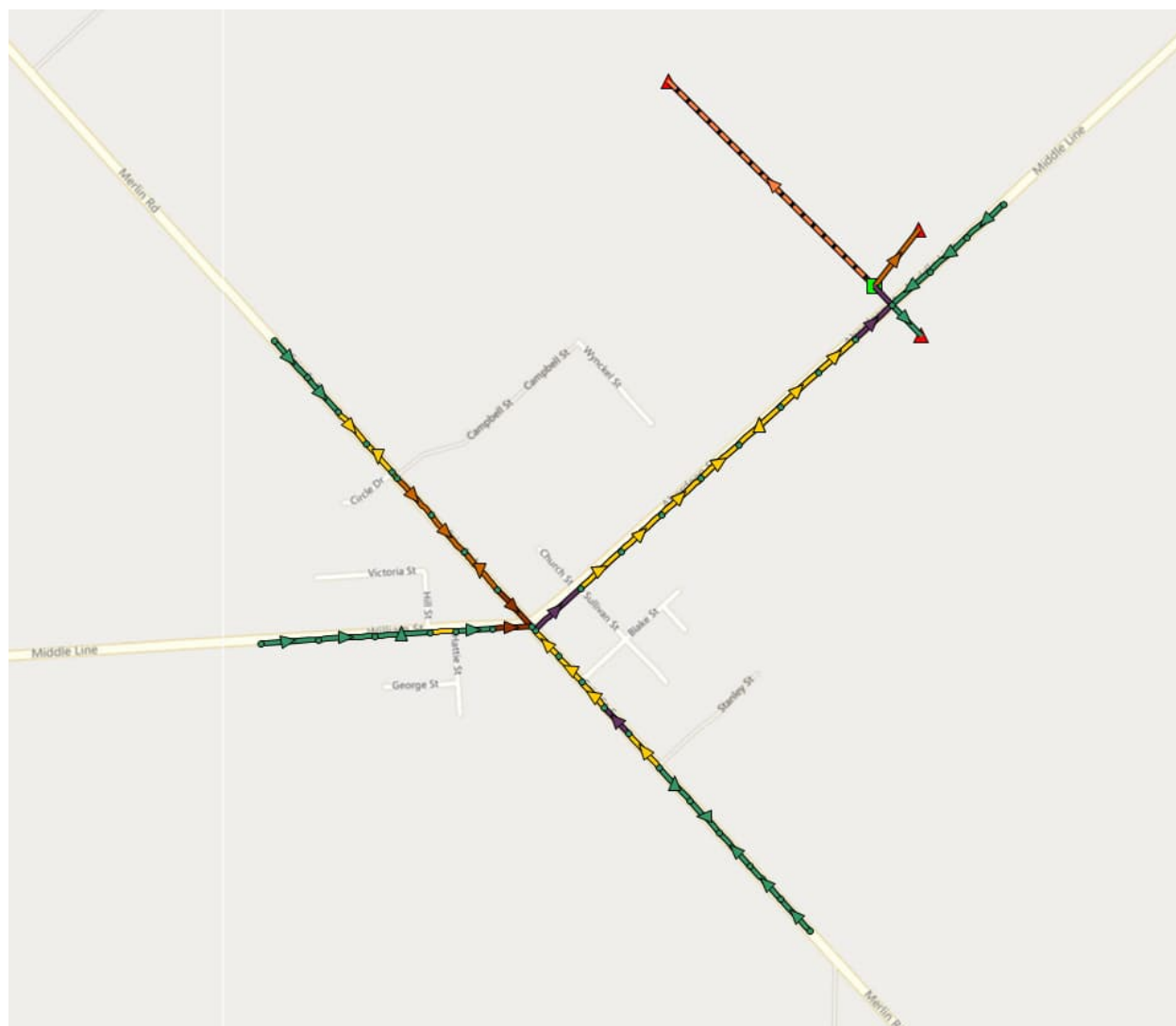


Figure 6-25: Merlin Existing Storm Sewer Performance: 10-Year Storm



Legend

DEPTH OF HGL BELOW GROUND

- Above Surface
- 0 – 1.8m
- > 1.8m

STORM SEWER PEAK FLOW RELATIVE TO CAPACITY

- Q Peak/Q Full < 50%
- Q Peak/Q Full 50% - 80%
- Q Peak/Q Full 80% - 100%
- Q Peak/Q Full 100% - 120%
- Q Peak/Q Full > 120%

6.2.3.8 Wheatley Wastewater Service Area

Figure 6-26: Wheatley Existing Storm Sewer Performance: 2-Year Storm

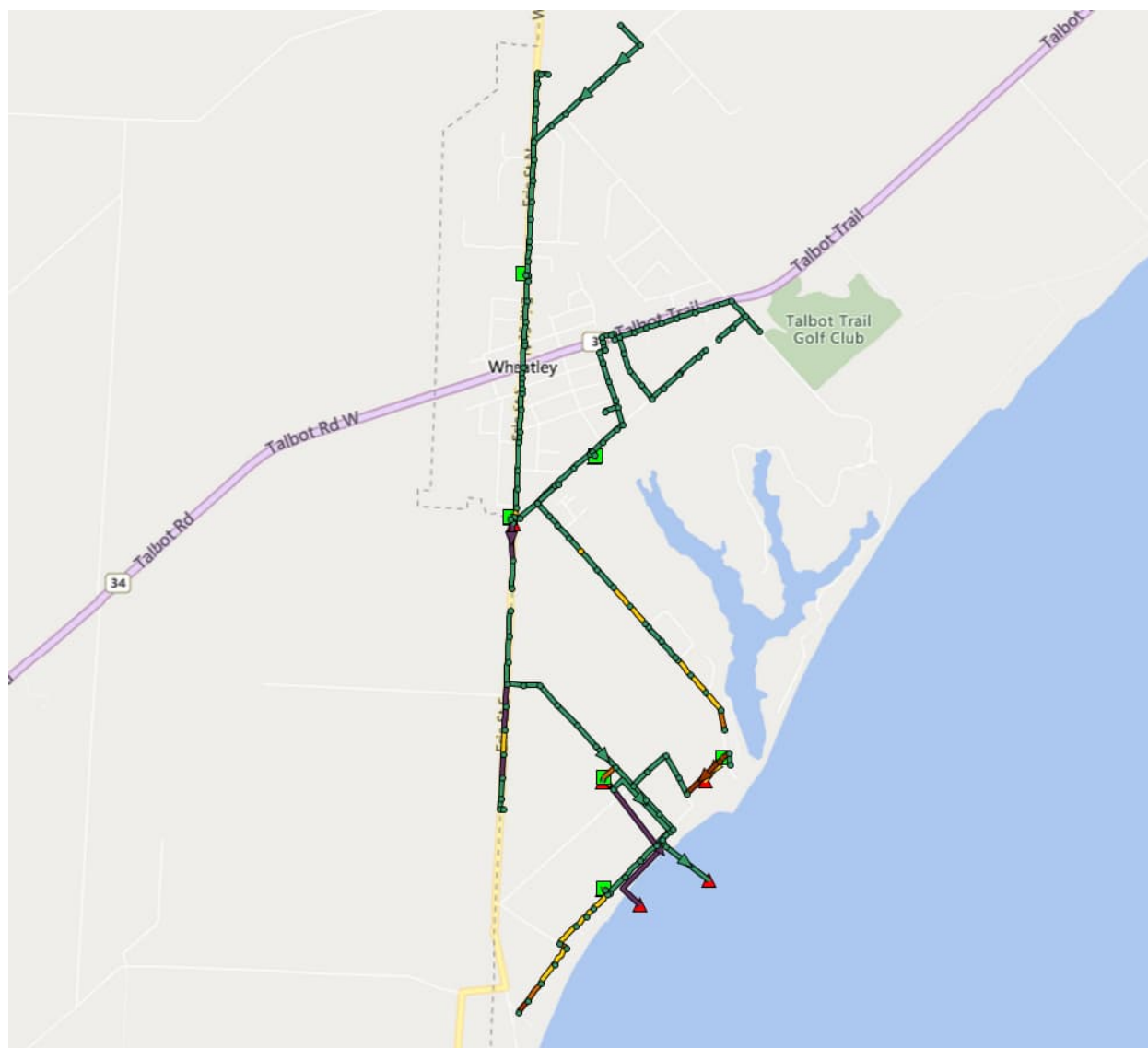
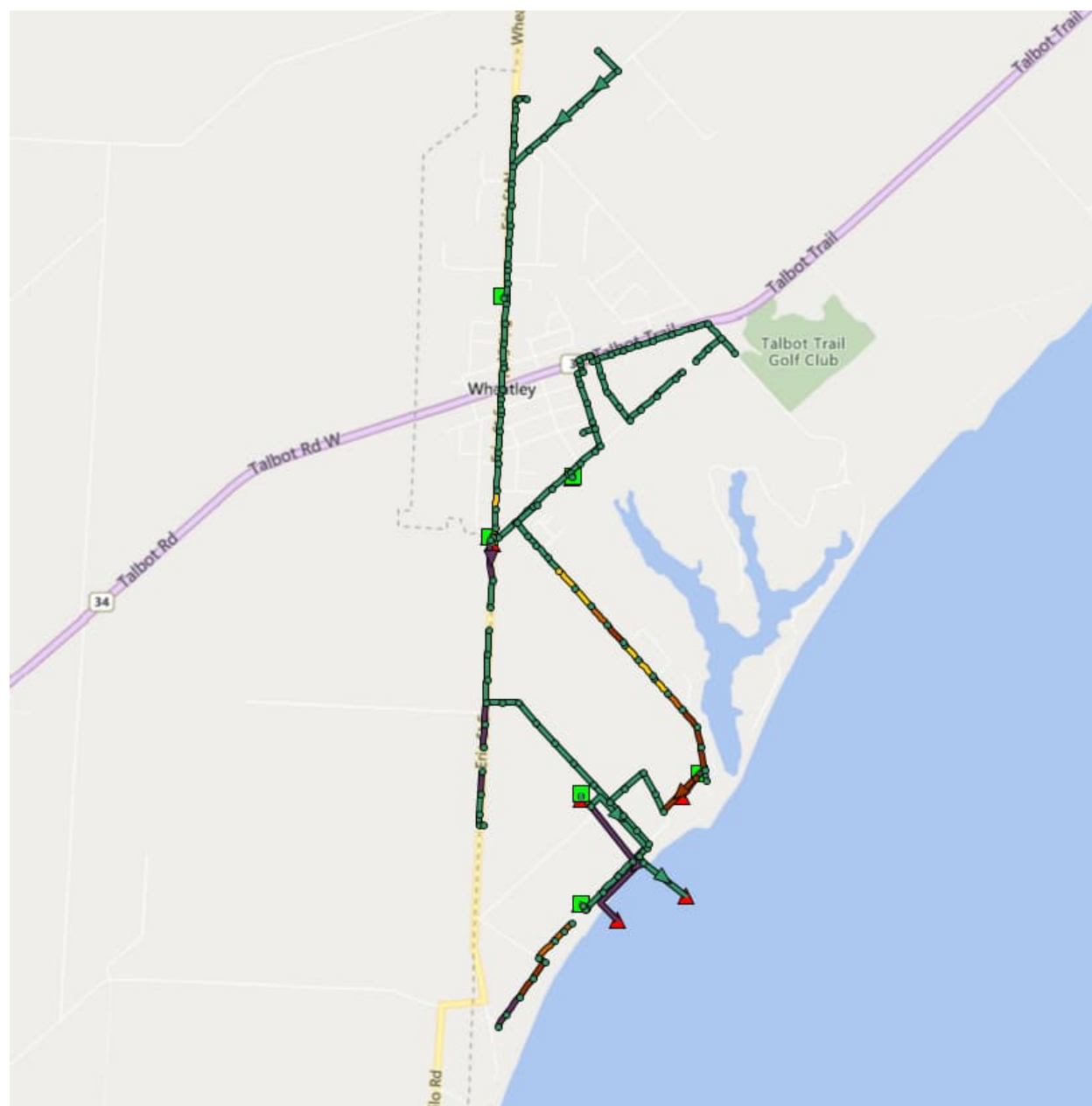


Figure 6-27: Wheatley Existing Storm Sewer Performance: 10-Year Storm



Legend

DEPTH OF HGL BELOW GROUND

- Above Surface
- 0 – 1.8m
- > 1.8m

STORM SEWER PEAK FLOW RELATIVE TO CAPACITY

- Q Peak/Q Full < 50%
- Q Peak/Q Full 50% - 80%
- Q Peak/Q Full 80% - 100%
- Q Peak/Q Full 100% - 120%
- Q Peak/Q Full > 120%

6.2.3.9 Tilbury Wastewater Service Area

Figure 6-28: Tilbury Existing Storm Sewer Performance: 2-Year Storm

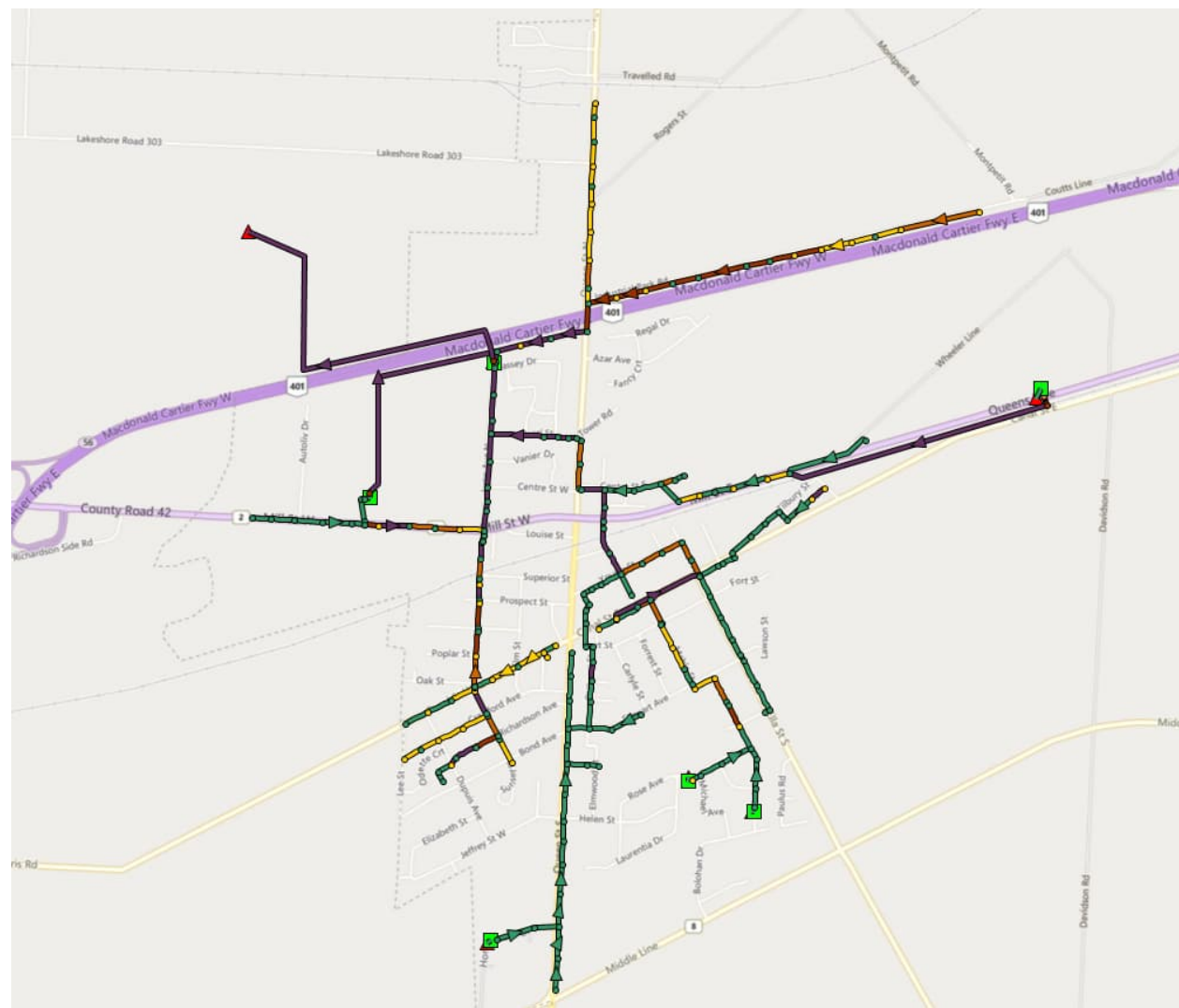
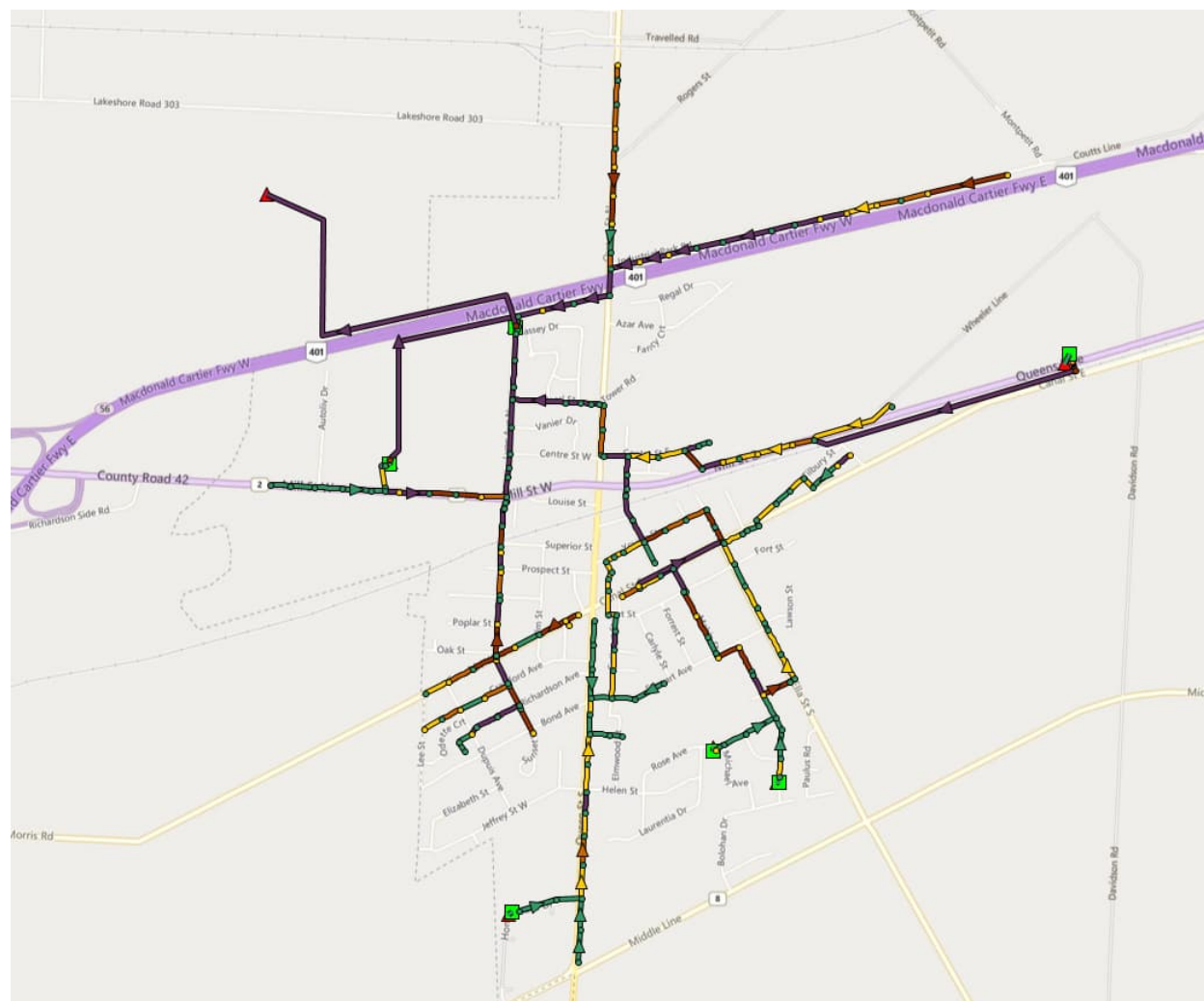


Figure 6-29: Tilbury Existing Storm Sewer Performance: 10-Year Storm



Legend

DEPTH OF HGL BELOW GROUND

- Above Surface
- 0 – 1.8m
- > 1.8m

STORM SEWER PEAK FLOW RELATIVE TO CAPACITY

- Q Peak/Q Full < 50%
- Q Peak/Q Full 50% - 80%
- Q Peak/Q Full 80% - 100%
- Q Peak/Q Full 100% - 120%
- Q Peak/Q Full > 120%

