NOTICE OF COMMENTS RECEIVED

Following Completion of the 30-day Public Review Period

The Municipality of Thames Centre filed the Water and Wastewater Master Plan report for the 30-calendar day public review period from **September 6, 2019 to October 6, 2019**. The report was available at the Municipality of Thames Centre located at 4305 Hamilton Road, Dorchester, ON N0L 1G3, during business hours. Electronic copies were available on the municipal webpage and were provided electronically when requested.

All comments received were tracked under the Communications and Engagement Plan, which can be found in **Appendix E** or **Table 5-3: Consultation Comments Summary on Pages 153-155** of the final report. The following revisions have been made to the Water and Wastewater Master Plan report:

Page 54, Table 1-11: Assessment of Impacts to Previously Identified Cultural Heritage Resources

- The word “previously” was removed from the table to avoid misinterpretation and possibility of omitting known and potential cultural heritage resources as recommended by the Ministry of Heritage, Sport, Tourism and Cultural Industries (MHSTCI).

Pages 89-97, Figures 2-12 to 2-16: Alternative Alignments

- Map labels created to differentiate between “Alternative 1” and “Alternative 2”.

Page 122, Section 3.5: Wastewater Servicing Strategy

- MHSTCI requested clarification on how cultural heritage resources would be avoided. This report section is intended to summarize the evaluation criteria that were reviewed for each alternative. Any known potential disruptions to cultural heritage would be captured during the project evaluation phase.

Page 125, Table 3-8: Evaluation of North Dorchester Wastewater Servicing Alternatives

- Modified table to include cultural heritage resources in the social/cultural evaluation criteria as requested by MHSTCI.

Page 145, Section 4.1.3: Ministry of Heritage, Sport, Tourism and Cultural Industries

- Updates to MHSTCI’s role in the review and approval process.

Page 146, Section 4.21: Archaeological and Built/Cultural Resources

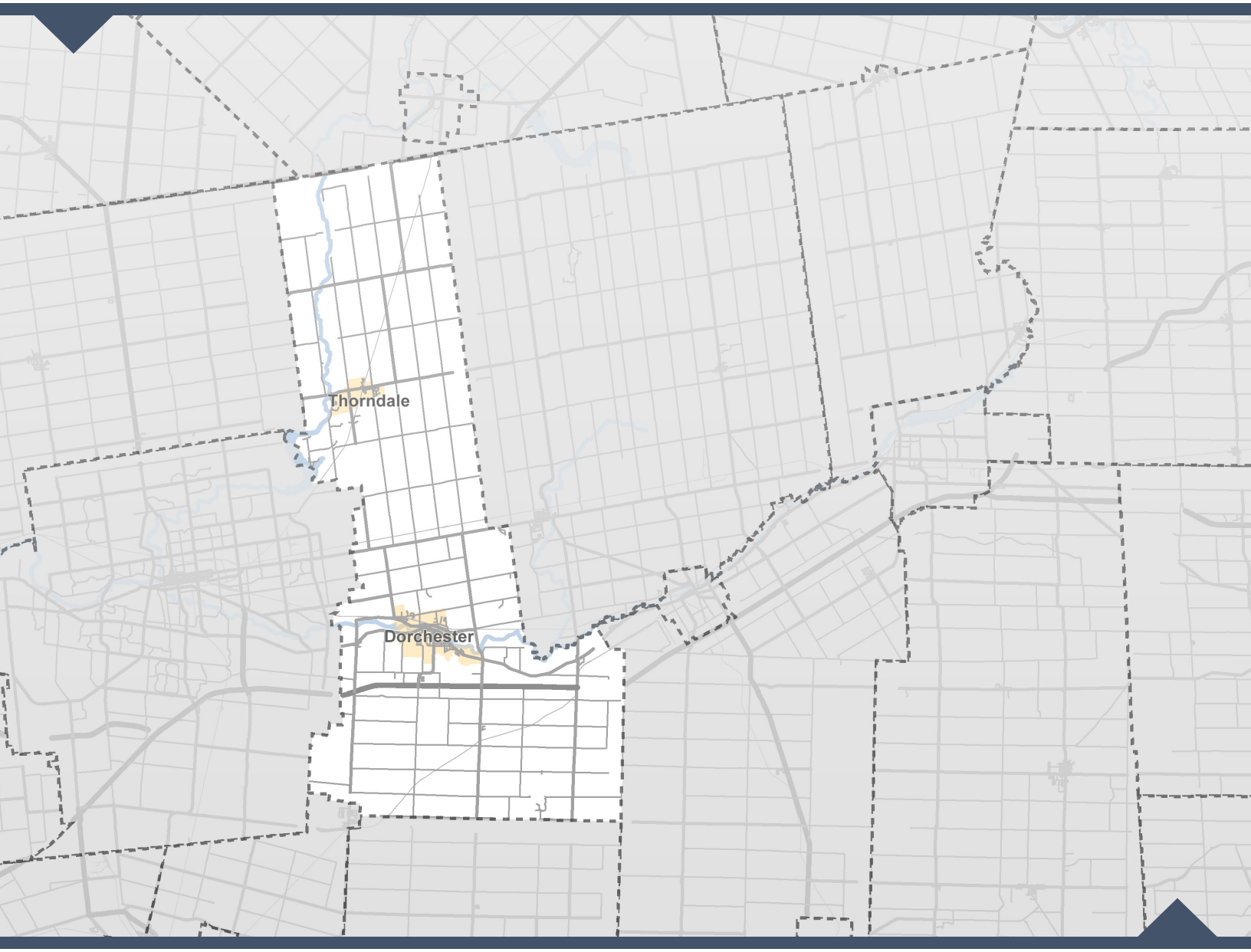
- Revised mitigation measure bullets to include additional scope and items as requested by MHSTCI.

Appendix E: Communications and Engagement Plan

- Updated to include comments received during the 30-day review period.

WATER AND WASTEWATER MASTER PLAN UPDATE – EXECUTIVE SUMMARY

Project No. 418109
November 2019



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1 Introduction

1.1 Background

The Municipality of Thames Centre is one of eight lower tier municipalities in Middlesex County situated within the Upper Thames River basin. The Municipality comprises a 2016 census population of 13,191, with approximately half the population located within the Municipality's two urban areas, Dorchester and Thorndale.

The Municipality of Thames Centre's water and wastewater servicing is operated under a single-tier system. The Municipality is responsible for the water supply, storage facilities and the distribution system; as well as wastewater treatment, pumping stations and the sewer collection system.

The Municipality of Thames Centre retained GM BluePlan Engineering Limited (GM BluePlan) to complete the Waster and Wastewater Master Plan Update which provides the review and development of water and wastewater servicing strategies for servicing within the Municipality. The Master Plan uses population and employment growth forecasts based on anticipated growth to buildout of the urban areas.

The Study Area for the Master Plan focuses on the existing service areas within the Communities of Dorchester and Thorndale, but also provides comment on municipal water and wastewater servicing for areas peripheral to the urban areas where the Municipality currently does not provide municipal servicing. The study area is shown in **Figure ES-1**.

The 2019 Master Plan Update builds on the 2008 Water and Wastewater Master Plan, as well as the 2018 Development Charges Background Study Report – Water and Wastewater Servicing. The Master Plan Update is a critical component in the Municipality's planning for growth and will provide the framework and vision for the water and wastewater servicing needs to Buildout.

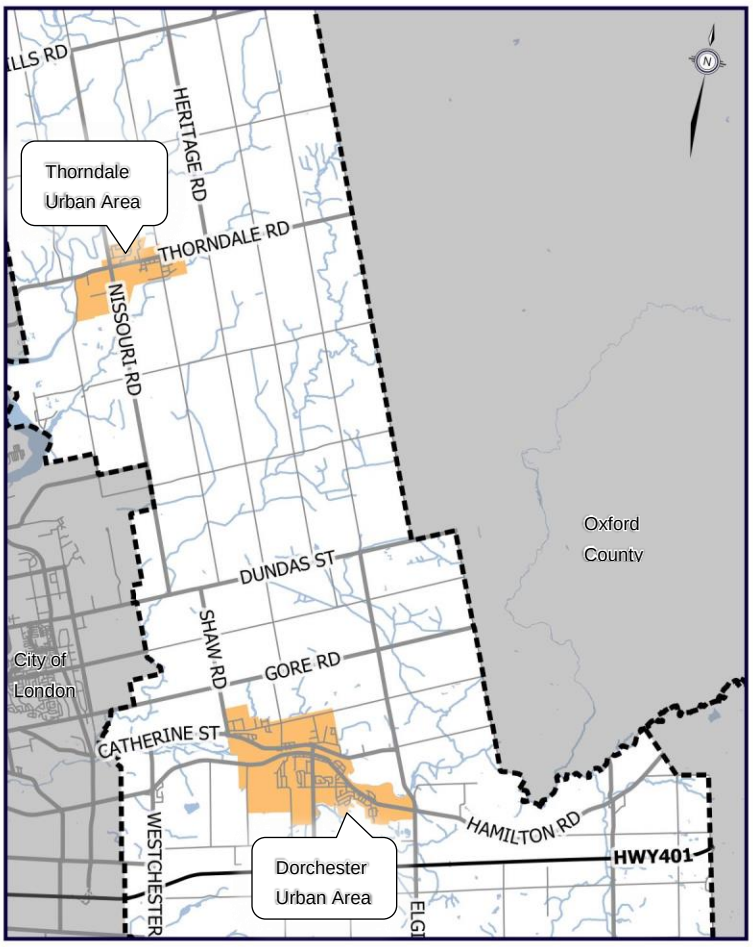


Figure ES-1: Municipality of Thames Centre Water and Wastewater Master Plan Study Area

1.1.1 Master Plan Objectives and Outline

The Master Plan comprehensively documents the development of the preferred water and wastewater servicing strategies for the Municipality of Thames Centre to meet the servicing needs of existing users and future development to buildout.

The Master Plan evaluates the ability of existing and planned water and wastewater infrastructure within the Municipality of Thames Centre to efficiently and effectively service the Municipality's existing population, service the forecasted growth, and evaluate/develop recommended servicing strategies.

There are generally four approaches to undertaking Master Plans under the Class EA process. This study follows Approach 1 of the approved master planning Class EA process. Under this approach, the Master Plan document is completed through a conceptual and strategic level study where detailed investigations would be required at

the project-specific level for individual Schedule B and C projects or developer led requirements identified though the Master Plan.

1.2 Background and Planning Context

1.2.1 Problem and Opportunity Statement

Through the Municipal Class EA process, Phase 1 requires the identification of a problem or opportunity statement that guides the development and evaluation of alternative strategies to address the deficiencies identified in the water and wastewater systems.

The Water and Wastewater Master Plan Update has been initiated to:

- Re-evaluate growth needs and water supply and wastewater treatment capacities;
- Review approach and ability to support responsible development and coordinate integrated solutions with growth areas;
- Plan for Buildout that includes flexibility in servicing strategy and understanding of servicing impacts and costs; and,
- Update the long-term financial planning that includes a capital forecast to service existing and support growth and can be used as basis for development charges and rate updates.

The 2019 Water and Wastewater Master Plan Update:

- Provides background information and context for servicing needs;
- Outlines existing baseline of the system and demonstrates impacts of growth;
- Establishes preferred servicing strategies; and,
- Provides technical information to support staff through implementation.

1.2.2 Water and Wastewater Master Plan Update Vision

The Thames Centre Master Plan Update establishes a preferred servicing strategy for Water and Wastewater that:

- Meets current needs of the Municipality;
- Supports growth;
- Maintains or improves service levels;
- Improves system resiliency and operational flexibility;
- Considers the long-term financial viability of the water and wastewater systems.

1.2.3 Study Area

Development within Dorchester and Thorndale is restricted to within the urban areas' Settlement Boundaries. There is potential for future development within peripheral areas to the Settlement Boundaries in both Dorchester and Thorndale. Development outside of the Settlement Boundaries in either Dorchester or Thorndale must comply with the policies set out in the Municipality of Thames Centre and County of Middlesex Official Plans.

The 401 Corridor Lands are currently zoned to allow for dry industrial use with no existing municipal servicing.

The Dorchester and Thorndale reside within the jurisdiction of the Upper Thames River Conservation Authority (UTRCA).

1.2.4 Planning and Growth Projections

Buildout projections set-out in the 2018 DC Background Study were compared to the available draft plans and concept plans and the area of available lands to be developed for residential and employment use in Dorchester, Thorndale and the Peripheral Areas (to the Settlement Boundaries) and the 401 Corridor Lands.

Three methods were developed to establish growth projections across Dorchester and Thorndale.

- Method 1: Growth within and outside the Urban Area Settlement Boundaries based on Development Charges (DC) Background Study growth projections;
- Method 2: Growth within Urban Area Settlement Boundaries based on Target Densities established through review of recent development and growth outside of Urban Area Settlement Boundaries based on DC Background Study growth projections; and,
- Method 3: Growth within and outside the Urban Area Settlement Boundaries based on Target Densities established through review of recent development.

The procedure and purpose / use of the alternative growth projection methodologies is summarized in **Table ES-1-1**.

Table ES-1-1: Purpose and Use of Proposed Growth and Allocation Methodologies to Inform Master Plan Recommendations

Approach Procedure and Purpose		Method 1	Method 2	Method 3
Procedure	For Dorchester and Thorndale	Buildout to DC Growth Projections	Buildout by Developable Area x Target Densities	
	For the Peripheral Lands and 401 Corridor Lands	Buildout to DC Growth Projections		Buildout by Developable Area x Target Densities
Purpose / Use		• Identification of Upgrade Triggers • Development of Capital Plan	Sizing of infrastructure upgrade after upgrade has been triggered by demands / flows generated by Method 1. Where proposed sizing based on Method 2 varies from sizing based on Method 3; more detailed engineering review will be undertaken, and sizing based on preferred approach in consultation with the Municipality.	

Buildout projections for Dorchester and Thorndale (including areas outside of the Settlement Boundary) based Incorporating the calculations set out in Section 1.10.4, Buildout Projections based on Method 1 through Method 3 are summarized in **Table ES-1-2** and **Table ES-1-3**.

Table ES-1-2: Summary of Buildout Projections based on Alternative Methods (Dorchester)

Dorchester	Equivalent Population (Persons + Jobs)	Method 1	Method 2	Method 3
Within Settlement Boundary Only	Existing	7,111		
	Ultimate Buildout	14,451	20,282	
Within Settlement Boundary and Including Peripheral and 401 Corridor Lands to be Developed	Ultimate Buildout	14,870	20,701	36,735

Table ES-1-3: Summary of Buildout Projections based on Alternative Methods (Thorndale)

Thorndale	Equivalent Population (Persons + Jobs)	Method 1	Method 2	Method 3
Within Settlement Boundary Only	Existing	1,618		
	Ultimate Buildout	4,154	7,141	
Within Settlement Boundary and Including Peripheral Lands to be Developed	Ultimate Buildout	4,475	7,462	13,195

1.3 Design Criteria and Level of Service Objectives

Water and wastewater design criteria was developed based on the Municipality's existing infrastructure and achievable level of service objectives. The design criteria impact the methodology and values used to estimate growth related demands/flows as well as the decision-making rationale related to infrastructure capacity and the trigger for upgrades. Detailed design criteria and level of service is provided in the Water Master Plan and Wastewater Master Plan sections.

1.3.1 Water Demand Design Criteria

The Master Plan has used the following design criteria to project water demands, determine capacity requirements and establish the water infrastructure program:

- Average Day Demand: 225 L/cap/d for both Dorchester and Thorndale;
- Maximum Day Demand Peaking Factors: 2.0 for Dorchester, 2.25 for Thorndale;
- Peak Hour Demand Peaking Factor: 3.75 for both Dorchester and Thorndale; and,
- Minimum Fire Flow: 76 L/s for residential land use, 150 L/s for Industrial / Commercial / Institutional land, to be provided for 2-hours within Dorchester and Thorndale.

1.3.2 Water Level of Service

- PHD scenario to assess minimum pressures: < 40 psi: does not meet LOS objective;

- ADD simulation to assess maximum pressures: > 90 psi: does not meet LOS objective; and,
- MDD+FF simulation to assess available fire flow (must maintain 20 psi across the system).

1.3.3 Wastewater Flows Design Criteria

The Master Plan has used the following design criteria to project wastewater flows, determine capacity requirements and establish the wastewater infrastructure program:

- Average Dry Weather Flow: 225 L/cap/d for both Dorchester and Thorndale
- I&I Allowance: 0.2 L/s/ha – 0.4 L/s/ha

1.3.4 Wastewater Level of Service

- Sewer Capacity: Existing and proposed sewers to be less than 100% full based on infiltration allowance of 0.2 L/s/ha.

Basement Flooding Risk: Existing and proposed sewers hydraulic grade line (HGL) to be more than 1.8 m below grade based on infiltration allowance of 0.6 L/s/ha.

1.4 Servicing Strategy Development

Opportunities and constraints for the water and wastewater systems were identified at the outset of the Master Plan and were used as a starting point for identifying servicing alternatives. The identification and assessment of servicing alternatives enables a comprehensive review of various servicing solutions.

As part of this Master Plan, water and wastewater alternative servicing strategies were reviewed for existing and future growth areas in order to select the servicing strategies that aligned with the Master Plan Update vision. Development of water and wastewater servicing strategies also includes consideration for:

- best use of existing infrastructure to avoid new infrastructure where possible;
- cost of new infrastructure;
- operation and maintenance costs to ensure financial sustainability; and,
- disruption to residents and business and the environment.

The Master Plan has used the Reasoned Argument Approach to guide evaluation of alternatives. The Reasoned Argument Approach provides clear and thorough rationale of the trade-offs among the various criteria and highlights the reasons why an alternative is the best alternative.

1.5 Water Servicing Strategy Development

Opportunities and constraints within the existing Dorchester and Thorndale water systems are summarized as follows:

1.5.1 Dorchester

In general, the water distribution system for Dorchester has sufficient capacity to provide adequate pressures under average day and peak hour conditions. The primary issues relate to the system's ability to provide adequate fire flow protection to key areas, such as the northwest industrial lands and southwestern development area.

The key issues and constraints identified by the Municipality and through the modelling exercise include:

- Long-term water supply deficiency – more water supply is required to service Dorchester to buildout, either through an additional groundwater source or through a connection to the Lake Huron & Elgin Area Primary Water Supply Systems;
- Limited study has been commenced to determine the availability of additional groundwater supply and the amount of additional groundwater available for water supply to service growth in Dorchester is unknown;
- Insufficient storage within the existing Dorchester ET to service the community to buildout;
- Inability to provide sufficient fire flow protection to northwest industrial lands and northeast residential lands;
- Capacity and conveyance issues through the Dorchester Road watermain – inability to provide enough water to Dorchester ET and distribution system to provide sufficient fire flow under build out conditions; and,
- Requirement for new watermain to service growth areas located in southwest Dorchester, north of the Thames River and southeast Dorchester.

The following lists key opportunities identified by the Municipality and through the modelling exercise:

- The Municipality has an approved budget for the commencement of study to determine the availability of additional groundwater supply within the Dorchester area;
- The Municipality has allocation within the Lake Huron & Elgin Area Primary Water Supply Systems and can commence the process to commission a connection to the system if no additional groundwater supply is found;
- The existing 2 x 2,500m^3 in-ground reservoirs located at the Dorchester WTF can be utilized for storage (the amount of water required for contact time for chlorine at the Dorchester WTF has been significantly reduced, freeing up nearly all of the volume within the reservoirs to be utilized for storage);

- The Municipality has an ongoing State of Good Repair (SOGR) program that focuses on replacing aging watermains, where breaks and higher leakage can occur more frequently due to structural defects; and,
- New infrastructure will be required as new development occurs, especially north of the Thames River and within southwest Dorchester. There are opportunities to provide additional system looping to help with security of supply and greater system flexibility.

1.5.2 401 Corridor Lands

Water service to the 401 Corridor Lands was considered as part of the Dorchester water servicing strategy. Upgrades within the Dorchester system will be required to service the 401 Corridor Lands.

The key issues and constraints identified by the Municipality and through the modelling exercise include:

- Inability to effectively service development of the 401 Corridor lands – lands located to the southwest of Dorchester within the 401 Corridor generally lie at elevations approximately 20 metres higher than those in Dorchester, and servicing of the 401 Corridor will upgraded infrastructure to meet demand and fire flow requirements.

The following lists key opportunities identified by the Municipality and through the modelling exercise:

- The 401 Corridor Lands are located outside of the Dorchester Settlement Boundary with only dry-industrial currently permitted. There is opportunity to complete a more detailed cost-benefit analysis of servicing to the area in support of any changes to land use.

1.5.3 Thorndale

In general, the water distribution system for Thorndale has sufficient capacity to provide adequate pressures under average day and peak hour conditions. The primary issues relate to the system's ability to provide adequate fire flow protection to key areas, such as the southwest residential developments and the industrial park area.

The key issues and constraints identified by the Municipality and through the modelling exercise include:

- Long-term water supply deficiency – more water supply is required to service Thorndale to buildout, either through an additional groundwater source or through a connection to the Lake Huron & Elgin Area Primary Water Supply Systems;

- Limited study has been commenced to determine the availability of additional groundwater supply and the amount of additional groundwater available for water supply to service growth in Thorndale is unknown;
- Insufficient storage within the existing Thorndale ET and in-ground reservoirs located at the Thorndale WTF to service the community to buildout;
- Inability to provide sufficient fire flow protection to the southwest industrial area and the Harrison Street industrial area; and,
- Requirement for new watermain to service growth areas located in south Thorndale.

The following lists key opportunities identified by the Municipality and through the modelling exercise:

- The existing WTF can be upgraded under the existing PTTW to service growth demands within the Settlement Boundary to buildout;
- Peripheral lands identified for potential future growth will require additional groundwater supply, however, there is opportunity to explore the availability of additional groundwater source within the Thorndale area prior to development of Peripheral Lands;
- The Municipality has allocation within the Lake Huron & Elgin Area Primary Water Supply Systems and can commence the process to commission a connection to the system if no additional groundwater supply is found;
- There is area within the existing Thorndale WTF site for the twinning of the 451m^3 reservoir to increase storage capacity within Thorndale to service buildout;
- There is opportunity to construct a second watermain crossing of the CN Corridor within south Thorndale as development is progressing – providing improved fire flows and security of supply;
- New infrastructure will be required as new development occurs, especially north of the Thames River and within southwest Dorchester. There are opportunities to provide additional system looping to help with security of supply and greater system flexibility; and,
- The Municipality has an ongoing State of Good Repair (SOGR) program that focuses on replacing aging watermains, where breaks and higher leakage can occur more frequently due to structural defects.

Figure 2-4 highlights key opportunities and constraints within the Dorchester water system and 401 Corridor Lands

1.6 Water Servicing Strategy

1.6.1 Dorchester

The preferred servicing strategy was developed to ensure that extension of the water distribution system is supportive of the existing servicing strategy and follows an integrated approach with the Municipality's development plans and progress as well as the SOGR program.

In general, the preferred water servicing strategy for Dorchester consists of:

- Maximizing supply availability at the Dorchester WTF while exploration of additional groundwater supply to service Dorchester is progressed;
- Ultimately achieving an additional groundwater supply to service Dorchester to buildout by completing the required investigation, study, testing and monitoring in order to determine the availability;
- Upgrading the Dorchester WTF facilities to utilize the 2 x 2,500m^3 in-ground reservoirs for system storage;
- Upgrading the Dorchester Road 300m diameter "spine" watermain in order to efficiently convey water from the WTF and the ET to the distribution system;
- Extending watermains to service development in southwest Dorchester, north Dorchester (north of Thames River) and southeast Dorchester;
- Aligning the intensification strategy with the ongoing SOGR projects to improve fire flows in Northwest Dorchester; and,
- Cost-benefit analysis required for 401 Corridor Lands to determine viability of providing sufficient operating pressures and available fire flows.

Key capital projects required to achieve this strategy include:

- Commencement of investigation to determine availability of additional groundwater supply;
- Upgrades and maintenance at Dorchester WTF to best utilize existing in-ground reservoirs for storage to supplement PHD;
- Upgrade of aging and undersized watermain along Dorchester Road to 300mm diameter PVC; and,
- New 300mm diameter watermain to service developments in southwest Dorchester, primarily along proposed internal road alignments.

1.6.2 Thorndale

The preferred water servicing strategy for Thorndale consists of:

- Upgrades at the Thorndale WTF to draw the upgraded PTTW amount of 22 L/s;
- Ultimately achieving an additional groundwater supply to service Thorndale to buildout by completing the required investigation, study, testing and monitoring in order to determine the availability;
- Twinning the 451m^3 in-ground reservoir at the Thorndale WTF to upgrade system storage to service growth to buildout;
- Installing a 300mm diameter watermain along the south limit of Thorndale from the east limit to the west limit of the Settlement Boundary; and,
- Provide additional looping to the Harrison Street area to improve fire flows when additional infrastructure is required in the area to service growth – potentially when Peripheral Lands are developed.

Key capital projects required to achieve this strategy includes:

- Upgrades at the Thorndale WTF to draw the upgraded PTTW amount of 22 L/s; and,
- 3.7 km of 300mm diameter watermain along the south limit of Thorndale from the east limit to the west limit of the Settlement Boundary.

In addition to the key capital projects, several other projects and upgrades are included within the water servicing strategy to address existing and future capacity needs within the collection system. The complete Preferred Water Strategy for the Municipality of Thames Centre is presented in **Figure ES-2** and **Figure ES-3.**

The Master Plan recommends that a separate study be carried out to evaluate the potential for municipal water and wastewater services for the 401 Corridor Lands.

1.6.3 Water Capital Program

A summary of the water servicing strategy capital program is provided in the following table. The capital program table contains project descriptions, dimensions, proposed timing, and estimated total project cost.

Municipality of Thames Centre

Water and Wastewater Master Plan Update

Dorchester Elevated Tank

Dorchester Water Treatment Plant

W-D-WM-16
W-D-WM-06
W-D-WM-05
W-D-WM-15
W-D-WM-14
W-D-WM-03
W-D-WM-04
W-D-WM-12
W-D-WM-02
W-D-WM-13
W-D-WM-18
W-D-WM-11
W-D-WM-10-Alt2
W-D-WM-10-Alt1
W-D-WM-09-Alt2
W-D-WM-09-Alt1
W-D-WM-08-Alt2
W-D-WM-01
W-D-WM-08-Alt1
W-D-WM-07
W-D-WM-17

SHAW RD
HAMILTON RD
BRIDGE ST
ANNE ST
CATHERINE ST
ELGIN RD
DORCHESTER RD

0 1 Kilometers

Proposed Water Network

- Capital Program - Benefit to Existing System
- Capital Program - New Watermain
- Capital Program - Upgrade Watermain
- Future Local Watermain

Existing Water Network

- Elevated Tank
- Water Treatment Plant
- Existing Watermain (≤ 150 mm)
- Existing Watermain (200 - 300 mm)

General Features

- Highway
- Arterial Road
- Growth Areas
- Settlement Boundary
- Property Parcel
- Waterbody

Figure ES-2

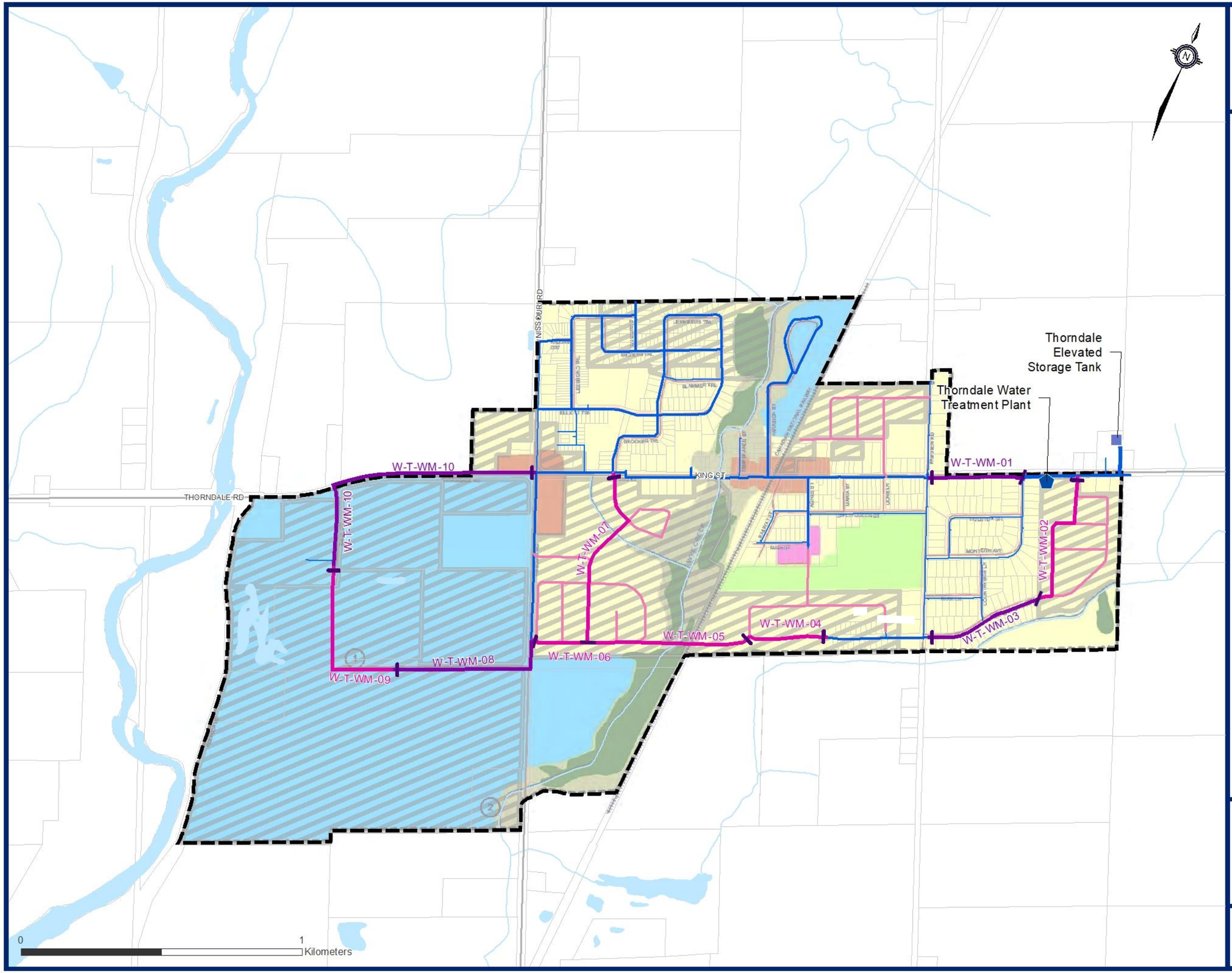
Preferred Dorchester Water Servicing Strategy

BluePlan Engineering

September 2019
418109-G-007
NAD 1983 UTM Zone 17N

Municipality of Thames Centre

Water and Wastewater Master Plan Update



Proposed Water Network

- Capital Program - New Watermain
- Capital Program - Upgrade Watermain
- Future Local Watermain

Existing Water Network

- Elevated Tank
- Water Treatment Plant
- Existing Watermain (≤ 150 mm)
- Existing Watermain (200 - 300 mm)

General Features

- Highway
- Arterial Road
- Growth Areas
- Settlement Boundary
- Property Parcel
- Waterbody

Figure ES-3

Preferred Thorndale Water Servicing Strategy

BluePlan Engineering

September 2019
418109-W-007
NAD 1983 UTM Zone 17N

Table ES-1: Water Capital Program

Capital Program ID	Name	Description	Serviced Development Blocks	Upgrade Trigger	Upgrade Trigger (Population Growth)	Class EA Schedule	Project Type	Length (m)	Size/Capacity	Capital Program Total Component Estimated Cost (Excl. HST)
W-D-SUP-01	Maximize Dorchester WTF Supply	Maximize Well Capacity at Existing WTF	All Dorchester Developments	Existing Need	Today	A	Treatment	0 m	20 L/s	$ 1,067,000
W-D-SUP-02	New Dorchester Groundwater Supply	Includes cost of new Dorchester groundwater supply and consolidation of sources at Dorchester WTF for treatment. Includes new well houses, raw watermains, and treatment. Excludes pump capacity upgrades cost to the Dorchester WTF High Lift Pumps	All Dorchester Developments	Accumulated growth	80% Trigger of 2,800 PPJ (Persons + Jobs) = 2,200 PPJ	C	Treatment	0 m	0 L/s	$ 10,000,000
W-D-BPS-01	Dorchester HLP Upgrades	Upgrade Dorchester HLPs to supply elevated tank and distribution system from reservoirs	All Dorchester Existing + Development	Accumulated Growth or State of Good Repair (SOGR)	6,000 PPJ	A	Pumping	0 m	90 L/s	$ 1,067,000
W-D-WM-01	Dorchester Watermain - Spine Trunk Upgrade on Dorchester Rd. (South of Byron Ave.)	450m of existing 250mm DI watermain (built in 1976) to be replaced by 300mm PVC watermain	All Dorchester Developments	Accumulated Growth	North Dorchester Development	A+	Watermain	450 m	300 mm	$ 931,000
W-D-WM-02	Dorchester Watermain - Spine Trunk Upgrade on Dorchester Rd. (River Bank)	190m of existing 250mm DI watermain (built in 1976 - 1987) to be replaced by 300mm PVC watermain	All Dorchester Developments	Accumulated Growth	North Dorchester Development	A+	Watermain	190 m	300 mm	$ 403,000
W-D-WM-03	Dorchester Watermain - Spine Trunk Upgrade on Catherine St. and Minnie Rd. (North Section)	390m of existing 250mm DI and PVC watermain (built in 1990 - 1992) to be replaced by 300mm PVC watermain following Catherine St. + Minnie St. alignment	All Dorchester Developments	Accumulated Growth	North Dorchester Development	A+	Watermain	390 m	300 mm	$ 1,345,000
W-D-WM-04	Dorchester Watermain - North St. Upgrade	360m of existing 150mm CI watermain (built in 1956) on North Street and Minnie Street to be replaced by 200mm PVC watermain.	All Dorchester Developments	Dorchester Development Block 14	With new development	A+	Watermain	360 m	200 mm	$ 628,000
W-D-WM-05	Dorchester Watermain - Northeast Loop	Total of 710m of proposed PVC watermain on North Street and Village Gate Dr. to complete loop, including 590m of 200mm proposed PVC watermain on North St. and 130m of 150mm proposed PVC watermain on Village Gate Dr.	All Dorchester Developments	Dorchester Development Blocks 9, 10, 11 and 12	With new development	A	Watermain	590 m	200 mm	$ 1,023,000
W-D-WM-06	Dorchester Watermain - Marion St. Upgrade	Total of 320m of 200mm watermain on Marion Street, including 100m of existing 150mm PVC watermain to be replaced by 200mm PVC watermain and 220m of proposed 200mm PVC watermain.	All Dorchester Developments	Dorchester Development Blocks 9, 10, 11 and 12	With new development	A+	Watermain	320 m	200 mm	$ 555,000
W-D-WM-07	Dorchester Watermain - West Trunk at the Development 25	Newly proposed West Trunk - 660m of proposed 300mm PVC watermain at Development 25.	Dorchester Development Block 25	Dorchester Development Block 25	Construction proposed	A	Watermain	660 m	300 mm	$ 1,067,000
W-D-WM-08-ALT1	Dorchester Watermain - West Trunk at the Development 22	Newly proposed West Trunk - 620m of proposed 300mm PVC watermain at Development 22.	Dorchester Development Blocks 16, 17, 18, and 22	Dorchester Development Block 22	With new development	A	Watermain	620 m	300 mm	$ 1,010,000
W-D-WM-09-ALT1	Dorchester Watermain - West Trunk river crossing at Development 22.	Newly proposed West Trunk - 140m of proposed 300mm PVC watermain river crossing.	Dorchester Development Blocks 16, 17, 18, and 48	Dorchester Development Block 18 or 22	With new development	B	Watermain	140 m	300 mm	$ 356,000
W-D-WM-10-ALT1	Dorchester Watermain - West Trunk at Development 22.	Newly proposed West Trunk - 270m of proposed 300mm PVC watermain at Development 22.	Dorchester Development Blocks 16, 17, 18, and 48	Dorchester Development Block 18 or 22	With new development	A	Watermain	270 m	300 mm	$ 410,000
W-D-WM-11	Dorchester Watermain - West Trunk on Christie Dr.	Newly proposed West Trunk - Total of 980m of 300mm PVC watermain along Christie Dr. including 870m of proposed 300mm PVC watermain and 110m of existing 150mm PVC watermain to be replaced by 300mm PVC watermain	Dorchester Development Blocks 16 - 18 and 48	Dorchester Development Block 18	With new development	A	Watermain	980 m	300 mm	$ 1,718,000
W-D-WM-12	Dorchester Watermain - West Trunk on Harris Rd. and Hamilton Rd.	Newly proposed West Trunk - 1080m of proposed 300mm PVC watermain along Harris Rd. and Hamilton Rd.	Dorchester Development Blocks 16, 17 and 18	Dorchester Development Block 18	With new development	A	Watermain	910 m	300 mm	$ 1,638,000
W-D-WM-13	Dorchester Watermain - West Trunk at Mill Ct. Loop	Newly proposed West Trunk - 800m of proposed 200mm PVC watermain on Mill Ct to complete loop	Dorchester Development 18	Watermain Replacement Program	-	A+	Watermain	800 m	200 mm	$ 1,394,000
W-D-WM-14	Dorchester Watermain - Catherine St. East Section Upgrade	1020m of existing 250mm DI watermain (built in 1983) to be replaced by 300mm PVC watermain on Catherine St.	Existing Dorchester Development	Watermain Replacement Program	-	A+	Watermain	1020 m	300 mm	$ 2,089,000
W-D-WM-15	Dorchester Watermain - Catherine St. West Section Upgrade	1390m of existing 200mm PVC watermain (built in 1973 - 2013) to be replaced by 300mm PVC watermain on Catherine St.	Existing Dorchester Development	Watermain Replacement Program	-	A+	Watermain	1390 m	300 mm	$ 2,932,000
W-D-WM-16	Dorchester Watermain - Northwest Industrial Lands Upgrade	1260m of existing 200mm DI & PVC watermain (built in 1978 - 2013) to be replaced by 300mm PVC watermain	Existing Dorchester Development	Watermain Replacement Program	-	A+	Watermain	1260 m	300 mm	$ 2,283,000
W-D-WM-17	Dorchester Watermain - Hamilton Rd. Extension	350m of proposed 200mm PVC watermain along Hamilton Rd.	Dorchester Development Block 47	Dorchester Development Block 47	With new development	A+	Watermain	350 m	200 mm	$ 610,000
W-D-WM-18	Dorchester Watermain - Benefit to Existing System	370m of proposed 200mm PVC watermain along Mill Rd.	Dorchester Development Block 19	Dorchester Development Block 19	With new development	A+	Watermain	350 m	200 mm	$ 645,000
Sub-Total Dorchester Water Capital Program Projects										**$ 33,171,000**

Table ES-1: Water Capital Program

Capital Program ID	Name	Description	Serviced Development Blocks	Upgrade Trigger	Upgrade Trigger (Population Growth)	Class EA Schedule	Project Type	Length (m)	Size/Capacity	Capital Program Total Component Estimated Cost (Excl. HST)
W-D-401-ST-01	Cost Benefit Study to Service 401 Corridor Lands	Cost-benefit study to evaluate servicing options for 401 Corridor Lands, will include recommendations for service pressures and available fire flow.	401 Corridor Lands	Development Interest	-	-	Watermain	0 m	0 L/s	$ 50,000
Sub-Total 401 Corridor Water Capital Program Projects										**$ 50,000**
W-T-SUP-01	Maximize Thorndale WTF Supply	Maximize Well Capacity at Existing WTF	All Thorndale Developments	Existing Need	Today	A	Treatment	0 m	22 L/s	$ 1,020,000
W-T-SUP-02	New Thorndale Groundwater Supply	Includes cost of new Dorchester groundwater supply and consolidation of sources at Thorndale WTF for treatment. Includes new well houses, raw watermains, and treatment. Excludes pump capacity upgrades cost to the Thorndale WTF High Lift Pumps	All Thorndale Developments	Accumulated growth	80% x 2,600 PPJ = 2,000 PPJ (after planned upgrade to 22 L/s)	C	Treatment	0 m	0 L/s	$ 10,000,000
W-T-RES-01	Thorndale Reservoir Upgrade	Twinning the existing 0.451 ML reservoir and 0.363 ML reservoir	All Thorndale Developments	Accumulated growth	80% x 5,800 PPJ = 4,600 PPJ	A	Storage	0 m	0 ML	$ 753,000
W-T-BPS-01	Thorndale HLP Upgrades	Upgrade Thorndale HLP to supply elevated tank and distribution system from reservoirs	All Thorndale Developments	Existing Need	Today	A	Pumping	0 m	20 ML	$ 1,020,000
W-T-WM-01	Thorndale Watermain - Thorndale Rd. Upgrade	350m of existing PVC watermain on Thorndale Rd. (built in 1987) to be replaced by 300mm PVC watermain	All Thorndale Development Blocks	Existing Need	Today	A+	Watermain	350 m	300 mm	$ 818,000
W-T-WM-02	Thorndale Watermain - South Trunk at Monteith Lands	540m of proposed 300mm PVC watermain at Monteith Lands to complete south trunk.	Thorndale Development Blocks 1, 2, 3, 4, 8, 9 and 13	Thorndale Development Block 13	With new development	A	Watermain	540 m	300 mm	$ 898,000
W-T-WM-03	Thorndale Watermain - South Trunk Meadowbrook Ln. Upgrade	440m of existing 150mm PVC watermain on Meadowbrook Ln.(built in 1990) to be replaced by 300mm PVC watermain	Thorndale Development Blocks 1, 2, 3, 4, 8, 9 and 13	Thorndale Development Block 8, (Phase 2) or 13	With new development	A+	Watermain	440 m	300 mm	$ 794,000
W-T-WM-04	Thorndale Watermain - South Trunk at Foxborough Subdivision	280m of proposed 300mm PVC watermain at Foxborough Subdivision to complete south trunk.	Thorndale Development Blocks 1, 2, 3, 4, 8, 9 and 13	Thorndale Development Block 9	Proposed construction	A	Watermain	280 m	300 mm	$ 387,000
W-T-WM-05	Thorndale Watermain - South Trunk at Railway Crossing	410m of proposed 300mm PVC watermain at railway crossing to complete south trunk (includes directional drilling)	Thorndale Development Blocks 1, 2, 3, 4, 8, 9 and 13	Thorndale Development Block 8	With new development	A+	Watermain	410 m	300 mm	$ 1,809,000
W-T-WM-06	Thorndale Watermain - South Trunk at Rosewood Subdivision	390m of proposed 300mm PVC watermain at Rosewood Subdivision to complete south trunk.	Thorndale Development Blocks 1, 2, 3, 4, 8, 9 and 13	Thorndale Development Block 8 (Phase 2)	With new development	A	Watermain	390 m	300 mm	$ 540,000
W-T-WM-07	Thorndale Watermain - Subtrunk at Rosewood	680m of proposed 300mm PVC watermain at Rosewood Subdivision.	Thorndale Development Blocks 1, 2, 3, 4, 8, 9 and 13	Thorndale Development Block 8	Proposed construction	A	Watermain	680 m	300 mm	$ 984,000
W-T-WM-08	Thorndale Watermain Upgrade - Gerald Pkwy. Upgrade	590m of existing 200mm PVC watermain (built in 2010) on Gerald Pkwy. to be replaced by 300mm PVC watermain.	Thorndale Development Blocks 1, 2, 3, and 4	Thorndale Development Block 1, 2 or 3	With new development	A+	Watermain	590 m	300 mm	$ 1,044,000
W-T-WM-09	Thorndale Watermain Upgrade - Industrial Lands Loop	590m of 300mm watermain to connect Ideal Dr. and Gerald Pkwy. to complete loop	Thorndale Development Blocks 1, 2, 3, and 4	Thorndale Development Block 1, 2 or 3	With new development	A+	Watermain	1000 m	300 mm	$ 1,031,000
W-T-WM-10	Thorndale Watermain Upgrade - Industrial Lands Upgrade	1020m of existing 200mm PVC watermain (built in 2010) on Thorndale Rd. and Ideal Dr. to be replaced by 300mm PVC watermain.	Thorndale Development Blocks 1, 2, 3 and 4	Thorndale Development Block 1, 2 or 3	With new development	A+	Watermain	1020 m	300 mm	$ 1,798,000
Sub-Total Thorndale Water Capital Program Projects										**$ 22,896,000**
Total Municipality of Thames Centre Water Capital Program										**$ 56,117,000**

1.7 Wastewater Servicing Strategy Development

Opportunities and constraints within the existing Dorchester and Thorndale wastewater systems are summarized as follows:

1.7.1 Dorchester

In general, the wastewater collection system in Dorchester has adequate capacity to convey existing peak wet weather flows with upgrades throughout the system are required to convey future peak wet weather flows.

The following key issues and constraints were identified:

- North Dorchester lands located north of the Thames River require to be pumped to the south Dorchester wastewater system or discharged to a new WWTF;
- There are many existing residents and businesses within Dorchester that are serviced by private sewer systems; uptake in residential and businesses connecting to the municipal sewer system is progressing slower that originally anticipated; delaying the buildout of the wastewater network and limiting growth capacity.
- Growth within North Dorchester has not progressed, and wastewater projects recommended in previous Master Plan updates and servicing strategies have not been further assessed, designed, constructed or commissioned;
- Existing properties located directly south of the Thames River also require to be pumped to the existing wastewater system or discharged to a new WWTF;
- New infrastructure required to extend wastewater servicing to new development areas (Greenfield growth);
- Certain localized small areas show surcharge issues under design-storm conditions. Field investigations are required for better assessment of the infrastructure in these areas;
- Upgrades to the Dorchester WWTF and Dorchester sewage pumping stations are required to accommodate growth.

The following opportunities were identified:

- Wastewater infrastructure required to service North Dorchester can be phased to service growth ahead of existing residents serviced by private sewer systems;
- There are planned and approved upgrades at the Dorchester WWTF to service growth to buildout;
- New infrastructure will be required as new development occurs, especially north of the Thames River and within southwest Dorchester. There are opportunities to

design the facilities to accommodate buildout growth and provide greater system flexibility; and,

- Coordination with the state of good repair (SOGR) program to maximize the use of existing infrastructure.

1.7.2 401 Corridor Lands

Wastewater service to the 401 Corridor Lands was considered as part of the Dorchester wastewater servicing strategy. Upgrades within the Dorchester system will be required to service the 401 Corridor Lands.

The key issues and constraints identified by the Municipality and through the modelling exercise include:

- Inability to effectively service development of the 401 Corridor lands – while lands located to the southwest of Dorchester within the 401 Corridor generally lie at elevations approximately 20 metres higher than those in Dorchester, the crossing of a tributary south of Dorchester will require a pumping facility or a siphon.

The following lists key opportunities identified by the Municipality and through the modelling exercise:

- The 401 Corridor Lands are located outside of the Dorchester Settlement Boundary with only dry-industrial currently permitted. There is opportunity to complete a more detailed cost-benefit analysis of servicing to the area in support of any changes to land use.

1.7.3 Thorndale

In general, the wastewater collection system in Thorndale has adequate capacity to convey existing and future peak wet weather flows. Upgrades to the Thorndale WWTF and SPS will be required to treat future peak wet weather flows. Some sewer upgrades may be required to convey future flows from buildout population based on Method 3 projections.

The following key issues and constraints were identified:

- New infrastructure required to extend wastewater servicing to new development areas (Greenfield growth);
- Upgrades to the Thorndale WWTF and Thorndale SPS are required to accommodate growth; and,
- Existing downstream sewers may be required to be upgraded based on development in Peripheral Lands.

The following opportunities were identified:

- Wastewater infrastructure required to service North Dorchester can be phased to service growth ahead of existing residents serviced by private sewer systems;
- There are planned and approved upgrades at the Thorndale WWTF and Thorndale SPS to service growth to buildout;
- New infrastructure will be required as new development occurs and there are opportunities to design the facilities to accommodate buildout growth and provide greater system flexibility; and,
- Coordination with the state of good repair (SOGR) program to maximize the use of existing infrastructure.

1.7.4 Wastewater Servicing Strategy

1.7.4.1 Dorchester

The preferred servicing strategy was developed to ensure that extension of the wastewater collection system is supportive of the existing servicing strategy and follows an integrated approach with the Municipality's development plans as well as the SOGR program.

In general, the preferred wastewater servicing strategy for Dorchester consists of:

- Pumping wastewater flows from North Dorchester to the existing south Dorchester wastewater system to be treated at Dorchester WWTF;
    - Phasing of wastewater pumping facilities in North Dorchester to service development growth ahead of existing properties on private sewage systems;
- Continued expansion of the Dorchester WWTF in line with the long-term strategy and as triggered by development growth;
- Extending the sewer network in southwest Dorchester and north Dorchester to service development growth;
- Extending the sewer network to service existing properties currently service by private sewage systems in southwest Dorchester and north Dorchester;
- Commissioning wastewater pumping facilities to service development in southeast Dorchester and existing unserviced residents and businesses in areas directly north and south of the Thames River;
- Cost-benefit analysis required for 401 Corridor Lands to determine viability of providing wastewater servicing to potential development lands; and,

- Upgrade of the Dorchester SPS and Dorchester #3 SPS to accommodate wastewater flows to buildout.

Key capital projects required to achieve this strategy include:

- Construction and commissioning of North Dorchester wastewater pumping station and forcemain (phased to service development ahead of unserviced residents);
- Upgrade of Dorchester WWTF and Dorchester SPS as required to service development growth;
- New 200mm to 375mm sewer primarily along internal road alignments to service southwest Dorchester development;
- Commissioning of study to determine viability of 401 Corridor Lands development serviced by municipal sewers.

1.7.4.2 Thorndale

The preferred wastewater strategy for Thorndale consists of:

- Expansion of the Thorndale WWTF and Thorndale SPS to service development within Peripheral Lands; and,
- Potential upgrade of downstream sewers in area of Thorndale WWTF buildout of Peripheral Lands occurs at higher densities.

Key capital projects required to achieve this strategy include:

- Upgrade of the Thorndale WWTF and Thorndale SPS as required to service development growth.

In addition to the key capital projects, several other projects and upgrades are included within the wastewater servicing strategy to address existing and future capacity needs within the collection system. The complete Preferred Wastewater Strategy is presented in **Figure ES-4** and **Figure ES-5.**

1.7.5 Wastewater Capital Program

A summary of the wastewater servicing strategy capital program is provided in the following table. The capital program table contains project descriptions, dimensions, proposed timing, and estimated total project cost.

