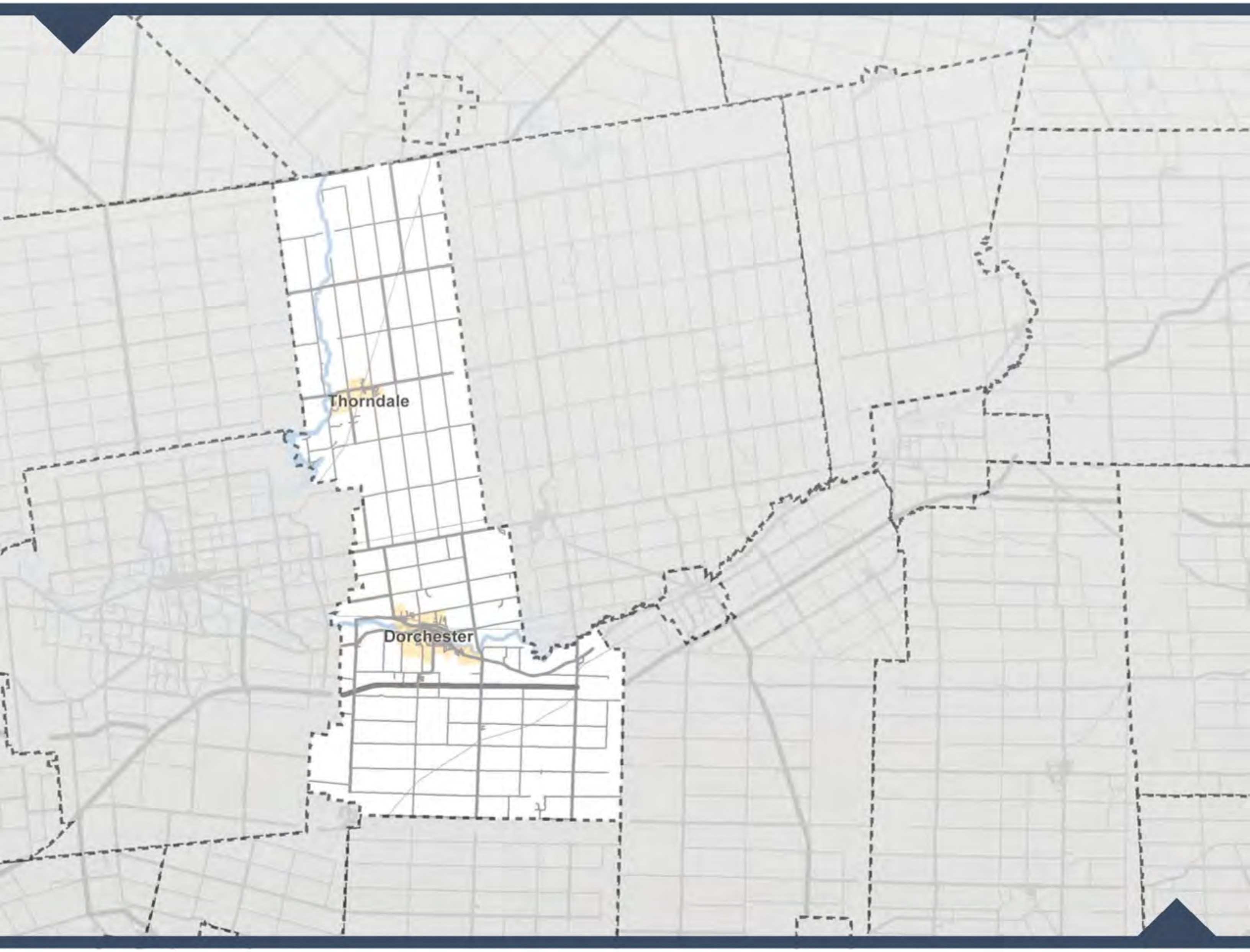
WATER AND WASTEWATER MASTER PLAN UPDATE – EXECUTIVE SUMMARY

Project No. 418109
August 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.

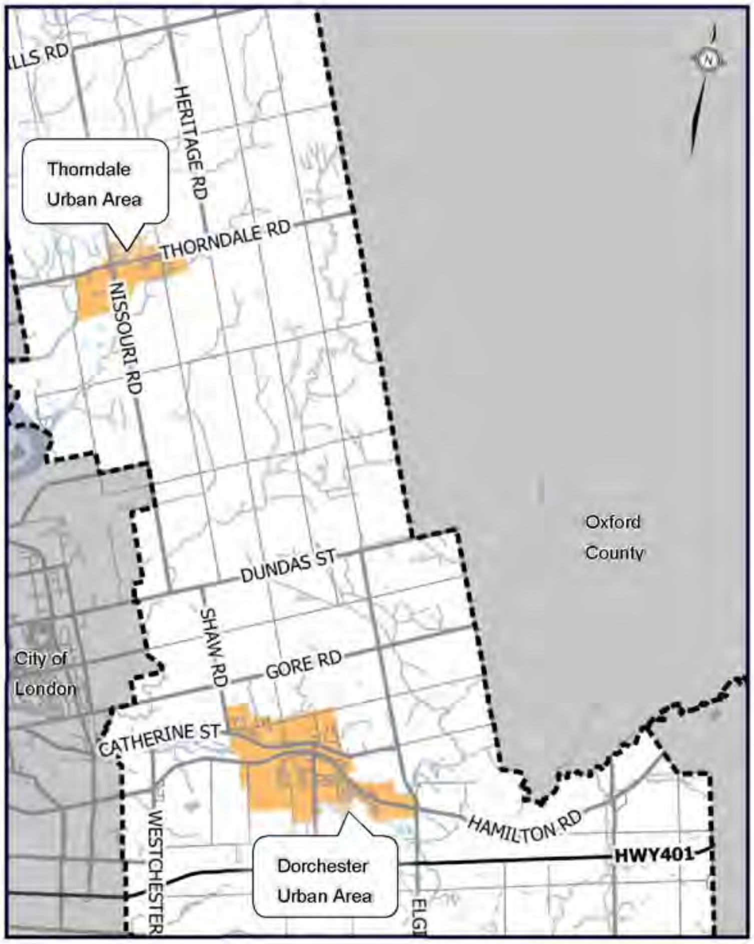


Figure ES-1: Municipality of Thames Centre Water and Wastewater Master Plan Study Area

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.

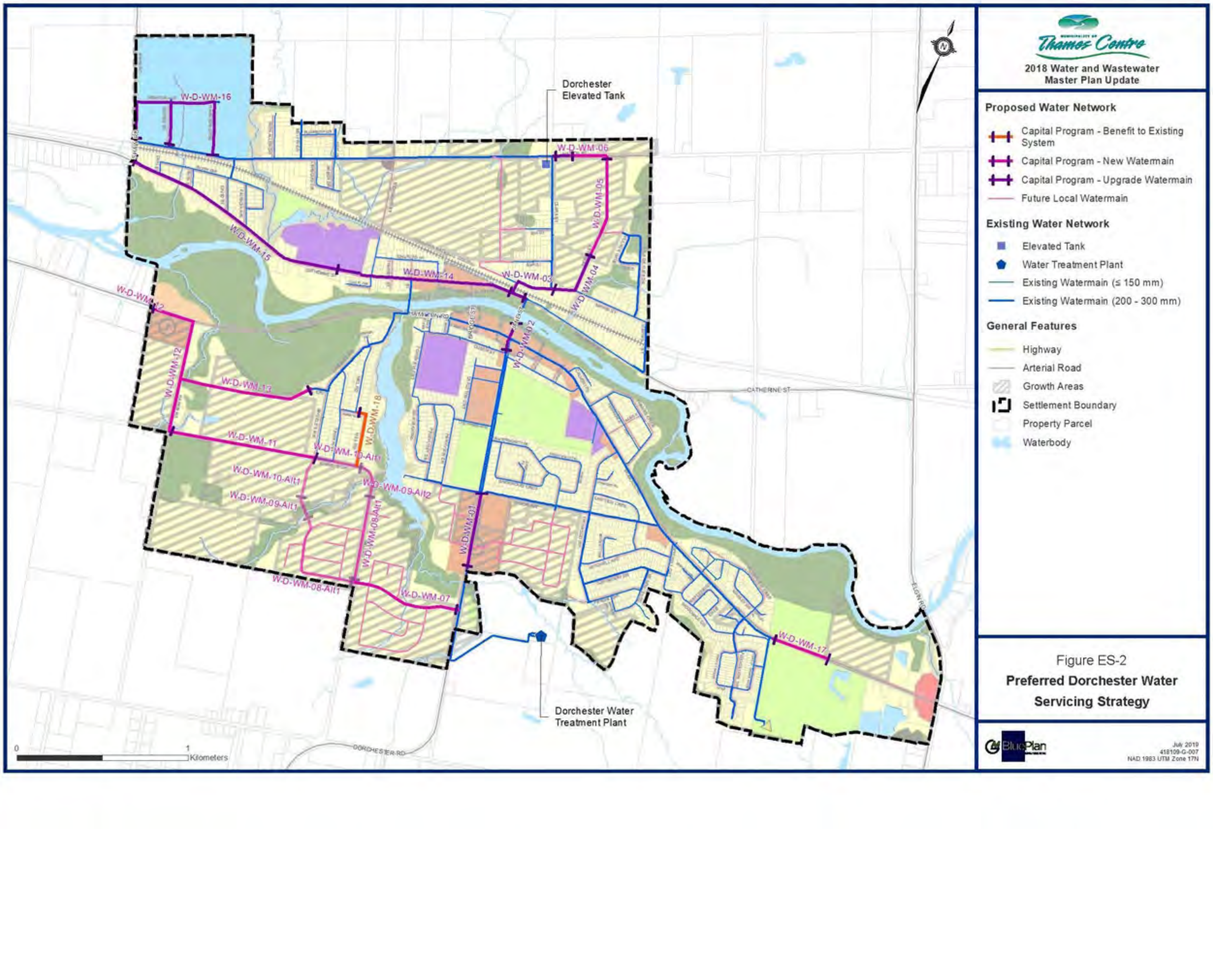


Figure ES-2
Preferred Dorchester Water Servicing Strategy

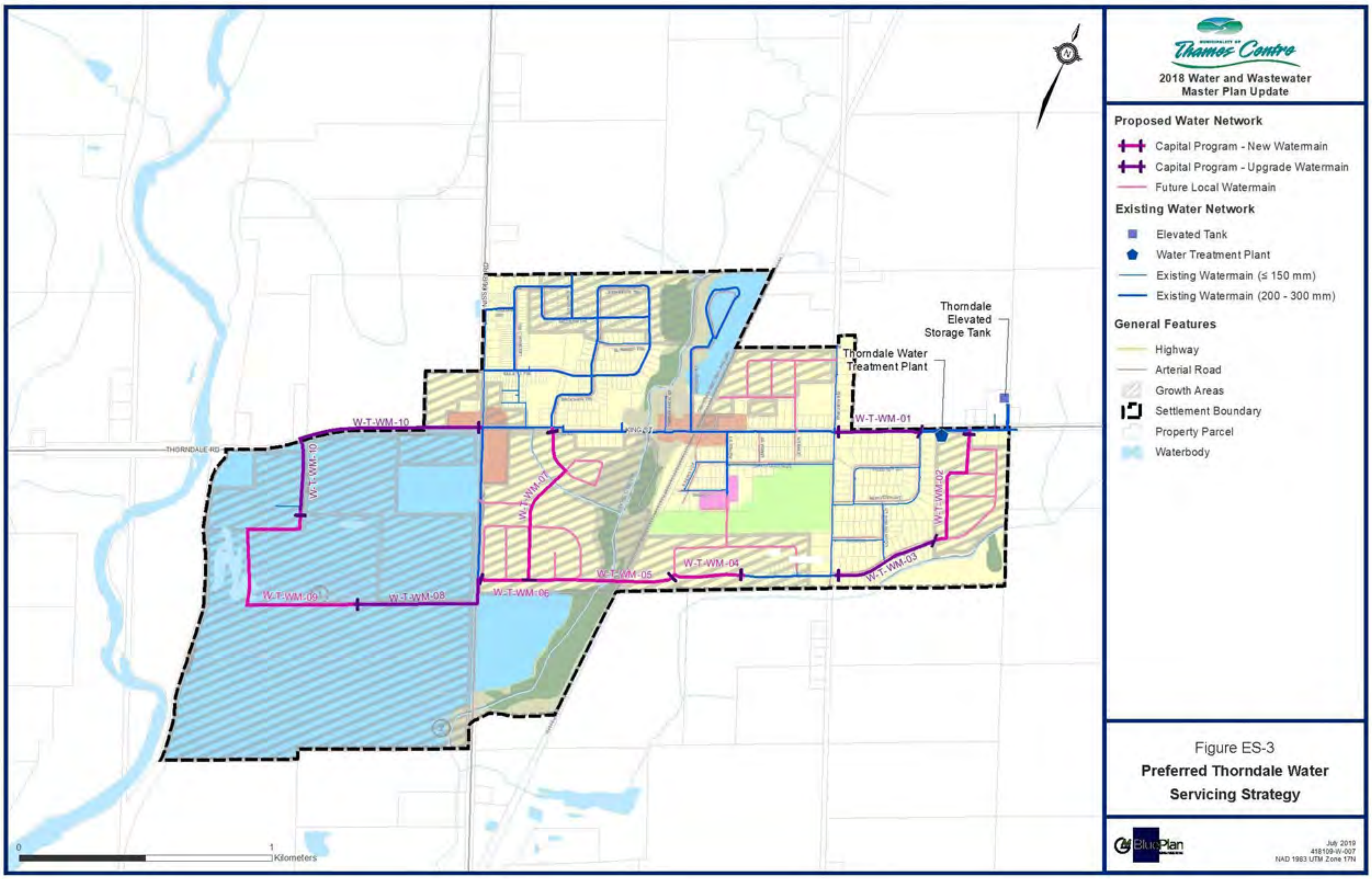


Figure ES-3

Preferred Thorndale Water Servicing Strategy

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	B	Treatment	0 m	10 L/s	$ 1,087,000
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	90% Trigger of 2,000 PPJ (Persons + Jobs) = 2,200 PPJ	C	Treatment	0 m	8 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	B	Pumping	0 m	80 L/s	$ 1,087,000
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	$ 511,000
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	B	Watermain	590 m	200 mm	$ 1,077,000
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 - 600m of proposed 300mm PVC watermain at Development 25	Dorchester Development Block 25	Dorchester Development Block 25	Construction proposed	B	Watermain	600 m	300 mm	$ 1,087,000
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	$ 1,710,000
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	B	Watermain	910 m	300 mm	$ 1,620,000
W-D-WM-13	Dorchester Watermain - West Trunk at Mill St. Loop	Newly proposed West Trunk - 880m of proposed 200mm PVC watermain on Mill St to complete loop	Dorchester Development 16	Watermain Replacement Program		A+	Watermain	880 m	200 mm	$ 1,294,000
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	$ 2,099,000
W-D-WM-15	Dorchester Watermain - Catherine St. West Section Upgrade	1330m 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	1330 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 1976 - 2013) to be replaced by 300mm PVC watermain	Existing Dorchester Development	Watermain Replacement Program	–	A+	Watermain	1260 m	300 mm	$ 2,263,000
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	310m of proposed 200mm PVC watermain along Mill Rd.	Dorchester Development Block 19	Dorchester Development Block 19	With new development	A+	Watermain	310 m	200 mm	$ 545,000
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 PPU = 2,080 PPU (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	$ 698,000
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	$ [illegible]
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 6	With new development	A+	Watermain	410 m	300 mm	$ 1,000,000
W-T-WM-06	Thorndale Watermain - South Trunk at Rosewood Subdivision	[illegible] 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	[illegible]	300 mm	$ 540,000
W-T-WM-07	Thorndale Watermain - Subtrunk at Rosewood	600m 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	600 m	300 mm	$ 894,000
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 250mm PVC watermain	Thorndale Development Blocks 1, 2, 3, and 4	Thorndale Development Block 1, 2 or 3	With new development	A+	Watermain	590 m	250 mm	$ 1,044,000
W-T-WM-09	Thorndale Watermain Upgrade - Industrial Lands Loop	1000m of 250mm watermain to connect Ideal Ln. 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	250 mm	$ 1,741,000
W-T-WM-10	Thorndale Watermain Upgrade - Industrial Lands Upgrade	1020m of existing 200mm PVC watermain (built in 2010) on Thorndale Rd. and Ideal Ln. to be replaced by 250mm PVC watermain	Thorndale Development Blocks 1, 2, 3 and 4	Thorndale Development Block 1, 2 or 3	With new development	A+	Watermain	1020 m	250 mm	$ 1,798,000
Sub-Total Thorndale Water Capital Program Projects										**$ 23,606,000**
Total Municipality of Thames Centre Water Capital Program										**$ 56,827,000**

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.

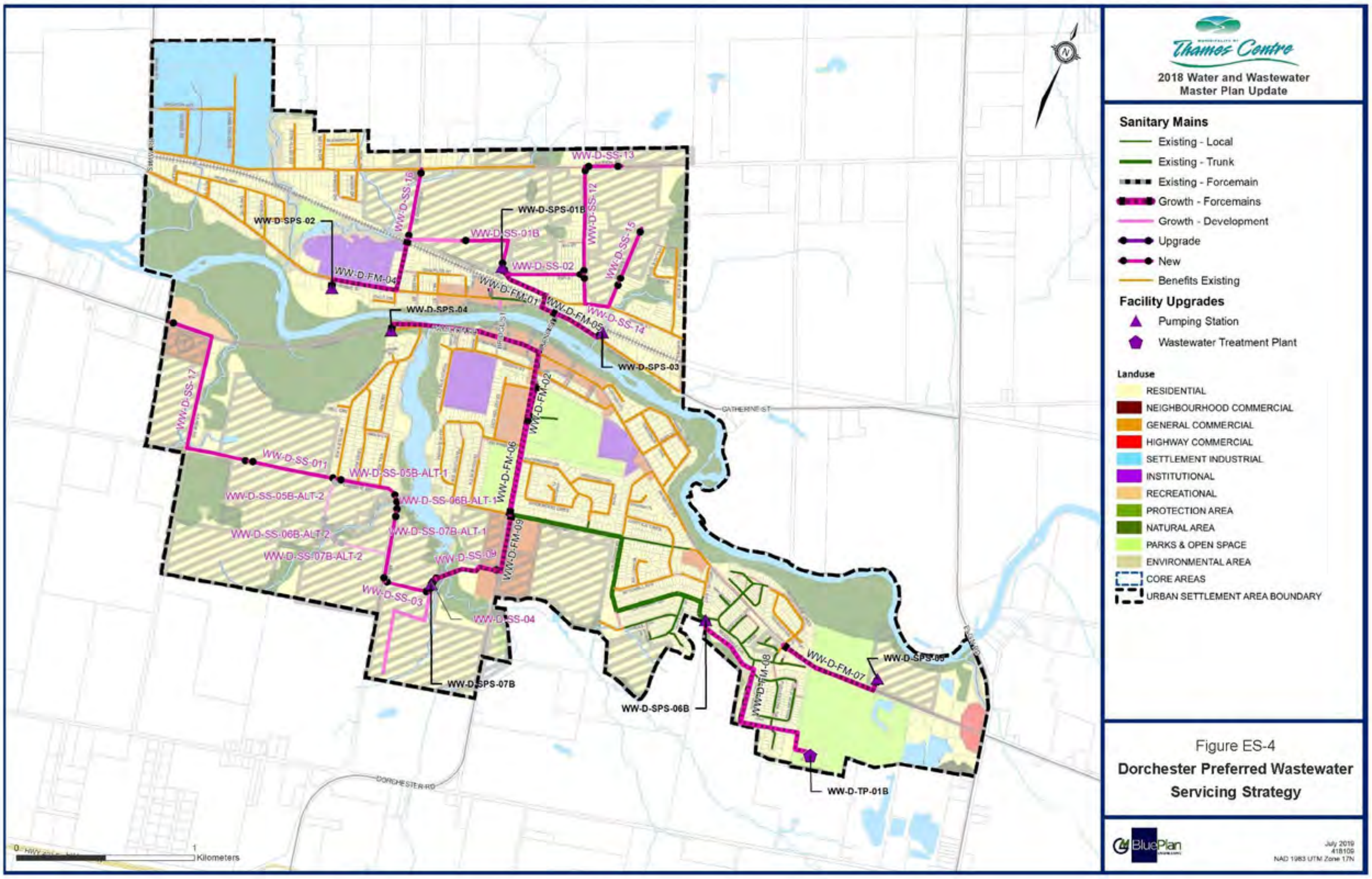
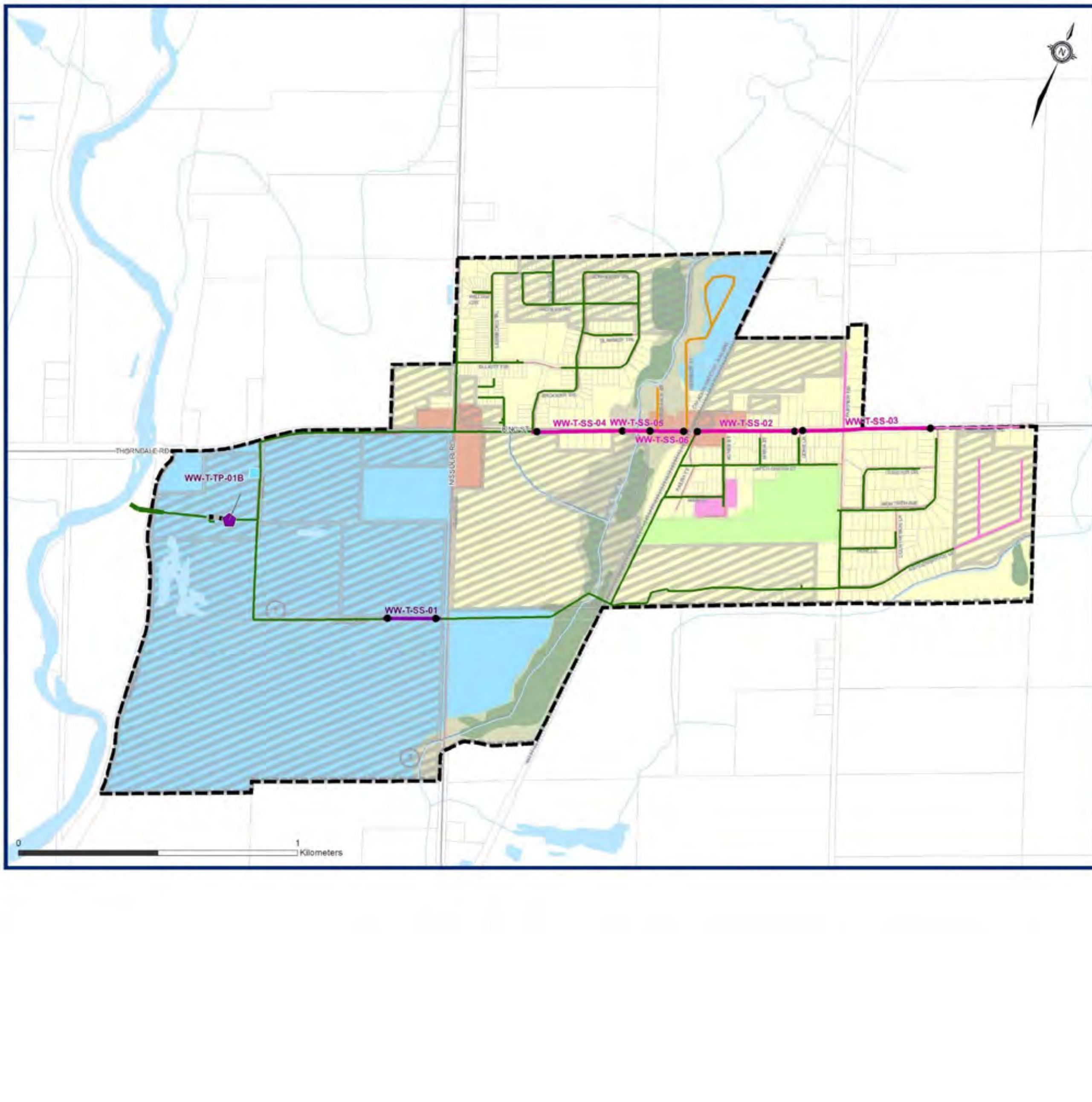


Figure ES-4
Dorchester Preferred Wastewater Servicing Strategy



Thames Centre

2018 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

July 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		1.2 ML	$ 14,001,900
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	$ 588,000
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		3 L/s	$ 173,000
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	$ 595,000
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		9 L/s	$ 538,000
WW-D-SPS-06B	Dorchester CPS Upgrades	Pumping station capacity upgrades required to accommodate growth flows in Dorchester	All Dorchester Development Blocks	Existing Need	Today	B	Pumping		254 L/s	$ 10,865,000
WW-D-SPS-07B	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	$ 5,559,000
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	$ 84,000
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,[illegible] PPJ = 2,100 PPJ	A+	Forcemain	650 m	300 mm	$ 109,000
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	$ 1,103,000
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	1000 m	100 mm	$ 2,507,000
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	1,250 m	300 mm	$ 7,162,000
WW-D-FM-09	PS3 forcemain	Twinned forcemain 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	$ 128,000
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	$ 567,000
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	$ 327,000
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	$ 1,163,000
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	$ 610,000
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	$ 490,000
WW-D-SS-16	Hammond 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	1,250 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	$ 7,365,000
WW-D-SS-22	Sewers for Municipal Servicing Replacing Private Sewage Systems (SPS-05B)	New sanitary sewers to benefit existing unserviced within South Dorchester (WW-D-SPS-05B 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-01	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 PPU	C	Treatment		1.0 MLD	$ 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	240 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	376 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 PPU	A+	Sewer	885 m	250 mm	$ 715,000
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 PPU	A+	Sewer	340 m	300 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 8-14 and 19	4,000 PPU	B	Sewer	70 m	600 mm	$ 19,000
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, 5, 8-13 and 16	3,150 PPU	A+	Sewer	130 m	300 mm	$ 274,000
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 PPU	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.

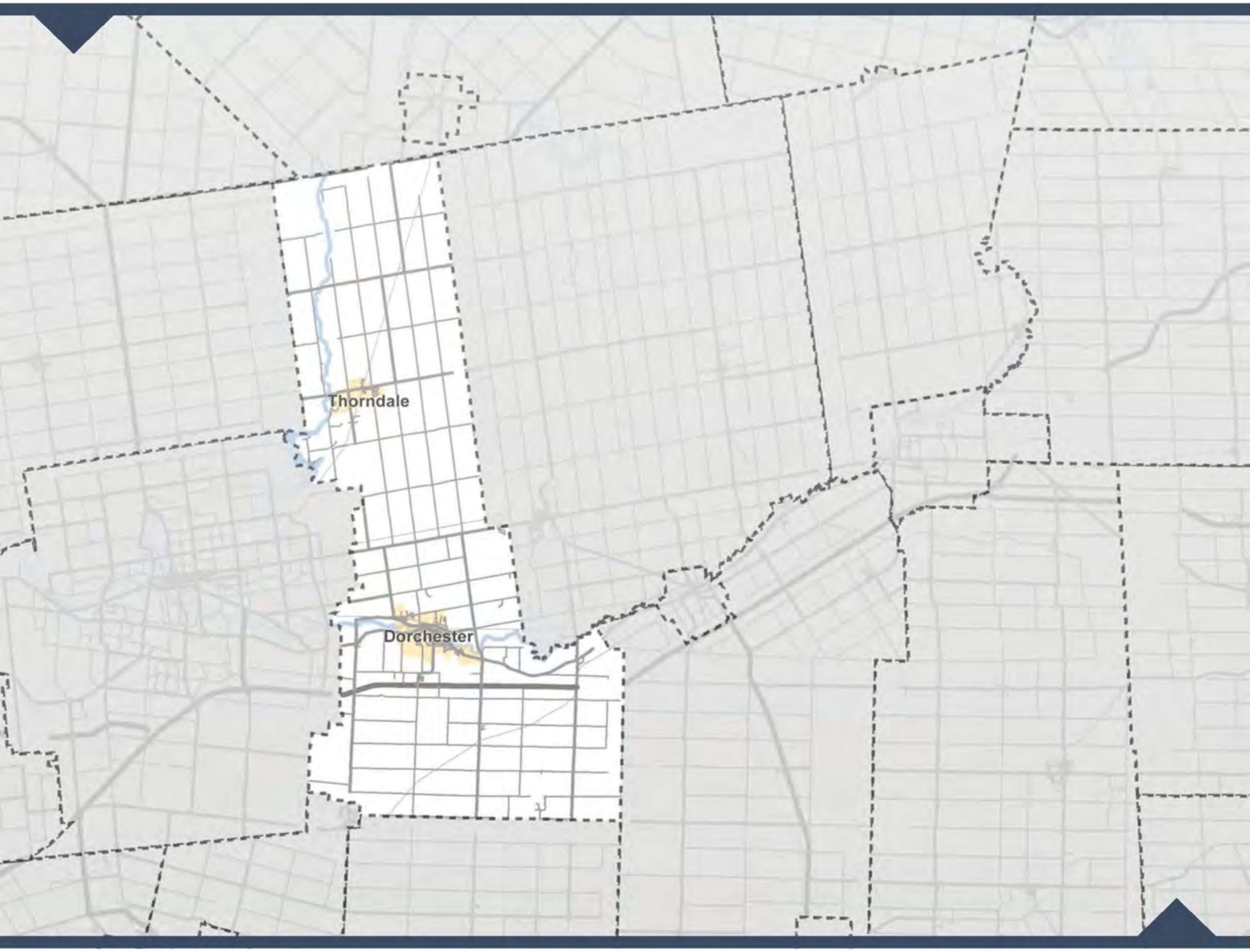
1.9 Public Consultation

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
August 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 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.

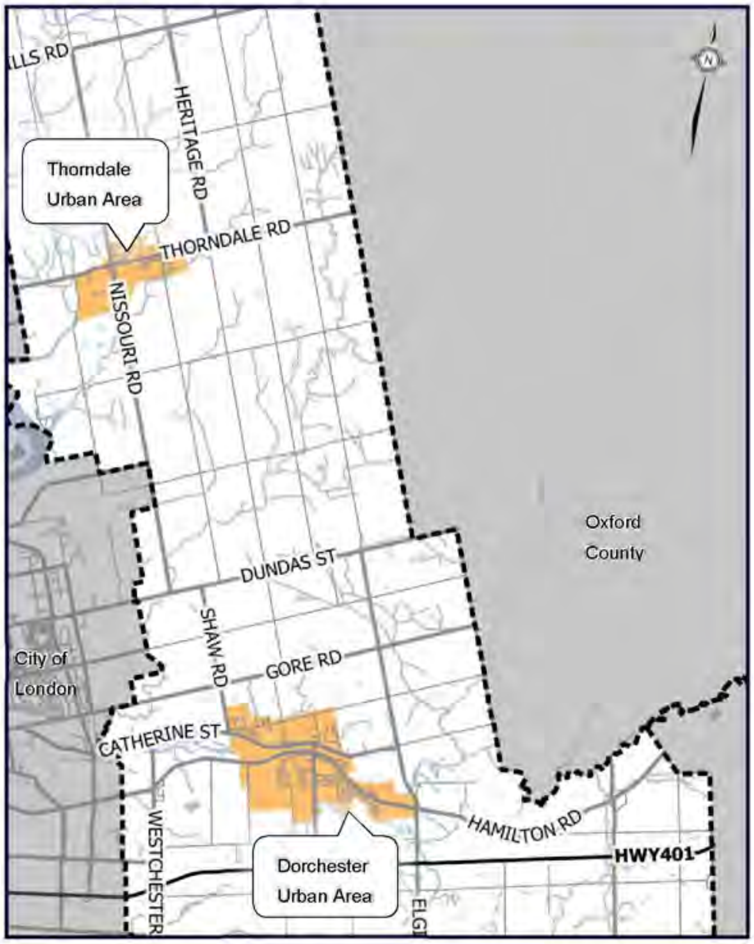


Figure 1-1: Municipality of Thames Centre Water and Wastewater Master Plan Study Area

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.