6.2.3.10 Mitchell's Bay Wastewater Service Area

Figure 6-30: Mitchell's Bay Existing Storm Sewer Performance: 2-Year Storm

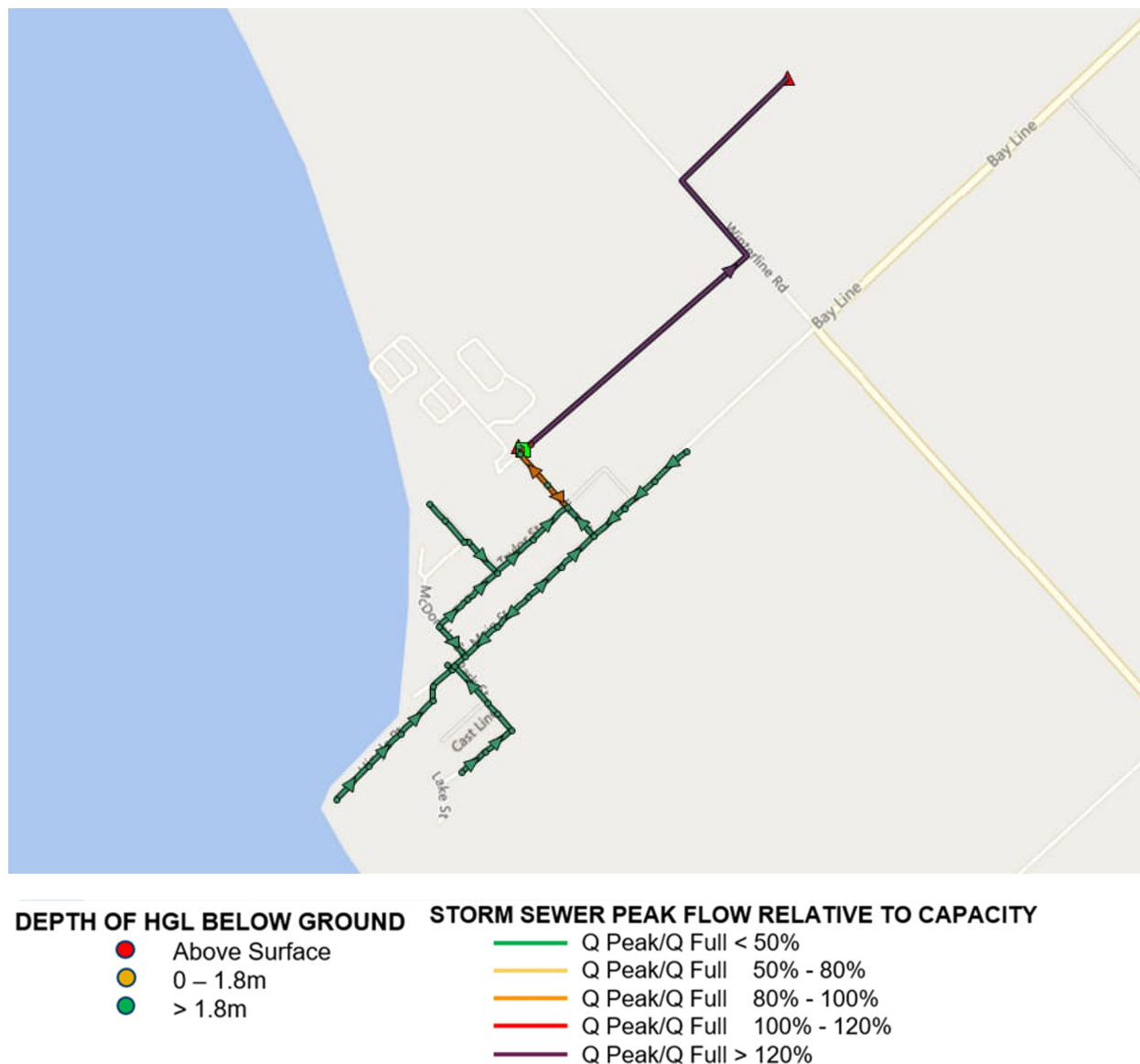
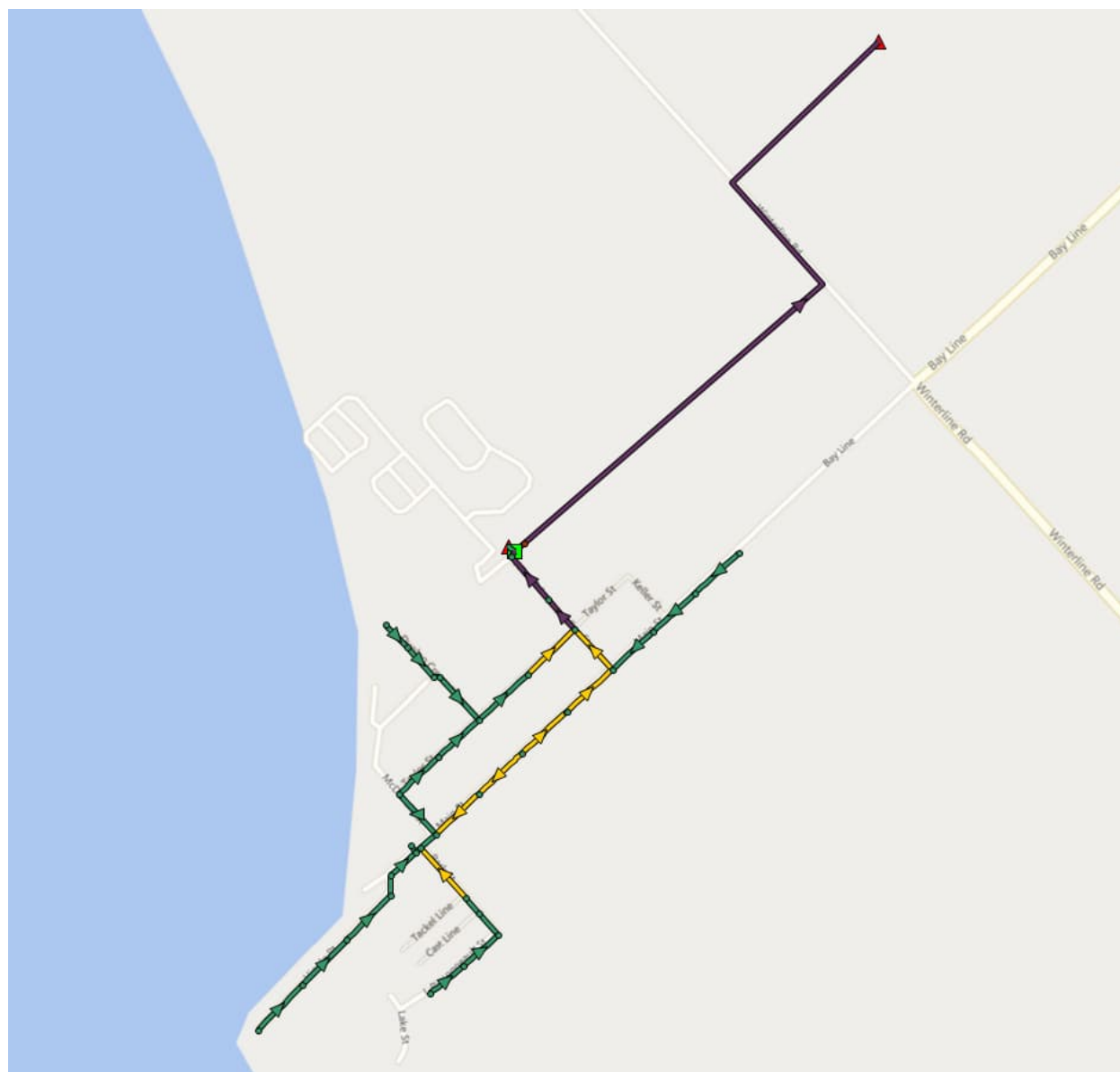


Figure 6-31: Mitchell's Bay Existing Storm Sewer Performance: 10-Year Storm



Legend

DEPTH OF HGL BELOW GROUND

- Above Surface
- 0 – 1.8m
- > 1.8m

STORM SEWER PEAK FLOW RELATIVE TO CAPACITY

- Q Peak/Q Full < 50%
- Q Peak/Q Full 50% - 80%
- Q Peak/Q Full 80% - 100%
- Q Peak/Q Full 100% - 120%
- Q Peak/Q Full > 120%

6.2.3.11 Recommended Sewer Upsizing to Address Capacity

From the above, the following future sewer upsizing projects are identified in **Table 6-2**.

Table 6-2: Recommended Sewer Upsizing to Address Capacity

Town	Location	Required Pipe Size	Length	Cost Estimate
Ridgetown	Erie Street / Tecumseh Street	600 mm	395 m	\$1,600,000
Ridgetown	West Street	300 mm	148 m	\$450,000
Blenheim	Marlborough Street / Industrial Avenue	525 mm	1020 m	\$4,000,000
Wallaceburg	Elgin Street	450 mm	465 m	\$1,400,000
Dresden	Brown Street / Main Street / Tecumseh Street	600 mm	1050 m	\$4,000,000
Dresden	Lorne Avenue / Holden Street / Fuller Street	600 mm	770 m	\$3,000,000
Tilbury	Pearl Street / Queen Street N / Centre Street E / Dufferin Street N	750 mm	770 m	\$3,600,000
Tilbury	Lyon Avenue	900 mm	750 m	\$4,000,000

6.2.4 Assessment of Water Pollution Control Plant Treatment Needs

6.2.4.1 Blenheim Sewage Treatment Plant

The Water Pollution Control Plant releases effluent during the period of March to December, especially before the freezing season. Based on a site visit, no major issues or concerns were identified. The plant operator noted that as the freezing season approaches by the end of February, several of the lagoons are quite full and remaining capacity is getting “tighter”. As the plant is currently utilizing about 50% of its rated capacity, lagoon storage in the freezing months may become more of an issue as the plant approaches its rated capacity. It is recommended that the final effluent concentrations during these freezing months are evaluated to determine the possibility of an increased discharge period to accommodate an increase in plant flows.

Operations staff noted that there is an occasional occurrence of algal blooms, causing overloading of the intermittent sand filters and thus limiting process capacity. However, these algal blooms have decreased in frequency recently.

As mentioned in the previous section, the Chatham-Kent Public Utilities Commission maintains a robust maintenance program to ensure the operating and monitoring

systems are reliable. In addition to the established maintenance program, it is recommended that the Chatham-Kent Public Utilities Commission look to address due to the age of the Facility a State of Good Repair (SOGR) program.

The future requirements or issues to be addressed within their respective timelines, are listed below.

Near term (within 5 years):

- Noted that there are some erosion issues with cells 1B, 2 and 3 and these cells are the only cells without concrete to address erosion. This should be a priority to address in the near term as flows to the plant increase.
- Evaluate final effluent concentrations during the freezing months to determine the possibility of an increased discharge period as the flow increases to the Water Pollution Control Plant.
- Replacement and/or maintenance of the mechanical belt filter screen. As there is no redundancy of screening, it is recommended that this work be performed during the freezing season to limit operational down time.

Interim term (within 10 years):

- The historical storage volume had a significant increase in all cells from 2019 to 2020; however, no change to volume in Cell D. Sludge volume is measured every 5 years and sludge depths are taken every year for estimating purposes. Dredging of the lagoons has occurred once since 2005 and is likely to be required again within the next 10 years based on measured volume and performance.
- Noted that Blower #3 was rebuilt in 2022. It is likely that all 3 blowers will need to be rebuilt, and eventually replaced.
- Blenheim sewage pumping station centrifugal pumps and Charing Cross sewage pumping station submersible pumps need to be assessed and upgraded, as needed.
- Replacement and/or maintenance of the four effluent pumps from the intermittent sand filtration system based on life cycle and performance.
- Provision of a new UV disinfection system with a cover for weather protection, as well as standby power for this equipment, as the plant does not currently include effluent disinfection (Water and Wastewater Master Plan Addendum Report - April 2018). The improvement addresses system performance and future requirements for more stringent effluent quality.

Long term (within 20 years):

- Effluent flow monitoring, as informed is not the most accurate with peak flows. As the peak flows will increase with growth, consider replacing the channel effluent flow monitoring with a more accurate flow monitoring option.
- The Water and Wastewater Master Plan Addendum Report, published April 2018, noted that “upgrading the existing process to implement a new mechanical plant is a preferred long-term strategy and solution to treatment.” This would be part of a long-term servicing strategy to provide a more efficient, centrally located regional facility to service un-serviced areas previously identified and any additional needs.

The Water Pollution Control Plant in order to continue to maintain or exceed the current operational performances need to have the following works during the projected 30-year window and beyond:

- Operational improvements as part of State of Good Repair and Investigative studies.
- Operational improvements as part of State of Good Repair and for better effluent quality.
- State of Good Repair due to age of the infrastructure including major process equipment.

6.2.4.2 Chatham Water Pollution Control Plant

The system design meets the current treatment targets and has been providing good performance. The Chatham-Kent Public Utilities Commission maintains a robust maintenance program to ensure the operating and monitoring systems are reliable. In addition to the established maintenance program, it is recommended that Chatham-Kent Public Utilities Commission look to address due to the age of the Facility with a State of Good Repair (SOGR) program.

The future requirements or issues to be addressed within their respective timelines, are listed below.

Some observations include:

- Plant experiences flow discrepancy between inflow and outflow, leading to the possibility of leakages at the facility as well as issues with outfall effluent flow monitoring accuracy issues.
- Operation staff noted that with the change in operations for drawing down of the contents from lagoons, no overflows from lagoons or plant bypasses occurred in the reporting period.

Near term (within 5 years):

- Replacement of exist. disinfection system with a UV based system equipped with weather enclosure and standby power to replace the existing chlorination/dechlorination disinfection system. including modifications to the existing effluent channel
- Chatham Water Pollution Control Plant Upgrades as required, including new digester & sludge dewatering.

Interim term (within 10 years):

- State of Good repair involving replacement of blowers, replacement of sludge pumps and associated works, replacement of Mechanical bar screens and grit tanks, modifications to the exist. piping at intake valve chamber, and all additional works related to these,

Long term (within 20 years):

- Chatham Water Pollution Control Plant -overall upgrades & replacements of all process equipment including ASME Repairs. Age of the plant may warrant replacement of one of them with an advanced and compact biological treatment systems such as Membrane Aerobic Biological Reactor.

The Water Pollution Control Plant in order to continue to maintain or exceed the current operational performances needs to have the following during the projected 30-year window and beyond;

- Operational improvements as part of State of Good Repair and Investigative studies.
- Operational improvements as part of State of Good Repair and for better effluent quality.
- State of Good Repair due to the age of the infrastructure including major process equipment.

6.2.4.3 Dresden Water Pollution Control Plant

The system design meets the current treatment targets and has been providing good performance. The Chatham-Kent Public Utilities Commission maintains a robust maintenance program to ensure the operating and monitoring systems are reliable. In addition to the established maintenance program, it is recommended that the Chatham-Kent Public Utilities Commission look to address due to the age of the Facility with a State of Good Repair (SOGR) program.

The future requirements or issues to be addressed within their respective timelines, are listed below.

- Water Pollution Control Plant requires extensive improvements to its aging infrastructure to meet future effluent quality requirements, and to provide adequate process capacity to its rated capacity of 4,546m³/day. The plant receives an influx of flow from the canning industry between mid-August and mid-October. This influx, especially from the tomato processing plant, has historically caused problems with colour and rise in concentration of Biological Oxygen Demand (BOD). Excess flow, typically during canning season, can result in operational challenges throughout the tomato harvest season (August to October).
- Another critical operation issue is excessive flow to the plant resulting from rainfall, resulting in washout of biological matter and impacting the treatment processes. This washout impacts treatment processes for weeks following a major rainfall event and needs to be mitigated.

Other minor issues are as follows:

- the blower for the aerated grit tank has not performed well since initial installation,
- the location of Parshall flume used for plant flow measurement results in inaccurate measurements when the manual bar screen is clogged (i.e., Hydraulic issue).
- minimal automation of the plant facility (specifically the manual bar screen in the deep wet well that needs to be raked 2 times/week).

Near term (within 5 years):

- Assess the industrial wastewater quality and investigate the potential for any pre-treatment options. The industrial wastewater needs to be characterized further with a needs assessment for further pre-treatment at the plant or on-site at the industry.
- Investigate further regarding rainfall events causing washout of the biological matter and determine a plan to mitigate.
- Implementation of Works to prevent washout.

Interim term (within 10 years):

- Provide a new SCADA system to provide operational control, (per Water and Wastewater Master Plan Addendum Report, - April 2018.) Much of the plant has minimal automation.
- Replace the existing headworks and install a new screening facility, (per the Water and Wastewater Master Plan Addendum Report, - April 2018. This will

deal with the above noted issues of aerated grit tank, plant flow measurement inaccuracies, and increase automation at the plant, coinciding with a new SCADA system.

- Provide a new UV in-channel disinfection system in a weather-proof enclosure to replace the existing dechlorination system, (per the Water and Wastewater Master Plan Addendum Report- April 2018.)
- Other related works for the above upgrades and additional works to bring the plant to modern state.

The Water Pollution Control Plant in order to continue to maintain or exceed the current operational performances needs to have the following during the projected 30-year window and beyond:

- Operational improvements as part of State of Good Repair and Investigative studies.
- Operational improvements as part of State of Good Repair and for better effluent quality.
- State of Good Repair due to age of the infrastructure including major process equipment.

6.2.4.4 Merlin Sewage Lagoon System

The system design meets the current treatment targets and has been providing good performance. The Chatham-Kent Public Utilities Commission maintains a robust maintenance program to ensure the operating and monitoring systems are reliable. In addition to the established maintenance program, it is recommended that the Chatham-Kent Public Utilities Commission look to address due to the age of the Facility with a State of Good Repair (SOGR) program.

The future requirements or issues to be addressed within their respective timelines, are listed below:

Near term (within 5 years):

- General repair works associated with earthen and concrete. structures.

Long term (within 20 years):

- Add a SAGR tertiary treatment into lagoons which will require associated Arch/Structural. /Mech. And Civil Works, associated Electrical Works, associated I&C Works, associated testing and commissioning, and general and civil works.

The Water Pollution Control Plant in order to continue to maintain or exceed the current operational performances needs to have the following during the projected 30-year window and beyond:

- Operational improvements as part of State of Good Repair and preventative maintenance.
- Implementation of a Mechanical treatment facility to improve effluent quality.

6.2.4.5 Mitchell's Bay Sewage Lagoon System

Mitchell's Bay is a popular recreational area and may experience additional growth beyond the current projection estimate of 400 residents by 2031. If additional growth occurs, then there may be a need for additional treatment capacity. The lagoon system in Mitchell's Bay is in a remote location and is difficult to efficiently operate and maintain.

For this reason, a previous study (Water and Wastewater Master Plan Addendum Report, published in April 2018), identified a future servicing option to convey all wastewater flows from the Mitchell's Bay service area to the Chatham Water Pollution Control Plant for centralized treatment. This future servicing option may include the following improvements:

- a new forcemain to convey all flows from the service area using the existing Mitchell's Bay sewage pumping station to Grande Pointe.
- an interim pumping station and forcemain at Grande Point to convey flows to the existing Pain Court SPS, which would then convey flows to the Chatham Water Pollution Control Plant.

The system design meets the current treatment targets and has been providing good performance. The Chatham-Kent Public Utilities Commission maintains a robust maintenance program to ensure the operating and monitoring systems are reliable. In addition to the established maintenance program, it is recommended that the Chatham-Kent Public Utilities Commission look to address needs of existing facility with a State of Good Repair (SOGR) program.

The future requirements or issues to be addressed within their respective timelines, are listed below.

Near term (within 5 years):

- General repair works associated with earthen and concrete structures.

Interim term (within 10 years):

- Dredging of the lagoons.

Long term (within 20 years):

- A conveyance system to send the flows to the Chatham Water Pollution Control Plant and decommissioning of Mitchell's Bay Lagoon system.

The Water Pollution Control Plant in order to continue to maintain or exceed the current operational performances need to have the following purposes during the projected 30-year window and beyond:

- Operational improvements as part of State of Good Repair and preventative maintenance.
- Decommissioning of Mitchell's Bay Lagoon, Pumping and forcemain to Chatham Water Pollution Control Plant (Project to be further developed through future Schedule B Class EA Study.)

6.2.4.6 Ridgetown Water Pollution Control Plant

During the site visit, no major issues or concerns were identified, and the plant is consistently operating in compliance with the effluent limits in the amended ECA. While the treatment plant usage is about 75% of the rated capacity during the reporting period, no bypass issues were reported. Large sized retention ponds allow good management of excess flows; however, inflow and infiltration curtailment in the Ridgetown and Thamesville collection systems would greatly assist.

The system design meets the current treatment targets and has been providing good performance. The Chatham-Kent Public Utilities Commission maintains a robust maintenance program to ensure the operating and monitoring systems are reliable. In addition to the established maintenance program, it is recommended that the Chatham-Kent Public Utilities Commission look to address needs of existing facility with a State of Good Repair (SOGR) program.

The future requirements or issues to be addressed within their respective timelines, are listed below.

Near term (within 5 years):

- Further investigation & mitigation of the inflow and infiltration observed from the Wildwood PS & Ridgetown and Thamesville collection systems during heavy rainfall events.
- Other miscellaneous works

Interim term (within 10 years):

- Dredging of the lagoons.

Long term (within 20 years):

- Ridgetown Water Pollution Control Plant Overall upgrades & replacements.

The Water Pollution Control Plant in order to continue to maintain or exceed the current operational performances needs to have the following during the projected 30-year window and beyond:

- Operational improvements as part of State of Good Repair and Investigative studies
- Operational improvements as part of State of Good Repair
- State of Good Repair due to age of the infrastructure including major process equipment.

6.2.4.7 Tilbury Water Pollution Control Plant

The system design meets the current treatment targets and has been providing good performance. Some observations include:

During the site visit, it was observed that sludge is breaking the surface on Cell/Lagoon 1. This system was commissioned in 2004 with 20 years storage capacity planned, and based on recent measurements, the operators reported that two thirds (2/3) of Cell/Lagoon 1 is filled. The operators and Chatham-Kent Public Utilities Commission have arranged for the dredging of Lagoon 1.