Municipality of Thames Centre

Water and Wastewater Master Plan Update

Sanitary Mains

- Existing - Local
- Existing - Trunk
- Existing - Forcemain
- Growth - Forcemains
- Growth - Development
- Upgrade
- New
- Benefits Existing

Facility Upgrades

- Pumping Station
- Wastewater Treatment Plant

Landuse

- RESIDENTIAL
- NEIGHBOURHOOD COMMERCIAL
- GENERAL COMMERCIAL
- HIGHWAY COMMERCIAL
- SETTLEMENT INDUSTRIAL
- INSTITUTIONAL
- RECREATIONAL
- PROTECTION AREA
- NATURAL AREA
- PARKS & OPEN SPACE
- ENVIRONMENTAL AREA
- CORE AREAS
- URBAN SETTLEMENT AREA BOUNDARY

WW-D-SS-13
WW-D-SS-16
WW-D-SPS-01B
WW-D-SS-01B
WW-D-SS-12
WW-D-SS-15
WW-D-SPS-02
WW-D-FM-04
WW-D-SS-02
WW-D-FM-01
WW-D-FM-05
WW-D-SS-14
WW-D-SPS-04
WW-D-SPS-03
WW-D-SS-17
WW-D-FM-02
WW-D-SS-011
WW-D-SS-05B-ALT-1
WW-D-SS-05B-ALT-2
WW-D-SS-06B-ALT-1
WW-D-FM-06
WW-D-SS-06B-ALT-2
WW-D-SS-07B-ALT-1
WW-D-FM-09
WW-D-SS-07B-ALT-2
WW-D-SS-09
WW-D-SS-03
WW-D-SS-04
WW-D-SPS-07B
WW-D-SPS-06B
WW-D-FM-08
WW-D-FM-07
WW-D-SPS-05
WW-D-TP-01B

S RAWLINS RD
HAMILTON RD
BRIDGE ST
JAMES ST
CATHERINE ST
DORCHESTER RD
ELGIN RD

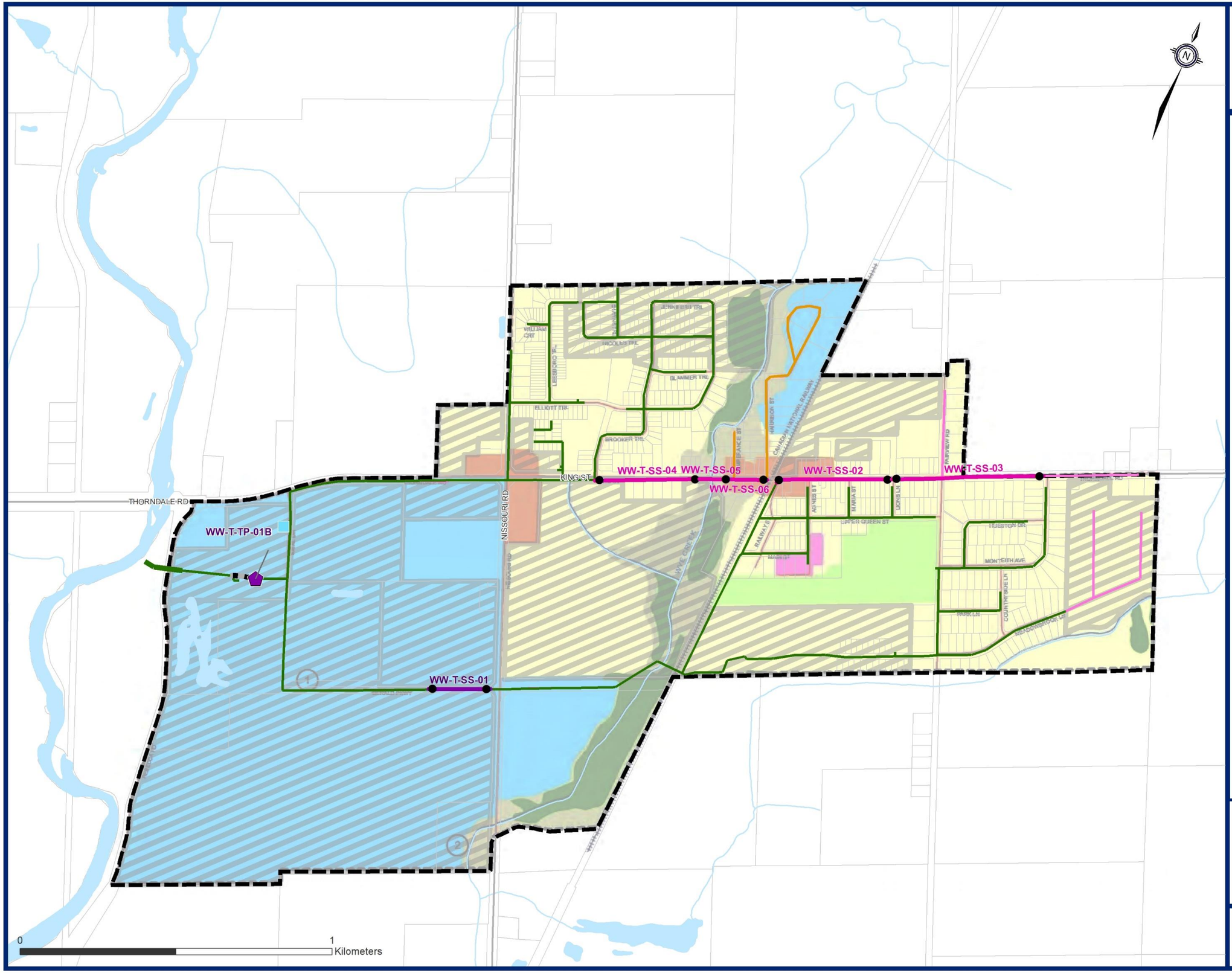
0 1 Kilometers

Figure ES-4

Dorchester Preferred Wastewater Servicing Strategy

BluePlan Engineering

September 2019
418109
NAD 1983 UTM Zone 17N



Municipality of Thames Centre

Water and Wastewater Master Plan Update

Sanitary Mains

- Existing - Local
- Existing - Trunk
- Growth - Local
- Growth - Trunk
- Existing - Forcemain
- Upgrade
- New
- Benefits Existing

Facility Upgrades

- WWTP

Landuse

- RESIDENTIAL
- MOBILE HOME PARK
- GENERAL COMMERCIAL
- SETTLEMENT INDUSTRIAL
- PROTECTION AREA
- PARKS & OPEN SPACE
- ENVIRONMENTAL AREA
- URBAN SETTLEMENT AREA BOUNDARY

Figure ES-5

Thorndale Preferred Wastewater Servicing Strategy

BluePlan Engineering

September 2019
418109-W-007
NAD 1983 UTM Zone 17N

Table ES-2: Wastewater Capital Program

Capital Program ID	Name	Description	Serviced Development Blocks and/or Existing Unserviced Areas	Upgrade Trigger	Upgrade Trigger (Population Growth)	Class EA Schedule	Project Type	Length (m)	Size/Capacity	Capital Program Total Component Estimated Cost (Excl. HST)
WW-D-TP-01B	Dorchester Treatment Plant Upgrades	Treatment plant capacity upgrades required to accommodate all development flows in Dorchester	All Dorchester Developments and Existing Areas on Private Sewage Systems (Unserviced)	Accumulated growth	80% Trigger of 1,000 PPJ (Persons + Jobs) = 800 PPJ	C	Treatment		3.2 ML	$ 14,001,000
WW-D-SPS-01B	North Dorchester New Development SPS	New SPS needed to support New Development north of railway in North Dorchester	Development 3-15 Existing Area 1	New Development North of Railway	With new development	B	Pumping		90 L/s	$ 4,732,000
WW-D-SPS-02	North Dorchester Northwest SPS	New SPS needed to support New Development and existing development south of railway and west of Dorchester Road Bridge in North Dorchester	Ex. Area 2	New Development or Municipal Servicing Replacing Private Sewage Systems	With new or existing development	B	Pumping		8 L/s	$ 568,000
WW-D-SPS-03	North Dorchester Northeast SPS	New SPS needed to support existing development south of railway and east of Dorchester Road Bridge in North Dorchester	Ex. Area 13	New Development or Municipal Servicing Replacing Private Sewage Systems	With new or existing development	B	Pumping		1 L/s	$ 121,000
WW-D-SPS-04	South Dorchester SPS	New SPS needed to support existing development south of river and north of PS3 drainage area in South Dorchester	Ex. Area 20 and North Part of Ex. Area 19	Development 19, 20 or Municipal Servicing Replacing Private Sewage Systems	With new or existing development	B	Pumping		12 L/s	$ 995,000
WW-D-SPS-05B	Southeast Dorchester SPS	New SPS needed to support Development block east of Valleyview Crescent in South Dorchester	Development 47	Development Block 47	With new development	B	Pumping		8 L/s	$ 538,000
WW-D-SPS-06B	Dorchester SPS Upgrades	Pumping station capacity upgrades required to accommodate growth flows in Dorchester	All Dorchester Development Blocks	Existing Need	Today	B	Pumping		254 L/s	$ 10,065,000
WW-D-SPS-07B	Dorchester PS3	Pumping station capacity upgrades required to accommodate growth flows in Dorchester	Development 16-19, 22-25, 29b	Southeast Development Blocks	80% Trigger of 4,500 PPJ = 3,600 PPJ	B	Pumping		102 L/s	$ 5,359,000
WW-D-FM-01	North Dorchester New Development forcemain	New forcemain needed to support new development SPS for development blocks North of CN rail in North Dorchester	Development 3-15 Ex. Area 1 - 4, 13	With WW-D-SPS-01	With new development	A+	Forcemain	475 m	300 mm	$ 1,244,000
WW-D-FM-02	Dorchester Road forcemain extension	New forcemain from Dorchester Road bridge forcemain to Dorchester road gravity sewers needed to support new development SPS for development blocks North of CN rail in North Dorchester	Development 3-15 Ex. Area 1 - 4, 13	With WW-D-SPS-01	With new development	A+	Forcemain	200 m	300 mm	$ 364,000
WW-D-FM-03	Dorchester Road forcemain extension	New forcemain from Dorchester Road bridge forcemain to Byron Ave trunk sewers needed to support new development SPS for development blocks North of CN rail in North Dorchester	Development 3-15 Ex. Area 1 - 4, 13	New Development or Municipal Servicing Replacing Private Sewage Systems	80% Trigger of 2,700 PPJ = 2,100 PPJ	A+	Forcemain	550 m	300 mm	$ 889,000
WW-D-FM-04	North Dorchester Northwest forcemain	New forcemain needed to support northwest development SPS for development blocks South of CN rail and West of Dorchester Road Bridge in North Dorchester	Ex. Area 2 and Surrounding Areas	With WW-D-SPS-02	Existing development	B	Forcemain	730 m	100 mm	$ 1,487,000
WW-D-FM-05	North Dorchester Northeast forcemain	New forcemain needed to support northeast SPS for existing development South of CN rail and East of Dorchester Road Bridge in North Dorchester	Ex. Area 13 and Surrounding Areas	With WW-D-SPS-03	With new development	B	Forcemain	500 m	100 mm	$ 1,183,000
WW-D-FM-06	South Dorchester forcemain	New forcemain needed to support south SPS for existing development South of river in South Dorchester	North part of Ex. Area 19 and Ex. Area 20	With WW-D-SPS-04	Existing development	B	Forcemain	1800 m	100 mm	$ 2,503,000
WW-D-FM-07	Southeast Dorchester forcemain	New forcemain needed to support southeast SPS for existing development East of serviced developments and North of Hamilton Road in South Dorchester	Development 47	With WW-D-SPS-05	With new development	B	Forcemain	620 m	100 mm	$ 771,000
WW-D-FM-08	Dorchester SPS forcemain	New forcemain needed to support Dorchester WWTP SPS for all existing and growth developments in Dorchester.	All Dorchester Development Blocks	With WW-D-SPS-06B (Dorchester SPS)	80% Trigger of 6,500 PPJ = 5,200 PPJ	B	Forcemain	1250 m	350 mm	$ 2,152,000
WW-D-FM-09	PS3 forcemain	Twinned forcemains needed to support PS3 for all development in Southeast Dorchester	Development 16-19, 22-25, 29b	With W-D-SPS-07B (Dorchester PS3)	80% Trigger of 4,500 PPJ = 3,600 PPJ	B	Forcemain	662 m	250 mm	$ 1,777,000
WW-D-SS-01B	New Development SPS West Sewers	New sanitary sewer required for development blocks going to new Development SPS in North Dorchester.	Development 3-7 Ex. Area 1	New Development or Municipal Servicing Replacing Private Sewage Systems	With new or existing development	A+	Sewer	420 m	300 mm	$ 490,000
WW-D-SS-02	New Development SPS East Sewers	New sanitary sewer required for development blocks going to new Development SPS in North Dorchester.	Development 8-15	New Development or Municipal Servicing Replacing Private Sewage Systems	With new or existing development	A	Sewer	480 m	250 mm	$ 712,000

Table ES-2: Wastewater Capital Program

Capital Program ID	Name	Description	Serviced Development Blocks and/or Existing Unserviced Areas	Upgrade Trigger	Upgrade Trigger (Population Growth)	Class EA Schedule	Project Type	Length (m)	Size/Capacity	Capital Program Total Component Estimated Cost (Excl. HST)
WW-D-SS-03	PS3 West Sewers	New sanitary sewer required for development blocks going to PS3 in Dorchester.	Development 17-18, 22, 25 Ex. Area 19	New Development or Municipal Servicing Replacing Private Sewage Systems	Proposed construction	A+	Sewer	265 m	375 mm	$ 1,529,000
WW-D-SS-04	PS3 West Sewers	New sanitary sewer required for development blocks going to PS3 in Dorchester.	Development 17-18, 22, 25 Ex. Area 19	New Development or Municipal Servicing Replacing Private Sewage Systems	With new or existing development	A+	Sewer	45 m	450 mm	$ 126,000
WW-D-SS-05B-ALT-1	Christie Drive and new Development sewer	New sanitary sewer required for development blocks going to PS3 in Dorchester.	Development 17-18, 22, 25 Ex. Area 19	New Development or Municipal Servicing Replacing Private Sewage Systems	With new or existing development	A+	Sewer	370 m	300 mm	$ 563,000
WW-D-SS-06B-ALT-1	Rath-Harris Municipal Drain Crossing	New sanitary sewer required for development blocks going to PS3 in Dorchester.	Development 17-18, 22, 25 Ex. Area 19	New Development or Municipal Servicing Replacing Private Sewage Systems	With new or existing development	B	Sewer	80 m	300 mm	$ 827,000
WW-D-SS-07B-ALT-1	New development sewer	New sanitary sewer required for development blocks going to PS3 in Dorchester.	Development 17-18, 22, 25 Ex. Area 19	New Development or Municipal Servicing Replacing Private Sewage Systems	With new or existing development	A+	Sewer	390 m	375 mm	$ 1,993,000
WW-D-SS-09	Sewer East of PS3	New sanitary sewer to accommodate growth flows east of PS3 in Dorchester	Development 24, 29b	New Development	With new development	A	Sewer	400 m	250 mm	$ 1,183,000
WW-D-SS-10	Sewer East of PS3	New sanitary sewer to accommodate growth flows east of PS3 in Dorchester	Development 24, 29b	New Development	With new development	A		30 m	300 mm	$ 102,000
WW-D-SS-11B	Christie Drive and new Development sewer	New sanitary sewer required for development blocks going to PS3 in Dorchester.	Development 17-18, 22, 25 Ex. Area 19	New Development	With new development	A	Sewer	505 m	300 mm	$ 632,000
WW-D-SS-12	Clara Street sewer	New sanitary sewer to accommodate growth Northeast of New development SPS in North Dorchester	Development 7 - 11 Ex. Surrounding Areas	New Development	With new development	A+	Sewer	605 m	200 mm	$ 880,000
WW-D-SS-13	Marion Street sewer	New sanitary sewer to accommodate growth Northeast of New development SPS in North Dorchester	Development 9 - 10 Ex. Surrounding Areas	New Development	With new development	A+	Sewer	210 m	200 mm	$ 342,000
WW-D-SS-14	North Street to Clara Street sewer	New sanitary sewer to accommodate growth Northeast of New development SPS in North Dorchester	Development 11-12, 14 Ex. Area 13, Surrounding Areas	New Development	With new development	A	Sewer	450 m	200 mm	$ 670,000
WW-D-SS-15	North Street Sewer	New sanitary sewer to accommodate growth Northeast of New development SPS in North Dorchester	Development 9-12, 14 Ex. Area 13, Surrounding Areas	New Development	With new development	A	Sewer	325 m	200 mm	$ 499,000
WW-D-SS-16	Richmond Street Sewer	New sanitary sewer to accommodate growth Northeast of New development SPS in North Dorchester	Development 5-7 Ex. Area 1,3-4, Surrounding Areas	New Development	With new development	A	Sewer	405 m	200 mm	$ 515,000
WW-D-SS-17	Hamilton Road to Christie Drive sewer	New sanitary sewer to accommodate growth flows east of PS3 in Dorchester	Development 16-17	New Development	With new development	A	Sewer	1250 m	200 mm	$ 1,530,000
WW-D-SS-18	Sewers for Municipal Servicing Replacing Private Sewage Systems (SPS-01B)	New sanitary sewers to benefit existing unserviced within North Dorchester (WW-D-SPS-01B catchment)	Ex. Areas in North Dorchester on Private Sewage Systems	Municipal Servicing Replacing Private Sewage Systems	With new development	A+	Sewer	7500 m	200 mm	$ 10,445,000
WW-D-SS-19	Sewers for Municipal Servicing Replacing Private Sewage Systems (SPS-02)	New sanitary sewers to benefit existing unserviced within North Dorchester (WW-D-SPS-02 catchment)	Ex. Areas in North Dorchester on Private Sewage Systems	Municipal Servicing Replacing Private Sewage Systems	With new development	A+	Sewer	5640 m	200 mm	$ 7,856,000
WW-D-SS-20	Sewers for Municipal Servicing Replacing Private Sewage Systems (SPS-03)	New sanitary sewers to benefit existing unserviced within North Dorchester (WW-D-SPS-03 catchment)	Ex. Areas in North Dorchester on Private Sewage Systems	Municipal Servicing Replacing Private Sewage Systems	With new development	A+	Sewer	1120 m	200 mm	$ 1,637,000
WW-D-SS-21	Sewers for Municipal Servicing Replacing Private Sewage Systems (SPS-04)	New sanitary sewers to benefit existing unserviced within South Dorchester (WW-D-SPS-04 catchment)	Ex. Areas in North Dorchester on Private Sewage Systems	Municipal Servicing Replacing Private Sewage Systems	With new development	A+	Sewer	5300 m	200 mm	$ 7,383,000
WW-D-SS-22	Sewers for Municipal Servicing Replacing Private Sewage Systems (SPS-06B)	New sanitary sewers to benefit existing unserviced within South Dorchester (WW-D-SPS-06B catchment)	Ex. Areas in South Dorchester on Private Sewage Systems	Municipal Servicing Replacing Private Sewage Systems	With new development	A+	Sewer	8200 m	200 mm	$ 11,420,000

Table ES-2: Wastewater Capital Program

Capital Program ID	Name	Description	Serviced Development Blocks and/or Existing Unserviced Areas	Upgrade Trigger	Upgrade Trigger (Population Growth)	Class EA Schedule	Project Type	Length (m)	Size/Capacity	Capital Program Total Component Estimated Cost (Excl. HST)
WW-D-SS-23	Sewers for Municipal Servicing Replacing Private Sewage Systems (SPS-07B)	New sanitary sewers to benefit existing unserviced within North Dorchester (WW-D-SPS-07B catchment)	Ex. Areas in South Dorchester on Private Sewage Systems	Municipal Servicing Replacing Private Sewage Systems	With new development	A+	Sewer	2250 m	200 mm	$ 3,172,000
Sub-Total Dorchester Wastewater Capital Program Projects										**$ 103,255,000**
WW-D-401-ST-01	Cost Benefit Study to Service 401 Corridor Lands	Cost-benefit study to evaluate servicing options for 401 Corridor Lands, will include recommendations for gravity, sewage pumping station or siphon options.	401 Corridor Lands	Development Interest		-	Study			$ 50,000
Sub-Total 401 Corridor Wastewater Capital Program Projects										**$ 50,000**
WW-T-TP-01B	Thorndale Treatment Plant Upgrades (includes SPS)	Treatment plant capacity upgrades required to accommodate all development flows in Thorndale (includes Thorndale SPS and forcemain)	All Thorndale Developments	Accumulated growth	1,000 PPJ	C	Treatment		1.0 ML	$ 7,192,000
WW-T-SS-01	Gerald Parkway sewer upgrades	Sewer upgrades along Gerald Parkway to accommodate growth flows in West Thorndale	Peripheral Lands Development 14 and 15	New Peripheral Lands Development	With new development	A+	Sewer	200 m	375 mm	$ 340,000
WW-T-SS-02	King Street sewer	King Street sewer from CN rail to Lions Lane to accommodate East Thorndale growth flows	Peripheral Lands Development 14 and 15	New Peripheral Lands Development	With new development	A+	Sewer	375 m	250 mm	$ 569,000
WW-T-SS-03	King Street sewer	King Street sewer from Lions Lane to Monteith Avenue to accommodate East Thorndale growth flows	Development 7-8, Ex. King St. Harrison St. Area and Peripheral Lands Development 16	Development 8-13 and 16	2,500 PPJ	A+	Sewer	485 m	250 mm	$ 719,000
WW-T-SS-04	King Street sewer	King Street sewer from Wye Creek to existing sewers to accommodate existing development flows	Development 7-8, Ex. King St. Harrison St. Area and Peripheral Lands Development 16	Development 8-13 and 17	2,500 PPJ	A+	Sewer	340 m	200 mm	$ 520,000
WW-T-SS-05	King Street sewer	King Street sewer under Wye Creek to accommodate existing development flows	Development 7-8, Ex. King St. Harrison St. Area and Peripheral Lands Development 16	Development 8-13 and 18	4,000 PPJ	B	Sewer	70 m	200 mm	$ 713,000
WW-T-SS-06	King Street sewer	King Street sewer from Harrison Street to before Wye Creek to accommodate existing development flows	Development 7-8, Ex. King St. Harrison St. Area and Peripheral Lands Development 16	Development 1, 3, 8-13 and 16	3,750 PPJ	A+	Sewer	130 m	200 mm	$ 234,000
WW-T-SS-07	Sewers for Existing Unserviced within Thorndale	New sanitary sewers to benefit existing unserviced within Thorndale	Ex. King St. Harrison St. Area	Municipal Servicing Replacing Private Sewage Systems	4,000 PPJ	A+	Sewer	806 m	200 mm	$ 1,152,000
Sub-Total Thorndale Wastewater Capital Program Projects										**$ 11,439,000**
Total Municipality of Thames Centre Wastewater Capital Program										**$ 114,744,000**

1.8 Further Considerations

The *Further Considerations* of the Master Plan report section provides an overall review of the permits and approvals, and mitigation measures that may be required for the preferred water and wastewater servicing strategy for the Municipality of Thames Centre.

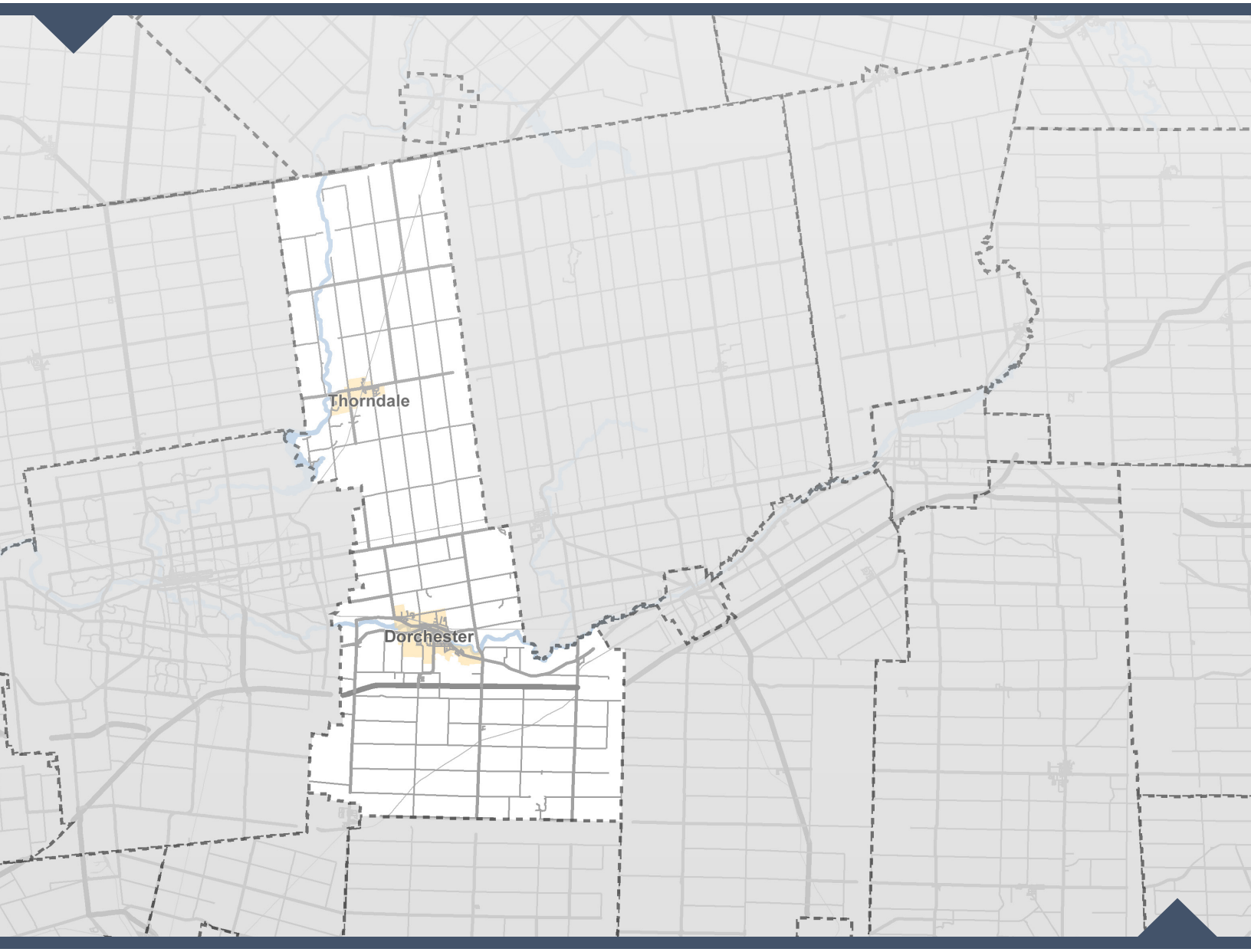
1.9 Public Consultation

The *Public Consultation* section provides a compilation of all the relevant documentation related to the public, stakeholder and agency consultation. This section also provides the background support for satisfying the Public Consultation for the Class EA Process.

In May 2019, one Public Information Centre (PIC) was held to elicit input on the Class EA process, servicing constraints and opportunities, alternative concepts and strategies to address the servicing challenges and opportunities, and the technically feasible solution.

WATER AND WASTEWATER MASTER PLAN UPDATE – MASTER PLAN REPORT

Project No. 418109
November 2019



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Version Updates

The following is a record of the changes/updates that have occurred on this document.

Revision No.	Changes/Updates	Revised By	Date
1	First Draft	GM BluePlan	August 2, 2019
2	Finalized Report for Project Filing	GM BluePlan	September 6, 2019
3	Post-Filing Updates	GM BluePlan	November 15, 2019

Glossary of Terms and Acronyms

The following table provides a summary of terms and acronyms that are commonly used throughout the report.

Term or Acronym	Definition
ADD	Average Day Demand
ADWF	Average Dry Weather Flow
DC	Development Charges
d/D	Standard Surcharge State
DWF	Dry Weather Flow
EA	Environmental Assessment
EAA	Environmental Assessment Act
FF	Fire Flow
FPSS	Public Fire Protection Survey Services
FUS	Fire Underwriters Survey
HGL	Hydraulic Grade Line
I/I	Inflow and Infiltration
ICI	Industrial, Commercial, Institutional
LHEAPWS	Lake Huron & Elgin Area Primary Water Supply Systems
LOS	Level of Service
MDD	Maximum Day Demand
MEA	Municipal Engineers Association
MNRF	Ministry of Natural Resources and Forestry
MECP	Ministry of the Environment, Conservation and Parks
PTTW	Permit to Take Water
PHD	Peak Hour Demand
PIC	Public Information Centre
PRV	Pressure Reducing Valve
PWWF	Peak Wet Weather Flow
SOGR	State of Good Repair
SPS	Sewage Pumping Station
UTRCA	Upper Thames River Conservation Authority
WHPA	Wellhead Protection Area
WPCP	Water Pollution Control Plan
WTF (or WTP)	Water Treatment Facility (or Water Treatment Plant)
WWF	Wet Weather Flow
WWTF (or WWTP)	Wastewater Treatment Facility (or Wastewater Treatment Plant)

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1 Background and Planning Framework

1.1 Introduction

1.1.1 Background

The Municipality of Thames Centre is one of eight lower tier municipalities in Middlesex County situated within the Upper Thames River basin. The Municipality comprises a 2016 census population of 13,191, with approximately half the population located within the Municipality's two urban areas, Dorchester and Thorndale.

The Municipality of Thames Centre's water and wastewater servicing is operated under a single-tier system. The Municipality is responsible for the water supply, storage facilities and the distribution system; as well as wastewater treatment, pumping stations and the sewer collection system.

Readily available and accessible public infrastructure is essential to the viability of existing and growing communities. Infrastructure planning, land use planning and infrastructure investment require close integration to ensure efficient, safe and economically achievable solutions to provide the required water and wastewater infrastructure. To balance the needs of growth with the protection and preservation of natural, environmental and heritage resources, the Municipality of Thames Centre initiated an integrated process to update the Water and Wastewater Master Plan.

The Municipality of Thames Centre retained GM BluePlan Engineering Limited (GM BluePlan) to complete the Waster and Wastewater Master Plan Update which provides the review and development of water and wastewater servicing strategies for servicing within the Municipality. The Master Plan uses population and employment growth forecasts based on anticipated growth to buildout of the urban areas.

The Study Area for the Master Plan focuses on the existing service areas within the Communities of Dorchester and Thorndale, but also provides comment on municipal water and wastewater servicing for areas peripheral to the urban areas where the Municipality currently does not provide municipal servicing. The study area is shown in **Figure 1-1**.

The 2019 Master Plan Update builds on the 2008 Water and Wastewater Master Plan, as well as the 2018 Development Charges Background Study Report – Water and Wastewater Servicing. The Master Plan Update is a critical component in the Municipality's planning for growth and will provide the framework and vision for the water and wastewater servicing needs to Buildout. Buildout.

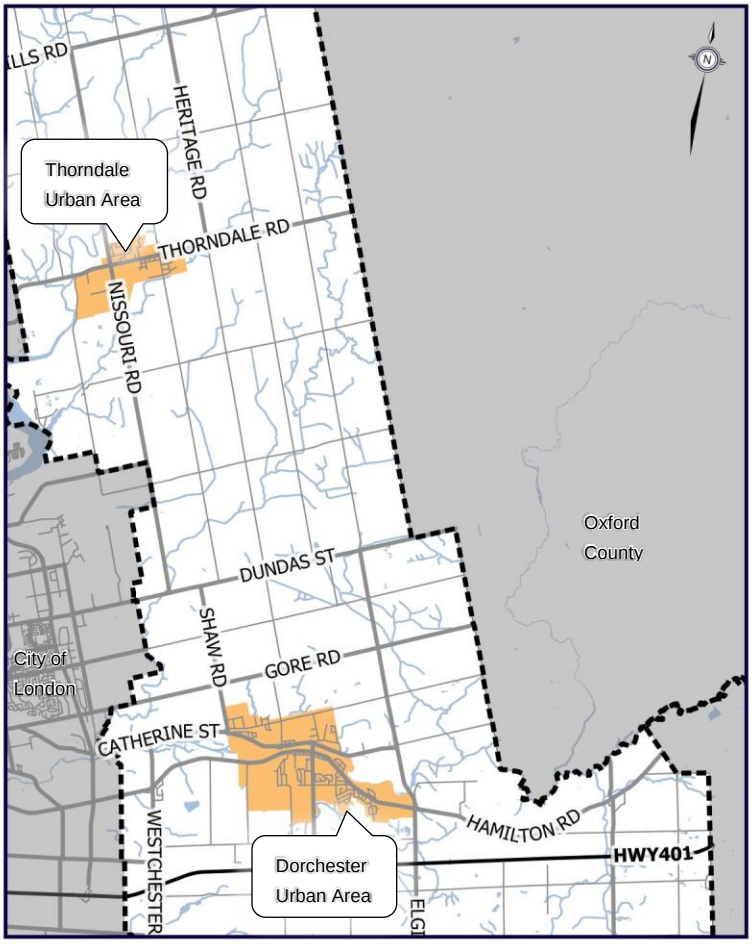

Figure 1-1: Municipality of Thames Centre Water and Wastewater Master Plan Study Area

1.2 Master Plan Objectives

The Master Plan comprehensively documents the development of the preferred water and wastewater servicing strategies for the Municipality of Thames Centre to meet the servicing needs of existing users and future development to buildout.

The Master Plan evaluates the ability of existing and planned water and wastewater infrastructure within the Municipality of Thames Centre to efficiently and effectively service the Municipality's existing population, service the forecasted growth, and evaluate/develop recommended servicing strategies.

The key objectives of the Master Plan are as follows:

- Review planning forecasts to buildout and determine the impacts on servicing needs for the Municipality's water and wastewater infrastructure;

- Evaluate the ability of existing and planned water and wastewater infrastructure to efficiently and effectively service the Municipality's existing users and anticipated growth;
- Undertake a comprehensive review and analysis for both water and wastewater servicing requirements;
- Address key servicing considerations as part of the development and evaluation of water and wastewater servicing strategies including:
    - Level of service to existing users, anticipated future growth to buildout estimated by the Municipality;
    - Operational flexibility and system security and reliability
    - Mitigation of impacts to natural, social and economic environments
    - Opportunity to meet policy, policy statements, regulations and technical criteria
    - Opportunity to optimize existing infrastructure and servicing strategies
    - Ensuring the strategies are cost effective.
- Utilize new calibrated water and wastewater hydraulic models for the analysis of servicing alternatives;
- Establish a complete and implementable water and wastewater capital program;
- Provide extensive consultation with the public and stakeholders; and
- Complete the Master Plan in accordance with the Municipal Engineers Association (MEA) Class Environmental Assessment (EA) process for Master Plans.

1.3 Master Planning Process

A Master Plan is typically subject to approval by the municipality but does not normally require approval under the Environmental Assessment Act (EAA). However, any specific project within a Master Plan must fulfill the Class Environmental Assessment (EA) requirements. At a minimum, Master Plans address Phases 1 and 2 of the Class EA process.

This section describes the class environmental assessment process and the specific requirements for the preparation of master plans.

1.3.1 Class Environmental Assessment Process

Ontario's Environmental Assessment Act (EAA) was passed in 1975 and was proclaimed in 1976.The EAA requires proponents to examine and document the environmental effects that could result from major projects or activities and their alternatives. Municipal undertakings became subject to the EAA in 1981.

The EAA's comprehensive definition of the environment is:

- Air, land or water;
- Plant and animal life, including human life;
- The social, economic and cultural conditions that influence the life of humans or a community;
- Any building, structure, machine or other device or thing made by humans;
- Any solid, liquid, gas, odour, heat, sound, vibration, or radiation resulting directly or indirectly from human activities; and,
- Any part of a combination of the foregoing and the interrelationships between any two or more of them, in or of Ontario.

The purpose of the EAA is the betterment of the people of the whole or any part of Ontario by providing for the protection, conservation and wise management of the environment in Ontario (RSO1990, c.18, s.2). It is the objective of EAA proponents to ensure that decisions result from a rational, objective, transparent, replicable, and impartial planning process.

As set out in Section 6.1(2) of the EAA, an EA document must include the following:

- A description of the purpose of the undertaking;
- A description of and a statement of the rationale for,
    - The undertaking;
    - The alternative methods of carrying out the undertaking; and,
    - Alternatives to the undertaking.

The EA document must also include a description of:

- The environment that will be affected or that might reasonably be expected to be affected, directly or indirectly, by the undertaking or alternatives to the undertaking;
- The effects that will be caused or that might reasonably be expected to be caused to the environment by the undertaking or alternatives to the undertaking;
- The actions necessary or that may reasonably be expected to be necessary to prevent, change, mitigate or remedy the effects upon or the effects that might reasonably be expected upon the environment by the undertaking or alternatives to the undertaking;
- An evaluation of the advantages and disadvantages to the environment of the undertaking, the alternative methods of carrying out the undertaking and the alternatives to the undertaking (RSO1990, c.18, s.2); and,
- A description of any consultation about the undertaking by the proponent and the results of the consultation.

1.3.2 The Principles of Environmental Planning

The EAA sets a framework for a systematic, rationale and replicable environmental planning process that is based on five key principles, as follows:

- Consultation with affected parties. Consultation with the public and government review agencies is an integral part of the planning process. Consultation allows the proponent to identify and address concerns cooperatively before final decisions are made. Consultation should begin as early as possible in the planning process.
- Consideration of a reasonable range of alternatives. Alternatives include functionally different solutions, “alternatives to” the proposed undertaking and “alternative methods” of implementing the preferred solution. The “Do Nothing” alternative must also be considered.
- Identification and consideration of the effects of each alternative on all aspects of the environment. This includes the natural, social, cultural, technical, and economic environments.
- Systematic evaluation of alternatives in terms of their advantages and disadvantages, to determine their net environmental effects. The evaluation shall increase in the level of detail as the study moves from the evaluation of “alternatives to” to the evaluation of “alternative methods”.
- Provision of clean and complete documentation of the planning process followed, to allow “traceability” of decision-making with respect to the project. The planning process must be documented in such a way that it may be repeated with similar results.

1.3.3 Class Environmental Assessment

“Class” Environmental Assessments (Class EAs) were approved by the Minister of the Environment in 1987 for municipal projects having predictable and mitigable impacts. The Municipal Class EA process was revised and updated in 1993, 2000, 2007, 2011 and 2015. The Class EA approach streamlines the planning and approvals process for municipal projects that are:

- Recurring;
- Similar in nature;
- Usually limited in scale;
- Predictable in the range of environmental impacts; and,
- Responsive to mitigation.

The Municipal Class Environmental Assessment, prepared by the Municipal Engineers Association (October 2000, as amended in 2007, 2011 and 2015), outlines the

procedures to be followed to satisfy Class EA requirements for water, wastewater, stormwater management and road projects. The process includes five phases:

- Phase 1: Identification of the Problem or Opportunity;
- Phase 2: Identification and Evaluation of Alternative Solutions to determine a Preferred Solution while taking input from the public and other stakeholders into consideration;
- Phase 3: Examination of Alternative Methods of implementation of the Preferred Solution based on the existing conditions and anticipated environmental effects, while taking input from the public and other stakeholders into consideration;
- Phase 4: Documentation of the Class EA process in the form of an Environmental Study Report (ESR) for public review; and,
- Phase 5: Implementation and Monitoring.

Projects subject to the Class EA process are classified into the following four "schedules" depending on the degree of the expected impacts.

Schedule A projects are minor or emergency operational and maintenance activities and are approved without the need for further assessment. These projects are typically smaller in scale and do not have a significant environmental effect.

Schedule A+ projects are also pre-approved; however, the public is to be advised prior to the project implementation. Projects of this class do not usually have the potential for adverse environmental impacts. Typical projects that fall in this category are within existing road allowance, and utility corridors.

Schedule B projects require a screening of alternatives for their environmental impacts and Phases 1 and 2 of the planning process must be completed. The proponent is required to consult with the affected public and relevant review agencies. Provided that no significant impacts are identified and no requests for a Part II Order to a Schedule C or Individual Environmental Assessment are received, Schedule B projects are approved and may proceed directly to implementation.

Schedule C projects must satisfy all five phases of the Class EA process. These projects have the potential for greater environmental impacts. Phase 3 involves the assessment of alternative methods of carrying out the project, as well as public consultation on the preferred conceptual design. Phase 4 normally includes the preparation of an Environmental Study Report (ESR) that is filed for public review. Provided no significant impacts are identified and no requests for Part II Order or "bump-up" to an Individual Environmental Assessment are received, Schedule C projects are then approved and may proceed directly to implementation.

Figure 1-2 illustrates the Municipal Class EA planning and design process with the phases required for each schedule.

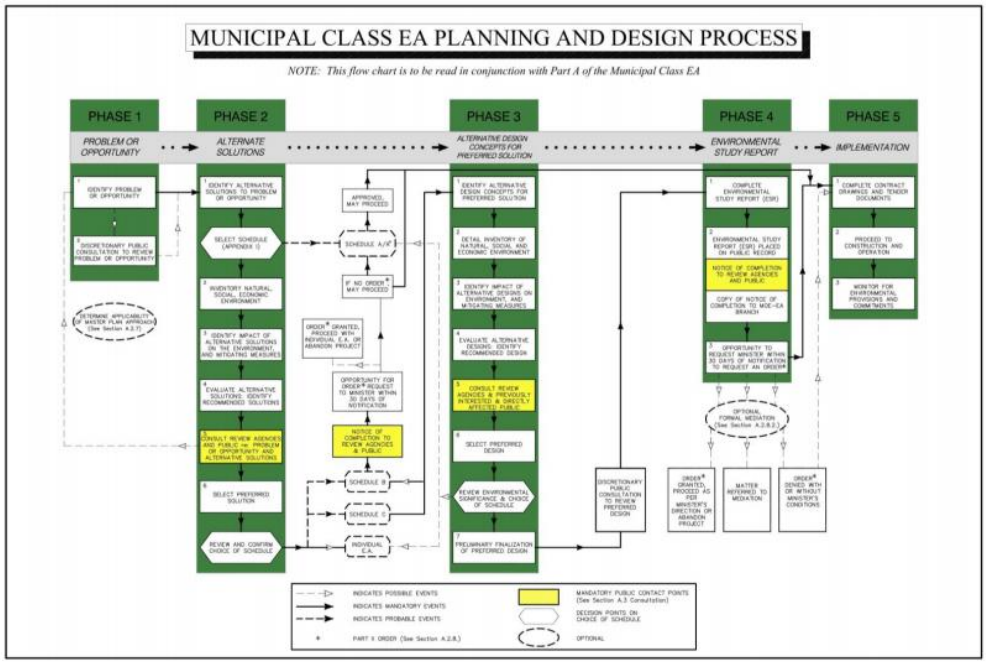

Figure 1 – Municipal Class EA Planning and Design Process

Figure 1-2: Municipal Class EA Planning and Design Process

1.3.4 Master Planning Process

Municipalities recognize the benefits of comprehensive, long-range planning exercises that examine problems and solutions for an overall system of municipal services. The Municipal Class EA for Water and Wastewater Projects recognizes the importance of master plans as the basis for sound environmental planning. The Class EA defines master plans as:

> "Long range plans which integrate infrastructure requirements for existing and future land use with environmental assessment planning principles. These plans examine an infrastructure system(s) or group of related projects in order to outline a framework for planning for subsequent projects and/or developments."

Master plans have distinguishing features that set them apart from project specific studies. These features include the following:

- Master plans are broad in scope and focus on the analysis of a system for the purpose of outlining a framework for the provision of future works and developments.
- Specific projects recommended in a master plan are part of a larger management system and are distributed geographically throughout the study area. The implementation of specific projects may occur over an extended time frame.

In accordance with the MEA Class EA document, a Master Plan must at least satisfy the requirements of Phases 1 and 2 of the Class EA process and incorporate the five key principles of environmental planning. The Master Plan must document public and agency consultation at each phase of the process and a reasonable range of alternative solutions must be identified and systematically evaluated.

The approach for the Master Plan is to confirm existing planned projects and where applicable, evaluate and develop any new components. This approach would also be scrutinized through a public and agency consultation process and be fully documented.

There are generally four approaches to undertaking Master Plans under the Class EA process. This study follows Approach 1 of the approved master planning Class EA process. Under this approach, the Master Plan document is completed through a conceptual and strategic level study where detailed investigations would be required at the project-specific level for individual Schedule B and C projects or developer led requirements identified though the Master Plan.

This **Master Servicing Plan Update** will address Phases 1 and 2 of the Class EA process by defining the relevant problems and opportunities, while identifying a preferred solution(s).

As a result, this **Master Servicing Plan Update** will be used to fulfill the requirements of all Schedule A, A+, and B recommended projects.

1.4 Public Consultation

Public and agency consultation are integral to the Class EA planning process. The public consultation process is essential for informing and obtaining input from potentially interested and affected parties during the study process.

Objectives of Phase 1 of the MEA Municipal Class EA process with respect to public consultation are as follows:

- Present clear and concise information to stakeholders at key stages of the study process;
- Solicit community, regulatory and Municipality staff input;
- Meet Municipal Class EA consultation requirements;
- To fulfill the consultation requirements of the MEA Municipal Class EA document:
    - Build on past communication protocols and consultation plans from previous Class EA and municipal planning initiatives, to ensure consistency and continuity.
    - Meet public and agency notification and consultation requirements for Phases 1 and 2 of the MEA Municipal Class EA; and
    - Complete additional tasks to enhance the proposed consultation program and overall Class EA process.

As part of the current project, a communication and consultation plan was developed. The main objective of the plan was to proactively engage the community, regulatory agencies, Thames Centre and Middlesex staff. More specifically, the plan was designed to:

- Ensure the general public, Municipal councillors, stakeholders, external agencies (including federal and provincial) and special interest groups had an opportunity to participate in the study process;
- Ensure that factual information was provided to interested and affected stakeholders early and often throughout the study process; and
- Contact external agencies to obtain legislative or regulatory approvals, or to collect pertinent technical information.

The complete Public Consultation process is documented in **Section 5 – Public Consultation.**

1.5 Relevant Studies and Background Information

The following completed County and Municipal level studies have been reviewed and considered throughout the master planning process and selection of preferred servicing strategies.

1.5.1.1 Municipality of Thames Centre Development Charges Background Study, May 2018

The 2018 Development Charges Background Study was prepared in in accordance with the methodology required under the Development Charges Act. The study reviewed the residential and non-residential growth forecasts to buildout for the Municipality; providing a baseline for growth forecasting to be used in the Master Plan Update.

This study projected an equivalent buildout population of 14,822 in Dorchester, and 4,475 in Thorndale. Equivalent population is detailed further in **Section 1.10.1 Planning and Growth Projections**.

As part of the DC study, the report also presented costs and implementation of water and wastewater projects required to service future growth based on the servicing strategies developed through the 2008 Water and Wastewater Master Plan.

1.5.1.2 2008 Municipality of Thames Centre Water and Wastewater Master Plan

The 2008 Thames Centre Water and Wastewater Master Plan Update determined preferred water and wastewater servicing strategies to meet potential population and employment growth within the urban areas of Dorchester and Thorndale. The 2008 Master Plan Update built on the 1997 Dorchester Planning Area Master Servicing Study, the 2002 Dorchester Long Term Water Supply Study and the 2003 Thorndale Water and Wastewater Master Plan Document.

The preferred servicing strategy with status of recommended projects for Dorchester is summarized in **Table 1-1**. The preferred servicing strategy with status of recommended projects for Thorndale is summarized in **Table 1-2**.

Table 1-1: Dorchester 2008 Water and Wastewater Master Plan Projects

2008 Water and Wastewater Master Plan Project	Status in 2019
Dorchester Water Projects	
• Maximize all existing wells to provide water supply to meet short term growth.	Source at WTF near capacity. 2014 Monitoring Report completed. There may be further opportunity for pump upgrades and security of supply upgrades.
• Expand the existing reservoir at the Dorchester Water Treatment Plant.	Not completed. There remain existing 2 x 2500m^3 in-ground reservoirs at the WTF. Nearly all of the 1,400m^3 within each reservoir previously utilized for disinfection is no longer required for disinfection and can be utilized for storage.

2008 Water and Wastewater Master Plan Project	Status in 2019
• Connect to the London Water Supply System once capacity is reached at the existing water treatment plant to supply ultimate buildout growth requirements.	Connection to the City of London has not been required and has not been completed
• Evaluate impact of decommission the existing water treatment plant.	The WTF was not considered for decommissioning.
Dorchester Wastewater Projects	
• Existing service areas remain unchanged.	Wastewater service area has remained all areas within the Settlement Boundary. Properties on private sewage systems in the Hamilton Road and Dorchester Road area, as well as along Byron Avenue between Dorchester Road and Hamilton Road were required to connect to the municipal sewage system per Municipality of Thames Centre By-Laws 076-2008 and 052-2012.
• Extend wastewater collection system to service existing and new development areas.	The collection system has been extended to service new development and existing properties where required.
• Convey all flows from Dorchester (including service areas south and north of Thames River) to the existing pollution control plant (PCP) through new and existing sewers and pumping stations.	Upgrades to the existing Dorchester WWTF have been designed and approved. Construction of Phase 1 of the upgrades was commenced in 2018.
• By continuing to utilize the existing pollution control plant (PCP), staged expansions will be required.	
• Construct five new pumping stations and forcemains.	Construction of PS No. 3 servicing southwest Dorchester commenced in 2018.
• Expand existing pumping station and forcemains.	Expansion of existing pumping stations and forcemains has not been required and has not completed.

Table 1-2: Thorndale 2008 Water and Wastewater Master Plan Projects

2008 Water and Wastewater Master Plan Project	Status in 2019
Thorndale Water Projects	
• Maximize existing wells and drill new well(s) to meet future demand needs. The existing well supplies can meet short term growth requirements. Hydrogeological studies will be required to confirm additional supplies.	PTTW recently upgraded to 20 L/s from 16 L/s.
• Construct a new elevated tank to provide floating storage to Thorndale.	1.65 ML elevated storage tank constructed in 2014.
• Extend the water distribution system to service the remainder of the urban area.	Water distribution system service continues to be extended to new development and existing properties within Thorndale Settlement Boundary.
Thorndale Wastewater Projects	
• Construct a new sanitary collection system for existing and future development in the urban area of Thorndale.	Thorndale WWTF constructed in 2012. Sewer network continues to be extended to new development and existing properties within Thorndale Settlement Boundary.
• Construct one new pollution control plant (PCP) west of the community, south of Thorndale Rd. discharging to the Thames River to service the entire existing and future development areas.	
• Provision for a deep trunk sewer on south of Thorndale Rd. conveying wastewater by gravity to the new PCP.	Trunk sewer along south limit of Thorndale from Meadowbrook Lane to the new WWTF has been constructed.

1.5.1.3 Municipality of Thames Centre Environmental Services Report No. ES-017-17, May 8, 2017

Report ES-017-17, approved by Council in May 2017, recommended that trunk watermain upgrades be completed in south Thorndale to improve available fire flow in the area of the industrial development park located in southwest Thorndale.

The report also recommended that Council adopt a minimum available fire flow guideline of 150 L/s.

The proposed 300mm diameter trunk watermain was estimated to cost $100,000 and the project was recommended to be included as eligible works within a future Development Charges Bylaw.

1.5.1.4 Dorchester WWTP Expansion Detailed Design Report, 2017

The 2017 Dorchester WWTP Expansion Detailed Design Report summarizes the proposed short-term and long-term expansion of the WWTP.

A Schedule C Class Environmental Assessment (Class EA) was completed in November

2016 that recommended the increase of the plant to a capacity of 1,200 m^3/d via the following expansion works:

- Addition of two Sequencing Batch Reactor (SBR) tanks and SBR equipment;
- Construction of new Filter Building with disk filters; and
- Expansion of UV structure and equipment.

Based on the estimated cost and funding availability, it was recommended that construction of these works be completed in two phases under separate tenders.

Phase 1A achieving 900 m^3/d commenced construction in 2018, and

Phase 1B achieving 1,200 m^3/d is planned for 2022 construction.

The expansion to 1200 m^3/d is a part of the long-term plan to expand the WWTP to an ultimate capacity of 6,000 m^3/d, as indicated in the original Certificate of Approval (CofA) issued in June 1999, which was later amended in November 2000 for approval for the 2002 capacity expansion to 520 m^3/d.

1.5.1.5 Hydrogeologic Assessment Report, Thorndale Drinking Water System, Thorndale Ontario

In support of population growth projections for the community of Thorndale, Thames Centre completed a of the existing water supply system and long-term supply from the Thorndale Well Field. The objective of the review was to maximize yield from the existing production wells and well field for Thames Centre.

Water supply for the Thorndale DWS is currently obtained from two (2) groundwater bedrock wells including Well 1 and Well 2. At the time of the study, the PTTW allowed for a combined water taking of 720,000 L/day (8.3 L/s) at both Production Well 1 and 2. Well 1 and 2 never pump simultaneously.

A 72 - hour pumping test was completed at Well 2 at an average pumping rate of 16.4 L/s. Drawdown of 5.3m was observed within Well 2 at the end of the 72-hour pumping period. Drawdown of 4.7m and 2. 4m was observed at the end of the 72-hour pumping period in Well 1 and Thorndale Road Garage Well, respectively.

No complaints were received by nearby private well users during the constant rate test.

Water quality from Well 2 meets all health- related ODWS criteria for tested parameters. The only parameters found to exceed the ODWS AO, OG, or MOH reporting limits were hardness, iron, and sodium, which are typical for groundwater in the area.