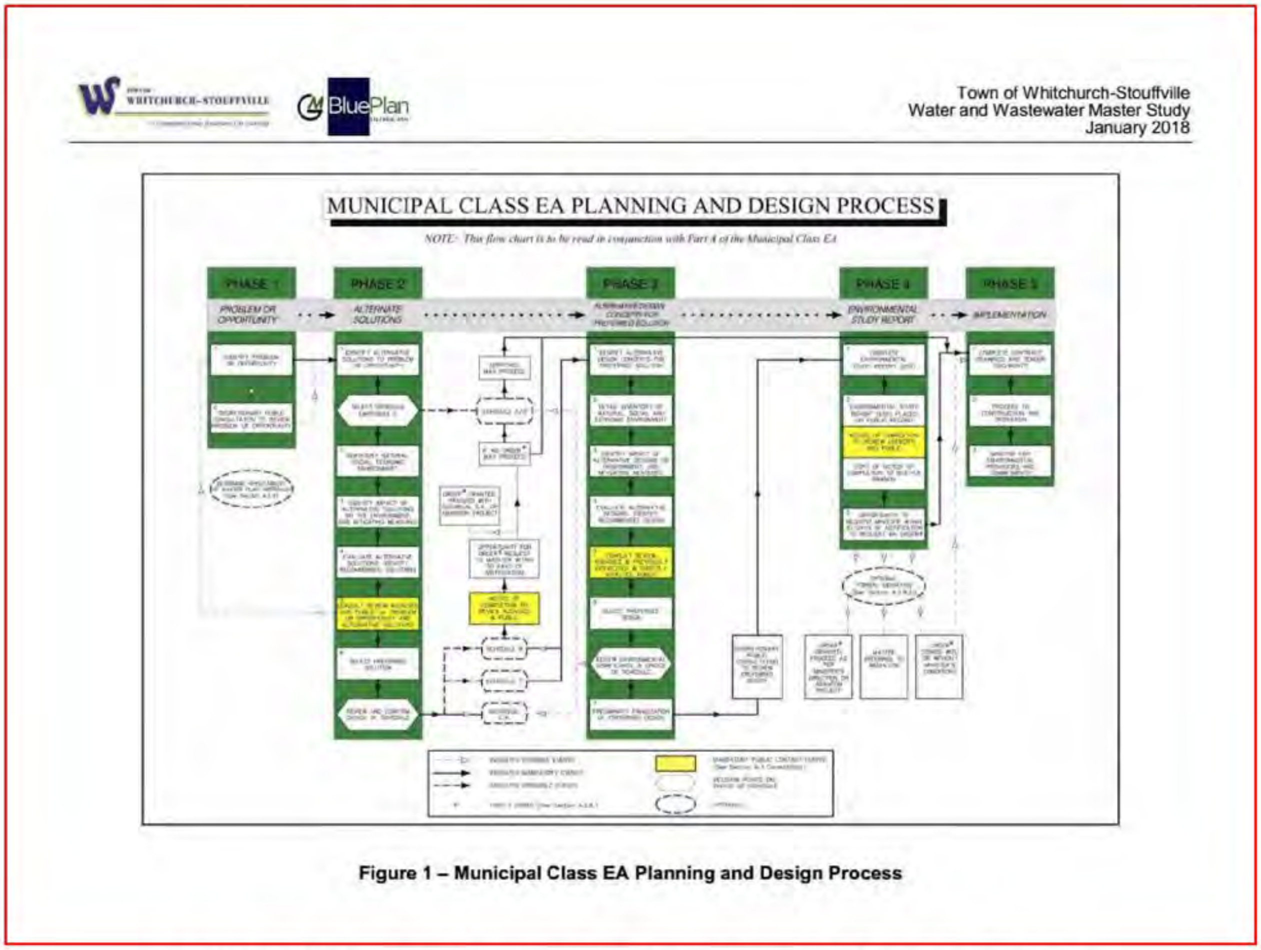


Figure 1-2: Municipal Class EA Planning and Design Process

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.
• 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.

2008 Water and Wastewater Master Plan Project	Status in 2019
• 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	

2008 Water and Wastewater Master Plan Project	Status in 2019
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.

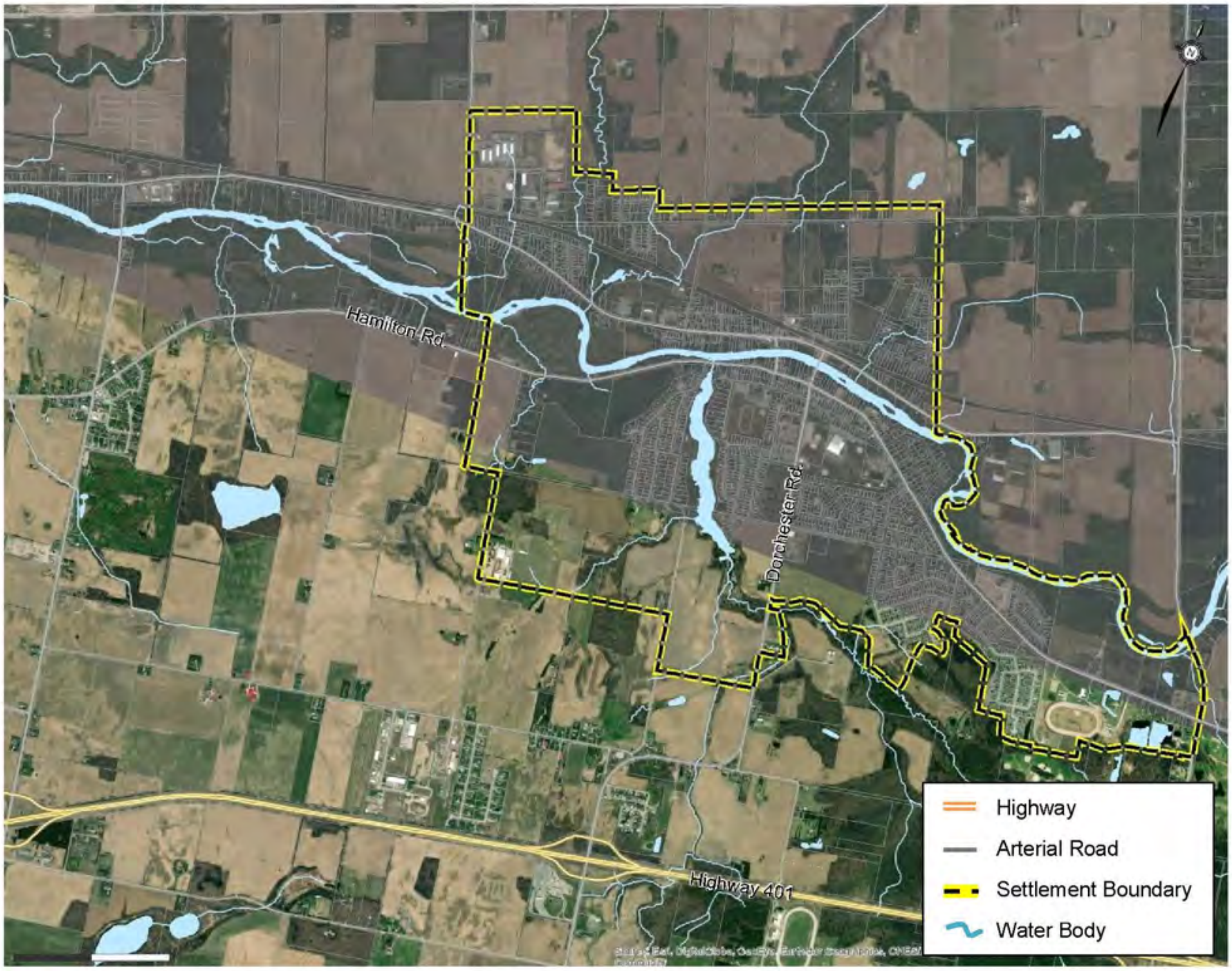


Figure 1-3: Study Area (Dorchester and 401 Corridor Lands)

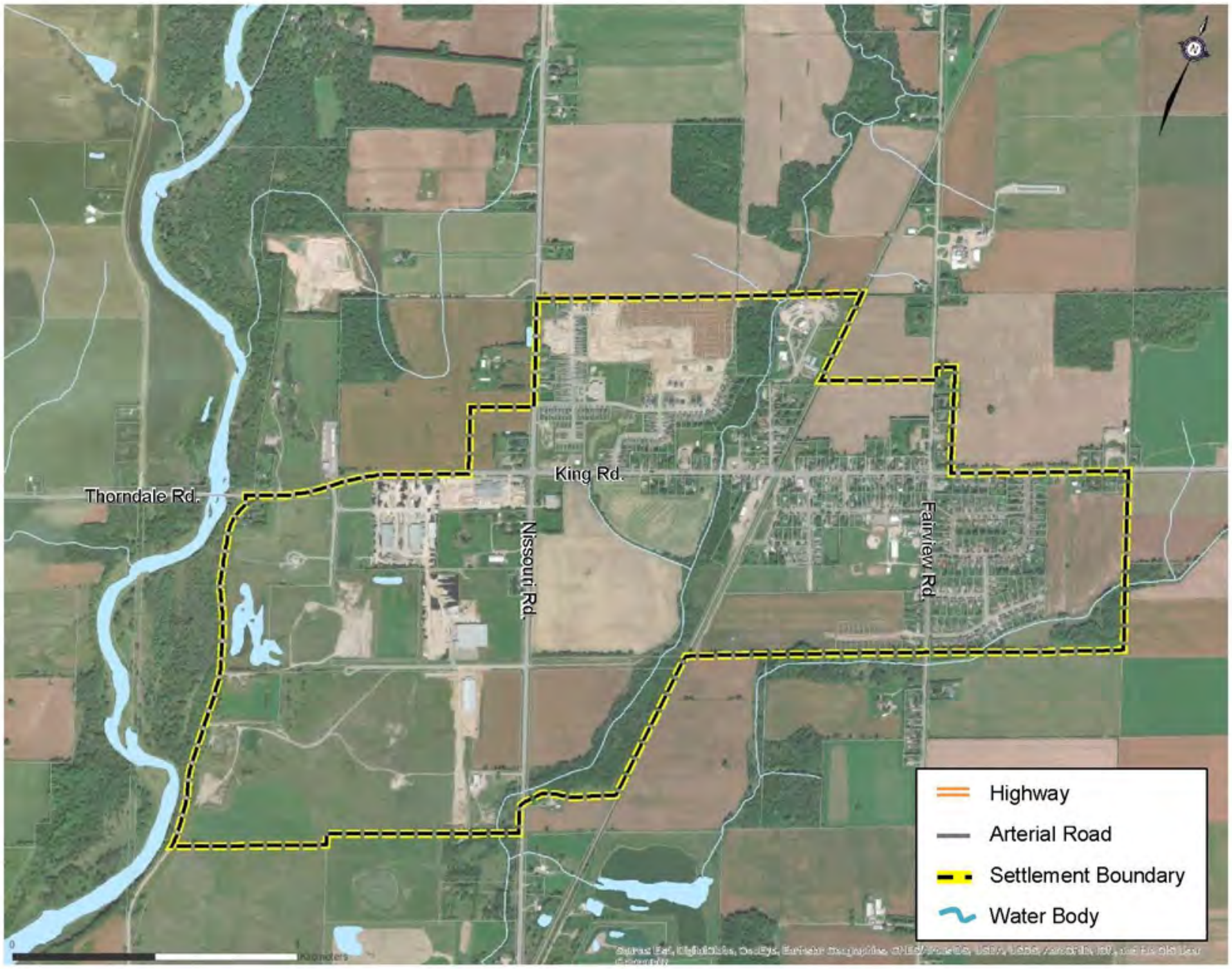


Figure 1-4: Study Area (Thorndale)

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

[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*

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.

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**.

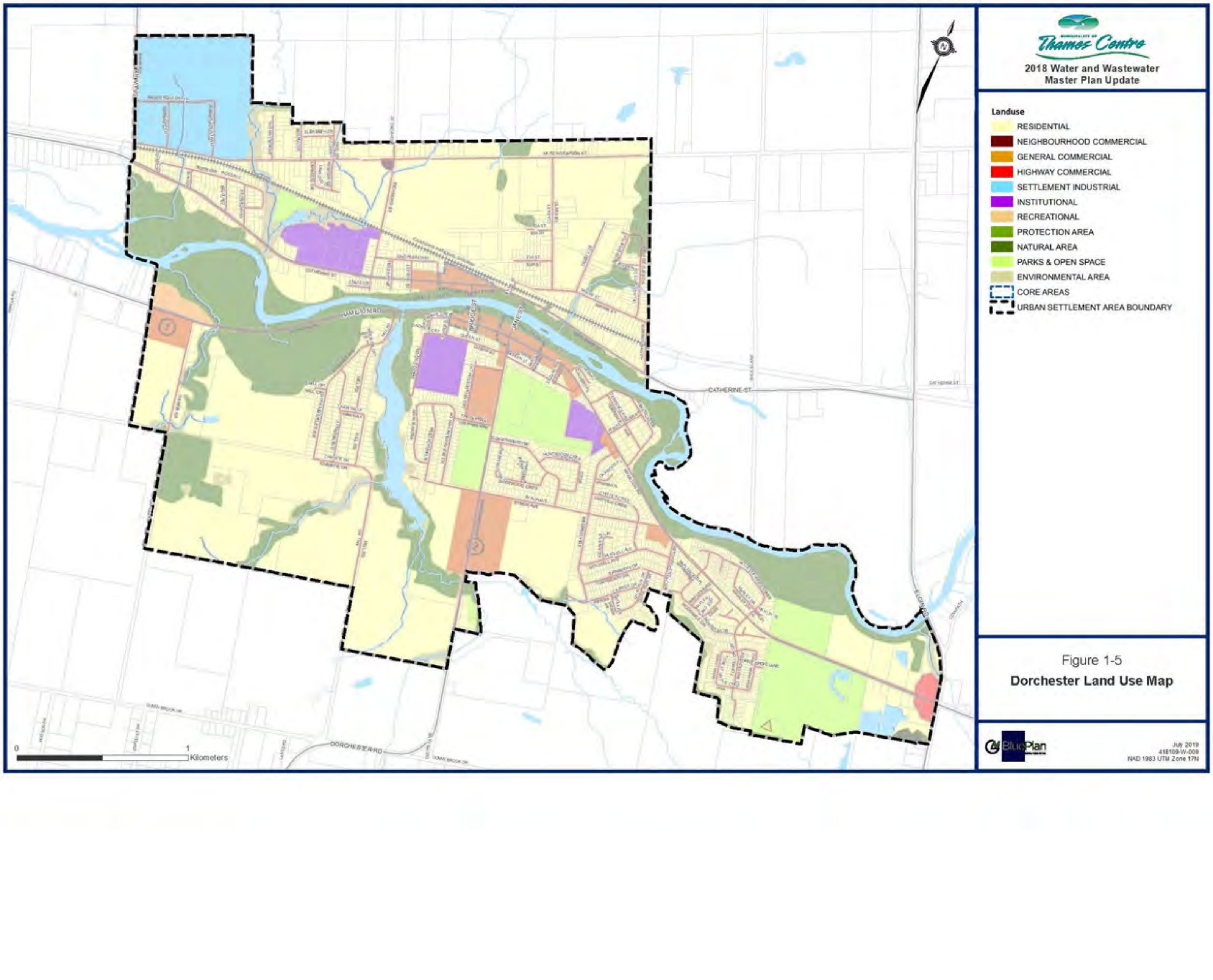
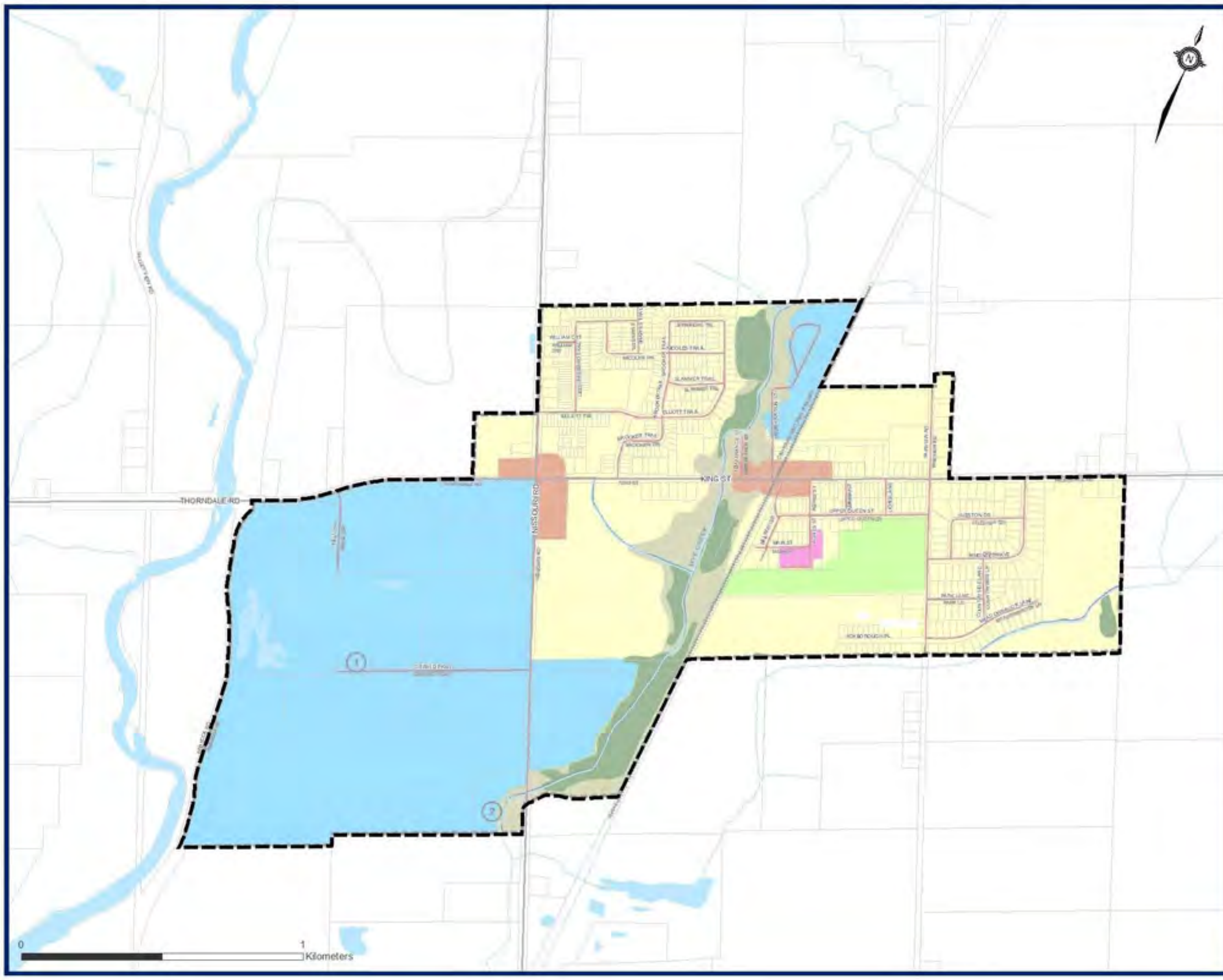


Figure 1-5

Dorchester Land Use Map



Thames Centre

2018 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

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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 • Significant valley lands • Significant wildlife habitat • Provincially significant areas of natural and scientific interest (ANSIs) • Regionally significant ANSIs & environmentally significant areas (ESAs)	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.
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.

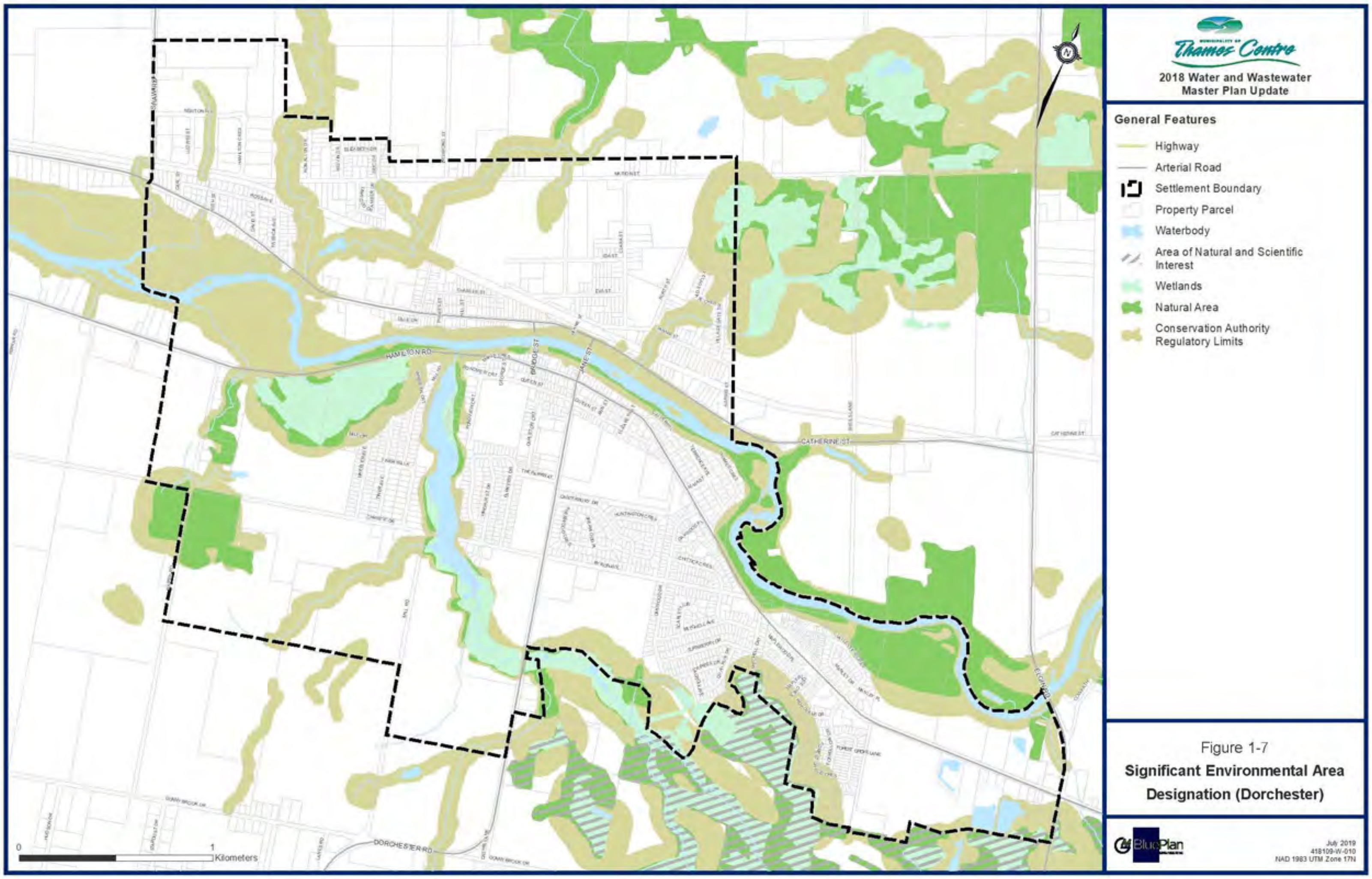
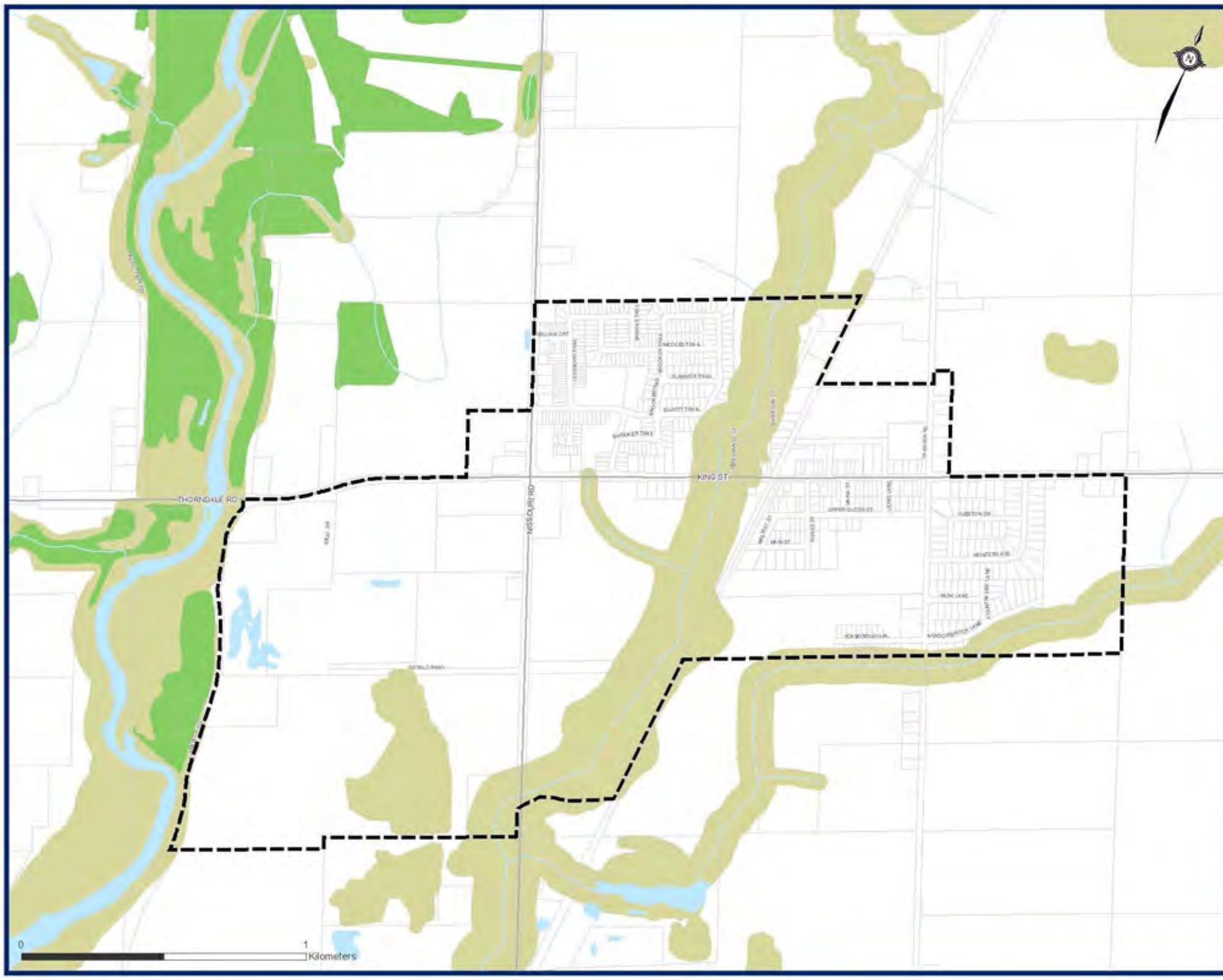


Figure 1-7
Significant Environmental Area Designation (Dorchester)

Thames Centre

2018 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**.

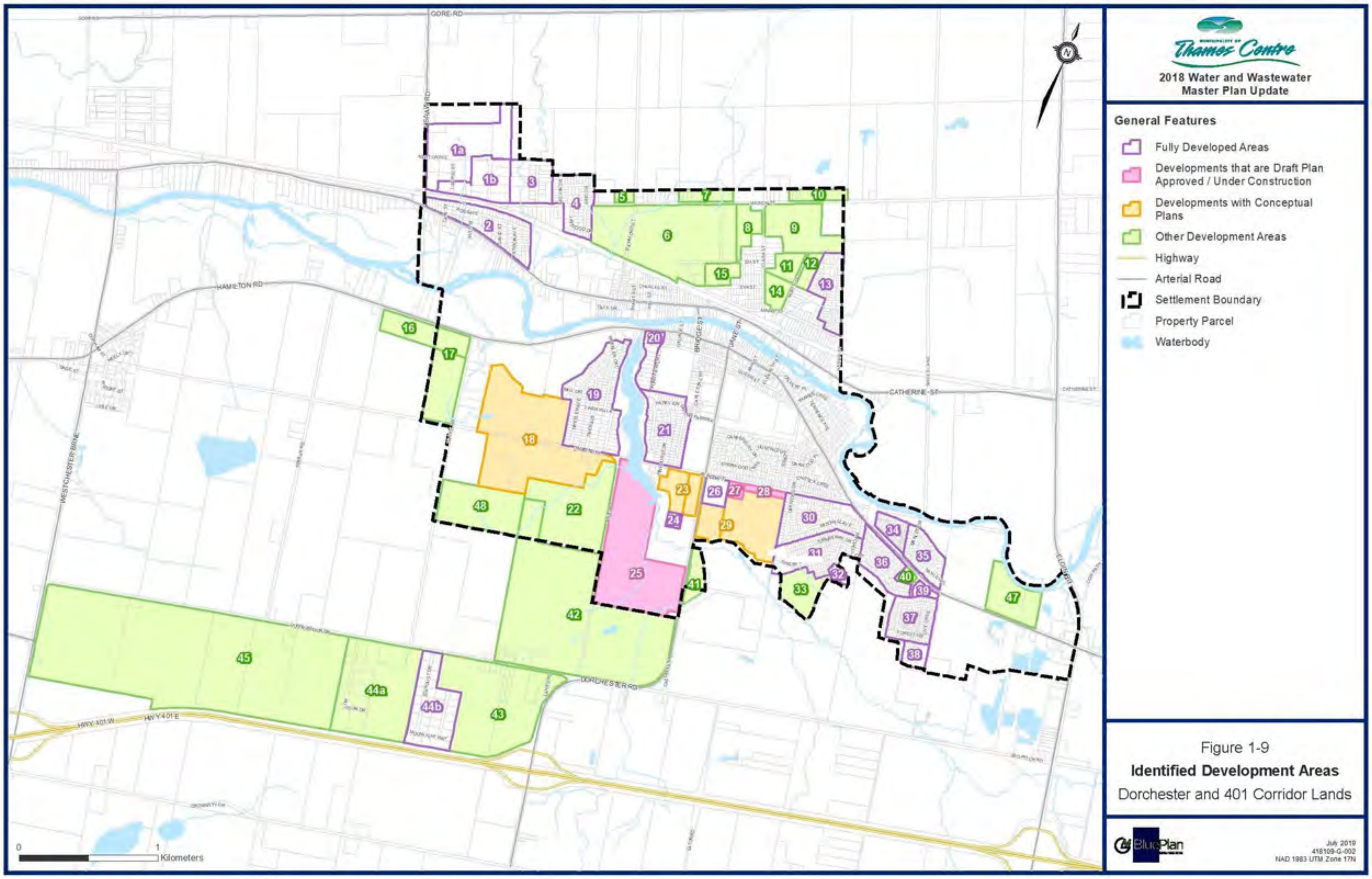


Figure 1-9
Identified Development Areas
Dorchester and 401 Corridor Lands

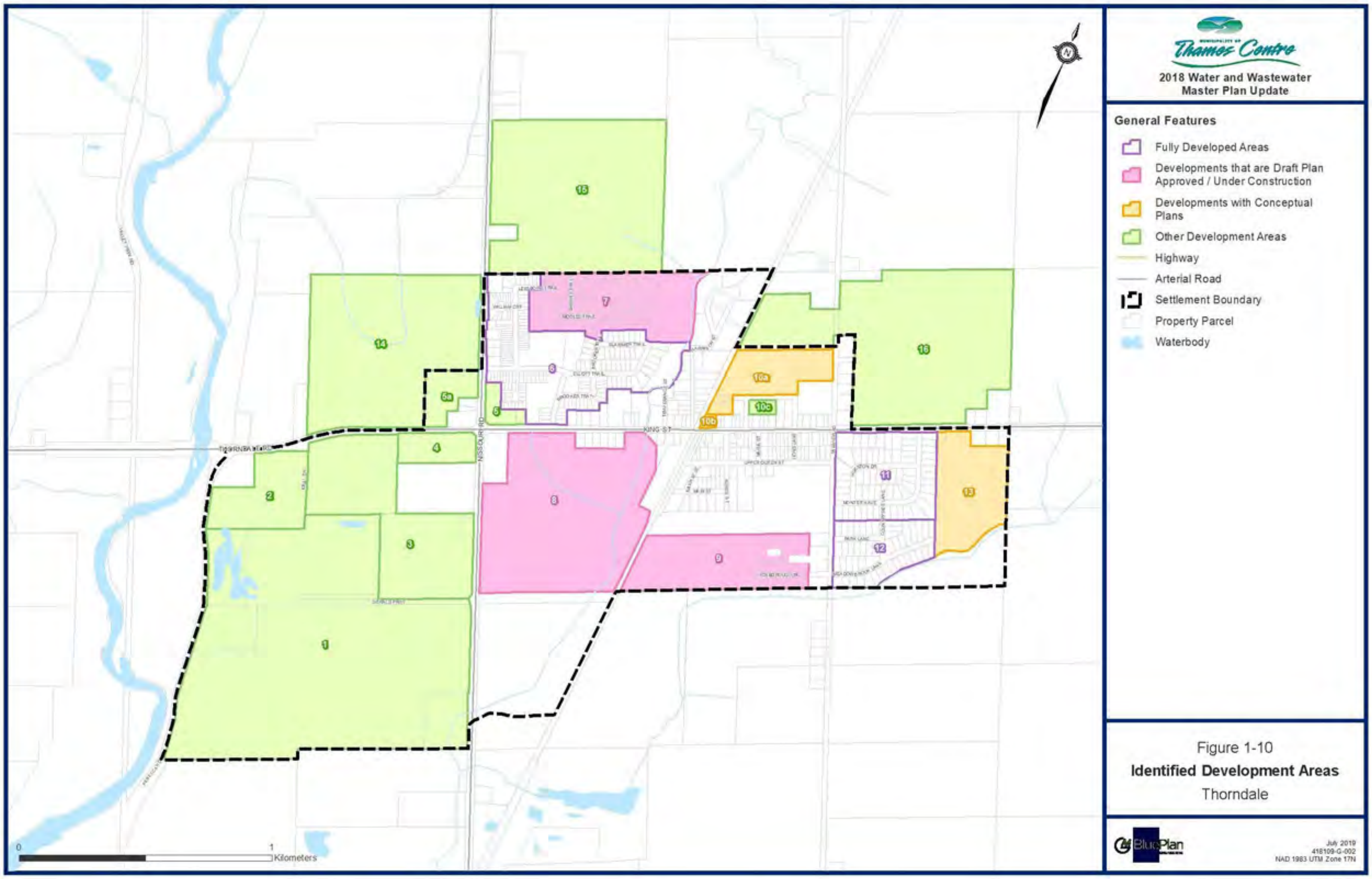


Figure 1-10
Identified Development Areas
Thorndale

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

<table>
<tr><th colspan="2">Approach Procedure and Purpose</th><th>Method 1</th><th>Method 2</th><th>Method 3</th></tr>
<tr><td rowspan="2">Procedure</td><td>For Dorchester and Thorndale</td><td>Buildout to DC Growth Projections</td><td colspan="2">Buildout by Developable Area x Target Densities</td></tr>
<tr><td>For the Peripheral Lands 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">Purpose / Use</td><td>• Identification of Upgrade Triggers
• Development of Capital Plan</td><td colspan="2">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.</td></tr>
</table>

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.