Also, the consultant was informed the following:

- with heavy rainfall, there is heavy infiltration from the Rose PS (SPS-205), even though it is not a combined sewer system. This requires further investigation and mitigation.
- a new fish processing plant, could be an additional industrial contributor to the plant flows in the near future.

As mentioned in the previous section, the Chatham-Kent Public Utilities Commission maintains a robust maintenance program to ensure the operating and monitoring systems are reliable. In addition to the established maintenance program, it is recommended that the Chatham-Kent Public Utilities Commission look to address the following issues within the timelines below.

Near term (within 5 years):

- Operators noted that Lagoon 1 is scheduled to be dredged as sludge is breaking the surface.
- Characterize the wastewater from the new fish processing plant . Existing and future industries may influence the quality of sewage received at the Water Pollution Control Plant for treatment.

- Further investigation and mitigation of the I/I observed from the Rose PS (SPS-205) during heavy rainfall events. Implementation of inflow and infiltration reduction program.

Interim term (within 10 years):

- Dredging of all lagoons, based on performance and annual monitoring of sludge levels.
- Replacement of both blowers.
- Replacement and/or maintenance of the Lyon Avenue sewage pumping station's submersible pumps.
- Replacement and/or maintenance of the mechanical bar screen based on life cycle and performance.
- Replacement and/or maintenance of the headworks air-lift pump and grit classifier, as well as the chemical air scrubber unit.
- Replacement and/or maintenance of the oxidation ditch rotating disk aerators.
- Replacement and/or maintenance of the secondary clarifier sludge scrapers, scum skimmers, headers, and activated sludge pumps.

Long term (within 20 years):

- Additional / redundant new UV system.
- Provision of Phosphorus removal facility – pump.
- Provision of a new Standby Power System.
- Replacement of Waste Sludge Storage Equipment - Fine Bubble Aeration System.
- Replacement of Disk Media Cloth Filter and Accessories.
- Other Needed Upgrades as part of SOGR.

The Water Pollution Control Plant in order to continue to maintain or exceed the current operational performances needs to have the following during the projected 30-year window and beyond:

- Operational improvements as part of State of Good Repair and Investigative studies.
- Operational improvements as part of State of Good Repair and preventative maintenance.
- State of Good Repair due to age of the infrastructure including major process equipment.

6.2.4.8 Wallaceburg Water Pollution Control Plant

Based on the site visit, no major issues or concerns were identified. As mentioned in the previous section, the Chatham-Kent Public Utilities Commission maintains a robust maintenance program to ensure the operating and monitoring systems are reliable.

In addition to the established maintenance program, it is recommended that the Chatham-Kent Public Utilities Commission look to address the following issues within the timelines below.

Near term (within 5 years):

- Operator noted that most days around 5 pm the dissolved oxygen (DO) level drops off significantly. This is likely due to peak loading conditions, and the operators can manually throttle the blowers to ensure the DO does not drop below 1 mg/L. It is recommended that additional setpoints and automation be added so that the blowers can automatically be throttled up if the DO drops below 1 mg/L.
- Based on the 2020 incident of high-water elevation in the Sydenham River, and the associated hydraulic and capacity repercussions at the plant, it is recommended that a hydraulic profile of the outfall be completed based on the 20-year storm water level projections. That these hydraulic findings be incorporated in the I/I study of the collection system, specifically those in close proximity to the river.
- I/O connections to PLC/SCADA

Interim term (within 10 years):

- The operator noted that there haven't been any full plant bypasses, and that once every 3 to 5 years there is a secondary treatment bypass due to flow and weather conditions. It is recommended that further investigation be completed to identify the limiting process causing the secondary bypass.
- It is also recommended to address the inflow and infiltration to the pumping stations to improve the capacity at the pumping stations and the wastewater treatment plant.
- Wallaceburg raw sewage pumps will likely need to be rebuilt, and eventually replaced. These pumps are to be assessed and upgraded, as needed.
- Replacement and/or maintenance of the mechanical screen channel

Long term (within 20 years):

- Replacement and/or maintenance of the blowers and fine bubble aeration system, based on life cycle and performance.

- Wallaceburg Water Pollution Control Plant - overall upgrades & replacements

The Water Pollution Control Plant in order to continue to maintain or exceed the current operational performances need to have the following purposes during the projected 30-year window and beyond:

- Operational improvements through Instrumentation & Control.
- Operational improvements as part of State of Good Repair and investigative studies.
- State of Good Repair due to age of the infrastructure including major process equipment.

6.2.4.9 Wheatley Water Pollution Control Plant

The system design meets the current treatment targets and has been providing good performance. Some observations include:

- Managing industrial wastewater from nearby industries is a concern, although their inflow hasn't impacted the effluent limits. For example, tomato processing wastewater turns the inflow at plant to red color, fish processing plant wastewater causes grease related issues all year round.
- Aeration management with coarse bubble diffusers is an issue, caused by grease from fish processing.
- Chlorine gas-based disinfection is employed for effluent management.

Based on the site visit, no major issues or concerns were identified. As mentioned in the previous section, the Chatham-Kent Public Utilities Commission maintains a robust maintenance program to ensure the operating and monitoring systems are reliable. In addition to the established maintenance program, it is recommended that the Chatham-Kent Public Utilities Commission look to address the following issues within the timelines below.

Near term (within 5 years):

- Characterize the wastewater from the new fish processing plant industry. Existing and future industries may influence the quality of sewage received at the Water Pollution Control Plant for treatment.
- Check both coarse bubble and fine bubble aeration systems for performance and undertake preventative maintenance to optimise the aeration needs.
- Operator noted that most days around 5 pm the dissolved oxygen (DO) level drops off significantly. This is likely due to peak loading conditions, and the operators can manually throttle the blowers to ensure the DO does not drop below 1 mg/L. It is recommended that additional setpoints and automation be

added so that the blowers can automatically be throttled up if the DO drops below 1 mg/L.

- Based on the 2020 incident of high-water elevation in the Sydenham River, and the associated hydraulic and capacity repercussions at the plant, it is recommended that a hydraulic profile of the outfall be completed based on the 50-year storm water level projections?? And that the hydraulic findings be incorporated in the I/I study of the collection system, specifically those in close proximity to the river.

Interim term (within 10 years):

- Replacement of existing Chlorine based disinfection system with a UV light-based disinfection with accessories as needed.

Long term (within 20 years):

- Replacement of Process Mechanical equipment and accessories as needed for a reliable Water Pollution Control Plant operation.

The Water Pollution Control Plant in order to continue to maintain or exceed the current operational performances need to have the following during the projected 30-year window and beyond:

- Operational improvements through Instrumentation & Control and investigative studies.
- Operational improvements as part of State of Good Repair.
- State of Good Repair due to age of the infrastructure including major process equipment.

7. Identification of Alternative Water Servicing Strategies

Having identified hydraulic capacity deficiencies in the existing systems to service existing and future populations, there are four alternate strategies moving forward.

7.1 Alternative 1: Do Nothing – Maintain the Status Quo

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

7.2 Alternative 2: Limit Growth

Assumes no improvements will be made beyond those already planned or approved and includes measures to limit future development in the Municipality of Chatham-Kent. While limiting growth would reduce the need for upgrades and improvements to the water service systems, it does not address the problem and opportunity statement or recognize that Chatham-Kent is experiencing residential and industrial growth. It also contradicts the Municipality's Official Plan and therefore this alternative is not to be carried forward.

7.3 Alternative 3: Water Conservation / Reduction in Use

This alternative partially addresses the Problem and Opportunity Statement. Water conservation and reduction in use can provide some treatment and water distribution relief but does not address future growth and would not be an adequate solution on its own. This strategy should be considered with **Alternative 4** – Water System Treatment Capacity Improvements and Distribution System Improvements.

7.4 Alternative 4: Water System Treatment Capacity Improvements and Distribution Improvements

This alternative addresses the Problem and Opportunity Statement and provides the ability to accommodate future growth. This strategy should be considered with **Alternatives 3 and 5**. Treatment capacity is sufficient to meet existing and future growth needs in all water systems except for the Chatham system. To increase treatment capacity for the Chatham system three Alternatives were developed, which are

described as **Alternative 4A**, **Alternative 4B** and **Alternative 4C** in the following sections.

7.4.1 Alternative 4A: Expand Existing Treatment Plant

This alternative would expand the existing Chatham Water Treatment Plant within its existing property, increasing treatment capacity by 35%. In addition to treatment capacity increases distribution system improvements/upgrades will also be implemented. Refer to **Figure 7-1**.

7.4.2 Alternative 4B: Construct a New Treatment Plant

This alternative would construct a new treatment plant outside of the existing plants property. The approximate location would be southeast of the Chatham urban boundary, south of Indian Creek Road, north of the 401 and east of Charing Cross Road. **Refer to Figure 7-2**. There are three (3) different ways to incorporate this new plant. This new plant could:

1. Replace and decommission the existing water treatment plant.
2. Provide additional capacity and work in conjunction with the existing water treatment plant.
3. Provide additional capacity and work in conjunction with the existing plant. Over time, the new plant could be expanded and completely replace the existing plant.

In addition to treatment capacity increases distribution system improvements/upgrades will also be implemented.

7.4.3 Alternative 4C: Construct a New Centralized Water Treatment Plant

This alternative would construct a new larger centralized water treatment plant near Charing Cross Road and Old Street Line that could service the Chatham and South Chatham-Kent water systems. In addition to treatment capacity increases distribution system improvements/upgrades will also be implemented. **Refer to Figure 7-3**.

7.5 Alternative 5: Chatham Water Storage Capacity Improvements and Distribution System Improvements

This alternative addresses the Problem and Opportunity Statement and provides the ability to accommodate future growth. This strategy should be considered with **Alternatives 3** and **4**. Storage capacity is sufficient to meet existing and future growth needs in all water systems except for the Chatham system. To increase storage

capacity for the Chatham system two alternatives were developed, which are described as **Alternative 5A**, and **Alternative 5B** in the following sections.

7.5.1 Alternative 5A: Expand Storage at the Existing Treatment Plant

This alternative would increase onsite reservoir storage capacity by 20ML at the existing water treatment plant within the existing property limits. In addition to storage capacity increases distribution system improvements/upgrades will also be implemented.

Refer to **Figure 7-4**.

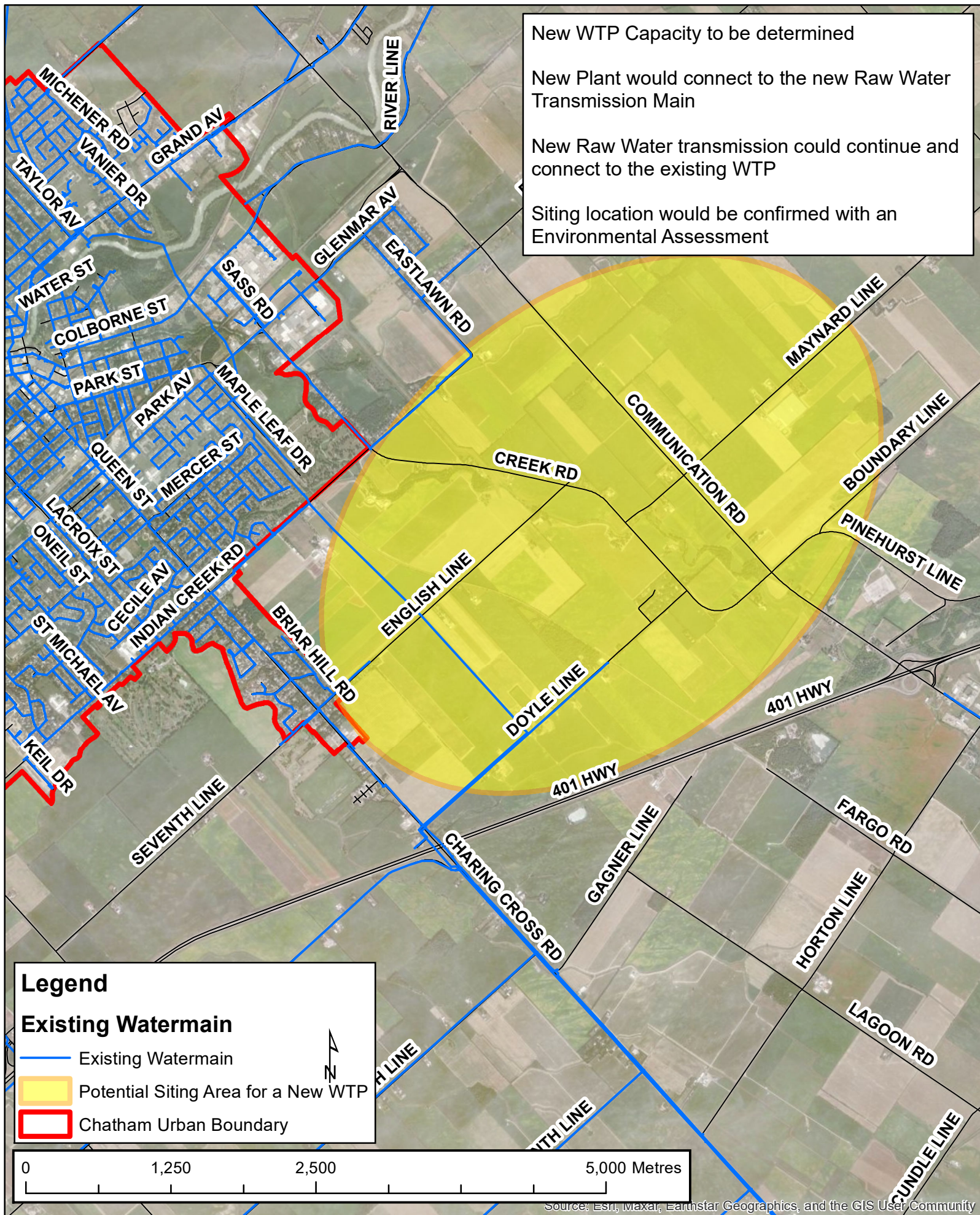
7.5.2 Alternative 5B: Build a new Elevated Tank and Expand onsite storage at the Treatment Plant.

This alternative would build and site a new elevated storage tank (10ML) outside the Chatham urban boundary, Refer to **Figure 7-5**, in combination with a smaller expansion of onsite reservoir storage capacity (10ML) at the existing treatment plant. In addition to storage capacity increases distribution system improvements/upgrades will also be implemented.

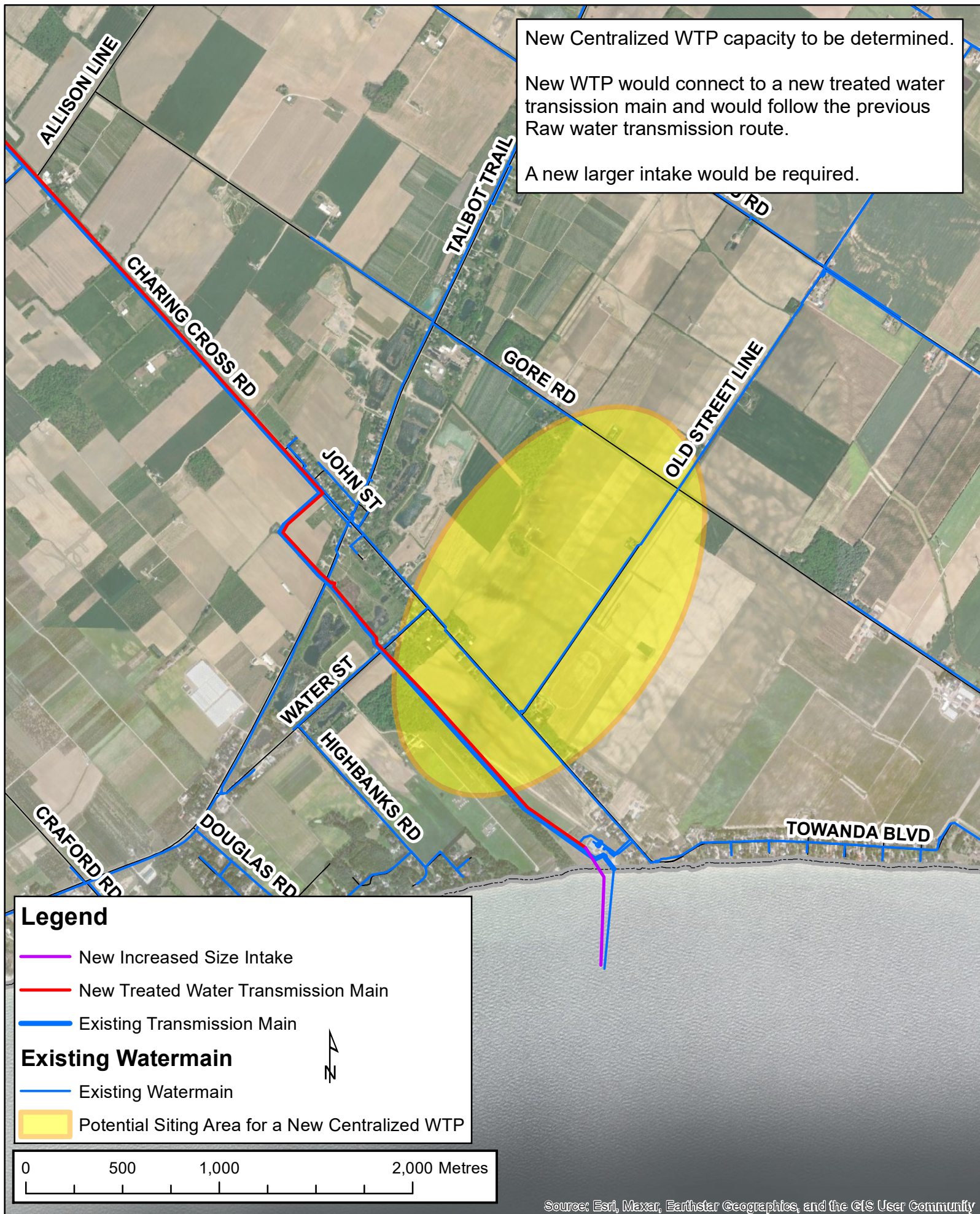
Figure 7-1 : Water System Alternative 4A
Chatham Water System - Water Treatment Plant
Expand Capacity by approximately 35%