Based on testing and analysis, Well 2 was determined to be capable of meeting the future predicted water supply demand of 22 L/ s while maintaining adequate available drawdown

within the pumping well and without causing unacceptable impacts to nearby private wells.

A combined daily maximum taking of 1,900,800 L/day was requested at Well 1 and 2. The pumping rate for Well 1 was recommended to remain unchanged from the current PTTW, and the instantaneous rate requested for Production Well 2 was 22 L/s (1,320 L/min).

Water levels at the Thorndale Road Garage Well will continue to be monitored to assess for potential impacts to nearby private wells under increased pumping. If the trigger level of 278 m AMSL is reached, Thames Centre would perform a residential well inspection of the private well to the east of the well field to confirm the construction details (i. e. depth of pump installation), and status of the well.

1.6 Problem and Opportunity Statement

Through the Municipal Class EA process, Phase 1 requires the identification of a problem or opportunity statement that guides the development and evaluation of alternative strategies to address the deficiencies identified in the water and wastewater systems.

The Water and Wastewater Master Plan Update has been initiated to:

- Re-evaluate growth needs and water supply and wastewater treatment capacities;
- Review approach and ability to support responsible development and coordinate integrated solutions with growth areas;
- Plan for Buildout that includes flexibility in servicing strategy and understanding of servicing impacts and costs; and,
- Update the long-term financial planning that includes a capital forecast to service existing and support growth and can be used as basis for development charges and rate updates.

The 2019 Water and Wastewater Master Plan Update:

- Provides background information and context for servicing needs;
- Outlines existing baseline of the system and demonstrates impacts of growth;
- Establishes preferred servicing strategies; and,
- Provides technical information to support staff through implementation.

1.6.1 Water and Wastewater Master Plan Update Vision

The Thames Centre Master Plan Update establishes a preferred servicing strategy for Water and Wastewater that:

- Meets current needs of the Municipality;
- Supports growth;

- Maintains or improves service levels;
- Improves system resiliency and operational flexibility;
- Considers the long-term financial viability of the water and wastewater systems.

1.7 Study Area

The Municipality of Thames Centre is located within the County of Middlesex, directly east of the City of London. The Municipality has an estimated 2018 population of 13,990. The majority of population and employment reside within the Municipality's two urban areas: Dorchester and Thorndale. Dorchester is the largest urban area with a 2018 residential population of 5,346 persons with 2018 employment of 1,765 jobs. Thorndale has a 2018 residential population of 1,216 persons with employment of 402 jobs. The study also focused on the 401 Corridor Lands, located southwest of Dorchester, and directly north of Highway 401. The study area is shown in **Figure 1-3** and **Figure 1-4**.

Development within Dorchester and Thorndale is restricted to within the urban areas' Settlement Boundaries. There is potential for future development within peripheral areas to the Settlement Boundaries in both Dorchester and Thorndale. Development outside of the Settlement Boundaries in either Dorchester or Thorndale must comply with the policies set out in the Municipality of Thames Centre and County of Middlesex Official Plans. Generally, lands identified for growth within the Settlement Boundaries are to be fully developed prior to expansion of the Settlement Boundary.

The 401 Corridor Lands are currently zoned to allow for dry industrial use with no existing municipal servicing.

The Dorchester and Thorndale reside within the jurisdiction of the Upper Thames River Conservation Authority (UTRCA). The Conservation Authorities Act provides for regulations that restrict development in areas adjacent to wetlands, watercourses, and hazard lands.

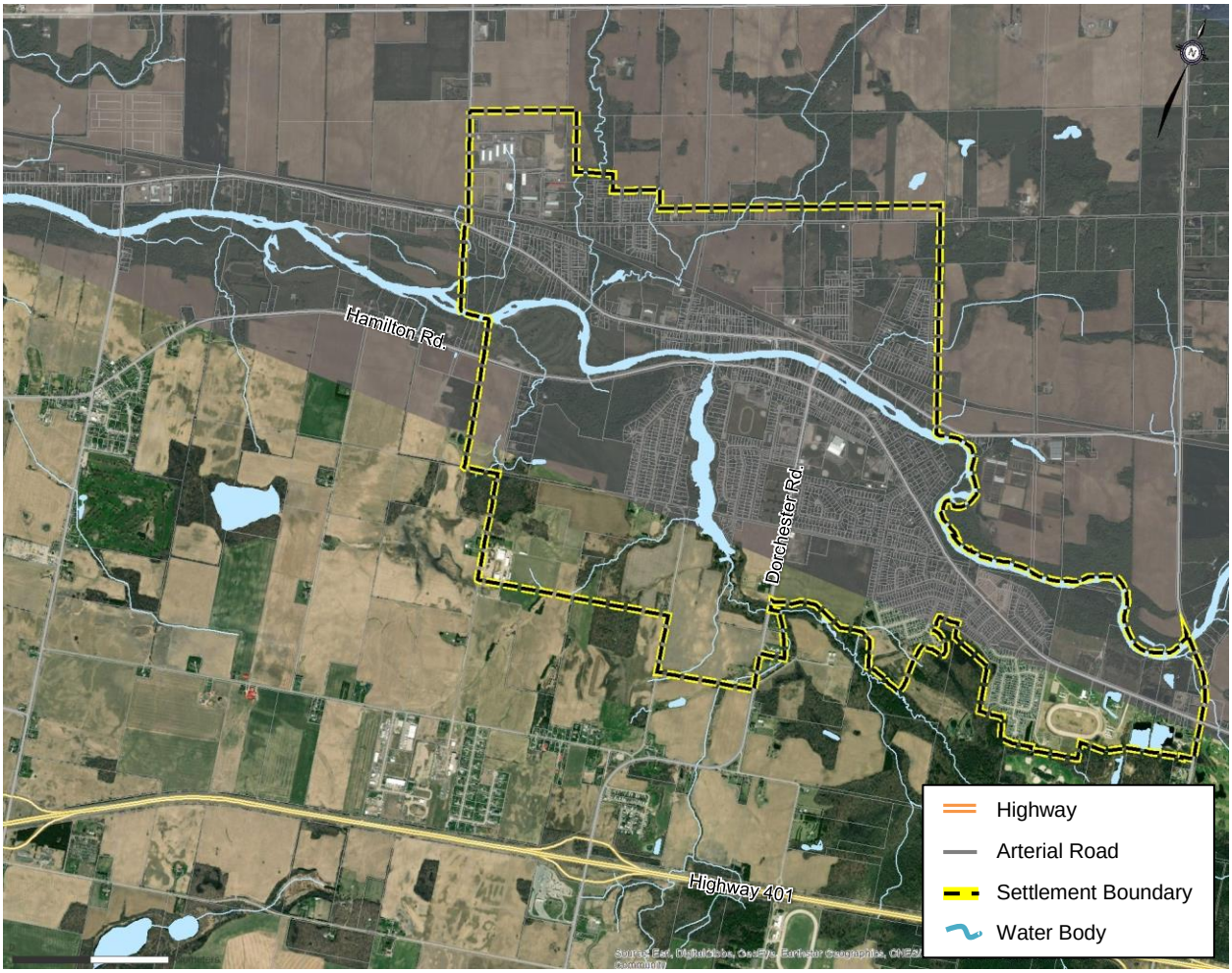

Figure 1-3: Study Area (Dorchester and 401 Corridor Lands)

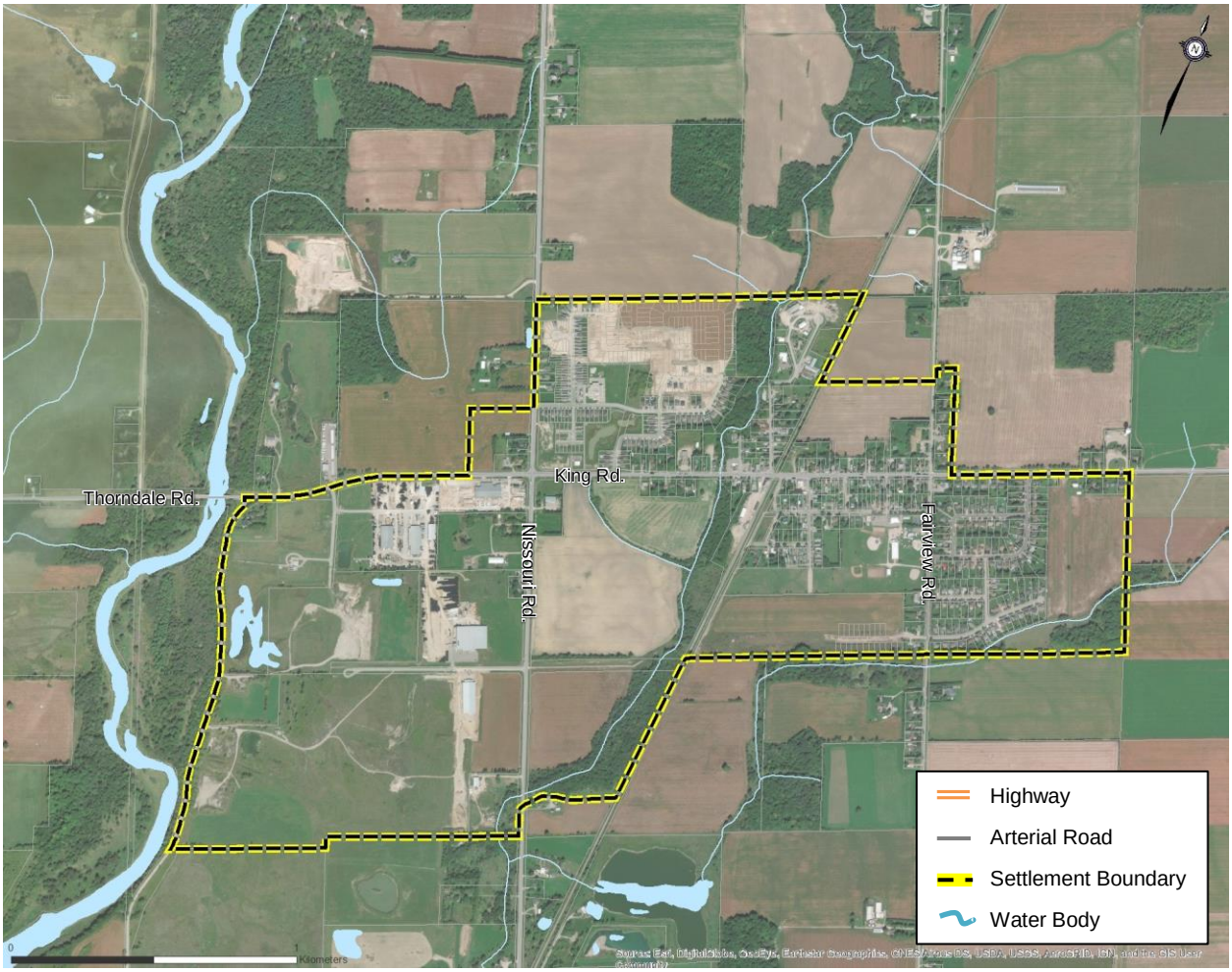

Figure 1-4: Study Area (Thorndale)

1.8 Planning Context

1.8.1 Provincial and Federal Legislation and Policy Context

1.8.1.1 Provincial Policy Statement

The Provincial Policy Statement, 2014 is issued under Section 3 of the Planning Act. The latest Provincial Policy Statement came into effect on April 30, 2014 and supersedes the 2005 Provincial Policy Statement (PPS). It 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 (Ministry of Municipal Affairs and Housing, MMAH, 2014). The policies of the PPS may be complemented by provincial plans or by locally-generated policies regarding matters of interest.

Key policies relevant to planning for water and wastewater services include:

Policy 1.6.1

Infrastructure, electricity generation facilities and transmission and distribution systems, and public service facilities shall be provided in a coordinated, efficient and cost-effective manner that considers impacts from climate change while accommodating projected needs.

Planning for infrastructure, electricity generation facilities and transmission and distribution systems, and public service facilities shall be coordinated and integrated with land use planning so that they are:

a. financially viable over their life cycle, which may be demonstrated through asset management planning; and,

b. available to meet current and projected needs.

Policy 1.6.3

Before consideration is given to developing new infrastructure and public service facilities:

a. the use of existing infrastructure and public service facilities should be optimized; and,

b. opportunities for adaptive re-use should be considered, wherever feasible.

Policy 1.6.6.1

Planning for sewage and water services shall:

a. Direct and accommodate expected growth or development in a manner that promotes the efficient use and optimization of existing:

    1. municipal sewage services and municipal water services; and

    2. private communal sewage services and private communal water services, where municipal sewage and water services are not available;

b. Ensure that these systems are provided in a manner that:
    1. can be sustained by the water resources upon which such services rely
    2. is feasible, financially viable and complies with all regulatory requirements; and
    3. protects human health and the natural environment;
c. Promote water conservation and water use efficiency;
d. Integrate servicing and land use considerations at all stages of the planning process; and,
e. Be in accordance with the servicing hierarchy outlined through policies 1.6.6.2, 1.6.6.3, 1.6.6.4 and 1.6.6.5.

Key policies relevant to planning for the Municipality of Thames Centre water and wastewater infrastructure include:

Policy 1.1.3.1

Settlement areas shall be the focus of growth and development, and their vitality and regeneration shall be promoted.

Policy 1.1.3.8

Planning authorities shall identify appropriate locations and promote opportunities for intensification and redevelopment where this can be accommodated taking into account existing building stock or areas, including *brownfields sites*, and the availability of suitable existing or planned *infrastructure* and *public service facilities* required to accommodate projected needs.

Policy 1.1.4.2

In *rural areas*, rural *settlement areas* shall be the focus of growth and development, and their vitality and regeneration shall be promoted.

Policy 1.1.4.3

When directing development in rural settlement areas in accordance with policy 1.1.3, planning authorities shall give consideration to rural characteristics, the scale of development and the provision of appropriate service levels.

1.8.1.2 Planning Reform Act

The Planning Act establishes the rules for land use planning in Ontario. It describes how land uses may be controlled in communities. Changes to the planning system were introduced in 2006 by the *Planning and Conservation Land Statute Law Amendment Act*. Key changes are as follows:

- Municipalities must now update their official plan every five years, followed by an update of the accompanying zoning by-law within three years after the new official plan is in effect
- There are more opportunities for public input before local decisions are made
- Municipalities have enhanced ability to plan for a range and mix of housing types and densities
- Municipalities have additional ability to have the final say on whether designated employment lands can be changed to other uses

1.8.1.3 Bill 13, Sustainable Water and Wastewater Systems Improvement and Maintenance Act, 2010

This Bill enacts the Sustainable Water and Wastewater Systems Improvement and Maintenance Act, 2010 and repeals the Sustainable Water and Sewage Systems Act, 2002. The Bill had it first reading on March 23rd, 2010. Key points of the Bill are as follows:

- Sets out the purposes of the Act, which include ensuring that public ownership of water services and wastewater services is maintained.
- Establishes the Ontario Water Board as an agent of the Crown and sets out the Board's objectives, powers and duties which relate to the regulation of water services and wastewater services.
- Sets out the responsibilities of municipalities or groups of municipalities that are designated as regulated entities by regulation.
- Regulated entities must prepare business plans for the provision of water services or wastewater services. The plan must contain, among other things, an assessment of the full cost of providing water services or wastewater services to the public and a description of how the regulated entity intends to pay this full cost.

1.8.1.4 Water Opportunities and Conservation Act

The Ontario Government passed the Water Opportunities and Conservation Act in 2010. The purposes of the Act are as follows:

- To foster innovative water, wastewater and storm water technologies, services and practices;
- To create opportunities for economic development and clean-technology jobs in Ontario; and
- To conserve and sustain water resources for present and future generations.

To further the purposes of the Act, the Minister of the Environment may establish aspirational targets in respect of the conservation of water and other matters.

The Act requires certain municipalities, persons and entities to prepare, approve and submit to the Minister of the Environment municipal water sustainability plans for municipal water services, municipal wastewater services and municipal storm water services under their jurisdiction. The Minister may establish performance indicators and targets for these services. The Act also authorizes the making of regulations requiring public agencies to prepare water conservation plans, achieve water conservation targets, and consider technologies, services and practices that promote the efficient use of water and reduce negative impacts on Ontario's water resources.

1.8.1.5 Safe Drinking Act

The *Safe Drinking Water Act* was adopted in 2002. The *Act* provides for the protection of human health and the prevention of drinking water hazards through the control and regulation of drinking water systems and drinking water testing. Key features of the *Act* include the following:

- Legally binding standards for contaminants in drinking water;
- Requirement to use licensed laboratories for drinking water testing;
- Requirement to report any results that do not meet the standards to the Ministry of the Environment and the local Medical Officer of Health and to undertake corrective action;
- All operators of municipal drinking water systems must be trained and certified;
- Establishment of a licensing regime for drinking water systems; and
- Inspections and enforcement to determine compliance with the Act.

1.8.1.6 Clean Water Act

The Clean Water Act was adopted in 2006 with the objective to protect existing and future sources of drinking water including rivers, lakes, and underground aquifers. The Act requires the following:

- That local communities assess existing and potential threats to their water, and that they set out and implement the actions needed to reduce or eliminate these threats;
- Empowers communities to take action to prevent threats from becoming significant;
- Public participation on every local source protection plan – the planning process for source protection is open to anyone in the community; and
- That all plans and actions be based on sound science.

1.8.1.6.1 Source Water Protection

Under the Clean Water Act, O. Reg. 287/07, on-site sewage systems and sewage works may be considered a threat to drinking water. These activities may be deemed significant

under certain conditions. The applicable source protection plan policies have been considered throughout this Master Plan.

Source Water Protection (SWP) Plans were prepared for the 19 watershed-based Source Protection Regions (SPR) across Ontario to protect existing and future sources and to identify areas of significant drinking water threats. The Municipality of Thames Centre falls within the Upper Thames River Source Protection Area.

The Source Water Protection Plans identify vulnerable areas that have been delineated under the Clean Water Act including Wellhead Protection Areas (WHPA), Intake Protection Zones (IPZ), Highly Vulnerable Aquifers (HVA), Significant Groundwater Recharge Areas (SGRA), and Vulnerable Scoring Areas for Groundwater and Surface Water (VSA) as well as water quantity vulnerable areas. According to the Source Protection Plan[1];

- WHPAs are *areas on the land around a municipal well, the size of which is determined by how quickly water travels underground to the well, measured in years.*
- IPZs are the *areas on the water and land surrounding a municipal surface water intake.*
- SGRAs are *areas characterized by porous soils that allow the water to seep easily into the ground and flor to an aquifer.*
- HVAs are *aquifers that can be easily changed or affected by contamination from both human activities and natural processes as a result of (a) its intrinsic susceptibility, as a function of the thickness and permeability of overlaying layers, or (b) by preferential pathways to the aquifer.*

The study area includes a WHPA in Dorchester and a WHPA in Thorndale.

Within the Dorchester WHPA, there are identified Vulnerable Scoring Areas (Groundwater), Vulnerable Scoring Areas (Surface Water) and Highly Vulnerable Aquifers. No IPZs have been identified.

No IPZs, Vulnerable Scoring Areas (Groundwater), SGRAs, Vulnerable Scoring Areas (Surface Water) or Highly Vulnerable Aquifers have been identified within the Thorndale WHPAs.

1.8.1.7 CCME Strategic Vision for Water

In 2009, the Canadian Council of Ministers of the Environment (CCME) provided a framework for future actions and activities related to water through the development of a vision and action plan, such that Canadians have access to clean, safe and sufficient

water to meet their needs in ways that also maintain the integrity of ecosystems. The goals and rationale developed as part of the vision includes the following:

Goal 1: Aquatic ecosystems are protected on a sustainable watershed basis.

Rationale: Enhance understanding and application of Integrated Water Resource Management to improve ecosystem health.

Goal 2: The conservation and wise use of water is promoted.

Rationale: Improve understanding of the full value of water to achieve behavioral change.

Goal 3: Water quality and water quantity management is improved, benefitting human and ecosystem health.

Rationale: Promote nationally consistent approaches to water quality and quantity monitoring, guidelines and multi-jurisdictional public reporting. Encourage research and networks to enhance knowledge and understanding of ground and surface waters.

Goal 4: Climate change impacts are reduced through adaptive strategies.

Rationale: Enhance water quality and quantity monitoring networks to support water and adaptation needs.

Goal 5: Knowledge about Canada's water is developed and shared.

Rationale: Help to spearhead value added information on water quality and quantity by supporting jurisdictional reporting efforts to Canadians in a systematic and consistent fashion.

1.8.1.8 Canada-wide Strategy for the Management of Municipal Wastewater Effluent

This 2009 Strategy was developed by the Canadian Council of Ministers of the Environment (CCME). It requires that all facilities achieve minimum National Performance Standards and develop and manage site-specific Effluent Discharge Objectives. The Strategy requires that overflow frequencies for sanitary sewers not increase due to development or redevelopment. The same applies for combined sewers, unless occurring as part of an approved combined sewer overflow management plan. Neither should occur during dry weather, except during spring thaw and emergencies. Source control of pollutants is recommended, and monitoring and reporting on effluent quality required. The 2014 Progress Report outlined the progress made by signatory federal, provincial and territorial jurisdictions on the commitments made in the 2009 Strategy.

1.8.1.9 CCME Wastewater Systems Effluent Regulations

The proposed CCME Wastewater System Effluent Regulations were published in March 2010, with the final Regulations published on June 29, 2012 and was amended January 2015. These Regulations are the primary instrument that Environment Canada is using

to implement the CCME Canada-wide Strategy for the Management of Municipal Wastewater Effluent.

The proposed Regulations apply to any wastewater system that has a capacity to deposit a daily volume of effluent of 100 cubic metres[2] or more from its final discharge point. The effluent from the applicable wastewater systems would be compared against "national effluent quality standards", which are as follows[3]:

- Average carbonaceous biochemical oxygen demand (CBOD) due to the quantity of BOD matter in the effluent of less than or equal to 25 mg/L;
- Average concentration of suspended solids in the effluent of less than or equal to 25 mg/L;
- Average concentration of total residual chlorine in the effluent of less than or equal to 0.02 mg/L; and
- Maximum concentration of un-ionized ammonia in the effluent of less than 1.25 mg/L, expressed as nitrogen (N), at 15°C ± 1°C.

1.8.1.10 CEPA – Inorganic Chloramines and Chlorinated Wastewater Effluents in Municipal Wastewater Effluent

The Canadian Environmental Protection Act (CEPA) required the elimination of toxic chlorine residuals from municipal wastewater effluent. All owners and operators of wastewater systems with daily volumes greater than 5,000 cubic metres of effluent were required to lower their total residual chlorine (TRC) levels to less than 0.02mg/L or lower by December 15, 2009[4].

1.8.1.11 Ministry of the Environment, Conservation and Parks Procedure F-5-1

Procedure F-5-1 outlines the treatment requirements for municipal and private sewage treatment works discharging to surface waters. Effluent requirements are established on a case-by-case basis considering the characteristics of the receiving water body. All sewage treatment works shall provide secondary treatment or equivalent as the "normal" level of treatment, unless individual receiving water assessment studies indicate the need for higher levels of treatment. Existing works not complying with the guideline are required to upgrade as soon as possible. The Procedure stipulates effluent design objectives for BOD, suspended solids, total phosphorus and ammonia and provides guidelines for BOD and suspended solids. It is the responsibility of the Region to ensure sewage treatment works are designed according to the guidelines and should be able to meet the objectives on an average annual basis and not exceed the guidelines.

[2] http://laws-lois.justice.gc.ca/eng/regulations/SOR-2012-139/FullText.html, Application 2(1)

3 http://laws-lois.justice.gc.ca/eng/regulations/SOR-2012-139/FullText.html, Authorization to Deposit 6(1)

[4] http://ec.gc.ca/lcpe-cepa/default.asp?lang=En&xml=8EE8F3F3-DE8E-41CD-BC74-BAB1B4F52171, (2); 4.3.3 – Dec 2009

1.8.2 Conservation Authority Regulation and Policy

The legislative mandate of the Conservation Authority, as set out in Section 20 of the Conservation Authorities Act, is to establish and undertake programs designed to further the conservation, restoration, development and management of natural resources.

Conservation Authorities are local agencies that protect and manage water and other natural resources at the watershed level. These agencies have a number of responsibilities and functions in the land use planning and development process.

The study area falls within the jurisdiction of the Upper Thames River Conservation Authority (UTRCA).

UTRCA is a commenting agency on the development applications under the Planning Act based on regulations approved by their Board of Directors and the province. Conservation Authority has agreements with partnering municipalities to provide technical services regarding matters associated with natural heritage protection, hazardous land management and water resources (e.g., stormwater management).

In addition, Conservation Authorities have the delegated responsibility from the Ministries of Natural Resources and Municipal Affairs and Housing to implement Section 3.1 (Natural Hazards) of the Provincial Policy Statement (2014), consistent with the Provincial one-window planning initiative.

UTRCA also administers Regulation 166/06 and Regulation 179/06 respectively, under Section 28 of the Conservation Authorities Act. In general, these regulations prohibit altering a watercourse, wetland or shoreline and prohibit development in areas adjacent to river and stream valleys, hazardous lands and wetlands, without the prior written approval from the Conservation Authority (i.e., issuance of a permit).

1.8.3 County and Municipal Legislation and Policy

1.8.3.1 Municipality of Thames Centre Official Plan

The Municipality of Thames Centre Official Plan (OP) establishes the land use policies to guide future development and manage growth and describes the Council's policies on land use. Policies on land use include appropriate location of residential, industrial, commercial and institutional properties, location of services (i.e., roads, watermains, sewers, parks and schools), and the order of the Municipality's growth plan.

The Municipality of Thames Centre OP is required to conform to the County of Middlesex Official Plan. The County of Middlesex adopted an Official Plan in 1997. The County Plan contains countywide land use and planning policies that guide growth and development over a twenty-year time period. The County Official Plan establishes an upper-tier policy framework that provides guidance to local municipalities, especially in the preparation of local Official Plans, and sets a framework for coordination and cooperation amongst the County and its lower-tier municipalities on planning and development issues that transcend municipal boundaries.

The Official Plan was adopted by Municipal Council in October 2003 and amended by Official Plan amendments over time.

1.8.3.1.1 Residential Development

When the Official Plan was prepared in 2003, the 2001 estimated population of Thames Centre was 12,899. It turned out actually to be 12,480 based on the 2001 census. Projections commissioned by the County in 2003 and ultimately adopted by it in 2006 (Official Plan Amendment No. 2) suggested the population of Thames Centre under a 'High' growth scenario would reach 14,673 in 2011; 15,877 in 2016 and 16,970 in 2021.

In actual fact, the population only reached 13,000 in 2011 (Statistics Canada). Projections undertaken as part of the Comprehensive Review of the Official Plan in 2013, predicted that the population of the Municipality will grow to only 13,072 by the year 2021 and thereafter slowly decline. All projections are based on a cohort survival model that takes into account births, deaths and migration but does not take into account changes in development policies, availability of servicing and other extraneous factors.

The latest revision of the OP notes that a significant amount of land designated 'Residential' exists within the Urban Settlement Areas of Dorchester and Thorndale, however, due primarily to servicing constraints, particularly Dorchester, much of this land cannot currently be developed. The Urban Settlement Areas currently offer a supply of approximately 1,000 acres of undeveloped, residentially designated lands which exceeds the land requirements for the 20-year planning period of the Official Plan.

At the time the Official Plan was prepared in 2003, the public expressed the view that growth should be focused on Dorchester and, if any expansion of its boundary was to be considered, that it be to the southwest. It was also felt that, should Thorndale develop adequate servicing, it should also be designated as a growth centre, although to a lesser degree than Dorchester. With servicing capability being enhanced in Thorndale (which included the construction of increased water storage capacity and a new sewage treatment plant) Thorndale is able to adopt a role as a growth centre of the Municipality along with Dorchester.

The OP also notes that there are significant limitations regarding the ability of the Hamlet Settlement Areas to support additional growth, residential or otherwise. All nine of the hamlets recognized in Thames Centre have been developed on private septic systems and wells. The potential for contamination as a result of seepage from septic systems into water wells; the cumulative impact of development, and the inability to economically provide full services to the Hamlets have been recognized by the Municipality as serious concerns. The Municipality, therefore, finds it prudent to place severe restrictions on new development within the Hamlets and to strictly limit future expansion.

Almost 97% of the Municipality's housing stock is single detached dwellings. As a result, some of Thames Centre's aging population has been forced to move away as there are limited housing options for them in the municipality. A greater diversity of housing in the form of semi-detached, apartments and condominium dwellings continue to be warranted,

in appropriate locations and amounts, for seniors, 'empty-nesters' and smaller households.

1.8.3.1.2 Non-Residential Development

Thames Centre's proximity to the City of London has a significant impact on commercial and industrial development and commuting patterns in the Municipality. Greater diversification of the local economy in order to provide more local employment opportunities and a broadened economic focus are desirable to provide greater self-reliance and reduce the prevalence of commuting.

At the time the Official Plan was prepared in 2003, the public was of the opinion that additional designated lands for commercial and industrial purposes, at appropriate locations, are warranted within the Municipality. Given the existing servicing constraints in the Municipality, emphasis should be placed on promoting and developing 'dry' industries such as warehousing and transportation businesses. In order to minimize the impact of industry on agricultural areas and residential areas and to take advantage of Thames Centre's strategic location in relation to the Provincial Highway network, industrial uses located close to the Provincial Highway 401 and at interchanges was supported.

Communities of Dorchester and Thorndale land use maps are provided in **Figure 1-5** and **Figure 1-6**.

Municipality of Thames Centre

Water and Wastewater Master Plan Update

Landuse

- RESIDENTIAL
- NEIGHBOURHOOD COMMERCIAL
- GENERAL COMMERCIAL
- HIGHWAY COMMERCIAL
- SETTLEMENT INDUSTRIAL
- INSTITUTIONAL
- RECREATIONAL
- PROTECTION AREA
- NATURAL AREA
- PARKS & OPEN SPACE
- ENVIRONMENTAL AREA
- CORE AREAS
- URBAN SETTLEMENT AREA BOUNDARY

0 1 Kilometers

Figure 1-5

Dorchester Land Use Map

BluePlan

September 2019
418109-W-009
NAD 1983 UTM Zone 17N

Municipality of Thames Centre

Water and Wastewater Master Plan Update

Landuse

- RESIDENTIAL
- MOBILE HOME PARK
- GENERAL COMMERCIAL
- SETTLEMENT INDUSTRIAL
- PROTECTION AREA
- PARKS & OPEN SPACE
- ENVIRONMENTAL AREA
- URBAN SETTLEMENT AREA BOUNDARY

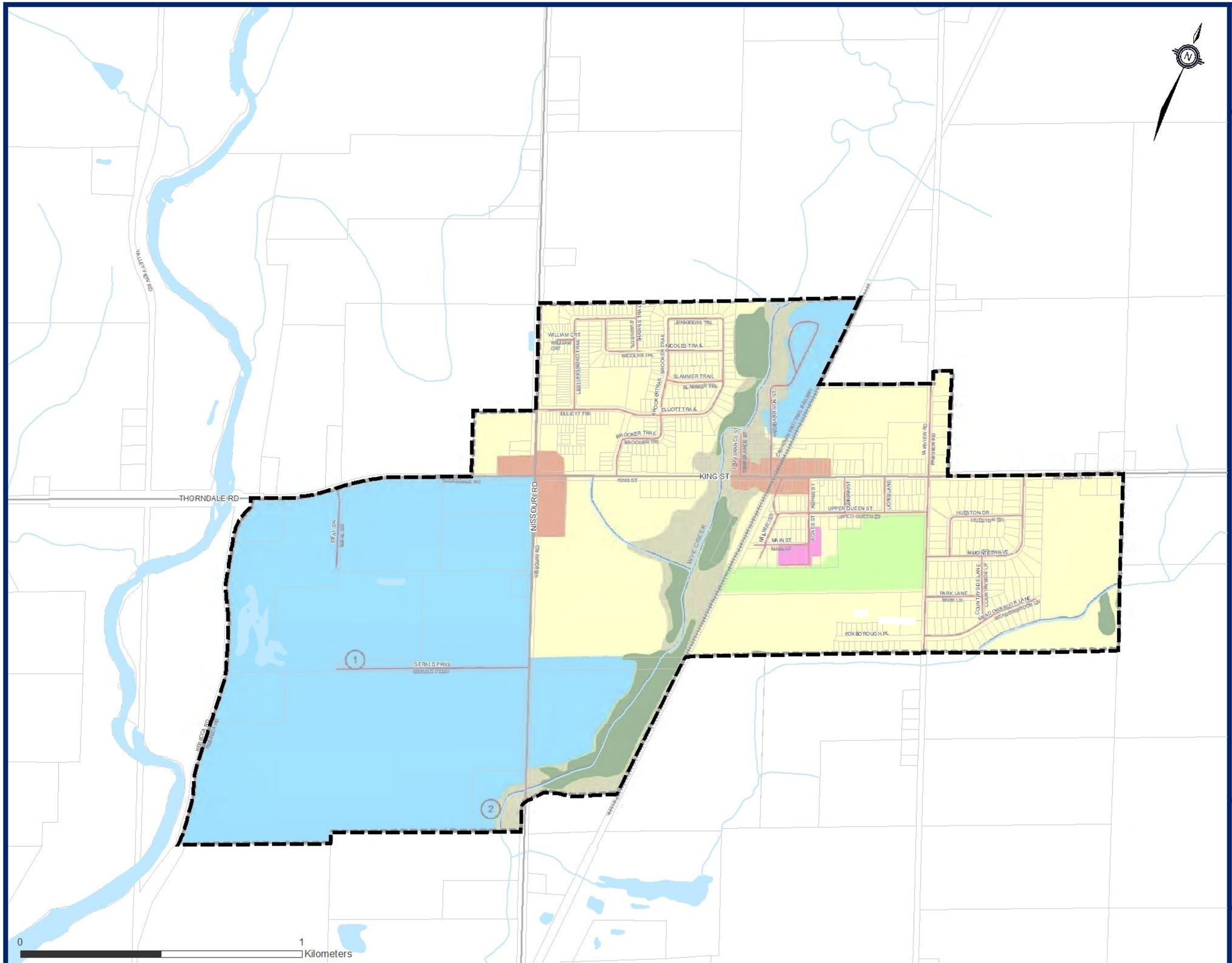

Figure 1-6

Thorndale Land Use Map

BluePlan Engineering

September 2019
418109-W-009
NAD 1983 UTM Zone 17N

1.8.3.2 County of Middlesex Official Plan

The County Official Plan (ROP) is a comprehensive document that sets out the policies for development of the municipalities within the County. The OP is intended to establish an upper tier policy framework that provides guidance to the local municipalities in the preparation of local Official Plans and Zoning By-laws; and set a framework for coordination and cooperation amongst the local municipalities and the County on planning and development issues that transcend municipal boundaries.

The County of Middlesex does not fund or maintain sanitary sewer or water systems in the County. The County does however, promote efficient and environmentally responsible development which is supportable on the basis of appropriate types and levels of water supply and sewage disposal. The County encourages new development to proceed on the basis of full municipal services.

The County OP establishes a Growth Management Hierarch that prioritizes Urban Areas, including Dorchester and Thorndale. Urban Areas must either have full municipal services or demonstrate the potential to provide full municipal services, through a master servicing component of settlement capability report and/or completion of an EA.

Lands which are currently designated for development in local official plans are anticipated to be adequate to meet the growth projections for the planning period. New lot creation in Agricultural Areas will only be permitted in accordance with the OP Consent policies.

Any expansion of the Settlement Areas will only be considered by the Municipality and only on the basis of a comprehensive review of the Plan, in conformity with the County of Middlesex Official Plan. Additionally, expansion of the Dorchester or Thorndale Settlement Boundaries must be consistent with the Provincial Policy Statement with the following factors taken into account:

- land availability within the Settlement Area and the availability of land in other settlement areas;
- the serviceability of existing undeveloped land within the Settlement Area and the serviceability of the lands proposed to be added;
- projected land and housing needs; and,
- impact on natural heritage features, prime agricultural lands, and mineral aggregate resources.

1.9 Environment Existing Conditions

1.9.1 Natural Environment Policy Context

1.9.1.1 Provincial Policy Statement (PPS)

The PPS was issued under Section 3 of the Planning Act and came into effect on April 30, 2014 and replaces the PPS issued March 1, 2005.

The natural heritage policies of the PPS (MMAH 2014) indicate that:

- Policy 2.1.1 Natural features and areas shall be protected for the long term;
- Policy 2.1.2 The diversity and connectivity of natural features in an area, and the long-term ecological function and biodiversity of natural heritage systems, should be maintained, restored or, where possible, improved, recognizing linkages between and among natural heritage features and areas, surface water features and groundwater features;
- Policy 2.1.3 Natural heritage systems shall be identified in Ecoregions 6E and 7E, recognizing that natural heritage systems will vary in size and form in settlement areas, rural areas and prime agricultural areas;
- Policy 2.1.4 Development and site alteration shall not be permitted in [the following] unless it has been demonstrated that there will be no negative impacts on the natural features or their ecological functions.
    a. Significant wetlands in the Canadian Shield north of Ecoregions 5E, 6E and 7E;
    b. Significant woodlands in Ecoregions 6E and 7E (excluding islands in Lake Huron and the St. Mary's River);
    c. Significant valleylands in Ecoregions 6E and 7E (excluding islands in Lake Huron and the St. Mary's River);
    d. Significant wildlife habitat
    e. Significant areas of natural and scientific interest; and
    f. Coastal wetlands in Ecoregions 5E, 6E and 7E that are not subject to policy 2.1.4(b).
- Policy 2.1.6 Development and Site alteration shall not be permitted in fish habitat except in accordance with provincial and federal requirements;
- Policy 2.1.7 Development and Site alteration shall not be permitted in habitat of endangered species and threatened species except in accordance with provincial and federal requirements; and
- Policy 2.1.8 Development and site alteration shall not be permitted on adjacent lands to the natural heritage features and areas identified in policies 2.1.3, 2.1.4 and 2.1.5 unless the ecological function of the adjacent lands has been evaluated and it has been demonstrated that there will be no negative impacts on the natural features or on their ecological functions.

1.9.1.2 Species at Risk Act (SARA)

At a federal level, species at risk designations for species occurring in Canada are initially determined by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC). If approved by the federal Minister of the Environment, species are added

to the federal List of Wildlife Species at Risk (Government of Canada 2002). Species that are included on Schedule 1 as endangered or threatened are afforded protection of critical habitat on federal lands under the Species at Risk Act (SARA). On private or provincially-owned lands, only aquatic species listed as endangered, threatened or extirpated and migratory birds are protected under SARA, unless ordered by the Governor in Council.

1.9.1.3 Endangered Species Act (ESA)

Species at risk designation for species in Ontario are initially determined by the Committee on the Status of Species at Risk in Ontario (COSSARO), and if approved by the provincial Minister of Natural Resources and Forestry, species are added to the provincial Endangered Species Act (ESA), which came into effect June 30, 2008 (Ontario 2007). The legislation prohibits the killing or harming of species identified as endangered or threatened in the various schedules to the Act. The ESA also provides habitat protection to all species listed as threatened or endangered. As of June 30, 2008, the Species at Risk in Ontario (SARO) List is contained in O. Reg. 230/08.

1.9.1.4 Fisheries Act

The purpose of the Fisheries Act is to maintain healthy, sustainable and productive Canadian fisheries through the prevention of pollution, and the protection of fish and their habitat. In 2012, changes were made to the Fisheries Act to enhance Fisheries and Oceans Canada (DFO) ability to manage threats to Canada's commercial, recreational and Aboriginal (CRA) fisheries.

Projects affecting waterbodies supporting Canada's CRA fisheries must comply with the provisions of the Fisheries Act. The proponent is responsible for determining if the project is likely to cause impacts to CRA fish and if these impacts can be avoided or mitigated.

1.9.1.5 Municipality of Thames Centre Official Plan

Section 3.2 of the OP describes the Natural Heritage Features and Natural Hazard Areas within the Municipality of Thames Centre. The Municipality's Natural Heritage Feature types and the associated development restrictions are summarized in **Table 1-3**.

Table 1-3: Natural Heritage Features and Development Restrictions

Natural Features Group		Development Restrictions
A	Natural Area • Provincially significant wetlands • Habitats for endangered and threatened species • Fish habitat	Development or site alteration is generally prohibited within identified boundaries of these features
B	Protection Area • Regionally significant wetlands • Significant woodlands and woodland patches identified by the Middlesex Natural • Heritage Study	Development and site alteration may be permitted if it can be demonstrated, through environmental studies conducted by qualified individuals, that no negative impacts on the features or their associated ecological functions will result.

	Natural Features Group	Development Restrictions
	• Significant valley lands • Significant wildlife habitat • Provincially significant areas of natural and scientific interest (ANSIs) • Regionally significant ANSIs & environmentally significant areas (ESAs)	
C	Environmental Area • Stream-bank corridors and flood plains along creeks and tributaries • Natural hazard lands, including flood plains and flood prone areas, areas within the • 100 Year Erosion Limit, and areas susceptible to erosion	Development and site alteration may be permitted where compliance can be demonstrated with the objectives for natural heritage policies and natural hazard policies (if applicable). Conservation Authority "fill, construction and alteration to waterway regulations" may apply to flood plains and steep slopes.

For new land use and/or development near or within a green system feature, evaluation of the proposals through an Environmental Impact Study (EIS) is required. Requirements for EIs are outlined in the OP.

Figure 1-7 and **Figure 1-8** show the Significant Environmental Area Designation within Dorchester and Thorndale.

Municipality of Thames Centre

Water and Wastewater Master Plan Update

General Features

- Highway
- Arterial Road
- Settlement Boundary
- Property Parcel
- Waterbody
- Area of Natural and Scientific Interest
- Wetlands
- Natural Area
- Conservation Authority Regulatory Limits

0 1 Kilometers

Figure 1-7

Significant Environmental Area Designation (Dorchester)

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Municipality of Thames Centre

Water and Wastewater Master Plan Update

General Features

- Highway
- Arterial Road
- Settlement Boundary
- Property Parcel
- Waterbody
- Area of Natural and Scientific Interest
- Wetlands
- Natural Area
- Conservation Authority Regulatory Limits

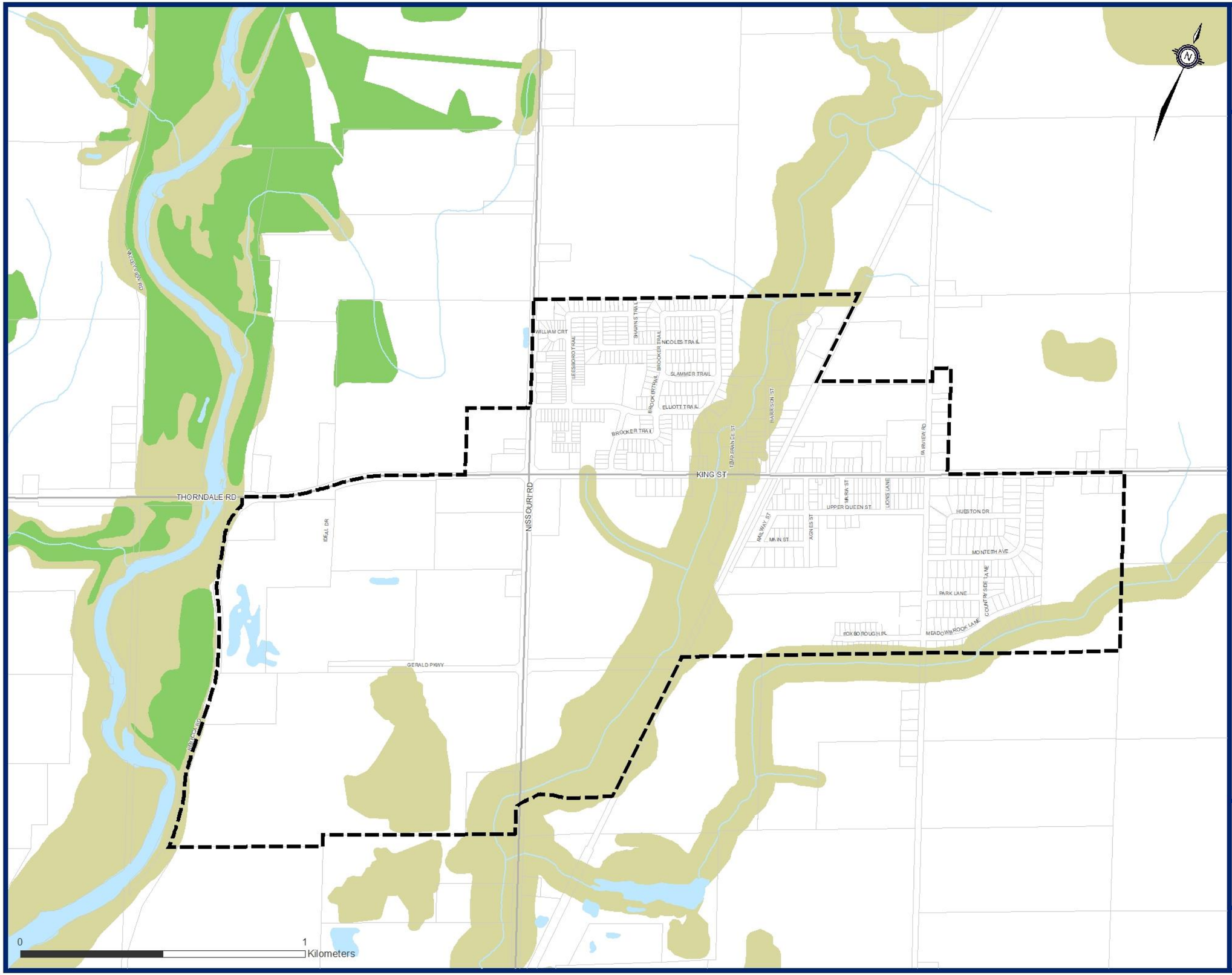

Figure 1-8

Significant Environmental Area Designation (Dorchester)

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1.10 Principles and Policies

The following sections outlines the principles and policies that guided the Municipality of Thames Centre Water and Wastewater Master Plan.

1.10.1 Planning and Growth Projections

Buildout projections set-out in the 2018 DC Background Study were compared to the available draft plans and concept plans and the area of available lands to be developed for residential and employment use in Dorchester, Thorndale and the Peripheral Areas (to the Settlement Boundaries) and the 401 Corridor Lands.

A review of alternative growth projection and allocation methodologies was completed to ensure that the design of planned infrastructure upgrades best balances the needs of providing for growth across the whole of Dorchester, Thorndale and the Peripheral and 401 Corridor Lands along with the requirements for localized development areas.

1.10.2 Development of Alternative Methodologies

Growth projections within Dorchester, Thorndale and the peripheral areas located outside of the two communities' Settlement Boundaries can be generally considered based on the following methodologies:

- Growth Projections to Buildout based on best available development application information and the Municipality's Development Charges Background Study; and,
- Growth Projections to Buildout based on best available development application information and future developable lands at established target densities.
    - Established target densities are determined through review of existing and planned development and consultation with the Municipality.

There are three main areas within the Municipality of Thames Centre that are considered for growth that is to be serviced by municipal water and wastewater. These are:

- Within the Dorchester Settlement Boundary (Dorchester);
- Within the Thorndale Settlement Boundary (Thorndale); and,
- Outside of the Existing Dorchester and Thorndale Settlement Boundaries (noted in throughout this report as Peripheral Lands and 401 Corridor Lands and noted in the DC Background Study as Rural Lands).

Identified development areas for Dorchester, 401 Corridor Lands and Thorndale are shown in **Figure 1-9** and **Figure 1-10**. Growth projections for areas where development application information is available is based on the type and number of units specified in the development approval submission or the most recent concept plan submitted to the Municipality. Development Maps provided by the Municipality are included in **Appendix A**.

Municipality of Thames Centre

Water and Wastewater Master Plan Update

General Features

- Fully Developed Areas
- Developments that are Draft Plan Approved / Under Construction
- Developments with Conceptual Plans
- Other Development Areas
- Highway
- Arterial Road
- Settlement Boundary
- Property Parcel
- Waterbody

0 1 Kilometers

Figure 1-9

Identified Development Areas

Dorchester and 401 Corridor Lands

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Municipality of Thames Centre

Water and Wastewater Master Plan Update

General Features

- Fully Developed Areas
- Developments that are Draft Plan Approved / Under Construction
- Developments with Conceptual Plans
- Other Development Areas
- Highway
- Arterial Road
- Settlement Boundary
- Property Parcel
- Waterbody

Figure 1-10

Identified Development Areas

Thorndale

0 1 Kilometers

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Three methods were developed to establish growth projections across Dorchester and Thorndale utilizing the above noted methodologies. A summary of the methods is shown in **Table 1-4**.

Table 1-4: Summary of Growth Projection and Allocation Methodologies

<table>
<tr><th>Area Type</th><th>Method 1</th><th>Method 2</th><th>Method 3</th></tr>
<tr><td colspan="4">Within the Dorchester and Thorndale Settlement Area Boundaries</td></tr>
<tr><td colspan="4">For Areas Where Development Application Information is Available</td></tr>
<tr><td>• Under Construction and Draft Plan Approved</td><td colspan="3" rowspan="2">Growth projections based on type and number of units specified in provided plans / drawings</td></tr>
<tr><td>• Developments with Conceptual Plans</td></tr>
<tr><td rowspan="2">• For Areas Identified as Developable in the Municipality's Development Maps where no Development Application Information is Available</td><td>Buildout to DC Growth Projections</td><td colspan="2">Buildout by Developable Area x Target Densities</td></tr>
<tr><td>Total growth projection matches DC Background Study for Dorchester and Thorndale.
Remainder of lands
=
Total DC Growth within Settlement Boundaries
–
Growth Specified in Areas Where Development Application Information is Available
Growth for Developable Lands where drawing / plan information is available is distributed by land use and developable area to equal Projections set out in DC Background Study.</td><td colspan="2">Target densities are identified for land use types within the Dorchester and Thorndale Settlement Area Boundaries and applied to all developable areas where there is no draft plans or concept information available.</td></tr>
<tr><td rowspan="2">Outside of the Dorchester and Thorndale Settlement Boundaries
(Peripheral and 401 Corridor Lands)</td><td colspan="2">Buildout to DC Growth Projections</td><td>Buildout by Developable Area x Target Densities</td></tr>
<tr><td colspan="2">Total growth projection matches DC Background Study for "Rural" Areas (Peripheral Lands to Settlement Boundaries in Dorchester and Thorndale and 401 Corridor Lands south of Dorchester).</td><td>Target densities are identified for land use types in the Peripheral Lands and 401 Corridor Lands and applied to all developable areas where there is no draft plans or concept information available.</td></tr>
</table>

1.10.3 Purpose and Use of Growth Projection Methodologies

The procedure and purpose / use of the alternative growth projection methodologies is summarized in **Table 1-5**.

Table 1-5: Purpose and Use of Proposed Growth and Allocation Methodologies to Inform Master Plan Recommendations

Approach Procedure and Purpose		Method 1	Method 2	Method 3
Procedure	For Dorchester and Thorndale	Buildout to DC Growth Projections	Buildout by Developable Area x Target Densities	
	For the Peripheral Lands and 401 Corridor Lands	Buildout to DC Growth Projections		Buildout by Developable Area x Target Densities
Purpose / Use		• Identification of Upgrade Triggers • Development of Capital Plan	Sizing of infrastructure upgrade after upgrade has been triggered by demands / flows generated by Method 1. Where proposed sizing based on Method 2 varies from sizing based on Method 3; more detailed engineering review will be undertaken, and sizing based on preferred approach in consultation with the Municipality.	

An example of wastewater infrastructure sizing based on the approach summarized in **Table 1-5** follows:

1. Growth allocated under Method 1 triggers a required upgrade (e.g. a new gravity sewer required to convey flows from Peripheral Lands development);
2. Sizing of the new sewer upgrade is completed utilizing Method 2 and Method 3;
3. If the proposed size differs based on Method 2 versus Method 3 (e.g. new gravity sewer is sized as 250mm diameter under Method 2 versus 375mm under Method 3), then more detailed review of risks versus operational issues is undertaken, and the sewer is sized based on the detailed review of sizing to Method 2 or Method 3.