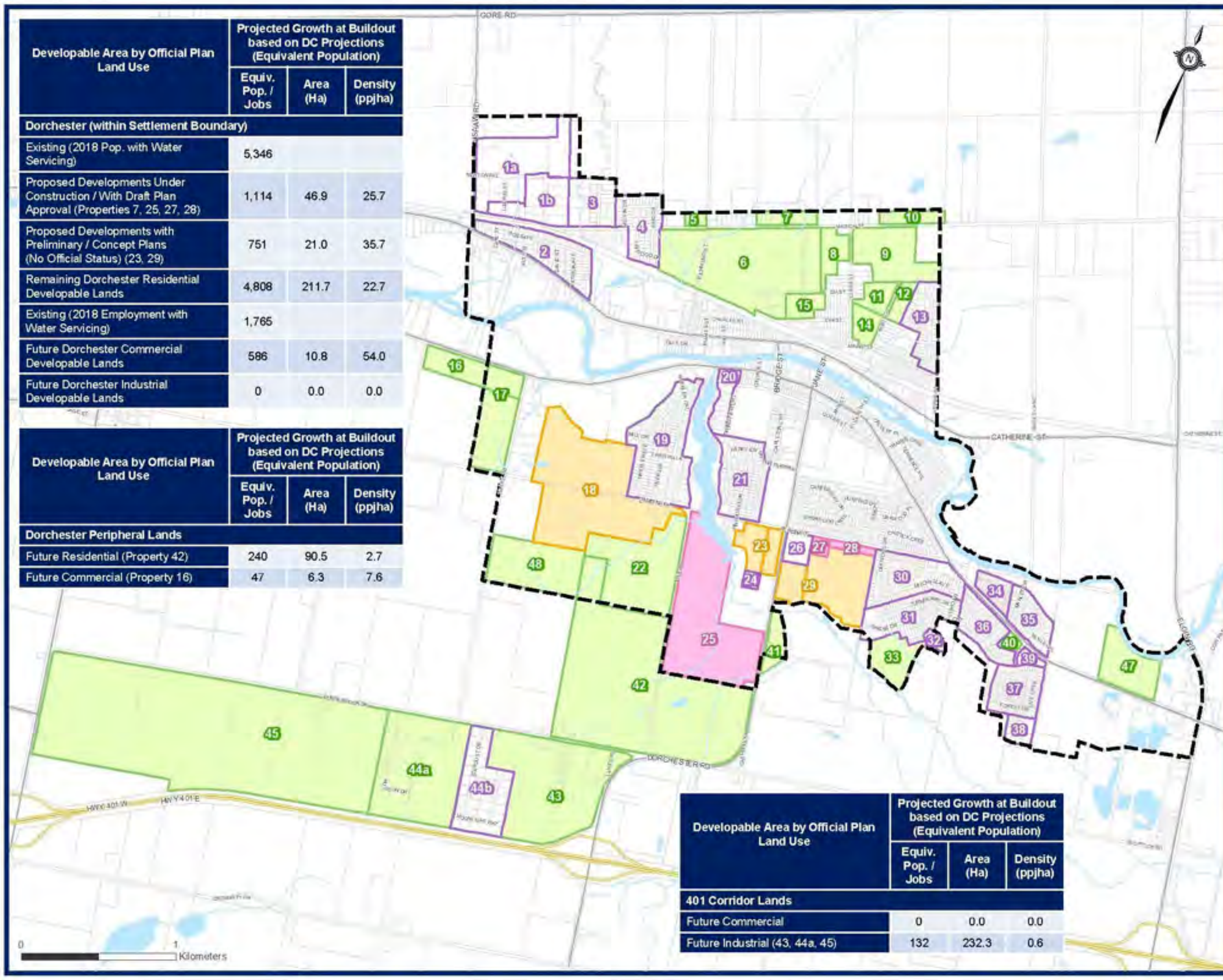
Employment growth within the Dorchester and Thorndale Settlement Boundaries was categorized only as urban (not specifically separated into Dorchester and Thorndale). The projected Urban Industrial and Commercial growth has been distributed between Dorchester and Thorndale based on developable area and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

Thames Centre

2018 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

Property Numbering is as set out in Thames Centre Development Maps (Development Maps are included in Appendix A)

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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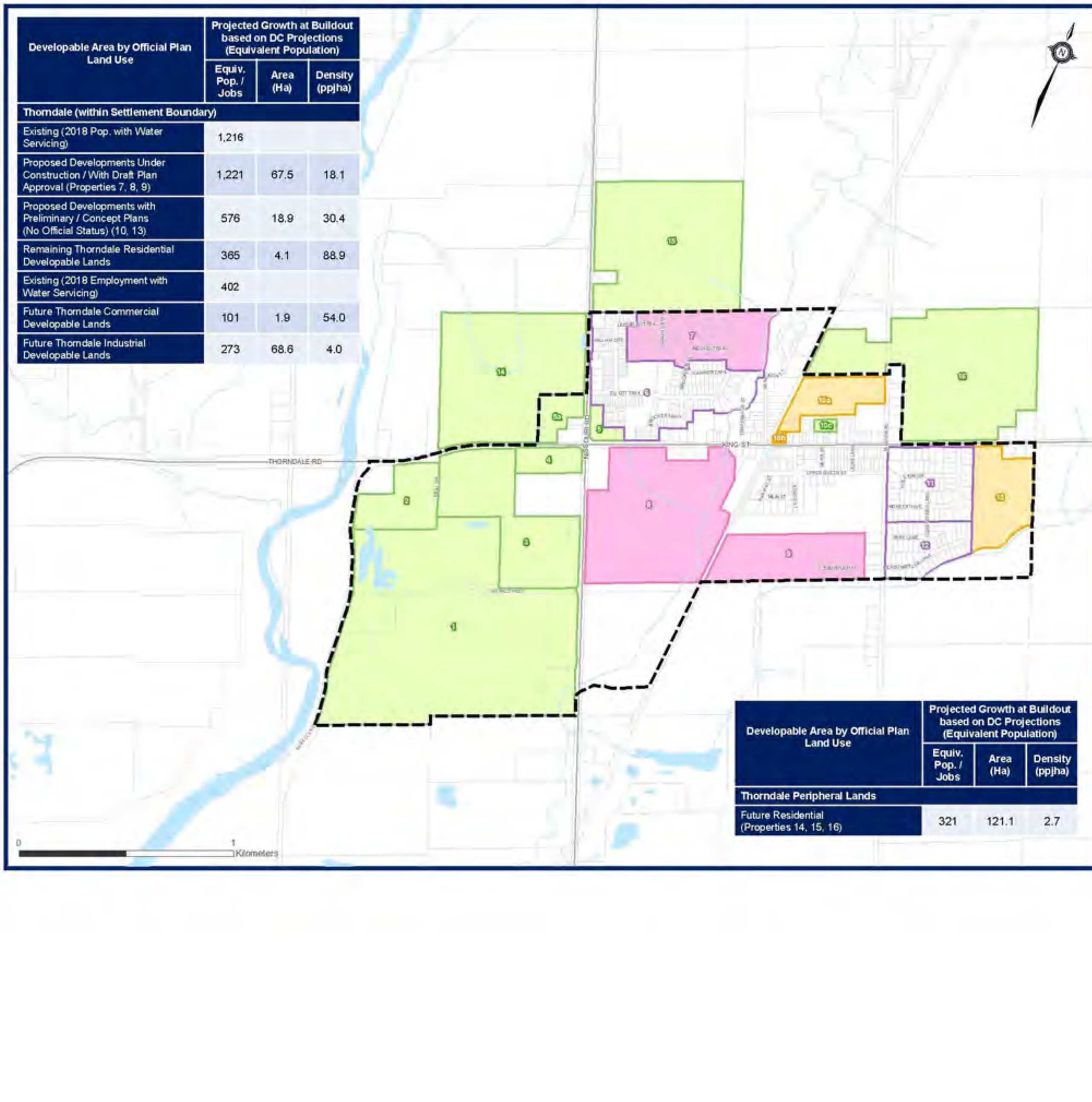
NAD 1983 UTM Zone 17N



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

2018 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

Property Numbering is as set out in Thames Centre Development Maps (Development Maps are included in Appendix A)

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.

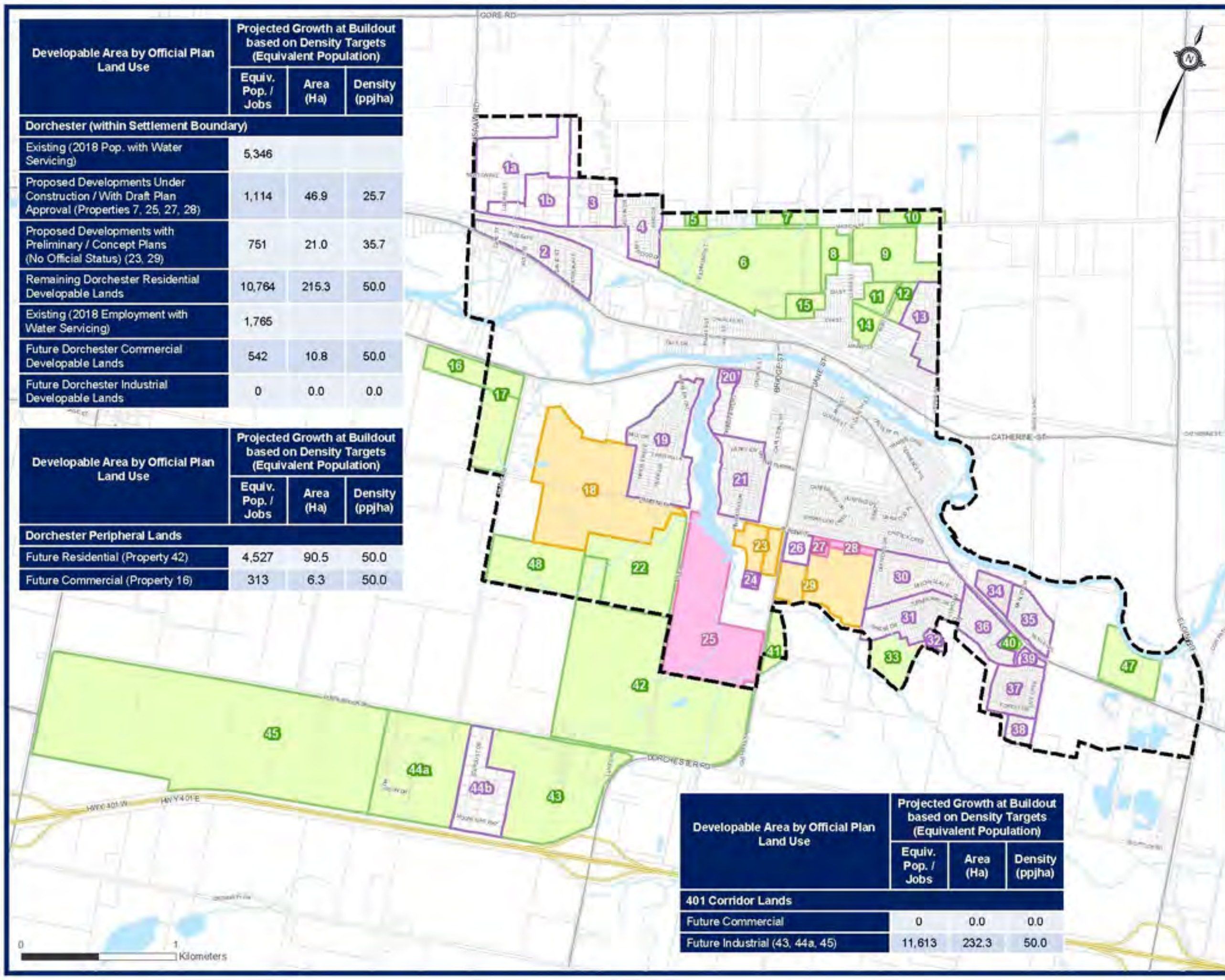
A review was completed to determine target densities based on proposed development densities for the draft plans and preliminary / concept plans in Dorchester and Thorndale as well as for employment lands in similarly sized municipalities. The proposed target densities are summarized in **Table 1-8**.

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

Thames Centre

2018 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

Property Numbering is as set out in Thames Centre Development Maps (Development Maps are included in Appendix A)

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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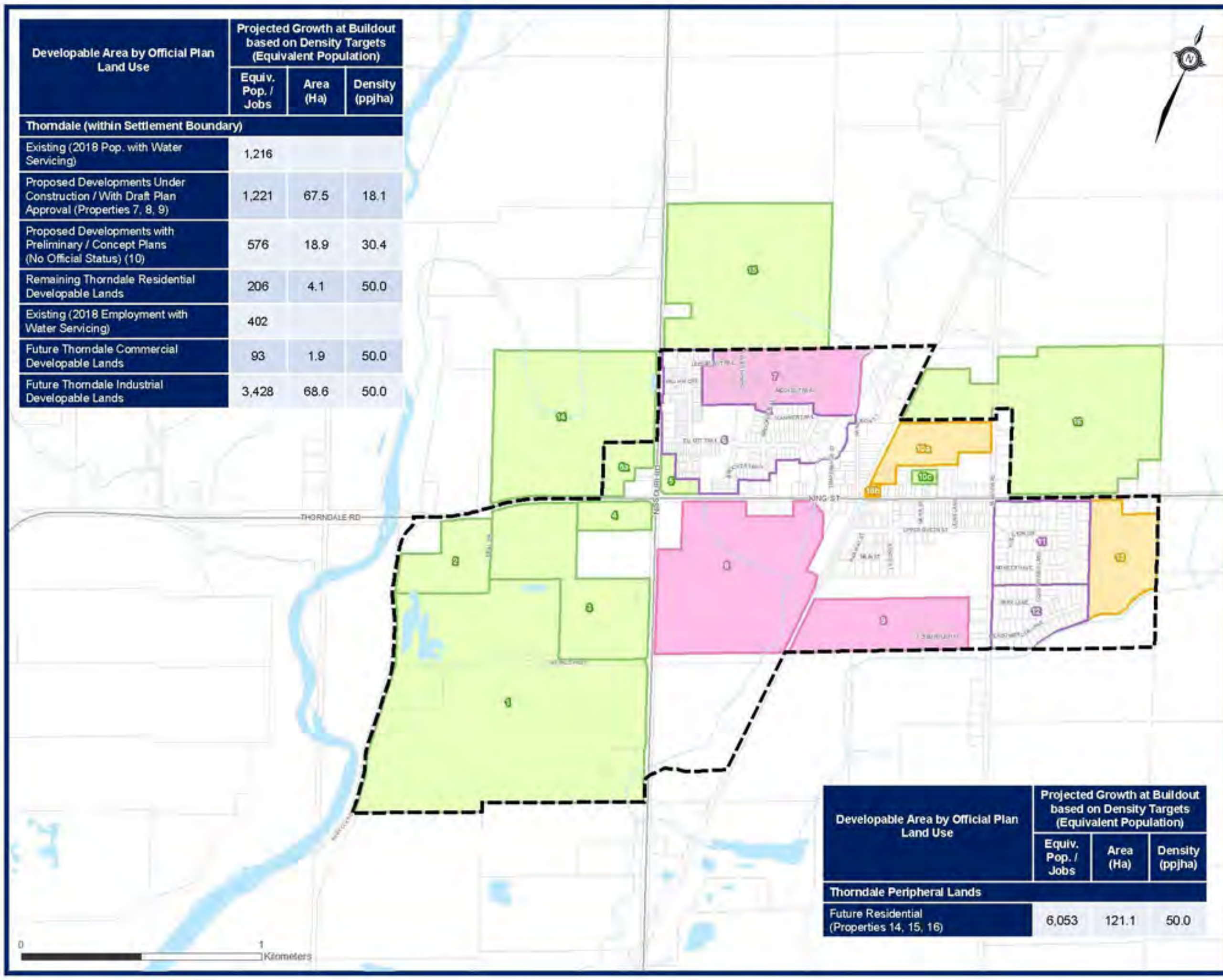
Developable Area by Official Plan Land Use	Projected Growth at Buildout based on Density Targets (Equivalent Population)		
	Equiv. Pop. / Jobs	Area (Ha)	Density (ppjha)
Thorndale (within Settlement Boundary)			
Existing (2018 Pop. with Water Servicing)	1,216		
Proposed Developments Under Construction / 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

Thames Centre

2018 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

Property Numbering is as set out in Thames Centre Development Maps (Development Maps are included in Appendix A)

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 previously 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 previously determined to have high archeological potential, moderate/unknown archeological potential, low/no archeological potential, or are within a previously 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: 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

<table>
<tr><th colspan="3">Water Demands Projection Methodology</th></tr>
<tr><td colspan="3">• 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.</td></tr>
<tr><th colspan="3">Water Demand Criteria for Growth</th></tr>
<tr><th colspan="2">Parameter</th><th>Design Criteria</th></tr>
<tr><td colspan="2">Average Day Demand (ADD)</td><td>225 L/cap/d</td></tr>
<tr><th colspan="2">Peaking Factors</th><th></th></tr>
<tr><td rowspan="2">Max Day Peaking Factor</td><td>Dorchester</td><td>2.00</td></tr>
<tr><td>Thorndale</td><td>2.25</td></tr>
<tr><td rowspan="2">Peak Hour Peaking Factor</td><td>Dorchester</td><td rowspan="2">3.75</td></tr>
<tr><td>Thorndale</td></tr>
<tr><th colspan="2">Land Use</th><th>Fire Flow</th></tr>
<tr><td colspan="2">Residential</td><td>76 L/s</td></tr>
<tr><td colspan="2">Industrial, Commercial, Institutional (ICI)</td><td>150 L/s</td></tr>
<tr><th colspan="3">Water System Criteria</th></tr>
<tr><td colspan="3">• Sizing of the water distribution system to accommodate Peak Hour Demands (PHD) and Maximum Day Demands plus Fire Flow (MDD + FF)</td></tr>
</table>

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**.

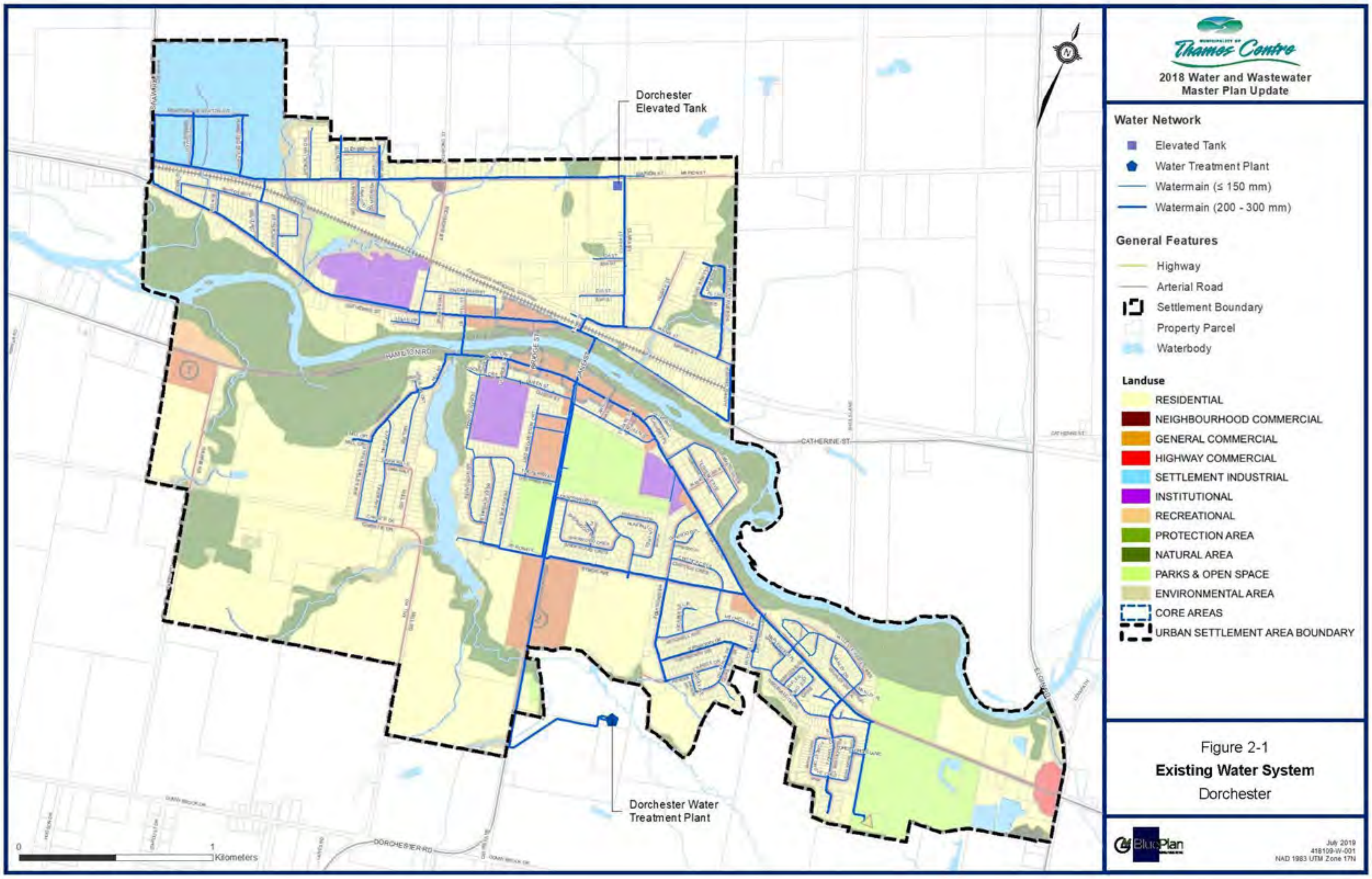


Figure 2-1
Existing Water System
Dorchester

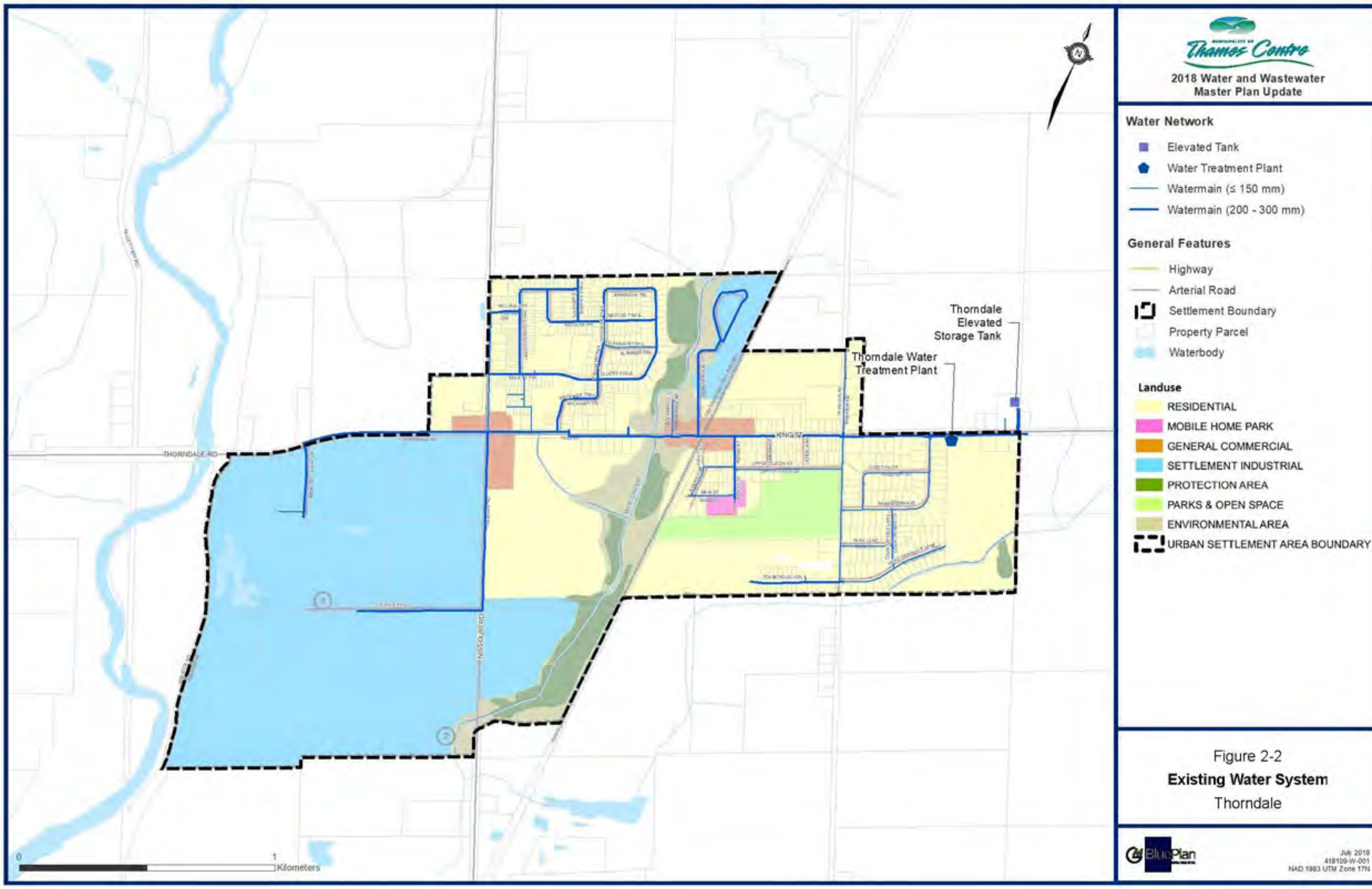


Figure 2-2
Existing Water System
Thorndale

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.

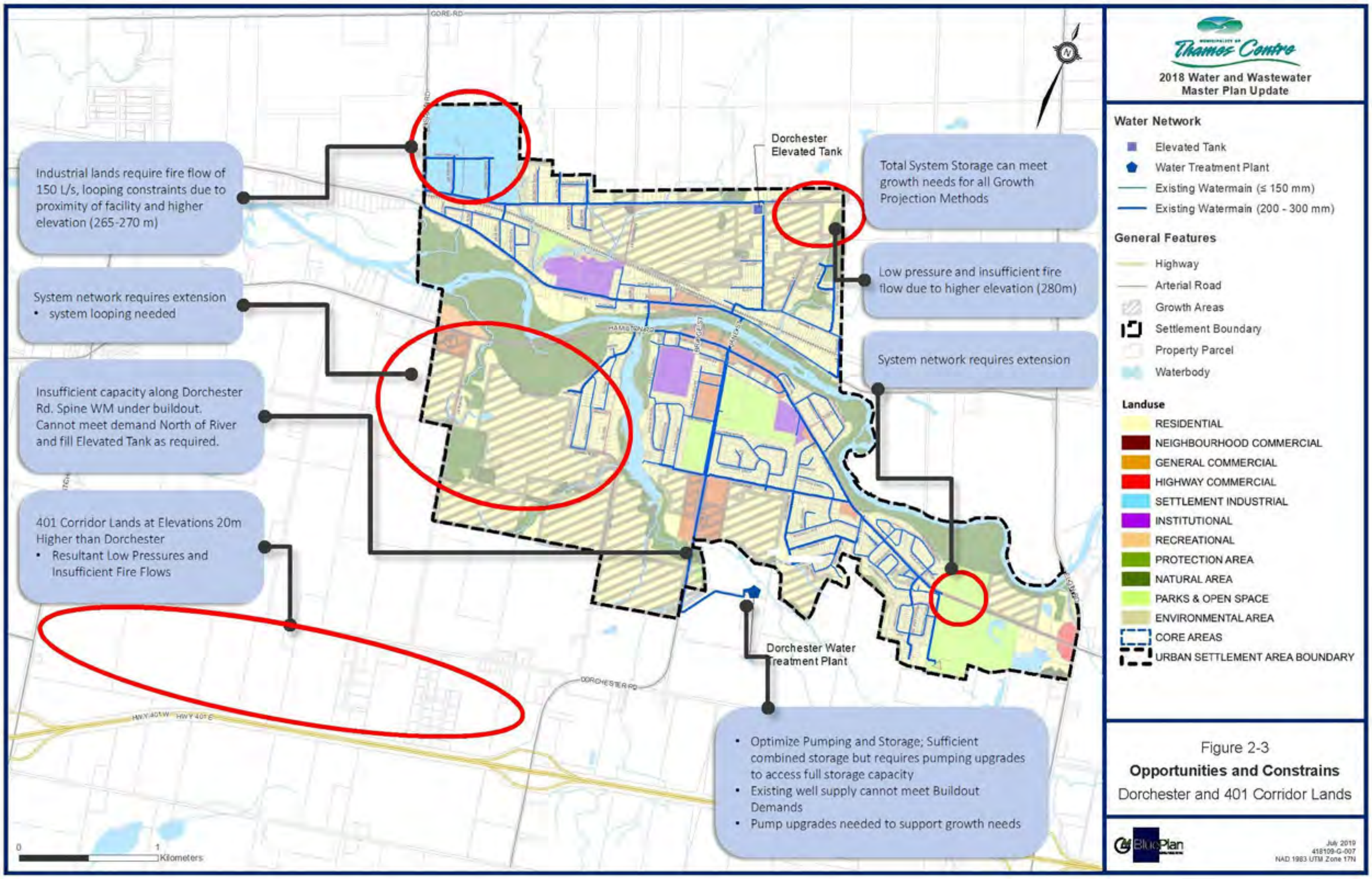


Figure 2-3
Opportunities and Constrains
Dorchester and 401 Corridor Lands

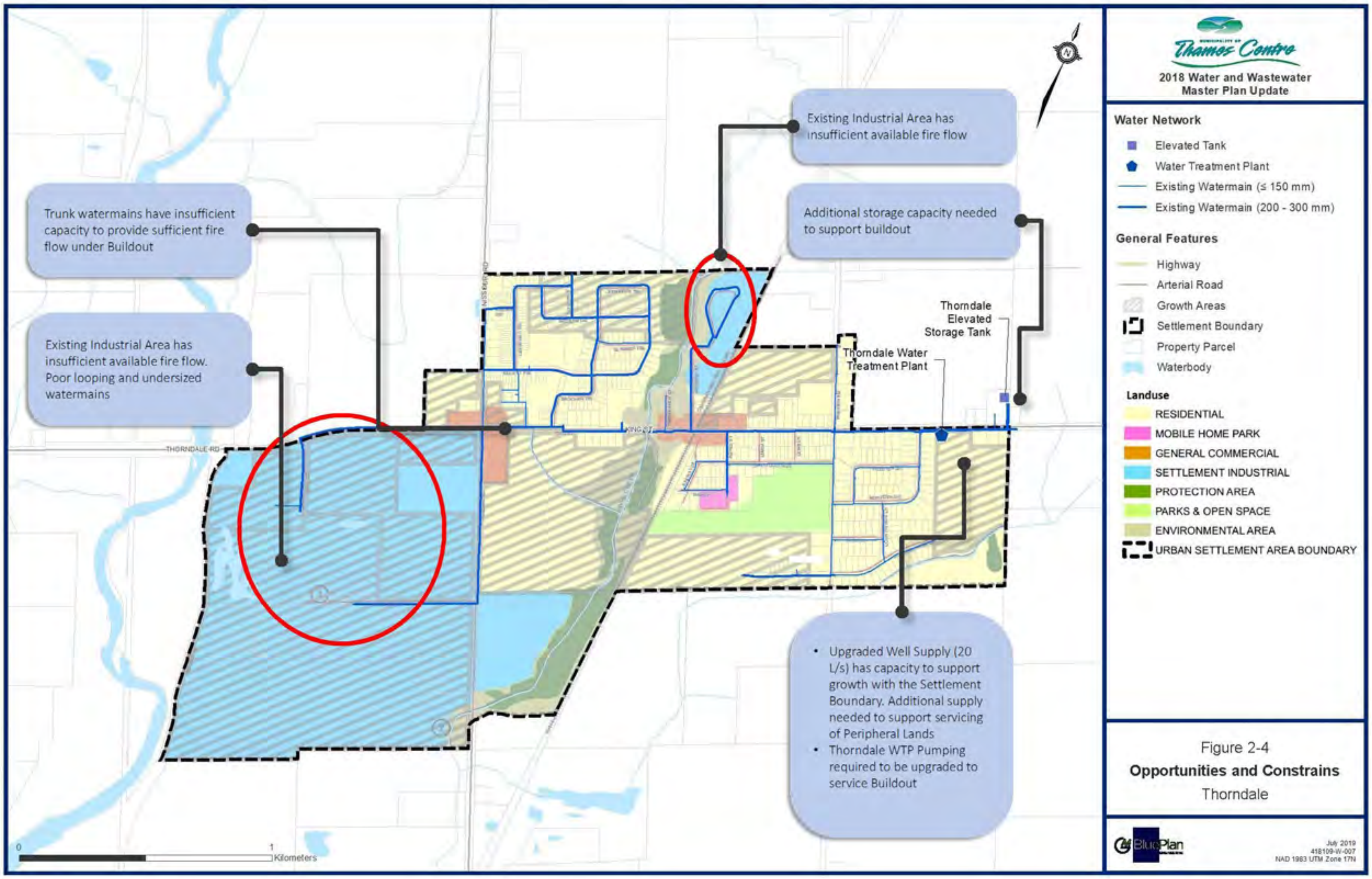


Figure 2-4
Opportunities and Constrains
Thorndale

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.