**Figure 7-2: Alternative 4B - Chatham Water System -
New Water Treatment Plant**



**Figur 7-3: Alternative 4C -
New Centralized Water Treatment Plant**



**Figure 7-4: Alternative 5A –
Expand Storage Capacity at the Existing Chatham Water Treatment Plant (20ML)**

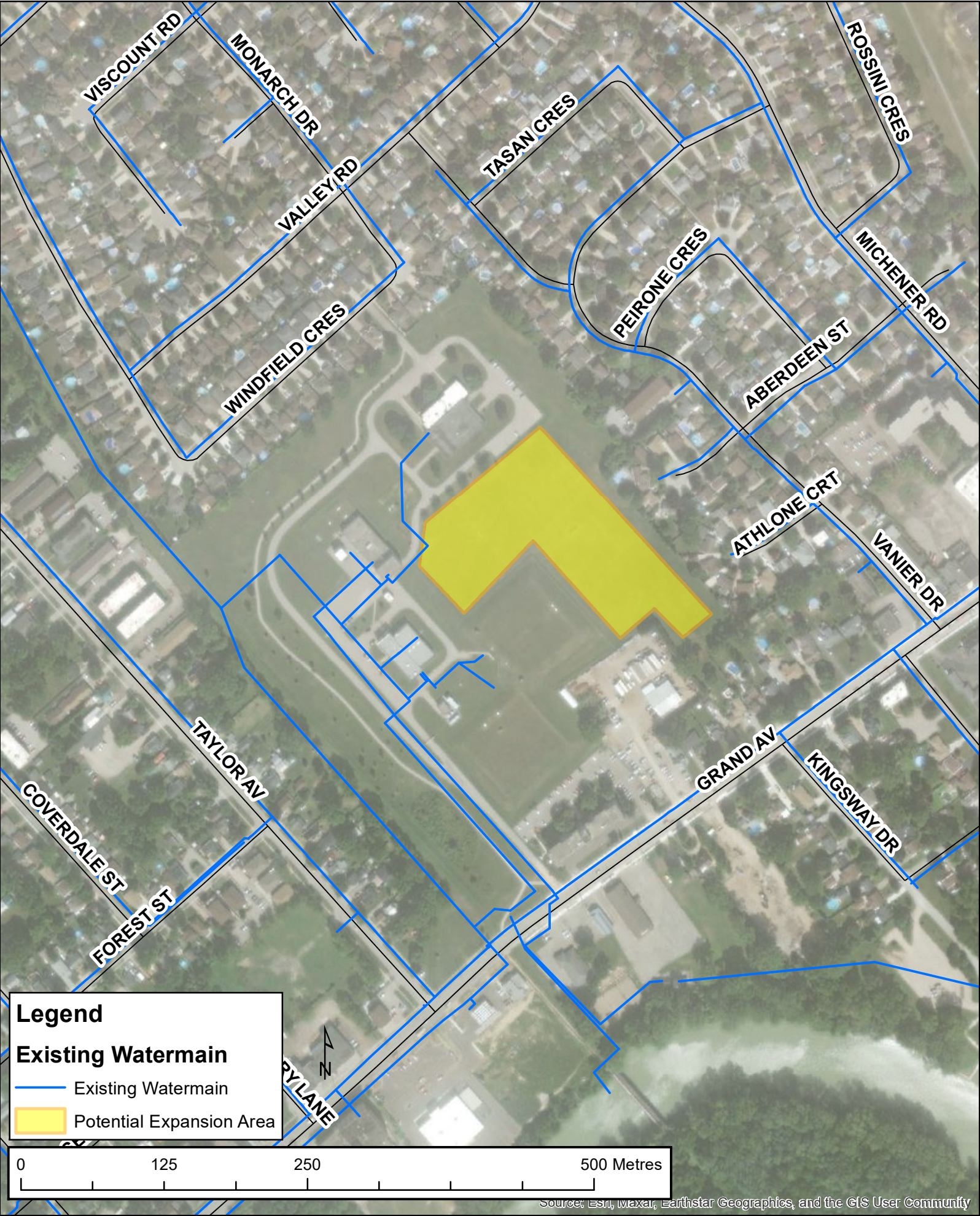
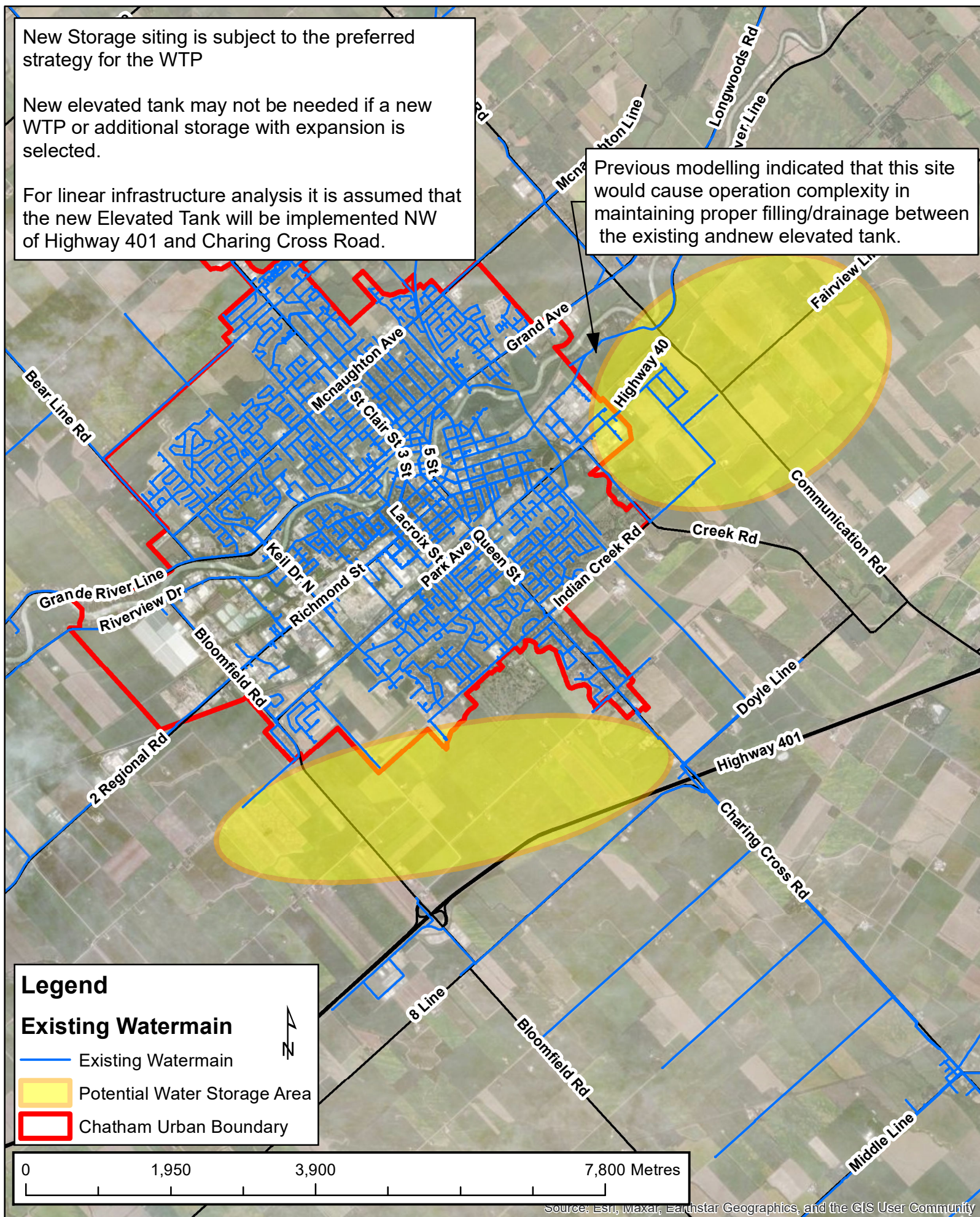


Figure 7-5: Alternative 5B – New Elevated Tank (10ML) and Expand Storage Capacity at the Existing Chatham Water Treatment Plant (10ML)



8. Identification of Alternative Wastewater System Strategies

Having identified hydraulic capacity deficiencies in the existing system to service existing flows and/or growth flows, there are four alternate strategies moving forward.

8.1 Alternative 1: Do nothing – Maintain the Status Quo

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

8.2 Alternative 2: Limit Growth

Assumes no improvements will be made beyond those already planned or approved and includes measures to limit future development in the Municipality of Chatham-Kent. While limiting growth would reduce the need for upgrades and improvements to the wastewater service systems, it does not address the problem and opportunity statement or recognize that Chatham-Kent is experiencing residential and industrial growth. It also contradicts the Municipality's Official Plan and therefore this alternative is not to be carried forward.

8.3 Alternative 3: Inflow and Infiltration Management

This alternative partially addresses the Problem and Opportunity Statement. Inflow and Infiltration Management including combined sewer separation (especially for the Central Chatham sewer system) will provide some treatment and sewer capacity relief but does not address future growth and would not be an adequate solution on its own. This strategy should be considered with **Alternative 4 – Wastewater Treatment and Collection System Improvements**.

8.4 Alternative 4: Wastewater Treatment and Collection System Improvements

This alternative addresses the Problem and Opportunity Statement and provides the ability to accommodate future growth. This strategy should be considered with **Alternative 3 – Inflow and Infiltration Management**.

9. Evaluation of Alternative Water and Wastewater Servicing Strategies

In order to evaluate the water and wastewater servicing strategies, a set of criteria were developed which are categorized in **Table 9-1**.

9.1 Evaluation Criteria

Table 9-1 below summarizes the criteria, including environmental categories that address the broad definition of the environment as described in the Environmental Assessment Act, used for evaluation purposes to assist in determining the best possible solution.

Table 9-1: Evaluation Criteria

Category	Criteria	Indicators
Socio-Economic	Long Term Impacts to the Community	Potential effects (Noise, Dust, Vibration, property access) related to disruptions to residences, agricultural, business, and travelling public during construction and operation. Potential effects on existing and approved / planned land uses. Degree of Property Acquisition / Easement requirements Conformance with approved local, and provincial plans and policies. Effects from operations that may impact local community.
	Business Impacts and Transportation Corridors	Supports growth and development. Potential effects on transportation corridors.
	Protects Public Health and Safety	Effects on Public Health and Safety, particularly on downstream users (including recreation and tourism).
Natural Environment	Protects Environmental Feature	Protects sensitive features and regulated areas. Minimize the potential impact from construction and operation to existing Terrestrial habitats/features.

Category	Criteria	Indicators
	Protects Groundwater, Streams and Rivers Minimizes Impacts on/from Climate Change	Minimize the potential impact from construction and operation to existing Aquatic habitats/features. Minimize the potential impact from construction and operation to Species at Risk. Effects on Source water and Source water protection. Effects on Surface Water Potential to encounter soil and water contamination. Potential for impacts to climate change and for climate change to impact the projects.
Economic	Project Costs	Capital Costs Property Acquisition/Easement Costs (no costs / order of magnitude) Operation and Management Costs
Technical	Meets Future Needs Potable Water Quality Maintenance of Service Constructability	Addresses the existing system capacity restraints. Improvements to level of service utilization of the existing infrastructure. Meets the long-term capacity requirements to service the projected population growth to 2053. Ability to maintain or improve water quality. Operation redundancy to improve services security and allow for safe and efficient maintenance activities. Potential to minimize increases to operational and/or maintenance complexity of the system. Sustainability. Reclaim and Reuse. Constructability with the system – requirement for system upgrades.

Category	Criteria	Indicators
	Legal Jurisdictional	Complexity of design / approvals. Potential for utility conflicts. Future regulatory requirements. Complexity of Approvals.
Cultural Environment	Archaeology Built Heritage Cultural Heritage Landscapes Indigenous Communities	Potential effects to cultural heritage resources. Potential effects to built heritage resources. Potential effects to Cultural Heritage Landscapes. Potential Impacts to Treaty Lands

9.2 Evaluation of Water Servicing Strategies

A detailed assessment of each alternative water servicing strategy was completed based on the evaluation categories and criteria. The evaluation approach used to consider the suitability and feasibility of alternative solutions for the study was a qualitative assessment. In this evaluation approach, trade-offs consider the advantages and disadvantages of each alternative to address the problem and opportunity statement with the least environmental effects and the most technical benefits which forms the rationale for the identification of a preferred alternative.

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

9.2.1 Recommended Water Servicing Strategies

Based on the previously stated need to incorporate Alternatives 3, 4 and 5 for a complete strategy that addresses the problem and opportunity statement, and given the criteria and methodology applied as part of the evaluation process, the following Alternative Water Servicing Strategies were recommended:

Alternative 3: Water Conservation / Reduction in Use. This alternative can help reduce treatment and distribution needs for the Chatham-Kent water system but ultimately will not provide for future growth or existing system deficiencies. As such, it is recommended to be included with the recommended Treatment and Storage Alternatives.

Alternative 4A: Expand the existing Chatham Water Treatment Plant Capacity by 35% and distribution system improvements. This alternative maximizes the existing water treatment plant assets and avoids the need for property acquisition. It also has the lowest impacts to the environment, climate change, cultural heritage resources and lowest operational and capital costs. Refer to **Table 9-2** for Alternative 4 Treatment Capacity Alternatives Evaluation Matrix.

Alternative 5A: Expand the Storage onsite at the existing Chatham Water Treatment Plant (20ML). This alternative avoids the need for property acquisition and can be coordinated with the water treatment plant capacity expansion (Recommended Alternative 4A). It also has the lowest impacts to the environment, climate change, cultural heritage resources and lowest operational and capital costs. Operation will also be easier from a full water system perspective. Refer to **Table 9-3** for Alternative 4 Storage Capacity Alternatives Evaluation Matrix.

Table 9-2 – Evaluation of Chatham Treatment Capacity Alternatives

Category	Criteria	Alternative 4A Expand Existing Water Treatment Plant	Alternative 4B New Treatment Plant in the area of Highway 401 and Doyle Line	Alternative 4C New Centralized Treatment Plant (Mega Plant for both Chatham and South Chatham Kent and convert Raw Water Transmission main to treated water transmission main)
Socio Economic	Long Term Impacts to the Community	Impacts to adjacent neighbourhood. During and after Construction due to increase noise, dust and operations. No impacts to future development plans as lands are owned by the PUC and adjacent to the plant. No property acquisition required. Plant expansion will support growth and development of the community.	Minor impacts to adjacent communities as the location is relatively undeveloped. New plant will use lands that could be used for future development. There are no approved plans in the area. Property acquisition is required. Plant expansion will support growth and development of the community.	Minor impacts to adjacent communities as the location is relatively undeveloped. New plant will use lands that could be used for future development. There are no approved plans in the area. Property acquisition is required. Plant expansion will support growth and development of the community.
	Business Impacts and Transportation Corridors	Central location of the existing plant will cause some disruptions to local transportation corridors and businesses during construction.	Low to moderate impacts to transportation corridors and business during construction due to the more remote location.	Low to moderate impacts to transportation corridors and business during construction due to the more remote location.
	Protects Public Health and Safety	Increased treatment capacity will continue to protect the publics health and safety.	Increased treatment capacity will continue to protect the publics health and safety.	Increased treatment capacity will continue to protect the publics health and safety.
Cultural Environment	Archaeology	No Impacts to Archaeology. Lands are previously disturbed. Stage 1 AA still Required.	Potential Impacts to Archaeology. Stage 1 AA required.	Potential Impacts to Archaeology. Stage 1 AA required.
	Built Heritage	No Impacts to Built Heritage. Lands are previously disturbed.	Potential Impacts to Built Heritage. Cultural Heritage Evaluation Report will be required.	Potential Impacts to Built Heritage. Cultural Heritage Evaluation Report will be required.
	Cultural Heritage Landscapes	No Impacts to Cultural Heritage Landscapes. Lands are previously disturbed.	Potential Impacts to Cultural Heritage Landscapes. Cultural Heritage Evaluation Report will be required.	Potential Impacts to Cultural Heritage Landscapes. Cultural Heritage Evaluation Report will be required.
	Indigenous Communities	No or minimal Impacts to Indigenous Communities. Continued consultation required. Lands are owned by CK – PUC.	No or minimal Impacts to Indigenous Communities. Continued consultation required.	No or minimal Impacts to Indigenous Communities. Continued consultation required.
Natural Heritage	Impacts to Aquatic Environment	Lowest impacts to the aquatic environment as site is already established.	Low to moderate impacts to the aquatic environment. Greenfield site may have Species at Risk and other terrestrial habitats.	Low to moderate impacts to the aquatic environment. Greenfield site may have Species at Risk and other terrestrial habitats.
	Impacts to Terrestrial Environment	Lowest impacts to the terrestrial environment as site is already established.	Moderate impacts to the terrestrial environment. Greenfield site may have Species at Risk and other terrestrial habitats.	Moderate impacts to the terrestrial environment. Greenfield site may have Species at Risk and other terrestrial habitats.

Table 9-2 – Evaluation of Chatham Treatment Capacity Alternatives

Category	Criteria	Alternative 4A Expand Existing Water Treatment Plant	Alternative 4B New Treatment Plant in the area of Highway 401 and Doyle Line	Alternative 4C New Centralized Treatment Plant (Mega Plant for both Chatham and South Chatham Kent and convert Raw Water Transmission main to treated water transmission main)
	Source Water Protection	Existing Plant and expansion area are within a Low Threat designated vulnerable areas. Area is within a Ground Water Recharge Area Area is within a Highly Vulnerable Aquifer Area	New Plant area has Low Threat designated vulnerable areas. Area has Ground Water Recharge Areas Area has Highly Vulnerable Aquifer Areas	New Plant area is within Low Threat designated vulnerable areas. Area has Ground Water Recharge Areas Area has Highly Vulnerable Aquifer Areas Area is within an Intake Protection Zone Area.
	Climate Change	Lowest impact to Climate change due to construction. Less equipment required for the expansion.	Moderate to High Climate change impacts due to construction.	Moderate to High Climate change impacts due to construction.
Technical	Meets Future Needs	Meets the current and future needs of Chatham.	Meets the current and future needs of Chatham.	Meets the current and future needs of Chatham.
	Potable Water Quality	No change to potable water quality.	No change to potable water quality.	No change to potable water quality.
	Maintenance of Service	No change to maintenance of the system.	More complex system maintenance with two Water treatment plants online for the same system.	Much larger water treatment plant supplying water to both the Chatham and South-Chatham-Kent water systems would be a more complex undertaking for maintenance.
	Constructability	Moderate constructability issues trying to keep the water treatment plant running while constructing the expansion.	Moderate to high constructability issues trying to keep the water treatment plant running while constructing the expansion. The new plant would be more complex to design and construct than the expansion.	High constructability issues associated with the much larger treatment plant. The centralized plant would be the most complex to design and construct as it would need to supply water to both the South Chatham-Kent water distributions system and the Chatham distribution system. The centralized plant would also require a new larger Raw water intake and a new water transmission main to Chatham (or potentially repurposing the existing RAW water transmission main to a potable watermain).

Table 9-2 – Evaluation of Chatham Treatment Capacity Alternatives

Category	Criteria	Alternative 4A Expand Existing Water Treatment Plant	Alternative 4B New Treatment Plant in the area of Highway 401 and Doyle Line	Alternative 4C New Centralized Treatment Plant (Mega Plant for both Chatham and South Chatham Kent and convert Raw Water Transmission main to treated water transmission main)
	Legal Jurisdictional	Lowest Impact. Fewer and more straightforward permitting and approvals.	Moderate Impact. The new treatment plant would require more stringent permitting and approvals.	Highest Impact. The centralized plant would require the most stringent permitting and approvals for both the plant and new raw water intake.
Economic and Financial	Capital Costs	Lowest Capital Cost	High Capital Cost	Highest Capital Cost
	Operation and Management Costs	Lowest Operation and Management Cost	Moderate Operation and Management Cost	Moderate to High Operation and Management Cost
	Potential for land acquisition costs.	No Land Required	High Cost – Land Acquisition required	Highest Cost – Larger Plant will require the most land.
		RECOMMENDED	NOT RECOMMENDED	NOT RECOMMENDED

Table 9-3 – Evaluation of Alternative 5 Storage Capacity Alternatives

Category	Criteria	Alternative 1 Expand Water treatment plant storage (20ML)	Alternative 2 New Elevated Tank (10ML) and Expand on site storage (10ML)
Socio Economic	Long Term Impacts to the Community	Impacts to adjacent neighbourhood. During and after Construction due to increase noise, dust and operations.	Impacts to adjacent neighbourhood. During and after Construction due to increase noise, dust and operations.
	Business Impacts and Transportation Corridors	No impacts to future development plans as lands are owned by the PUC and adjacent to the plant.	New Elevated Tank will require land that could be used for future development.
		No property acquisition required.	Some property acquisition is required.
		Increasing storage will support growth and development.	Increasing storage will support growth and development.
Cultural Environment	Protects Public Health and Safety	Central location of the existing plant will cause some disruptions to local transportation corridors and businesses during construction.	Central location of the existing plant will cause some disruptions to local transportation corridors and businesses during construction.
			New elevated tank construction will cause additional disruptions to local transportation corridors and businesses.
		Increased storage capacity will continue to protect the publics health and safety.	Increased storage capacity will continue to protect the publics health and safety.
	Archaeology	No Impacts to Archaeology. Lands are previously disturbed. Stage 1 AA still Required.	Potential Impacts to Archaeology. Stage 1 AA required.
	Built Heritage	No Impacts to Built Heritage. Lands are previously disturbed.	Potential Impacts to Built Heritage. Cultural Heritage Evaluation Report will be required.
	Cultural Heritage Landscapes	No Impacts to Cultural Heritage Landscapes. Lands are previously disturbed.	Potential Impacts to Cultural Heritage Landscapes. Cultural Heritage Evaluation Report will be required.
	Indigenous Communities	No or minimal Impacts to Indigenous Communities. Continued consultation required. Lands are owned by CK – PUC.	No or minimal Impacts to Indigenous Communities. Continued consultation required.

Table 9-3 – Evaluation of Alternative 5 Storage Capacity Alternatives

Category	Criteria	Alternative 1 Expand Water treatment plant storage (20ML)	Alternative 2 New Elevated Tank (10ML) and Expand on site storage (10ML)
Natural Heritage	Impacts to Aquatic Environment	Lowest impacts to the aquatic environment as site is already established.	Low to moderate impacts to the aquatic environment. Greenfield site may have Species at Risk and other terrestrial habitats.
	Impacts to Terrestrial Environment	Lowest impacts to the terrestrial environment as site is already established.	Moderate impacts to the terrestrial environment. Greenfield site may have Species at Risk and other terrestrial habitats.
	Source Water Protection	Existing Plant and expansion area are within a Low Threat designated vulnerable areas.	New Elevated Tank area is within a Low Threat designated vulnerable area.
		Area is within a Ground Water Recharge Area	Area has Ground Water Recharge Areas
		Area is within a Highly Vulnerable Aquifer Area	Area has Highly Vulnerable Aquifer Areas
	Climate Change	Lowest impact to Climate change due to construction. Less equipment required for the expansion.	Moderate to High Climate change impacts due to construction.
Technical	Meets Future Needs	Meets the current and future needs of Chatham.	Meets the current and future needs of Chatham.
	Potable Water Quality	No change to potable water quality.	No change to potable water quality.
	Maintenance of Service	No change to maintenance of the system	More complex system maintenance with both an onsite treatment plant storage and an elevated tank.
	Constructability	Low impact. Can be coordinated with the treatment plant expansion.	More complex design and construction, due to having both an onsite expansion and a new elevated tank.
	Legal Jurisdictional	Lowest Impact. Fewer and more straightforward permitting and approvals that can be coordinated with the treatment plant expansion.	Moderate Impact. The new elevated tank would require additional and more stringent permitting and approvals.