Sizing planned infrastructure based on this approach provides for oversized area infrastructure that can help protect against future capacity constraints. Future capacity constraints can lead to costly oversizing or construction of new “relief” infrastructure through newly urbanized areas. Alternatively, oversized infrastructure can lead to operational issues in the interim period prior to Buildout (or if Buildout does not progress to the projected densities).

The application of the alternative methodologies to determine Buildout projections are detailed in the following sections.

1.10.4 Existing and Ultimate Growth Projections

1.10.4.1 Existing Residential and Employment Population

Existing equivalent population (residential population (persons) and employment population (jobs) for which municipal water servicing is provided is shown in **Table 1-6**.

Table 1-6: Existing Water Serviced Population in Dorchester and Thorndale

Area	Dorchester	Thorndale
Existing Serviced Residential Population	5,346	1,216
Existing Serviced Employment Population	1,765	402
Total Existing Serviced Equivalent Population	**7,111**	**1,618**

Existing equivalent population (residential population (persons) and employment population (jobs) for which municipal water servicing is provided was determined as follows

Existing residential populations are based on the serviced residential populations for the Dorchester Water Treatment Plant and the Thorndale Water Treatment Plant (taken from the 2018 DC Background Study (Schedule 6c). Population was assumed to be WTF Users x 2018 Persons Per Unit (P. P. U.). 2018 P. P. U. is 2.673 as set out in Table 3-1 of the DC Background Study.

Employment Population is based on the total ratio of 2018 Urban jobs to residential population. 2018 Urban jobs / residential population and is equal to 2,545 jobs / 7,708 persons = 0.33 jobs/person. This information was taken from Schedule 2a in the DC Background Study. Based on this, the estimated existing serviced Employment populations are:

- Dorchester Employment Population = 0.33 jobs/p x 5,346 persons = 1,765 jobs
- Thorndale Employment Population = 0.33 jobs/p x 1,216 persons = 402 jobs

1.10.4.2 Best Available Development Information

At present, there are six residential developments within Dorchester and Thorndale which are under construction or have draft plan approval. There are an additional three residential developments within Dorchester and Thorndale where potential developers

have provided the Municipality with preliminary plans / development concepts – but the potential developments have no official status.

The developments with best available development information are summarized in **Table 1-7**.

Table 1-7: Best Available Development Information for Dorchester and Thorndale

Developable Area by Official Plan Land Use	Projected Growth at Buildout (Equivalent Population)		
	Equiv. Pop. / Jobs	Area (Ha)	Density (ppjha)
Dorchester Residential			
Proposed Developments Under Construction / With Draft Plan Approval	1,114	46.9	25.7
Proposed Developments with Preliminary / Concept Plans (No Official Status)	751	21.0	35.7
Total Dorchester Proposed Developments with Best Available Development Information	**1,946**	**68.0**	**28.6**
Thorndale Residential			
Proposed Developments Under Construction / With Draft Plan Approval	1,221	67.5	18.1
Proposed Developments with Preliminary / Concept Plans (No Official Status)	576	18.9	30.4
Total Thorndale Proposed Developments with Best Available Development Information	**1,796**	**86.5**	**20.8**

Detailed unit counts based on best available development information is included in **Appendix A**.

1.10.5 Growth Projections based on the Municipality's Development Charges Background Study

Growth projections to Buildout were provided by the Municipality as part of the 2018 Development Charges (DC) Background Study (Watson and Associates Economists Ltd., 2018).

Areas of Growth within the municipality have been categorized as follows:

- Urban – includes Thames Centre's two urban areas:
  - Dorchester; and,
  - Thorndale;
- Rural – includes the 401 development corridor lands located outside of the urban boundary that are being considered as potentially developable by the Municipality.

Within the study, urban residential growth was separated into Dorchester and Thorndale and Rural Areas. Residential growth projected within Dorchester and Thorndale has been allocated based on distribution across developable area and Official Plan land use.

Employment growth within the Dorchester and Thorndale Settlement Boundaries was categorized only as urban (not specifically separated into Dorchester and Thorndale). The projected Urban Industrial and Commercial growth has been distributed between Dorchester and Thorndale based on developable area and Official Plan designated land use.

Rural residential and industrial and commercial employment growth has been distributed across Peripheral Areas and 401 Corridor Lands based on Official Plan land use.

Projected growth from 2018 to Buildout based on the projections from the 2018 DC Background Study for Dorchester, Thorndale and the Peripheral Lands and 401 Corridor Lands is shown in **Figure 1-11** and **Figure 1-12**.

Developable Area by Official Plan Land Use	Projected Growth at Buildout based on DC Projections (Equivalent Population)		
	Equiv. Pop. / Jobs	Area (Ha)	Density (ppjha)
Dorchester (within Settlement Boundary)			
Existing (2018 Pop. with Water Servicing)	5,346		
Proposed Developments Under Construction / With Draft Plan Approval (Properties 7, 25, 27, 28)	1,114	46.9	25.7
Proposed Developments with Preliminary / Concept Plans (No Official Status) (23, 29)	751	21.0	35.7
Remaining Dorchester Residential Developable Lands	4,808	211.7	22.7
Existing (2018 Employment with Water Servicing)	1,765		
Future Dorchester Commercial Developable Lands	586	10.8	54.0
Future Dorchester Industrial Developable Lands	0	0.0	0.0

Developable Area by Official Plan Land Use	Projected Growth at Buildout based on DC Projections (Equivalent Population)		
	Equiv. Pop. / Jobs	Area (Ha)	Density (ppjha)
Dorchester Peripheral Lands			
Future Residential (Property 42)	240	90.5	2.7
Future Commercial (Property 16)	47	6.3	7.6

Developable Area by Official Plan Land Use	Projected Growth at Buildout based on DC Projections (Equivalent Population)		
	Equiv. Pop. / Jobs	Area (Ha)	Density (ppjha)
401 Corridor Lands			
Future Commercial	0	0.0	0.0
Future Industrial (43, 44a, 45)	132	232.3	0.6

0 1 Kilometers

Municipality of Thames Centre

Water and Wastewater Master Plan Update

General Features

- Fully Developed Areas
- Developments that are Draft Plan Approved / Under Construction
- Developments with Conceptual Plans
- Other Development Areas
- Highway
- Arterial Road
- Settlement Boundary
- Property Parcel
- Waterbody

Where No Development Information is Available (e.g. Under Construction, Draft Plans, Preliminary / Concept Plans), Growth Projections are to meet DC Background Study Projections.

Figure 1-11

Dorchester Projected Growth (Serviced) 2018 – Buildout DC Background Study Projections

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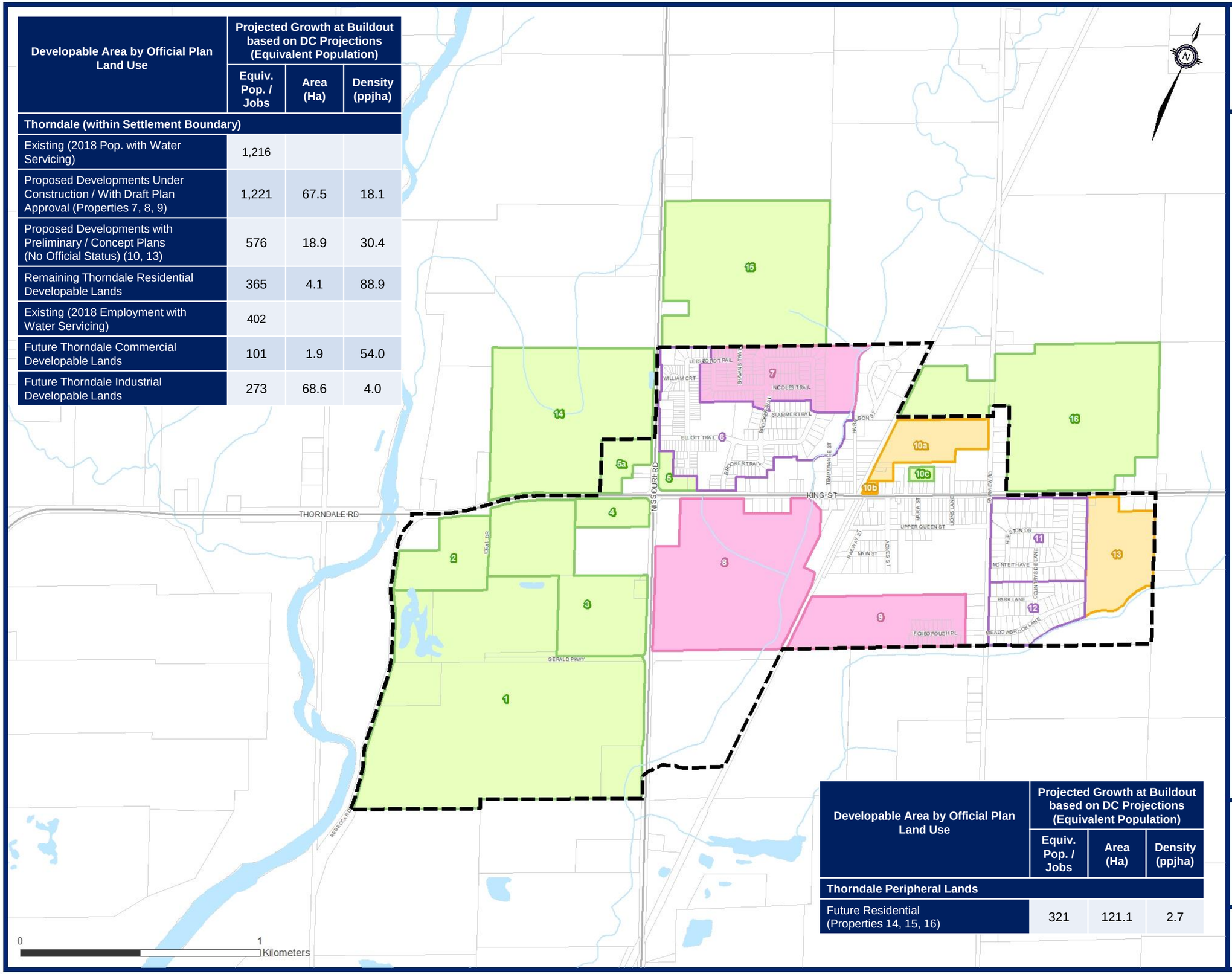
Developable Area by Official Plan Land Use	Projected Growth at Buildout based on DC Projections (Equivalent Population)		
	Equiv. Pop. / Jobs	Area (Ha)	Density (ppjha)
Thorndale (within Settlement Boundary)			
Existing (2018 Pop. with Water Servicing)	1,216		
Proposed Developments Under Construction / With Draft Plan Approval (Properties 7, 8, 9)	1,221	67.5	18.1
Proposed Developments with Preliminary / Concept Plans (No Official Status) (10, 13)	576	18.9	30.4
Remaining Thorndale Residential Developable Lands	365	4.1	88.9
Existing (2018 Employment with Water Servicing)	402		
Future Thorndale Commercial Developable Lands	101	1.9	54.0
Future Thorndale Industrial Developable Lands	273	68.6	4.0



Developable Area by Official Plan Land Use	Projected Growth at Buildout based on DC Projections (Equivalent Population)		
	Equiv. Pop. / Jobs	Area (Ha)	Density (ppjha)
Thorndale Peripheral Lands			
Future Residential (Properties 14, 15, 16)	321	121.1	2.7

Municipality of Thames Centre

Water and Wastewater Master Plan Update

General Features

- Fully Developed Areas
- Developments that are Draft Plan Approved / Under Construction
- Developments with Conceptual Plans
- Other Development Areas
- Highway
- Arterial Road
- Settlement Boundary
- Property Parcel
- Waterbody

Where No Development Information is Available (e.g. Under Construction, Draft Plans, Preliminary / Concept Plans), Growth Projections are to meet DC Background Study Projections.

Figure 1-12

Thorndale Projected Growth (Serviced) 2018 – Buildout

DC Background Study Projections

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Equivalent serviced populations at Buildout (based on DC Study Projections) for Dorchester, Thorndale and the Peripheral Lands and 401 Corridor Lands are included in **Appendix A**.

1.10.6 Growth Projections based on the Target Densities

The initial review of the Buildout projections set-out in the 2018 DC Background Study compared to the available draft plans and concept plans prompted discussions with the Municipality about determining alternative growth projections based on target densities.

Determining area infrastructure needs based on a reasonable estimate of growth density within developable areas will ensure that the Municipality's local area knowledge and planning expertise is best incorporated into the Master Plan servicing.

A review was completed to determine target densities based on proposed development densities for the draft plans and preliminary / concept plans in Dorchester and Thorndale as well as for employment lands in similarly sized municipalities. The proposed target densities are summarized in **Table 1-8**.

Table 1-8: Proposed Target Growth Densities by Land Use

Area Description	Land Use	Proposed Target Density (ppjha)
Dorchester, Thorndale and Peripheral Areas	Residential	50
	Commercial	50
	Industrial	50
401 Corridor Lands	Industrial	50

Unserviced Dry Industrial land use is already permitted within the 401 Corridor Lands. This may impact the ultimate serviced target density of the lands within this area. There remains more than 200 hectares of developable Industrial land use within the 401 Corridor Lands with potential for future development. The Buildout target density of 50 jpha was determined to accommodate the significant opportunity for growth within this area once municipal servicing becomes available.

Projected growth from 2018 to Buildout based on the proposed target densities for Dorchester, Thorndale and the Peripheral Lands and 401 Corridor Lands is shown in **Figure 1-13** and **Figure 1-14**..

Developable Area by Official Plan Land Use	Projected Growth at Buildout based on Density Targets (Equivalent Population)		
	Equiv. Pop. / Jobs	Area (Ha)	Density (ppjha)
Dorchester (within Settlement Boundary)			
Existing (2018 Pop. with Water Servicing)	5,346		
Proposed Developments Under Construction / With Draft Plan Approval (Properties 7, 25, 27, 28)	1,114	46.9	25.7
Proposed Developments with Preliminary / Concept Plans (No Official Status) (23, 29)	751	21.0	35.7
Remaining Dorchester Residential Developable Lands	10,764	215.3	50.0
Existing (2018 Employment with Water Servicing)	1,765		
Future Dorchester Commercial Developable Lands	542	10.8	50.0
Future Dorchester Industrial Developable Lands	0	0.0	0.0

Developable Area by Official Plan Land Use	Projected Growth at Buildout based on Density Targets (Equivalent Population)		
	Equiv. Pop. / Jobs	Area (Ha)	Density (ppjha)
Dorchester Peripheral Lands			
Future Residential (Property 42)	4,527	90.5	50.0
Future Commercial (Property 16)	313	6.3	50.0

Developable Area by Official Plan Land Use	Projected Growth at Buildout based on Density Targets (Equivalent Population)		
	Equiv. Pop. / Jobs	Area (Ha)	Density (ppjha)
401 Corridor Lands			
Future Commercial	0	0.0	0.0
Future Industrial (43, 44a, 45)	11,613	232.3	50.0

0 1 Kilometers

Municipality of Thames Centre

Water and Wastewater Master Plan Update

General Features

- Fully Developed Areas
- Developments that are Draft Plan Approved / Under Construction
- Developments with Conceptual Plans
- Other Development Areas
- Highway
- Arterial Road
- Settlement Boundary
- Property Parcel
- Waterbody

Where No Development Information is Available (e.g. Under Construction, Draft Plans, Preliminary / Concept Plans), Growth Projections are based on proposed density targets.

Area Description	Land Use	Proposed Target Density (ppjha)
Dorchester and Peripheral Areas	Residential	50
	Commercial	50
	Industrial	50
401 Corridor Lands	Industrial	50

Figure 1-13
Dorchester Projected Growth 2018 – Buildout
Proposed Density Targets

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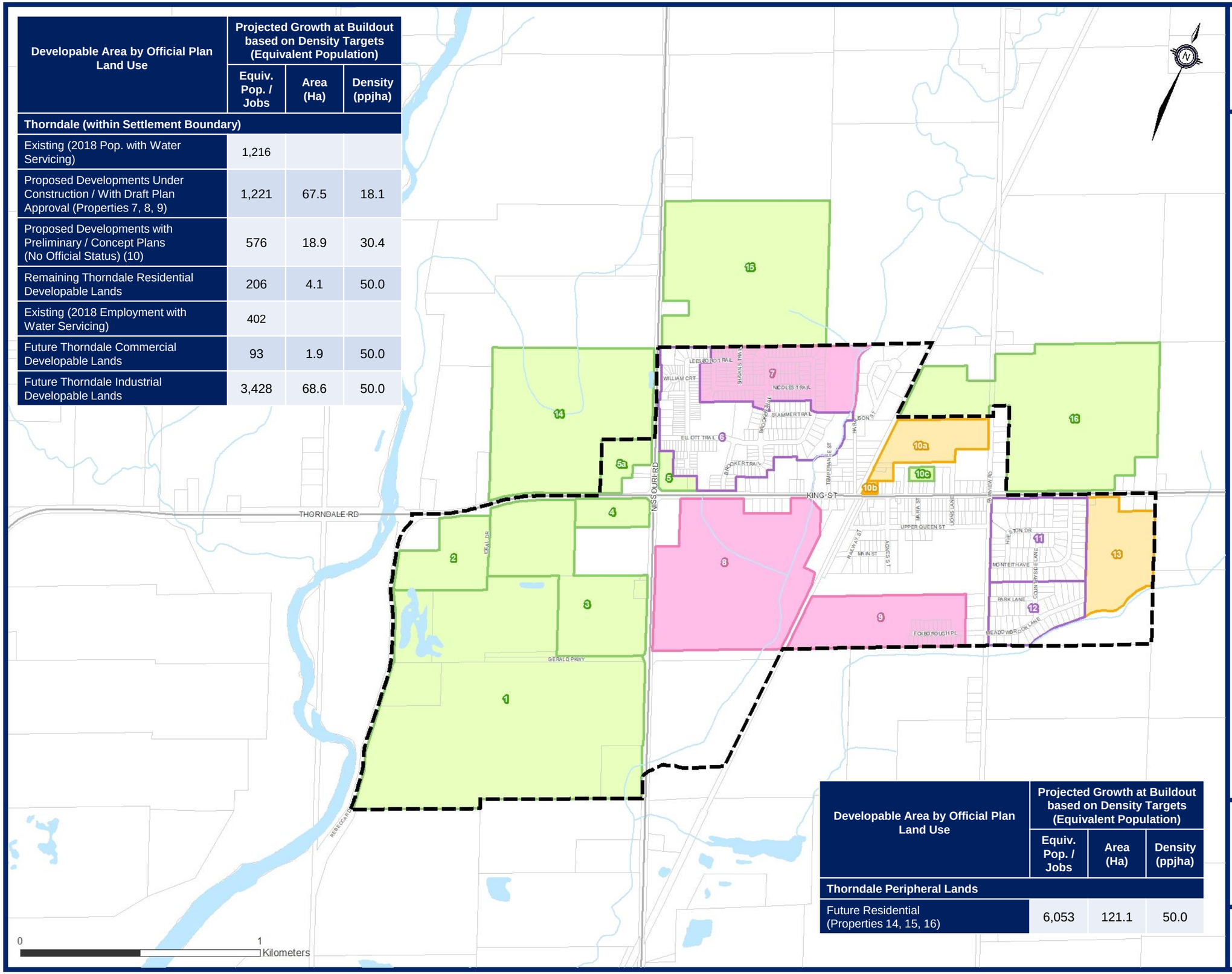
Developable Area by Official Plan Land Use	Projected Growth at Buildout based on Density Targets (Equivalent Population)		
	Equiv. Pop. / Jobs	Area (Ha)	Density (ppjha)
Thorndale (within Settlement Boundary)			
Existing (2018 Pop. with Water Servicing)	1,216		
Proposed Developments Under Construction / With Draft Plan Approval (Properties 7, 8, 9)	1,221	67.5	18.1
Proposed Developments with Preliminary / Concept Plans (No Official Status) (10)	576	18.9	30.4
Remaining Thorndale Residential Developable Lands	206	4.1	50.0
Existing (2018 Employment with Water Servicing)	402		
Future Thorndale Commercial Developable Lands	93	1.9	50.0
Future Thorndale Industrial Developable Lands	3,428	68.6	50.0



Developable Area by Official Plan Land Use	Projected Growth at Buildout based on Density Targets (Equivalent Population)		
	Equiv. Pop. / Jobs	Area (Ha)	Density (ppjha)
Thorndale Peripheral Lands			
Future Residential (Properties 14, 15, 16)	6,053	121.1	50.0

Municipality of Thames Centre

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General Features

- Fully Developed Areas
- Developments that are Draft Plan Approved / Under Construction
- Developments with Conceptual Plans
- Other Development Areas
- Highway
- Arterial Road
- Settlement Boundary
- Property Parcel
- Waterbody

Where No Development Information is Available (e.g. Under Construction, Draft Plans, Preliminary / Concept Plans), Growth Projections are based on proposed density targets.

Area Description	Land Use	Proposed Target Density (ppjha)
Thorndale and Peripheral Areas	Residential	50
	Commercial	50
	Industrial	50

Figure 1-14
Thorndale Projected Growth 2018 – Buildout Proposed Density Targets

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Equivalent serviced populations at Buildout (based on target densities) for Dorchester, Thorndale and the Peripheral Lands and 401 Corridor Lands are summarized in **Appendix A**.

1.10.7 Summary of Buildout Projections based on Alternative Methodologies

Buildout projections for Dorchester and Thorndale (including areas outside of the Settlement Boundary) based Incorporating the calculations set out in Section 1.10.4, Buildout Projections based on Method 1 through Method 3 are summarized in **Table 1-9** and **Table 1-10**.

Table 1-9: Summary of Buildout Projections based on Alternative Methods (Dorchester)

Dorchester	Equivalent Population (Persons + Jobs)	Method 1	Method 2	Method 3
Within Settlement Boundary Only	Existing	7,111		
	Ultimate Buildout	14,451	20,282	
Within Settlement Boundary and Including Peripheral and 401 Corridor Lands to be Developed	Ultimate Buildout	14,870	20,701	36,735

Table 1-10: Summary of Buildout Projections based on Alternative Methods (Thorndale)

Thorndale	Equivalent Population (Persons + Jobs)	Method 1	Method 2	Method 3
Within Settlement Boundary Only	Existing	1,618		
	Ultimate Buildout	4,154	7,141	
Within Settlement Boundary and Including Peripheral Lands to be Developed	Ultimate Buildout	4,475	7,462	13,195

1.10.8 Phasing of Growth

When establishing the capital program for water and wastewater infrastructure upgrades, it is important to determine reasonable phasing of development based on expectations of how quickly approved development will be constructed and where there will be future development interest. These factors are then balanced with the potential impacts on development of the costs of required and recommended upgrades.

1.11 Design Criteria and Level of Service Objectives

This section provides a summary of the water and wastewater design criteria and level of service objectives used under the Master Plan. The design criteria outline the methodology and values used to estimate growth related demands/flows as well as the decision-making rationale related to infrastructure capacity and the trigger for upgrades. Detailed design criteria and level of service is provided in the Water Master Plan and Wastewater Master Plan sections.

1.11.1 Water Demand Design Criteria

The Master Plan has used the following design criteria to project water demands, determine capacity requirements and establish the water infrastructure program:

- Average Day Demand: 225 L/cap/d for both Dorchester and Thorndale;
- Maximum Day Demand Peaking Factors: 2.0 for Dorchester, 2.25 for Thorndale;
- Peak Hour Demand Peaking Factor: 3.75 for both Dorchester and Thorndale; and,
- Minimum Fire Flow: 76 L/s for residential land use, 150 L/s for Industrial / Commercial / Institutional land, to be provided for 2-hours within Dorchester and Thorndale.

1.11.2 Water Level of Service

- PHD scenario to assess minimum pressures: < 40 psi: does not meet LOS objective;
- ADD simulation to assess maximum pressures: > 90 psi: does not meet LOS objective; and,
- MDD+FF simulation to assess available fire flow (must maintain 20 psi across the system).

1.11.3 Wastewater Flows Design Criteria

The Master Plan has used the following design criteria to project wastewater flows, determine capacity requirements and establish the wastewater infrastructure program:

- Average Dry Weather Flow: 225 L/cap/d for both Dorchester and Thorndale

- I&I Allowance: 0.2 L/s/ha – 0.4 L/s/ha

1.11.4 Wastewater Level of Service

- Sewer Capacity: Existing and proposed sewers to be less than 100% full based on infiltration allowance of 0.2 L/s/ha.
- Basement Flooding Risk: Existing and proposed sewers hydraulic grade line (HGL) to be more than 1.8 m below grade based on infiltration allowance of 0.6 L/s/ha.

1.12 Infrastructure Triggers and Sizing

The trigger for infrastructure upgrade requirements was growth based on Method 2. Infrastructure upgrades planned for based on Method 2 densities ensures that required infrastructure is in place ahead of growth at expected densities.

When infrastructure upgrade requirements are triggered, sizing of infrastructure was based on the following:

1.12.1 Linear Infrastructure

Watermain, sanitary sewers and forcemains are to be sized based on Method 3. Sizing based on Method 3 ensures that future linear infrastructure triggered by growth is sized to accommodate buildout of all potential development lands inside and outside of Settlement Boundary at expected densities. There are marginal cost increases to install upgraded pipes and this approach better protects against costly upgrades if underground infrastructure is required to be upsized or twinned to accommodate more growth than originally expected.

1.12.1.1 Vertical Infrastructure

Treatment plants, pumping stations and storage facilities based on Method 2. Sizing based on Method 2 provides for reasonable and cost efficient vertical infrastructure upgrades. Pumps and most equipment can be sized and costed for expected Method 2 buildout with consideration for future upgrade or expansion if 50 PPJ/ha development occurs outside of Settlement Boundary. The increases in costs to size storage facilities for Method 3 can be prohibitive.

1.13 Alternatives Evaluation Approach

The evaluation approach has been designed to ensure a logical and transparent process that can document the evaluation and decision making that will ultimately develop a defensible capital program. Sustainability principles were also considered in the development of the Master Plan Update and have been integrated within the four-point evaluation. The four-point evaluation is summarized in **Table 1-11**.

Table 1-11: Four-Point Evaluation Criteria

Category	Criteria	Definition
Technical Factors	Meets existing and future servicing needs	To assess the alternative's ability to satisfy the project problem and opportunity statements and to achieve the desired system technical level of service objectives. This includes capacity to meet existing level of service and capacity to support future growth.
	Supports phased expansion of the system	To assess whether the proposed servicing strategy minimizing the length of new sewer/watermain and sewer/watermain upgrades needs, maximizing the capacity/use of existing facilities. provides flexibility in servicing of growth areas.
	Provides a reliable service	To assess the overall system configuration's ability to support flexibility in system operations, redundancy in system supply capacity, minimizes the risk related to single element failure, and adaptation to the potential impacts of climate change. Includes the feasibility and maintenance of implementation (i.e. length of watermain/sewer with associated operation and maintenance factors, additional pumping due to hydraulic conditions, or regular maintenance requirements) and adaptation to increases in system demands or reduction in supply capacity due to climate change.
	Minimizes and manages construction risk	To assess the alternative's constructability including scope of infrastructure upgrades, environmental significance, time required to complete construction, and impact on existing utilities. This also includes assessing the timing and technical suitability of project implementation with the aim of improving the overall flexibility in project phasing and reducing the number of critically dependent components.
	Aligns with approval and permitting process	To assess the impact any required property/approvals may have on the implementation process (expropriation of land/land purchase, temporary/permanent easements, or land leasing fees) and compatibility with surrounding land use.
	Ability to adapt to climate change	To assess the alternative's resiliency to maintain the desired system technical level of service objectives due to climate changes impacts. This includes assessment of system resiliency due to the increase in system demands or reduction in supply capacity, and/or the facility and network vulnerability to climate related failures such as flooding.
Environmental Factors	Protects environment features	To assess, monitor and ensure the preservation and protection of all aquatic resources and other natural features within the site location, watermain alignment, and surrounding environment. This includes any impact to wetlands (Locally or Provincially Significant, identified by Conservation Authority and Province), wildlife habitat, or valley lands, which may be identified by Conservation Authorities, Municipalities, or Province.
	Protects wildlife and species at risk	To assess any potential species at risk within the site location and construction zone. The implementation must not affect the function of habitat for locally significant wildlife, including endangered or threatened species. The habitat includes nesting sites, hibernation areas, foraging areas, areas of wildlife travel, migratory birds/ paths.
	Minimizes climate change impacts	Uses technology and practices, where applicable, to minimize climate change impacts and reduce greenhouse gas contributions. This includes consideration during the construction process, day to day operations, and future maintenance requirements.

Category	Criteria	Definition
Social and Cultural Factors	Protects resident quality of life	To assess that proposed solutions ability to maintain or improve upon the existing level of service. Further, to assess any impacts to existing residents due the long-term operation of any new/modified facilities.
	Manages and minimizes construction impacts	To assess any impact to existing build up areas (residents, businesses) due to construction activities, including creating noise/dust/vibrations, traffic and traffic flow, limiting access to properties (temporary), or other. This also includes identifying needs to alter timing and scope of the construction practices to minimize impacts.
	Protects cultural heritage features	To assess impacts to a structure, property or district which has been identified to be of cultural heritage value or interest. Impacts may be deemed as temporary (i.e. site access) or permanent (i.e. altering the existing conditions).
	Protects archaeological features	To assess any impact to areas determined to have high archeological potential, moderate/unknown archeological potential, low/no archeological potential, or are within a disturbed area.
Financial Viability	Capital and life-cycle costs	To minimize the capital and lifecycle operational costs of the new infrastructure.
	Operation and maintenance costs	To minimize the operational costs of the new infrastructure and impacts on existing operational and maintenance cost of the existing infrastructure. Life cycle costing to consider greenhouse gas emissions and carbon pricing.

1.13.1 Description of the Evaluation Process

Individual evaluation of the criteria (Technical Feasibility, Environmental Impacts, Social / Cultural Impacts and Financial Viability) was completed using approach outlined in **Table 1-12**.

Table 1-12: Alternative Evaluation Approach (Reasoned Argument Approach)

Evaluation Indicator	Evaluation Description
	"High" Solution generates beneficial impacts and/or has no substantial technical challenges
	"Medium" Solution to a mix of positive and negative elements with some impacts
	"Low" Solution presents permanent negative impacts and/or presents significant technical challenges

Each alternative was evaluated through the reasoned argument approach which provided a clear and thorough rationale of the trade-offs among the various options based on the anticipated impacts caused by various evaluation criteria and factors. The basis of this approach is to qualitatively evaluate the relative advantages, disadvantages, and impacts of each alternative against the established criteria. This process was intended to highlight why the preferred alternative was chosen through evaluation of technical, environmental, social/cultural, and financial criteria.

1.13.2 Costing Methodology

Concept-level costing of servicing alternatives was considered with life-cycle costs generally represented as shown in **Table 1-13**.

Table 1-13: Concept Level Cost Estimate Approach

Concept-Level Servicing Alternative Cost Estimate	Concept-Level Cost Estimate Description
$	Low Cost Works – straightforward linear works with minimal operating costs over the life-cycle of the infrastructure (e.g. regular depth Greenfield watermain)
$$	Medium Cost Works – straightforward facility upgrades or linear works with permitting and study requirements (e.g. smaller SPS within Greenfield or linear watermain within urban right-of-way)
$$$	High Cost Works – facility or complex linear design that includes multi-component approval and study process as well as high operating costs over the life-cycle of the infrastructure (e.g. BPS, trenchless watermain)

Concept-Level Servicing Alternative Cost Estimate	Concept-Level Cost Estimate Description
$$$$	Highest Cost Works – complex facility or linear design that includes significant study, permitting and engineering as well as operating costs over the life-cycle of the infrastructure (e.g. WTF, ET, or complex trenchless undertakings with significant PTTW)

The cost estimation methodology for capital projects at a master planning level are typically based on an overall unit cost approach. The unit cost rates used for this Master Plan are representative in 2019 dollars and take into consideration Southwestern Ontario prices of labour and availability of materials. The development of these rates has been informed by multiple area Master Planning Studies and Asset Management Plans. The cost estimates have undergone independent peer reviews in order to further refine and ensure overall accuracy. They were also favorably compared to costs of recent capital projects completed within the GTA and throughout Southern Ontario. A summary of the unit costs is provided in **Appendix C**.

2 Water Master Plan

The *Water Master Plan* provides an overall review of the water policies and criteria, existing water distribution system, technical analysis, and development of the preferred water servicing strategy for the Municipality of Thames Centre. This section has been organized as follows:

2.1 Water System Policy and Criteria

2.3 Existing Water Distribution System

2.4 Assessment of Existing and Future Water Infrastructure

2.5 Water Servicing Strategy

2.6 Capital Program

This section is one of five sections that make up the complete Master Plan Class EA Study Report and should be read in conjunction with the other sections.

2.1 Water System Policy and Criteria

Water policies, design criteria, and level of service requirements were reviewed and updated as part of this Master Plan to provide guidelines and direction to the master planning process, in addition to ensuring that water demands are adequately representative to support the decision making for sizing and timing of future infrastructure.

2.1.1 Water Servicing Principles and Policies

Specific servicing principles and policies have been developed to guide the development of water servicing strategies. In general, the Municipality of Thames Centre is looking to build and maintain efficient, reliable, sustainable, and well-managed water systems that provide high level of service to the public.

2.1.2 Water Design Criteria

A guiding principle of design criteria is to ensure that the demand projections are adequately predicted with an appropriate factor of safety and risk management. This overall principle also ensures that infrastructure has sufficient capacity to meet the growing needs of the Municipality and does not impede the approved/planned growth.

The water demand criteria updated as part of the Municipality of Thames Centre Master Plan are summarized in **Table 2-1**.

Table 2-1: Water Demand Criteria

Water Demands Projection Methodology		
• Existing flows were established using water billing data provided by the Municipality. The data was assessed to identify average day demands at each billing address throughout the systems. These demands represent the Baseline demands for the water distribution systems. • Growth flows applied to the Baseline using design criteria.		
Water Demand Criteria for Growth		
Parameter		**Design Criteria**
Average Day Demand (ADD)		225 L/cap/d
Peaking Factors		
Max Day Peaking Factor	Dorchester	2.00
	Thorndale	2.25
Peak Hour Peaking Factor	Dorchester	3.75
	Thorndale	
Land Use		**Fire Flow**
Residential		76 L/s
Industrial, Commercial, Institutional (ICI)		150 L/s
Water System Criteria		
• Sizing of the water distribution system to accommodate Peak Hour Demands (PHD) and Maximum Day Demands plus Fire Flow (MDD + FF)		

Development of the water demand criteria for the 2019 Master Plan Update is detailed further in the Workshop No. 1 and Workshop No. 2 presentations included in **Appendix B**.

2.1.3 Water Level of Service

Industry standards for Level of Service objectives are always changing to meet the demands of growth and reflect more efficient water consumption. The distribution system should be sized for PHD and MDD+FF with considerations for water quality during low demand periods.

The following summarizes the performance indicators that were used to assess the Dorchester and Thorndale distribution networks and ability to meet the LOS objectives:

- PHD scenario to assess minimum pressures:
    - 40-50 psi: flag
    - < 40 psi: does not meet LOS objective

- ADD simulation to assess maximum pressures:
  - > 90 psi: does not meet LOS objective
- MDD+FF simulation to assess available fire flow (must maintain 20 psi across the system):
  - 80-100% of fire flow target: flag
  - < 80% of fire flow target: does not meet LOS objective
- In addition to pressure and fire flow objectives, the system was reviewed for watermains with high headloss gradients and/or high velocities.

2.1.4 Demand Projections

The population and employment projections outlined in Section **1.10.1** and the design criteria within **Section 2.1.2** were utilized to calculate the average day demand (ADD) and the maximum day demand (MDD). The total projected ADD and MDD are shown in **Table 2-2**.

Table 2-2: Water Demand Projections at Buildout

	Total Population & Employment			Projected ADD (L/s)			Project MDD (L/s)		
	Method 1	Method 2	Method 3	Method 1	Method 2	Method 3	Method 1	Method 2	Method 3
Dorchester	14,870	20,701	36,735	50.4	65.6	95.2	96.0	136.4	185.7
Thorndale	4,475	7,462	13,195	13.3	21.1	36.0	29.2	46.7	80.3

2.2 Capital Cost Estimates

A capital cost is provided for all projects proposed as part of this Master Plan. For the majority of the water system projects, a base construction cost was obtained using either a unit rate construction cost, based on pipe diameter, or unique project analysis. The base construction cost considers several factors specific to each project such as creek crossings, railway and highway crossings, tunneling requirements, and location of construction (Greenfield, urban, suburban). Design, administration, contingency, and non-recoverable HST costs were added to arrive at a final project cost. Detailed costing sheets were developed to support the financial evaluation for each capital project. The final project costs are provided in the Capital Program, **Section 2.6**.

2.3 Existing Water Distribution System

The Municipality of Thames Centre is responsible for the entire water supply and distribution system in the communities of Dorchester and Thorndale.

Dorchester obtains its water from eight wells that are completed in either shallow unconfined sand and gravel aquifers or a deeper bedrock aquifer. The wells are located in two well fields (Well Field-2 and Well Field-3) along Dorchester Road. Dorchester water supply is generally limited to the overburden wells. The bedrock wells are only used intermittently for sample collection.

The Dorchester municipal water system consists of the Dorchester Water Treatment Facility (WTF) (located in south Dorchester fronting on Dorchester Road), the Dorchester Elevated Tank (ET) (located on Clara Street) and 43.3 km of watermains, ranging in size from 100mm to 300mm.

A map of the Dorchester Water Distribution System and the location of the facilities is shown on **Figure 2-1**.

Thorndale obtains its water from two deep bedrock production wells, located in northeast Thorndale. The Thorndale municipal water system consists of the Thorndale WTF (fronting on Thorndale Road, located east of Montieth Avenue), the Thorndale ET (located north of Thorndale Road and east of Montieth Avenue) and 15.2 km of watermains, ranging in size from 100mm to 300mm.

A map of the Thorndale Water Distribution System and the location of the facilities is shown on **Figure 2-2**.

Municipality of Thames Centre

Water and Wastewater Master Plan Update

Dorchester Elevated Tank

Dorchester Water Treatment Plant

0 1 Kilometers

Water Network

- Elevated Tank
- Water Treatment Plant
- Watermain (≤ 150 mm)
- Watermain (200 - 300 mm)

General Features

- Highway
- Arterial Road
- Settlement Boundary
- Property Parcel
- Waterbody

Landuse

- RESIDENTIAL
- NEIGHBOURHOOD COMMERCIAL
- GENERAL COMMERCIAL
- HIGHWAY COMMERCIAL
- SETTLEMENT INDUSTRIAL
- INSTITUTIONAL
- RECREATIONAL
- PROTECTION AREA
- NATURAL AREA
- PARKS & OPEN SPACE
- ENVIRONMENTAL AREA
- CORE AREAS
- URBAN SETTLEMENT AREA BOUNDARY

Figure 2-1

Existing Water System

Dorchester

BluePlan Engineering

September 2019
418109-W-001
NAD 1983 UTM Zone 17N

Municipality of Thames Centre

Water and Wastewater Master Plan Update

Water Network

- Elevated Tank
- Water Treatment Plant
- Watermain (≤ 150 mm)
- Watermain (200 - 300 mm)

General Features

- Highway
- Arterial Road
- Settlement Boundary
- Property Parcel
- Waterbody

Landuse

- RESIDENTIAL
- MOBILE HOME PARK
- GENERAL COMMERCIAL
- SETTLEMENT INDUSTRIAL
- PROTECTION AREA
- PARKS & OPEN SPACE
- ENVIRONMENTAL AREA
- URBAN SETTLEMENT AREA BOUNDARY

Thorndale Elevated Storage Tank

Thorndale Water Treatment Plant

THORNDALE RD

KING ST

NISSOURI RD

GERALD PKWY

WYE CREEK

0 1 Kilometers

Figure 2-2

Existing Water System

Thorndale

BluePlan Engineering

September 2019
418109-W-001
NAD 1983 UTM Zone 17N

2.3.1 Dorchester Water Distribution System

The Dorchester water distribution system is comprised of approximately 43 km of various sized watermains, 450 watermain valves, and 180 hydrants. The Dorchester water distribution system is a single pressure zone.

The facilities that support the distribution system are summarized in **Table 2-3.**

Table 2-3: Existing Facilities within the Dorchester Water System

Name	Location
Dorchester WTF In-Ground Reservoirs	Dorchester WTF (Dorchester Road)
Dorchester Elevated Tank	Clara Street, South of Marion Street

2.3.1.1 Dorchester Well Production

Water extraction from the groundwater production wells is regulated by a Permit to Take Water, which is issued by the Ministry of the Environment, Conservation and Parks (MECP). The daily and annual withdrawals for the Dorchester production wells are summarized in **Table 2-4** and **The firm** capacity for the Dorchester Water Supply, based on largest pump our of service (2PW1 Pump) is 42.6 L/s.

Table 2-5.

Water from the production wells from both well fields is pumped directly to the Dorchester WTF. The water quality from the shallow overburden wells is generally good with treatment consisting of disinfection and removal of iron, manganese and sulphur. Groundwater from the bedrock wells has shown high levels of hydrogen sulphide and additional treatment is required to remove this contaminant. Currently the plant has the capability to remove hydrogen sulphide though oxidation and filtration, however, the two bedrock wells are not being used at this time.

The Dorchester WTF operates under Amended PTTW Groundwater 4304-AABHQE, issued on May 25, 2016 which expires on May 21, 2021. The current PTTW treats all overburden wells from each well field and the bedrock wells as each being one unit for the purposes of establishing the maximum amounts to be taken.

The actual capacity for Dorchester's water supply is limited to the overburden wells. The bedrock wells are only used intermittently for sample collection.

Table 2-4 summarizes the permitted amounts of water as well as the pumping capacity from each source.

Table 2-4: Daily Well Withdrawal – Dorchester

Well	Permitted Daily Withdrawal	Pumping Capacity	2017 Actual Maximum Daily Withdrawal
2PW1	1,440,000 L/day (16.7 L/s)	16.7 L/s	723,000 L on September 22, 2017
3PW (Overburden)	3,680,640 L/day (42.6 L/s)	42.6 L/s	1,877,000 L on June 13, 2017
3PW (Bedrock)	2,225,000 L/day (25.8 L/s)	0 L/s (Used for Sample Collection Only)	164,000 L on November 13, 2017

Source: Dorchester WTF PTTW Groundwater 4304-AABHQE and Dorchester WTF SCADA Production Data

The firm capacity for the Dorchester Water Supply, based on largest pump our of service (2PW1 Pump) is 42.6 L/s.

Table 2-5: Annual Well Withdrawal – Dorchester

Annual Permitted Withdrawal (m^3)		2017 Annual Withdrawal (m^3)	Percentage of Permitted Annual Withdrawal (%)
Overburden Wells (2PW1, 3PW)	1,869,034	453,380	24%
Bedrock Wells (3PW)	812,052		
Total	**2,681,086**		**17%**

Source: Dorchester WTF PTTW Groundwater 4304-AABHQE and Dorchester WTF SCADA Production Data

2.3.1.2 Dorchester Pumping and Storage Facilities

Table 2-6 and **Table 2-7** summarize facility specifications for the pumping stations and storage facilities respectively, within Dorchester.

Table 2-6: Dorchester Pumping

Facility	No. of Pumps	Firm Capacity
HLP at the Dorchester WTF	2 (One Duty Pump, One Standby Pump)	90 L/s (1 Pump x 90 L/s)

Table 2-7: Dorchester Water Storage Facilities

Facility	Storage Capacity (m^3)	Top Water Level (masl)
In-Ground Reservoirs at the Dorchester WTF	2 x ~2,500m^3 = ~5,000m^3	Pumped to system by Dorchester WTF HLP
Dorchester ET	1.8 ML	303 m

2.3.2 Thorndale Water Distribution System

The Thorndale water distribution system is comprised of approximately 15 km of various sized watermains, 180 watermain valves, and 80 hydrants. The Thorndale water distribution system is a single pressure zone.

2.3.2.1 Thorndale Well Production

Water extraction from the Thorndale groundwater production wells is regulated by a Permit to Take Water, which is issued by the Ministry of the Environment, Conservation and Parks (MECP). The Thorndale WTF operates under Amended PTTW Groundwater 5082-AP2RUV, issued on July 27, 2017. The PTTW was recently amended to increase the permitted daily withdrawal for Well 2 to 1,900,800 L/day (up from 720,000 L/day). Well 1 and Well 2 are not to be operated concurrently. Municipality staff have noted that Well 1 could also be upgraded to operate at the approved PTTW amount. Capacity of the aquifer is anticipated to be limited to the 1,900,800 L/day.

Table 2-8 and **Table 2-9** summarize the permitted amounts of water as well as the pumping capacity from each source.

Table 2-8: Daily Well Withdrawal – Thorndale

Well	Permitted Daily Withdrawal	Pumping Capacity	2017 Actual Maximum Daily Withdrawal (L)
Well 1	720,000 L/day (8.33 L/s)	8.3 L/s	416,000 (on October 12, 2017
Well 2	1,900,800 L/day (22 L/s)	8.3 L/s (To be upgraded to 22 L/s)	428,000 (on April 27, 2017

Source: Thorndale WTF PTTW Groundwater 5082-AP2RUV and Dorchester WTF SCADA Production Data

Table 2-9: Annual Well Withdrawal – Thorndale

Annual Permitted Withdrawal (m^3)	2017 Annual Withdrawal (L)	Percentage of Permitted Annual Withdrawal (%)
693,792	87,812	13%

Source: Source: Thorndale WTF PTTW Groundwater 5082-AP2RUV and Dorchester WTF SCADA Production Data

The water obtained from these production wells are treated with chlorine for disinfection, and sodium silicate to ensure iron and manganese are kept in suspension.

2.3.2.2 Thorndale Pumping and Storage Facilities

Table 2-10 and **Table 2-11** summarize facility specifications for the pumping stations and storage facilities respectively, within Thorndale.

Table 2-10: Thorndale Pumping

Facility	No. of Pumps	Firm Capacity
HLP at the Thorndale WTF	3 (2 Duty and One Standby)	16.6 L/s (2 Pumps x 8.3 L/s)
Fire Pump (Decommissioned)	1	40.5 L/s

Table 2-11: Thorndale Water Storage Facilities

Facility	Storage Capacity (m^3)	Top Water Level (masl)
In-Ground Reservoirs at the Dorchester WTF	1 x 451 m^3 1 x 363 m^3	Pumped to system by Dorchester WTF HLP
Thorndale ET	1.65 ML	340 m

2.4 Assessment of Existing and Future Water Infrastructure

A critical step in the Master Planning process is the assessment of the existing infrastructure to establish the water system baseline conditions. These baseline conditions will become the basis of the future recommendations of the Master Plan, therefore it was important to ensure that they were determined through a comprehensive detailed analysis of the system. Once the existing system conditions were established, the potential impacts of the future growth demand on the water distribution system were analyzed to develop and recommend future servicing strategies.

The following sections describe current opportunities and constraints within the existing water system and assess the system's ability to accommodate growth to buildout.

2.4.1 Opportunities and Constraints

Existing and future water opportunities and constraints were identified through discussions with Municipality staff, as well as through hydraulic analyses and review of infrastructure data (e.g. GIS, design reports, as-built information, etc.). The InfoWater hydraulic model for Dorchester and Thorndale was used to analyze the performance of the existing and future system under different demand conditions such as ADD, MDD, PHD, and MDD+FF.

2.4.1.1 Dorchester

In general, the water distribution system for Dorchester has sufficient capacity to provide adequate pressures under ADD and PHD conditions. The primary issues relate to the system's ability to provide adequate fire flow protection to key areas, such as the northwest industrial lands and southwestern development area. Figure 2-3 highlights some of the key opportunities and constraints within the Dorchester water distribution system.

The key issues and constraints identified by the Municipality and through the modelling exercise include:

- Long-term water supply deficiency – more water supply is required to service Dorchester to buildout, either through an additional groundwater source or through a connection to the Lake Huron & Elgin Area Primary Water Supply Systems;
- Limited study has been commenced to determine the availability of additional groundwater supply and the amount of additional groundwater available for water supply to service growth in Dorchester is unknown;
- Insufficient storage within the existing Dorchester ET to service the community to buildout;
- Inability to provide sufficient fire flow protection to northwest industrial lands and northeast residential lands;

- Capacity and conveyance issues through the Dorchester Road watermain – inability to provide enough water to Dorchester ET and distribution system to provide sufficient fire flow under build out conditions; and,
- Requirement for new watermain to service growth areas located in southwest Dorchester, north of the Thames River and southeast Dorchester.

The following lists key opportunities identified by the Municipality and through the modelling exercise:

- The Municipality has an approved budget for the commencement of study to determine the availability of additional groundwater supply within the Dorchester area;
- The Municipality has allocation within the Lake Huron & Elgin Area Primary Water Supply Systems and can commence the process to commission a connection to the system if no additional groundwater supply is found;
- The existing 2 x 2,500m^3 in-ground reservoirs located at the Dorchester WTF can be utilized for storage (the amount of water required for contact time for chlorine at the Dorchester WTF has been significantly reduced, freeing up nearly all of the volume within the reservoirs to be utilized for storage);
- The Municipality has an ongoing State of Good Repair (SOGR) program that focuses on replacing aging watermains, where breaks and higher leakage can occur more frequently due to structural defects; and,
- New infrastructure will be required as new development occurs, especially north of the Thames River and within southwest Dorchester. There are opportunities to provide additional system looping to help with security of supply and greater system flexibility.

Figure 2-3 highlights key opportunities and constraints within the Dorchester water system and 401 Corridor Lands.

2.4.1.2 401 Corridor Lands

Water service to the 401 Corridor Lands was considered as part of the Dorchester water servicing strategy. Upgrades within the Dorchester system will be required to service the 401 Corridor Lands.

The key issues and constraints identified by the Municipality and through the modelling exercise include:

- Inability to effectively service development of the 401 Corridor lands – lands located to the southwest of Dorchester within the 401 Corridor generally lie at elevations approximately 20 metres higher than those in Dorchester, and servicing of the 401 Corridor will upgraded infrastructure to meet demand and fire flow requirements.

The following lists key opportunities identified by the Municipality and through the modelling exercise:

- The 401 Corridor Lands are located outside of the Dorchester Settlement Boundary with only dry-industrial currently permitted. There is opportunity to complete a more detailed cost-benefit analysis of servicing to the area in support of any changes to land use.

2.4.1.3 Thorndale

In general, the water distribution system for Thorndale has sufficient capacity to provide adequate pressures under ADD and PHD conditions. The primary issues relate to the system's ability to provide adequate fire flow protection to key areas, such as the southwest residential developments and the industrial park area. Figure 2-3 highlights some of the key opportunities and constraints within the Thorndale water distribution system.

The key issues and constraints identified by the Municipality and through the modelling exercise include:

- Long-term water supply deficiency – more water supply is required to service Thorndale to buildout, either through an additional groundwater source or through a connection to the Lake Huron & Elgin Area Primary Water Supply Systems;
- Limited study has been commenced to determine the availability of additional groundwater supply and the amount of additional groundwater available for water supply to service growth in Thorndale is unknown;
- Insufficient storage within the existing Thorndale ET and in-ground reservoirs located at the Thorndale WTF to service the community to buildout;
- Inability to provide sufficient fire flow protection to the southwest industrial area and the Harrison Street industrial area; and,
- Requirement for new watermain to service growth areas located in south Thorndale.