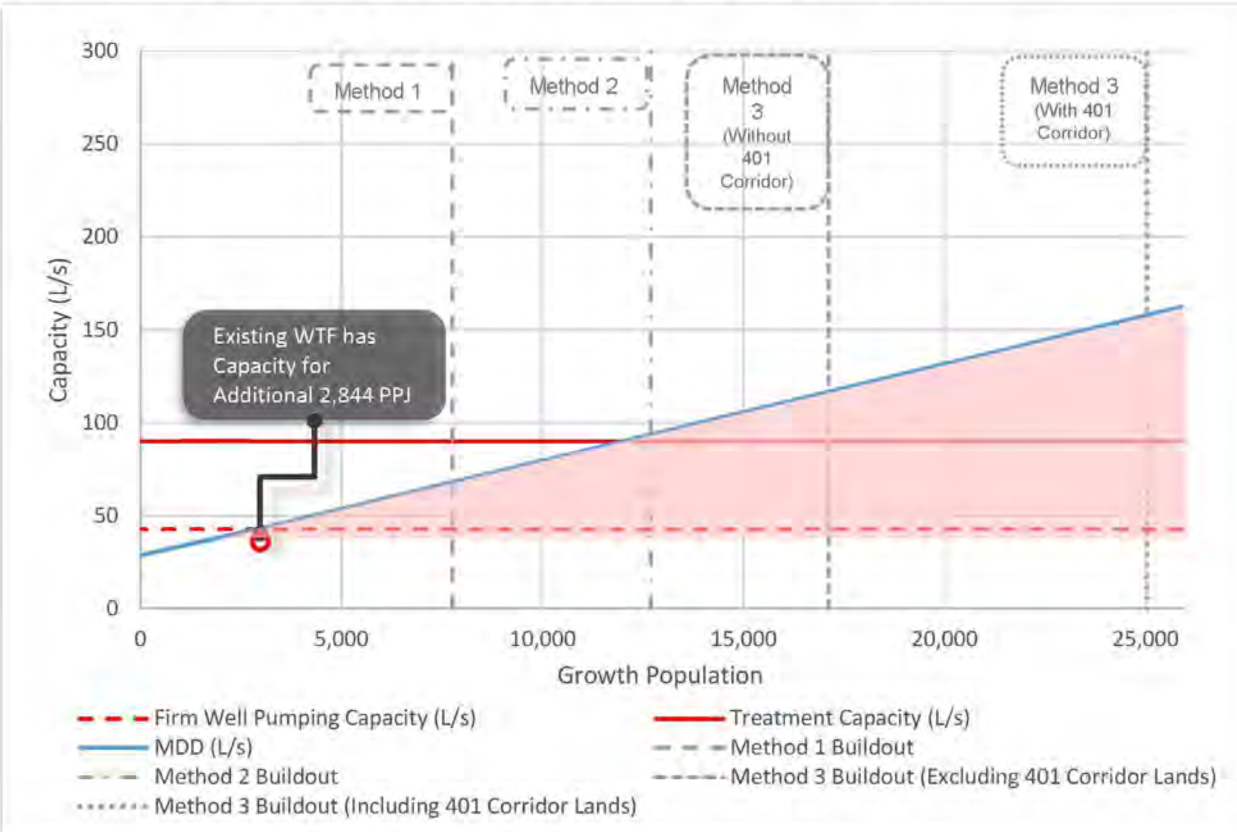


Figure 2-5: Dorchester Water Supply Needs

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 .

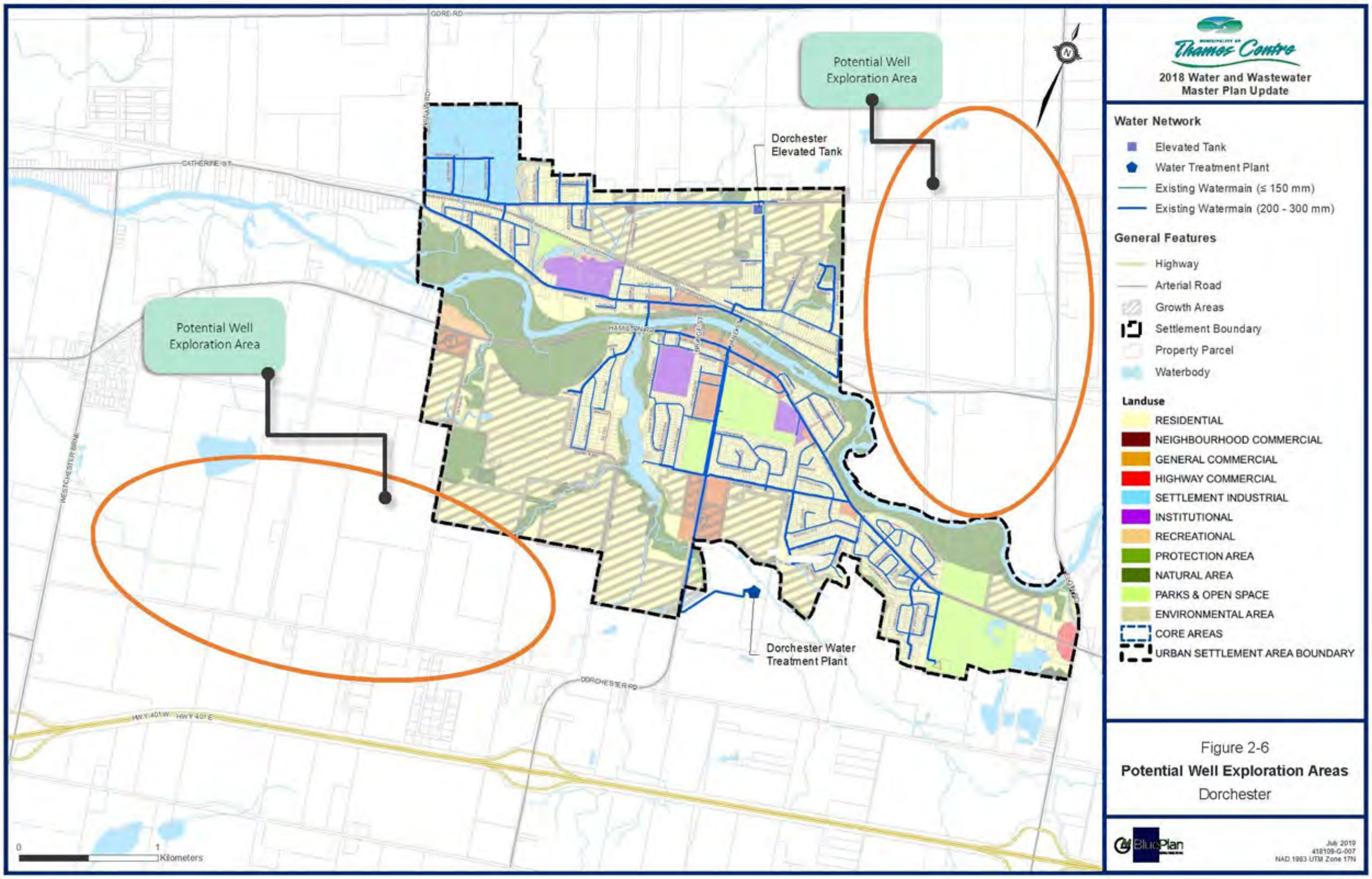


Figure 2-6
Potential Well Exploration Areas
Dorchester

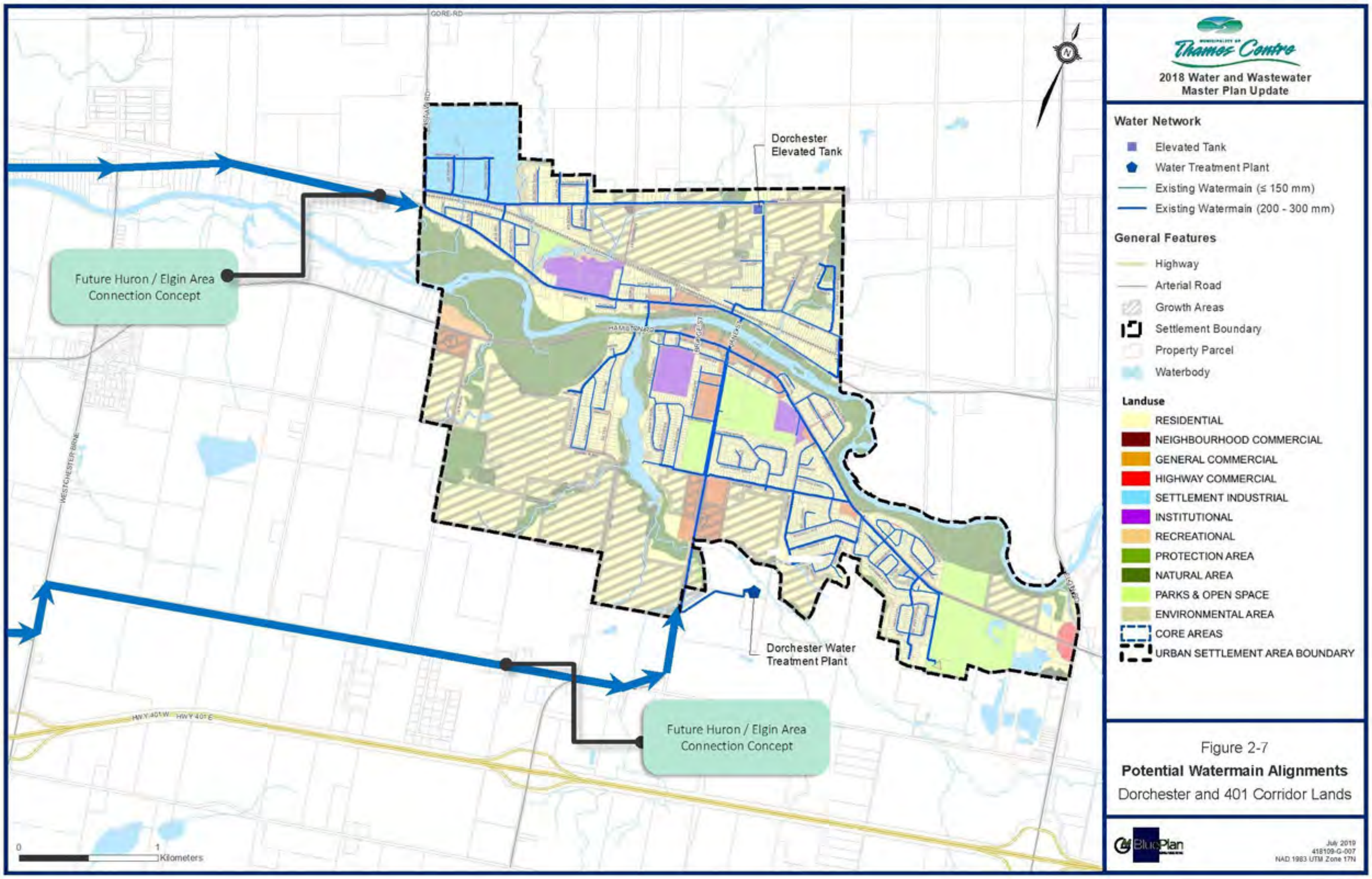


Figure 2-7
Potential Watermain Alignments
Dorchester and 401 Corridor Lands

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

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**.

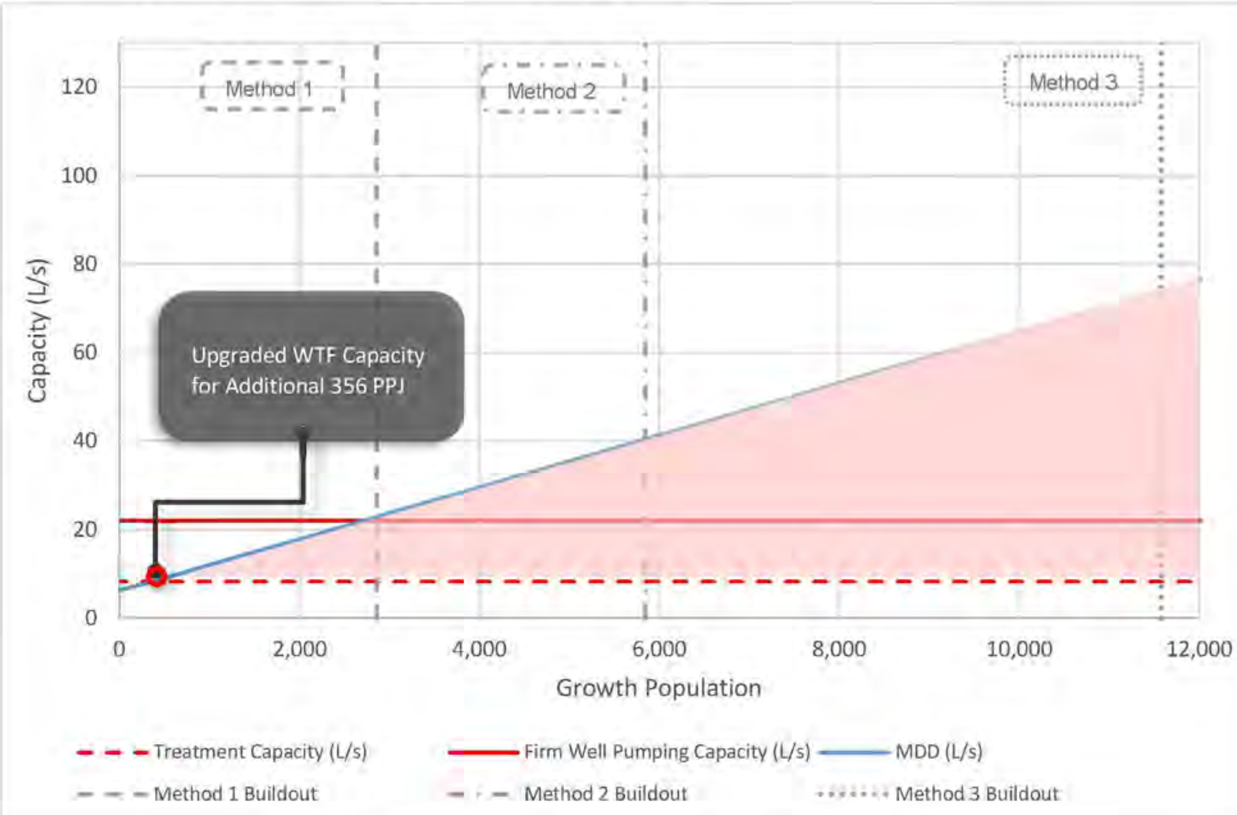


Figure 2-8: Thorndale Water Supply Needs

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 .

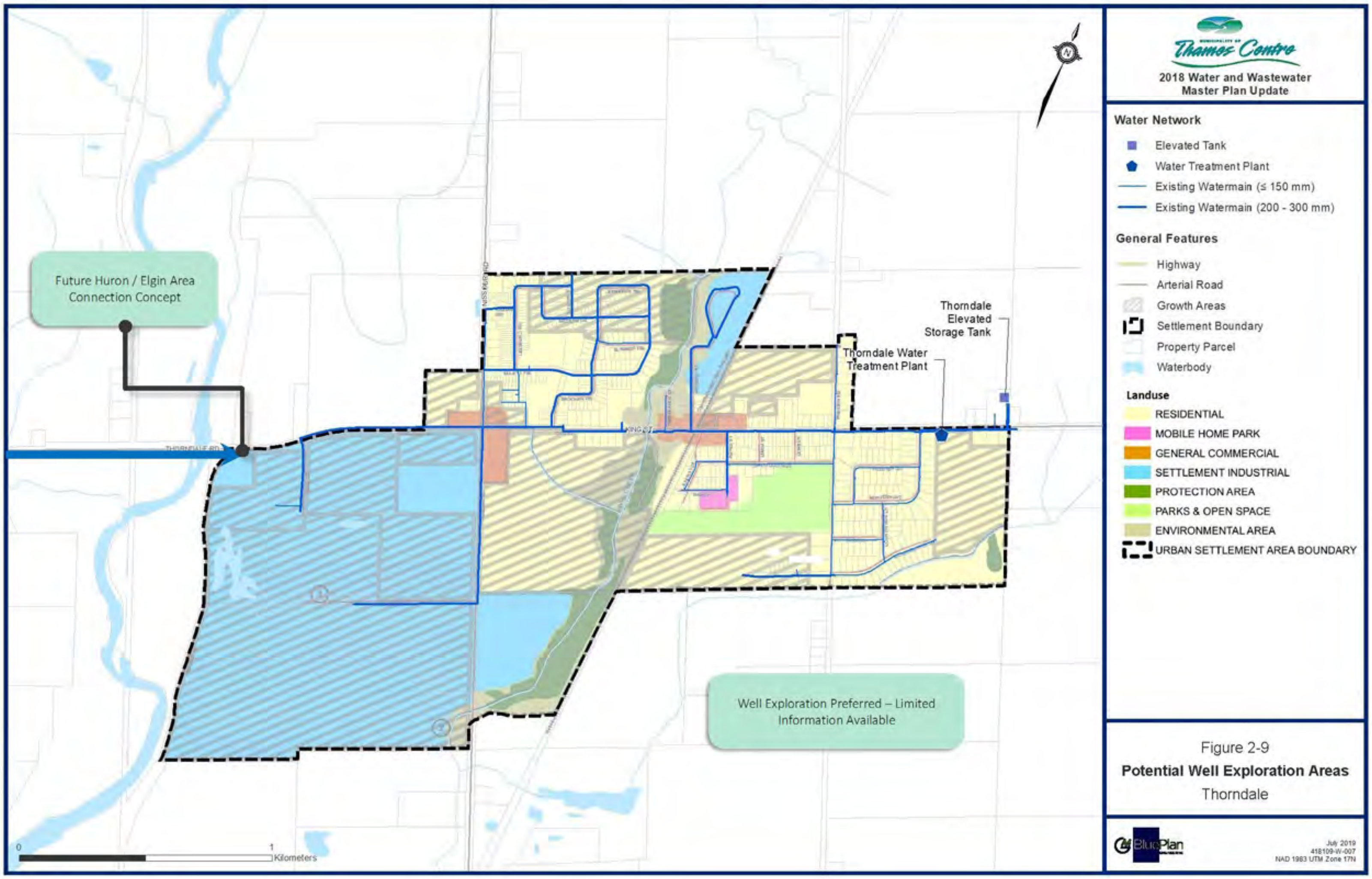


Figure 2-9
Potential Well Exploration Areas
Thorndale

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

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**.

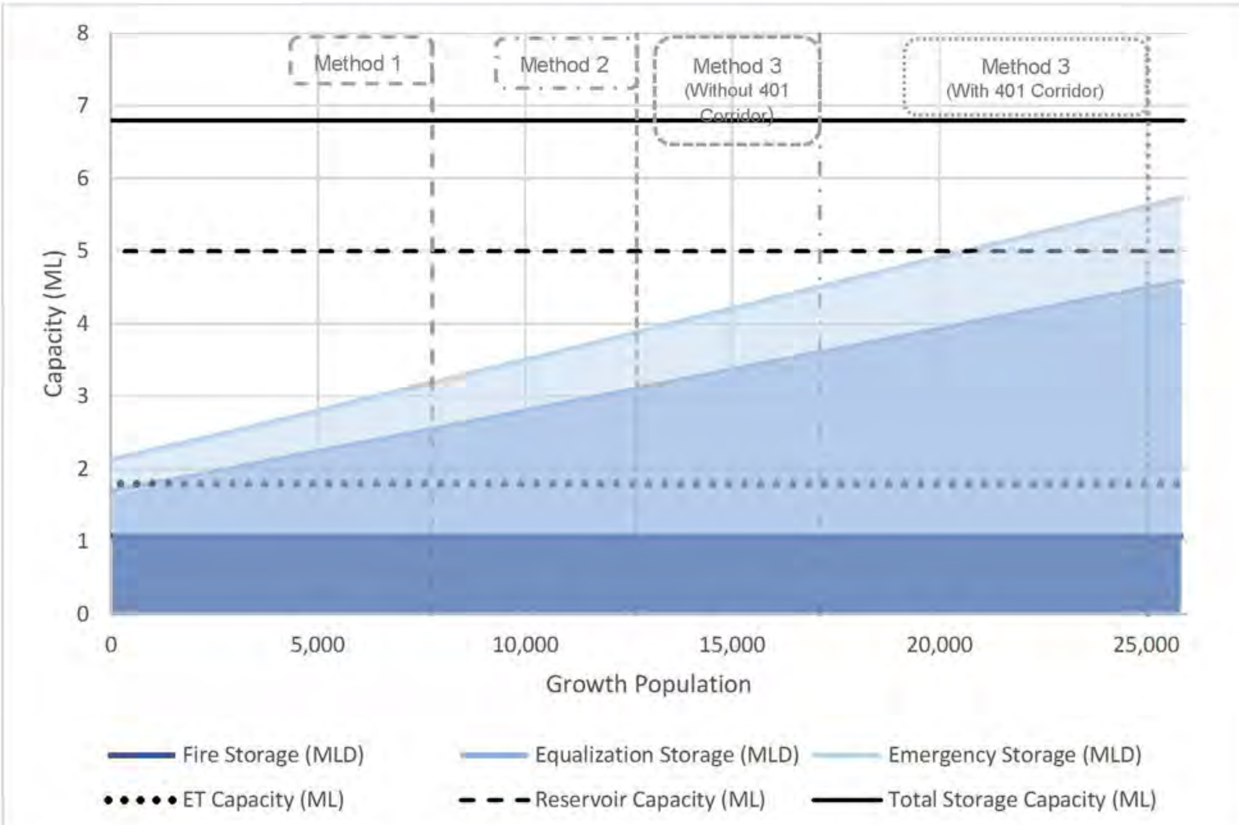


Figure 2-10: Dorchester Storage Needs and Availability

The advantages, disadvantages and upgrades, costs and timing are summarized in .

Table 2-14: 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**.

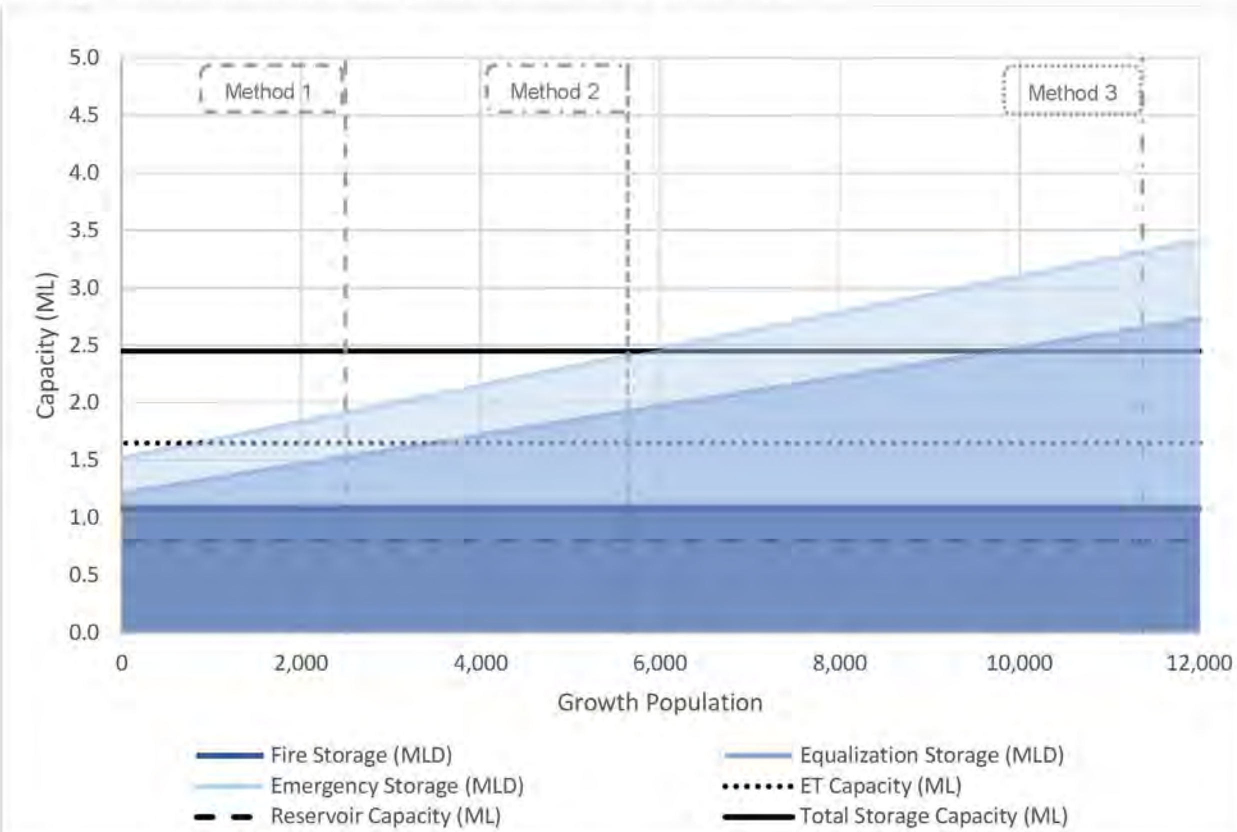


Figure 2-11: Thorndale Storage Needs and Availability

The advantages, disadvantages and upgrades, costs and timing are summarized in .

Table 2-15: 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 .

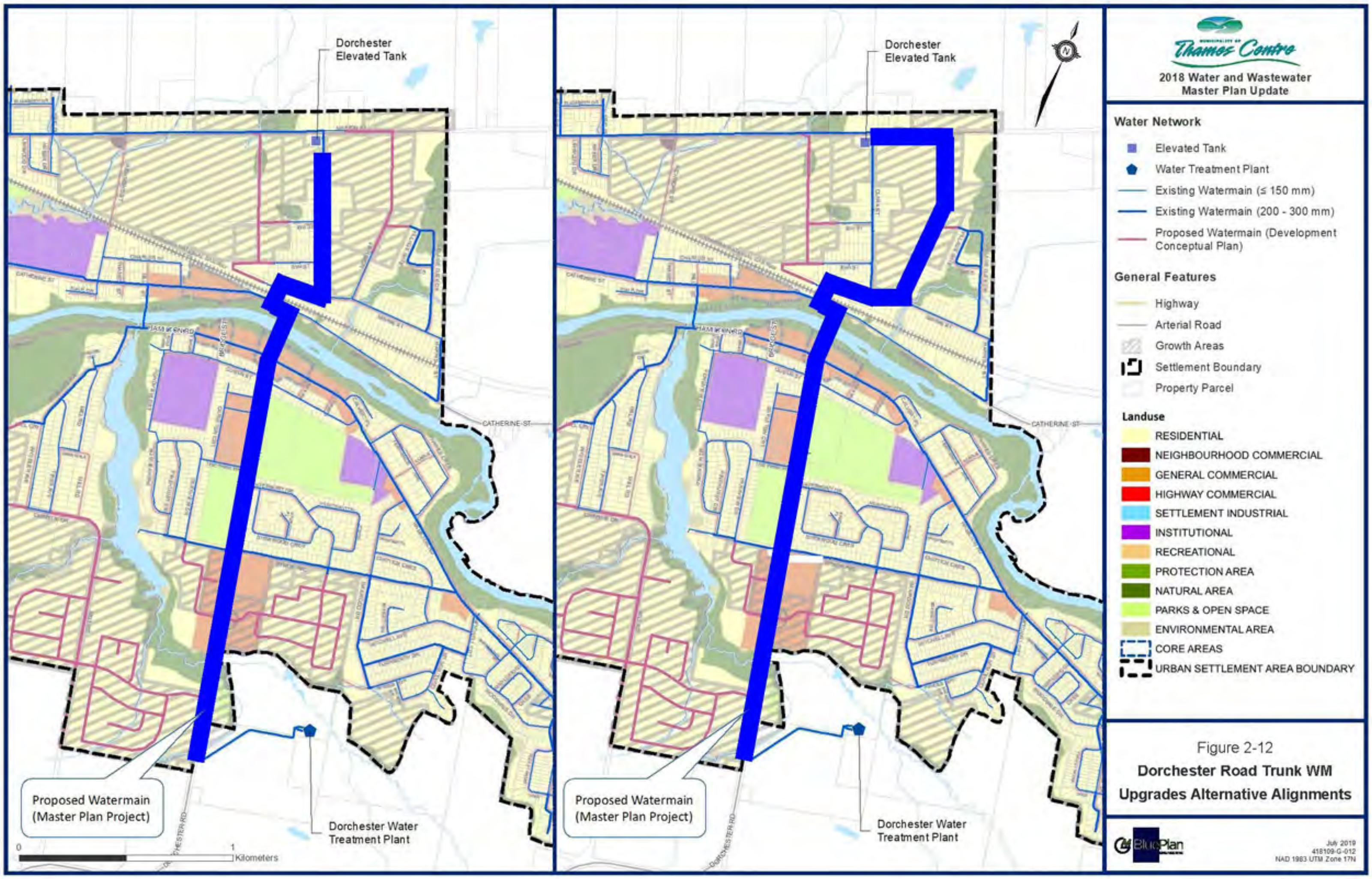


Figure 2-12
Dorchester Road Trunk WM Upgrades Alternative Alignments

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. (green) · Env. (green) · Soc./Cul. (yellow) · Fin. (yellow)	Tech. (green) · Env. (green) · Soc./Cul. (green) · Fin. (green)
	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**.