Table 9-3 – Evaluation of Alternative 5 Storage Capacity Alternatives

Category	Criteria	Alternative 1 Expand Water treatment plant storage (20ML)	Alternative 2 New Elevated Tank (10ML) and Expand on site storage (10ML)
Economic and Financial	Capital Costs	Lowest capital cost.	Moderate to high capital cost due to construction at two sites.
	Operation and Management Costs	Lowest operational and management costs	Moderate operational and management costs.
	Potential for land acquisition costs.	No land required.	Moderate land acquisition costs.
		RECOMMENDED	NOT RECOMMENDED

9.3 Evaluation of Wastewater Servicing Strategies

Due to Alternatives 1 and 2 not addressing the problem opportunity statement and inflow and infiltration management only being able to partially address the problem and opportunity statement, a screening of the wastewater servicing strategies was undertaken which highlights the rationale for selecting the recommended Wastewater servicing strategy. **Refer to Table 9-4.**

9.3.1 Recommended Wastewater Servicing Strategy

Considering the above Alternatives 3, and 4 are combined for a complete strategy that addresses the problem and opportunity statement. Given the evaluation screening applied, the following alternative wastewater servicing strategies are recommended:

Alternative 3: Inflow and Infiltration reduction. This alternative only partially addresses the problem and opportunity statement. This will provide some treatment and sewer capacity relief but does not address future growth and all current system deficiencies. Therefore, this is not an adequate solution on its own and needs to be incorporated with Alternative 4.

Alternative 4: Wastewater Treatment and Collection System Improvements. This addresses the problem and opportunity statement and can provide the ability to accommodate future growth and address current system deficiencies.

Table 9-4: Screening of Wastewater Servicing Strategies

Alternative	Rationale	Screening Result
Alternative 1: Do Nothing / Maintain the Status Quo	Does not address the problem opportunity statement.	Screened from Further Consideration.
Alternative 2: Limit Growth	Does not address the problem and opportunity statement. Disregards the fact that Chatham-Kent is growing both residentially and industrially/commercially.	Screened from Further Consideration.
Alternative 3: Inflow and Infiltration Management	Partially addresses the problem and opportunity statement. Only provides some relief to treatment and collection.	Recommended to be incorporated along with collection system and treatment improvements.

Alternative	Rationale	Screening Result
	Needs to be considered in conjunction with treatment and collection system improvements	
Alternative 4: Wastewater Treatment and Collection System Improvements	Addresses the problem and opportunity statement. Accommodate future growth and existing system deficiencies.	Recommended to be studied further and develop a list of Wastewater infrastructure projects along with Inflow and Infiltration reduction to accommodate future growth and existing system deficiencies.

10. Recommended Projects

10.1 Water System Recommended Projects

The following are the recommended projects for the Chatham-Kent water system:

Table 10-1: Recommended Projects for the Chatham-Kent Water System

Table 10-1: Recommended Projects for the Chatham-Kent Water System

Water System	Project Description	Purpose	Implementation Timing	Cost	Cost/Anum	Future Municipal Class Environmental Assessment Study Required
Raw Water Pumping Station	Increase pumping capacity by replacing existing Pump No.3 (267L/s) to larger capacity (527L/s).	Increase South Chatham Kent Water Treatment Plant Highlift pump capacity to meet future greenhouse demands.	Long Term >10 Years	\$3,557,250	\$177,862/yr.	Exempt
Chatham	11 kms of new 600mm transmission main from existing Water Treatment Plant Highlift pumping station to the Southwest area of Chatham Water System (Partial Ring TM). Refer to Figure 10-1	Improves system pressures.	Long Term >10 Years	\$38,208,788	\$1910,439/yr.	Schedule B Class Environmental Assessment
Chatham	Increase storage capacity at the existing Chatham Water Treatment Plant. Refer to Figure 7-4	To increase to the required storage capacity.	Short Term 0-5 Years	\$19,400,000	\$3,880,000/yr.	Exempt
Chatham	Increase treatment capacity at the existing Chatham Water Treatment Plant. Refer to Figure 7-1	To meet future water demands.	Interim Term 5-10 Years	\$206,700,000	\$20,670,000/yr.	Schedule C Class Environmental Assessment
Chatham	Increase pumping capacity at the existing Chatham Water Treatment Plant Highlift Pumping Station.	To meet future water demands.	Interim Term 5-10 Years	\$3,091,500	\$309,150/yr.	Exempt
Chatham	Conduct condition assessment for existing raw water transmission main.	To ensure watermain capacity is maintained at design level.	Short Term 0-5 Years	\$1,500,000	\$300,000/yr.	N/A
Chatham /Bothwell	300mm watermain from Thamesville Elevated Tank to Zone 6 Rd. Refer to Figure 10-2	To service future growth east of Thamesville.	Interim Term 5-10 Years	\$7,200,000	\$720,000/yr.	Schedule B Class Environmental Assessment has been completed.
Chatham /Bothwell	Zone 6 Road to Delaware Nation 200mm watermain Refer to Figure 10-2	To provide treated water to Delaware Nation	Interim Term 5-10 Years	\$1,150,000	\$115,000/yr.	Schedule B Class Environmental Assessment has been completed
Chatham /Bothwell	New Booster Pump Station at the Northeast corner of Zone 5 Road and Baseline. Refer to Figure 10-2	To provide adequate pressure for Northeast Water Distribution system.	Interim Term 5-10 Years	\$300,000	NA	Schedule B Class Environmental Assessment has been completed
Chatham /Bothwell	New 300mm watermain from Zone 6 Rd and Baseline to Bothwell. Refer to Figure 10-2	To service future growth east of Thamesville and provide water to Bothwell.	Long Term >10 Years	\$9,720,000	\$486,000/yr.	Schedule B Class Environmental Assessment has been completed
Chatham /Bothwell	Replace the Thamesville Standpipe with a 2.3ML Standpipe. Refer to Figure 10-2	To increase top water levels and provide adequate pressure to Kent-Bridge	Interim Term 5-10 Years	\$5,000,000	\$500,000/yr.	Schedule B Class Environmental Assessment has been completed
Ridgetown / Highgate	300mm Integration Transmission Main for Blenheim and Ridgetown. Refer to Figure 10-3	Deliver water supply from South Chatham Kent Water System to Ridgetown-Highgate Water System	Interim Term 5-10 Years	\$24,425,625	\$2,442,562/yr.	Schedule B Class Environmental Assessment

Table 10-1: Recommended Projects for the Chatham-Kent Water System

Water System	Project Description	Purpose	Implementation Timing	Cost	Cost/Anum	Future Municipal Class Environmental Assessment Study Required
Ridgetown / Highgate	Retrofitting existing water treatment plant as pumping station for Ridgetown.	Utilize existing Ridgetown Water Treatment Plant for receiving treated water from South Chatham Kent Water System and deliver treated water to Ridgetown-Highgate Water Systems	Interim Term 5-10 Years	\$5,070,000	\$507,000/yr.	Exempt
Ridgetown / Highgate	Replacement / Rehabilitation of the existing Ridgetown Elevated Tank.	Ensure the existing elevated tank will be functioning properly for future.	Interim Term 5-10 Years	\$ 2,000,000	\$200,000/yr.	Exempt
Wallaceburg	New Water Treatment Plant for Wallaceburg-Dresden Integrated Water System.	To replace existing Wallaceburg WTP.	Short Term 0-5 Years	\$ 39,300,000	\$7,860,000/yr.	Schedule C Class Environmental Assessment has been completed
Wallaceburg	New storage reservoir (56ML).	On-site storage facility for new Wallaceburg WTP.	Short Term 0-5 Years	\$27,600,000	\$5,520,000/yr.	Schedule C Class Environmental Assessment has been completed
Wallaceburg	New intake and lowlift pumping station for new Wallaceburg Water Treatment Plant.	Withdraw raw water for new Wallaceburg WTP.	Short Term 0-5 Years	\$ 7,900,000	\$1,580,000/yr.	Schedule C Class Environmental Assessment has been completed
Wallaceburg	New raw water transmission main.	Deliver raw water to new Wallaceburg WTP.	Short Term 0-5 Years	\$9,500,000	\$1,900,000/yr.	Schedule C Class Environmental Assessment has been completed
Wallaceburg	600mm Treated water transmission main. Refer to Figure 10-4	Deliver treated water from Wallaceburg WS to Dresden WS.	Interim Term 5-10 Years	\$32,800,000	\$3,280,000/yr.	Schedule C Class Environmental Assessment has been completed
South Chatham-Kent	2.6 km New Charing Cross Road 600mm transmission main. Refer to Figure 10-5	To increase transfer capacity for filling Blenheim Reservoir	Interim Term 5-10 Years	\$7,730,600	\$773,060/yr.	Schedule B Class Environmental Assessment
South Chatham-Kent	5.6 km of new 200mm local distribution system Looping. Refer to Figure 10-6	To improve the overall system pressures	Interim Term 5-10 Years	\$7,214,063	\$721,406/yr.	Exempt
South Chatham-Kent	Increase pumping capacity at the existing South Chatham Kent Water Treatment Plant Highlift Pumping Station.	To meet the future water demands	Interim Term 5-10 Years	\$1,113,005	\$111,300/yr.	Exempt
Wheatley / Tilbury	New Booster Pumping Station to transfer water supply from Wheatley WS to Tilbury WS. Refer to Figure 10-7	To increase transfer capacity for filling Tilbury Elevated Tank	Interim Term 5-10 Years	\$ 2,410,250	\$241,025/yr.	Schedule B Class Environmental Assessment

Table 10-1: Recommended Projects for the Chatham-Kent Water System

Water System	Project Description	Purpose	Implementation Timing	Cost	Cost/Anum	Future Municipal Class Environmental Assessment Study Required
Wheatley / Tilbury	New local booster pumping station for east of Wheatley WS. Refer to Figure 10-7	To improve the local system pressures	Short Term 0-5 Years	\$1,951,250	\$390,250/yr.	Schedule B Class Environmental Assessment
Wheatley / Tilbury	Decommissioning of Tilbury inground reservoir and pumping station.	To minimize the overall operational complexity and reduce the long term O&M costs	Interim Term 5-10 Years	\$ 2,025,000	\$202,500	Exempt
All Systems	Various Investigative Studies -PFAS Presence and Baseline Removal (WTPs Only) and response plan -Source water algae monitoring and response plans -Distribution system biological stability study to assess potential regrowth in the system -Emerging contaminants monitoring including 1,4-dioxane, VOCs, trace metals -Manganese removal assessment study for Surface Water and Ground Water systems to meet new HC guidelines	To meet changing water quality demands and operational improvements	Short Term 0-5 Years	\$750,000	\$150,000/yr.	Exempt
All Systems	Preventative Maintenance of the Composite Elevated Tanks, Stand Pipes and Spheroid Tanks, and their replacement.	To meet and maintain the required local system pressures.	On an individual system basis	On an individual system basis	NA	Exempt

Figure 10-1: New Chatham East-Central Partial Ring (600mm)

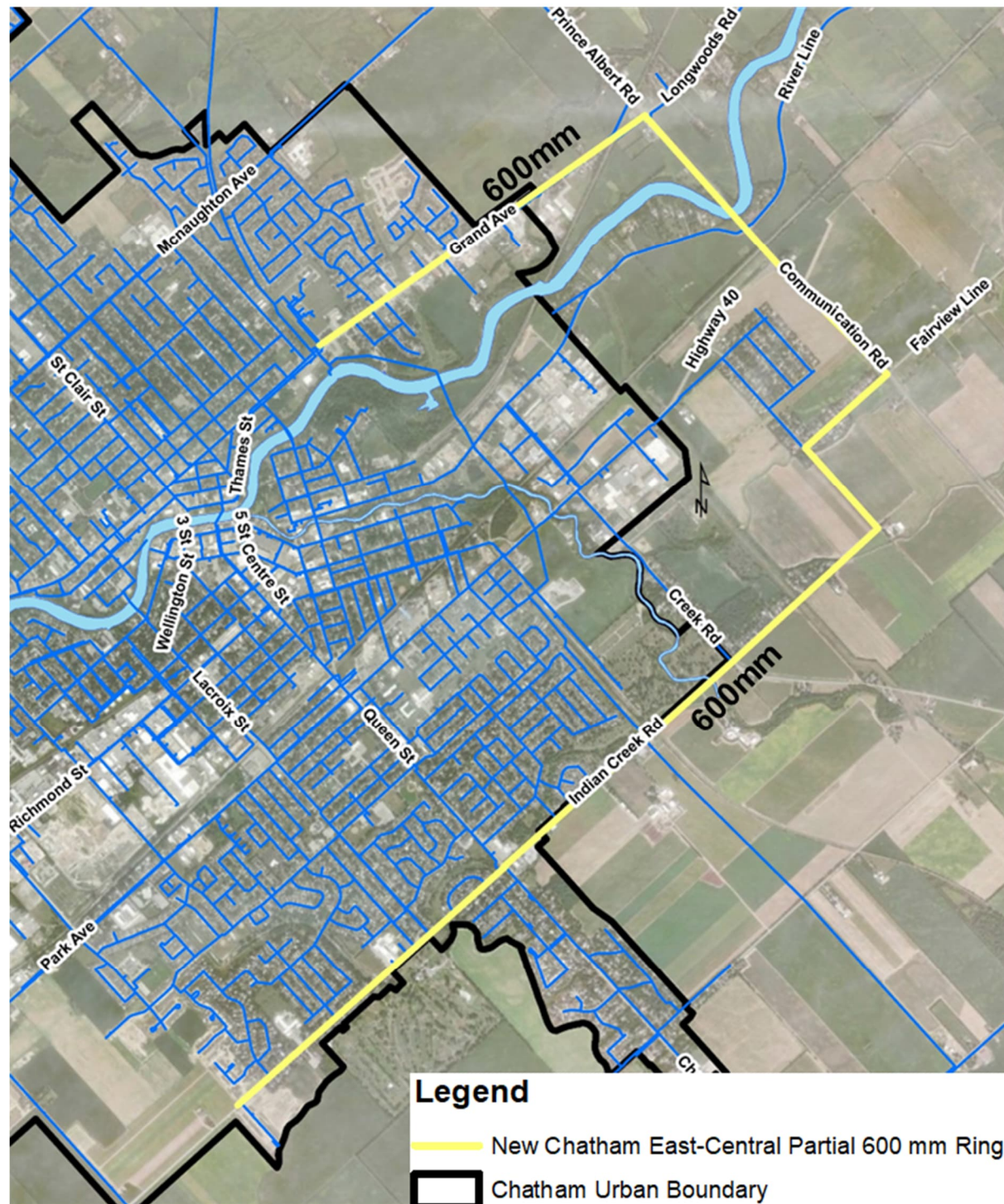


Figure 10-2: Chatham / Bothwell Northeast Water Distribution System

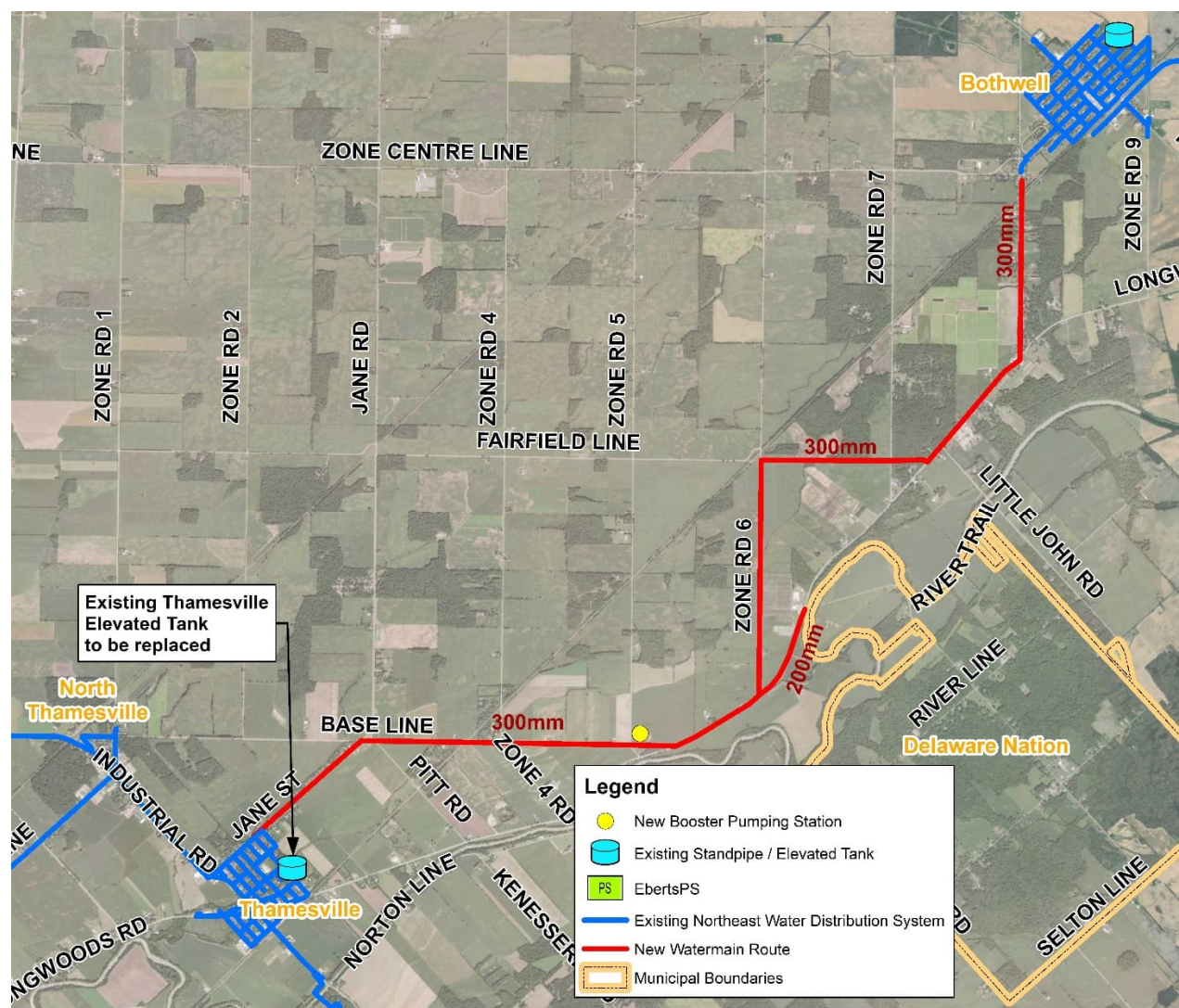


Figure 10-3: Blenheim to Ridgeway Highgate 300mm Interconnection and Scane Road 300mm Watermain