The following lists key opportunities identified by the Municipality and through the modelling exercise:

- The existing WTF can be upgraded under the existing PTTW to service growth demands within the Settlement Boundary to buildout;
- Peripheral lands identified for potential future growth will require additional groundwater supply, however, there is opportunity to explore the availability of additional groundwater source within the Thorndale area prior to development of Peripheral Lands;
- The Municipality has allocation within the Lake Huron & Elgin Area Primary Water Supply Systems and can commence the process to commission a connection to the system if no additional groundwater supply is found;

- There is area within the existing Thorndale WTF site for the twinning of the 451m^3 reservoir to increase storage capacity within Thorndale to service buildout;
- There is opportunity to construct a second watermain crossing of the CN Corridor within south Thorndale as development is progressing – providing improved fire flows and security of supply;
- New infrastructure will be required as new development occurs, especially north of the Thames River and within southwest Dorchester. There are opportunities to provide additional system looping to help with security of supply and greater system flexibility; and,
- The Municipality has an ongoing State of Good Repair (SOGR) program that focuses on replacing aging watermains, where breaks and higher leakage can occur more frequently due to structural defects.

Figure 2-4 highlights key opportunities and constraints within the Dorchester water system and 401 Corridor Lands.

Industrial lands require fire flow of 150 L/s, looping constraints due to proximity of facility and higher elevation (265-270 m)

System network requires extension
- system looping needed

Insufficient capacity along Dorchester Rd. Spine WM under buildout. Cannot meet demand North of River and fill Elevated Tank as required.

401 Corridor Lands at Elevations 20m Higher than Dorchester
- Resultant Low Pressures and Insufficient Fire Flows

Dorchester Elevated Tank

Total System Storage can meet growth needs for all Growth Projection Methods

Low pressure and insufficient fire flow due to higher elevation (280m)

System network requires extension

Dorchester Water Treatment Plant

- Optimize Pumping and Storage; Sufficient combined storage but requires pumping upgrades to access full storage capacity
- Existing well supply cannot meet Buildout Demands
- Pump upgrades needed to support growth needs

GORE RD
HAMILTON RD
BRIDGE ST
MAIN ST
ELGIN RD
DORCHESTER RD
HWY 401 W
HWY 401 E
0
1
Kilometers

Municipality of Thames Centre

Water and Wastewater Master Plan Update

Water Network
- Elevated Tank
- Water Treatment Plant
- Existing Watermain (≤ 150 mm)
- Existing Watermain (200 - 300 mm)

General Features
- Highway
- Arterial Road
- Growth Areas
- Settlement Boundary
- Property Parcel
- Waterbody

Landuse
- RESIDENTIAL
- NEIGHBOURHOOD COMMERCIAL
- GENERAL COMMERCIAL
- HIGHWAY COMMERCIAL
- SETTLEMENT INDUSTRIAL
- INSTITUTIONAL
- RECREATIONAL
- PROTECTION AREA
- NATURAL AREA
- PARKS & OPEN SPACE
- ENVIRONMENTAL AREA
- CORE AREAS
- URBAN SETTLEMENT AREA BOUNDARY

Figure 2-3

Opportunities and Constrains

Dorchester and 401 Corridor Lands

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Trunk watermains have insufficient capacity to provide sufficient fire flow under Buildout

Existing Industrial Area has insufficient available fire flow. Poor looping and undersized watermains

Existing Industrial Area has insufficient available fire flow

Additional storage capacity needed to support buildout

- Upgraded Well Supply (20 L/s) has capacity to support growth with the Settlement Boundary. Additional supply needed to support servicing of Peripheral Lands
- Thorndale WTP Pumping required to be upgraded to service Buildout

Thorndale Elevated Storage Tank

Thorndale Water Treatment Plant

NISSOURI RD

KING ST

THORNDALE RD

0 1 Kilometers

Municipality of Thames Centre

Water and Wastewater Master Plan Update

Water Network

- Elevated Tank
- Water Treatment Plant
- Existing Watermain (≤ 150 mm)
- Existing Watermain (200 - 300 mm)

General Features

- Highway
- Arterial Road
- Growth Areas
- Settlement Boundary
- Property Parcel
- Waterbody

Landuse

- RESIDENTIAL
- MOBILE HOME PARK
- GENERAL COMMERCIAL
- SETTLEMENT INDUSTRIAL
- PROTECTION AREA
- PARKS & OPEN SPACE
- ENVIRONMENTAL AREA
- URBAN SETTLEMENT AREA BOUNDARY

Figure 2-4

Opportunities and Constrains

Thorndale

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2.5 Water Servicing Strategy

The identification and assessment of servicing alternatives is a critical component of the master planning process. It allows for a comprehensive review of various servicing solutions to provide transparency and a recommended strategy that is defensible.

As part of this Master Plan, water alternative servicing strategies were reviewed for existing and future growth areas in order to select the servicing strategies that:

- Make best use of existing infrastructure to avoid new infrastructure where possible;
- Minimize cost of new infrastructure;
- Consider operation and maintenance costs to ensure financial sustainability;
- Ensure long term reliability and security of the water system;
- Increase system resilience to climate change;
- Avoid/minimize environmental crossings and other disruptions to the environment where possible;
- Avoid disruptions to cultural heritage resources;
- Plan for future infrastructure within the existing road right-of-way where possible;
- Avoid/reduce production of Green House Gas Emissions; and,
- Avoid/minimize impact to areas that could represent a significant drinking water threat.

2.5.1 Servicing Strategy Development

Alternative water servicing strategies were identified and reviewed for existing and future growth areas within the Municipality of Thames Centre in order to select the best servicing solutions for the system. Collectively, all the area specific servicing solutions will form the overall water servicing strategy for the Municipality.

The following sections summarize the development of the alternative servicing strategies for key growth areas within the Municipality of Thames Centre.

2.5.1.1 Supply Strategy

Presently, the Dorchester water system has capacity to supply approximately 3,000 additional persons plus jobs. This is based on the firm capacity of the overburden well pumps to supply 42.6 L/s. Development of a short-term and long-term water supply strategy is essential for continued growth within Dorchester. **Figure 2-5** summarizes Dorchester's water supply needs under the three buildout methods.

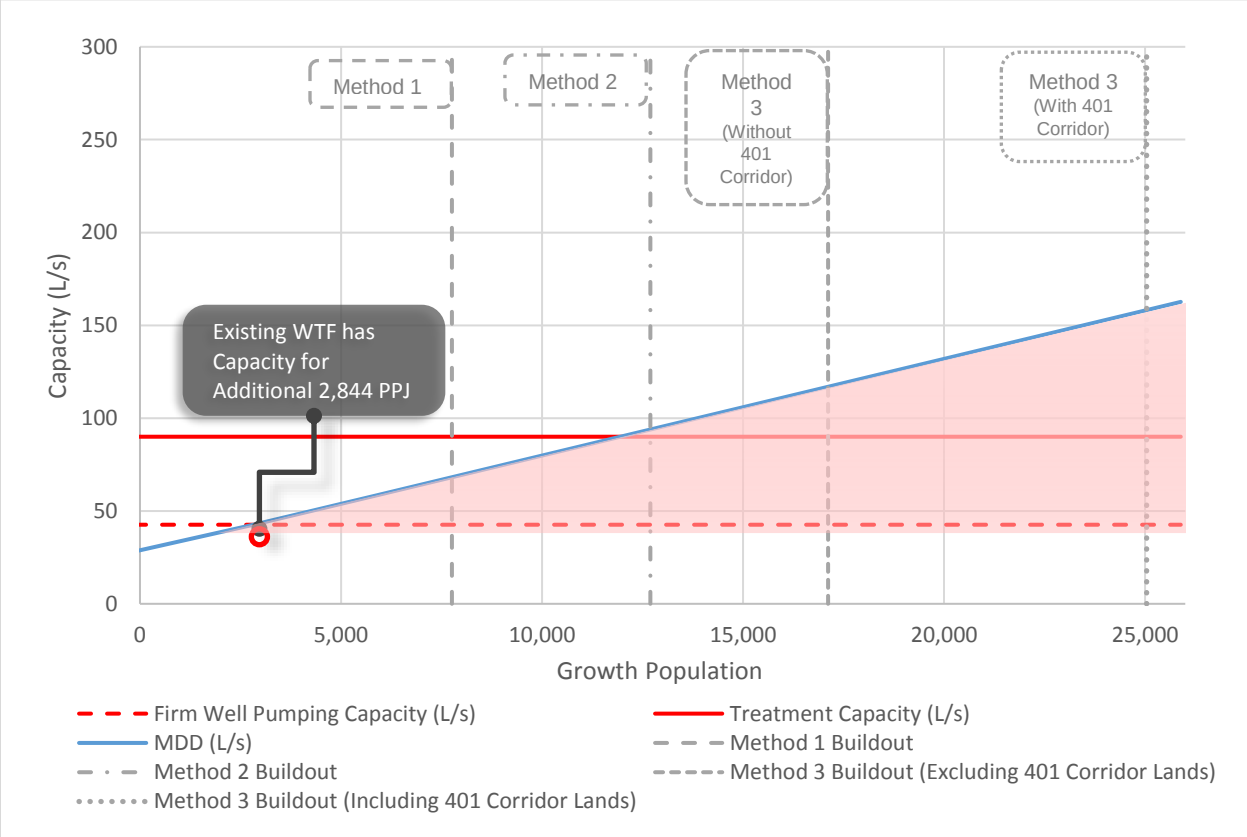

Figure 2-5: Dorchester Water Supply Needs

Overburden wells are permitted to supply 59.3 L/s and it is expected that this firm capacity can be achieved with well pump infrastructure upgrades. The bedrock wells, currently used only for sample collection are permitted to supply an additional 25.75 L/s. Additional study is required to determine the viability of supplying water from the bedrock wells.

The primary objective of the water servicing strategy will be to prioritize control of the water supply by the Municipality. Development of additional groundwater and ownership water system facilities is preferred to a potential connection to the Lake Huron & Elgin Area Primary Water Supply Systems.

Determination of the availability of additional groundwater will require years of investigation, study, tests and monitoring prior to knowing whether or not there is enough

groundwater available in the Dorchester and Thorndale areas to service the community to buildout.

2.5.1.1.1 Dorchester

In the interim, future demands from development of southwest Dorchester and north of the Thames River is expected to exceed the capacity of the existing supply. Maximizing supply to the system in combination with the investigation for additional groundwater supply is required to service development in the short-term. Four alternatives were considered:

1. Maximize Well Capacity at Existing WTF to Service as Much Growth as Possible
    - Initiate study and complete required upgrades to maximize existing well fields and Dorchester WTF. Limit growth to the upgraded available supply at the Dorchester WTF.
2. New Groundwater Source within Dorchester
    - Initiate investigation of new groundwater source within Dorchester to supplement existing well field supply.
3. Commission Lake Huron & Elgin Area Primary Water Supply Systems Supply Connection
    - Connect to Lake Huron & Elgin Area Primary Water Supply Systems to supply Dorchester water distribution system
4. Maximize Existing Facilities plus Supply New Groundwater Source within Dorchester
    - Hybrid of Alternatives 1 and 2 - Initiate study and complete required upgrades to maximize existing well fields and Dorchester WTF and initiate investigation of new groundwater source within Dorchester to supplement existing well field supply.

Dorchester's potential well exploration areas are shown in **Figure 2-6**. Potential watermain alignments for a connection to the Lake Huron & Elgin Area Primary Water Supply Systems are shown in **Figure 2-7**.

The advantages, disadvantages and upgrades, costs and timing are summarized in **Table 2-12**.

Municipality of Thames Centre

Water and Wastewater Master Plan Update

Potential Well Exploration Area

Potential Well Exploration Area

Dorchester Elevated Tank

Dorchester Water Treatment Plant

GORE RD
CATHERINE ST
WESTCHESTER BRNE
ISHAM RD
HAMILTON RD
BRIDGE ST
MAIN ST
ELGIN RD
DORCHESTER RD
HWY 401 W
HWY 401 E

0 1 Kilometers

Water Network

- Elevated Tank
- Water Treatment Plant
- Existing Watermain (≤ 150 mm)
- Existing Watermain (200 - 300 mm)

General Features

- Highway
- Arterial Road
- Growth Areas
- Settlement Boundary
- Property Parcel
- Waterbody

Landuse

- RESIDENTIAL
- NEIGHBOURHOOD COMMERCIAL
- GENERAL COMMERCIAL
- HIGHWAY COMMERCIAL
- SETTLEMENT INDUSTRIAL
- INSTITUTIONAL
- RECREATIONAL
- PROTECTION AREA
- NATURAL AREA
- PARKS & OPEN SPACE
- ENVIRONMENTAL AREA
- CORE AREAS
- URBAN SETTLEMENT AREA BOUNDARY

Figure 2-6

Potential Well Exploration Areas

Dorchester

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Municipality of Thames Centre

Water and Wastewater Master Plan Update

GORE RD

ASHAWAY RD

Dorchester Elevated Tank

Future Huron / Elgin Area Connection Concept

HAMILTON RD

BRIDGE ST

MAIN ST

WESTCHESTER BRNE

HWY 401 W

HWY 401 E

Dorchester Water Treatment Plant

Future Huron / Elgin Area Connection Concept

0 1 Kilometers

Water Network

- Elevated Tank
- Water Treatment Plant
- Existing Watermain (≤ 150 mm)
- Existing Watermain (200 - 300 mm)

General Features

- Highway
- Arterial Road
- Growth Areas
- Settlement Boundary
- Property Parcel
- Waterbody

Landuse

- RESIDENTIAL
- NEIGHBOURHOOD COMMERCIAL
- GENERAL COMMERCIAL
- HIGHWAY COMMERCIAL
- SETTLEMENT INDUSTRIAL
- INSTITUTIONAL
- RECREATIONAL
- PROTECTION AREA
- NATURAL AREA
- PARKS & OPEN SPACE
- ENVIRONMENTAL AREA
- CORE AREAS
- URBAN SETTLEMENT AREA BOUNDARY

Figure 2-7

Potential Watermain Alignments

Dorchester and 401 Corridor Lands

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Table 2-12: Comparison of Servicing Alternatives for Dorchester Water Supply

	Dorchester Water Supply Concept 1	Dorchester Water Supply Concept 2	Dorchester Water Supply Concept 3	Dorchester Water Supply Concept 4
Description	Maximize Well Capacity at Existing WTF to Service as Much Growth as Possible	New Groundwater Source within Dorchester	Commission Lake Huron & Elgin Area Primary Water Supply Systems Supply Connection	Maximize Existing Facilities + Supply New Groundwater Source within Dorchester
Advantages	• Availability of some additional capacity to supply growth within short term	• Identification of new sufficient groundwater supply will provide Municipality with full control over water supply • If a sufficient groundwater supply is not found, then Lake Huron & Elgin Area connection supply option can be initiated at that time	• Potential connection available along Hamilton Road or Donnybrook Drive from London or south from Lake Huron & Elgin Water Supply • There is allocation of supply available for Thames Centre • Can provide certainty of supply for growth to Buildout • Provides supply for growth to buildout under all growth projection methods • Similar infrastructure and construction costs for all buildout scenarios	• Maximizing capacity of existing WTF provides interim solution to service growth while groundwater supply investigation is undertaken • Expected that well and pump upgrades can provide availability of some additional capacity to supply growth within short-term while well exploration is commenced • Identification of new sufficient groundwater supply will provide Municipality with full control over water supply • If a sufficient groundwater supply is not found, then Huron & Elgin Area connection supply option can be initiated at that time

Disadvantages	• Not enough capacity within existing wellfield to service growth to Buildout	• Extensive study required across years to determine if there is new groundwater supply available
		• Uncertainty that there is available well capacity to supply growth to Buildout
		• May require reconfiguration of existing Dorchester system depending on location of new supply
			• Requires servicing and cost sharing agreement
			  • Servicing agreement must be implemented and renewed
			• Requires extensive watermain construction and maintenance
			• Does not provide Municipality with full control over water supply
				• Risk that:
				  • Growth will outpace maximum capacity of existing WTF
				  • Groundwater supply will not be found, and Huron & Elgin Area connection option postponed for 4 years
				Location / quality issues with new groundwater supply require extensive infrastructure

Upgrades, Costs and Timing			• Servicing Agreement - $$$ • Trunk watermain construction with metering - $$$$ • Booster Pumping Station may be required - $$ • Estimated timing: • Agreement – 2years • 6-7 years to commissioning	• Upgrade well and pump at Dorchester WTF – $$ - 1 -2 years • Well Exploration – $$ - 4 years prior to identification of available source and location • Pumping and conveyance infrastructure related to new supply - $$$ - 7 – 10 years total to commissioning
Four-Point Criteria Evaluation			🟢 **Tech.** | 🟡 **Env.** | 🟡 **Soc. /Cul.** | 🟡 **Fin.**	🟡 **Tech.** | 🟡 **Env.** | 🟢 **Soc. /Cul.** | 🟢 **Fin.**
Recommendations	Supply Concept 1 not carried forward based on reasoned argument approach – cannot effectively service buildout in Dorchester.	Supply Concept 2 not carried forward based on reasoned argument approach – Servicing concept can be enhanced to best service development in short-term while investigation of additional groundwater source is being completed.	Supply Concept 3 not chosen as preferred as the established preference of the Municipality of Thames Centre through Council is to retain control of the Municipality's water supply. The servicing alternative to connect to the Lake Huron & Elgin Area Primary Water Supply Systems is to be retained as a back-up alternative if no additional groundwater supply available to Dorchester is found.	**Supply Concept 4 was selected as the preferred alternative as it prioritizes Municipality control over water supply and provides the most flexibility to service short-term growth and growth to buildout**

2.5.1.1.2 Thorndale

Thorndale's upgraded PTTW (1,900,800 L/day (22 L/s)) allows for the servicing of growth within the Settlement Boundary to buildout. Corresponding well, pump and HLP upgrades will be required to achieve the supply of 22 L/s.

Thorndale's supply needs are shown in **Figure 2-8**.

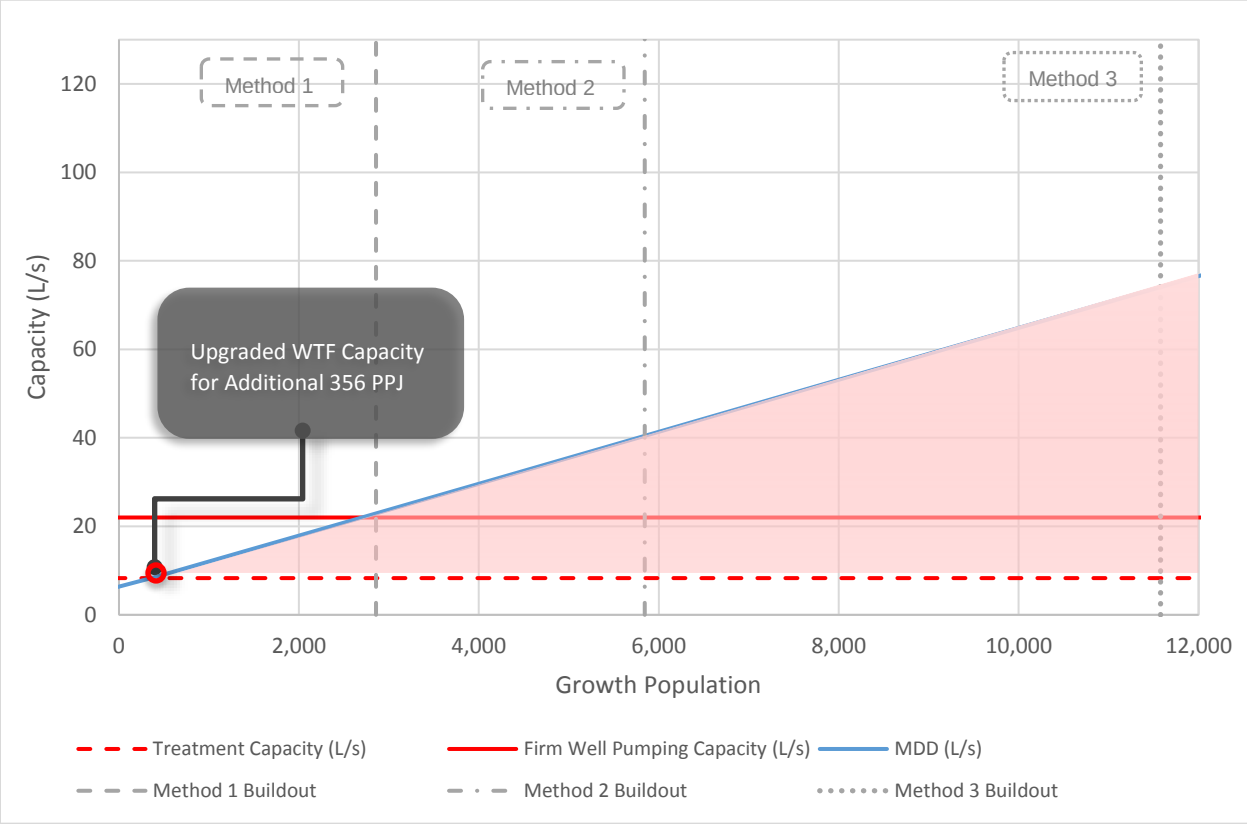

Figure 2-8: Thorndale Water Supply Needs

It is anticipated that the Thorndale well fields can achieve the permitted 22 L/s and likely not produce any additional supply. Municipality staff have noted that studies have indicated that there is likely only the single aquifer within the Thorndale area.

The primary objective for Thorndale's water supply strategy will also be to prioritize control of the water supply by the Municipality. Determination of the availability of additional groundwater will require years of investigation, study, tests and monitoring and can be completed concurrently with any studies to be carried out for Dorchester.

Similar to for Dorchester, four supply strategy alternatives were considered:

1. Maximize Well Capacity at Existing Thorndale WTF to Service as Much Growth as Possible;
2. New Groundwater Source within Thorndale;

3. Commission Lake Huron & Elgin Area Primary Water Supply Systems Supply Connection; and,
4. Maximize Existing Facilities plus Supply New Groundwater Source within Thorndale
    - This is the hybrid of Alternatives 1 and 2.

Potential well exploration areas within Thorndale, as well as potential watermain alignments for a connection to the Lake Huron & Elgin Area Primary Water Supply Systems are shown in **Figure 2-9**.

The advantages, disadvantages and upgrades, costs and timing are summarized in **Table 2-13**.

Future Huron / Elgin Area Connection Concept

Thorndale Elevated Storage Tank

Thorndale Water Treatment Plant

Well Exploration Preferred – Limited Information Available

0 1 Kilometers

Municipality of Thames Centre

Water and Wastewater Master Plan Update

Water Network

- Elevated Tank
- Water Treatment Plant
- Existing Watermain (≤ 150 mm)
- Existing Watermain (200 - 300 mm)

General Features

- Highway
- Arterial Road
- Growth Areas
- Settlement Boundary
- Property Parcel
- Waterbody

Landuse

- RESIDENTIAL
- MOBILE HOME PARK
- GENERAL COMMERCIAL
- SETTLEMENT INDUSTRIAL
- PROTECTION AREA
- PARKS & OPEN SPACE
- ENVIRONMENTAL AREA
- URBAN SETTLEMENT AREA BOUNDARY

Figure 2-9

Potential Well Exploration Areas

Thorndale

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September 2019
418109-W-007
NAD 1983 UTM Zone 17N

Table 2-13: Comparison of Servicing Alternatives for Thorndale Water Supply

	Thorndale Water Supply Concept 1	Thorndale Water Supply Concept 2	Thorndale Water Supply Concept 3	Thorndale Water Supply Concept 4
Description	Maximize Well Capacity at Existing WTF to Service as Much Growth as Possible	New Groundwater Source within Thorndale	Commission Lake Huron & Elgin Area Primary Water Supply Systems Supply Connection	Maximize Existing Facilities + Supply New Groundwater Source within Thorndale
Advantages	• Availability of some additional capacity to supply growth within short term	• Identification of new sufficient groundwater supply will provide Municipality with full control over water supply • If a sufficient groundwater supply is not found, then Lake Huron & Elgin Area connection supply option can be initiated at that time	• Potential connection available from Medway Road / Thorndale Road or Dorchester (via Hamilton Road or Donnybrook Drive from London or south from Lake Huron / Elgin Water Supply) • There is allocation of supply available for Thames Centre • Can provide certainty of supply for growth to Buildout • Provides supply for growth to buildout under all growth projection methods • Similar infrastructure and construction costs for all buildout scenarios	• Maximizing capacity of existing WTF provides interim solution to service growth within Thorndale Settlement Boundary while well exploration is commenced • Expected that supply will be limited to approximately 22 L/s (in line with the existing PTTW) • Identification of new sufficient groundwater supply will provide Municipality with full control over water supply • If a sufficient groundwater supply is not found, then Lake Huron & Elgin Area connection supply option can be initiated at that time

Disadvantages	• Not enough capacity within existing wellfield to service growth to Buildout	• Extensive study required across years to determine if there is new groundwater supply available
		• Uncertainty that there is available well capacity to supply growth to Buildout
		• May require reconfiguration of existing Thorndale system depending on location of new supply
			• Requires servicing and cost sharing agreement
			  • Servicing agreement must be implemented and renewed
			• Requires extensive watermain construction and maintenance
			• Does not provide Municipality with full control over water supply
				• Risk that:
				  • Growth will outpace maximum capacity of existing WTF
				  • Groundwater supply will not be found, and Huron & Elgin Area connection option postponed for 4 years
				• Location / quality issues with new groundwater supply require extensive infrastructure

Upgrades, Costs and Timing			• Servicing Agreement - $$$ • Trunk watermain construction with metering - $$$$ • Booster Pumping Station may be required - $$ • Estimated timing: • Agreement – 2years • 6-7 years to commissioning	• Upgrade well and pump at Thorndale WTF – $$ - 1 -2 years • Well Exploration – $$ - 4 years prior to identification of available source and location • Pumping and conveyance infrastructure related to new supply - $$$ - 7 – 10 years total to commissioning
Four-Point Criteria Evaluation			🟢 **Tech.** | 🟡 **Env.** | 🟡 **Soc. /Cul.** | 🟡 **Fin.**	🟡 **Tech.** | 🟡 **Env.** | 🟢 **Soc. /Cul.** | 🟢 **Fin.**
Recommendations	Supply Concept 1 not carried forward based on reasoned argument approach – cannot effectively service buildout in Thorndale.	Supply Concept 2 not carried forward based on reasoned argument approach – Servicing concept can be enhanced to best service development in short-term while investigation of additional groundwater source is being completed.	Supply Concept 3 not chosen as preferred as the established preference of the Municipality of Thames Centre through Council is to retain control of the Municipality's water supply. The servicing alternative to connect to the Lake Huron & Elgin Area Primary Water Supply Systems is to be retained as a back-up alternative if no additional groundwater supply available to Thorndale is found.	**Supply Concept 4 was selected as the preferred alternative as it prioritizes Municipality control over water supply and provides the most flexibility to service short-term growth and growth to buildout**

2.5.1.2 Storage Strategy

The objective of the storage strategy for Dorchester and Thorndale will be to provide the new level of service for available fire flow as well as maintain equalization and emergency storage in line with MECP guidelines.

The elevated tanks in Dorchester and Thorndale still have substantial service life (the Thorndale ET was very recently constructed in 2011). Expansion of the existing tank facilities will be cost prohibitive and require that the facilities be taken offline during construction. Based on this, the expansion alternative was not considered in greater detail.

The Municipality indicated that they would consider the utilization of existing in-ground reservoirs at the Dorchester WTF and Thorndale WTF for required additional storage. The facilities now require only a small percentage of the inground reservoirs volume for treatment requirements, and nearly all of the available volume can be made available for storage. In-ground storage will require upgraded pumping to meet peak hour and fire flow demands in combination with the elevated tanks.

2.5.1.2.1 Dorchester

Two alternatives were considered to meet storage requirements for Dorchester to build-out:

1. Construct Additional Storage Facility; and,
2. Utilize Dorchester WTF Reservoirs in combination with Dorchester ET.

Dorchester's storage needs and availability are shown in **Figure 2-10**.

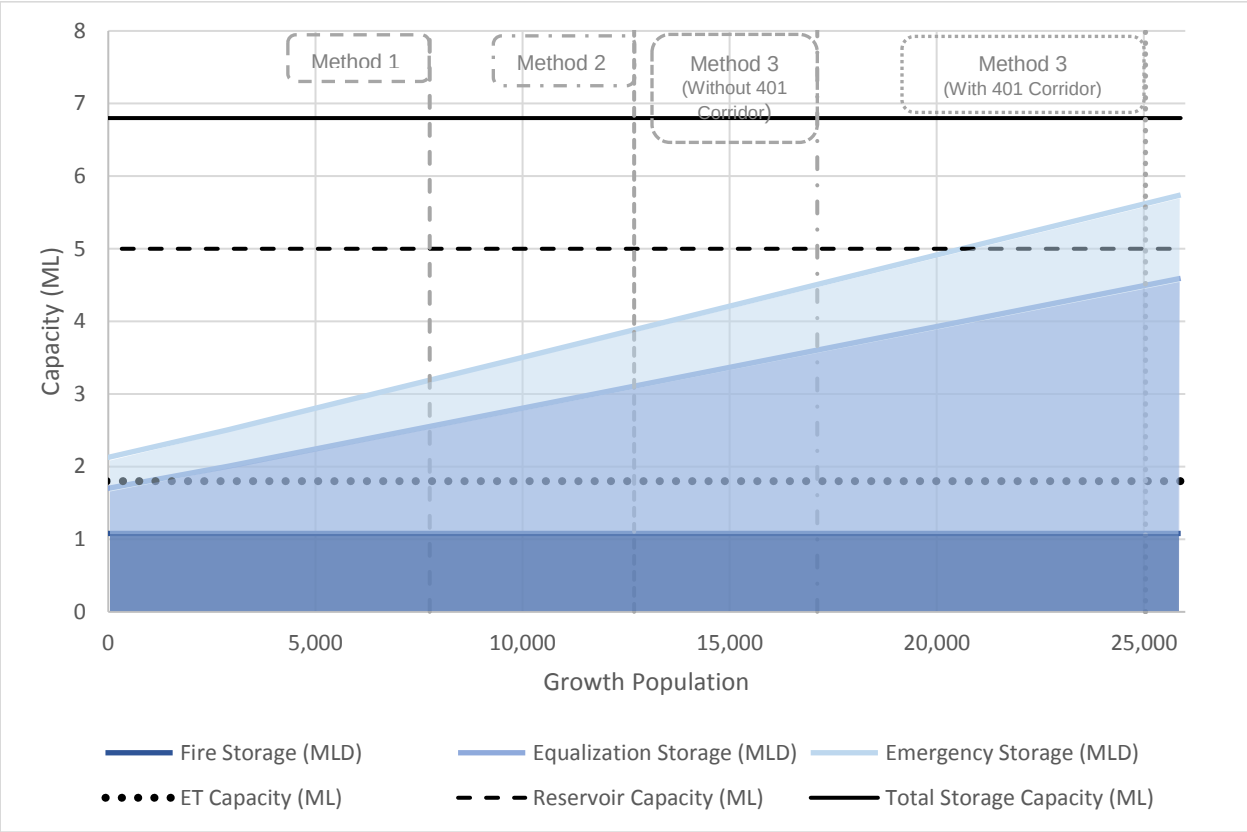

Figure 2-10: Dorchester Storage Needs and Availability

The advantages, disadvantages and upgrades, costs and timing are summarized in **Table 2-14**.

Table 2-14: Comparison of Servicing Alternatives for Dorchester Water Storage

	Dorchester Water Storage Concept 1	Dorchester Water Storage Concept 2
Description	**Construct Additional Storage Facility** Second elevated tank or reservoir with booster pumping station to be constructed in South Dorchester to meet storage needs at buildout	**Utilize Dorchester WTF Reservoirs in combination with Dorchester ET** Utilize existing inground reservoirs at Dorchester WTF to supplement system storage required for buildout; requires WTF pump capacity upgrades to access full storage capacity
Advantages	• Can be located to service 401 Corridor Lands as well as provide security of supply to south Dorchester • Location can be optimized based on available well supply (if identified) to reduce infrastructure requirements • Can best accommodate future Lake Huron & Elgin Area connection if available well supply is not found	• Minimizes infrastructure upgrades in Dorchester (can utilize storage within the existing inground reservoirs at Dorchester WTF)
Disadvantages	• More extensive infrastructure upgrade requirements than to utilize existing WTF • Construction of storage facilities (especially highly visible elevated tanks) has historically been opposed by area residents and businesses	• Requires additional pumping capacity and associated operations costs at WTF • Increases standby power requirements at WTF
Upgrades, Costs and Timing	• New reservoir or elevated tank • Environmental Assessment - $ - 2 years • Design and construction - $$ - 2 to 4 years • Total - $$$ - 4 – 6 years	• Pump Upgrades at Dorchester WTF - $ • New infrastructure from new supply location to Dorchester WTF - $$ • Estimated timing: • 1 – 3 years
Four-Point Criteria Evaluation	🟢 **Tech.** 🟢 **Env.** 🟡 **Soc. /Cul.** 🔴 **Fin.**	🟢 **Tech.** 🟢 **Env.** 🟢 **Soc. /Cul.** 🟡 **Fin.**
Recommendations	Storage Concept 1 not chosen as preferred based on reasoned argument approach – Construction and operation of an additional storage facility is cost prohibitive, and typically there are residents and businesses that oppose the aesthetics of construction of a storage facility within their local area.	**Storage Concept 2 chosen as preferred alternative because it best utilizes existing infrastructure reducing construction costs and mitigating issues with resident and business opposition to new storage infrastructure.**

The existing 2 x 2,500m^3 in-ground reservoirs at the Dorchester WTF can be utilized with additional pumping capacity to upgrade storage within Dorchester. Generally, the Dorchester ET will be utilized primarily to meet the fire flow level of service, and the in-ground reservoirs utilized to service PHD. The existing oversized 90 L/s HLP at the Dorchester WTF can also be utilized to provide additional storage to the system from the in-ground reservoirs.

2.5.1.2.2 Thorndale

In-ground storage volume at the Thorndale WTF, and similar to Dorchester, alternatives were considered to meet storage requirements for Thorndale to build-out. Thorndale's storage needs and availability are shown in **Figure 2-11**.

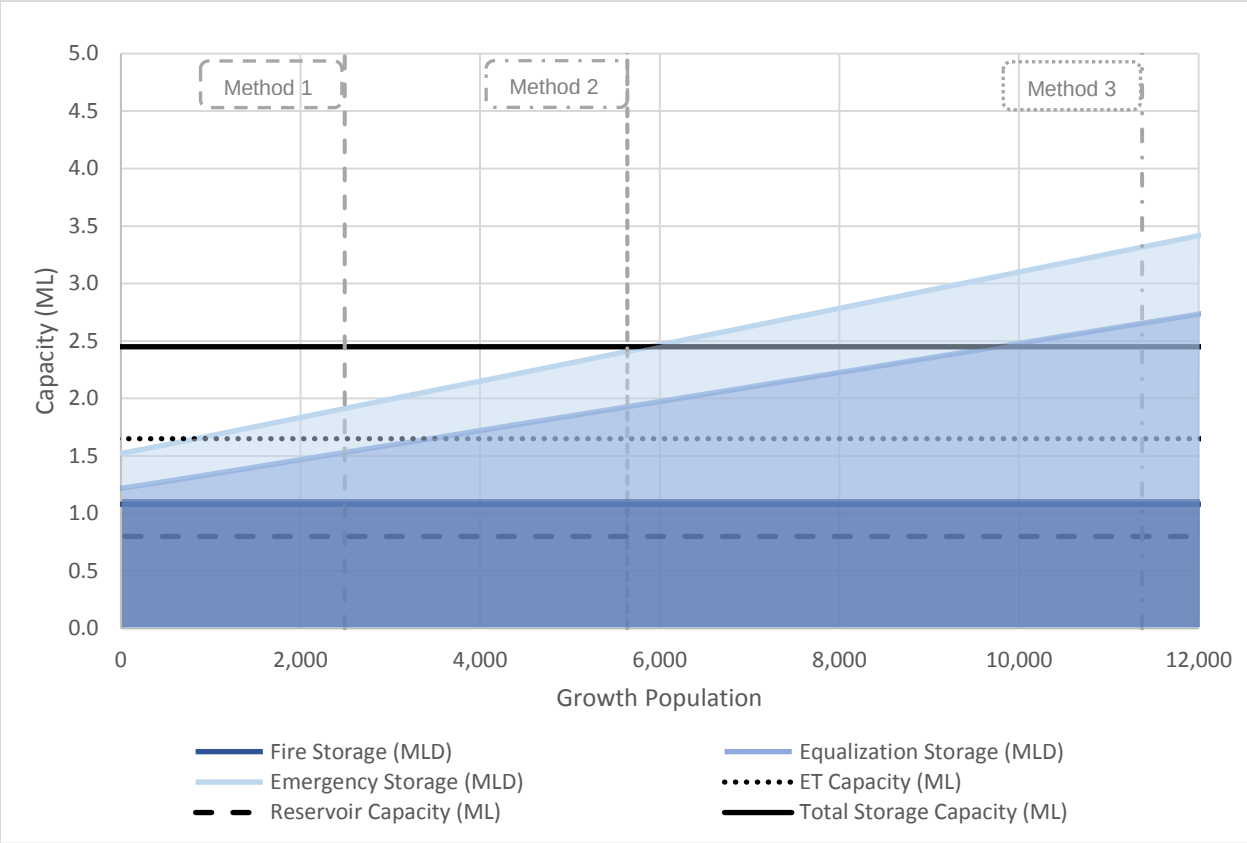

Figure 2-11: Thorndale Storage Needs and Availability

The advantages, disadvantages and upgrades, costs and timing are summarized in **Table 2-15**.

Table 2-15: Comparison of Servicing Alternatives for Thorndale Water Storage

	Thorndale Water Storage Concept 1	Thorndale Water Storage Concept 2
Description	**Construct Additional Storage Facility** Second elevated tank or reservoir with booster pumping with booster pumping station to meet storage needs at buildout	**Utilize Thorndale WTF Reservoirs in combination with Thorndale ET** Utilize existing inground reservoirs at Thorndale WTF to supplement system storage required for buildout; requires WTF pump capacity upgrades to access full storage capacity
Advantages	• Can provide additional fire flow and security of supply to Thorndale Industrial Park • Location can be optimized based on available well supply (if identified) to reduce infrastructure requirements • Can best accommodate future Lake Huron & Elgin Area connection if available well supply is not found	• Minimizes infrastructure upgrades in Thorndale (can utilize storage within the existing inground reservoirs at Thorndale WTF) • There is available land at Thorndale WTF site for construction of new reservoir
Disadvantages	• More extensive infrastructure upgrade requirements than to utilize existing WTF site • Construction of storage facilities (especially highly visible elevated tanks) has historically been opposed by area residents and businesses	• Cannot meet total storage requirements at buildout under Method 3 • If peripheral lands outside of Settlement Boundary develop at >50 ppha, more storage will be required
Upgrades, Costs and Timing	• New reservoir or elevated tank • Environmental Assessment - $ - 2 years • Design and construction - $$ - 2 to 4 years • Total - $$$ - 4 – 6 years	• New reservoir and pump upgrades - $$ - 1 – 2 years • New infrastructure from new supply location to Thorndale WTF - $$
Four-Point Criteria Evaluation	🟢 **Tech.** 🟢 **Env.** 🟡 **Soc. /Cul.** 🔴 **Fin.**	🟢 **Tech.** 🟢 **Env.** 🟢 **Soc. /Cul.** 🟡 **Fin.**
Recommendations	Storage Concept 1 not chosen as preferred based on reasoned argument approach – Construction and operation of an additional storage facility is cost prohibitive, and typically there are residents and businesses that oppose the aesthetics of construction of a storage facility within their local area.	**Storage Concept 2 chosen as preferred alternative because it best utilizes existing infrastructure reducing construction costs and mitigating issues with resident and business opposition to new storage infrastructure.**

The existing in-ground reservoirs at the Thorndale WTF site can be utilized for storage to complement the Thorndale ET. This in combination with the corresponding pump upgrades will provide required storage to the buildout population within the Settlement Boundary.

A twinning of the larger (451m^3) reservoir at the Thorndale WTF site will be required to service buildout of Thorndale's Peripheral Areas.

2.5.1.3 Dorchester Water Distribution System

There are three key servicing areas within Dorchester where the distribution system is required to be upgraded to service growth to buildout.

2.5.1.3.1 Dorchester Road Trunk Watermain Upgrade Servicing

The existing Dorchester Road trunk watermain conveys water from water treatment facility to elevated tank and Dorchester distribution system. The Dorchester Road watermain serves as the "spine" of the Dorchester water distribution system, connecting the community's various areas to the Dorchester WTF and the Dorchester ET. Upgrades will are required for future system resiliency and to service buildout scenarios in North and South Dorchester. The existing Thames River watermain crossing can be utilized.

Alternative alignments for the Dorchester Road Trunk Watermain upgrades are shown in **Figure 2-12**.

The advantages, disadvantages and upgrades, costs and timing are summarized in **Table 2-16**.

Dorchester Road Watermain Upgrade Alternative 1

Dorchester Elevated Tank

Proposed Watermain (Master Plan Project)

Dorchester Water Treatment Plant

0 1 Kilometers

Dorchester Road Watermain Upgrade Alternative 2

Dorchester Elevated Tank

Proposed Watermain (Master Plan Project)

Dorchester Water Treatment Plant

Municipality of Thames Centre

Water and Wastewater Master Plan Update

Water Network

- Elevated Tank
- Water Treatment Plant
- Existing Watermain (≤ 150 mm)
- Existing Watermain (200 - 300 mm)
- Proposed Watermain (Development Conceptual Plan)

General Features

- Highway
- Arterial Road
- Growth Areas
- Settlement Boundary
- Property Parcel

Landuse

- RESIDENTIAL
- NEIGHBOURHOOD COMMERCIAL
- GENERAL COMMERCIAL
- HIGHWAY COMMERCIAL
- SETTLEMENT INDUSTRIAL
- INSTITUTIONAL
- RECREATIONAL
- PROTECTION AREA
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- CORE AREAS
- URBAN SETTLEMENT AREA BOUNDARY

Figure 2-12

Dorchester Road Trunk WM Upgrades Alternative Alignments

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Table 2-16: Comparison of Servicing Alternatives for Dorchester Road Trunk Watermain Upgrade

Dorchester Road Watermain Upgrade Alternative 1 New watermain alignment along Clara St. to Dorchester Elevated Tank in North Dorchester	Dorchester Road Watermain Upgrade Alternative 2 New watermain alignment through new development roads in North Dorchester
• Clara Street alignment option within existing right-of-way, does not require that timing of watermain construction aligns with development construction.	• Construction of new watermain alignment along proposed roads through greenfield development is more cost efficient and less disruptive to residents; and, • Expected that required watermain upgrades triggered by growth will align with timing of development.
● **Tech.** ● **Env.** ● **Soc. /Cul.** ● **Fin.**	● **Tech.** ● **Env.** ● **Soc. /Cul.** ● **Fin.**
	Preferred Alternative

2.5.1.3.2 Southwest Dorchester Water Servicing

A new trunk watermain is required to service growth in Southwest Dorchester. Mill Road and Christie Drive developments are in Approval Process with preliminary road and servicing layouts.

Alternative alignments for the Southwest Dorchester Water Servicing upgrades are shown in **Figure 2-13**.

The advantages, disadvantages and upgrades, costs and timing are summarized in **Table 2-17**.

Municipality of Thames Centre

Water and Wastewater Master Plan Update

Water Network

- Elevated Tank
- Water Treatment Plant
- Existing Watermain (≤ 150 mm)
- Existing Watermain (200 - 300 mm)
- Proposed Watermain (Development Conceptual Plan)

General Features

- Highway
- Arterial Road
- Growth Areas
- Settlement Boundary
- Property Parcel

Landuse

- RESIDENTIAL
- NEIGHBOURHOOD COMMERCIAL
- GENERAL COMMERCIAL
- HIGHWAY COMMERCIAL
- SETTLEMENT INDUSTRIAL
- INSTITUTIONAL
- RECREATIONAL
- PROTECTION AREA
- NATURAL AREA
- PARKS & OPEN SPACE
- ENVIRONMENTAL AREA
- CORE AREAS
- URBAN SETTLEMENT AREA BOUNDARY

Proposed Watermain (Master Plan Project)

Southwest Dorchester Watermain Upgrade Alternative 1

Proposed Watermain (Master Plan Project)

Southwest Dorchester Watermain Upgrade Alternative 2

0 1 Kilometers

Figure 2-13

Southwest Dorchester WM Upgrades Alternative Alignments

BluePlan

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NAD 1983 UTM Zone 17N

Table 2-17: Comparison of Servicing Alternatives for Southwest Dorchester Watermain Upgrades

Southwest Dorchester Watermain Upgrade Alternative 1 New watermain alignment along Hamilton Rd. to service southwest Dorchester development	Southwest Dorchester Watermain Upgrade Alternative 2 New watermain alignment through new development in Southwest Dorchester
• Long section of new watermain through environmentally sensitive area, existing roadway and not servicing any properties; • Increased costs and environmental approvals; and, • Construction on municipal road increases disruption to residents	• Easement allows for connection to existing watermain through Mill Pond development; • Greenfield construction lessens costs and construction disruption to residents; • Less environmental crossings and expected less construction dewatering; and, • Construction timing will be coordinated with development.
🟢 Tech. 🔴 Env. 🟡 Soc. /Cul. 🟡 Fin.	🟢 Tech. 🟡 Env. 🟢 Soc. /Cul. 🟢 Fin.
	Preferred Alternative

2.5.1.3.3 Northwest Dorchester Water Servicing

Available fire flow to existing Northwest Dorchester industrial area is insufficient. Upgrades to the trunk watermain servicing Northwest Dorchester are required to improve fire flows to the existing area. As this project is primarily benefit-to-existing, it is anticipated that the project can be completed as part of the Municipality's SOGR watermain replacement program.

Alternative alignments for the Northwest Dorchester Water Servicing upgrades are shown in **Figure 2-14**.

The advantages, disadvantages and upgrades, costs and timing are summarized in **Table 2-18**.

Northwest Dorchester Watermain Upgrade Alternative 1

Dorchester Elevated Tank

Proposed Watermain (Master Plan Project)

Northwest Dorchester Watermain Upgrade Alternative 2

Dorchester Elevated Tank

Proposed Watermain (Master Plan Project)

0 1 Kilometers

Municipality of Thames Centre

2018 Water and Wastewater Master Plan Update

Water Network

- Elevated Tank
- Water Treatment Plant
- Existing Watermain (≤ 150 mm)
- Existing Watermain (200 - 300 mm)
- Proposed Watermain (Development Conceptual Plan)

General Features

- Highway
- Arterial Road
- Growth Areas
- Settlement Boundary
- Property Parcel

Landuse

- RESIDENTIAL
- NEIGHBOURHOOD COMMERCIAL
- GENERAL COMMERCIAL
- HIGHWAY COMMERCIAL
- SETTLEMENT INDUSTRIAL
- INSTITUTIONAL
- RECREATIONAL
- PROTECTION AREA
- NATURAL AREA
- PARKS & OPEN SPACE
- ENVIRONMENTAL AREA
- CORE AREAS
- URBAN SETTLEMENT AREA BOUNDARY

Figure 2-14

Northwest Dorchester WM Upgrades Alternative Alignments

BluePlan Engineering

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Table 2-18: Comparison of Servicing Alternatives for Northwest Dorchester Watermain Upgrades

Northwest Dorchester Watermain Upgrade Alternative 1 Watermain Upgrades along Catherine Street	Northwest Dorchester Watermain Upgrade Alternative 2 Watermain Upgrades along Marion Street
• Longer watermain section through built up municipal road; • Recently installed (existing) watermain crossing of railway at Shaw Road can be utilized; • Project can be coordinated with SOGR watermain replacement program – upgrade when existing watermain has reached the end of its service life; and, • Cost-efficient if combined with SOGR watermain replacement program - with no additional disruption to residents.	• Shorter section along less built-up road; and, • Existing watermain is newer than watermain along Catherine Street – if upgrade is aligned with SOGR watermain replacement program, then upgrade is postponed further into future.
● Tech. ● Env. ● Soc. /Cul. ● Fin.	● Tech. ● Env. ● Soc. /Cul. ● Fin.
Preferred Alternative	

2.5.1.4 401 Corridor Lands

Development of the 401 Corridor Lands will require an extension of the watermain from the Dorchester system or connection to the Lake Huron & Elgin Area Primary Water Supply Systems feed to Dorchester. Development of the 401 Corridor Lands will add to the future supply demand and the determination of approach to future supply expansion (additional groundwater source versus connection to the Lake Huron & Elgin Area Water Supply Systems) will influence the servicing solution for the area. As noted in **Section 2.4.1.2**, topography in the area is generally 20 metres higher than at the Dorchester WTF, and considerations need to be made for level of service to the area including provision of sufficient operating pressures and fire flows.

It is recommended that the Municipality undertake further analysis to review cost-benefits of providing water and wastewater servicing to the 401 Corridor Lands. This study can be completed in combination with the investigation into additional groundwater supply for Dorchester.

Figure 2-15 shows the future servicing concepts that are to be considered as part of the cost-benefit analysis.

Municipality of Thames Centre

Water and Wastewater Master Plan Update

HAMILTON RD

WESTCHESTER BRNE

DORCHESTER RD

HWY 401 W

HWY 401 E

Supply 401 Corridor Lands from Dorchester WTP

401 Corridor Lands Concept 1

Supply 401 Corridor Lands with Low Lift BPS

401 Corridor Lands Concept 2

Supply 401 Corridor Lands with BPS + Fire Pump

401 Corridor Lands Concept 3

Supply 401 Corridor Lands with BPS + Storage Facility

401 Corridor Lands Concept 4

0 1 Kilometers

Water Network

- Elevated Tank
- Water Treatment Plant
- Existing Watermain (≤ 150 mm)
- Existing Watermain (200 - 300 mm)
- Proposed Watermain (Development Conceptual Plan)

General Features

- Highway
- Arterial Road
- Growth Areas
- Settlement Boundary
- Property Parcel

Landuse

- RESIDENTIAL
- NEIGHBOURHOOD COMMERCIAL
- GENERAL COMMERCIAL
- HIGHWAY COMMERCIAL
- SETTLEMENT INDUSTRIAL
- INSTITUTIONAL
- RECREATIONAL
- PROTECTION AREA
- NATURAL AREA
- PARKS & OPEN SPACE
- ENVIRONMENTAL AREA
- CORE AREAS
- URBAN SETTLEMENT AREA BOUNDARY

Figure 2-15

Future Water Servicing Concepts for 401 Corridor Lands

BluePlan

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2.5.1.5 Thorndale Water Distribution System

Development in South Thorndale and Thorndale Industrial Park requires security of supply and sufficient fire flow. There is opportunity to construct a trunk watermain along the south limit of the Thorndale from the east limit to the west limit and crossing underneath the CN Rail Corridor.

Alternative alignments for the Northwest Dorchester Water Servicing upgrades are shown in **Figure 2-16**.

The advantages, disadvantages and upgrades, costs and timing are summarized in **Table 2-19**.

Thorndale Elevated Storage Tank

Thorndale Water Treatment Plant

Proposed Watermain (Master Plan Project)

Thorndale Trunk Watermain Upgrade Alternative 1

Thorndale Elevated Storage Tank

Thorndale Water Treatment Plant

Proposed Watermain (Master Plan Project)

Thorndale Trunk Watermain Upgrade Alternative 2

0 1 Kilometers

Municipality of Thames Centre

Water and Wastewater Master Plan Update

Water Network

- Elevated Tank
- Water Treatment Plant
- Existing Watermain (≤ 150 mm)
- Existing Watermain (200 - 300 mm)
- Proposed Watermain (Development Conceptual Plan)

General Features

- Highway
- Arterial Road
- Growth Areas
- Settlement Boundary
- Property Parcel

Landuse

- RESIDENTIAL
- MOBILE HOME PARK
- GENERAL COMMERCIAL
- SETTLEMENT INDUSTRIAL
- PROTECTION AREA
- PARKS & OPEN SPACE
- ENVIRONMENTAL AREA
- URBAN SETTLEMENT AREA BOUNDARY

Figure 2-16

Thorndale Trunk Watermain Upgrades Alternative Alignments

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Table 2-19: Comparison of Servicing Alternatives for Thorndale Trunk Watermain Upgrades

Thorndale Trunk Watermain Upgrade Alternative 1 New Watermain Through South Thorndale	**Thorndale Trunk Watermain Upgrade Alternative 2** Watermain Upgrades along King Street and Thorndale Road
• Oversizing of watermains can be installed during watermain construction for area developments; • Improves system resiliency with additional feed to west Thorndale; and, • Construction through greenfield areas will lessen costs and disruption to residents.	• Shorter section along built-up road, temporary water bypasses may be required; • Construction of watermain crossing railway will be more expensive through built-up area of King Street; and, • Does not provide system resiliency; retains only the single crossing of railway and creek.
🟢 **Tech.** 🟡 **Env.** 🟢 **Soc. /Cul.** 🟢 **Fin.**	🟡 **Tech.** 🟢 **Env.** 🟡 **Soc. /Cul.** 🟡 **Fin.**
Preferred Alternative	

2.5.2 Preferred Water Servicing Strategy

The recommended water servicing strategy can be broken down into various components that have different aims but each contributing to the overall improvement of the existing system and service the projected buildout growth.