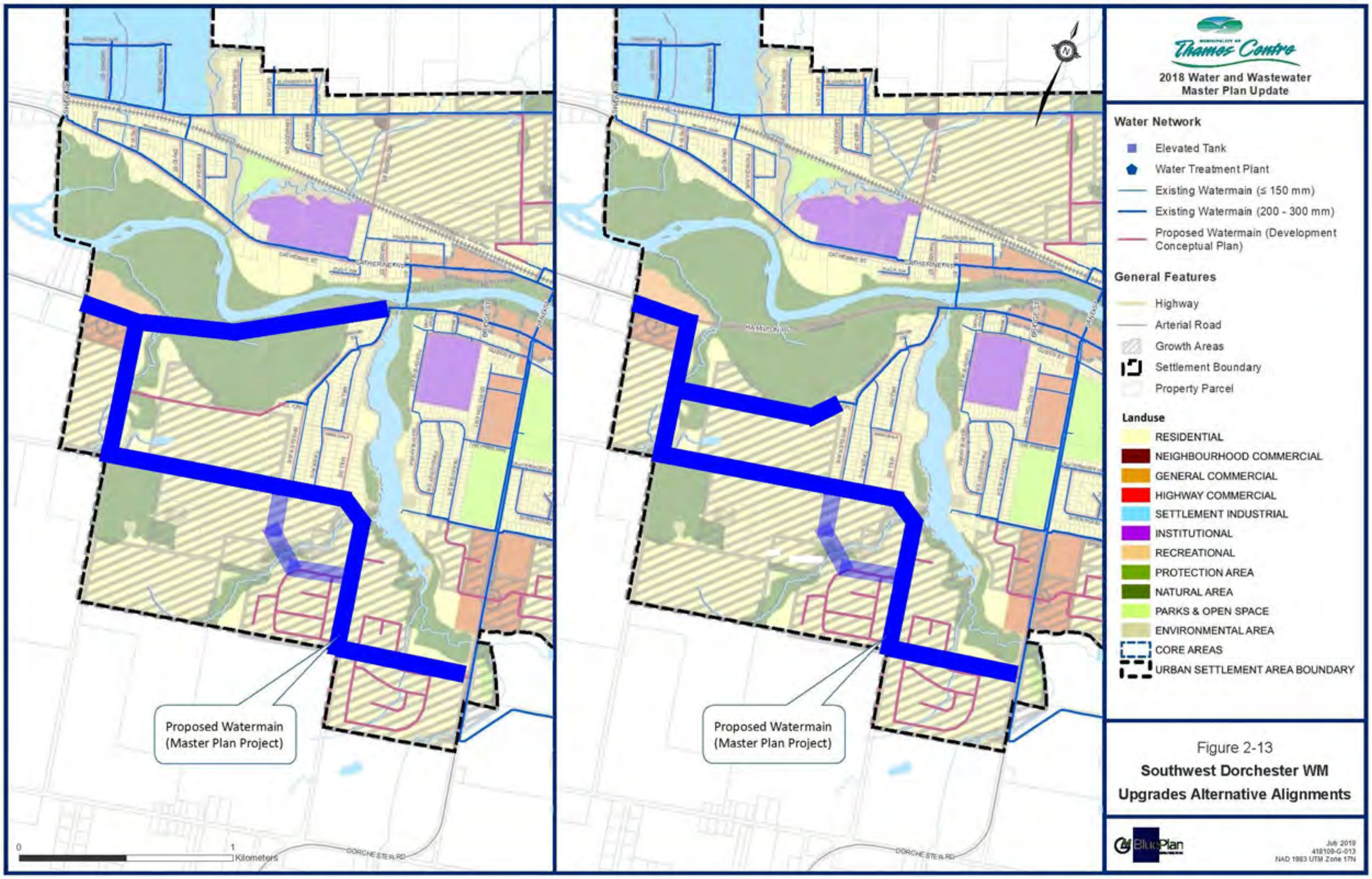


Figure 2-13
Southwest Dorchester WM Upgrades Alternative Alignments

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

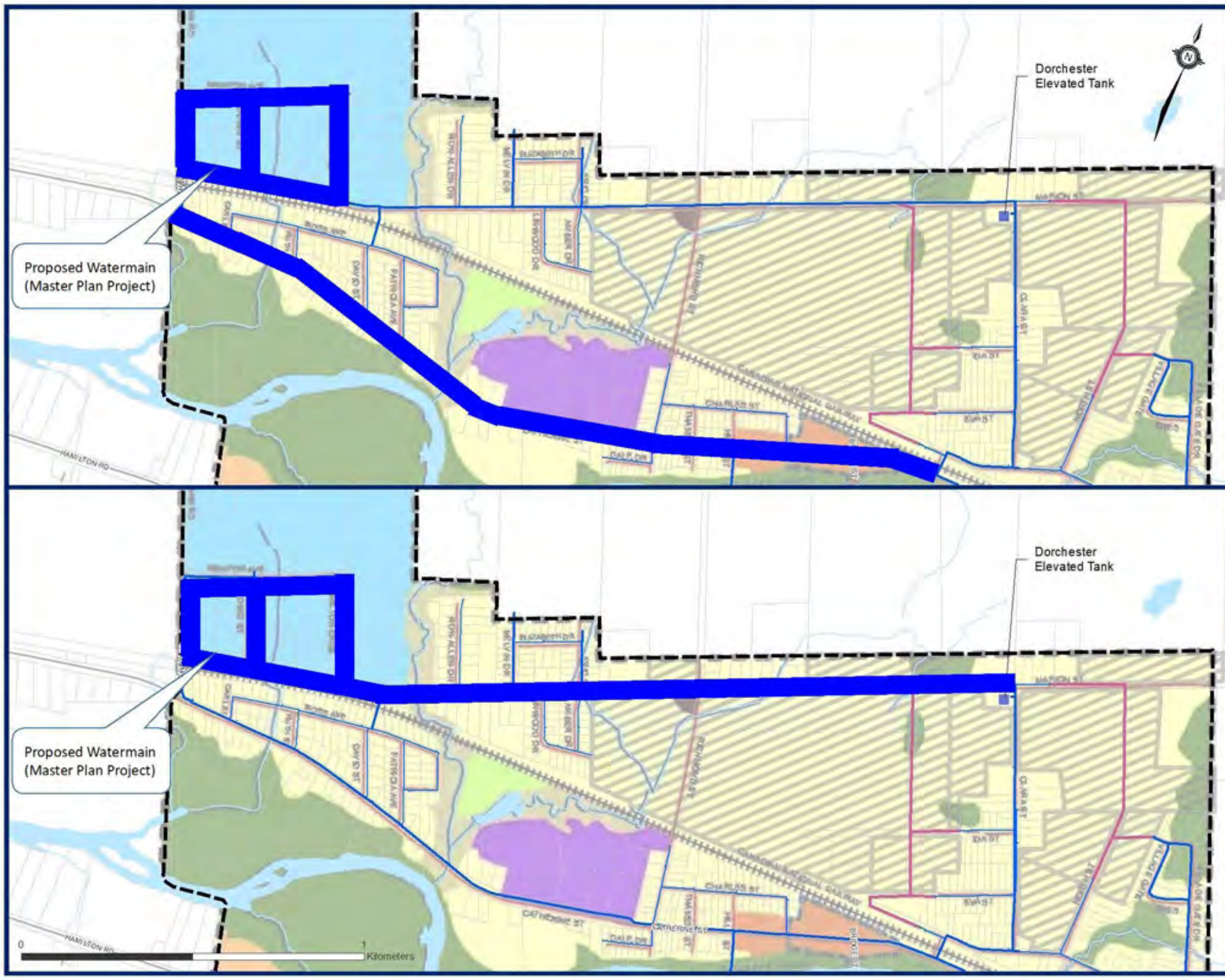
Southwest Dorchester Watermain Upgrade Alternative 1 New watermain alignment along Hamilton Rd. to service southwest Dorchester development	**Southwest Dorchester Watermain Upgrade Alternative 2** New watermain alignment through new development in Southwest Dorchester
• Long section of new watermain 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**.



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

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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.

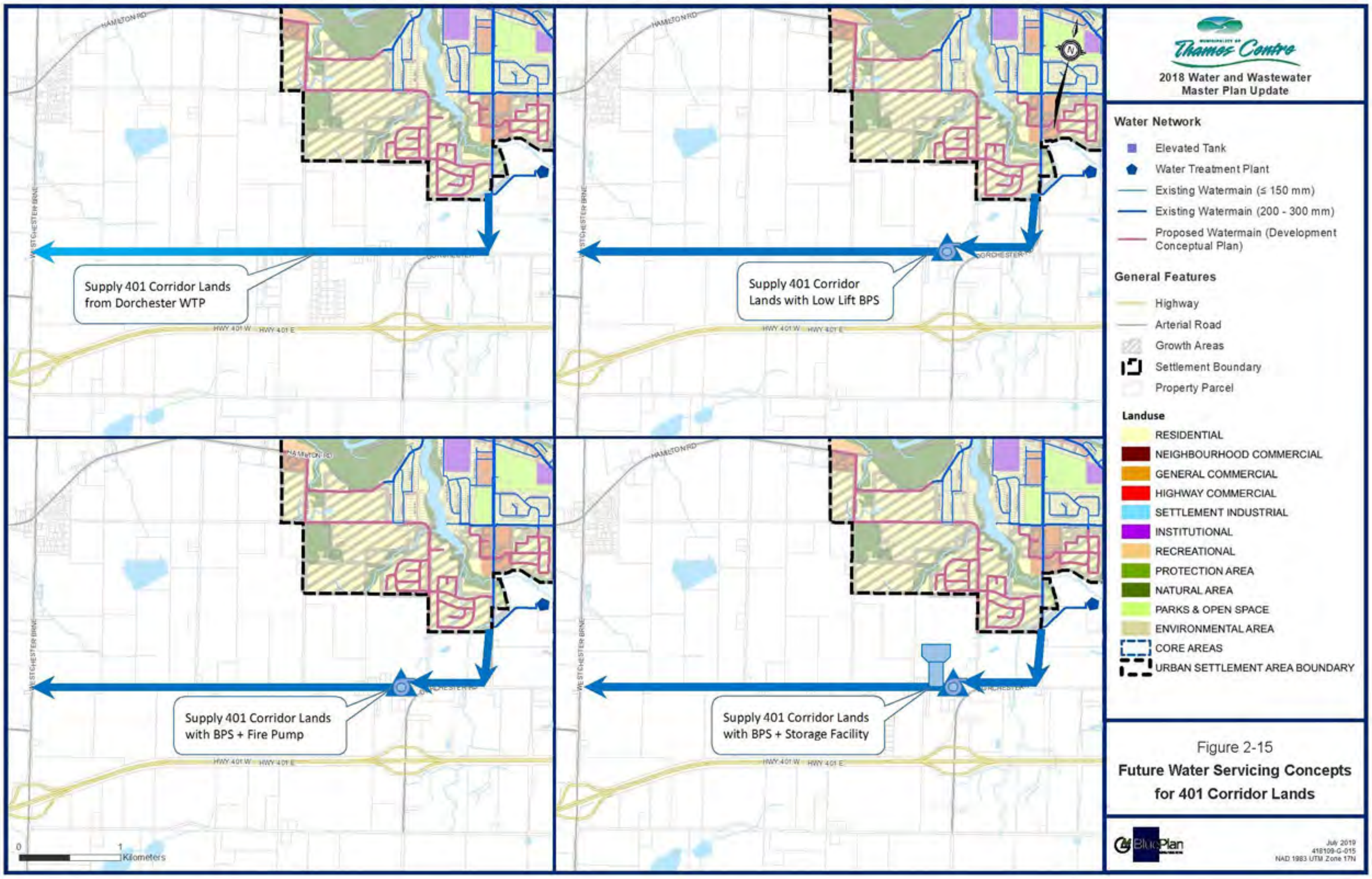


Figure 2-15
Future Water Servicing Concepts for 401 Corridor Lands

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**.

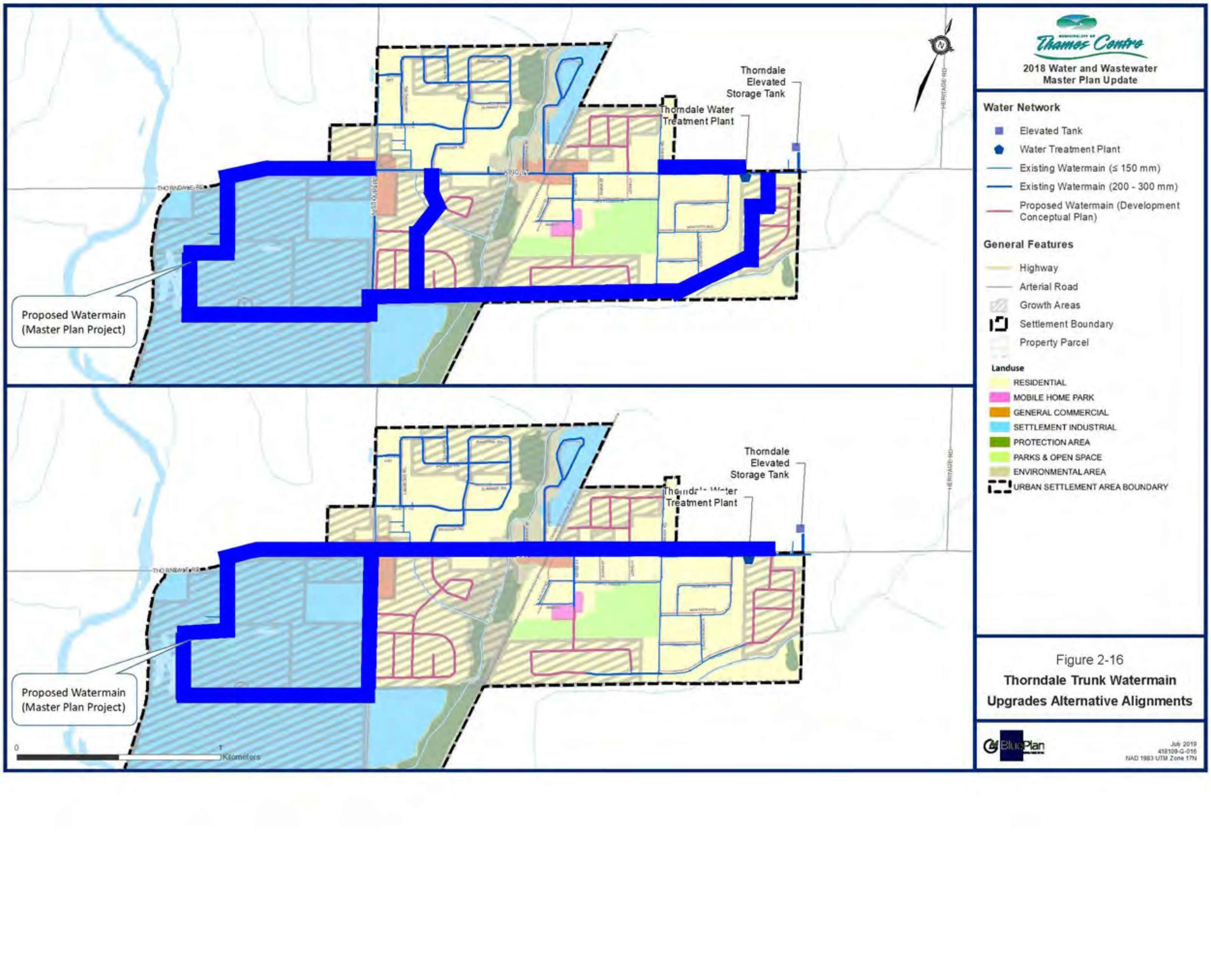


Figure 2-16
Thorndale Trunk Watermain Upgrades Alternative Alignments

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.

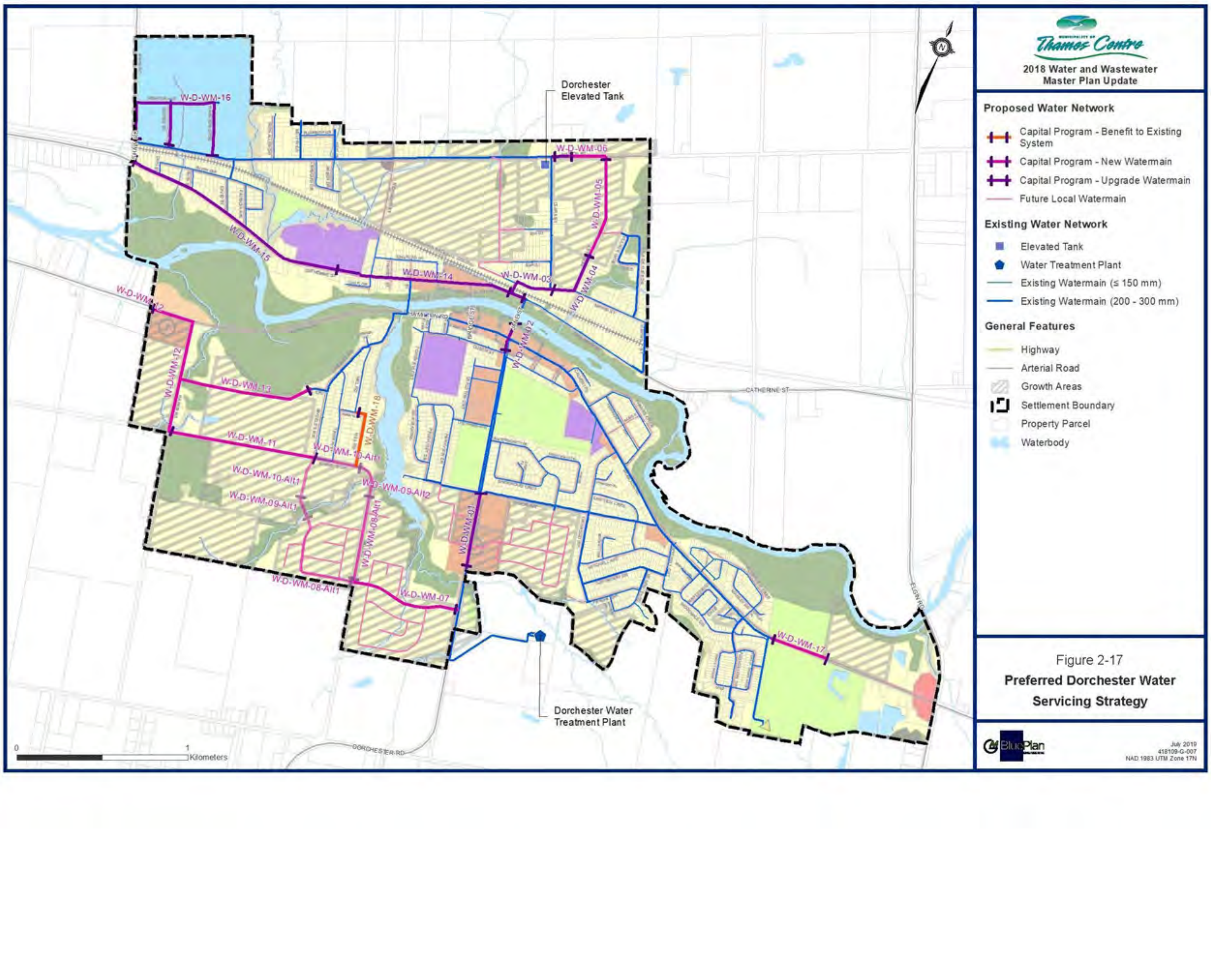
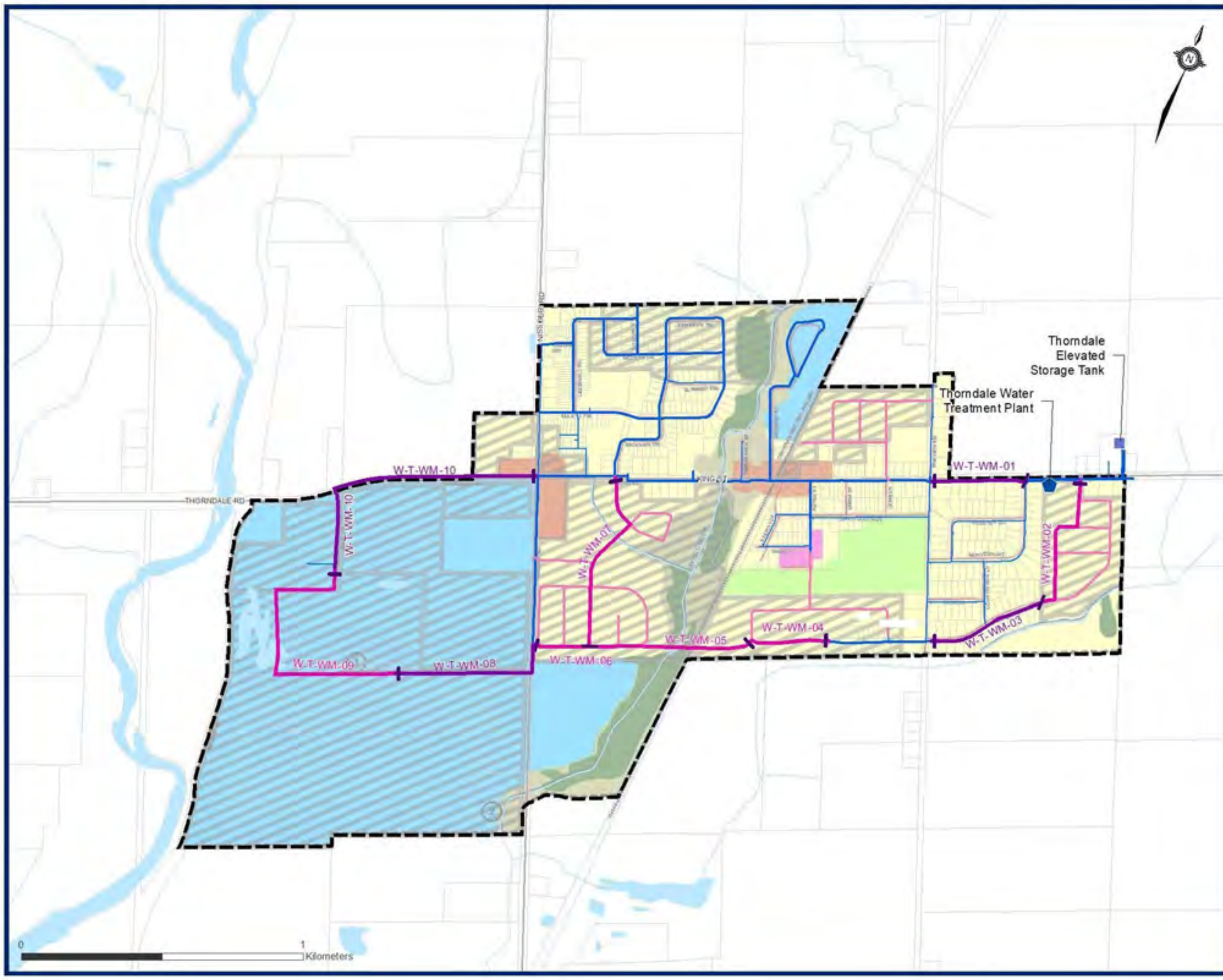


Figure 2-17

Preferred Dorchester Water Servicing Strategy



Thames Centre

2018 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

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418109-W-007
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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 Size/Capacity	Method 1 Total Component Estimated Cost (Excl. HST)	Method 2 Size/Capacity	Method 2 Total Component Estimated Cost (Excl. HST)	Method 3 Size/Capacity	Method 3 Total Component Estimated Cost (Excl. HST)	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 Development	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 sources, raw watermains, and treatment. Excludes pump capacity upgrades: cost to the Dorchester WTF High Lift Pumps	All Dorchester Development	Accumulated growth	80% Trigger of 2,000 PPJ (Persons + Jobs) = 2200 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 reservoir	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.)	460m of existing 250mm DI watermain (built in 1978) to be replaced by 300mm PVC watermain	All Dorchester Development	Accumulated Growth	North Dorchester Development	A+	Watermain	460 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 Development	Accumulated Growth	North Dorchester Development	A+	Watermain	190 m	300 mm	$ 402,000	300 mm	$ 402,000	300 mm	$ 402,000	300 mm	$ 402,000
W-D-WM-03	Dorchester Watermain - Spine Trunk Upgrade on Catherine St. and Minnie Rd. (North Section)	590m 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 Development	Accumulated Growth	North Dorchester Development	A+	Watermain	590 m	300 mm	$ 1,346,000	300 mm	$ 1,346,000	300 mm	$ 1,346,000	300 mm	$ 1,346,000
W-D-WM-04	Dorchester Watermain - North St. Upgrade	350m of existing 150mm DI watermain (built in 1955) on North Street and Minnie Street to be replaced by 200mm PVC watermain	All Dorchester Development	Dorchester Development Block 14	With new development	A+	Watermain	350 m	200 mm	$ 620,000	200 mm	$ 620,000	200 mm	$ 620,000	200 mm	$ 620,000
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 120m of 150mm proposed PVC watermain on Village Gate Dr.	All Dorchester Development	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 - Mason St. Upgrade	Total of 320m of 200mm watermain on Mason Street, including 100m of existing 150mm PVC watermain to be replaced by 200mm PVC watermain and 220m of proposed 200mm PVC watermain	All Dorchester Development	Dorchester Development Blocks 9, 10, 11 and 12	With new development	A+	Watermain	320 m	200 mm	$ 665,000	200 mm	$ 665,000	200 mm	$ 665,000	200 mm	$ 665,000
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-WM08-ALT1	Dorchester Watermain - West Trunk at the Development 22	Newly proposed West Trunk - 520m 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	520 m	300 mm	$ 1,010,000	300 mm	$ 1,010,000	300 mm	$ 1,010,000	300 mm	$ 1,010,000
W-D-WM09-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	$ 359,000	300 mm	$ 359,000	300 mm	$ 359,000	300 mm	$ 359,000
W-D-WM10-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 1000m 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 49	With new development	A	Watermain	880 m	300 mm	$ 1,719,000	300 mm	$ 1,719,000	300 mm	$ 1,719,000	300 mm	$ 1,719,000
W-D-WM-12	Dorchester Watermain - West Trunk on Hamlet Rd. and Hamilton Rd.	Newly proposed West Trunk - 1080m of proposed 300mm PVC watermain along Hamlet Rd. and Hamilton Rd.	Dorchester Development Blocks 15, 17 and 50	Dorchester Development Block 49	With new development	A	Watermain	810 m	300 mm	$ 1,630,000	300 mm	$ 1,630,000	300 mm	$ 1,630,000	300 mm	$ 1,630,000
W-D-WM-13	Dorchester Watermain - West Trunk at Mill Ct. Loop	Newly proposed West Trunk - 900m of proposed 200mm PVC watermain on Mill Ct to complete loop	Dorchester Development 50	Watermain Replacement Program		A+	Watermain	620 m	200 mm	$ 1,384,000	200 mm	$ 1,384,000	200 mm	$ 1,384,000	200 mm	$ 1,384,000
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	1300m 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	1060 m	300 mm	$ 2,202,000	300 mm	$ 2,202,000	300 mm	$ 2,202,000	300 mm	$ 2,202,000
W-D-WM-16	Dorchester Watermain - Northwest Industrial Lands Upgrade	1280m of existing 200mm DI & PVC watermain (built in 1976 - 2017) to be replaced by 300mm PVC watermain	Existing Dorchester Development	Watermain Replacement Program		A+	Watermain	1280 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 300mm PVC watermain along Hamilton Rd.	Dorchester Development Block 47	Dorchester Development Block 47	With new development	A+	Watermain	350 m	300 mm	$ 510,000	300 mm	$ 510,000	300 mm	$ 510,000	300 mm	$ 510,000
W-D-WM-18	Dorchester Watermain - Benefits Existing System	370m of proposed 200mm PVC watermain along Mill Rd.	Dorchester Development Block 19	Dorchester Development Block 19	With new development	A+	Watermain	380 m	200 mm	$ 646,000	200 mm	$ 646,000	200 mm	$ 646,000	200 mm	$ 646,000
Sub Total Dorchester Water Capital Program Projects										$ 20,171,000		$ 20,171,000		$ 20,171,000		$ 20,171,000
W-D-401-STU1	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. Includes pump capacity upgrades cost to the Thorndale WTF High Lift Pumps	All Thorndale Developments	Accumulated growth	80% (>2,800 PPU = 2,000 PPU (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 0.383 ML reservoir	All Thorndale Developments	Accumulated growth	80% of 5,800 PPU = 4,600 PPU	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 reservoir	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	$ 910,000	300 mm	$ 910,000	300 mm	$ 910,000	300 mm	$ 910,000
W-T-WM-02	Thorndale Watermain - South Trunk at McIlwraith Lands	590m of proposed 300mm PVC watermain at McIlwraith Lands to complete south trunk	Thorndale Development Blocks 1, 2, 3, 4, 8, 9 and 10	Thorndale Development Block 10	With new development	A	Watermain	590 m	300 mm	$ 980,000	300 mm	$ 980,000	300 mm	$ 980,000	300 mm	$ 980,000
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 10	Thorndale Development Block 9 (Phase 2) or 10	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 10	Thorndale Development Block 9	Proposed construction	A	Watermain	280 m	300 mm	$ 357,000	300 mm	$ 357,000	300 mm	$ 357,000	300 mm	$ 357,000
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 10	Thorndale Development Block 8	With new development	A+	Watermain	410 m	300 mm	$ 1,009,000	300 mm	$ 1,009,000	300 mm	$ 1,009,000	300 mm	$ 1,009,000
W-T-WM-06	Thorndale Watermain - South Trunk at Rosewood Subdivision	380m of proposed 300mm PVC watermain at Rosewood Subdivision to complete south trunk	Thorndale Development Blocks 1, 2, 3, 4, 8, 9 and 10	Thorndale Development Block 8 (Phase 2)	With new development	A	Watermain	380 m	300 mm	$ 940,000	300 mm	$ 940,000	300 mm	$ 940,000	300 mm	$ 940,000
W-T-WM-07	Thorndale Watermain - Sub-loop at Rosewood	590m of proposed 300mm PVC watermain at Rosewood Subdivision	Thorndale Development Blocks 1, 2, 3, 4, 8, 9 and 10	Thorndale Development Block 8	Proposed construction	A	Watermain	590 m	300 mm	$ 464,000	300 mm	$ 464,000	300 mm	$ 464,000	300 mm	$ 464,000
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 250mm 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	1000m of 250mm 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	$ 1,741,000	300 mm	$ 1,741,000	300 mm	$ 1,741,000	300 mm	$ 1,741,000
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 250mm 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										$ 23,808,000		$ 23,808,000		$ 23,808,000		$ 23,808,000
Total Municipality of Thames Centre Water Capital Program										$ 76,027,000		$ 76,027,000		$ 76,027,000		$ 76,027,000

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:

<u>Sewer Capacity</u>

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

<u>Basement Flooding Risk</u>

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**.

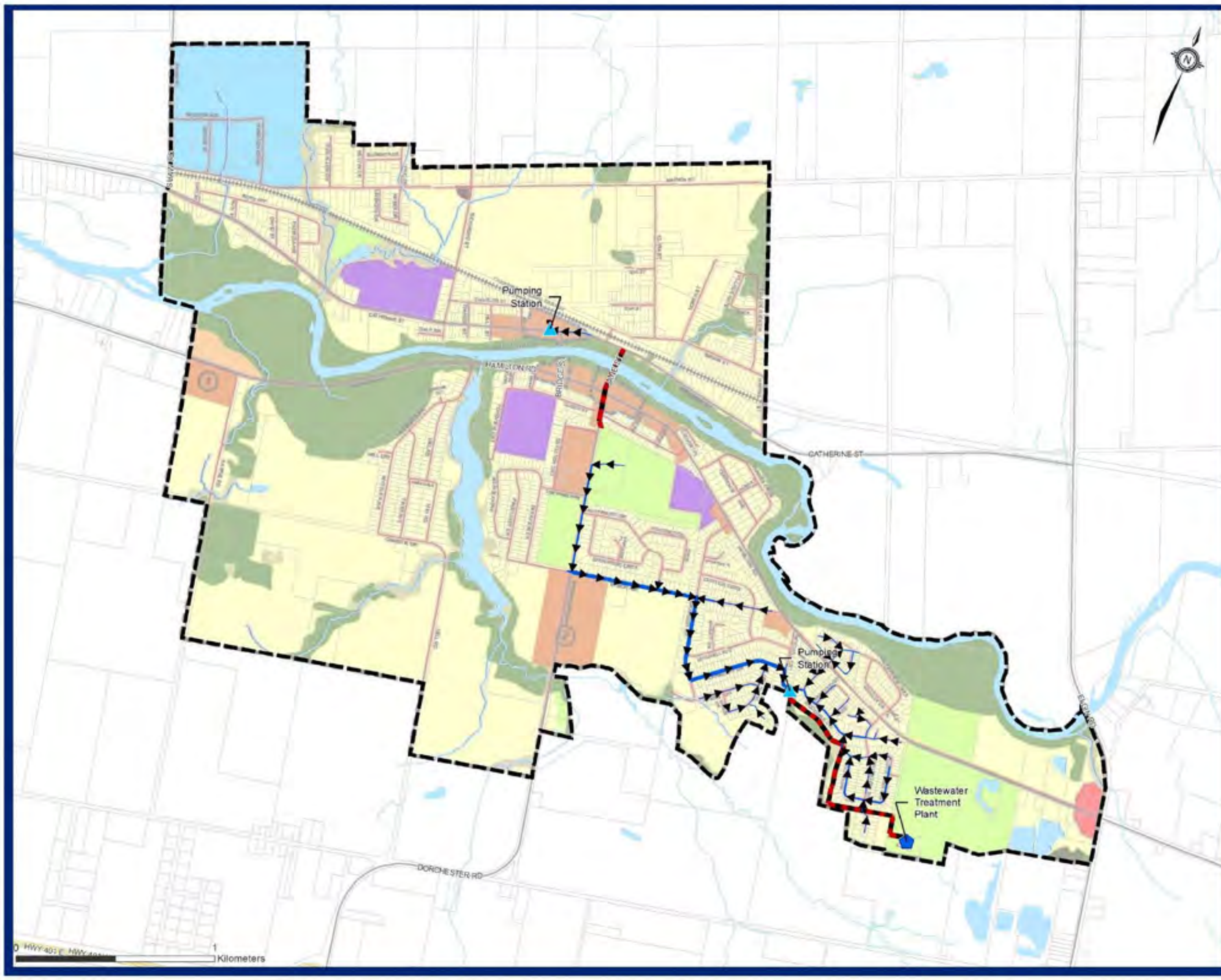


Figure 3-1

Dorchester Existing Wastewater System

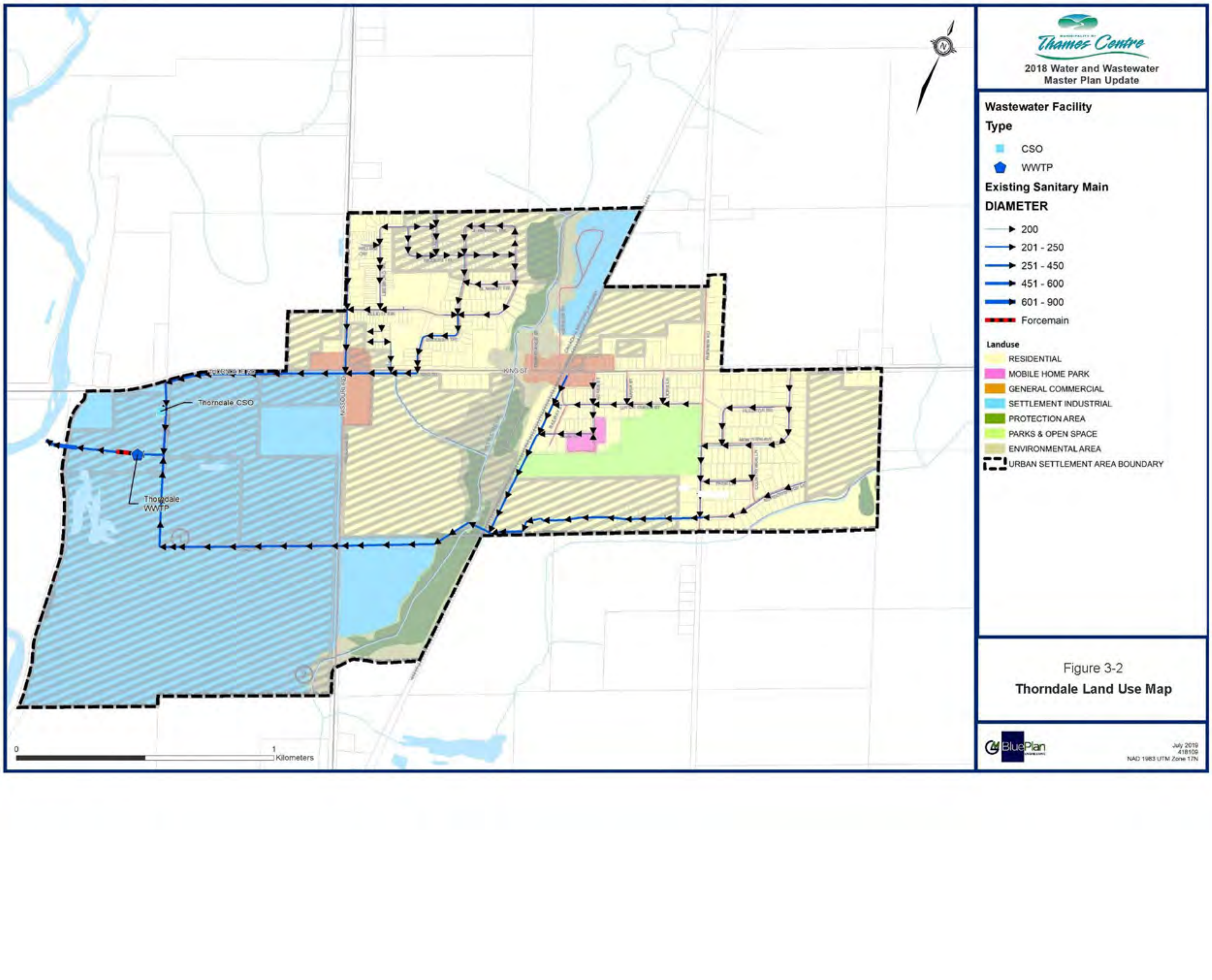


Figure 3-2
Thorndale Land Use Map

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.