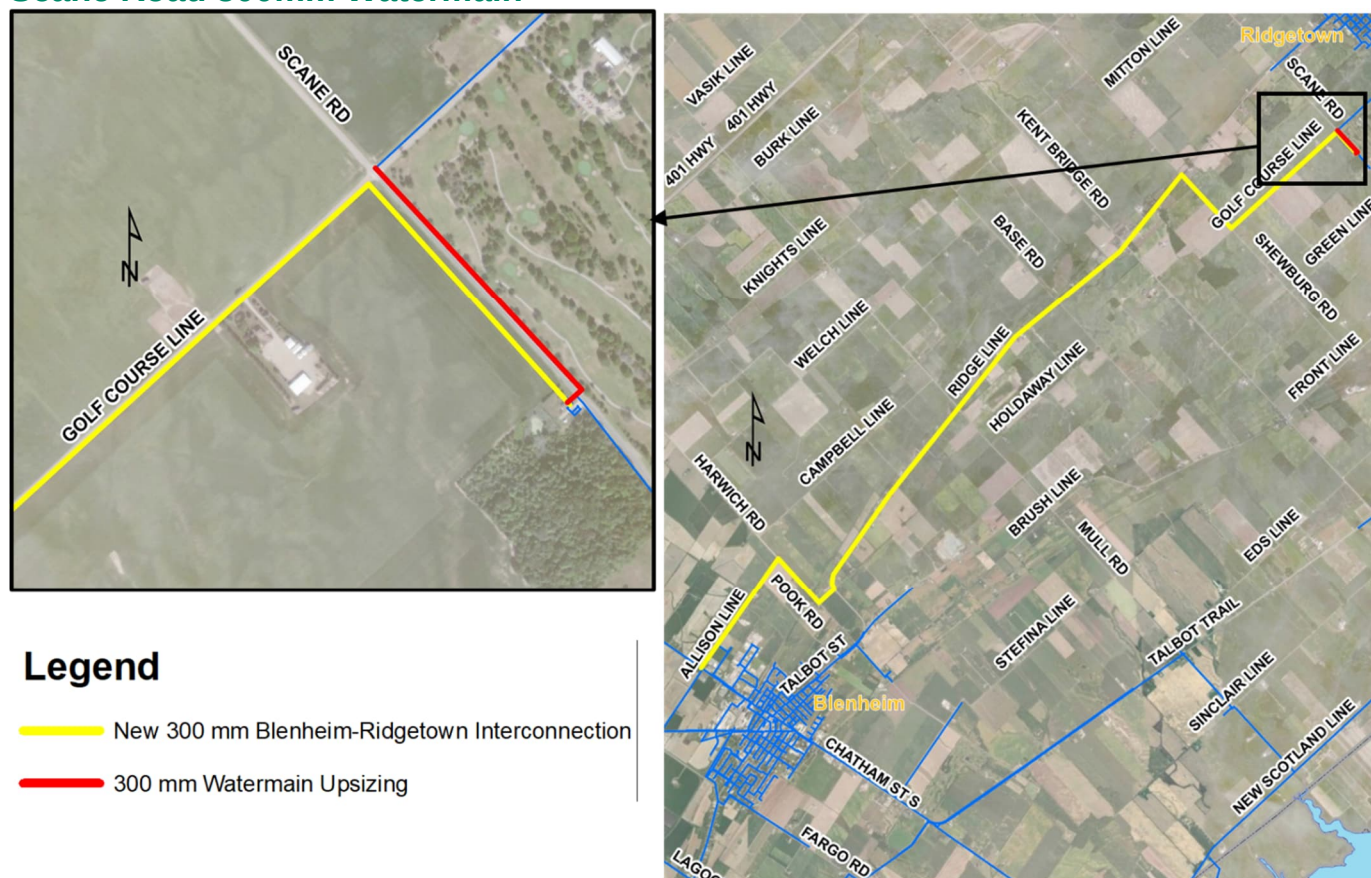
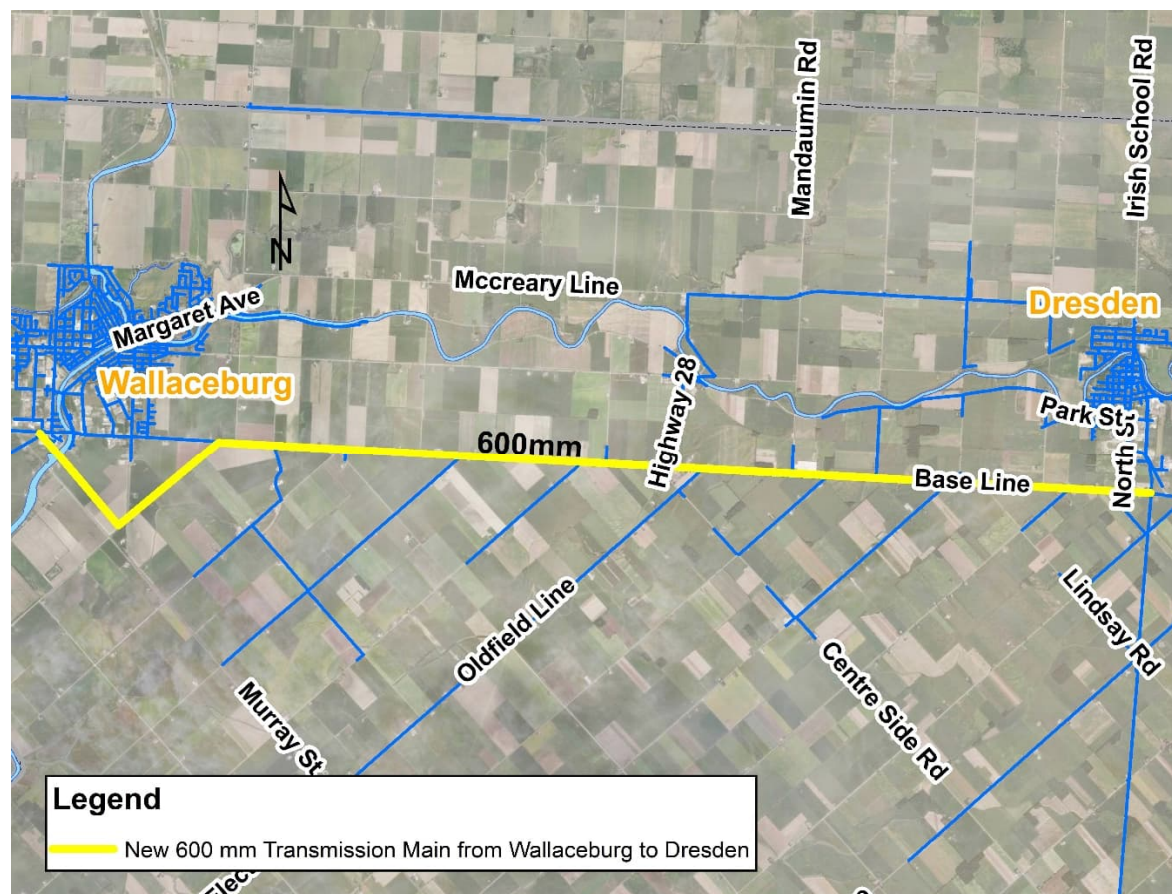


Figure 10-4: Wallaceburg New 600mm Transmission Main to Dresden



**Figure 10-5: South Chatham-Kent New Charing Cross Road 600mm
Transmission Main**



Figure 10-6: South Chatham-Kent New Local 200mm Watermain Loop

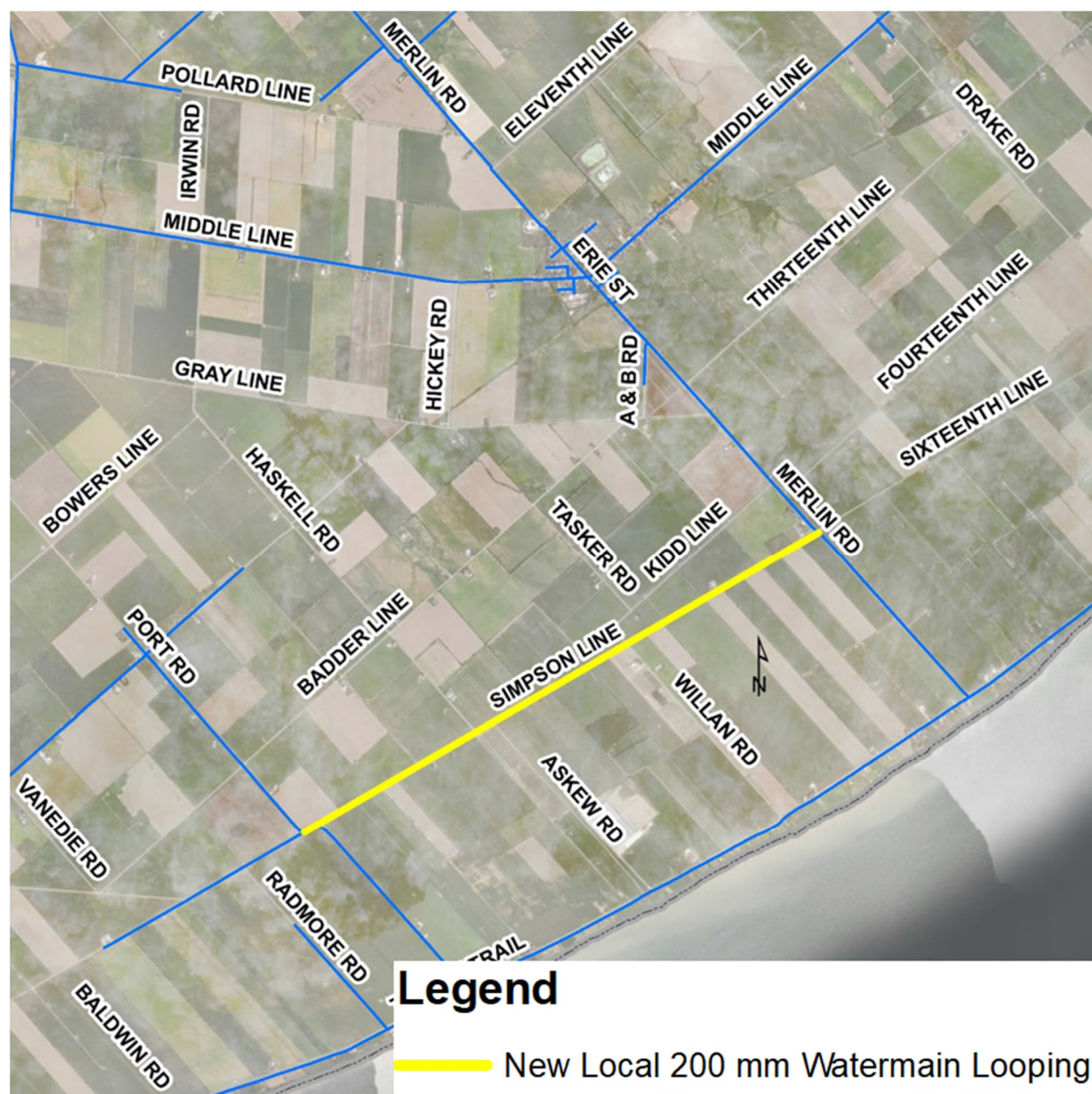
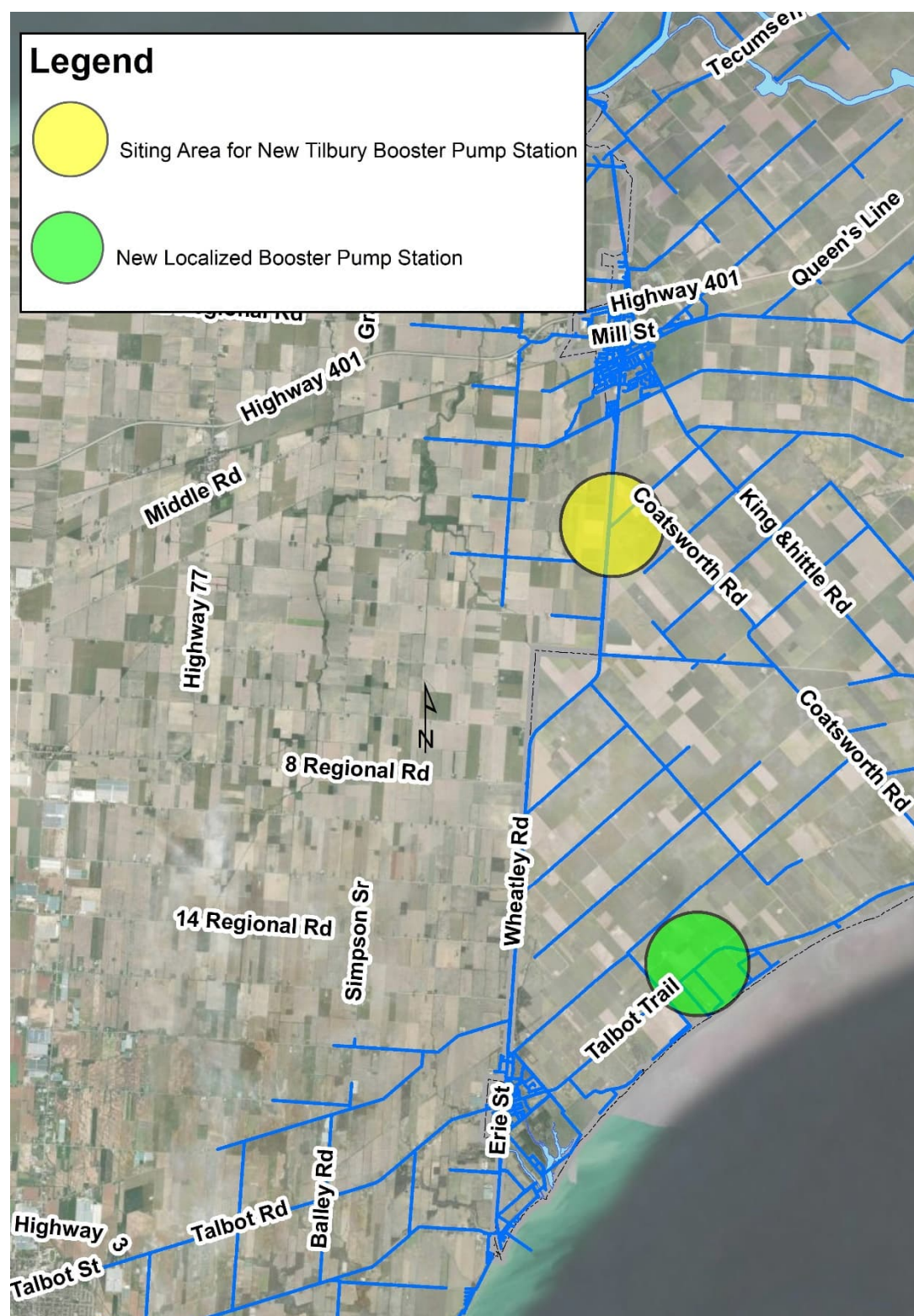


Figure 10-7: Wheatley Tilbury New Booster Pumping Station and New Local Booster Pumping Station



10.2 Wastewater System Recommended Projects

The following are the recommended projects for the Chatham-Kent wastewater system:

Table 10-2: Recommended Projects for the Chatham-Kent Wastewater Collection System

Servicing Growth and Existing Capacity Issues

Wastewater Service Area	Project Description	Implementation Timing	Cost	Cost per Annum	Future Municipal Class Environmental Assessment Study Required
Chatham Collection System	Pumping Station Upgrades to Chatham SPS-103 (Campus Parkway/Grand Ave Area) (Figure 10-12) - Short Term Additional Pumping Capacity - Twin Forcemain to Water Pollution Control Plant - Long Term Complete Station Upgrade	Short Term 0-5 Years Interim Term 5-10 Years Long Term >10 Years	\$300,000 \$5,000,000 \$1,700,000	NA \$500,000/yr. \$85,000/yr	Exempt Schedule B Class Environmental Assessment Exempt
Chatham Collection System	Pumping station upgrades to Chatham main lift station to WPCP (Figure 10-13) - Pumping Upgrades, increasing firm capacity to 800L/s - Twin 750mm Forcemain Section	Short Term 0-5 Years Interim Term 5-10 Years	\$1,7,000,000 \$900,000	\$85,000/yr. \$90,000/yr.	Exempt Schedule B Class Environmental Assessment

Pumping Station Upgrades Addressing Overflows and Frequency of Surcharge of Upstream Areas

Wastewater Service Area	Project Description	Implementation Timing	Cost	Cost Per Annum	Future Municipal Class Environmental Assessment Study Required
Wallaceburg	Pumping station upgrades to Wallaceburg SPS-405 (Dundas St/ Thomas Ave Area) - Upsizing Pumps to 185 L/s Firm Capacity - Twin 250mm Forcemain	Interim Term 5-10 Years Long Term >10 Years	\$500,000 \$1,000,000	NA \$50,000/yr.	Exempt Schedule B Class Environmental Assessment
Wallaceburg	Pumping station upgrades to Wallaceburg SPS-402 (Arnold St / Biden St Area) Upsizing Pumps to 140 L/s Firm Capacity	Interim Term 5- 10 Years	\$500,000	NA	Exempt
Wallaceburg	Pumping station upgrades to Wallaceburg SPS-401 (Bill McDougall Park) - Upsizing Pumps to 240 L/s - Twin 350mm Forcemain	Interim Term 5- 10 Years Long Term >10 Years	\$400,000 \$3,000,000	NA \$150,000	Exempt Schedule B Class Environmental Assessment

Table 10-2: Recommended Projects for the Chatham-Kent Wastewater Collection System

Sewer Upgrades Addressing Surcharge During Large Storms

Wastewater Service Area	Project Description	Implementation Timing	Cost	Cost per Annum	Future Municipal Class Environmental Assessment Study Required
Ridgetown	Erie Street / Tecumseh Street 600mm (Figure 10-8)	Long Term >10 Years	\$1,600,000	\$80,000/yr.	Exempt
Ridgetown	West Street 300mm (Figure 10-8)	Long Term >10 Years	\$450,000	NA	Exempt
Blenheim	Marlborough Street / Industrial Avenue 525mm (Figure 10-9)	Long Term >10 Years	\$4,000,000	\$200,000/yr.	Exempt
Wallaceburg	Elgin Street 450mm (Figure 10-10)	Long Term >10 Years	\$1,400,000	\$70,000/yr.	Exempt
Dresden	Brown Street / Main Street / Tecumseh Street 600mm (Figure 10-11)	Long Term >10 Years	\$4,000,000	\$200,000/yr.	Exempt
Dresden	Lorne Avenue / Holden Street / Fuller Street 600mm (Figure 10-11)	Long Term >10 Years	\$3,000,000	\$150,000/yr.	Exempt
Tilbury	Pearl Street / Queen Street N / Centre Street E / Dufferin Street N 750mm (Figure 10-12)	Long Term >10 Years	\$3,600,000	\$180,000/yr.	Exempt
Tilbury	Lyon Avenue 900mm (Figure 10-12)	Long Term >10 Years	\$4,000,000	\$200,000/yr.	Exempt

Pumping Station Upgrades Addressing Surcharge During Large Storms

Wastewater Service Area	Project Description	Implementation Timing	Cost	Cost Per Annum	Future Municipal Class Environmental Assessment Study Required
Wheatley	SPS – 602 Pumping Upgrade	Interim Term 5- 10 Years	\$400,000	NA	Exempt

Additional Servicing Improvements

Wastewater Service Area	Project Description	Implementation Timing	Cost	Cost Per Annum	Future Municipal Class Environmental Assessment Study Required
Mitchell’s Bay	Decommissioning of Mitchell’s Bay Lagoon, Pumping and Forcemain to Chatham Water Pollution Control Plant	Long Term >10 Years	\$9,250,000	\$462,000	Exempt

Additional Studies

Wastewater Service Area	Project Description	Implementation Timing	Cost	Cost Per Annum	Future Municipal Class Environmental Assessment Study Required
Tilbury	Inflow and Infiltration Reduction Study	Short Term 0-5 Years	\$300,000	NA	Exempt
Dresden	Inflow and Infiltration Study	Short Term 0-5 Years	\$300,00	NA	Exempt

Combined Sewer Separation

Wastewater Service Area	Project Description	Implementation Timing	Cost	Cost Per Annum	Future Municipal Class Environmental Assessment Study Required
Chatham	Optimizing capacity of the combined sewer trunks / interceptors	To be determined on an individual Project Basis	\$75,000,000	\$7,500,000/year for the next 10 years	Exempt
Chatham	Continuing Sewer Separation Program for Chatham Targeting largest Downstream Sewers Feeding the Trunk / Interceptor	To be determined on an individual Project Basis	\$150,000,000	\$15,000,000/year for the next 10 years	Exempt