2.5.2.1 Dorchester

The preferred servicing strategy was developed to ensure that extension of the water distribution system is supportive of the existing servicing strategy and follows an integrated approach with the Municipality's development plans and progress as well as the SOGR program.

In general, the preferred water servicing strategy for Dorchester consists of:

- Maximizing supply availability at the Dorchester WTF while exploration of additional groundwater supply to service Dorchester is progressed;
- Ultimately achieving an additional groundwater supply to service Dorchester to buildout by completing the required investigation, study, testing and monitoring in order to determine the availability;
- Upgrading the Dorchester WTF facilities to utilize the 2 x 2,500m^3 in-ground reservoirs for system storage;
- Upgrading the Dorchester Road 300m diameter "spine" watermain in order to efficiently convey water from the WTF and the ET to the distribution system;

- Extending watermains to service development in southwest Dorchester, north Dorchester (north of Thames River) and southeast Dorchester;
- Aligning the intensification strategy with the ongoing SOGR projects to improve fire flows in Northwest Dorchester; and,
- Cost-benefit analysis required for 401 Corridor Lands to determine viability of providing sufficient operating pressures and available fire flows.

Key capital projects required to achieve this strategy include:

- Commencement of investigation to determine availability of additional groundwater supply;
- Upgrades and maintenance at Dorchester WTF to best utilize existing in-ground reservoirs for storage to supplement PHD;
- Upgrade of aging and undersized watermain along Dorchester Road to 300mm diameter PVC; and,
- New 300mm diameter watermain to service developments in southwest Dorchester, primarily along proposed internal road alignments.

2.5.2.2 Thorndale

The preferred water servicing strategy for Thorndale consists of:

- Upgrades at the Thorndale WTF to draw the upgraded PTTW amount of 22 L/s;
- Ultimately achieving an additional groundwater supply to service Thorndale to buildout by completing the required investigation, study, testing and monitoring in order to determine the availability;
- Twinning the 451m^3 in-ground reservoir at the Thorndale WTF to upgrade system storage to service growth to buildout;
- Installing a 300mm diameter watermain along the south limit of Thorndale from the east limit to the west limit of the Settlement Boundary; and,
- Provide additional looping to the Harrison Street area to improve fire flows when additional infrastructure is required in the area to service growth – potentially when Peripheral Lands are developed.

Key capital projects required to achieve this strategy includes:

- Upgrades at the Thorndale WTF to draw the upgraded PTTW amount of 22 L/s; and,
- 3.7 km of 300mm diameter watermain along the south limit of Thorndale from the east limit to the west limit of the Settlement Boundary.

In addition to the key capital projects, several other projects and upgrades are included within the water servicing strategy to address existing and future capacity needs within the collection system. The complete Preferred Water Strategy for the Municipality of Thames Centre is presented in **Figure 2-17** and **Figure 2-18.** Each capital project is listed along with its respective estimated capital cost in **Table 2-20.**

The Master Plan recommends that a separate study be carried out to evaluate the potential for municipal water and wastewater services for the 401 Corridor Lands.

Municipality of Thames Centre

Water and Wastewater Master Plan Update

Dorchester Elevated Tank

Dorchester Water Treatment Plant

W-D-WM-16
W-D-WM-06
W-D-WM-05
W-D-WM-15
W-D-WM-14
W-D-WM-03
W-D-WM-04
W-D-WM-12
W-D-WM-02
W-D-WM-13
W-D-WM-18
W-D-WM-11
W-D-WM-10-Alt2
W-D-WM-10-Alt1
W-D-WM-09-Alt2
W-D-WM-09-Alt1
W-D-WM-08-Alt2
W-D-WM-01
W-D-WM-08-Alt1
W-D-WM-07
W-D-WM-17

SHAW RD
HAMILTON RD
BRIDGE ST
MAIN ST
CATHERINE ST
ELGIN RD
DORCHESTER RD

0 1 Kilometers

Proposed Water Network

- Capital Program - Benefit to Existing System
- Capital Program - New Watermain
- Capital Program - Upgrade Watermain
- Future Local Watermain

Existing Water Network

- Elevated Tank
- Water Treatment Plant
- Existing Watermain (≤ 150 mm)
- Existing Watermain (200 - 300 mm)

General Features

- Highway
- Arterial Road
- Growth Areas
- Settlement Boundary
- Property Parcel
- Waterbody

Figure 2-17

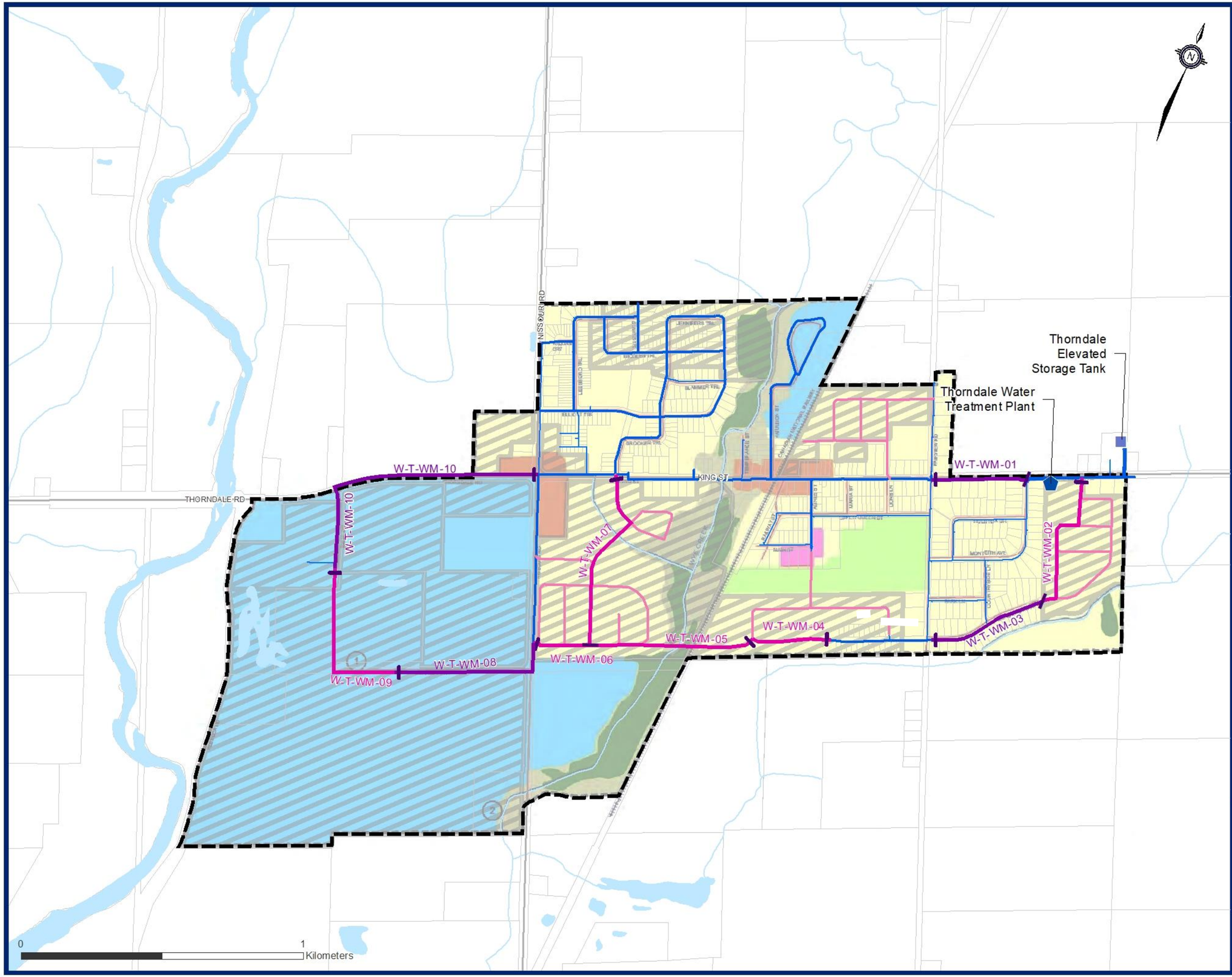
Preferred Dorchester Water Servicing Strategy

BluePlan Engineering

September 2019
418109-G-007
NAD 1983 UTM Zone 17N

Municipality of Thames Centre

Water and Wastewater Master Plan Update



Proposed Water Network

- Capital Program - New Watermain
- Capital Program - Upgrade Watermain
- Future Local Watermain

Existing Water Network

- Elevated Tank
- Water Treatment Plant
- Existing Watermain (≤ 150 mm)
- Existing Watermain (200 - 300 mm)

General Features

- Highway
- Arterial Road
- Growth Areas
- Settlement Boundary
- Property Parcel
- Waterbody

Figure 2-18

Preferred Thorndale Water Servicing Strategy

BluePlan Engineering

September 2019
418109-W-007
NAD 1983 UTM Zone 17N

2.6 Capital Program

As described in the previous sections, the Preferred Water Servicing Strategy has been developed to support the servicing needs of the existing and future growth areas within the Municipality of Thames Centre to buildout. The capital costs for each project of the Preferred Strategy were estimated according to the costing methodology within **Section 2.1.4**. These projects are listed according to their project number and are shown in **Table 2-20**. The capital program table contains project descriptions, dimensions, proposed timing, and estimated total project cost. Detailed project sheets are included in **Appendix D**.

The water capital program will work as a foundation for the Municipality of Thames Centre's Capital Budget. The capital program provides a list and timing of new assets that the Municipality will have to operate and maintain; and therefore, it is the starting point for the planning of operation and maintenance costs and resources allocation for new water infrastructure.

2.6.1 Implementation Plan

As outlined in **Section 1.3** of this report, the Water and Wastewater Master Plan sets out to satisfy the Class EA Master Plan Approach 1 requirements according to the MEA Class EA document. The Preferred Water Servicing Strategy will support the servicing needs of the Municipality of Thames Centre's future growth to buildout. This strategy will be implemented in accordance with each project Class EA schedule.

The Class EA requirements for each project have been identified in the Capital Program. Schedule A and A+ projects may move forward to design and construction, with A+ projects requiring public notification prior to implementation. Schedule B or equivalent projects that have been identified within the Preferred Water Servicing Strategy will be part of a developer-led local servicing plan and approved through the Planning Act Municipal development review process or will be satisfied through separate Class EA study prior to design and construction. The Preferred Water Strategy did not identify any Schedule C projects.

Further, any future Water EA project in the Municipality of Thames Centre should include the results of other Class EAs projects where applicable.

During the next steps of the implementation program, primarily during detailed design of the projects, the following requirements should be considered:

- Finalization of property requirements;
- Refinement of infrastructure alignment;
- Identification of preferred construction methodologies;
- Completion of additional supporting investigations as required (e.g. geotechnical, hydrogeological, etc.);

- Review and mitigation of potential construction related impacts; and,
- Satisfying of all provincial, municipal and conservation authority approval requirements.

With respect to the Municipality's planning and budgeting, this program will be utilized as a high-level baseline estimate for the Municipality's capital budget. These costs will be further developed and refined during the implementation phases as detailed information becomes available.

The anticipated timing of each project within the Preferred Strategy has been established based on the projected population and employment growth within the Municipality of Thames Centre. The water program's project scheduling has also been cross-referenced with the wastewater program to ensure project coordination along common alignments.

Given the growth-related nature of the servicing strategies, the water capital program forms the foundation for the water component of the Municipality of Thames Centre's Development Charges (DC) By-Law.

Table 2-20: Water Capital Program

Capital Program ID	Name	Description	Serviced Development Blocks	Upgrade Trigger	Upgrade Trigger (Population Growth)	Class EA Schedule	Project Type	Length (m)	Method 1		Method 2		Method 3		Size/Capacity	Capital Program Total Component Estimated Cost (Excl. HST)
									Size/Capacity	Total Component Estimated Cost (Excl. HST)	Size/Capacity	Total Component Estimated Cost (Excl. HST)	Size/Capacity	Total Component Estimated Cost (Excl. HST)		
W-D-SUP-01	Maximize Dorchester WTF Supply	Maximize Well Capacity at Existing WTF	All Dorchester Developments	Existing Need	Today	A	Treatment	0 m	20 L/s	$ 1,067,000	20 L/s	$ 1,067,000	20 L/s	$ 1,067,000	20 L/s	$ 1,067,000
W-D-SUP-02	New Dorchester Groundwater Supply	Includes cost of new Dorchester groundwater supply and consolidation of sources at Dorchester WTF for treatment. Includes new well houses, raw watermains, and treatment. Excludes pump capacity upgrades cost to the Dorchester WTF High Lift Pumps	All Dorchester Developments	Accumulated growth	80% Trigger of 2,800 PPJ (Persons + Jobs) = 2,200 PPJ	C	Treatment	0 m	0 L/s	$ 10,000,000	0 L/s	$ 10,000,000	0 L/s	$ 10,000,000	0 L/s	$ 10,000,000
W-D-BPS-01	Dorchester HLP Upgrades	Upgrade Dorchester HLPs to supply elevated tank and distribution system from reservoirs	All Dorchester Existing + Development	Accumulated Growth or State of Good Repair (SOGR)	80% Trigger of 8,000 PPJ = 6,400 PPJ	A	Pumping	0 m	90 L/s	$ 1,067,000	90 L/s	$ 1,067,000	90 L/s	$ 1,067,000	90 L/s	$ 1,067,000
W-D-WM-01	Dorchester Watermain - Spine Trunk Upgrade on Dorchester Rd. (South of Byron Ave.)	450m of existing 250mm DI watermain (built in 1976) to be replaced by 300mm PVC watermain	All Dorchester Developments	Accumulated Growth	North Dorchester Development	A+	Watermain	450 m	300 mm	$ 931,000	300 mm	$ 931,000	300 mm	$ 931,000	300 mm	$ 931,000
W-D-WM-02	Dorchester Watermain - Spine Trunk Upgrade on Dorchester Rd. (River Bank)	190m of existing 250mm DI watermain (built in 1976 - 1987) to be replaced by 300mm PVC watermain	All Dorchester Developments	Accumulated Growth	North Dorchester Development	A+	Watermain	190 m	300 mm	$ 403,000	300 mm	$ 403,000	300 mm	$ 403,000	300 mm	$ 403,000
W-D-WM-03	Dorchester Watermain - Spine Trunk Upgrade on Catherine St. and Minnie Rd. (North Section)	390m of existing 250mm DI and PVC watermain (built in 1990 - 1992) to be replaced by 300mm PVC watermain following Catherine St. + Minnie St. alignment	All Dorchester Developments	Accumulated Growth	North Dorchester Development	A+	Watermain	390 m	300 mm	$ 1,345,000	300 mm	$ 1,345,000	300 mm	$ 1,345,000	300 mm	$ 1,345,000
W-D-WM-04	Dorchester Watermain - North St. Upgrade	360m of existing 150mm CI watermain (built in 1956) on North Street and Minnie Street to be replaced by 200mm PVC watermain.	All Dorchester Developments	Dorchester Development Block 14	With new development	A+	Watermain	360 m	200 mm	$ 628,000	200 mm	$ 628,000	200 mm	$ 628,000	200 mm	$ 628,000
W-D-WM-05	Dorchester Watermain - Northeast Loop	Total of 710m of proposed PVC watermain on North Street and Village Gate Dr. to complete loop, including 590m of 200mm proposed PVC watermain on North St. and 130m of 150mm proposed PVC watermain on Village Gate Dr.	All Dorchester Developments	Dorchester Development Blocks 9, 10, 11 and 12	With new development	A	Watermain	590 m	200 mm	$ 1,023,000	200 mm	$ 1,023,000	200 mm	$ 1,023,000	200 mm	$ 1,023,000
W-D-WM-06	Dorchester Watermain - Marion St. Upgrade	Total of 320m of 200mm watermain on Marion Street, including 100m of existing 150mm PVC watermain to be replaced by 200mm PVC watermain and 220m of proposed 200mm PVC watermain.	All Dorchester Developments	Dorchester Development Blocks 9, 10, 11 and 12	With new development	A+	Watermain	320 m	200 mm	$ 555,000	200 mm	$ 555,000	200 mm	$ 555,000	200 mm	$ 555,000
W-D-WM-07	Dorchester Watermain - West Trunk at the Development 25	Newly proposed West Trunk - 660m of proposed 300mm PVC watermain at Development 25.	Dorchester Development Block 25	Dorchester Development Block 25	Construction proposed	A	Watermain	660 m	300 mm	$ 1,067,000	300 mm	$ 1,067,000	300 mm	$ 1,067,000	300 mm	$ 1,067,000
W-D-WM-08-ALT1	Dorchester Watermain - West Trunk at the Development 22	Newly proposed West Trunk - 620m of proposed 300mm PVC watermain at Development 22.	Dorchester Development Blocks 16, 17, 18, and 22	Dorchester Development Block 22	With new development	A	Watermain	620 m	300 mm	$ 1,010,000	300 mm	$ 1,010,000	300 mm	$ 1,010,000	300 mm	$ 1,010,000
W-D-WM-09-ALT1	Dorchester Watermain - West Trunk river crossing at Development 22.	Newly proposed West Trunk - 140m of proposed 300mm PVC watermain river crossing.	Dorchester Development Blocks 16, 17, 18, and 48	Dorchester Development Block 18 or 22	With new development	B	Watermain	140 m	300 mm	$ 356,000	300 mm	$ 356,000	300 mm	$ 356,000	300 mm	$ 356,000
W-D-WM-10-ALT1	Dorchester Watermain - West Trunk at Development 22.	Newly proposed West Trunk - 270m of proposed 300mm PVC watermain at Development 22.	Dorchester Development Blocks 16, 17, 18, and 48	Dorchester Development Block 18 or 22	With new development	A	Watermain	270 m	300 mm	$ 410,000	300 mm	$ 410,000	300 mm	$ 410,000	300 mm	$ 410,000
W-D-WM-11	Dorchester Watermain - West Trunk on Christie Dr.	Newly proposed West Trunk - Total of 980m of 300mm PVC watermain along Christie Dr. including 870m of proposed 300mm PVC watermain and 110m of existing 150mm PVC watermain to be replaced by 300mm PVC watermain	Dorchester Development Blocks 16 - 18 and 48	Dorchester Development Block 18	With new development	A	Watermain	980 m	300 mm	$ 1,718,000	300 mm	$ 1,718,000	300 mm	$ 1,718,000	300 mm	$ 1,718,000
W-D-WM-12	Dorchester Watermain - West Trunk on Harris Rd. and Hamilton Rd.	Newly proposed West Trunk - 1080m of proposed 300mm PVC watermain along Harris Rd. and Hamilton Rd.	Dorchester Development Blocks 16, 17 and 18	Dorchester Development Block 18	With new development	A	Watermain	910 m	300 mm	$ 1,638,000	300 mm	$ 1,638,000	300 mm	$ 1,638,000	300 mm	$ 1,638,000
W-D-WM-13	Dorchester Watermain - West Trunk at Mill Ct. Loop	Newly proposed West Trunk - 800m of proposed 200mm PVC watermain on Mill Ct to complete loop	Dorchester Development 18	Watermain Replacement Program	-	A+	Watermain	800 m	200 mm	$ 1,394,000	200 mm	$ 1,394,000	200 mm	$ 1,394,000	200 mm	$ 1,394,000
W-D-WM-14	Dorchester Watermain - Catherine St. East Section Upgrade	1020m of existing 250mm DI watermain (built in 1983) to be replaced by 300mm PVC watermain on Catherine St.	Existing Dorchester Development	Watermain Replacement Program	-	A+	Watermain	1020 m	300 mm	$ 2,089,000	300 mm	$ 2,089,000	300 mm	$ 2,089,000	300 mm	$ 2,089,000
W-D-WM-15	Dorchester Watermain - Catherine St. West Section Upgrade	1390m of existing 200mm PVC watermain (built in 1973 - 2013) to be replaced by 300mm PVC watermain on Catherine St.	Existing Dorchester Development	Watermain Replacement Program	-	A+	Watermain	1390 m	300 mm	$ 2,932,000	300 mm	$ 2,932,000	300 mm	$ 2,932,000	300 mm	$ 2,932,000
W-D-WM-16	Dorchester Watermain - Northwest Industrial Lands Upgrade	1260m of existing 200mm DI & PVC watermain (built in 1978 - 2013) to be replaced by 300mm PVC watermain	Existing Dorchester Development	Watermain Replacement Program	-	A+	Watermain	1260 m	300 mm	$ 2,283,000	300 mm	$ 2,283,000	300 mm	$ 2,283,000	300 mm	$ 2,283,000
W-D-WM-17	Dorchester Watermain - Hamilton Rd. Extension	350m of proposed 200mm PVC watermain along Hamilton Rd.	Dorchester Development Block 47	Dorchester Development Block 47	With new development	A+	Watermain	350 m	200 mm	$ 610,000	200 mm	$ 610,000	200 mm	$ 610,000	200 mm	$ 610,000
W-D-WM-18	Dorchester Watermain - Benefit to Existing System	370m of proposed 200mm PVC watermain along Mill Rd.	Dorchester Development Block 19	Dorchester Development Block 19	With new development	A+	Watermain	350 m	200 mm	$ 645,000	200 mm	$ 645,000	200 mm	$ 645,000	200 mm	$ 645,000
Sub-Total Dorchester Water Capital Program Projects										**$ 33,171,000**		**$ 33,171,000**		**$ 33,171,000**		**$ 33,171,000**
W-D-401-ST-01	Cost Benefit Study to Service 401 Corridor Lands	Cost-benefit study to evaluate servicing options for 401 Corridor Lands, will include recommendations for service pressures and available fire flow.	401 Corridor Lands	Development Interest	-	-	Watermain	0 m	0 L/s	$ 50,000	0 L/s	$ 50,000	0 mm	$ 50,000	0 L/s	$ 50,000
Sub-Total 401 Corridor Water Capital Program Projects										**$ 50,000**		**$ 50,000**		**$ 50,000**		**$ 50,000**

Table 2-20: Water Capital Program

Capital Program ID	Name	Description	Serviced Development Blocks	Upgrade Trigger	Upgrade Trigger (Population Growth)	Class EA Schedule	Project Type	Length (m)	Size/Capacity	Total Component Estimated Cost (Excl. HST)	Size/Capacity	Total Component Estimated Cost (Excl. HST)	Size/Capacity	Total Component Estimated Cost (Excl. HST)	Size/Capacity	Total Component Estimated Cost (Excl. HST)
W-T-SUP-01	Maximize Thorndale WTF Supply	Maximize Well Capacity at Existing WTF	All Thorndale Developments	Existing Need	Today	A	Treatment	0 m	22 L/s	$ 1,020,000	22 L/s	$ 1,020,000	22 L/s	$ 1,020,000	22 L/s	$ 1,020,000
W-T-SUP-02	New Thorndale Groundwater Supply	Includes cost of new Dorchester groundwater supply and consolidation of sources at Thorndale WTF for treatment. Includes new well houses, raw watermains, and treatment. Excludes pump capacity upgrades cost to the Thorndale WTF High Lift Pumps	All Thorndale Developments	Accumulated growth	80% x 2,600 PPJ = 2,000 PPJ (after planned upgrade to 22 L/s)	C	Treatment	0 m	0 L/s	$ 10,000,000	0 L/s	$ 10,000,000	0 L/s	$ 10,000,000	0 L/s	$ 10,000,000
W-T-RES-01	Thorndale Reservoir Upgrade	Twinning the existing 0.451 ML reservoir and 0.363 ML reservoir	All Thorndale Developments	Accumulated growth	80% x 5,800 PPJ = 4,600 PPJ	A	Storage	0 m	0 ML	$ 753,000	0 ML	$ 753,000	0 ML	$ 753,000	0 ML	$ 753,000
W-T-BPS-01	Thorndale HLP Upgrades	Upgrade Thorndale HLP to supply elevated tank and distribution system from reservoirs	All Thorndale Developments	Existing Need	Today	A	Pumping	0 m	20 ML	$ 1,020,000	20 ML	$ 1,020,000	20 ML	$ 1,020,000	20 ML	$ 1,020,000
W-T-WM-01	Thorndale Watermain - Thorndale Rd. Upgrade	350m of existing PVC watermain on Thorndale Rd. (built in 1987) to be replaced by 300mm PVC watermain	All Thorndale Development Blocks	Existing Need	Today	A+	Watermain	350 m	300 mm	$ 818,000	300 mm	$ 818,000	300 mm	$ 818,000	300 mm	$ 818,000
W-T-WM-02	Thorndale Watermain - South Trunk at Monteith Lands	540m of proposed 300mm PVC watermain at Monteith Lands to complete south trunk.	Thorndale Development Blocks 1, 2, 3, 4, 8, 9 and 13	Thorndale Development Block 13	With new development	A	Watermain	540 m	300 mm	$ 898,000	300 mm	$ 898,000	300 mm	$ 898,000	300 mm	$ 898,000
W-T-WM-03	Thorndale Watermain - South Trunk Meadowbrook Ln. Upgrade	440m of existing 150mm PVC watermain on Meadowbrook Ln.(built in 1990) to be replaced by 300mm PVC watermain	Thorndale Development Blocks 1, 2, 3, 4, 8, 9 and 13	Thorndale Development Block 8, (Phase 2) or 13	With new development	A+	Watermain	440 m	300 mm	$ 794,000	300 mm	$ 794,000	300 mm	$ 794,000	300 mm	$ 794,000
W-T-WM-04	Thorndale Watermain - South Trunk at Foxborough Subdivision	280m of proposed 300mm PVC watermain at Foxborough Subdivision to complete south trunk.	Thorndale Development Blocks 1, 2, 3, 4, 8, 9 and 13	Thorndale Development Block 9	Proposed construction	A	Watermain	280 m	300 mm	$ 387,000	300 mm	$ 387,000	300 mm	$ 387,000	300 mm	$ 387,000
W-T-WM-05	Thorndale Watermain - South Trunk at Railway Crossing	410m of proposed 300mm PVC watermain at railway crossing to complete south trunk (includes directional drilling)	Thorndale Development Blocks 1, 2, 3, 4, 8, 9 and 13	Thorndale Development Block 8	With new development	A+	Watermain	410 m	300 mm	$ 1,809,000	300 mm	$ 1,809,000	300 mm	$ 1,809,000	300 mm	$ 1,809,000
W-T-WM-06	Thorndale Watermain - South Trunk at Rosewood Subdivision	390m of proposed 300mm PVC watermain at Rosewood Subdivision to complete south trunk.	Thorndale Development Blocks 1, 2, 3, 4, 8, 9 and 13	Thorndale Development Block 8 (Phase 2)	With new development	A	Watermain	390 m	300 mm	$ 540,000	300 mm	$ 540,000	300 mm	$ 540,000	300 mm	$ 540,000
W-T-WM-07	Thorndale Watermain - Subtrunk at Rosewood	680m of proposed 300mm PVC watermain at Rosewood Subdivision.	Thorndale Development Blocks 1, 2, 3, 4, 8, 9 and 13	Thorndale Development Block 8	Proposed construction	A	Watermain	680 m	300 mm	$ 984,000	300 mm	$ 984,000	300 mm	$ 984,000	300 mm	$ 984,000
W-T-WM-08	Thorndale Watermain Upgrade - Gerald Pkwy. Upgrade	590m of existing 200mm PVC watermain (built in 2010) on Gerald Pkwy. to be replaced by 300mm PVC watermain.	Thorndale Development Blocks 1, 2, 3, and 4	Thorndale Development Block 1, 2 or 3	With new development	A+	Watermain	590 m	300 mm	$ 1,044,000	300 mm	$ 1,044,000	300 mm	$ 1,044,000	300 mm	$ 1,044,000
W-T-WM-09	Thorndale Watermain Upgrade - Industrial Lands Loop	590m of 300mm watermain to connect Ideal Dr. and Gerald Pkwy. to complete loop	Thorndale Development Blocks 1, 2, 3, and 4	Thorndale Development Block 1, 2 or 3	With new development	A+	Watermain	1000 m	300 mm	$ 1,031,000	300 mm	$ 1,031,000	300 mm	$ 1,031,000	300 mm	$ 1,031,000
W-T-WM-10	Thorndale Watermain Upgrade - Industrial Lands Upgrade	1020m of existing 200mm PVC watermain (built in 2010) on Thorndale Rd. and Ideal Dr. to be replaced by 300mm PVC watermain.	Thorndale Development Blocks 1, 2, 3 and 4	Thorndale Development Block 1, 2 or 3	With new development	A+	Watermain	1020 m	300 mm	$ 1,798,000	300 mm	$ 1,798,000	300 mm	$ 1,798,000	300 mm	$ 1,798,000
Sub-Total Thorndale Water Capital Program Projects										**$ 22,896,000**		**$ 22,896,000**		**$ 22,896,000**		**$ 22,896,000**
Total Municipality of Thames Centre Water Capital Program										**$ 56,117,000**		**$ 56,117,000**		**$ 56,117,000**		**$ 56,117,000**

3 Wastewater Master Plan

The *Wastewater Master Plan* provides an overall review of the wastewater policies and criteria, existing wastewater collection system, technical analysis, and development of the preferred wastewater servicing strategy for the Municipality of Thames Centre.

This section has been organized as described below:

3.1 Wastewater System Policy and Criteria

3.2 Existing Wastewater Collection Systems

3.3 Wastewater Hydraulic Model

3.4 Assessment of Existing and Future Wastewater Infrastructure

3.5 Wastewater Servicing Strategy

This section is one of five sections that make up the complete Master Plan Class EA Study Report and should be read in conjunction with the other sections.

3.1 Wastewater System Policy and Criteria

Wastewater policies, design criteria and level of service requirements were updated as part of this Master Plan to provide guidelines and direction to the master planning process and to ensure that wastewater flows were accurate to support the decision making for the sizing and timing of future infrastructure such as pipes and facilities. Development of the Municipality's wastewater policies and design criteria is documented in **Appendix B**.

3.1.1 Wastewater Servicing Principles and Policies

Specific servicing principles and policies have been developed to guide and provide direction for the development of wastewater servicing strategies. In general, the Municipality of Thames Centre is looking to build and maintain efficient, reliable, sustainable and well managed wastewater systems that provide high level of service to the public.

3.1.2 Wastewater Design Criteria

A guiding principle of design criteria is to ensure that the flow projections are adequately predicted with an appropriate factor of safety and risk management. This overall principle also ensures that infrastructure has sufficient capacity to meet the growing needs of the Municipality and does not impede the approved/planned growth.

The wastewater flow criteria updated as part of the Municipality of Thames Centre Water and Wastewater Master Plan are summarized in **Table 3-1**.

Table 3-1: Wastewater Flow Criteria

Wastewater Flow Projection Methodology	
• Use existing flows for Baseline • Existing flows based on flow monitoring data • Growth flows applied to the Baseline using design criteria	
Wastewater Flow Criteria for Growth	
Parameter	**Design Criteria**
Average Dry Weather Flow (ADWF)	350 L/cap/d
Inflow & Infiltration Allowance	0.2 L/s/ha to 0.4 L/s/ha (based on Level of Service criteria)
Wastewater System Criteria	
• Sizing treatment facilities for Average Day Flows (ADF) • Sizing of trunk sewers, pumping stations and collection system for Peak Wet Weather Flow (PWWF) • Sewage pumping stations firm capacity based on largest pump out of service	

3.1.3 Wastewater Level of Service

Many municipalities use a range of level of service (LOS) requirements to identify when the sanitary system is no longer performing as designed. These level of service requirements can range from depth and flow in the sanitary sewer network, to depth of Hydraulic Grade Line (HGL) to ground level, among others. With regards to LOS, industry standards are adapting to factors such as growth and climate change. Standard surcharge state (d/D) analysis and basement flooding analysis are still suitable for high level assessments such as Master Planning, but more detail is recommended when reviewing the infrastructure to schedule planned improvements to the sanitary network. The Municipality of Thames Centre Master Plan Level of Service Requirements are as follows:

Sewer Capacity

Existing and proposed sewers are to be less than 100% full based on infiltration allowance of 0.2 L/s/ha.

Basement Flooding Risk

Existing and proposed sewers hydraulic grade line (HGL) is to be more than 1.8 m below grade based on an infiltration allowance of 0.6 L/s/ha.

3.1.4 Flow Projection

The population and employment projections outlined in **Section 1.10.1** and the design criteria within **Section 1.11** were utilized to calculate the average dry weather flow projections (ADWF).

Table 3-2 summarizes Dorchester flows at buildout under the alternative growth projection methods, including and not including the Peripheral Lands and 401 Corridor Lands.

Table 3-2: Dorchester Wastewater Flow Projections

Growth Scenario	Existing Treatment Capacity	Planned Future Treatment Capacity	Average Dry Weather Flow (ADWF) (L/s)		Ultimate Treatment Capacity/(Deficit) (L/s)	
			Within Dorchester Settlement Boundary Only	Including Peripheral Lands and 401 Corridor	Within Dorchester Settlement Boundary Only	Including Peripheral Lands and 401 Corridor
Existing (2018)	6.0	13.9	3.0	-	10.9	10.9
Method 1			28.2	30.3	(14.3)	(16.4)
Method 2			42.1	45.5	(28.2)	(31.6)
Method 3			42.1	87.2	(28.2)	(73.3)

Table 3-3 summarizes Thorndale flows at buildout under the alternative growth projection methods, including and not including the Peripheral Lands.

Table 3-3: Thorndale Wastewater Flow Projections

Growth Scenario	Existing Treatment Capacity (L/s)	Planned Future Treatment Capacity (L/s)	Average Dry Weather Flow (ADWF) (L/s)		Ultimate Treatment Capacity/(Deficit) (L/s)	
			Within Settlement Boundary Only	Including Peripheral Lands	Within Settlement Boundary Only	Including Peripheral Lands
Existing (2018)	7.8	15.0	2.1	2.1	12.9	12.9
Method 1			8.9	9.7	6.1	5.3
Method 2			16.7	17.5	(1.7)	(2.5)
Method 3			16.7	32.4	(1.7)	(17.4)

3.1.5 Capital Cost Estimates

A capital cost is provided for all projects proposed as part of this Master Plan. For the majority of the wastewater system projects, a base construction cost was obtained using either a unit rate construction cost, based on pipe diameter, or unique project analysis. The base construction cost considers several factors specific to each project such as creek crossings, railway and highway crossings, tunneling requirements, and location of construction (Greenfield, urban, suburban). Design, administration, contingency, and non-recoverable HST costs were added to arrive at a final project cost. Detailed costing sheets were developed to support the financial evaluation for each capital project. The final project costs are provided in the Capital Program, **Section 3.6**.

3.2 Existing Wastewater Collection Systems

The Municipality of Thames Centre is responsible for the entire wastewater collection and treatment system in the communities of Dorchester and Thorndale.

The existing wastewater system within Dorchester is limited to south of the Thames River. Flows are conveyed to the Dorchester Sewage Pumping Station, located on Turnberry Drive in southeast Dorchester. Flows are pumped to the Dorchester Wastewater Treatment Facility (WWTF), which is located south of the Dorchester fairgrounds.

There are existing properties throughout south Dorchester, as well as all properties in North Dorchester that remain serviced by private sewage disposal systems. It is estimated that the existing serviced population within Dorchester is 1915 persons.

The Dorchester municipal wastewater system consists of the Dorchester WWTF, the Dorchester SPS and forcemain and 7,425 km of sanitary sewers, ranging in size from 200mm to 600mm. Construction of a second pumping station (Dorchester #3 SPS) commenced in 2018 to service growth in southeast Dorchester.

A map of the Dorchester Wastewater Collection System including catchment areas and the location of the facilities is shown in **Figure 3-1**.

The existing wastewater system within Thorndale services nearly all of the properties located within the Thorndale Settlement Boundary. Flows are conveyed to the Thorndale Sewage Pumping Station (SPS) and Wastewater Treatment Facility (WWTF), located in west Thorndale within the industrial park area.

The Thorndale municipal wastewater system is comprised of the Thorndale WWTF and Thorndale SPS and 11,490 km of sanitary sewers, ranging in size from 200mm to 450mm.

A map of the Thorndale Wastewater Collection System and the location of the facilities is shown in **Figure 3-2**.

Municipality of Thames Centre

Water and Wastewater Master Plan Update

Wastewater Facilities

Type

- Pumping Station
- Wastewater Treatment Plant

Existing Sanitary Main

DIAMETER

- 200
- 201 - 250
- 251 - 450
- 451 - 600
- 601 - 900
- Existing Forcemain

Landuse

- RESIDENTIAL
- NEIGHBOURHOOD COMMERCIAL
- GENERAL COMMERCIAL
- HIGHWAY COMMERCIAL
- SETTLEMENT INDUSTRIAL
- INSTITUTIONAL
- RECREATIONAL
- PROTECTION AREA
- NATURAL AREA
- PARKS & OPEN SPACE
- ENVIRONMENTAL AREA
- CORE AREAS
- URBAN SETTLEMENT AREA BOUNDARY

Pumping Station

Pumping Station

Wastewater Treatment Plant

HAMILTON RD

CATHERINE ST

DORCHESTER RD

SHAWARD

BRIDGE ST

JANE ST

ELGIN RD

HWY 401 E

HWY 401 W

0 1 Kilometers

Figure 3-1

Dorchester Existing Wastewater System

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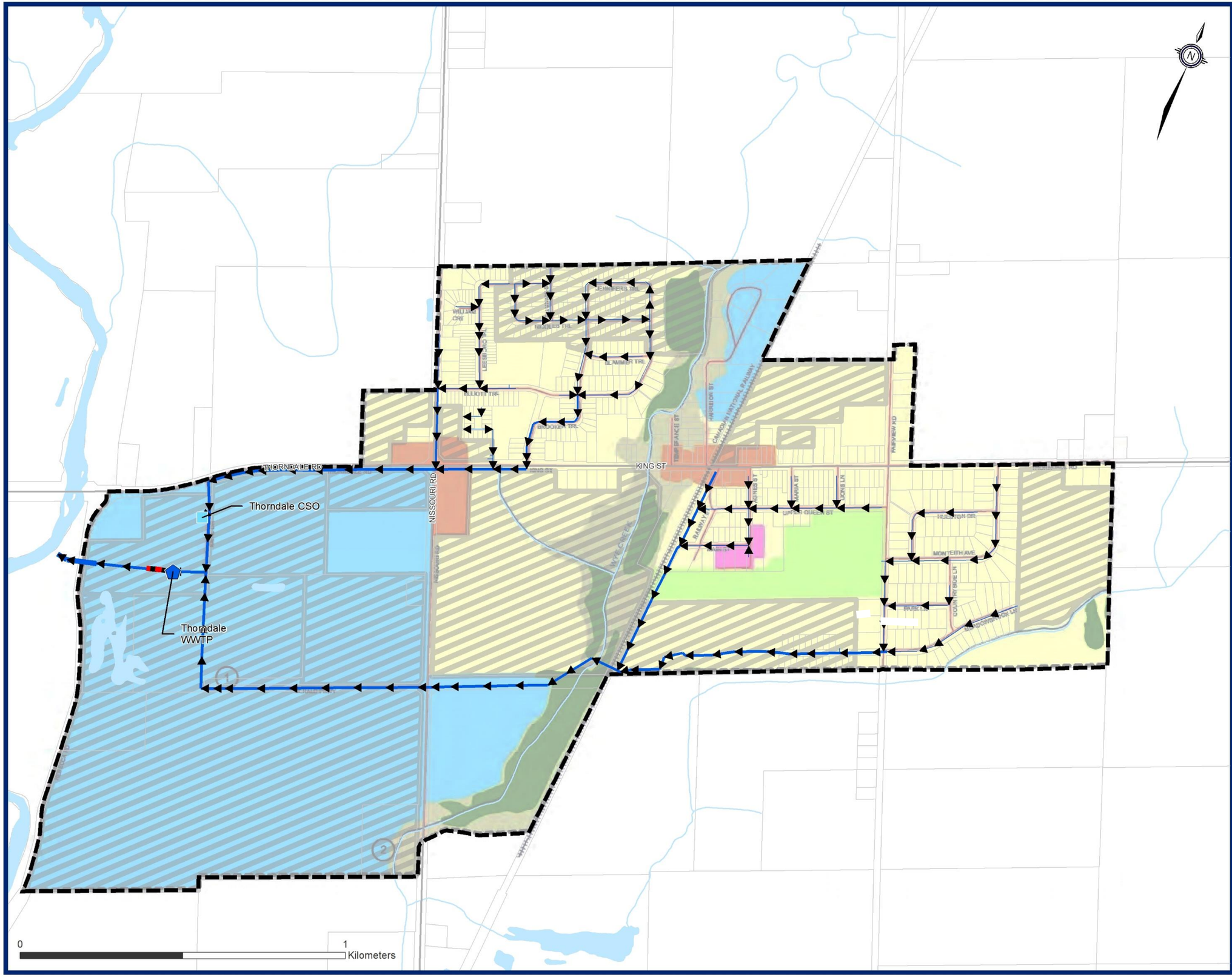
Municipality of Thames Centre

Water and Wastewater Master Plan Update



Wastewater Facility

Type

- CSO
- WWTP

Existing Sanitary Main

DIAMETER

- 200
- 201 - 250
- 251 - 450
- 451 - 600
- 601 - 900
- Forcemain

Landuse

- RESIDENTIAL
- MOBILE HOME PARK
- GENERAL COMMERCIAL
- SETTLEMENT INDUSTRIAL
- PROTECTION AREA
- PARKS & OPEN SPACE
- ENVIRONMENTAL AREA
- URBAN SETTLEMENT AREA BOUNDARY

Figure 3-2

Thorndale Land Use Map

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3.2.1 Dorchester Wastewater Collection System

The Dorchester municipal wastewater collection system consists of small local sewers, approximately 5,500 km total sewer length, which connect to larger sewers conveying flows generally in a southeasterly direction to the Dorchester SPS, which discharges flows to the Dorchester WWTF. The Dorchester #3 SPS, currently under construction, will service southeast Dorchester and discharge to sewers along Hamilton Road, upstream of the Dorchester SPS.

3.2.1.1 Dorchester Wastewater Treatment Facility

The existing Dorchester WWTF was constructed in 2000, and the plant was initially rated for 520 m^3/d. The long-term plan was established to expand the WWTF to an ultimate capacity of 6,000 m^3/d, as indicated in the original Certificate of Approval (CofA) issued in June 1999, which was later amended in November 2000 for approval for the first-phase capacity of 520 m^3/d.

A Schedule C Class Environmental Assessment (Class EA) was completed in November 2016 to meet the future growth needs of the community. The Class EA recommended increasing the plant to a capacity of 1,200 m^3/d via the following expansion works:

- Addition of two Sequencing Batch Reactor (SBR) tanks and SBR equipment;
- Construction of new Filter Building with disk filters; and
- Expansion of UV structure and equipment.

The expansion was planned to be completed in two phases under separate tenders – with Phase 1A achieving 900 m^3/d and Phase 1B achieving 1,200 m^3/d. Phase 1A commenced construction in 2018. Phase 1B is scheduled for construction in 2022.

Table 3-4 summarizes the treatment capacity and utilization at the Dorchester WWTF.

Table 3-4: 2017 Wastewater Treatment Capacity and Utilization – Dorchester

Average Daily Flow Rated Capacity (m^3/d)	2017 Average Daily Flow (m^3/d)	Percentage of Rated Capacity (%)
520	291	56%

Source: Dorchester WWTF Data

3.2.1.2 Dorchester Wastewater Pumping Facilities

Table 3-5 summarizes the pumping capacity at the Dorchester wastewater pumping stations.

Table 3-5: Dorchester Wastewater Pumping Stations Capacity

Sewage Pumping Station	No. of Pumps	Installed Firm Capacity	Ultimate Firm Capacity	Forcemain
Dorchester SPS	Installed: 2 (1 Duty, 1 Standby) Future: 3 Total (2 Duty, 1 Standby)	20.7 L/s (Each Pump at 20.7 L/s)	41.4 L/s (2 x 20.7 L/s)	1 x 200mm
Dorchester #3 SPS	3 (2 Duty, 1 Standby)	33 L/s	66 L/s	2 x 150mm

3.2.2 Thorndale Wastewater Collection System

The Dorchester municipal wastewater collection system consists of small local sewers, approximately 7 km total sewer length, which connect to larger sewers conveying flows generally in a southwesterly direction to the Thorndale WWTF. Existing properties fronting on King Street located east of Wye Creek and properties located in the Harrison Street area are not serviced by municipal sewers.

3.2.2.1 Thorndale Wastewater Treatment Facility

The existing Thorndale WWTF was constructed in 2012 at a rating of 674 m^3/d.

A Schedule C Class Environmental Assessment was competed in 2009, establishing a long-term plan for the Thorndale WWTF. Stage 2 construction will increase the plant capacity from 674 m^3/d to 1,018 m3/d and Stage 3 construction will increase the plant flows to 1,295 m^3/d.

The Thorndale WWTF utilizes Sequencing Batch Reactor (SBR) technology, complete with headworks process area and Aerated Sludge Holding Tanks (ASHT). All flows to the SBR are directed to the headworks by a Raw Sewage Pumping Station.

Table 3-6 summarizes the treatment capacity and utilization at the Thorndale WWTF.

Table 3-6: 2017 Wastewater Treatment Capacity and Utilization – Thorndale

Average Daily Flow Rated Capacity (m^3/d)	2017 Average Daily Flow (m^3/d)	Percentage of Rated Capacity (%)
200	674	30%

Source: Thorndale WWTF Flow Data Records

3.2.2.2 Thorndale Wastewater Pumping Facility

The Thorndale SPS is located at the Thorndale WWTF. **Table 3-7** summarizes the pumping capacity at the Thorndale Sewage Pumping Station

Table 3-7: Thorndale Wastewater Pumping Station Capacity

Sewage Pumping Station	No. of Pumps	Installed Capacity	Ultimate Capacity	Forcemain
Thorndale SPS	3 (2 Duty, 1 Standby)	56.4 L/s (2 x 28.2 L/s)	56.4 L/s	1 x 150mm

3.3 Wastewater Hydraulic Model

Analysis of the existing and future wastewater collection system within the Municipality of Thames Centre was undertaken using a wastewater hydraulic model. As part of this Master Plan, a new all-pipe wastewater hydraulic model was built specifically for the communities of Dorchester and Thorndale.

The wastewater hydraulic model was developed using PCSWMM hydraulic modelling software and calibrated to available flow monitoring data to create the baseline/existing scenario.

Calibration of the wastewater model for Dorchester was primarily based on wet weather events from May 4 to May 6, 2017. Calibration for the wastewater model for Thorndale was based on the rain on snow event from February 6 to February 8, 2019. SCADA data was not available at the Thorndale WWTF for dates prior to January 2019.

3.4 Assessment of Existing and Future Wastewater Infrastructure

3.4.1 Opportunities and Constraints

Existing and future wastewater opportunities and constraints were identified through discussions with Municipality staff, as well as through hydraulic analyses and review of infrastructure data (e.g. GIS, design reports, as-built information, etc.). The PCSWMM all-pipe hydraulic model for Dorchester and Thorndale was used to analyze the performance of the existing and future system under dry weather and wet weather flow conditions.

3.4.1.1 Dorchester

In general, the wastewater collection system in Dorchester has adequate capacity to convey existing peak wet weather flows with upgrades throughout the system are required to convey future peak wet weather flows. **Figure 3-3** highlights some of the key opportunities and constraints in Dorchester.

The following key issues and constraints were identified:

- North Dorchester lands located north of the Thames River require to be pumped to the south Dorchester wastewater system or discharged to a new WWTF;
- There are many existing residents and businesses within Dorchester that are serviced by private sewer systems; uptake in residential and businesses connecting to the municipal sewer system is progressing slower that originally

anticipated; delaying the buildout of the wastewater network and limiting growth capacity.

- Growth within North Dorchester has not progressed, and wastewater projects recommended in previous Master Plan updates and servicing strategies have not been further assessed, designed, constructed or commissioned;
- Existing properties located directly south of the Thames River also require to be pumped to the existing wastewater system or discharged to a new WWTF;
- New infrastructure required to extend wastewater servicing to new development areas (Greenfield growth);
- Certain localized small areas show surcharge issues under design-storm conditions. Field investigations are required for better assessment of the infrastructure in these areas;
- Upgrades to the Dorchester WWTF and Dorchester sewage pumping stations are required to accommodate growth; and,

The following opportunities were identified:

- Wastewater infrastructure required to service North Dorchester can be phased to service growth ahead of existing residents serviced by private sewer systems;
- There are planned and approved upgrades at the Dorchester WWTF to service growth to buildout;
- New infrastructure will be required as new development occurs, especially north of the Thames River and within southwest Dorchester. There are opportunities to design the facilities to accommodate buildout growth and provide greater system flexibility; and,
- Coordination with the state of good repair (SOGR) program to maximize the use of existing infrastructure.

Figure 3-3 highlights key opportunities and constraints within the Dorchester wastewater system and 401 Corridor Lands.

3.4.1.2 401 Corridor Lands

Wastewater service to the 401 Corridor Lands was considered as part of the Dorchester wastewater servicing strategy. Upgrades within the Dorchester system will be required to service the 401 Corridor Lands.

The key issues and constraints identified by the Municipality and through the modelling exercise include:

- Inability to effectively service development of the 401 Corridor lands – while lands located to the southwest of Dorchester within the 401 Corridor generally lie at

elevations approximately 20 metres higher than those in Dorchester, the crossing of a tributary south of Dorchester will require a pumping facility or a siphon.

The following lists key opportunities identified by the Municipality and through the modelling exercise:

- The 401 Corridor Lands are located outside of the Dorchester Settlement Boundary with only dry-industrial currently permitted. There is opportunity to complete a more detailed cost-benefit analysis of servicing to the area in support of any changes to land use.

3.4.1.3 Thorndale

In general, the wastewater collection system in Thorndale has adequate capacity to convey existing and future peak wet weather flows. Upgrades to the Thorndale WWTF and SPS will be required to treat future peak wet weather flows. Some sewer upgrades may be required to convey future flows from buildout population based on Method 3 projections.

The following key issues and constraints were identified:

- New infrastructure required to extend wastewater servicing to new development areas (Greenfield growth);
- Upgrades to the Thorndale WWTF and Thorndale SPS are required to accommodate growth;
- Existing downstream sewers may be required to be upgraded based on development in Peripheral Lands; and,
- Existing properties fronting on King Street located east of Wye Creek as well as along Harrison Street are not serviced by municipal sewers.

The following opportunities were identified:

- Wastewater infrastructure required to service North Dorchester can be phased to service growth ahead of existing residents serviced by private sewer systems;
- There are planned and approved upgrades at the Thorndale WWTF and Thorndale SPS to service growth to buildout;
- New infrastructure will be required as new development occurs and there are opportunities to design the facilities to accommodate buildout growth and provide greater system flexibility; and,
- Coordination with the state of good repair (SOGR) program to maximize the use of existing infrastructure.

Figure 3-4 highlights key opportunities and constraints within the Thorndale wastewater system.