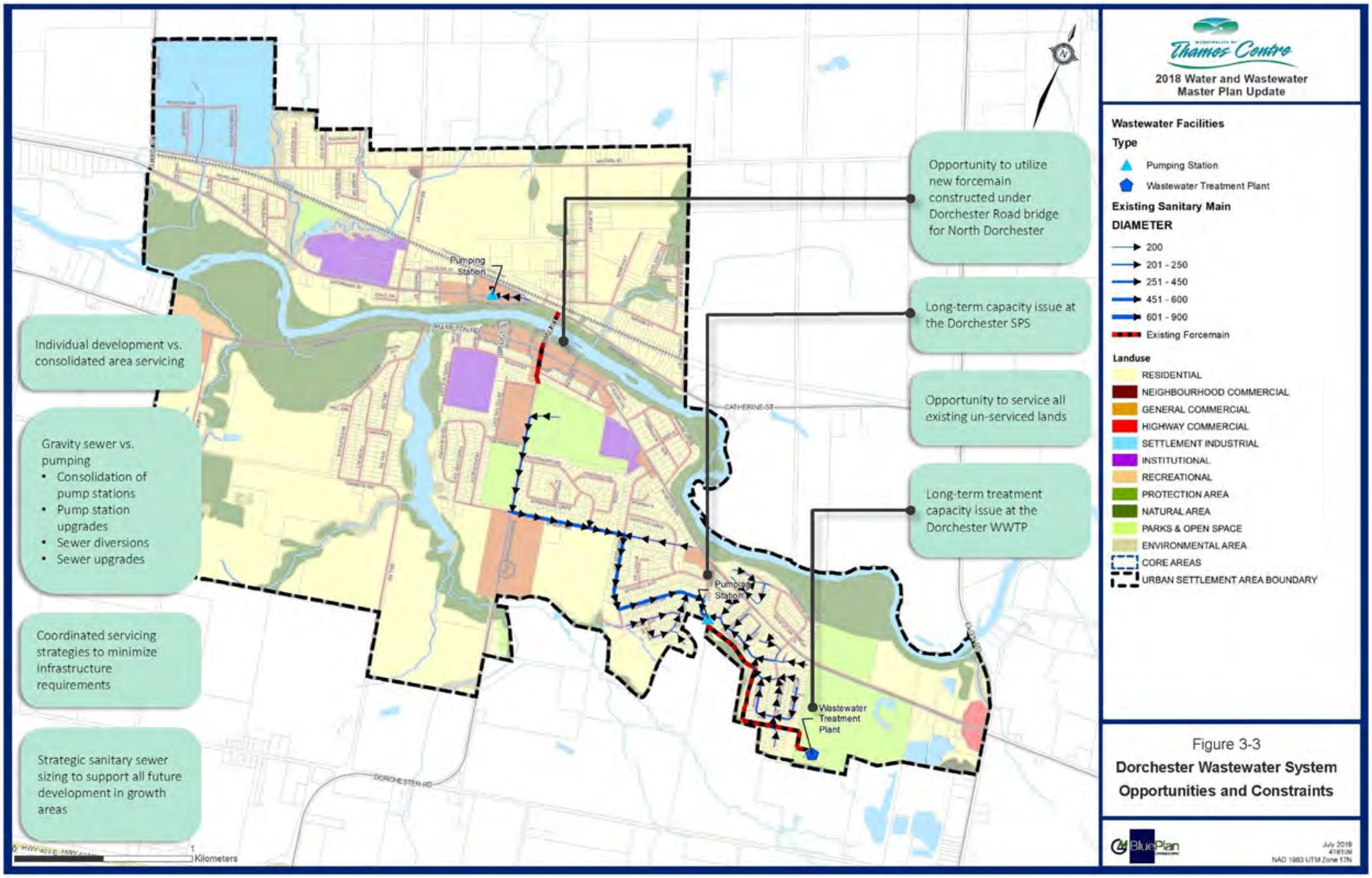


Figure 3-3
Dorchester Wastewater System Opportunities and Constraints

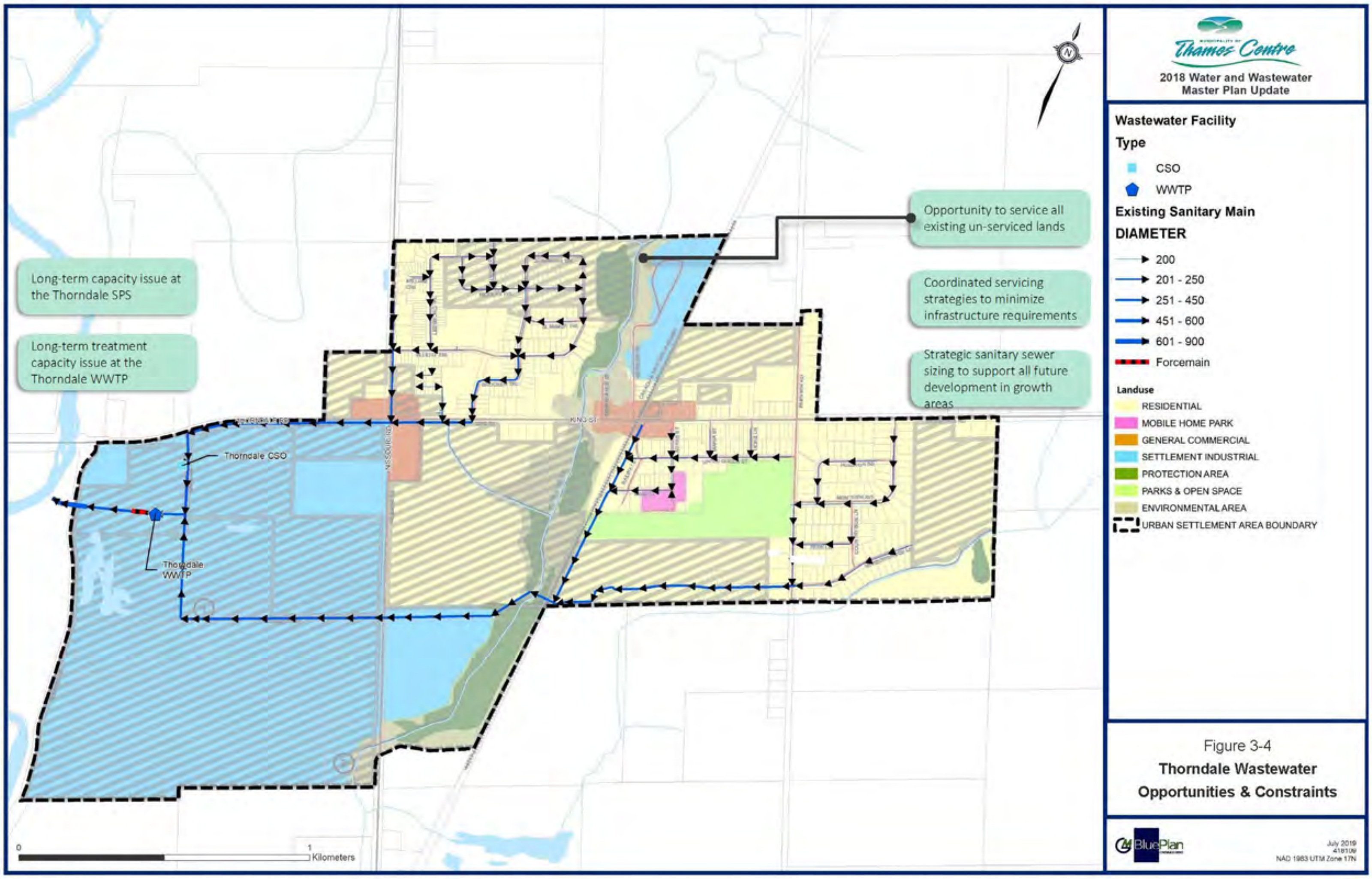


Figure 3-4
Thorndale Wastewater Opportunities & Constraints

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**.

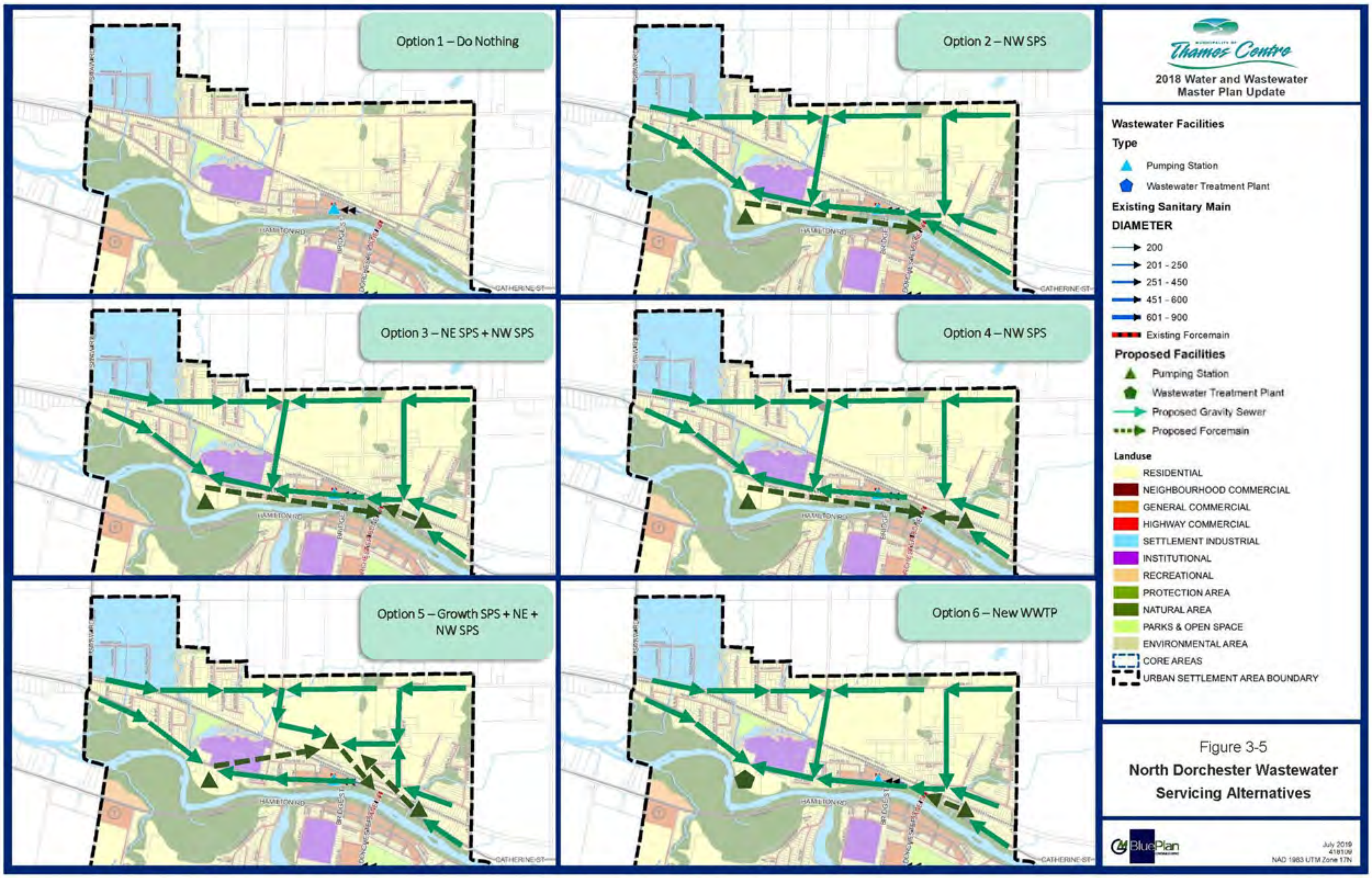


Figure 3-5
North Dorchester Wastewater Servicing Alternatives

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

Evaluation Criteria	Alternative 1 Do Nothing	Alternative 2 Northwest SPS - all growth areas and all existing areas gravity to one SPS	Alternative 3 Northwest and Northeast SPS - all growth and existing areas	Alternative 4 Northeast SPS - all growth East of Development 6 can gravity to NESPS, remaining areas gravity to NWSPS	Alternative 5 New Development SPS - all growth North of CN rail can gravity to New Development SPS, remaining areas gravity to NW SPS and NESPS	Alternative 6 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
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
Construction impacts (noise, vibration, dust)	None	Minimal, short term	Minimal, short term	Minimal, short term	Minimal, short term	Moderate, short term

Evaluation Criteria	Alternative 1 Do Nothing	Alternative 2 Northwest SPS - all growth areas and all existing areas gravity to one SPS	Alternative 3 Northwest and Northeast SPS - all growth and existing areas	Alternative 4 Northeast SPS - all growth East of Development 6 can gravity to NESPS, remaining areas gravity to NWSPS	Alternative 5 New Development SPS - all growth North of CN rail can gravity to New Development SPS, remaining areas gravity to NW SPS and NESPS	Alternative 6 Northwest WWTF and Northeast SPS - all growth and existing areas
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**.

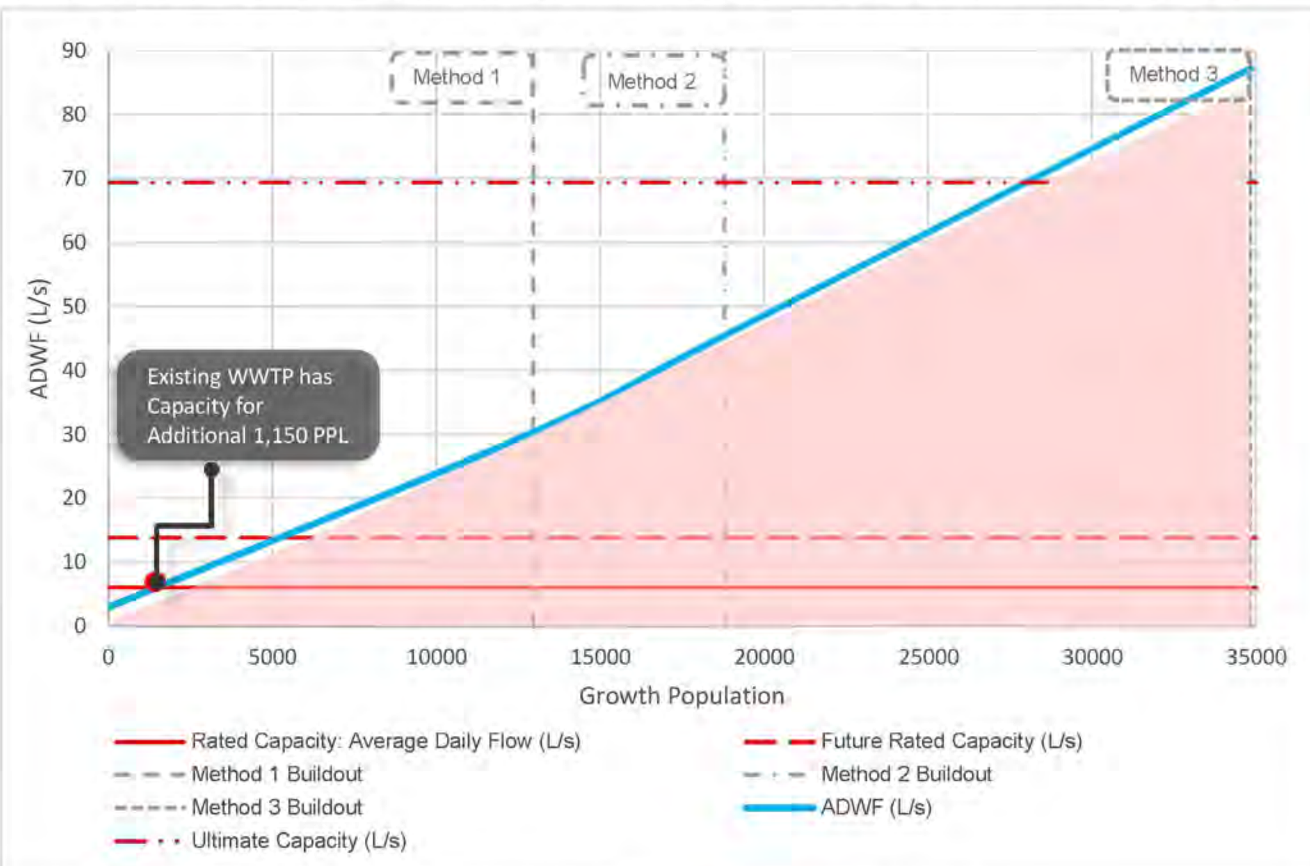


Figure 3-6: Dorchester WWTF Treatment Needs

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**.

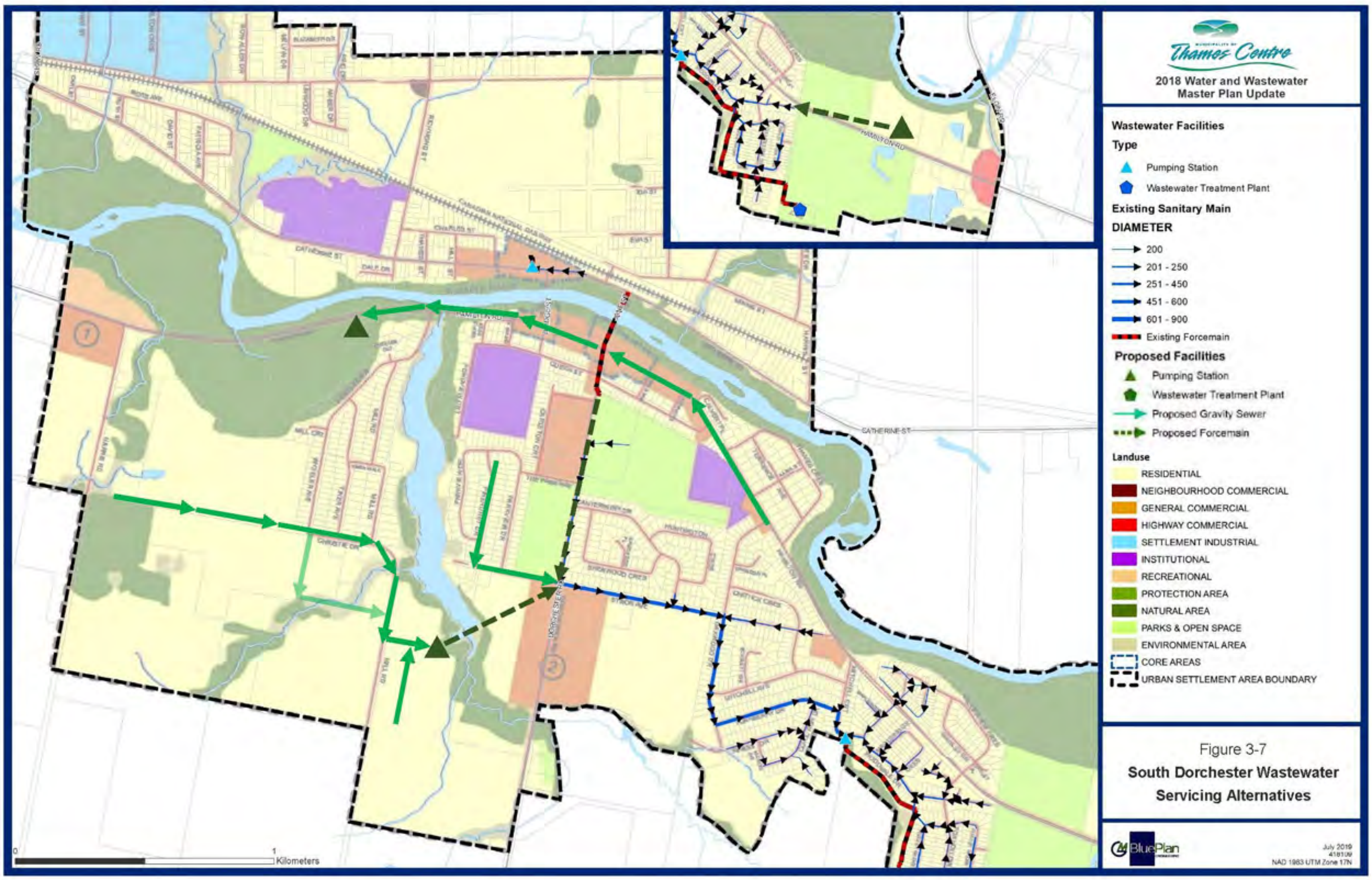


Figure 3-7
South Dorchester Wastewater Servicing Alternatives

3.5.1.4

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**.

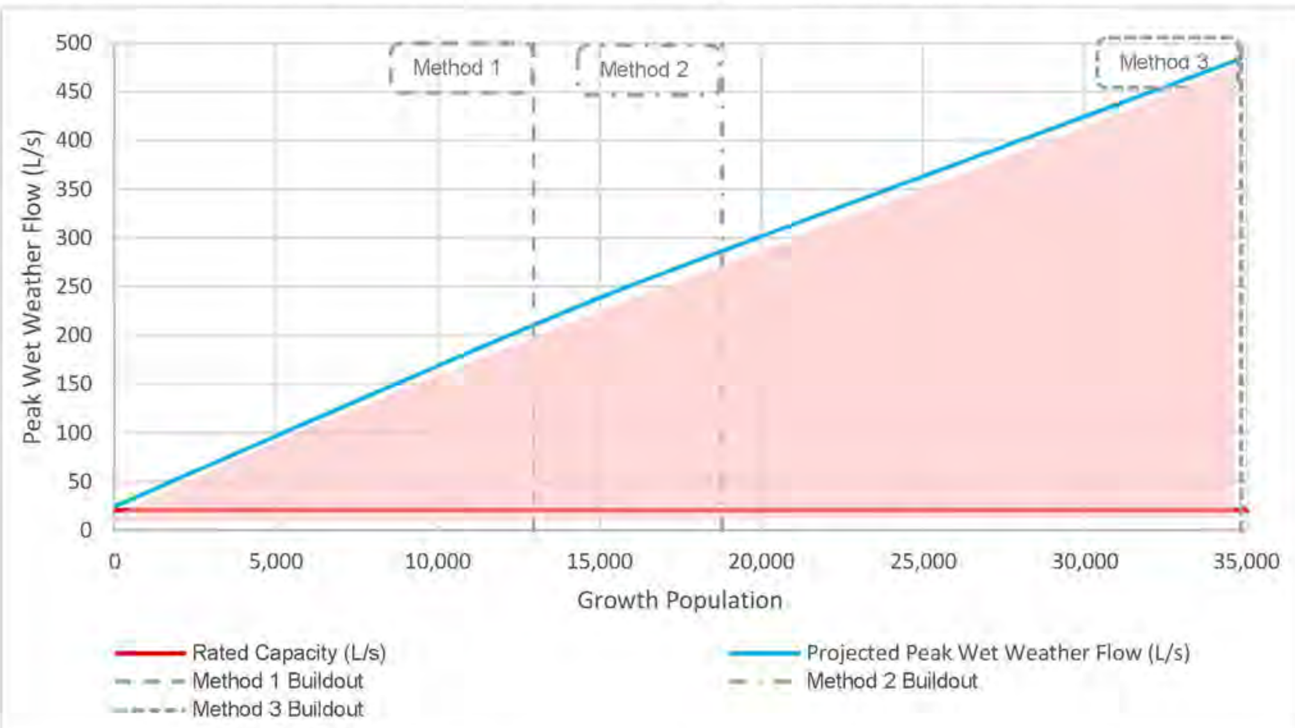


Figure 3-8: Upgrade Requirements Triggers at Dorchester SPS

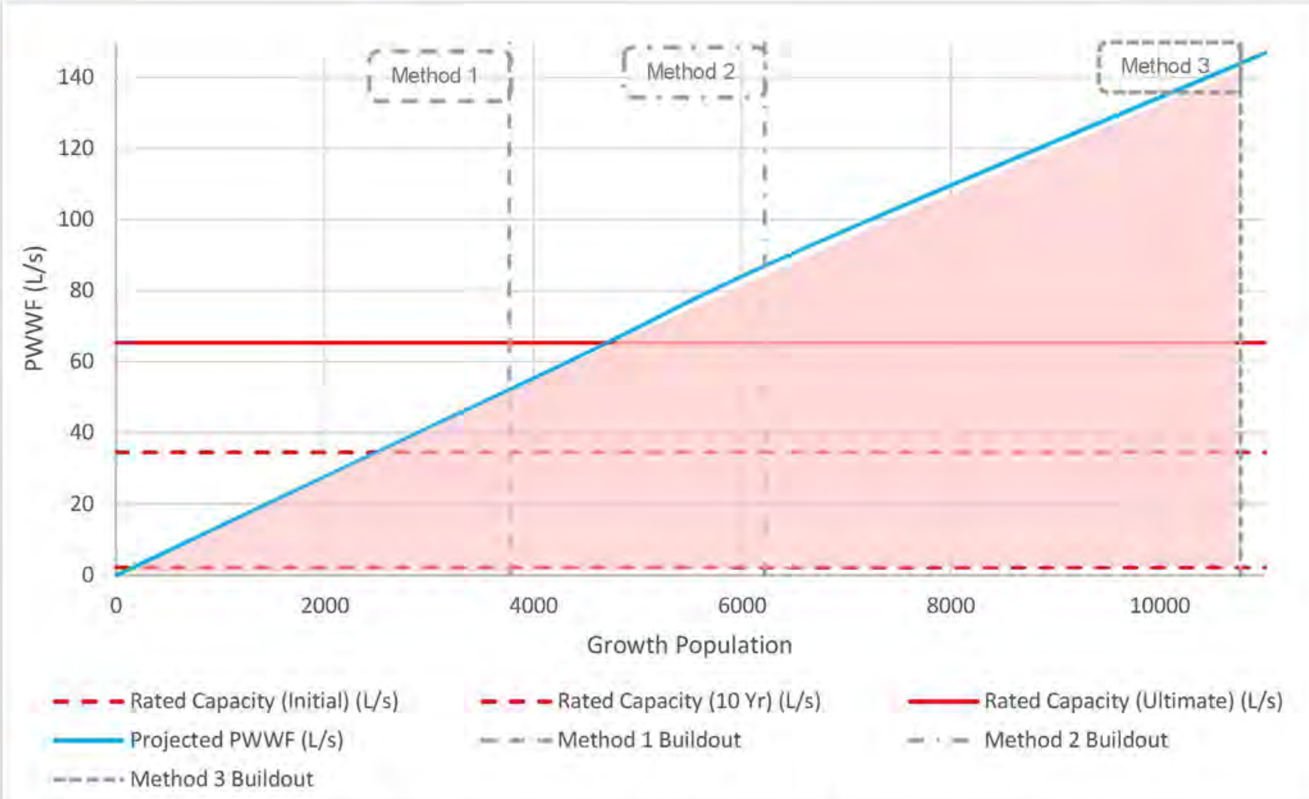


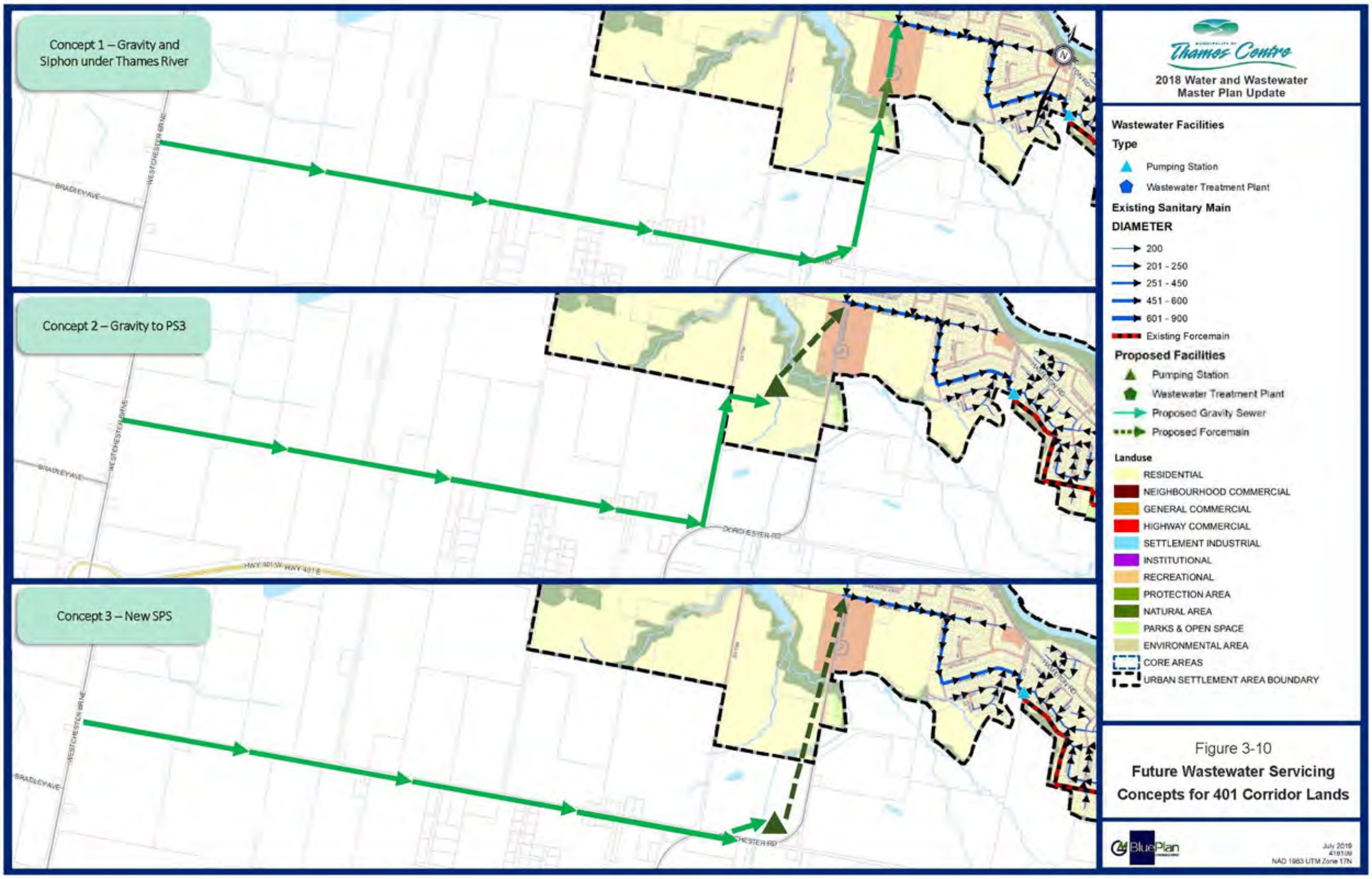
Figure 3-9: Upgrade Requirements Triggers at Dorchester #3 SPS

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
Thames Centre
2018 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
BRADLEY AVE
DORCHESTER RD
HWY 401 W
HWY 401 E
Figure 3-10
Future Wastewater Servicing Concepts for 401 Corridor Lands
BluePlan
July 2019
NAD 1983 UTM Zone 17N

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**.