Table 10-2 Place Holder

Figure 10-8: Ridgetown Sewer Upsizing to Address Capacity



Figure 10-9: Blenheim Sewer Upsizing to Address Capacity

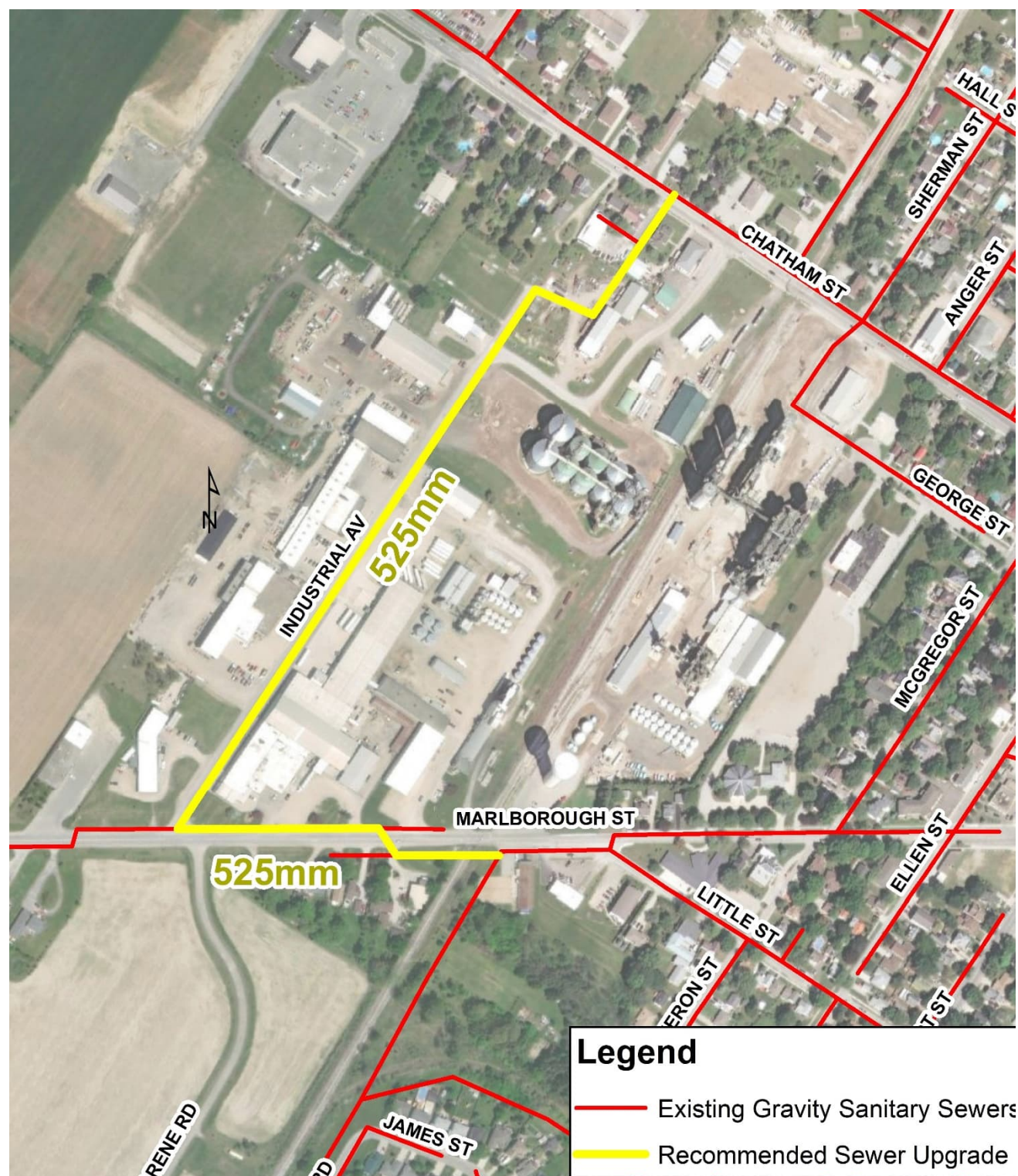


Figure 10-10: Wallaceburg Sewer Upsizing to Address Capacity



Figure 10-11: 12: Dresden Sewer Upsizing to Address Capacity

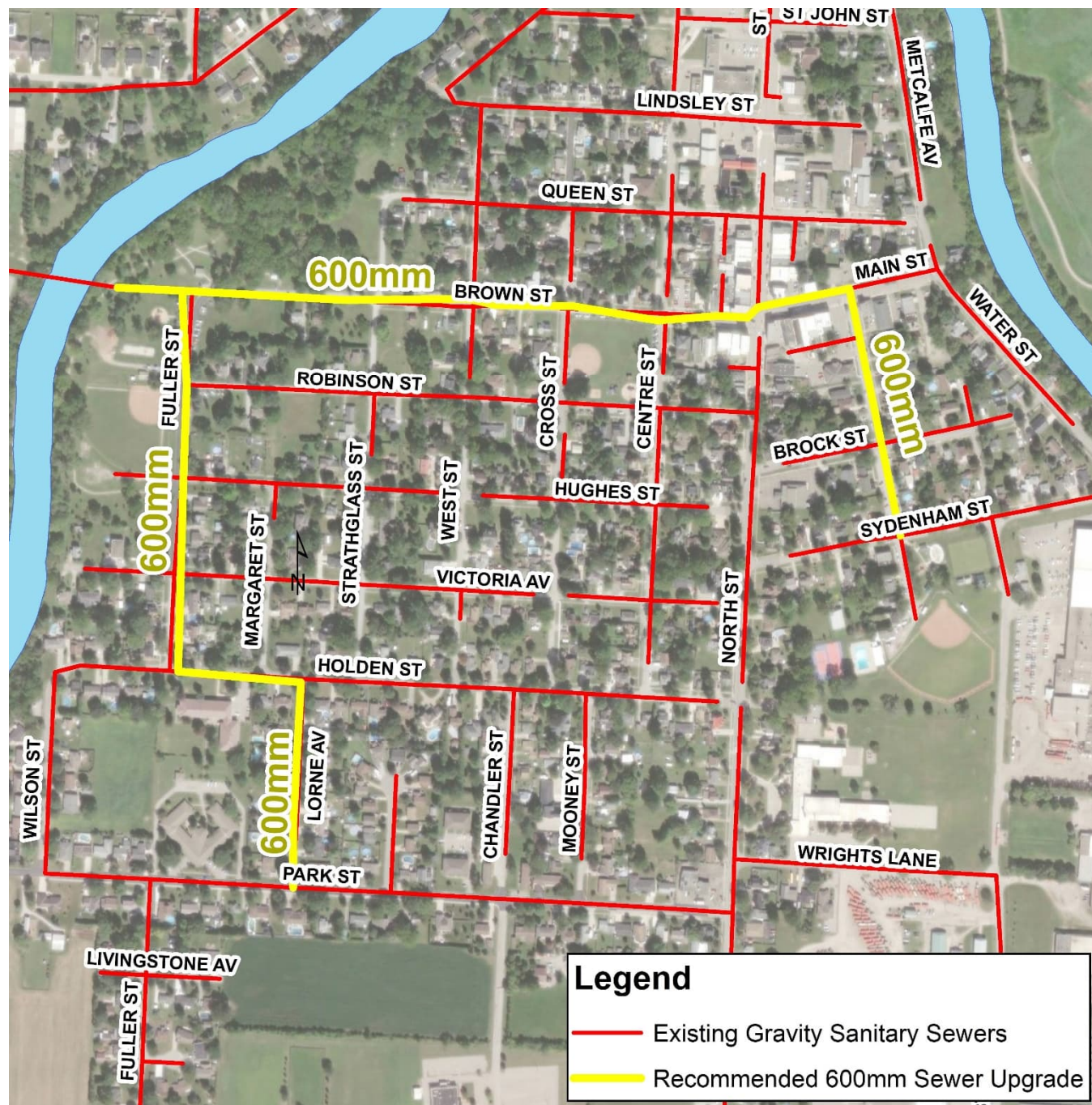


Figure 10-13: Tilbury Sewer Upsizing to Address Capacity

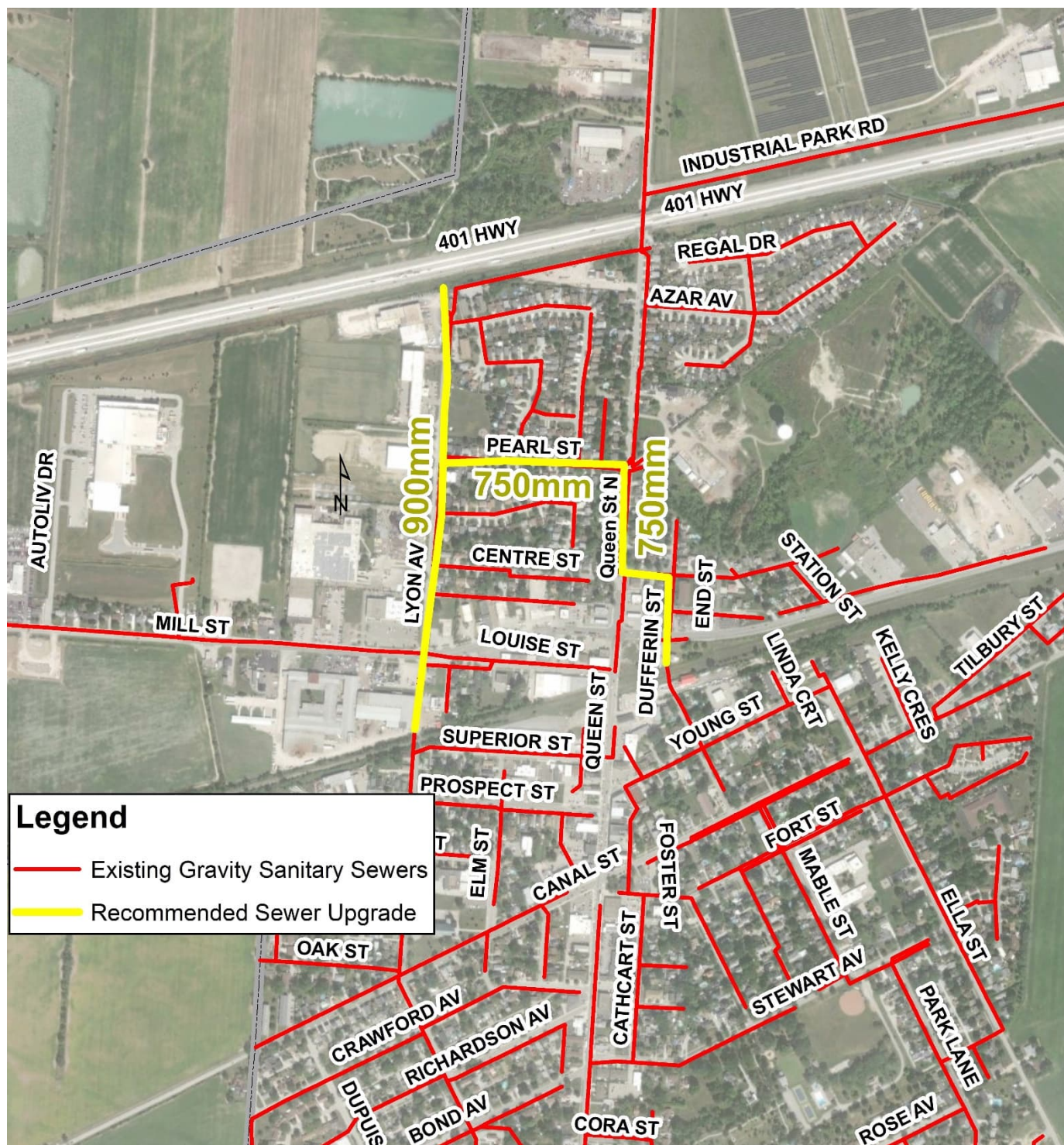


Figure 10-14: Pump Station Upgrade to Chatham SPS-103

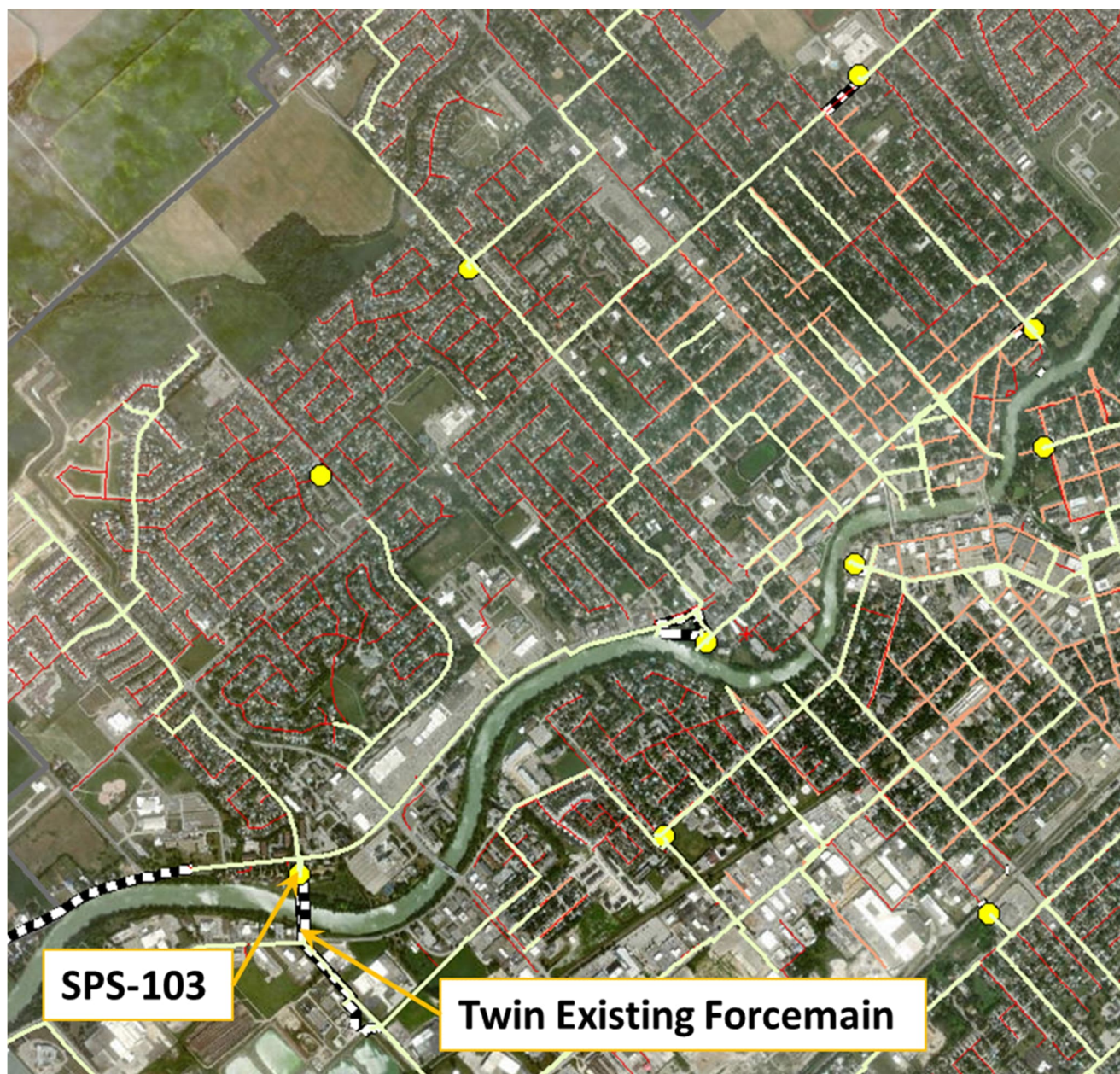


Figure 10-15: Pump Station Upgrade to Chatham Main Lift Station



Figure 10-16: Pump Station Upgrade to Wallaceburg SPS-405



Figure 10-17: Pump Station Upgrade to Wallaceburg SPS-401

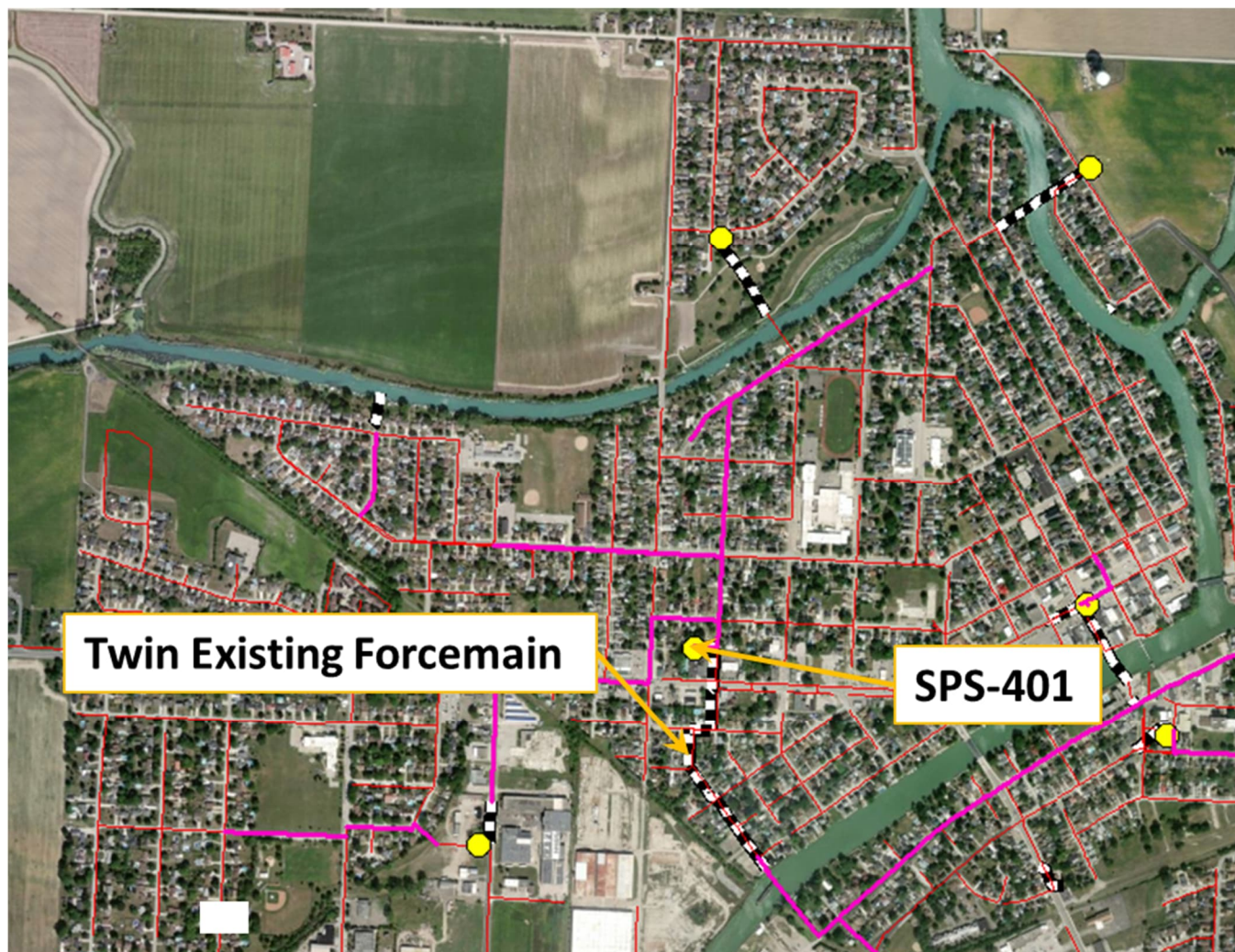


Table 10-3: Recommended Projects for the Chatham-Kent Wastewater Treatment System

Wastewater Treatment System	Project Description	Short Term 0-5 Year Implementation Cost	Interim Term 5-10 Year Implementation Cost	Long Term >10 Year Implementation Cost	Future Municipal Class Environmental Assessment Study Required
Chatham Water Pollution Control Plant	Improve effluent quality with better disinfection & better regional sludge management system. Operational improvements as part of State of Good Repair and preventative maintenance. State of Good Repair due to age of the infrastructure including major process equipment.	\$19,405,100	\$4,481,300	\$76,880,400	Exempt
Wallaceburg Water Pollution Control Plant	Operational improvements through Instrumentation & Control. Operational improvements as part of State of Good Repair and investigative studies. State of Good Repair due to age of the infrastructure including major process equipment.	\$419,350	\$1,912,600	\$48,841,650	Exempt
Blenheim Water Pollution Control Plant	Operational improvements through Instrumentation & Control. Operational improvements as part of State of Good Repair and investigative studies. State of Good Repair due to age of the infrastructure including major process equipment.	\$2,343,400	\$2,137,850	\$9,204,300	Exempt
Dresden Water Pollution Control Plant	Operational improvements through Instrumentation & Control. Operational improvements as part of State of Good Repair and investigative studies. State of Good Repair due to age of the infrastructure including major process equipment.	\$657,800	\$4,277,527	\$9,044,750	Exempt
Merlin Water Pollution Control Plant	Operational improvements as part of State of Good Repair and preventative maintenance. Implementation of a Mechanical treatment facility to improve effluent quality.	\$32,890	\$0	\$13,088,600	Exempt
Mitchell's Bay Water Pollution Control Plant	Operational improvements as part of State of Good Repair and preventative maintenance. Decommissioning of Mitchell's Bay Lagoon, Pumping and forcemain to Chatham WPCP	\$32,900	\$82,200	\$0	Schedule B Class Environmental Assessment

Table 10-3: Recommended Projects for the Chatham-Kent Wastewater Treatment System

Wastewater Treatment System	Project Description	Short Term 0-5 Year Implementation Cost	Interim Term 5-10 Year Implementation Cost	Long Term >10 Year Implementation Cost	Future Municipal Class Environmental Assessment Study Required
Ridgetown Water Pollution Control Plant	Operational improvements as part of State of Good Repair and Investigative studies.	\$246,700	\$65,800	\$9,949,200	Exempt
	Operational improvements as part of State of Good Repair.				
	State of Good Repair due to age of the infrastructure including major process equipment.				
Tilbury Water Pollution Control Plant	Operational improvements as part of State of Good Repair and Investigative studies.	\$263,100	\$6,199,800	\$9,886,700	Exempt
	Operational improvements as part of State of Good Repair and preventative maintenance.				
	State of Good Repair due to age of the infrastructure including major process equipment.				
Wheatley Water Pollution Control Plant	Operational improvements as part of State of Good Repair and Investigative studies.	\$235,000	\$1,248,000	\$6,325,000	Exempt
	Operational improvements as part of State of Good Repair and preventative maintenance.				
	State of Good Repair due to age of the infrastructure including major process equipment.				

10.3 Southwest Chatham Servicing Study

The Municipality of Chatham-Kent has also initiated a Municipal Class Environmental Assessment Master Plan (“Approach 1”) study to develop a strategy for Sanitary, Stormwater and Water servicing for the Southwest Area of Chatham (currently outside of the existing Chatham urban boundary) to address servicing requirements and future growth needs especially for the employment lands in the area of the Highway 401 and Bloomfield Road interchange.

This 2023 Water and Wastewater Master Plan has taken the Southwest Chatham Servicing study into consideration when developing the wastewater generation and potable water needs for this area. However, once the Southwest Chatham servicing study is completed, it will ultimately identify all required linear and vertical infrastructure requirements which is not the objective of this Master Plan report. The Southwest Chatham Servicing study will also support any future urban boundary expansion and subsequent Official Plan Amendment.

11. Financing Water and Wastewater Projects

11.1 Overview

This section summarises the following:

- Review of the available water and wastewater forecast study.
- Financial ability of the Chatham-Kent Public Utilities Commission to fund the recommended water and wastewater infrastructure.
- Identify the various funding sources and whether the Chatham-Kent Public Utilities Commission needs to consider them.

In 2020, the Chatham-Kent Public Utilities Commission received a Water and Wastewater Rate Study prepared by Watson & Associates Economists limited (Dated January 09,2020). The study window was 2020 to 2029 inclusive.

The study had identified that PUC's 2020 to 2029 capital spending program for water and wastewater is \$214 M and \$255 M (inflated), respectively.

- Over the forecast period, increase the relationship of the water decreasing block volume rate (relationship of block 2 as a % of block 1) from 57% to 65% by 2029.
- Over the forecast period, increase the relationship of the wastewater decreasing block volume rate (relationship of block 2 as a % of block 1) from 55% to 65% by 2029.
- New water customers are forecasted to increase by 112 customers annually to 2029.

The basis for these forecasts identified in this study, is the PUC's capital budget.

The capital expenditures under water infrastructure were categorised as studies (year 2024, and 2029), Short term projects (2020 to 2024) and medium-term projects (2025-2029), as listed below:

- Studies - \$34,000.
- Short term - \$28,771,000
- Medium Term - \$21,409,000

The capital expenditures under water infrastructure were categorised as capital expenditures (year 2024, and 2029), Short term projects (2020 to 2024) and medium-term projects (2025-2029)., as listed below.

- Studies - \$23,000.
- Short term - \$27,292,000

- Medium Term -\$64,940,000

A review of the costs indicated that more capital funding is recommended for short term water related infrastructure, and medium-term wastewater related infrastructure.

11.2 Capital Costs

A Summary of the capital costs for the recommended alternatives under Water and Wastewater Infrastructure listed earlier are provided herein. Given the significant capital costs and applicable available funding sources (e.g., development charges, water rates, use of reserves) it is imperative that the PUC allocate sufficient budgetary provisions for the procurement or renewal of these assets in the near term, interim term and long term.