Municipality of Thames Centre

Water and Wastewater Master Plan Update

Opportunity to utilize new forcemain constructed under Dorchester Road bridge for North Dorchester

Long-term capacity issue at the Dorchester SPS

Opportunity to service all existing un-serviced lands

Long-term treatment capacity issue at the Dorchester WWTP

Individual development vs. consolidated area servicing

Gravity sewer vs. pumping
- Consolidation of pump stations
- Pump station upgrades
- Sewer diversions
- Sewer upgrades

Coordinated servicing strategies to minimize infrastructure requirements

Strategic sanitary sewer sizing to support all future development in growth areas

Pumping Station

Pumping Station

Wastewater Treatment Plant

HAMILTON RD

CATHERINE ST

DORCHESTER RD

BRIDGE ST

JANE ST

SHAWARD

ELGINARD

0 1 Kilometers

Wastewater Facilities

Type

- Pumping Station
- Wastewater Treatment Plant

Existing Sanitary Main

DIAMETER

- 200
- 201 - 250
- 251 - 450
- 451 - 600
- 601 - 900
- Existing Forcemain

Landuse

- RESIDENTIAL
- NEIGHBOURHOOD COMMERCIAL
- GENERAL COMMERCIAL
- HIGHWAY COMMERCIAL
- SETTLEMENT INDUSTRIAL
- INSTITUTIONAL
- RECREATIONAL
- PROTECTION AREA
- NATURAL AREA
- PARKS & OPEN SPACE
- ENVIRONMENTAL AREA
- CORE AREAS
- URBAN SETTLEMENT AREA BOUNDARY

Figure 3-3

Dorchester Wastewater System Opportunities and Constraints

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Municipality of Thames Centre

Water and Wastewater Master Plan Update

Long-term capacity issue at the Thorndale SPS

Long-term treatment capacity issue at the Thorndale WWTP

Opportunity to service all existing un-serviced lands

Coordinated servicing strategies to minimize infrastructure requirements

Strategic sanitary sewer sizing to support all future development in growth areas

Thorndale CSO

Thorndale WWTP

THORNDALE RD

KING ST

NISSOURI RD

0 1 Kilometers

Wastewater Facility

Type

- CSO
- WWTP

Existing Sanitary Main

DIAMETER

- 200
- 201 - 250
- 251 - 450
- 451 - 600
- 601 - 900
- Forcemain

Landuse

- RESIDENTIAL
- MOBILE HOME PARK
- GENERAL COMMERCIAL
- SETTLEMENT INDUSTRIAL
- PROTECTION AREA
- PARKS & OPEN SPACE
- ENVIRONMENTAL AREA
- URBAN SETTLEMENT AREA BOUNDARY

Figure 3-4

Thorndale Wastewater Opportunities & Constraints

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3.5 Wastewater Servicing Strategy

The identification and assessment of servicing alternatives is a critical component of the master planning process. It enables a comprehensive review of various servicing solutions and should be documented to ensure the process has been carried out in a transparent and defensible manner.

As part of this Master Plan, wastewater alternative servicing strategies were reviewed for existing and future growth areas in order to select the servicing strategies that:

- Make best use of existing infrastructure to avoid new infrastructure where possible;
- Minimize cost of new infrastructure;
- Consider operation and maintenance costs to ensure financial sustainability;
- Ensure long term reliability and security of the wastewater system;
- Increase system resilience to climate change
- Avoid/minimize environmental crossings and other disruptions to the environment where possible;
- Avoid disruptions to cultural heritage resources;
- Plan for future infrastructure within the existing road right-of-way where possible; and,
- Avoid/minimize impact to areas that could represent a significant drinking water threat.

3.5.1 Servicing Strategy Development

Wastewater alternative servicing strategies were identified and reviewed for existing and future growth areas within the Municipality of Thames Centre in order to select the best servicing solution for each area. Collectively, all the area specific servicing solutions will form the overall wastewater servicing strategy for the Municipality.

The following sections summarize the development of the alternative servicing strategies for key growth areas within the Municipality of Thames Centre.

3.5.1.1 Dorchester

3.5.1.1.1 North Dorchester

North Dorchester located north of the Thames River has development lands that have been identified for growth within previous Master Plan updates and servicing studies. Development within North Dorchester has not yet progressed, and this may be partly due to the extensive wastewater infrastructure required to be constructed and commissioned ahead of any development proceeding.

North Dorchester is a key servicing strategy component as a servicing alternative for the area is the commissioning of a new WWTF. Conveying wastewater flows from North Dorchester to a new WWTF located north of Thames River, rather than conveying flows

across the river to the existing Dorchester WWTF has significant impacts on the overall servicing strategy. As the Master Plan was progressed it was realized that a key project outcome for the Master Plan is the development of an achievable servicing strategy for North Dorchester.

Servicing concepts for this Master Plan considered the servicing of development and existing residents and businesses currently connected to private sewer systems, as well as servicing concepts that would allow for the phasing of wastewater infrastructure to encourage development ahead of existing properties connection to the municipal sewer system.

A group representing landowners in North Dorchester has indicated the Municipality that they are interested in developing lands and requested a preferred servicing strategy with focus on their ability to fund and construct phased wastewater infrastructure components.

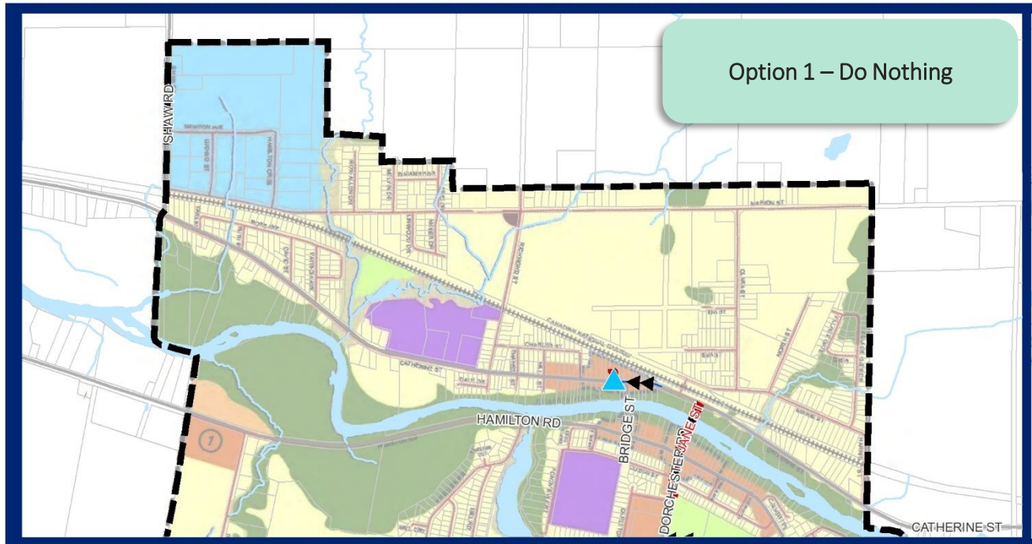
Six alternatives were considered:

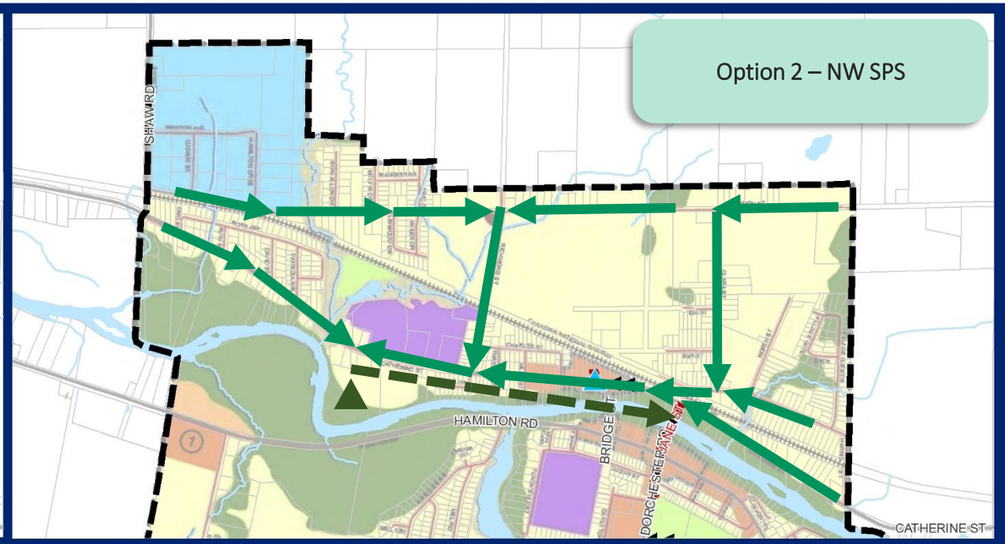
1. Do nothing;
2. Commission a single sewage pumping station to service all growth areas and existing unserviced areas;
3. Commission two sewage pumping stations (one in northeast and one in northwest) to service all growth areas and existing unserviced areas – with all growth areas discharging to the northwest sewage pumping station
4. Commission two sewage pumping stations (one in the northeast and one in the northwest) to service all growth areas and existing unserviced areas (growth areas discharging to nearest pumping station);
5. Commission initial pumping station to service growth areas, then ultimately commission two additional smaller pumping stations to service the existing unserviced areas; and,
6. Commission new WWTF to service all growth areas and existing unserviced areas in North Dorchester – additional pumping station in northeast to service existing unserviced areas likely also required.

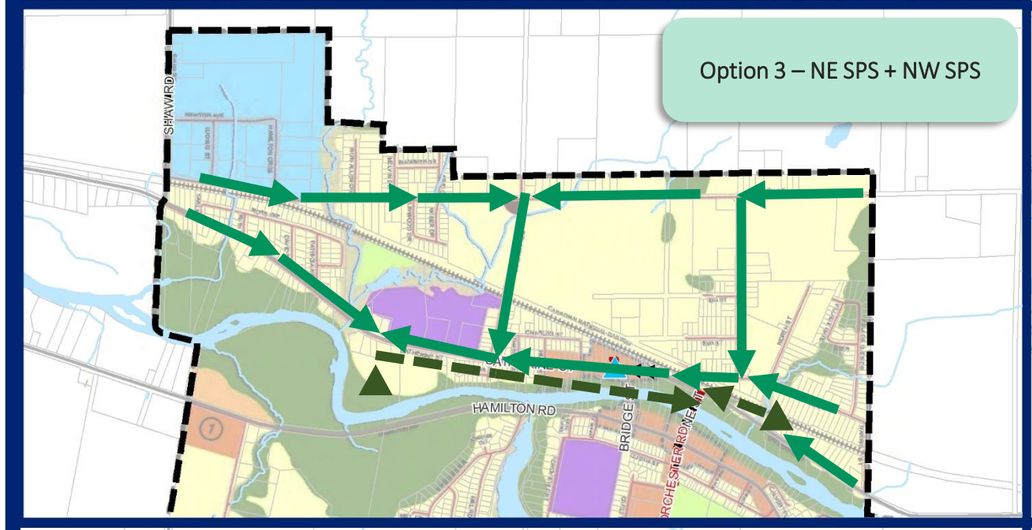
Alternatives 2 through 5, discharge to the south Dorchester wastewater system and ultimately outlet at the Dorchester WWTF.

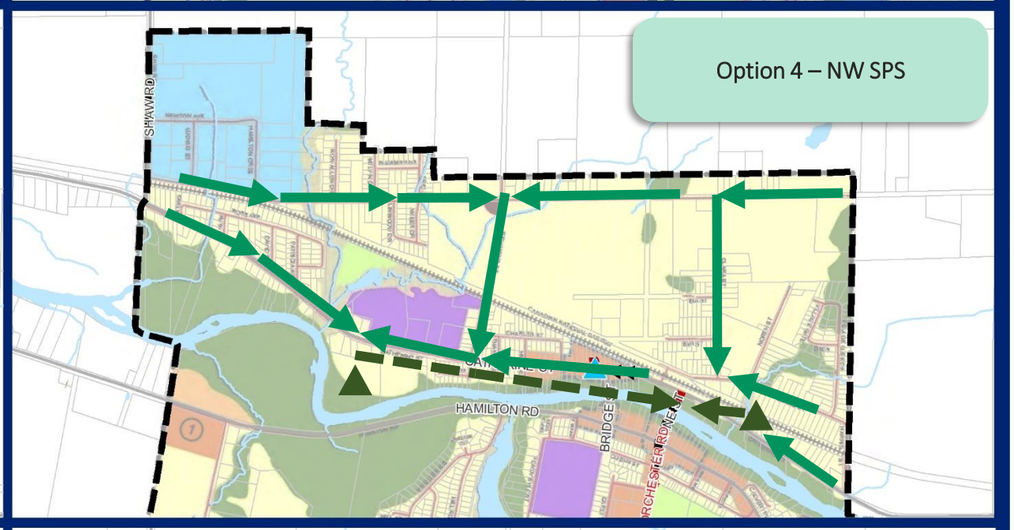
North Dorchester Servicing Alternatives are shown in **Figure 3-5**.

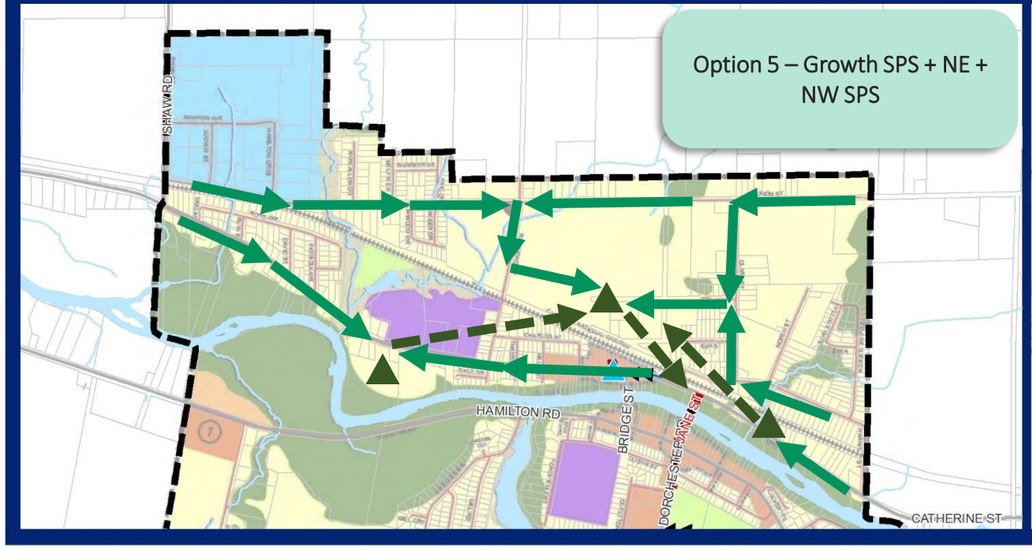
A detailed evaluation of the North Dorchester Servicing Alternatives is shown in **Table 3-8**.

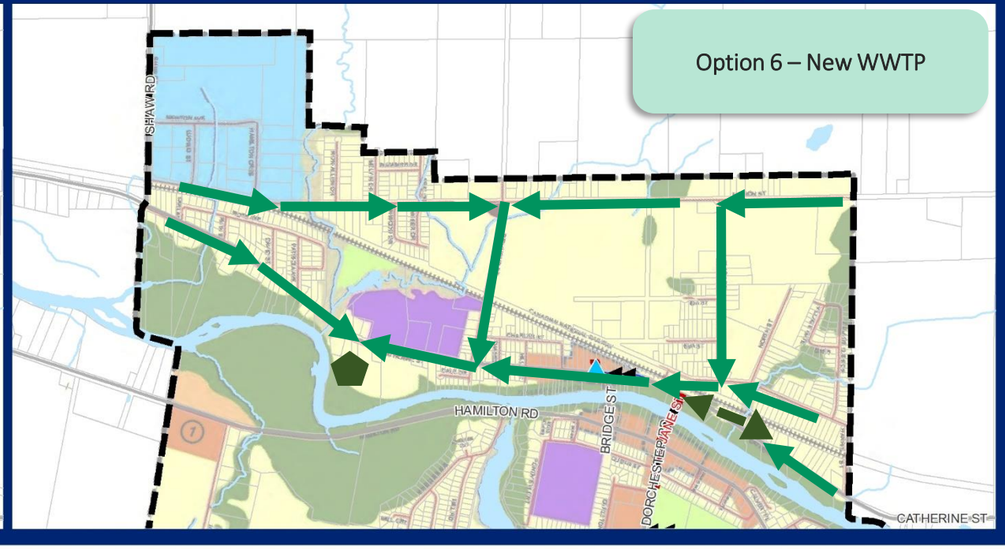












Municipality of Thames Centre

Water and Wastewater Master Plan Update

Wastewater Facilities

Type

- Pumping Station
- Wastewater Treatment Plant

Existing Sanitary Main

DIAMETER

- 200
- 201 - 250
- 251 - 450
- 451 - 600
- 601 - 900
- Existing Forcemain

Proposed Facilities

- Pumping Station
- Wastewater Treatment Plant
- Proposed Gravity Sewer
- Proposed Forcemain

Landuse

- RESIDENTIAL
- NEIGHBOURHOOD COMMERCIAL
- GENERAL COMMERCIAL
- HIGHWAY COMMERCIAL
- SETTLEMENT INDUSTRIAL
- INSTITUTIONAL
- RECREATIONAL
- PROTECTION AREA
- NATURAL AREA
- PARKS & OPEN SPACE
- ENVIRONMENTAL AREA
- CORE AREAS
- URBAN SETTLEMENT AREA BOUNDARY

Figure 3-5

North Dorchester Wastewater Servicing Alternatives

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Table 3-8: Evaluation of North Dorchester Wastewater Servicing Alternatives

Evaluation Criteria	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5	Alternative 6
	Do Nothing	Northwest SPS - all growth areas and all existing areas gravity to one SPS	Northwest and Northeast SPS - all growth and existing areas	Northeast SPS - all growth East of Development 6 can gravity to NESPS, remaining areas gravity to NWSPS	New Development SPS - all growth North of CN rail can gravity to New Development SPS, remaining areas gravity to NW SPS and NESPS	Northwest WWTF and Northeast SPS - all growth and existing areas
Technical						
Meets capacity for future growth	No	Yes	Yes	Yes	Yes	Yes
Technical viability	No implementation required	Generally easy to implement	Generally easy to implement	Generally easy to implement	Generally easy to implement	Difficult to implement
Operations and maintenance	None	One SPS to operate for North lands	Two SPS to operate for North Lands	Two SPS to operate for North Lands	Three SPS to operate for North Lands	One WWTF and one SPS to operate for North Lands
Environmental						
Environmentally sensitive feature impacts	No environmental impacts	No environmental impacts	No environmental impacts	No environmental impacts	No environmental impacts	Some environmental impacts
Water features and resources impacts		No impacts	No impacts	No impacts	No impacts	New WWTF outlet to river
Species at Risk impacts		No known impacts	No known impacts	No known impacts	No known impacts	No known impacts
Soil (contamination)		No known impacts	No known impacts	No known impacts	No known impacts	No known impacts
Geology and hydrogeology considerations		No known impacts	No known impacts	No known impacts	No known impacts	No known impacts
Social / Cultural						
Property impacts	None	Impact to private home septic systems	Impact to private home septic systems	Impact to private home septic systems	Impact to private home septic systems	Impact to private home septic systems
Cultural heritage impacts	No known impacts	No known impacts	No known impacts	No known impacts	No known impacts	No known impacts
Traffic and transportation impacts	None	Minimal short-term disruption to traffic	Minimal short-term disruption to traffic	Minimal short-term disruption to traffic	Minimal short-term disruption to traffic	Minimal short-term disruption to traffic

Evaluation Criteria	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5	Alternative 6
	Do Nothing	Northwest SPS - all growth areas and all existing areas gravity to one SPS	Northwest and Northeast SPS - all growth and existing areas	Northeast SPS - all growth East of Development 6 can gravity to NESPS, remaining areas gravity to NWSPS	New Development SPS - all growth North of CN rail can gravity to New Development SPS, remaining areas gravity to NW SPS and NESPS	Northwest WWTF and Northeast SPS - all growth and existing areas
Construction impacts (noise, vibration, dust)	None	Minimal, short term	Minimal, short term	Minimal, short term	Minimal, short term	Moderate, short term
Financial						
Capital / construction costs	$0	$$$	Short-Term: $$$, Long-Term: $$$$	$$$$	Short-Term: $$, Long-Term: $$$$	$$$$
Operations and maintenance costs	No change	$$	Short-Term: $, Long-Term: $$	$$$	Short-Term: $, Long-Term: $$$$	$$$$
Lifecycle cost	No change	$$	$$$	$$$	$$$$	$$$$
Recommendation	Not recommended because the "Do Nothing" option does not meet future servicing capacity	Not recommended because it will delay construction of development blocks	Not recommended because it will delay construction of development blocks	Not recommended because it will delay construction of development blocks	**Recommended to allow for development within North Dorchester to proceed**	Not recommended because of upgrades occurring at the existing WWTF

3.5.1.2 Dorchester Wastewater Treatment

Construction of a second WWTF in Dorchester was considered as a servicing alternative in the 2008 Master Plan (but ultimately not selected as the preferred alternative). Recently a landowners group, represented by Dillon Consulting Limited requested that the Municipality reconsider the alternative to construct a second WWTF in Dorchester.

Utilization of the approved capacity expansion at the existing Dorchester WWTF was determined to be the preferred treatment alternative through evaluation of the North Dorchester wastewater servicing alternatives. Utilization of the existing Dorchester WWTF as well as existing infrastructure in combination with the preferred alternative for North Dorchester wastewater servicing provides for the most reasonable approval, construction and operation. This

Wastewater treatment needs at the Dorchester WWTF based on the three alternative buildout methods and the alternative catchment area scenarios are shown in **Figure 3-6**.

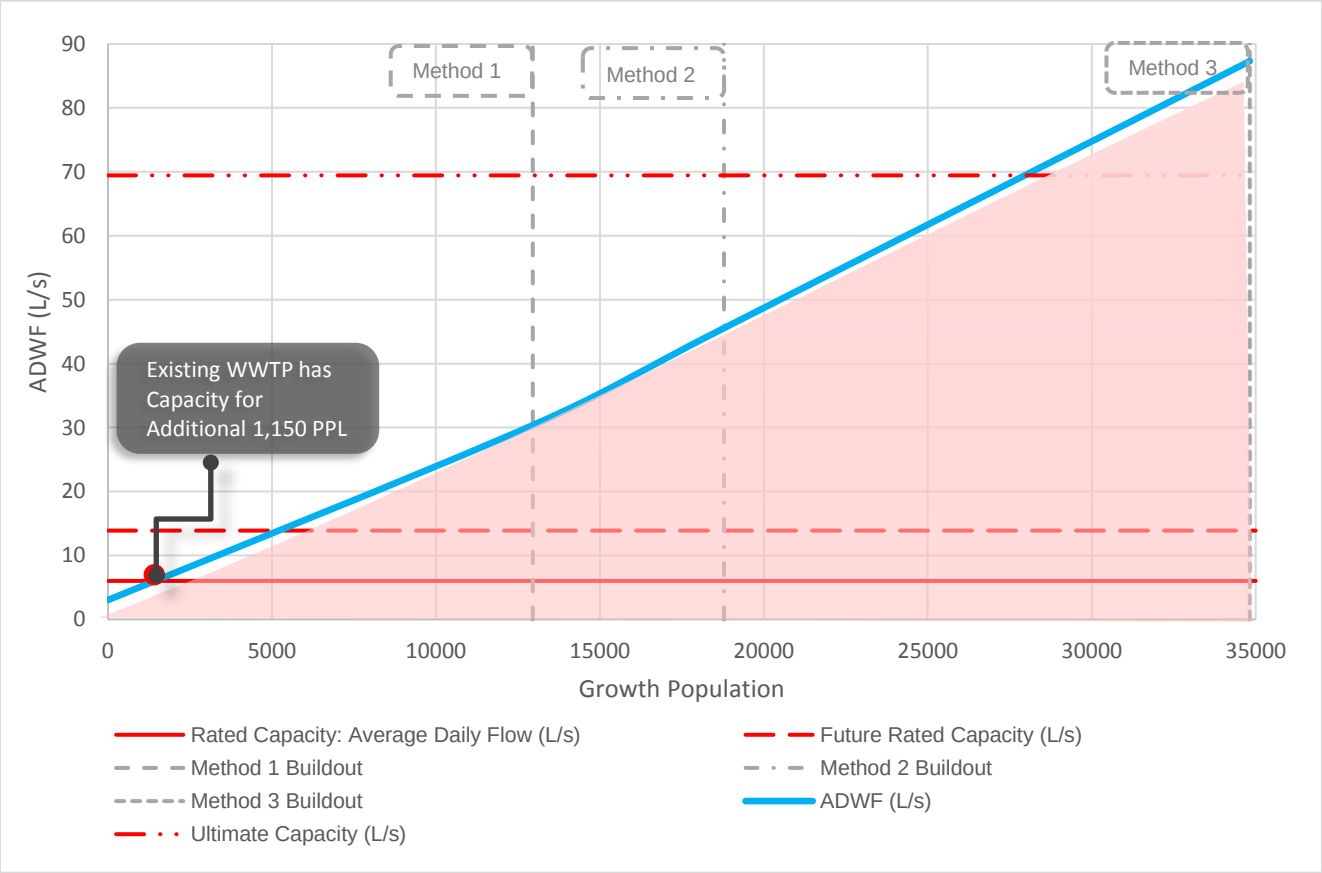

Figure 3-6: Dorchester WWTF Treatment Needs

3.5.1.3 South Dorchester Wastewater Servicing

Construction of Dorchester PS #3 commenced in 2019 and will guide the wastewater servicing strategy for southwest Dorchester. Flows from development in southwest Dorchester will be conveyed to the Dorchester PS #3. Crossing of the Rath-Harris Municipal Drain will be required but gravity sewers can be constructed at a depth to allow for conveyance of flows from the western growth areas (Area 17a and 17b, located west of Harris Road) by gravity to Dorchester #3 SPS.

Two new pumping stations will be required to service south Dorchester at buildout. The two new pumping stations required are located at:

- Area directly south of Thames River (Hamilton Road and Bridge Street area); to service existing residents and businesses currently on private sewage systems; and,
- Southeast area of Dorchester (area of Hamilton Road, west of the Scouts Canada Camp BEL) to service future development.

Wastewater flows from South Dorchester will be discharged to the Dorchester SPS and ultimately the Dorchester WWTF.

The alternative for South Dorchester Wastewater Servicing is shown in **Figure 3-7**.

Municipality of Thames Centre

Water and Wastewater Master Plan Update

Wastewater Facilities

Type

- Pumping Station
- Wastewater Treatment Plant

Existing Sanitary Main

DIAMETER

- 200
- 201 - 250
- 251 - 450
- 451 - 600
- 601 - 900
- Existing Forcemain

Proposed Facilities

- Pumping Station
- Wastewater Treatment Plant
- Proposed Gravity Sewer
- Proposed Forcemain

Landuse

- RESIDENTIAL
- NEIGHBOURHOOD COMMERCIAL
- GENERAL COMMERCIAL
- HIGHWAY COMMERCIAL
- SETTLEMENT INDUSTRIAL
- INSTITUTIONAL
- RECREATIONAL
- PROTECTION AREA
- NATURAL AREA
- PARKS & OPEN SPACE
- ENVIRONMENTAL AREA
- CORE AREAS
- URBAN SETTLEMENT AREA BOUNDARY

0 1 Kilometers

Figure 3-7

South Dorchester Wastewater Servicing Alternatives

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3.5.1.4 Dorchester Wastewater Pumping Station Upgrades

Dorchester SPS and Dorchester #3 SPS are required to be upgraded in combination with the preferred servicing strategies.

The Dorchester SPS will ultimately convey flows from South Dorchester as well as potentially from North Dorchester and the 401 Corridor Lands. The existing station is a wet well with submersible pumps and an outdoor control panel and standby generator. Significant upgrades to this SPS will be required that may include a control building and dry well. The existing site is owned by the Municipality and there is enough additional area to construct an upgraded SPS. The existing single 200mm diameter forcemain will also be required to be upgraded (and potentially twinned).

Dorchester #3 SPS has been designed for future upgrade including pump upgrade and replacement. The twin 150mm forcemain will also be required to be upgraded to service development in Southwest Dorchester as growth nears buildout.

Upgrade requirement triggers at the Dorchester SPS and Dorchester #3 SPS (based on the alternative build out methods) are shown in **Figure 3-8** and **Figure 3-9**.

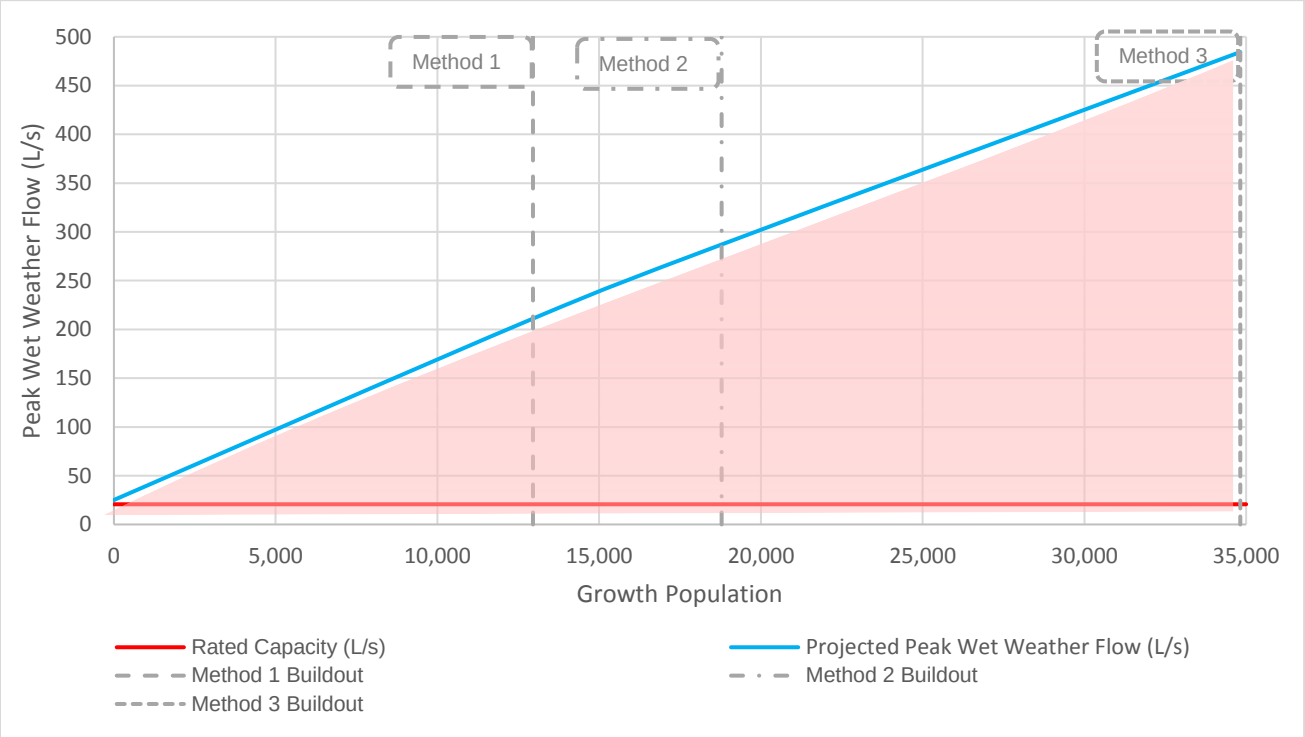


Figure 3-8: Upgrade Requirements Triggers at Dorchester SPS

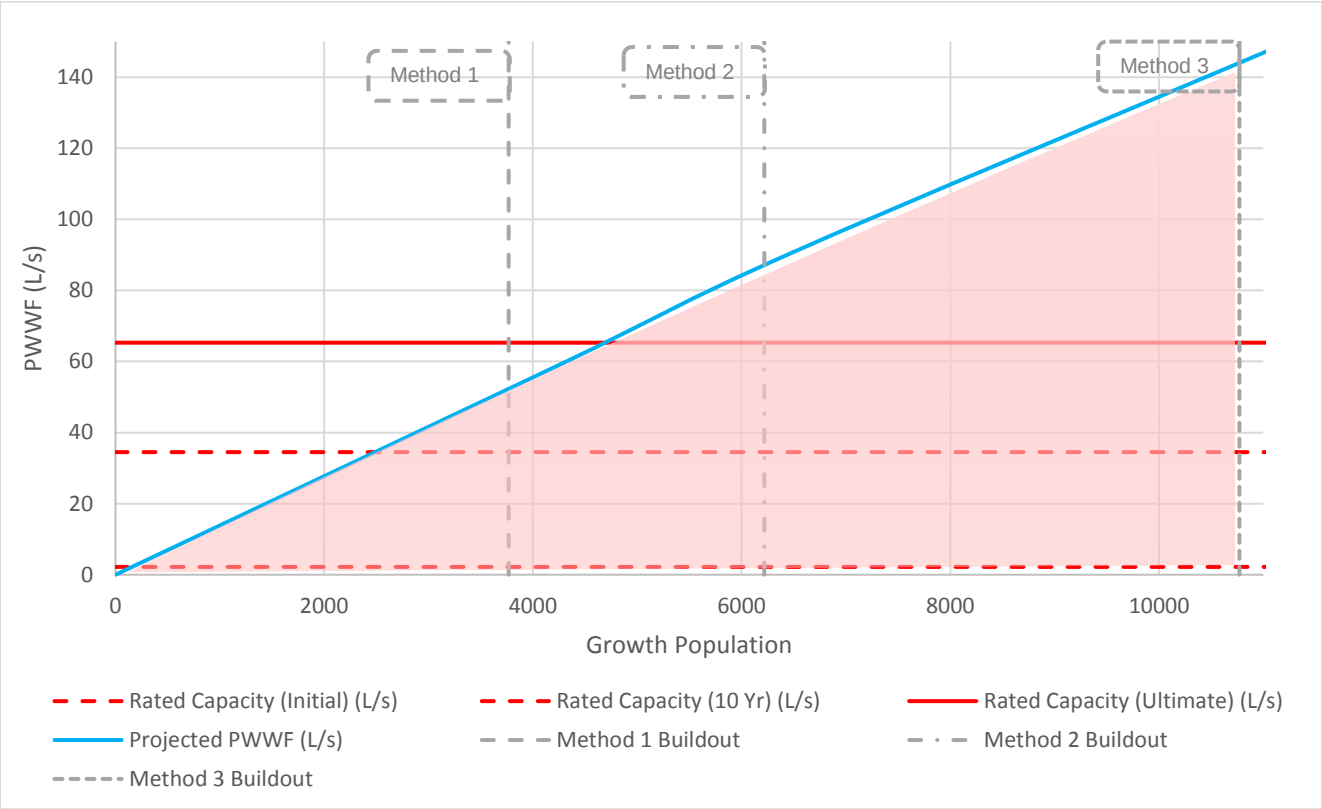


Figure 3-9: Upgrade Requirements Triggers at Dorchester #3 SPS

3.5.1.5 401 Corridor

Development of the 401 Corridor Lands will require new gravity sewer to convey flows to the Dorchester wastewater system, and ultimately the Dorchester WWTF. Topography in the area generally allows for the conveyance of flows from the higher elevation 401 Corridor lands to the lower elevation Dorchester sewers by gravity sewer. There is one crossing of a tributary south of the Dorchester south Settlement Boundary that cannot be crossed by gravity sewer, and a pumping facility or siphon will be required.

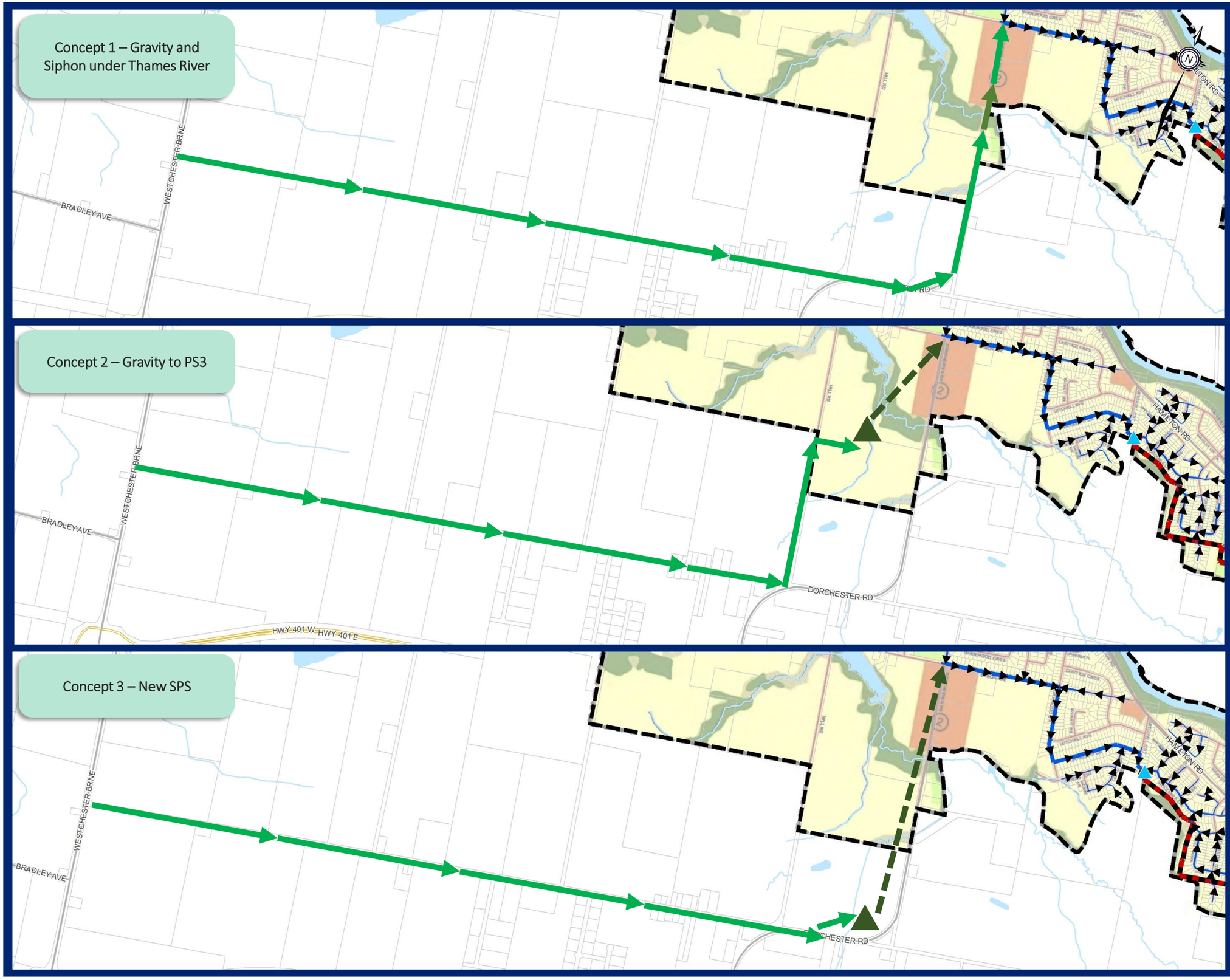
As noted in **Section 2.4.1.2**, it is recommended that the Municipality undertake further analysis to review cost-benefits of providing water and wastewater servicing to the 401 Corridor Lands.

Figure 3-10 shows the future servicing concepts that are to be considered as part of the cost-benefit analysis.

Concept 1 – Gravity and Siphon under Thames River

Concept 2 – Gravity to PS3

Concept 3 – New SPS



Municipality of Thames Centre

Water and Wastewater Master Plan Update

Wastewater Facilities

Type

- Pumping Station
- Wastewater Treatment Plant

Existing Sanitary Main

DIAMETER

- 200
- 201 - 250
- 251 - 450
- 451 - 600
- 601 - 900
- Existing Forcemain

Proposed Facilities

- Pumping Station
- Wastewater Treatment Plant
- Proposed Gravity Sewer
- Proposed Forcemain

Landuse

- RESIDENTIAL
- NEIGHBOURHOOD COMMERCIAL
- GENERAL COMMERCIAL
- HIGHWAY COMMERCIAL
- SETTLEMENT INDUSTRIAL
- INSTITUTIONAL
- RECREATIONAL
- PROTECTION AREA
- NATURAL AREA
- PARKS & OPEN SPACE
- ENVIRONMENTAL AREA
- CORE AREAS
- URBAN SETTLEMENT AREA BOUNDARY

Figure 3-10

Future Wastewater Servicing Concepts for 401 Corridor Lands

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3.5.1.6 Thorndale

Existing sewers within Thorndale have capacity to convey flows from development within the Settlement Boundary. Development of the Peripheral Lands may trigger required size upgrades of some downstream sewers located in the area of the Thorndale WWTF.

The Thorndale WWTF has planned upgrades to service growth within the Settlement Boundary. The WWTF will require further upgrades to service development outside of the Settlement Boundary within Peripheral Lands.

Thorndale treatment needs (based on the alternative growth projection methods) compared to the existing and planned capacity expansion at the Thorndale WWTF is shown in **Figure 3-11**.

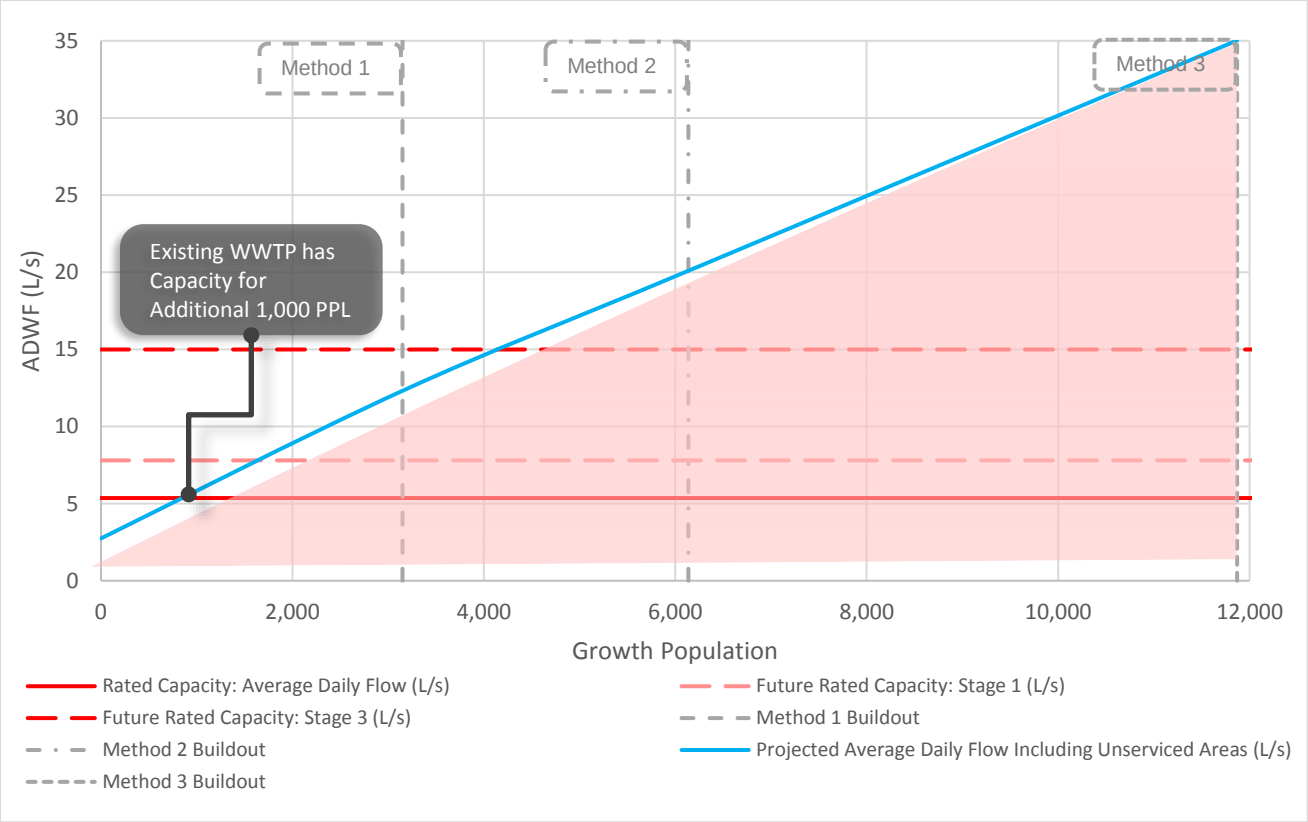
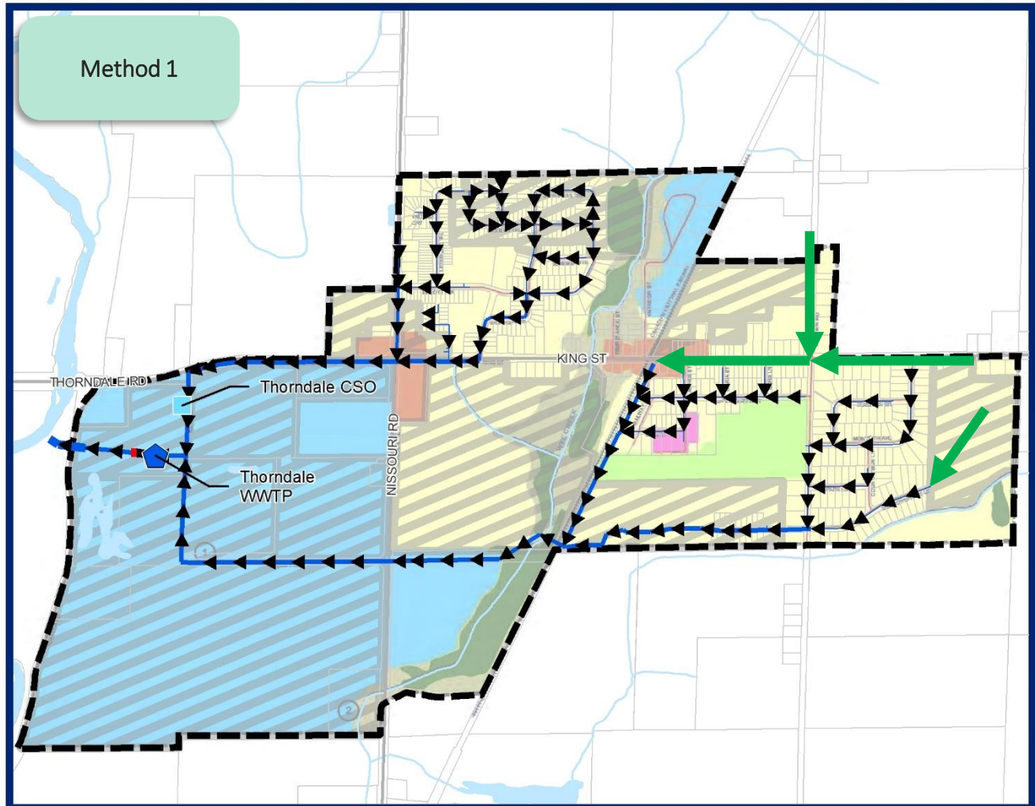


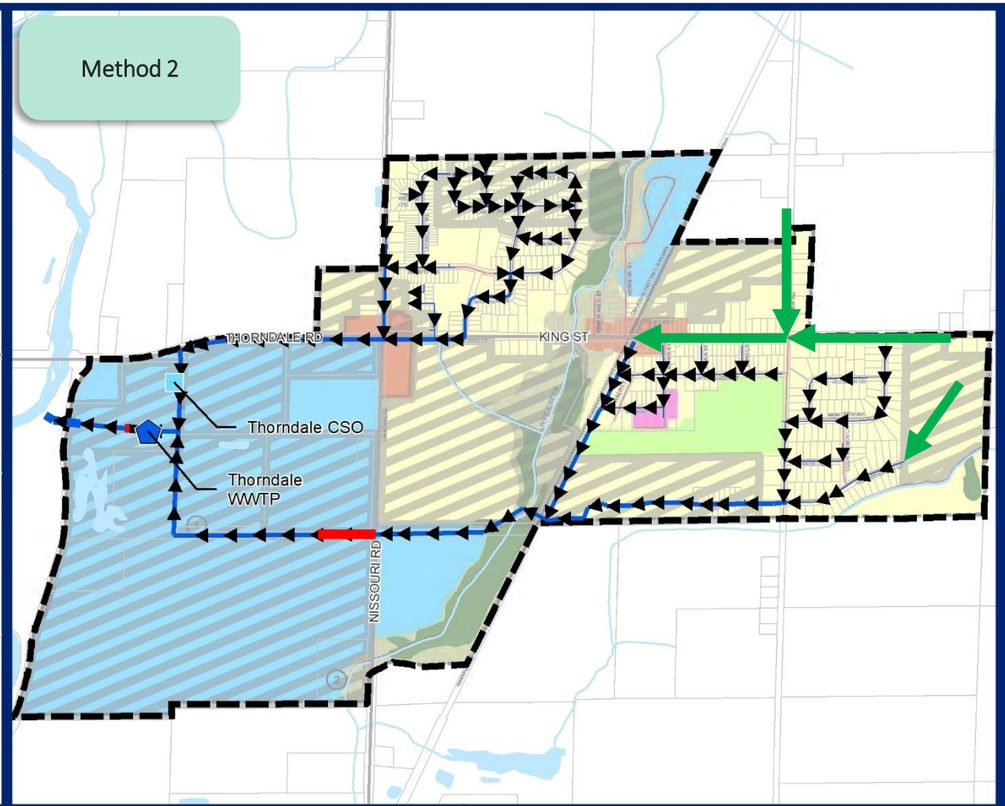
Figure 3-11: Thorndale Treatment Needs Compared to Thorndale WWTF Existing and Future Capacity

The alternative for Thorndale Wastewater Servicing is shown in **Figure 3-12**.

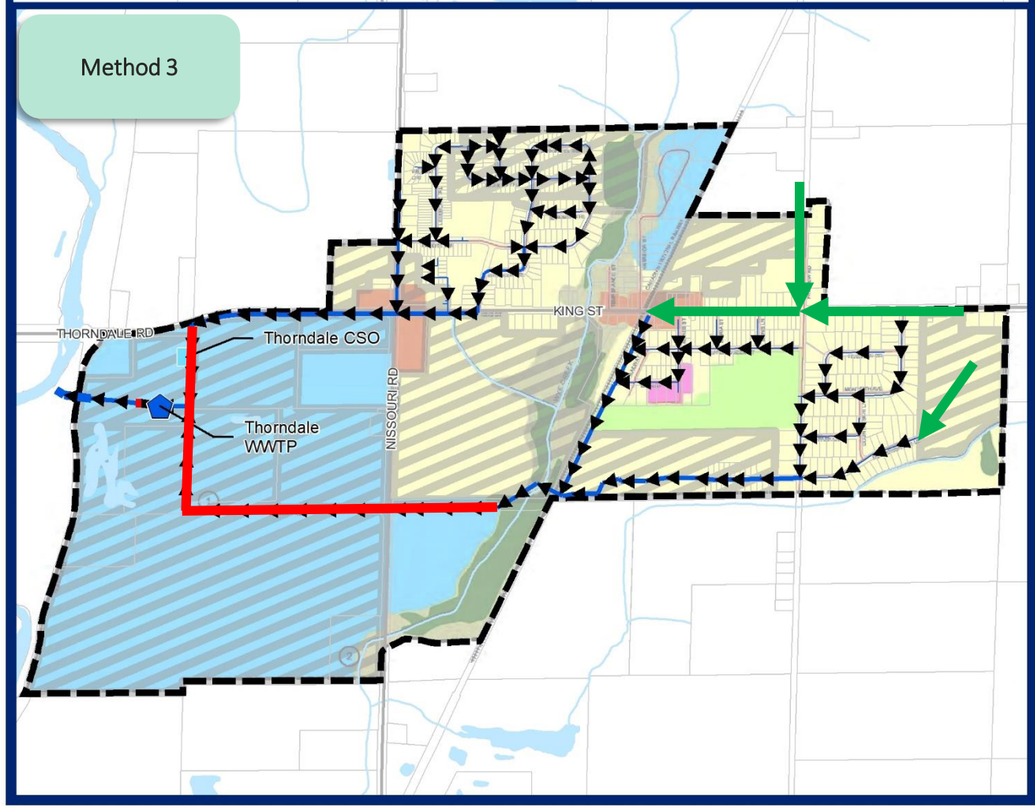
Method 1



Method 2



Method 3



Municipality of Thames Centre

Water and Wastewater Master Plan Update

Wastewater Facility

Type

- CSO
- WWTP

Existing Sanitary Main

DIAMETER

- 200
- 201 - 250
- 251 - 450
- 451 - 600
- 601 - 900
- Forcemain

Proposed Infrastructure

- Proposed Gravity Sewer
- Gravity Sewer - over capacity

Landuse

- RESIDENTIAL
- MOBILE HOME PARK
- GENERAL COMMERCIAL
- SETTLEMENT INDUSTRIAL
- PROTECTION AREA
- PARKS & OPEN SPACE
- ENVIRONMENTAL AREA
- URBAN SETTLEMENT AREA BOUNDARY

Figure 3-12

Thorndale Wastewater Servicing Alternatives

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3.5.2 Preferred Wastewater Servicing Strategy

The recommended wastewater servicing strategy can be broken down into various components that have different aims but each contributing to the overall improvement of the existing system and service the projected buildout growth.