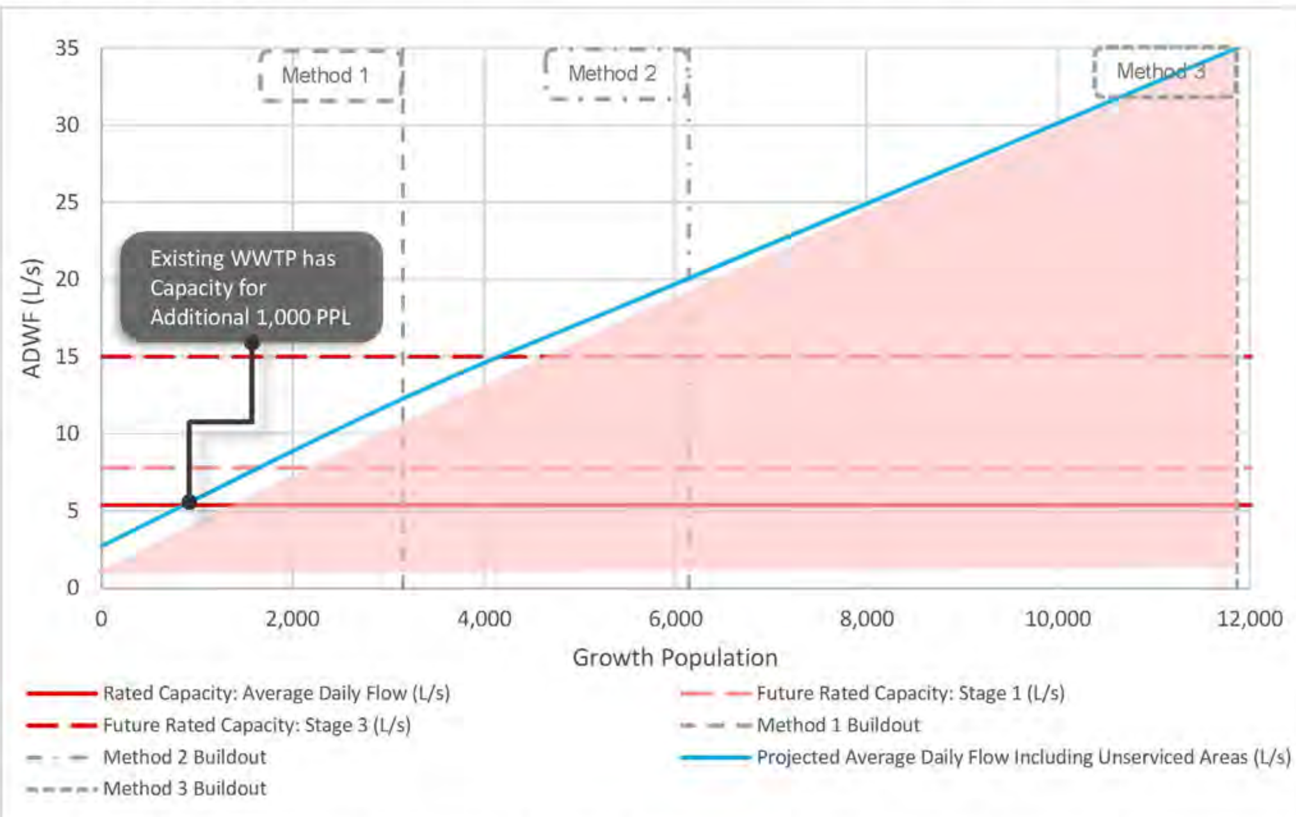


Figure 3-11: Thorndale Treatment Needs Compared to Thorndale WWTF Existing and Future Capacity

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

Figure 3-12
Thorndale Wastewater Servicing Alternatives

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**.

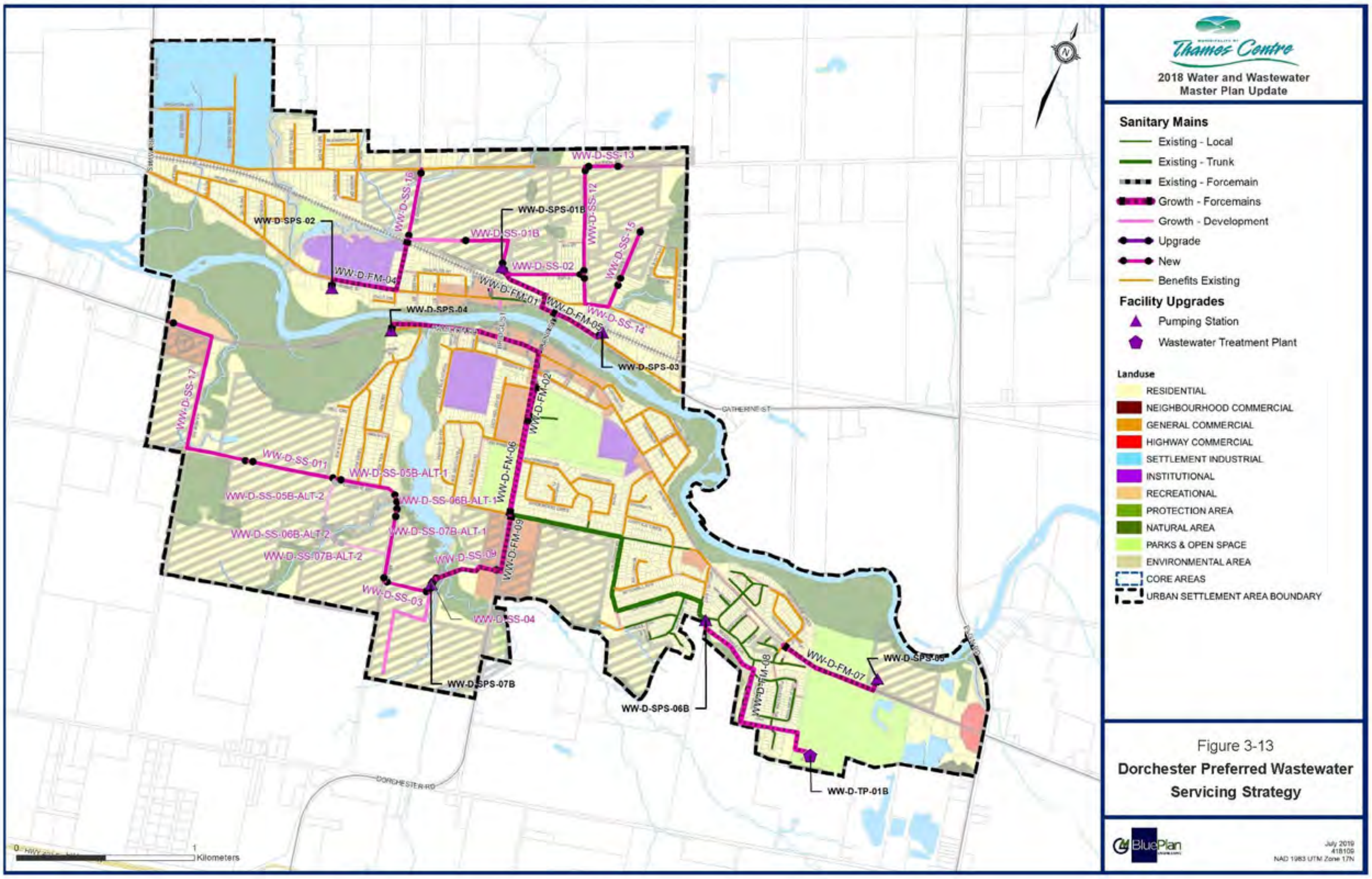


Figure 3-13
Dorchester Preferred Wastewater Servicing Strategy

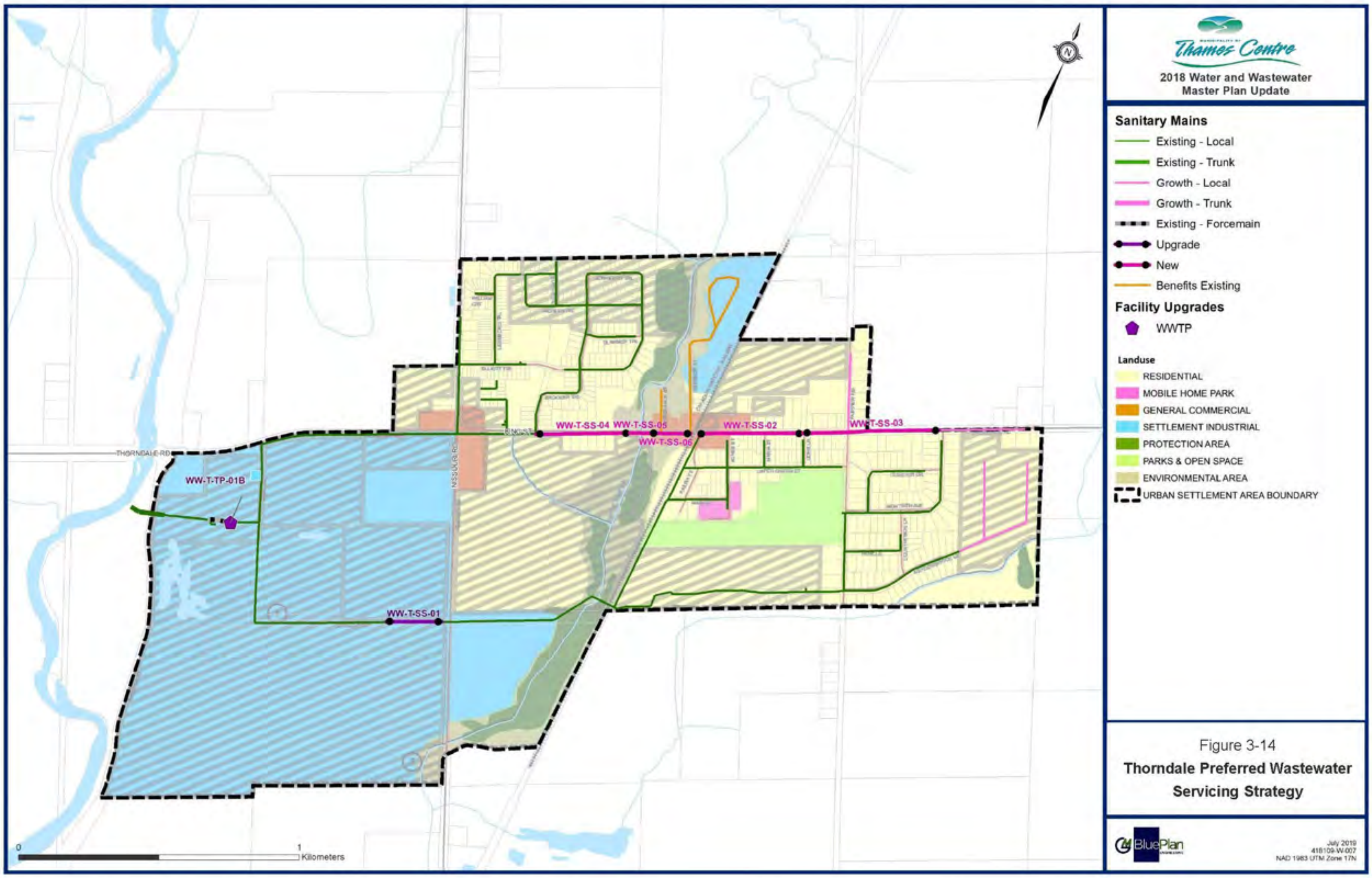


Figure 3-14
Thorndale Preferred Wastewater Servicing Strategy

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 1.1**. 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 Size/Capacity	Method 1 Total Component Estimated Cost (Excl. HST)	Method 2 Size/Capacity	Method 2 Total Component Estimated Cost (Excl. HST)	Method 3 Size/Capacity	Method 3 Total Component Estimated Cost (Excl. HST)	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 (Bentoon + Jobs) = 800 PPJ	C	Treatment		2.1 ML	$8,410,000	4.2 ML	$18,003,000	6.0 ML	$26,076,000	7.2 ML	$ 14,006,000
WW-D-SPS-01B	North Dorchester New Development SPS	New SPS needed to support New Development north of railway in North Dorchester	Development 8-15, 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	$900,000	9 L/s	$980,000	8 L/s	$980,000	8 L/s	$ 900,000
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 15	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 18, 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	$391,000	8 L/s	$539,000	8 L/s	$539,000	8 L/s	$ 576,000
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	PS3	Pumping station capacity upgrades required to accommodate growth flows in Dorchester	Development 16-19, 22-25, 28b	Southeast Development Block 4	80% Trigger of 4,500 PPJ = 3,600 PPJ	B	Pumping		66 L/s	$3,601,000	102 L/s	$5,350,000	156 L/s	$6,793,000	102 L/s	$ 5,350,000
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	473 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 8-15, Ex. Area 1 - 4, 13	With WW-D-SPS-01	With new development	A+	Forcemain	300 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 8-15, Ex. Area 1 - 4, 13	New Development or Municipal Servicing Replacing Private Sewage Systems	80% Trigger of 2,700 PPJ = 2,160 PPJ	A+	Forcemain	650 m			300 mm	$809,000	300 mm	$809,000	300 mm	$ 860,000
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	$1,467,000	100 mm	$1,467,000	100 mm	$1,467,000	100 mm	$ 1,467,000
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	550 m	100 mm	$1,163,000	100 mm	$1,163,000	100 mm	$1,163,000	100 mm	$ 1,163,000
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	1900 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	420 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	300 mm	$2,162,000	300 mm	$2,112,000	300 mm	$2,112,000	300 mm	$ 2,162,000
WW-D-FM-09	PS3 forcemain	Twinned forcemains needed to support PS3 for all development in Southeast Dorchester	Development 16-19, 22-25, 28b	With WW-D-SPS-07B (Dorchester PS3)	80% Trigger of 4,500 PPJ = 3,600 PPJ	B	Forcemain	682 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	$490,000	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 17-19, 22, 25, Ex. Area 19	New Development or Municipal Servicing Replacing Private Sewage Systems	Proposed construction	A+	Sewer	265 m	375 mm	$1,528,000	375 mm	$1,528,000	375 mm	$1,528,000	375 mm	$ 1,528,000
WW-D-SS-04	PS3 West Sewers	New sanitary sewer required for development blocks going to PS3 in Dorchester	Development 17-19, 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-02B-ALT-1	Christie Drive and new Development sewer	New sanitary sewer required for development blocks going to PS3 in Dorchester	Development 17-19, 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	$663,000	300 mm	$663,000	300 mm	$ 562,000

BluePlan

Thames Centre

Table 3-9: Wastewater Capital Program

Capital Program ID	Name	Description	Development Blocks and/or Existing Unserviced Areas	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)
WWD-SS-06B-ALT-1	Path-Hamo 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	50 m	250 mm	$364,000	300 mm	$627,000	300 mm	$627,000	300 mm	$ 627,000
WWD-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	380 m	250 mm	$1,577,000	375 mm	$1,993,000	375 mm	$1,993,000	375 mm	$ 1,993,000
WWD-SS-09	Sewer East of PS3	New sanitary sewer to accommodate growth flows east of PS3 in Dorchester	Development 24, 25b	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
WWD-SS-10	Sewer East of PS3	New sanitary sewer to accommodate growth flows east of PS3 in Dorchester	Development 24, 25b	New Development	With new development	A		30 m	300 mm	$102,000	300 mm	$102,000	300 mm	$102,000	300 mm	$ 102,000
WWD-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	605 m	250 mm	$631,000	300 mm	$632,000	300 mm	$632,000	300 mm	$ 632,000
WWD-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
WWD-SS-13	Marion Street sewer	New sanitary sewer to accommodate growth Northeast of New development SPS in North Dorchester	Development 8 - 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
WWD-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
WWD-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	$469,000	200 mm	$499,000	200 mm	$499,000	200 mm	$ 469,000
WWD-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	$615,000	200 mm	$615,000	200 mm	$615,000	200 mm	$ 615,000
WWD-SS-17	Hamilton Road to Christie Drive sewer	New sanitary sewer to accommodate growth flows east of PS3 in Dorchester	Development 15-17	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
WWD-SS-18	Sewers for Municipal Servicing Replacing Private Sewage Systems (SPS-01B)	New sanitary sewers to benefit existing unserviced within North Dorchester (WWD-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
WWD-SS-19	Sewers for Municipal Servicing Replacing Private Sewage Systems (SPS-02)	New sanitary sewers to benefit existing unserviced within North Dorchester (WWD-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	$7,686,000	200 mm	$7,686,000	200 mm	$7,686,000	200 mm	$ 7,686,000
WWD-SS-20	Sewers for Municipal Servicing Replacing Private Sewage Systems (SPS-03)	New sanitary sewers to benefit existing unserviced within North Dorchester (WWD-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
WWD-SS-21	Sewers for Municipal Servicing Replacing Private Sewage Systems (SPS-04)	New sanitary sewers to benefit existing unserviced within South Dorchester (WWD-SPS-04 catchment)	Ex. Areas in North Dorchester on Private Sewage Systems	Municipal Servicing Replacing Private Sewage Systems	With new development	A+	Sewer	6300 m	200 mm	$7,383,000	200 mm	$7,383,000	200 mm	$7,383,000	200 mm	$ 7,383,000
WWD-SS-22	Sewers for Municipal Servicing Replacing Private Sewage Systems (SPS-06B)	New sanitary sewers to benefit existing unserviced within South Dorchester (WWD-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
WWD-SS-23	Sewers for Municipal Servicing Replacing Private Sewage Systems (SPS-07B)	New sanitary sewers to benefit existing unserviced within North Dorchester (WWD-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										**$ 96,421,000**		**$ 103,255,000**		**$ 110,898,000**		**$ 103,255,000**
WWD-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 Initiated		-	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	Associated Development Blocks and/or Existing Unserviced Areas	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)
WW-T-TP-005	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	1,050 PPU	C	Treatment		0.3 ML	$2,207,000	1.0 ML	$7,152,000	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	300 m			375 mm	$385,000	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	$560,000	250 mm	$ 560,000
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 6-13 and 15	2,350 PPU	A+	Sewer	465 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 6-13 and 17	2,350 PPU	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 6-13 and 15	4,000 PPU	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 PPU	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 Protecting Private Sewage Systems	4,600 PPU	A+	Sewer	800 m					200 mm	$1,152,000	200 mm	$ 1,152,000
Sub-Total Thorndale Wastewater Capital Program Projects										$ 2,207,000		$ 7,537,000		$ 20,223,000		$ 11,430,000
Total Municipality of Thames Centre Wastewater Capital Program										$ 93,646,000		$ 116,837,000		$ 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 Tourism, Culture and Sport

The MTCS must approve of the fieldwork and reporting completed as part of an archaeological assessment and must deem it compliant with the Ministry's 2011 Standards and Guidelines for Consultant Archaeologists.

Additional surveys may be required contingent on the MTCS 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 previously 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:

- Avoid the cemeteries in the Study Area;
- Plan future water and wastewater servicing work in the Dorchester and Thorndale Heritage Areas within the existing road right-of-ways;
- Conduct site-specific Heritage Impact Assessment 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 Golder recommends conducting a Cultural Heritage Assessment Report for 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 Comments Received

5.7 Notice of Completion

5.8 Aboriginal and First Nations Consultation

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 Comments Received

Through the public consultation process, comments were received from stakeholders. These comments were filed and addressed accordingly. **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.	1. Comment filed. 2. 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.
MTCS	07-Jan-19	MTCS 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. MTCS 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	▪ 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

Stakeholder	Date	Summary of Comments	Action
		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.	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.
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.

Stakeholder	Date	Summary of Comments	Action
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.

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.	1. Comment filed. 2. 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.
MTCS	07-Jan-19	MTCS 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. MTCS 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	▪ 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

Stakeholder	Date	Summary of Comments	Action
		regulatory requirements of the Clean Water Act and Source Protection Plan.	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.
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	▪ Comment filed.

Stakeholder	Date	Summary of Comments	Action
		determine if there are any potential impacts. Interested in viewing the Final Report when complete.	▪ 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.

5.7 Notice of Completion

The Notice of Completion was published and distributed on August 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.

5.8 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.

MUNICIPALITY OF THAMES CENTRE

APPENDIX A

PLANNING AND DEVELOPMENT INFORMATION

Date:	July 31, 2019	File:	418109
To:	Carlos Reyes, Municipality of Thames Centre		
From:	Matthew Fisher – GM BluePlan Julien Bell – GM BluePlan		
Project:	Water and Wastewater Master Plan Update		
Subject:	Growth Projections and Allocation Methodology (Updated with Final Growth Projections Numbers for inclusion in the 2019 Water and Wastewater Master Plan Final Report)		

TECHNICAL MEMO

1 Introduction

This memo is intended to outline the Municipality of Thames Centre's growth projections; as well as the allocation approach and assumptions which will be utilized to support the Water and Wastewater Infrastructure Evaluation and Needs Assessment. The growth projections will be used to estimate future system demands and flows (and ultimately the growth-related water and wastewater infrastructure needs).

This technical memorandum has been updated for inclusion in the 2019 Water and Wastewater Master Plan Final Report and replaces the February 22, 2019 document. This technical memorandum has been updated with final growth projections numbers based on comments provided by the City and best available development plan information.

2 Alternative Methodologies for Growth Projections

GM BluePlan initially completed a review of the Build-Out projections set-out in the 2018 DC Background Study 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. This initial review identified inconsistent resultant densities and prompted a more detailed review of growth projection and allocation methodologies.

The review of alternative growth projection and allocation methodologies will 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.

2.1 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.

As noted above, 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 this technical memorandum as Peripheral Lands and 401 Corridor Lands and noted in the DC Background Study as Rural Lands).

The Municipality has provided GMBP with their internal development maps for Dorchester and Thorndale along with supporting drawings for development applications within the municipality's two urban areas. This information is considered the best available development application information. Growth projections for areas where development application information is available is based on the type and number of units specified in the drawing package.

Three methods will be developed to establish growth projections across Thames Centre utilizing the above noted methodologies and the above noted areas where growth is to be provided with municipal servicing. A summary of the methods is shown in **Table 2-1**.

Table 2-1: 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>Build-Out to DC Growth Projections</td><td colspan="2">Build-Out 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">Build-Out to DC Growth Projections</td><td>Build-Out 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>

The Municipality's provided Development Maps and the Land Use Maps for Dorchester and Thorndale taken from the Municipality's official plan are included in **Appendix A**.

2.2 Purpose and Use of Growth Projection Methodologies

The procedure and purpose / use of the alternative growth projection methodologies is summarized in **Table 2-2**.

Table 2-2: Purpose and Use of Proposed Growth and Allocation Methodologies to Inform Master Plan Recommendations

<table>
<tr><th colspan="2">Approach Procedure and Purpose</th><th>Method 1</th><th>Method 2</th><th>Method 3</th></tr>
<tr><td rowspan="2">Procedure</td><td>For Dorchester and Thorndale</td><td>Build-Out to DC Growth Projections</td><td colspan="2">Build-Out by Developable Area x Target Densities</td></tr>
<tr><td>For the Peripheral Lands and 401 Corridor Lands</td><td colspan="2">Build-Out to DC Growth Projections</td><td>Build-Out by Developable Area x Target Densities</td></tr>
<tr><td colspan="2">Purpose / Use</td><td>• Identification of Upgrade Triggers
• Development of Capital Plan</td><td colspan="2">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.</td></tr>
</table>

Using the approach summarized in **Table 2-2**:

1. Growth allocated under Method 1 can trigger a required upgrade (e.g. a new gravity sewer required to convey flows from Peripheral Lands development);
2. Sizing of the new 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.

Sizing planned infrastructure based on this approach provides for oversized area infrastructure that can help protect against future capacity constraints that will require 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 build-out (or if build-out does not progress to the projected densities).

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

3 Existing and Ultimate Growth Projections

3.1 Existing Residential and Employment Population

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

Table 3-1: 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 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 WTP 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

3.2 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 3-2**.

Table 3-2: 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	**1,865**	**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**.

3.3 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.

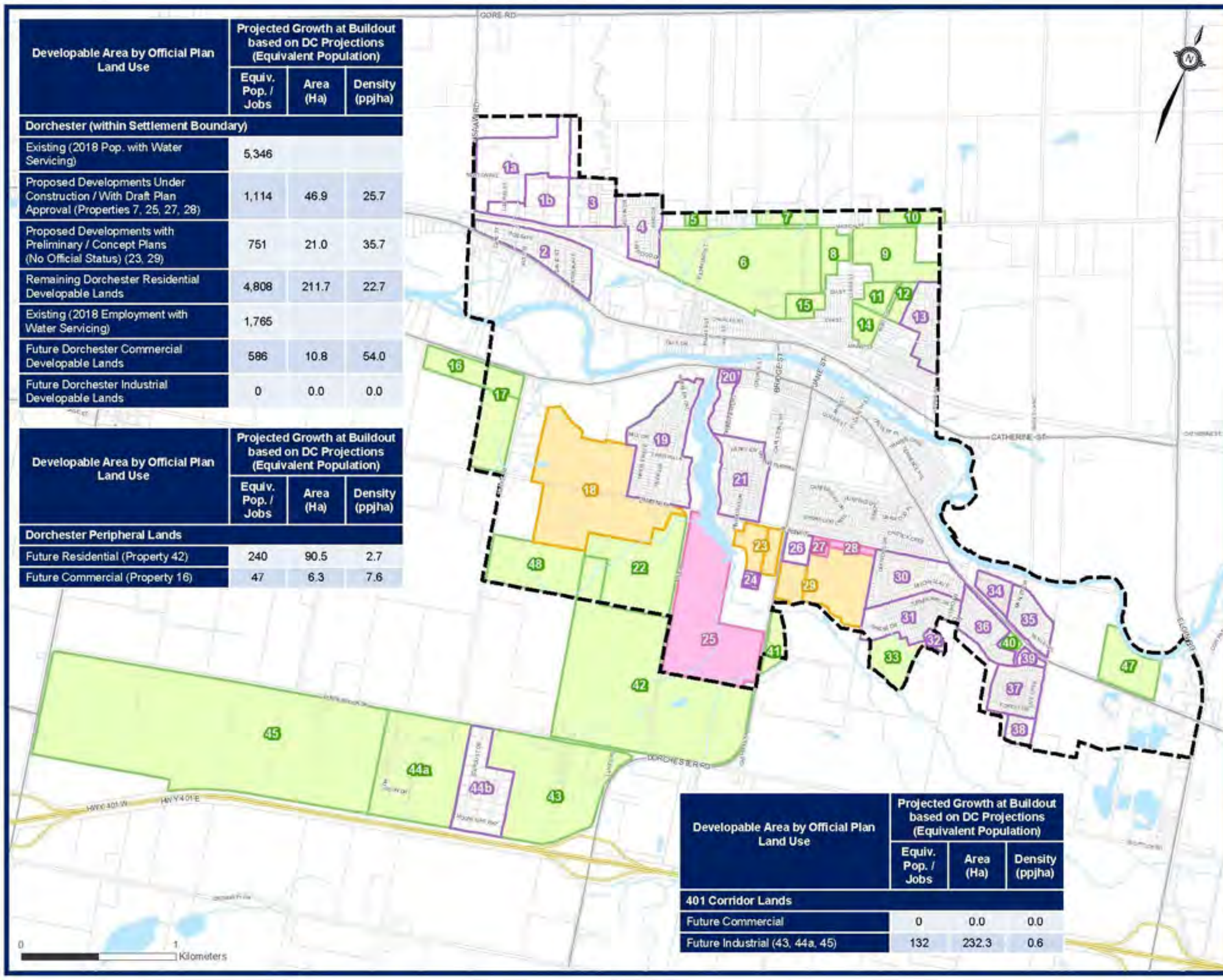
Employment growth within the Dorchester and Thorndale Settlement Boundaries was categorized only as urban (not specifically separated into Dorchester and Thorndale). The projected Urban Industrial and Commercial growth has been distributed between Dorchester and Thorndale based on developable area and 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 3-1** and **Figure 3-2**.

Thames Centre

2018 Water and Wastewater Master Plan Update



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

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

Property Numbering is as set out in Thames Centre Development Maps (Development Maps are included in Appendix A)

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 3-1
Dorchester Projected Growth (Serviced) 2018 – Buildout
DC Background Study Projections

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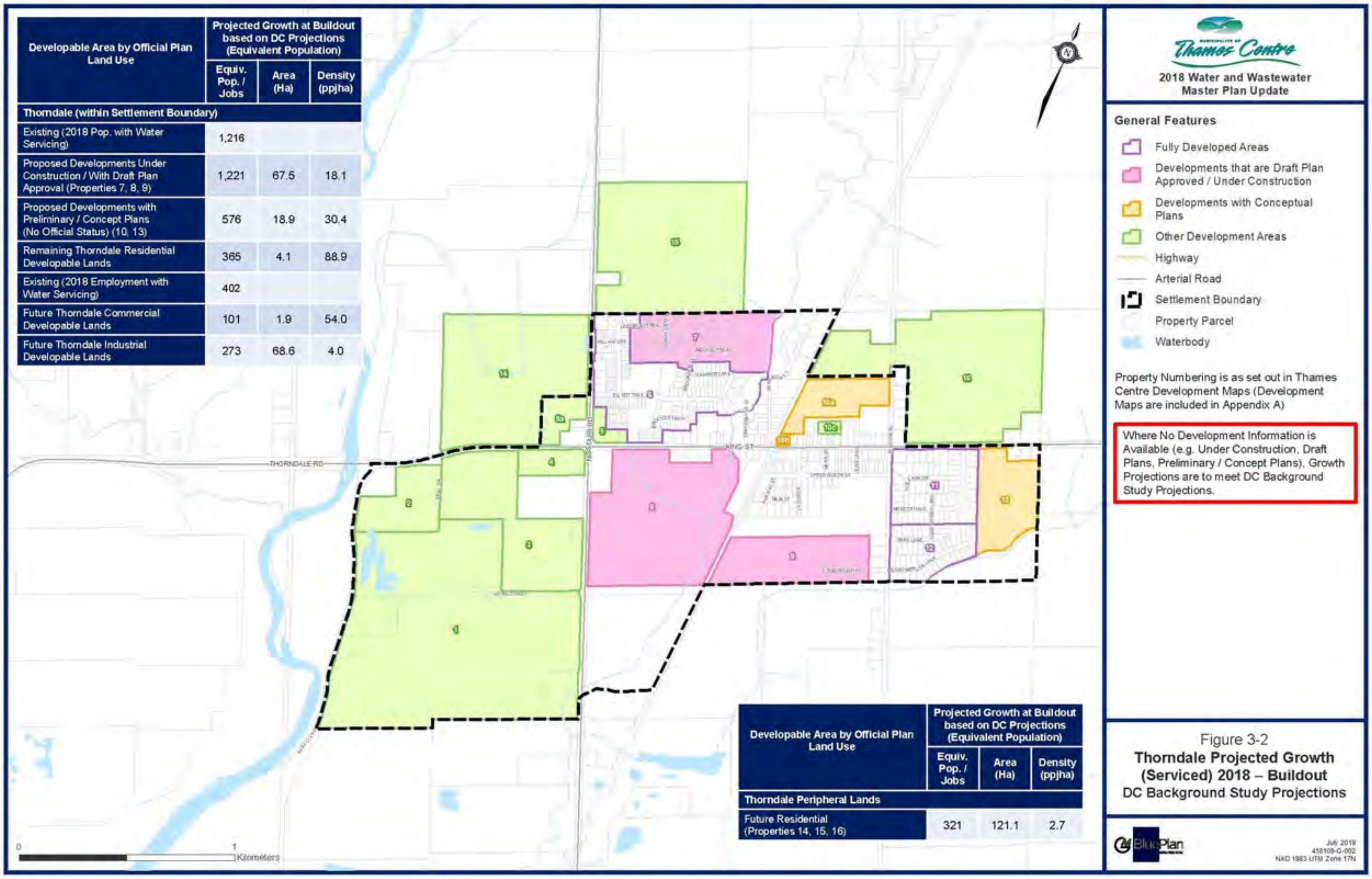
Developable Area by Official Plan Land Use	Projected Growth at Buildout based on DC Projections (Equivalent Population)		
	Equiv. Pop. / Jobs	Area (Ha)	Density (ppjha)
Thorndale (within Settlement Boundary)			
Existing (2018 Pop. with Water Servicing)	1,216		
Proposed Developments Under Construction / 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

2018 Water and Wastewater Master Plan Update

Figure 3-2
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**.