Table 11-1: Capital Cost for Water Infrastructure

Alternative	Near Term (until 2027)	Interim (up to 2032)	Long term (2051)
Alternative 4- Water System Improvements* Addresses the Problem and Opportunity Statement. Provides ability to accommodate future growth. Should be considered with Alternative 3-Water Conservation/Reduction in Use.	\$ 107,901,300	\$ 308,230,100	\$ 51,486,100

*Note: * It should be noted that the alternative 3 - **Water Conservation/Reduction in Use**, will provide some relief for water treatment and distribution but does not consider future growth and would not be an adequate solution on its own.*

A Summary of the capital costs for the recommended alternatives under Wastewater Infrastructure listed earlier are provided herein.

Table 11-2: Capital Cost for Wastewater Infrastructure

Alternative	Near Term (until 2027)	Interim (up to 2032)	Long term (2051)
Alternative 4 - Wastewater Treatment and System Improvements* Addresses the Problem and Opportunity Statement. Provides the ability to accommodate future growth.	\$140,589,800	\$149,613,300	\$213,895,900

Alternative	Near Term (until 2027)	Interim (up to 2032)	Long term (2051)
Should be considered with Alternative 3 – Inflow and Infiltration Management.			

Note: * It should be noted that the alternative 3 - **Inflow and Infiltration Management**, will provide some treatment and sewer capacity relief but does not address future growth and would not be an adequate solution on its own.

**The costs include a 30-year projection of sewer separation program completion, at an average of \$7.5 M/yr. for the Community of Chatham.

A comparison between the forecasted value in the rate study report and estimated costs from the technical work of modelling and site investigation for the 2020 - 2029 indicated period the following:

- Costs associated with water related infrastructure identified for the near term were at least 3 times more than identified in the rate study report.
- Costs associated with wastewater related infrastructure identified for the near term were less than 10%, with the differentiator being the Central Chatham Sewer Separation Program.

A significant difference was noted in between the interim term requirement for the water related infrastructure between the works.

The primary reason for these differences in the near and interim terms were as follows:

- Need for increased storage capacity at the Chatham Water Treatment Plant.
- All works such as New raw water transmission main, new intake and low lift pumping station for new Wallaceburg Water Treatment Plant, New storage reservoir (56ML) and the new storage reservoir (56ML) for the Wallaceburg community.
- Increase the treatment capacity at the existing Chatham Water Treatment Plant.
- Integration of Transmission Main for Blenheim and Ridgetown.
- Treated water transmission main at Wallaceburg.

The following cost summary considering both works, provides the capital forecast in this assessment for both near term and interim terms for the water only.

Table 11-3: Near and Interim Term Water Capital Forecast

Item	Near Term	Interim Term
Works considered in the report (2023 -29)	\$9,555,000	\$18,701,000
Works considered in this Master Plan	\$100,001,250	\$ 308,220,418

Item	Near Term	Interim Term
Total	\$109,556,250	326,921,418

Note: * The common works considered from the rate study report for both near and interim terms was 'elevated tank improvement allowance'.

The following cost summary considering both works, provides the capital forecast in this assessment for both near term and interim terms for the wastewater only.

Table 11-4: Near and Interim Term Wastewater Capital Forecast

Item	Near Term	Interim Term
Works considered in the report (2023 - 29)	3,070,000	16,732,240
Works considered in this Master Plan	21,540,000	\$ 22,168,377
Total	24,610,000	38,900,617

Note: * The works considered from the rate study under the interim term were the Central Chatham Sewer Separation program -Sewers and Pumping Stations'.

11.3 Capital Financing

When planning for new infrastructure, many municipalities apply a “user pays” principle which is based on the premise that those who benefit from new growth-related infrastructure should be the ones who pay for it. This applies to the users associated with new growth as well. However, this approach of relying on the tax base is only successful for municipalities when they plan to finance a Capital works project(s). Herein an overview of potential finding sources for the growth-related infrastructure identified in this report.

11.4 Subsidies and Grants

Over the past decade, the province and in some cases the Federal government have offered Municipalities various funding programs that are typically based on a cost-share formula (e.g.. One third contribution from Province, Federal government and Municipality) for projects, especially major works.

Some of the available grant sources are Federal Funding (Clean Water and Wastewater Fund – Phase 2), Federal Gas Tax, and Provincial Funding (Ontario Community Infrastructure Fund, and Building Ontario Up related investment).

11.5 Reserves

Per section 4.5 of the 2020 Rate Study report used herein, the Public Utilities Commission has established reserves and reserve funds for investments needed for Water and Wastewater Infrastructure projects. There are two types of reserves: capital reserves and lifecycle reserves (long term infrastructure). Note that these reserves are funded directly by annual contributions from rates and do have a direct impact on the water and wastewater users. The PUC is continuing with this practice and remains the primary basis for funding.

As of January 1, 2022 (from the 2021 consolidated financial statement report by Deloitte) the available funding for both water and wastewater are as follows:

- Water - \$ 10,194,308
- Wastewater - \$17,799,966

11.6 Direct Developer Costs

This is another way of funding new projects. By charging the developer of a land, recognizing the that the identified infrastructure is required to service the new development project within the existing urban boundary, or a new land added to the existing urban boundary. At this time, no Development Charges revenue has been considered in the cost estimates of projects identified from the Master Plan projects.

11.7 Debenture Financing

This is another method used by municipalities to assist in cash flowing large capital expenditures, while ensuring to minimize the overall cost to the Taxpayer. This approach is regulated by the province, through O.Reg 403/02.

The Municipality's estimated annual repayment limit, (as identified in the Ministry of Municipal Affairs and Housing based on 2021 Financial Information Return) for 2023 is \$54,996,293.

11.8 Tax Base

Tax base can be utilized for the water and wastewater infrastructure recommended in the Master Plan report as the Municipality already taxes on the existing infrastructure used to provide water and wastewater servicing.

11.9 Debt Financing

Infrastructure Ontario (this crown corporation has merged the former OSIFA) has been set up by the Province of Ontario as a tool to assist municipalities in renewing their infrastructure through low cost and long-term financial assistance.

The program includes the amongst many infrastructure facilities, the following:

- Clean water infrastructure.
- Sewage infrastructure.
- Waste management infrastructure.

An eligible applicant for the loans from this corporation, must submit a formal application along with pertinent financial information. Allotments are prioritized and distributed based upon the assessment of need undertaken by the province.

The consultant of the Rate Study report had identified that at the time of 2020 report preparation, the PUC will not require debt financing for the capital projects identified.

AECOM is of the opinion that Chatham-Kent Public Utilities Commission revisits this recommendation due to the capital requirement identified for both near an interim water and wastewater infrastructure funding requirements identified in this section.

11.10 Operating Cost

The probable direct operating cost associated with the recommended projects under the water and wastewater alternatives were considered in this analysis.

This includes a review of sections 5.2 and 5.4 and Tables 5-1 and 5-2 from the 2020 Rate Study. Specifically, attention was given to the period of 2023 to 2029, which falls within the period of interest for the Master Plan – near term and interim term.

Considering the following recommended improvements which are significant compared to the proposed projects listed in the study, the operating costs should be revisited.

- Need for increased storage capacity at the Chatham WTP – to meet the demand for Chatham Service area.
- All works such as New raw water transmission main, new intake and low lift pumping station for new Wallaceburg Water Treatment Plant, New storage reservoir (56ML) and the New Water Treatment Plant for Wallaceburg-Dresden Integrated Water System for the Wallaceburg community.
- Increase the treatment capacity at the existing Chatham Water Treatment Plant to meet the future growth demand including Greenhouses.

- Integration of Transmission Main for Blenheim and Ridgetown. Construction of this capital works will allow the decommissioning of Ridgetown WTP, and thus could greatly reduce the operation and maintenance costs. Using the available information from the 2012 Master plan, the \$447,000 when inflated to 2029 is about \$672,690 at 2.43%.

In the case of the wastewater scenario, the recommended major project work will be occurring at Chatham Water Pollution Control Plant in the near term. This capital works is likely to alter the estimated operating costs for the Chatham Water Pollution Control Plant.

12. Consultation

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

- Generate awareness of the project and provide opportunities for involvement throughout the planning process; and
- Facilitate constructive input from public and agency stakeholders at key points in the MCEA process, prior to decision-making.

The MCEA process requires two points of mandatory contact for a Master Plan Approach 1 project, which are:

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

For this study five (5) points of contact were made. The first was a Notice of Study Commencement, the second was Public Information Centre #1, to introduce the project and provide a background summary of the need for this study, the third was Public Information Centre #2 to provide additional information including opportunities and constraints, the fourth was Public Information Centre #3 to provide the recommended projects to address the problem and opportunity statement, and lastly a Notice of Study Completion was the fifth point of contact.

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

12.1 Public Consultation

Table 12-1: Public Consultation Notices

Notice	Publication Date
Notice of Commencement Appendix A.1	January 6 th , 2023
Notice of PIC #1 Appendix A.2	January 16 th , 2023
Notice of PIC #2 Appendix A.3	July 19 th , 2023
Notice of PIC #3 Appendix A.4	September 11 th , 2023
Notice of Completion Appendix A.5	November 20 th , 2023

12.1.1 Notice of Study Commencement

The Notice of Commencement was first issued on January 6th, 2023, introducing the Master Plan study and included the project webpage (<https://www.letstalkchatham-kent.ca/chatham-kent-water-and-wastewater-master-plan>) which provided contact information for the Chatham-Kent Public Utilities Commission and consultant project managers. The following describes the methods by which the notice was distributed:

- Advertised in the Following local newspapers:
 - Tilbury Times
 - The Ridgetown Independent New
 - Blenheim News Tribune
 - Southpoint Sun
 - The Herald
 - The Chatham Voice
 - West Elgin Chronicle
 - Wallaceburg Courier Press
 - The Chatham Daily News

- Chatham This Week
- Advertised on the Chatham-Kent Public Utilities Commission Facebook page.
- Municipality of Chatham-Kent Facebook page
- Chatham-Kents Lets Talk page
- Issued to the Study's contact list.

12.1.2 Public Information Centre 1

The first Public Information Centre was an online presentation that went live on November 30th, 2021, and remained accessible for the remainder of the project. The purpose of the PIC was to introduce the project, share background study findings and gather comments on the following:

- Problem and Opportunity Statement.
- Existing conditions.
- The Master Plan process.
- Design Criteria.
- Next steps of the study.

Following a two (2) week review period there were one (1) comment regarding the presented materials. The comment is listed in **Table 12-2**.

Table 12-2: Public Information Centre 1 Comments

Comment	Response
This municipality covers a large geographic area with multiple water and wastewater infrastructure assets. It would be financially impossible to expand all of them at one time, while developers will want to develop in every area at similar times. It will be necessary to only allow growth in areas to the level that their infrastructure can handle until there is improved infrastructure. This is something that council has not had the stomach to do. This infrastructure project, the desire for a new municipal hub, rebuilding downtown Wheatley, Highway 3 diversion, shoreline erosion, and the dike at Erieau will all fight for budget dollars that are shrinking. At the same time taxpayers are upset that council is demanding more money from a municipality with below average household incomes. And then there are the twin issues of rising interest rates and inflation. Whatever is decided	This Study is a road map for existing and future water and wastewater needs for the community of Chatham-Kent and will be used to plan infrastructure to accommodate growth to the year 2051. These projects will be necessary to maintain existing water and wastewater services and to plan for the future allowing for residential, commercial and industrial growth.

Comment	Response
will lead to community outrage so be prepared for a fight to prove that this project is more important than it's competing issues.	
Is there/has there been any consideration providing water to the remaining 20 houses by connecting the communication road and Doyle Line water services.	At this time there is no scheduled project to install a watermain along Communication Road. However, you could petition for municipal water. A petition procedure form to have water municipal water was provided.

12.1.3 Public Information Centre 2

The Second Public Information Centre was an online video presentation that went live on August 25th, 2023, and remained accessible for the remainder of the project. The purpose of the Public Information Centre was to summarize Public Information Centre 1, summarize the water and wastewater servicing strategies, describe evaluation criteria, present the recommended strategies, and gather feedback on:

- The recommended water and wastewater servicing strategies
- The evaluation criteria and process
- Next steps of the study.

Following a two (2) week review period there were no relevant comments regarding the presented materials.

12.1.4 Public Information Centre 3

The Third Public Information Centre was an online video presentation that went live on September 25th, 2023, and remained accessible for the remainder of the project. The purpose of the Public Information Centre was to summarize Public Information Centre 2, summarize the water and wastewater servicing alternative, present the recommended water and wastewater projects, and gather feedback on:

- The recommended water and wastewater projects.
- The project capital costs and timing.
- Next steps of the study.

Following a two (2) week review period there were no relevant comments regarding the presented materials.

12.1.5 Notice of Study Completion

The Notice of Completion was sent out to review agencies, stakeholders, Indigenous Communities, local residents, posted on the Chatham-Kent Let's Talk Page, posted on the Chatham-Kent Public Utilities Commission Facebook page, posted on the Municipality of Chatham-Kents Facebook/Instagram page and posted in the same local papers as the Notice of Study Commencement, indicating that the report will on public record for 30 calendar days. During the 30-day review period, anyone with an interest could provide comments or ask questions. The notice briefly outlined the recommended projects/servicing strategies and provided a link to the location where the report could be viewed or downloaded. **Table 12-3** summarizes the comments received during the 30-day review period.

Table 12-3: Public Comments during the 30-day review Period

Comment / Issue	Response
Pending...	

12.2 Agency Consultation

All relevant regulatory agencies and authorities were contacted at the project initiation stage through correspondence notifying them of the study commencement and requesting their comments. All of these agencies were included in the project mailing list, which was updated regularly to ensure accuracy. They were also notified of the PICs and the Notice of Completion. The following section provides a summary of correspondence received from external agencies. Agency correspondence can be found in **Appendix A.6**.

Table 12-4: Agency Comments

Agency	Comment	Response
Ministry of Environment Conservation and Parks (MECP)	MECP provided information on the following: Requirements for duty to consult with Indigenous Communities.	This Study has undertaken the necessary requirements to fulfil the Duty to Consult. See

Agency	Comment	Response
		Section 12.3 for details of Indigenous consultation.
Lower Thames Valley Conservation Authority	Since the plan includes potential changes to drinking water infrastructure within a regional source protection area, certain regulations may apply to any potential or planned changes. It is important for our office to provide early engagement and clear direction regarding source water protection policies and consultation in the initial stages of the process. This allows us to identify any impact these policies and regulations may have on decisions as you move forward with the plan. With this in mind, certain sections of the Safe Drinking Water Act and the Clean Water Act will apply as follows: • Safe Drinking Water Act, O.Reg. 205/18 - Municipal Residential Drinking Water Systems in Source Protection Areas • Clean Water Act, O.Reg. 287/07 General - Section 48, Amendments to Source Protection Plan	This Study has taken this into consideration. As this Master Plan is being conducted at a broad level, further studies will be required for some projects (Schedule B and C). Recommended projects requiring a Schedule B or C Environmental Assessment will include greater investigations into source water and source water protection.

12.3 Indigenous Communities

All Indigenous Communities outlined in the MECP Notice of Commencement correspondence have been contacted via a Notice of Commencement/Project Introduction/Invitation to consult. These Indigenous Communities were also sent the Notice of PICs and the Notice of Completion. The following communities were contacted throughout the course of this study.

- Aamjiwnaang First Nation.
- Bkejwanong Territory (Walpole Island First Nation).
- Caldwell First Nation. (Contacted using the Online Portal)
- The Chippewas of Kettle and Stony Point First Nation.
- Chippewas of the Thames First Nation.
- Eelunaapeewi Lahkeewiit (Delaware Nation).
- Munsee-Delaware Nation.
- Oneida Nation of the Thames.

None of the communities contacted provided and comments or concerns.

13. Master Plan Commitments, Mitigation and Monitoring

13.1 Mitigation Measures

13.1.1 Climate Change and Sustainability

The implications of climate change have a far-reaching impact on the planning, design, construction, and management of both capital assets and the water sources. Changing weather patterns, increased frequency of extreme events, and fluctuating temperatures can significantly impact the life and efficiency of assets. Likewise, it will impact source water's quality and quantity, which will in turn stress the assets. For the Chatham-Kent Public Utilities Commission, these changes can bring about increased costs, compromised service delivery, and potential risks to public safety. Therefore, it's crucial for the Chatham-Kent Public Utilities Commission to integrate climate change considerations into their decision-making processes for the new capital assets and continue to manage their source water through conservation practices, protection measures to manage the water balance.

The excessive flooding can result in unwanted Inflow and Infiltration impacting both the collection treatment systems. Overflows can result in unwanted sewage spills to the water bodies, while washouts at the treatment plants could result in a comprise to the effluent quality. Aside from the effluent quality, this may result in person hours to be diverted to address the issue.

It is suggested that the PUC develop a plan to mitigate the environmental impacts. Such a plan will aid to address the pervasive effects of climate change, emphasizing both mitigation and adaptation. The plan can consider the profound impacts of shifting climates, such as rising temperatures, unpredictable crop yields, and increased extreme weather events.

While sustainability has various definitions, from a Municipality's perspective of management of both water resources and protection and wastewater handling including options for energy conservation and energy recovery, involves balancing today's resource needs with those of the future to ensure that the objective is met.

As far water distribution and treatment from a sustainability perspective, it is suggested that aside from the major item which is the source itself – water, there are secondary factors that need to be addressed. For example, operation of the facility is managed in a way, so that supply meets the demand and thus energy and the accessories such as chemical usage is conserved. Operating environment should be maintained in such a way that it doesn't lead to corrosion, which can affect the asset, leakage with water wastage, and metal such iron or copper leaching into the water.

Similarly for wastewater collection and treatment, it is important that wastewater is considered as a resource in terms of energy, fuel and fertilizer. Water conservation can result in a better strength wastewater than diluted or low strength wastewater, which will allow better management of energy in terms of a pumping station operation as well as the mechanical equipment inclined biological treatment operation. Both are considered to be major energy consuming equipment in wastewater management.

Anaerobic Digestion is one of the useful wastes to productive energy technologies used at a wastewater treatment plant. The Chatham Water Pollution Control Plant is equipped with an anaerobic digestion complex, and waste sludge generated at Water Pollution Control Plant from other communities are shipped herein for treatment. The Chatham-Kent Public Utilities Commission can consider managing this complex including gas handling accessories better in the future to derive more benefits in terms of reusable energy for plant operation, and effective biosolids disposal.

13.1.2 Source Water Protection

Most of the Water Treatment Plants, except for the Ridgetown Water Treatment Plant in the Municipality are serviced by surface water resources.

The quality of surface water in the last two decades, especially in North America is showing a steady decline due to climate change, the presence of emerging contaminants of concern such as PFAS, algal toxins, microplastics, endocrine disrupting chemicals, and Pharmaceuticals and personal care products. Besides the climate, densification of population, and the public's approach to waste disposal are also responsible for the declining water quality.

What are the key potential water quality concerns?

- More frequent and/or more severe Turbidity spikes
- More frequent and/or more algal blooms
- Increase in algal toxins
- Presence of PFAS compounds
- Presence of Microplastics

Every owner and operators of a municipal drinking water system has to abide by the Ontario Government's drinking water regulations (O. Reg 170/03) under the Safe Drinking Water Act 2002. Each of these owner and operators are required to establish, maintain and continually improve a Quality Management System (QMS) based on the requirements of the Drinking Water Quality Management Standard (DWQMS). Chatham-Kent Public Utilities Commission prepares an annual report on drinking water and wastewater quality management system communication and annual information and makes it public. In this report, the Chatham-Kent Public Utilities Commission

through sections Raw Water Supply and Drinking Water Quality Trends, Changes that could affect the Quality Management Systems and Staff Suggestions continues to monitor the source water quality trends throughout the year,

Besides as part of an on-going practice the Chatham-Kent Public Utilities Commission through the following actions and activities continues to safeguard, maintain, or improve the quality and/or quantity of sources of drinking water and their contributing areas.

- Riparian zone restoration to reduce runoff pollution.
- Stream bank stabilization to reduce sedimentation.
- Best management practices for stormwater control.
- Local ordinances to limit certain activities in source water or wellhead protection areas.
- Developing emergency response plans.
- Educating local industry, businesses, and citizens on pollution prevention and source water protection.
- Studies to get an understanding of the hydrological and or hydrogeological environment of the water sources, and implement recommendations (e.g., Vulnerability of Ridgetown aquifers within the delineated Well Head Protection Areas).

13.2 Approvals

The recommended projects under both Water and Wastewater infrastructure in this report, will fall under the Municipal Class Environmental Assessment Schedule B and C studies. When these projects get implemented, depending on the complexity, approvals will be required from various regulatory authorities not limited to Ministry of Environment Conservation and Parks (Drinking Water Works Permit, ECA – Wastewater), Lower Thames Valley Conservation Authority, St Clair Region Conservation Authority, Electrical Safety Authority, and Ministry of Natural Resources and Forestry.

14. Conclusion and Next Steps

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

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

Appropriate public notification and opportunity for comment was provided and no comments were received that could not adequately be addressed. Subject to receiving Municipal Class Environmental Assessment clearance following the 30-day review period, the Chatham-Kent Public Utilities Commission can start the detailed design and permitting-approvals phase for selected MCEA exempt projects, and proceed with additional studies required to meet Schedule B and C MCEA project requirements according to the timing outlined in this report.