3.5.2.1 Dorchester

The preferred servicing strategy was developed to ensure that extension of the wastewater collection system is supportive of the existing servicing strategy and follows an integrated approach with the Municipality's development plans as well as the SOGR program.

In general, the preferred wastewater servicing strategy for Dorchester consists of:

- Pumping wastewater flows from North Dorchester to the existing south Dorchester wastewater system to be treated at Dorchester WWTF;
    - Phasing of wastewater pumping facilities in North Dorchester to service development growth ahead of existing properties on private sewage systems;
- Continued expansion of the Dorchester WWTF in line with the long-term strategy and as triggered by development growth;
- Extending the sewer network in southwest Dorchester and north Dorchester to service development growth;
- Extending the sewer network to service existing properties currently service by private sewage systems in southwest Dorchester and north Dorchester;
- Commissioning wastewater pumping facilities to service development in southeast Dorchester and existing unserviced residents and businesses in areas directly north and south of the Thames River;
- Cost-benefit analysis required for 401 Corridor Lands to determine viability of providing wastewater servicing to potential development lands; and,
- Upgrade of the Dorchester SPS and Dorchester #3 SPS to accommodate wastewater flows to buildout.

Key capital projects required to achieve this strategy include:

- Construction and commissioning of North Dorchester wastewater pumping station and forcemain (phased to service development ahead of unserviced residents);
- Upgrade of Dorchester WWTF and Dorchester SPS as required to service development growth;
- New 200mm to 375mm sewer primarily along internal road alignments to service southwest Dorchester development;

- Commissioning of study to determine viability of 401 Corridor Lands development serviced by municipal sewers.

3.5.2.2 Thorndale

The preferred wastewater strategy for Thorndale consists of:

- Expansion of the Thorndale WWTF and Thorndale SPS to service development within Peripheral Lands;
- Potential upgrade of downstream sewers in area of Thorndale WWTF buildout of Peripheral Lands occurs at higher densities; and,
- Servicing of existing properties along King Street east of Wye Creek and in Harrison Street area when there is opportunity (potentially when a significant number of area residents express interest in connecting to municipal system or when new infrastructure can be effectively aligned with the Municipality's SOGR program).

Key capital projects required to achieve this strategy include:

- Upgrade of the Thorndale WWTF and Thorndale SPS as required to service development growth.

In addition to the key capital projects, several other projects and upgrades are included within the wastewater servicing strategy to address existing and future capacity needs within the collection system. The complete Preferred Wastewater Strategy is presented in **Figure 3-13** and **Figure 3-14.** Each capital project is listed along with its respective estimated capital cost in **Section 3.6**.

Municipality of Thames Centre

Water and Wastewater Master Plan Update

Sanitary Mains

- Existing - Local
- Existing - Trunk
- Existing - Forcemain
- Growth - Forcemains
- Growth - Development
- Upgrade
- New
- Benefits Existing

Facility Upgrades

- Pumping Station
- Wastewater Treatment Plant

Landuse

- RESIDENTIAL
- NEIGHBOURHOOD COMMERCIAL
- GENERAL COMMERCIAL
- HIGHWAY COMMERCIAL
- SETTLEMENT INDUSTRIAL
- INSTITUTIONAL
- RECREATIONAL
- PROTECTION AREA
- NATURAL AREA
- PARKS & OPEN SPACE
- ENVIRONMENTAL AREA
- CORE AREAS
- URBAN SETTLEMENT AREA BOUNDARY

Figure 3-13

Dorchester Preferred Wastewater Servicing Strategy

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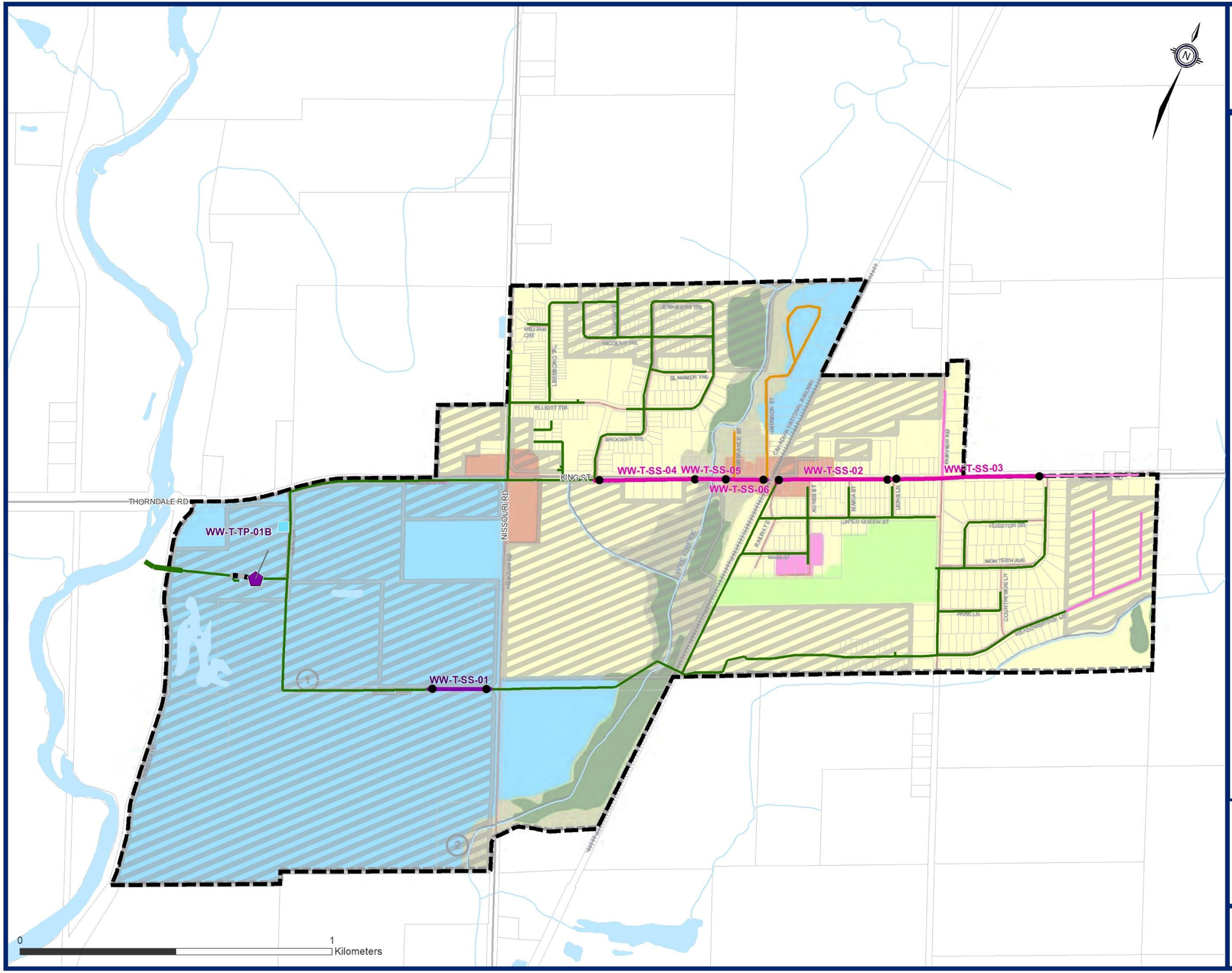
0 1 Kilometers



Municipality of Thames Centre

Water and Wastewater Master Plan Update

Sanitary Mains

- Existing - Local
- Existing - Trunk
- Growth - Local
- Growth - Trunk
- Existing - Forcemain
- Upgrade
- New
- Benefits Existing

Facility Upgrades

- WWTP

Landuse

- RESIDENTIAL
- MOBILE HOME PARK
- GENERAL COMMERCIAL
- SETTLEMENT INDUSTRIAL
- PROTECTION AREA
- PARKS & OPEN SPACE
- ENVIRONMENTAL AREA
- URBAN SETTLEMENT AREA BOUNDARY

Figure 3-14

Thorndale Preferred Wastewater Servicing Strategy

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NAD 1983 UTM Zone 17N

3.6 Capital Program

As described in the previous sections, the Preferred Wastewater Servicing Strategy has been developed to support the servicing needs of the existing and future growth areas within the Municipality of Thames Centre to buildout. The capital costs for each project of the Preferred Strategy were estimated according to the costing methodology discussed in **Section 1.13.2**. These projects are listed according to their project number and are shown in **Table 3-9**. The capital program table contains project descriptions, dimensions, proposed timing, and estimated total project cost. Detailed project sheets are included in **Appendix D**.

The wastewater capital program will work as a foundation for the Municipality of Thames Centre's Capital Budget. The capital program provides a list and timing of new assets that the Municipality will have to operate and maintain; and therefore, it is the starting point for the planning of operation and maintenance costs and resources allocation for new wastewater infrastructure.

3.6.1 Implementation Plan

As outlined in **Section 1.1.1** of this report, the Water and Wastewater Master Plan sets out to satisfy the EA Approach 1 requirements according to the MEA Class EA document. The Preferred Wastewater Servicing will support the servicing needs of the Municipality of Thames Centre's future growth to 2041. This strategy will be implemented in accordance with each project Class EA schedule.

The Class EA requirements for each project have been identified in the Capital Program. Schedule A and A+ projects may move forward to design and construction, with A+ projects requiring public notification prior to implementation. Schedule B or equivalent projects that have been identified within the Preferred Wastewater Servicing Strategy will be part of a developer-led local servicing plan and approved through the Planning Act Municipal development review process or will be satisfied through separate Class EA study prior to design and construction. The Preferred Wastewater Strategy did not identify any Schedule C projects.

Further, any future Wastewater EA project in the Municipality of Thames Centre should include the results of other Class EAs projects where applicable.

During the next steps of the implementation program, primarily during detailed design of the projects, the following requirements should be considered:

- Finalization of property requirements;
- Refinement of infrastructure alignment;
- Identification of preferred construction methodologies;
- Completion of additional supporting investigations as required (e.g. geotechnical, hydrogeological, etc.);

- Review and mitigation of potential construction related impacts; and,
- Satisfying of all provincial, municipal and conservation authority approval requirements.

With respect to the Municipality's planning and budgeting, this program will be utilized as high-level baseline estimate for the Municipality's capital budget. These costs will be further developed and refined during the implementation phases as more detailed information becomes available.

The anticipated timing of each project within the Preferred Strategy has been established based on the projected population and employment growth within the Municipality of Thames Centre. The wastewater program's project scheduling has also been cross referenced with the water program to ensure project coordination along common alignments.

Given the growth-related nature of the servicing strategies, the wastewater capital program forms the foundation for the wastewater component of the Municipality of Thames Centre's Development Charges (DC) By-Law.

Table 3-9: Wastewater Capital Program

Capital Program ID	Name	Description	Serviced Development Blocks and/or Existing Unserviced Areas	Upgrade Trigger	Upgrade Trigger (Population Growth)	Class EA Schedule	Project Type	Length (m)	Method 1		Method 2		Method 3		Size/Capacity	Capital Program Total Component Estimated Cost (Excl. HST)
									Size/Capacity	Total Component Estimated Cost (Excl. HST)	Size/Capacity	Total Component Estimated Cost (Excl. HST)	Size/Capacity	Total Component Estimated Cost (Excl. HST)		
WW-D-TP-01B	Dorchester Treatment Plant Upgrades	Treatment plant capacity upgrades required to accommodate all development flows in Dorchester	All Dorchester Developments and Existing Areas on Private Sewage Systems (Unserviced)	Accumulated growth	80% Trigger of 1,000 PPJ (Persons + Jobs) = 800 PPJ	C	Treatment		2.1 ML	$9,410,000	3.2 ML	$14,001,000	6.0 ML	$26,076,000	3.2 ML	$ 14,001,000
WW-D-SPS-01B	North Dorchester New Development SPS	New SPS needed to support New Development north of railway in North Dorchester	Development 3-15 Existing Area 1	New Development North of Railway	With new development	B	Pumping		61 L/s	$3,212,000	90 L/s	$4,732,000	90 L/s	$4,732,000	90 L/s	$ 4,732,000
WW-D-SPS-02	North Dorchester Northwest SPS	New SPS needed to support New Development and existing development south of railway and west of Dorchester Road Bridge in North Dorchester	Ex. Area 2	New Development or Municipal Servicing Replacing Private Sewage Systems	With new or existing development	B	Pumping		8 L/s	$568,000	8 L/s	$568,000	8 L/s	$568,000	8 L/s	$ 568,000
WW-D-SPS-03	North Dorchester Northeast SPS	New SPS needed to support existing development south of railway and east of Dorchester Road Bridge in North Dorchester	Ex. Area 13	New Development or Municipal Servicing Replacing Private Sewage Systems	With new or existing development	B	Pumping		1 L/s	$121,000	1 L/s	$121,000	1 L/s	$121,000	1 L/s	$ 121,000
WW-D-SPS-04	South Dorchester SPS	New SPS needed to support existing development south of river and north of PS3 drainage area in South Dorchester	Ex. Area 20 and North Part of Ex. Area 19	Development 19, 20 or Municipal Servicing Replacing Private Sewage Systems	With new or existing development	B	Pumping		12 L/s	$995,000	12 L/s	$995,000	12 L/s	$995,000	12 L/s	$ 995,000
WW-D-SPS-05B	Southeast Dorchester SPS	New SPS needed to support Development block east of Valleyview Crescent in South Dorchester	Development 47	Development Block 47	With new development	B	Pumping		4 L/s	$301,000	8 L/s	$538,000	8 L/s	$538,000	8 L/s	$ 538,000
WW-D-SPS-06B	Dorchester SPS Upgrades	Pumping station capacity upgrades required to accommodate growth flows in Dorchester	All Dorchester Development Blocks	Existing Need	Today	B	Pumping		190 L/s	$7,531,000	254 L/s	$10,065,000	411 L/s	$12,200,000	254 L/s	$ 10,065,000
WW-D-SPS-07B	Dorchester PS3	Pumping station capacity upgrades required to accommodate growth flows in Dorchester	Development 16-19, 22-25, 29b	Southeast Development Blocks	80% Trigger of 4,500 PPJ = 3,600 PPJ	B	Pumping		66 L/s	$3,501,000	102 L/s	$5,359,000	156 L/s	$6,793,000	102 L/s	$ 5,359,000
WW-D-FM-01	North Dorchester New Development forcemain	New forcemain needed to support new development SPS for development blocks North of CN rail in North Dorchester	Development 3-15 Ex. Area 1 - 4, 13	With WW-D-SPS-01	With new development	A+	Forcemain	475 m	300 mm	$1,244,000	300 mm	$1,244,000	300 mm	$1,244,000	300 mm	$ 1,244,000
WW-D-FM-02	Dorchester Road forcemain extension	New forcemain from Dorchester Road bridge forcemain to Dorchester road gravity sewers needed to support new development SPS for development blocks North of CN rail in North Dorchester	Development 3-15 Ex. Area 1 - 4, 13	With WW-D-SPS-01	With new development	A+	Forcemain	200 m	300 mm	$364,000	300 mm	$364,000	300 mm	$364,000	300 mm	$ 364,000
WW-D-FM-03	Dorchester Road forcemain extension	New forcemain from Dorchester Road bridge forcemain to Byron Ave trunk sewers needed to support new development SPS for development blocks North of CN rail in North Dorchester	Development 3-15 Ex. Area 1 - 4, 13	New Development or Municipal Servicing Replacing Private Sewage Systems	80% Trigger of 2,700 PPJ = 2,100 PPJ	A+	Forcemain	550 m			300 mm	$889,000	300 mm	$889,000	300 mm	$ 889,000
WW-D-FM-04	North Dorchester Northwest forcemain	New forcemain needed to support northwest development SPS for development blocks South of CN rail and West of Dorchester Road Bridge in North Dorchester	Ex. Area 2 and Surrounding Areas	With WW-D-SPS-02	Existing development	B	Forcemain	730 m	100 mm	$1,487,000	100 mm	$1,487,000	100 mm	$1,487,000	100 mm	$ 1,487,000
WW-D-FM-05	North Dorchester Northeast forcemain	New forcemain needed to support northeast SPS for existing development South of CN rail and East of Dorchester Road Bridge in North Dorchester	Ex. Area 13 and Surrounding Areas	With WW-D-SPS-03	With new development	B	Forcemain	500 m	100 mm	$1,183,000	100 mm	$1,183,000	100 mm	$1,183,000	100 mm	$ 1,183,000
WW-D-FM-06	South Dorchester forcemain	New forcemain needed to support south SPS for existing development South of river in South Dorchester	North part of Ex. Area 19 and Ex. Area 20	With WW-D-SPS-04	Existing development	B	Forcemain	1800 m	100 mm	$2,503,000	100 mm	$2,503,000	100 mm	$2,503,000	100 mm	$ 2,503,000
WW-D-FM-07	Southeast Dorchester forcemain	New forcemain needed to support southeast SPS for existing development East of serviced developments and North of Hamilton Road in South Dorchester	Development 47	With WW-D-SPS-05	With new development	B	Forcemain	620 m	100 mm	$771,000	100 mm	$771,000	100 mm	$771,000	100 mm	$ 771,000
WW-D-FM-08	Dorchester SPS forcemain	New forcemain needed to support Dorchester WWTP SPS for all existing and growth developments in Dorchester.	All Dorchester Development Blocks	With WW-D-SPS-06B (Dorchester SPS)	80% Trigger of 6,500 PPJ = 5,200 PPJ	B	Forcemain	1250 m	350 mm	$2,152,000	350 mm	$2,152,000	350 mm	$2,152,000	350 mm	$ 2,152,000
WW-D-FM-09	PS3 forcemain	Twinned forcemains needed to support PS3 for all development in Southeast Dorchester	Development 16-19, 22-25, 29b	With W-D-SPS-07B (Dorchester PS3)	80% Trigger of 4,500 PPJ = 3,600 PPJ	B	Forcemain	662 m	250 mm	$1,777,000	250 mm	$1,777,000	250 mm	$1,777,000	250 mm	$ 1,777,000
WW-D-SS-01B	New Development SPS West Sewers	New sanitary sewer required for development blocks going to new Development SPS in North Dorchester.	Development 3-7 Ex. Area 1	New Development or Municipal Servicing Replacing Private Sewage Systems	With new or existing development	A+	Sewer	420 m	250 mm	$488,000	300 mm	$490,000	300 mm	$490,000	300 mm	$ 490,000
WW-D-SS-02	New Development SPS East Sewers	New sanitary sewer required for development blocks going to new Development SPS in North Dorchester.	Development 8-15	New Development or Municipal Servicing Replacing Private Sewage Systems	With new or existing development	A	Sewer	480 m			250 mm	$712,000	250 mm	$712,000	250 mm	$ 712,000
WW-D-SS-03	PS3 West Sewers	New sanitary sewer required for development blocks going to PS3 in Dorchester.	Development 17-18, 22, 25 Ex. Area 19	New Development or Municipal Servicing Replacing Private Sewage Systems	Proposed construction	A+	Sewer	265 m	375 mm	$1,529,000	375 mm	$1,529,000	375 mm	$1,529,000	375 mm	$ 1,529,000
WW-D-SS-04	PS3 West Sewers	New sanitary sewer required for development blocks going to PS3 in Dorchester.	Development 17-18, 22, 25 Ex. Area 19	New Development or Municipal Servicing Replacing Private Sewage Systems	With new or existing development	A+	Sewer	45 m	450 mm	$126,000	450 mm	$126,000	450 mm	$126,000	450 mm	$ 126,000
WW-D-SS-05B-ALT-1	Christie Drive and new Development sewer	New sanitary sewer required for development blocks going to PS3 in Dorchester.	Development 17-18, 22, 25 Ex. Area 19	New Development or Municipal Servicing Replacing Private Sewage Systems	With new or existing development	A+	Sewer	370 m	250 mm	$562,000	300 mm	$563,000	300 mm	$563,000	300 mm	$ 563,000

Table 3-9: Wastewater Capital Program

Capital Program ID	Name	Description	Serviced Development Blocks and/or Existing Unserviced Areas	Upgrade Trigger	Upgrade Trigger (Population Growth)	Class EA Schedule	Project Type	Length (m)	Method 1		Method 2		Method 3		Size/Capacity	Capital Program Total Component Estimated Cost (Excl. HST)
									Size/Capacity	Total Component Estimated Cost (Excl. HST)	Size/Capacity	Total Component Estimated Cost (Excl. HST)	Size/Capacity	Total Component Estimated Cost (Excl. HST)		
WW-D-SS-06B-ALT-1	Rath-Harris Municipal Drain Crossing	New sanitary sewer required for development blocks going to PS3 in Dorchester.	Development 17-18, 22, 25 Ex. Area 19	New Development or Municipal Servicing Replacing Private Sewage Systems	With new or existing development	B	Sewer	80 m	250 mm	$364,000	300 mm	$827,000	300 mm	$827,000	300 mm	$ 827,000
WW-D-SS-07B-ALT-1	New development sewer	New sanitary sewer required for development blocks going to PS3 in Dorchester.	Development 17-18, 22, 25 Ex. Area 19	New Development or Municipal Servicing Replacing Private Sewage Systems	With new or existing development	A+	Sewer	390 m	250 mm	$1,977,000	375 mm	$1,993,000	375 mm	$1,993,000	375 mm	$ 1,993,000
WW-D-SS-09	Sewer East of PS3	New sanitary sewer to accommodate growth flows east of PS3 in Dorchester	Development 24, 29b	New Development	With new development	A	Sewer	400 m	250 mm	$1,183,000	250 mm	$1,183,000	250 mm	$1,183,000	250 mm	$ 1,183,000
WW-D-SS-10	Sewer East of PS3	New sanitary sewer to accommodate growth flows east of PS3 in Dorchester	Development 24, 29b	New Development	With new development	A		30 m	300 mm	$102,000	300 mm	$102,000	300 mm	$102,000	300 mm	$ 102,000
WW-D-SS-11B	Christie Drive and new Development sewer	New sanitary sewer required for development blocks going to PS3 in Dorchester.	Development 17-18, 22, 25 Ex. Area 19	New Development	With new development	A	Sewer	505 m	250 mm	$631,000	300 mm	$632,000	300 mm	$632,000	300 mm	$ 632,000
WW-D-SS-12	Clara Street sewer	New sanitary sewer to accommodate growth Northeast of New development SPS in North Dorchester	Development 7 - 11 Ex. Surrounding Areas	New Development	With new development	A+	Sewer	605 m	200 mm	$880,000	200 mm	$880,000	200 mm	$880,000	200 mm	$ 880,000
WW-D-SS-13	Marion Street sewer	New sanitary sewer to accommodate growth Northeast of New development SPS in North Dorchester	Development 9 - 10 Ex. Surrounding Areas	New Development	With new development	A+	Sewer	210 m	200 mm	$342,000	200 mm	$342,000	200 mm	$342,000	200 mm	$ 342,000
WW-D-SS-14	North Street to Clara Street sewer	New sanitary sewer to accommodate growth Northeast of New development SPS in North Dorchester	Development 11-12, 14 Ex. Area 13, Surrounding Areas	New Development	With new development	A	Sewer	450 m	200 mm	$670,000	200 mm	$670,000	200 mm	$670,000	200 mm	$ 670,000
WW-D-SS-15	North Street Sewer	New sanitary sewer to accommodate growth Northeast of New development SPS in North Dorchester	Development 9-12, 14 Ex. Area 13, Surrounding Areas	New Development	With new development	A	Sewer	325 m	200 mm	$499,000	200 mm	$499,000	200 mm	$499,000	200 mm	$ 499,000
WW-D-SS-16	Richmond Street Sewer	New sanitary sewer to accommodate growth Northeast of New development SPS in North Dorchester	Development 5-7 Ex. Area 1,3-4, Surrounding Areas	New Development	With new development	A	Sewer	405 m	200 mm	$515,000	200 mm	$515,000	200 mm	$515,000	200 mm	$ 515,000
WW-D-SS-17	Hamilton Road to Christie Drive sewer	New sanitary sewer to accommodate growth flows east of PS3 in Dorchester	Development 16-17	New Development	With new development	A	Sewer	1250 m	200 mm	$1,530,000	200 mm	$1,530,000	200 mm	$1,530,000	200 mm	$ 1,530,000
WW-D-SS-18	Sewers for Municipal Servicing Replacing Private Sewage Systems (SPS-01B)	New sanitary sewers to benefit existing unserviced within North Dorchester (WW-D-SPS-01B catchment)	Ex. Areas in North Dorchester on Private Sewage Systems	Municipal Servicing Replacing Private Sewage Systems	With new development	A+	Sewer	7500 m	200 mm	$10,445,000	200 mm	$10,445,000	200 mm	$10,445,000	200 mm	$ 10,445,000
WW-D-SS-19	Sewers for Municipal Servicing Replacing Private Sewage Systems (SPS-02)	New sanitary sewers to benefit existing unserviced within North Dorchester (WW-D-SPS-02 catchment)	Ex. Areas in North Dorchester on Private Sewage Systems	Municipal Servicing Replacing Private Sewage Systems	With new development	A+	Sewer	5640 m	200 mm	$7,856,000	200 mm	$7,856,000	200 mm	$7,856,000	200 mm	$ 7,856,000
WW-D-SS-20	Sewers for Municipal Servicing Replacing Private Sewage Systems (SPS-03)	New sanitary sewers to benefit existing unserviced within North Dorchester (WW-D-SPS-03 catchment)	Ex. Areas in North Dorchester on Private Sewage Systems	Municipal Servicing Replacing Private Sewage Systems	With new development	A+	Sewer	1120 m	200 mm	$1,637,000	200 mm	$1,637,000	200 mm	$1,637,000	200 mm	$ 1,637,000
WW-D-SS-21	Sewers for Municipal Servicing Replacing Private Sewage Systems (SPS-04)	New sanitary sewers to benefit existing unserviced within South Dorchester (WW-D-SPS-04 catchment)	Ex. Areas in North Dorchester on Private Sewage Systems	Municipal Servicing Replacing Private Sewage Systems	With new development	A+	Sewer	5300 m	200 mm	$7,383,000	200 mm	$7,383,000	200 mm	$7,383,000	200 mm	$ 7,383,000
WW-D-SS-22	Sewers for Municipal Servicing Replacing Private Sewage Systems (SPS-06B)	New sanitary sewers to benefit existing unserviced within South Dorchester (WW-D-SPS-06B catchment)	Ex. Areas in South Dorchester on Private Sewage Systems	Municipal Servicing Replacing Private Sewage Systems	With new development	A+	Sewer	8200 m	200 mm	$11,420,000	200 mm	$11,420,000	200 mm	$11,420,000	200 mm	$ 11,420,000
WW-D-SS-23	Sewers for Municipal Servicing Replacing Private Sewage Systems (SPS-07B)	New sanitary sewers to benefit existing unserviced within North Dorchester (WW-D-SPS-07B catchment)	Ex. Areas in South Dorchester on Private Sewage Systems	Municipal Servicing Replacing Private Sewage Systems	With new development	A+	Sewer	2250 m	200 mm	$3,172,000	200 mm	$3,172,000	200 mm	$3,172,000	200 mm	$ 3,172,000
Sub-Total Dorchester Wastewater Capital Program Projects										**$ 90,431,000**		**$ 103,255,000**		**$ 118,899,000**		**$ 103,255,000**
WW-D-401-ST-01	Cost Benefit Study to Service 401 Corridor Lands	Cost-benefit study to evaluate servicing options for 401 Corridor Lands, will include recommendations for gravity, sewage pumping station or siphon options.	401 Corridor Lands	Development Interest		-	Study			$50,000		$50,000		$50,000		$ 50,000
Sub-Total 401 Corridor Wastewater Capital Program Projects										**$ 50,000**		**$ 50,000**		**$ 50,000**		**$ 50,000**

Table 3-9: Wastewater Capital Program

Capital Program ID	Name	Description	Serviced Development Blocks and/or Existing Unserviced Areas	Upgrade Trigger	Upgrade Trigger (Population Growth)	Class EA Schedule	Project Type	Length (m)	Method 1		Method 2		Method 3		Size/Capacity	Capital Program Total Component Estimated Cost (Excl. HST)
									Size/Capacity	Total Component Estimated Cost (Excl. HST)	Size/Capacity	Total Component Estimated Cost (Excl. HST)	Size/Capacity	Total Component Estimated Cost (Excl. HST)		
WW-T-TP-01B	Thorndale Treatment Plant Upgrades (includes SPS)	Treatment plant capacity upgrades required to accommodate all development flows in Thorndale (includes Thorndale SPS and forcemain)	All Thorndale Developments	Accumulated growth	1,000 PPJ	C	Treatment		0.3 ML	$2,207,000	1.0 ML	$7,192,000	2.3 ML	$15,985,000	1.0 ML	$ 7,192,000
WW-T-SS-01	Gerald Parkway sewer upgrades	Sewer upgrades along Gerald Parkway to accommodate growth flows in West Thorndale	Peripheral Lands Development 14 and 15	New Peripheral Lands Development	With new development	A+	Sewer	200 m			375 mm	$340,000	375 mm	$340,000	375 mm	$ 340,000
WW-T-SS-02	King Street sewer	King Street sewer from CN rail to Lions Lane to accommodate East Thorndale growth flows	Peripheral Lands Development 14 and 15	New Peripheral Lands Development	With new development	A+	Sewer	375 m					250 mm	$569,000	250 mm	$ 569,000
WW-T-SS-03	King Street sewer	King Street sewer from Lions Lane to Monteith Avenue to accommodate East Thorndale growth flows	Development 7-8, Ex. King St. Harrison St. Area and Peripheral Lands Development 16	Development 8-13 and 16	2,500 PPJ	A+	Sewer	485 m					250 mm	$719,000	250 mm	$ 719,000
WW-T-SS-04	King Street sewer	King Street sewer from Wye Creek to existing sewers to accommodate existing development flows	Development 7-8, Ex. King St. Harrison St. Area and Peripheral Lands Development 16	Development 8-13 and 17	2,500 PPJ	A+	Sewer	340 m					200 mm	$520,000	200 mm	$ 520,000
WW-T-SS-05	King Street sewer	King Street sewer under Wye Creek to accommodate existing development flows	Development 7-8, Ex. King St. Harrison St. Area and Peripheral Lands Development 16	Development 8-13 and 18	4,000 PPJ	B	Sewer	70 m					200 mm	$713,000	200 mm	$ 713,000
WW-T-SS-06	King Street sewer	King Street sewer from Harrison Street to before Wye Creek to accommodate existing development flows	Development 7-8, Ex. King St. Harrison St. Area and Peripheral Lands Development 16	Development 1, 3, 8-13 and 16	3,750 PPJ	A+	Sewer	130 m					200 mm	$234,000	200 mm	$ 234,000
WW-T-SS-07	Sewers for Existing Unserviced within Thorndale	New sanitary sewers to benefit existing unserviced within Thorndale	Ex. King St. Harrison St. Area	Municipal Servicing Replacing Private Sewage Systems	4,000 PPJ	A+	Sewer	806 m					200 mm	$1,152,000	200 mm	$ 1,152,000
Sub-Total Thorndale Wastewater Capital Program Projects										**$ 2,207,000**		**$ 7,532,000**		**$ 20,232,000**		**$ 11,439,000**
Total Municipality of Thames Centre Wastewater Capital Program										**$ 92,688,000**		**$ 110,837,000**		**$ 139,181,000**		**$ 114,744,000**

4 Further Considerations

The *Further Considerations* section provides an overall review of the permits and approvals, and mitigation measures that may be required for the preferred water and wastewater servicing strategy for the Municipality of Thames Centre.

This section has been organized as described below:

4.1 Permits and Approvals

4.2 Impacts and Mitigation Measures

This section is one of five sections that make up the complete Master Plan Class EA Study Report and should be read in conjunction with the other sections.

4.1 Permits and Approvals

This section provides an overview of the key permits and approvals that may be required in advance of the construction activities, and which will be further explored during detailed design.

4.1.1 Fisheries and Oceans Canada

A Fisheries Act self-screening may be required. A project review or authorizations may apply if impacts to fish and aquatic habitat cannot be avoided or mitigated during design and construction.

4.1.2 Ministry of the Environment, Conservation and Parks

4.1.2.1 Permit to Take Water

A Permit to Take Water (PTTW) is required for any water takings over 50,000 L/day. For a taking of greater than 50,000 L/day, but less than 400,000 L/day, the water taking shall be registered in the Environmental Activity and Sector Registry.

In the event that groundwater is present within the range of excavation depth, there is potential for dewatering requirements to exceed 400,000 L/d: this would require MECP approval through the PTTW application process. Prior to submitting any PTTW applications, ensure all that of the other related necessary approvals are obtained first.

4.1.2.2 Environmental Activity and Sector Registry

Any activities that discharge air contaminants at the facility will be registered in the Environmental Activity and Sector Registry as prescribed by O. Reg. 1/17.

4.1.2.3 Environmental Compliance Approval

Environmental Compliance Approval(s) are required for all sewage works.

4.1.2.4 Ministry of Natural Resources and Forestry

Wildlife relocation permits may be required if wildlife removals are needed during construction. Similarly, fish relocation permits may be required if fish salvage or relocations are needed during construction. Permits or other authorization may be required to conduct an activity that could impact an endangered or threatened plant or animal or its habitat.

4.1.3 Ministry of Heritage, Sport, Tourism and Cultural Industries

The Ministry of Heritage, Sport, Tourism and Cultural Industries (MHSPTCI) reviews archaeological assessments to determine consistency with the 2011 Standards and Guidelines for Consultant Archaeologists.

MHSTCI also reviews and comments on Cultural Heritage Assessment Reports, Cultural Heritage Evaluation Reports and Heritage Impact Assessments that have been submitted for environmental assessment projects.

Additional surveys may be required contingent on the MHSPTCI review of a Stage 1 Study Report.

4.1.4 Conservation Authorities

Construction plans and supporting technical studies will be required to assess impacts, and to implement strategies to minimize and mitigate impacts, to regulated natural features and hazards. The Municipality of Thames Centre requires permits under O. Reg. 157/06, from UTRCA, respectively, for interference or alteration to wetlands or watercourses, or for development within regulated areas.

4.1.5 Municipality of Thames Centre

Tree removal will be conducted in order to comply with the Municipality's By-law as required.

4.1.6 Drinking Water Source Protection

The Clean Water Act (2006) and the Source Protection Plans that follow under it provide guidance and requirements in land use planning for the protection of Ontario's water resources. In some circumstances, sewage infrastructure may be considered an activity that poses a "significant" risk to drinking water quality.

The Municipality falls within the Upper Thames River Source Protection Area.

There are Wellhead Protection Areas (WHPAs) associated with the municipal wells servicing Dorchester and Thorndale.

The Master Plan recommends infrastructure projects to support development proposals in potentially vulnerable areas. The Municipality of Thames Centre will determine the need for any new Risk Management Plans and continue to complete best practice education for sites within vulnerable areas that do not require a Risk Management Plan.

4.2 Impacts and Mitigation Measures

During the Municipal Class EA, the Municipality of Thames Centre worked closely with key stakeholders to address and resolve key issues or challenges associated with this study. However, not all issues can be addressed within the context of this Municipal Class EA process. As a result, the potential effects associated with the preferred strategies are provided below, as are the proposed mitigation measures developed to avoid or minimize those impacts.

4.2.1 Archaeological and Built/Cultural Resources

A Stage 1 archaeological assessment is recommended once a conceptual or preliminary design for the Water and Wastewater strategies are prepared for projects outside of existing and future road right of ways and undisturbed areas. The Stage 1 assessment will improve on this current assessment and will confirm the archeological potential of the area.

As part of the cultural heritage existing conditions brief, the following mitigation measures are recommended within the study area:

- Completion of fieldwork that determines the extent of any cemeteries, as burials may be located outside the known boundaries and might be impacted;
- Plan future water and wastewater servicing work in the Dorchester and Thorndale Heritage Areas within the existing road right-of-ways;
    - Impacts from construction activity (such as ground-borne vibration) may occur, and a peak particle velocity (PPV) for heritage structures should be determined by a qualified structural engineer with cultural heritage experience prior to construction, followed by a post-construction examination;
- Completion of a baseline Cultural Heritage Assessment Report (CHAR) to determine known and potential cultural heritage resources;
    - The results of the CHAR might recommend a Heritage Impact Assessment (HIA);
- Conduct site-specific HIA prior to water and/or wastewater servicing work on or adjacent (contiguous) to all properties designated under the Ontario Heritage Act and/or subject to a heritage plaque.
- For any other areas in the Municipality where water and wastewater servicing projects will be subject to Schedule B Municipal Class EAs, it is recommended that a Cultural Heritage Assessment Report be completed in support of each project.

4.2.2 Air Quality, Dust and Noise

The recommended servicing strategies are located within Dorchester and Thorndale. These areas are composed of agriculture, recreational, residential and limited commercial/industrial developments. Most construction will take place in existing and future road rights-of-ways which may be adjacent to potential sensitive receptors such as residential and business properties. Specific air quality, dust and noise mitigation measures should be prepared during the design stages. This will help to minimize the impact of odour problems and generation of sulfides and other odorous compounds which may be generated by the construction and operation of the recommended strategies. However, in general the Municipality of Thames Centre will:

- Ensure Odour Control Plan (OCP) is delivered during construction and operation of recommended SPS projects. During the design stage of implementation, as required by the Municipality, the proponent will provide a noise, odour and/or dust mitigation plan including direction submitting complaints.
- Employ a noise and dust control strategy to reduce emissions during construction of the recommended projects.
- Obtain an Environmental Compliance Approval for Air and Noise during detailed design where required.
- Develop a construction-staging plan to minimize community disruption where required.
- Use low noise equipment during construction, where possible.
- Restrict working hours for construction, in accordance with the Municipality of Thames Centre's Noise Control By-law.
- During implementation of the design stage, as required by the Municipality, the proponent should provide noise, odour and/or dust mitigation plan including direction on how to submit complaints.
- As recommended by the MECP, non-chloride dust suppressants will be used during the construction phase.

4.2.3 Species at Risk

Any work that may impact the habitat of threatened or endangered species shall meet all associated regulations, including registration and permitting, as well as comply with all regulations within the Endangered Species Act (ESA).

To minimize any harm to wildlife and wildlife habitat, the following mitigation measures should be implemented during the construction process:

- Any vegetation clearing that must occur during construction shall not occur during the breeding bird season (April 15 to August 15). If this is not possible, prior to vegetation clearing, a qualified biologist must complete a nest search.
- Measures must be implemented to protect trees from direct and indirect physical damage.

- Once the construction has been completed, all disturbed areas shall be rehabilitated, stabilized and revegetated to ensure the project site is restored to pre-construction conditions.
- Installation of exclusion fencing surrounding the active construction area.

4.2.4 Significant Natural Environment Features

It is recommended that future planning avoid any significant natural environment features including environmental significant areas, significant wetlands, woodlands, ANSIs and valleylands. If preferred alternatives cannot avoid these area, additional studies are recommended to conform to applicable policies of the Greenbelt, ORMCP, Municipality and County Official Plans.

Works in or surrounding significant wetlands, and fish habitat will require a *Development, Interference with Wetland and Alterations to Shorelines and Watercourses* permit from the UTRCA, depending on the area's conservation authority jurisdiction.

4.2.5 Surface and Groundwater

The surface water features associated with the creeks and lakes are considered to be sensitive receptors. As shallow groundwater is understood to discharge to these watercourses, they are considered to be susceptible to impacts from changes in groundwater quantity and/or quality. Mitigation of potential impacts to surface water and groundwater should include the following:

- Appropriate selection of construction methods to minimize dewatering near creeks;
- Appropriate selection of linear sewer route and construction methods to minimize potential disruption of current state of interaction between groundwater and surface water;
- Employing clay collars as necessary to reduce preferential seepage along the proposed alignment, especially where it is proposed to slope towards and/or cross any creeks;
- Development of an erosion and sediment control plan to ensure dewatering discharge does not impact surface water while protecting the watercourse from sediment laden runoff; and,
- Development and implementation of a spills response plan in the event of a fuel spill or sediment release.

In order to protect surface and groundwater features, the design of the municipal service corridors should include trench barrier mechanism to prevent the horizontal and vertical transport of potential contaminants through the disturbed soil and materials around the municipal services, especially in areas currently with no municipal sanitary sewer

services. This methodology will be considered during design and permits and approvals stage in consultation with the Municipality.

For any development occurring within a Wellhead Protection Area, the development of a Source Water Impact Assessment and Mitigation Plan may be required.

A geotechnical evaluation for ground settlement, excavation basal heaving and the selection of an appropriate dewatering mechanism should be performed by a geotechnical engineer for the phases of the project that will require a PTTW or where groundwater is under artesian conditions. In addition, a hydrogeological impact assessment should be performed for these projects.

4.2.6 Contaminated Areas

It is recommended that a Phase One Environmental Site Assessment be performed to identify potential contaminating activities and provide an assessment of the risk of contaminated groundwater and soils to support the design phases of planned works.

If soils are contaminated, they will be disposed of consistent with Part XV.1 of the Environmental Protection Act and Ontario Regulations 153/04, Records of Site Condition. The MECP's London District Office will be contacted for future consultation if contaminated sites are present.

Activities involving the management of excess soil will be completed in accordance with the MECP's current guidance document titled "Management of Excess Soil – A Guide for Best Management Practices" (2014) available online (http://www.ontario.ca/document/management-excess-soil-guide-best-management-practices). All waste generated during construction will be disposed of in accordance with provincial requirements. The areas of construction disturbance will be kept to a minimum.

4.2.7 Traffic Management

During detailed design of the recommended projects the proponent will prepare a traffic management plan. This plan will need to consider required signage, traffic control measures to aid the safe ingress and egress of trucks to and from the site, and mitigation of impacts to vehicular traffic in addition to other pedestrian and cycling movements.

4.2.8 Utilities

During detailed design of the recommended projects, the proponent will need to contact the relevant utility firms to confirm and ensure impacts to utilities are minimized or avoided during construction and operations.

5 Public Consultation

5.1 Communication and Consultation Summary

The *Public Consultation* section provides a compilation of all the relevant documentation related to the public, stakeholder and agency consultation. This section also provides the background support for satisfying the Public Consultation for the Class EA Process.

This section has been organized as described below:

5.2 Communication and Consultation Summary

5.3 Contact List

5.4 Notice of Commencement

5.5 Public Information Centre

5.6 Aboriginal and First Nations Consultation

5.7 Comments Received

5.8 Notice of Completion

This section is one of five sections that make up the complete Master Plan Class EA Study Report and should be read in conjunction with the other sections.

5.2 Communication and Consultation Summary

Public consultation is an integral component of the Class EA process, enabling the Municipality to inform the public about the study while eliciting input from potentially interested and affected parties during the study process.

The primary goals of the public consultation process are to:

- Present clear and concise information to stakeholders at key stages of the study process;
- Solicit community, regulatory and Municipality staff input;
- Undertake comprehensive consultation to complete the duty to consult with Aboriginal people in Ontario;
- Consider stakeholder comments when evaluating alternative solutions and in recommending the technical feasible solution; and,
- Comply with Municipal Class EA consultation requirements.

At the outset of the public consultation process, the Municipality of Thames Centre developed a Communication and Consultation Plan tailored to this study. The primary objective of the plan was to encourage two-way communication with the community, regulatory agencies and Municipality staff. More specifically, the plan was designed to:

- Build on past communication protocols and consultation plans from previous Class EAs and municipal planning initiatives - to ensure consistency and continuity;
- Ensure the general public, local councillors, stakeholders, external agencies (including federal, provincial and regional) and special interest groups had an opportunity to participate in the study process;
- Ensure that relevant information was provided to interested and affected stakeholders early and often throughout the planning process; and,
- Make contact with external agencies to obtain legislative or regulatory approvals, and to collect pertinent technical information.

In order to comply with the Municipal Class EA process, the Municipality hosted a Public Information Centre to elicit input on the study process and the preliminary preferred servicing solution and infrastructure projects. Complete documentation of the consultation and communication program is provided in **Appendix E.**

5.3 Contact List

A list of stakeholders, review agencies and other interested parties was developed at the outset of the study to invite participation in the planning process. The contact list was updated throughout the study as more individuals became aware of the study or provided feedback.

5.4 Notice of Commencement

The combined Notice of Commencement and PIC #1 was published and distributed on December 7, 2018. The notice was made public by the following means:

- Mailed/ e-mailed to the stakeholders listed in the contact list; and,
- Advertised in the Thames Centre local newspaper, The Signpost

5.5 Public Information Centre

The study's PIC was intended to elicit input on the Class EA process, servicing constraints and opportunities, alternative concepts and strategies to address the servicing challenges and opportunities, and the technically feasible solution. The study included one PIC.

5.5.1 Public Information Centre No. 1

The Notice of PIC #1 was distributed to the individuals listed in the master contact list as well as being posted in the Thames Centre local newspaper; The Signpost.

PIC No. 1 was held during Phase 2 of the Class EA study process to present the systems opportunities and constraints, present preliminary preferred servicing strategies and received public input.

PIC No. 1 was held at the location and date provided in **Table 5-1**:

Table 5-1: Public Information Centre No. 1

Date	Location
Thursday, May 30, 2019 **4:00 p.m. to 6:00 p.m.**	Thorndale Community Centre 265 Upper Queen Street, Thorndale, Ontario
Thursday, May 30, 2019 **7:00 p.m. to 9:00 p.m.**	The Flight Exec Centre 2066 Dorchester Road, Dorchester, Ontario

Details on the attendance, comments received, and display panels presented during PIC No. 1 are provided in **Appendix E**.

5.6 Aboriginal and First Nations Consultation

Following the notice of commencement and PIC #1, the MECP provided GM BluePlan with a list of Aboriginal and First Nation's communities who may potentially be affected by the Municipality's Master Plan. The identified communities include:

- Aamjiwnaang First Nation
- Bkejwanong Territory (Walpole Island First Nation)
- Chippewas of Kettle and Stony Point First Nation
- Chippewas of the Thames First Nation
- Caldwell First Nation
- Oneida Nation of the Thames (ONYOTA'A:KA)
- Munsee-Delaware Nation
- Eelünaapéewi Lahkéewiit (Delaware Nation)

These communities were added to the project contact list and received all project notices throughout the project's timeline.

5.7 Comments Received

Through the public consultation process, comments were received from stakeholders. These comments were filed and addressed accordingly. **Table 5-2** provides a summary of comments received during this study. **Appendix E** provides the detailed list of comments received throughout the study.

Table 5-2: Consultation Comments Summary

Stakeholder	Date	Summary of Comments	Action
MECP	12-Dec-18	MECP advised of new process to submit notices along with a Project Information Form to regional representative.	• Comment filed. • GMBP submitted requested documents to MECP on 18-Dec-18.
Bell Canada	18-Dec-18	Requested contact name to be removed from stakeholder list and suggested addressing as "attention to" so any Bell office recipient can open.	• Comment filed. • Updates made to stakeholder list.
MHSTCI	07-Jan-19	MHSTCI provided official response and showed interest in three areas including: archaeological resources (including land and marine); built heritage resources (including bridges and monuments); and cultural heritage landscapes. MHSTCI requested to remain on the stakeholder list.	• Comment filed. • No technical heritage studies were completed under this study.
UTRCA	01-Feb-19	Confirmed receipt of Notice of Commencement. Expressed interest in the review of documents and proposed alternatives including draft Environmental Study Report and/or Assimilative Capacity Report. Stated that prior to undertaking any works in the regulated area including filling, grading, construction, alteration to a watercourse and/or interference with a wetland would require written approval from UTRCA. To consider incorporating regulatory requirements of the Clean Water Act and Source Protection Plan.	• Comment filed. • This Master Plan will not include an Environmental Study Report or Assimilative Capacity Report. A copy of the final report will be sent to UTRCA for review during the public review period. In addition, no works related to the listed (i.e. construction) will take place.
COTTFN	03-Apr-19	COTTFN confirmed receipt of Notice of Commencement. Noted that this study is located within the London Township Treaty area (1796) as well as the Big Bear Creek Additions to Reserve (ATR) land selection area, and COTTFN's Traditional Territory. Requested to remain on the stakeholder list and send notification via email.	• Comment filed. • Revised stakeholder list to include new email address.

Stakeholder	Date	Summary of Comments	Action
Oneida Nation of the Thames	05-Apr-19	Confirmed receipt of Notice of Commencement. Encouraged team to come out to the community and present the project to the Oneida Environment Department.	• Comment filed. • Team contacted Oneida to set up date for presentation.
CJDL Consulting Engineering	29-Apr-19	Confirmed receipt of Notice of Commencement. Requested to remain on the stakeholder list and suggested adding two additional contacts from CJDL.	• Comment filed. • Stakeholder list updated.
Resident	16-May-19	Resident interested in more information about the study. Is currently a home owner in Dorchester on septic system.	• Comment filed. • GMBP issued response with date and information for upcoming Public Information Centre.
MECP	29-May-19	Acknowledged receipt of Notice of Commencement. Provided list of Indigenous Communities for consultation.	• Comment filed. • GMBP provided list of indigenous communities with information presented at the Public Information as well as an opportunity to learn more about the study.
RW Stratford Consulting Inc.	05-Jun-19	Requested an electronic copy of materials presented at Public Information Centre.	• Comment filed. • GMBP provided link for download which includes materials presented at Public Information Centre.
COTTFN	19-Jun-19	Confirmed receipt of Public Information Centre material. Stated that based on this review, there is not enough information to determine if there are any potential impacts. Interested in viewing the Final Report when complete.	• Comment filed. • GMBP to provide copy of the final report during the 30-day public review period.
COTTFN	19-Jun-19	Provided invoice to Thames Centre for the review of materials.	• Comment filed. • Thames Centre processed invoice.

Stakeholder	Date	Summary of Comments	Action
Middlesex County Library	05-Sep-19	Responded to Notice of Study Completion and informed that the respective notice would be on display at the library's community bulletin boards.	• Comment filed.
Aamjiwnaang First Nation	05-Sep-19	Responded to Notice of Study Completion and shared the respective notice with the First Nation consultation contact.	• Comment filed.
COTTFN	11-Sep-19	Requested an electronic copy of the final report.	• Comment filed.
CJDL Consulting Engineering	12-Sep-19	Requested an electronic copy of the final report.	• Comment filed.
COTTFN	23-Sep-19	Acknowledge review of final report. Chippewas of the Thames First Nation presently have minimal concerns with the information provided and ask that if there are any changes to the project that are of substantive nature to keep in contact.	• Comment filed. • Team will contact COTTFN of any substantial changes to project.
MHSTCI	30-Sep-19	Requested an electronic copy of the final report for review and copy.	• Comment filed.
MHSTCI	08-Nov-19	Provided written comments on the final report as pertaining to MHSTCI.	• Comment filed. • Incorporated comments into the final report.

5.8 Notice of Completion

The Notice of Completion was published and distributed on September 5, 2019. The notice was made public by the following means:

- Mailed/ e-mailed to the stakeholders listed in the contact list,
- Advertised in the Signpost, a weekly newspaper.