The DC Study also identifies employment growth in the Primary, Work at Home and Institutional categories. Growth at Buildout for these employment categories is summarized in **Table 3-3**.

Table 3-3: Summary of Growth Projections at Buildout for Primary, Work at Home and Institutional Employment Categories at Buildout

<table>
<tr><th>Location</th><th>Primary</th><th>Work at Home</th><th>Institutional</th></tr>
<tr><td>Urban</td><td rowspan="2">2</td><td rowspan="2">951</td><td>340</td></tr>
<tr><td>Rural</td><td>0</td></tr>
</table>

Employment growth projections for Primary, Work at Home and Institutional at Buildout are taken from Schedule 10a in the DC Background Study. Schedule 10c notes that there is no Institutional Employment growth projected for Rural areas.

Work at Home growth is accounted for in the per capita residential water and wastewater design criteria to be utilized for the Master Plan and does not require to be considered separately for allocation purposes.

There are three schools within Dorchester (Northdale and River Heights Public Schools and Lord Dorchester Secondary School) and no schools within Thorndale. It is estimated that the 340 Urban Institutional jobs will be distributed evenly between Dorchester and Thorndale. Institutional job growth in Dorchester will be distributed uniformly between the existing three schools, and Institutional job growth in Thorndale will be estimated at an assumed new school location within the residential growth areas.

3.4 Growth Projections based on the Target Densities

As noted above in Section 2, initial review of the Build-Out 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.

We have reviewed 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. Based on our review, we are proposing that the Municipality proceed with the target densities summarized in **Table 3-4**
.

Table 3-4: Proposed Target Growth Densities by Land Use

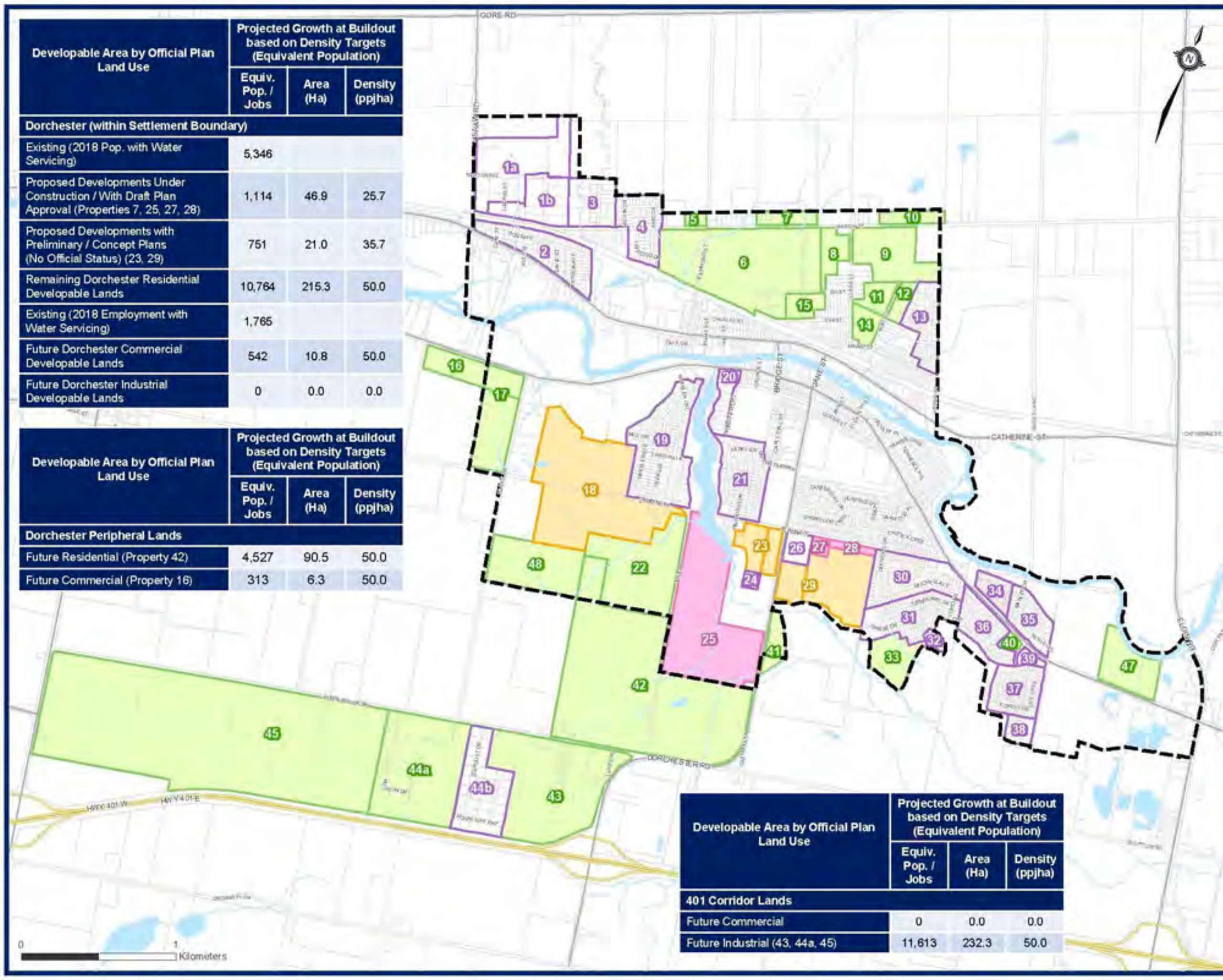
Area Description	Land Use	Proposed Target Density (ppjha)
Dorchester, Thorndale and Peripheral Areas	Residential	50
	Commercial	50
	Industrial	50
401 Corridor Lands	Industrial	50

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. However, there remains more than 200 hectares of developable Industrial land use within the 401 Corridor Lands, and because there remains so much potential for future development within the 401 Corridor Lands, it is expected that there is significant opportunity for growth within this area once municipal servicing becomes available. It is recommended that the target density remain 50 jpha at Buildout in order to accommodate the potential for municipally-serviced growth.

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 3-3** and **Figure 3-4**.

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

Thames Centre

2018 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

Property Numbering is as set out in Thames Centre Development Maps (Development Maps are included in Appendix A)

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 3-3
Dorchester Projected Growth 2018 – Buildout Proposed Density Targets

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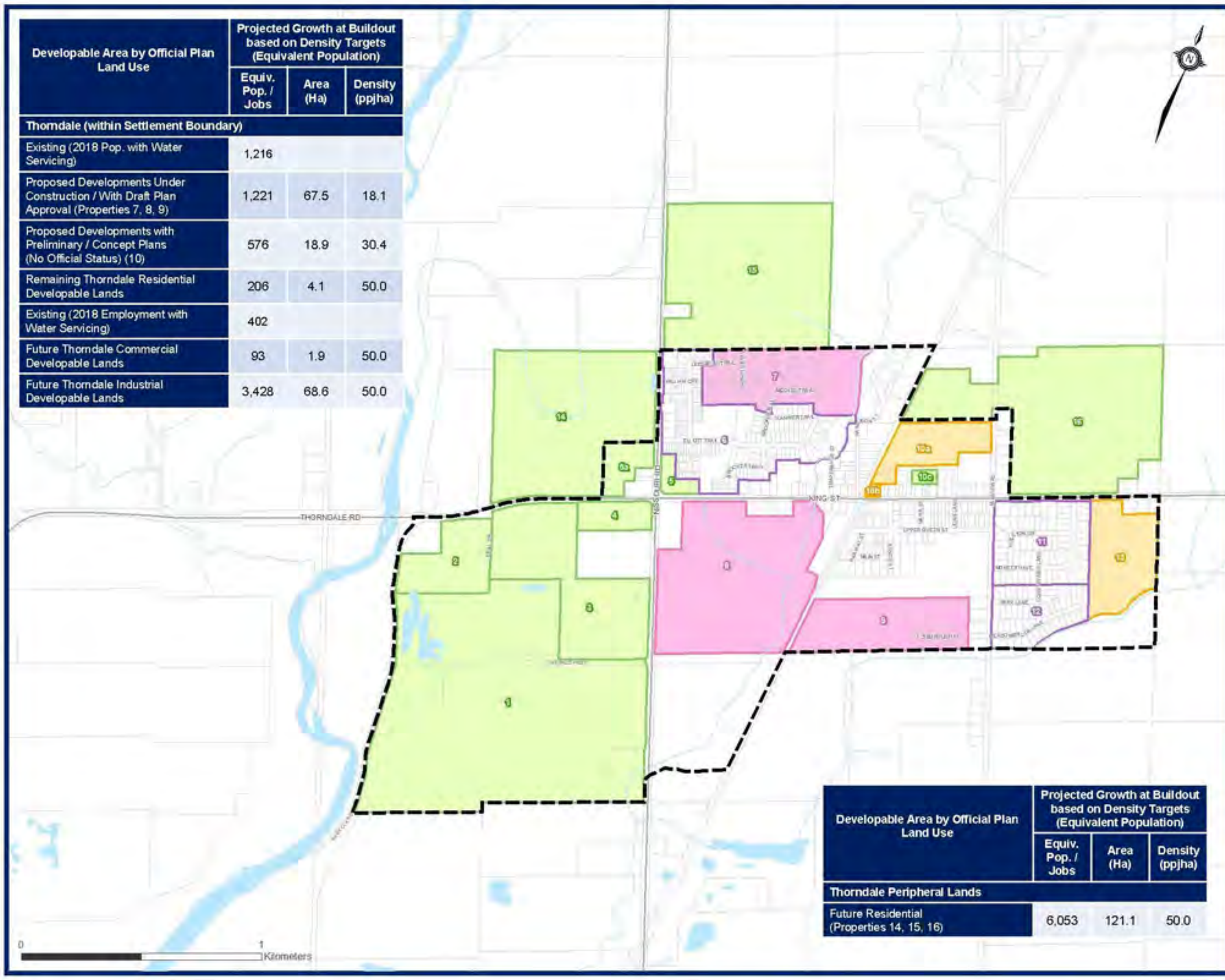
Developable Area by Official Plan Land Use	Projected Growth at Buildout based on Density Targets (Equivalent Population)		
	Equiv. Pop. / Jobs	Area (Ha)	Density (ppjha)
Thorndale (within Settlement Boundary)			
Existing (2018 Pop. with Water Servicing)	1,216		
Proposed Developments Under Construction / 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

Thames Centre

2018 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

Property Numbering is as set out in Thames Centre Development Maps (Development Maps are included in Appendix A)

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 3-4
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**.

3.5 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 3, Buildout Projections based on Method 1 through Method 3 are summarized in **Table 3-5** and **Table 3-6**.

Table 3-5: 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 3-6: 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

4 Phasing

When establishing the capital plan 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.

After the water and wastewater servicing concepts are determined for Buildout, more detailed review of the proposed phasing will be completed in conjunction with the determination of the capital plan.

5 Closing

It is recommended that the Municipality proceed with the development of the 2018 Water and Wastewater Master Plan models utilizing the growth projections and allocation methodology outlined above.

We trust the above to be in order for your approval. Should you have any questions or wish to discuss further, please do not hesitate in contacting the undersigned.

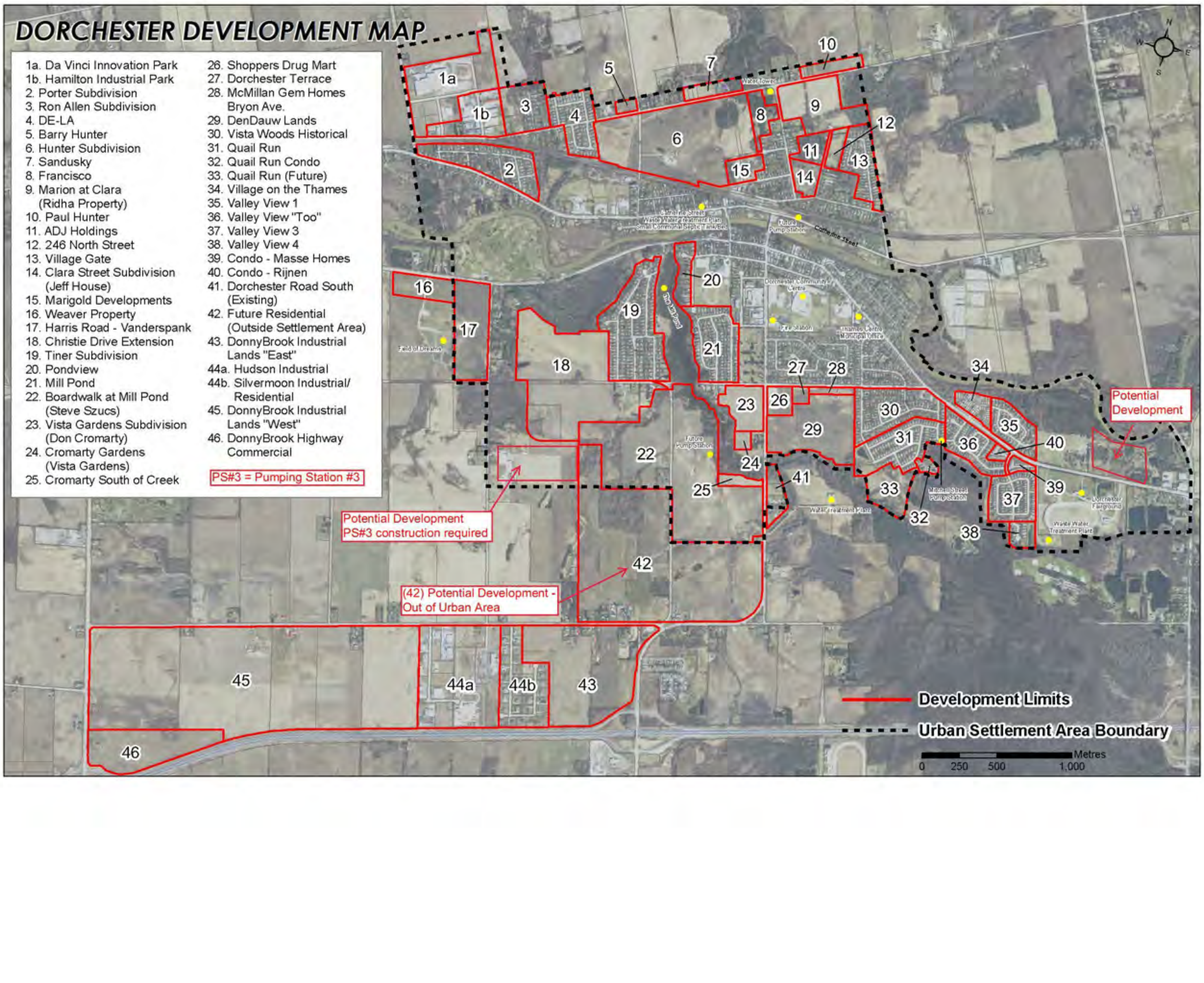
Yours Truly,

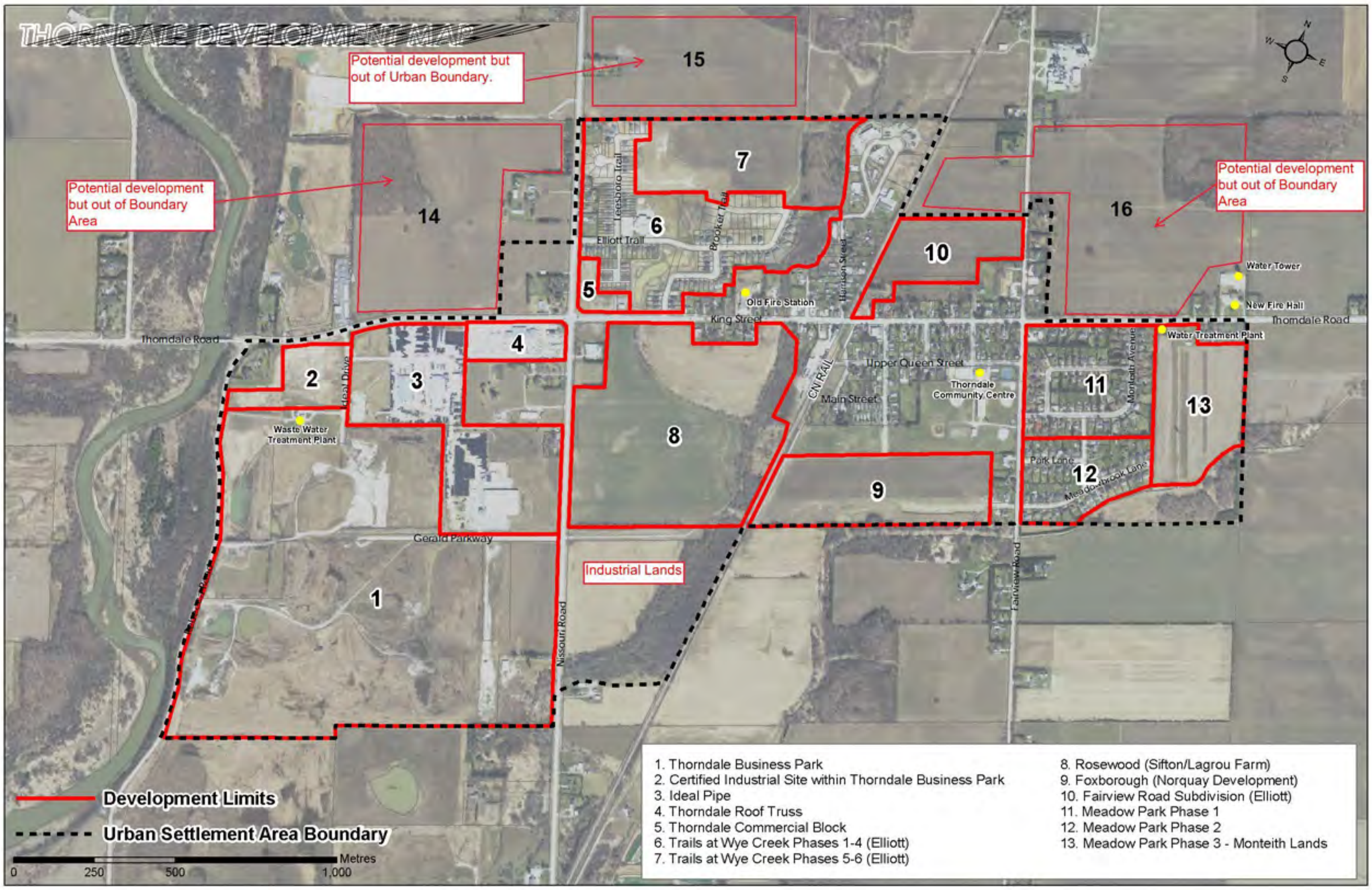
GM BluePlan Engineering Ltd.

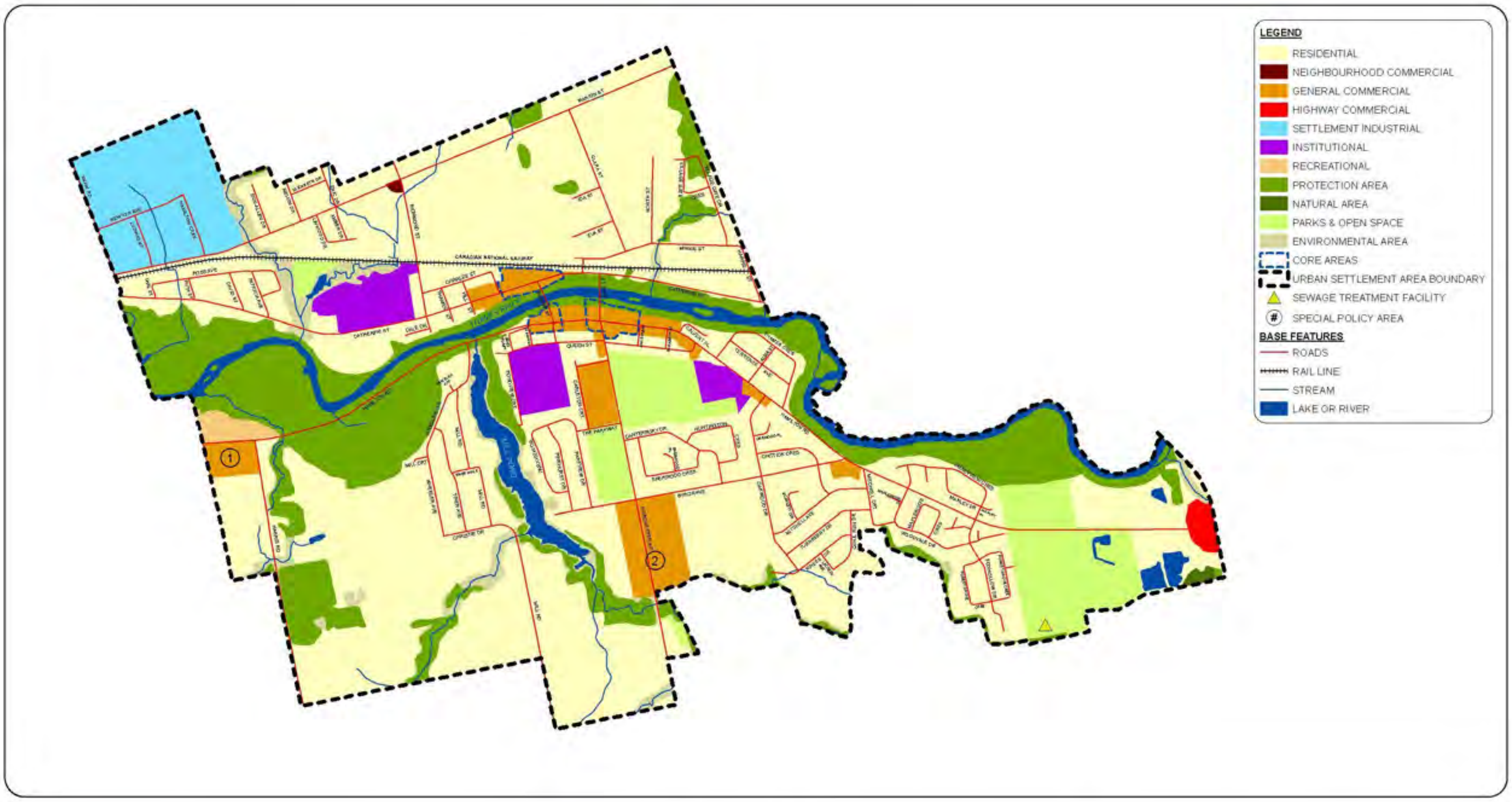
Per:

Matthew Fisher, P.Eng.
Infrastructure Planning

Appendix A


DORCHESTER DEVELOPMENT MAP
1a. Da Vinci Innovation Park
1b. Hamilton Industrial Park
2. Porter Subdivision
3. Ron Allen Subdivision
4. DE-LA
5. Barry Hunter
6. Hunter Subdivision
7. Sandusky
8. Francisco
9. Marion at Clara (Ridha Property)
10. Paul Hunter
11. ADJ Holdings
12. 246 North Street
13. Village Gate
14. Clara Street Subdivision (Jeff House)
15. Marigold Developments
16. Weaver Property
17. Harris Road - Vanderspank
18. Christie Drive Extension
19. Tiner Subdivision
20. Pondview
21. Mill Pond
22. Boardwalk at Mill Pond (Steve Szucs)
23. Vista Gardens Subdivision (Don Cromarty)
24. Cromarty Gardens (Vista Gardens)
25. Cromarty South of Creek
26. Shoppers Drug Mart
27. Dorchester Terrace
28. McMillan Gem Homes Bryon Ave.
29. DenDauw Lands
30. Vista Woods Historical
31. Quail Run
32. Quail Run Condo
33. Quail Run (Future)
34. Village on the Thames
35. Valley View 1
36. Valley View "Too"
37. Valley View 3
38. Valley View 4
39. Condo - Masse Homes
40. Condo - Rijnen
41. Dorchester Road South (Existing)
42. Future Residential (Outside Settlement Area)
43. DonnyBrook Industrial Lands "East"
44a. Hudson Industrial
44b. Silvermoon Industrial/ Residential
45. DonnyBrook Industrial Lands "West"
46. DonnyBrook Highway Commercial
PS#3 = Pumping Station #3
Potential Development
PS#3 construction required
(42) Potential Development - Out of Urban Area
Potential Development
Development Limits
Urban Settlement Area Boundary
Metres
0 250 500 1,000


THORNDALE DEVELOPMENT MAP
Potential development but out of Urban Boundary.
Potential development but out of Boundary Area
Potential development but out of Boundary Area
Industrial Lands
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
Thorndale Road
King Street
Elliott Trail
Brooker Trail
Harrison Street
Upper Queen Street
Main Street
CN RAIL
Nissouri Road
Fairview Road
Ideal Drive
Gerald Parkway
Monteith Avenue
Park Lane
Meadowbrook Lane
Old Fire Station
Thorndale Community Centre
Waste Water Treatment Plant
Water Treatment Plant
Water Tower
New Fire Hall
Development Limits
Urban Settlement Area Boundary
Metres
0
250
500
1,000
1. Thorndale Business Park
2. Certified Industrial Site within Thorndale Business Park
3. Ideal Pipe
4. Thorndale Roof Truss
5. Thorndale Commercial Block
6. Trails at Wye Creek Phases 1-4 (Elliott)
7. Trails at Wye Creek Phases 5-6 (Elliott)
8. Rosewood (Sifton/Lagrou Farm)
9. Foxborough (Norquay Development)
10. Fairview Road Subdivision (Elliott)
11. Meadow Park Phase 1
12. Meadow Park Phase 2
13. Meadow Park Phase 3 - Monteith Lands

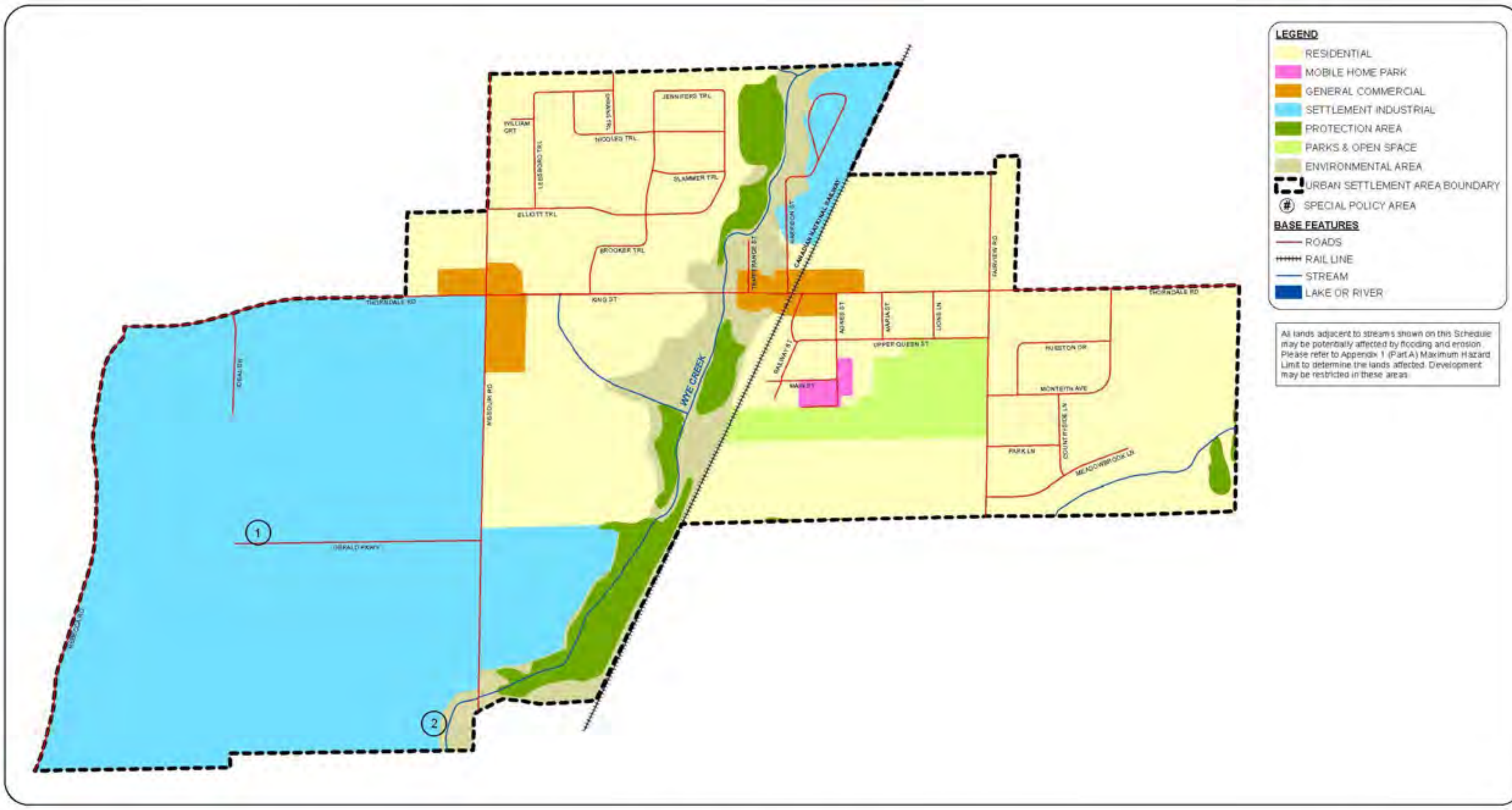


SCHEDULE 'B-1'

LAND USE PLAN - DORCHESTER SETTLEMENT AREA

MUNICIPALITY OF THAMES CENTRE

OFFICIAL PLAN



SCHEDULE 'B-2'

LAND USE PLAN - THORNDALE SETTLEMENT AREA

MUNICIPALITY OF THAMES CENTRE

OFFICIAL PLAN

SCALE: 1:10,000 metres

Residential and Employment Development Summary
Based on DC Background Study Projections

Residential

Residential Dwelling Type	P. P. U.
Single & Semi-Detached	2.999
Multiples	2.213
Apartments	1.528

Dorchester	2018 - 2028		2018 - 2038		2018 - Buildout	
	Units	Population	Units	Population	Units	Population
Single & Semi-Detached	370	1,109.630	830	2,489.170	1,687	5,059.313
Multiples	25	55.325	98	216.874	441	975.933
Apartments	25	38.200	90	137.520	467	713.576
Institutional		1		4		5
Total	**420**	**1,204.155**	**1,018**	**2,847.564**	**2,595**	**6,753.822**

Thorndale	2018 - 2028		2018 - 2038		2018 - Buildout	
	Units	Population	Units	Population	Units	Population
Single & Semi-Detached	140	419.860	314	941.686	639	1,916.361
Multiples	10	22.130	17	37.621	72	159.336
Apartments	10	15.280	16	24.448	51	77.928
Institutional		2		6		8
Total	**160**	**459.270**	**347**	**1,009.755**	**762**	**2,161.625**

Rural	2018 - 2028		2018 - 2038		2018 - Buildout	
	Units	Population	Units	Population	Units	Population
Single & Semi-Detached	60	179.940	100	299.900	187	560.813
Multiples	-	-	-	-	-	-
Apartments	-	-	-	-	-	-
Institutional						
Total	**60**	**179.940**	**100**	**299.900**	**187**	**560.813**

Employment

Employment Land Use Type	ft.²/Employee
Industrial	1,300
Commercial/Population Related	550
Institutional	700

Urban	2018 - 2028		2018 - 2038		2018 - Buildout	
	Gross Floor Area (ft.²)	Employees	Gross Floor Area (ft.²)	Employees	Gross Floor Area (ft.²)	Employees
Industrial	81,607	62.775	193,928	149.175	355,388	273.375
Commercial	80,993	147.260	215,849	392.453	377,696	686.720
Institutional	42,000	60.000	126,000	180.000	238,000	340.000
Total	**204,600**	**270.035**	**535,777**	**721.628**	**971,084**	**1,300.095**

Allocation between Dorchester and Thorndale completed based on potential development area (Ha).

Rural	2018 - 2028		2018 - 2038		2018 - Buildout	
	Gross Floor Area (ft.²)	Employees	Gross Floor Area (ft.²)	Employees	Gross Floor Area (ft.²)	Employees
Industrial	39,293	30.225	93,373	71.825	171,113	131.625
Commercial	7,557	13.740	17,901	32.547	26,054	47.371
Institutional	-	-	-	-	-	-
Total	**46,850**	**43.965**	**111,274**	**104.373**	**197,167**	**178.996**

Rural Employment Lands are assumed to be lands located within Dorchester and Thorndale Map Development Limits, but outside of Urban Settlement Area Boundary

Summary of Growth Projections
Method 1: Based on DC Background Study Projections

Developable Area by Official Plan Land Use	Projected Growth at Buildout (Equivalent Population)		
	Equiv. Pop. / Jobs	Area (Ha)	Density (pph-a)
Dorchester Residential			
Existing (2016 Pop. with Water Servicing)	5,348		
Proposed Developments Under Construction / With Draft Plan Approval	1,114	43.4	25.7
Proposed Developments with Preliminary / Concept Plans (No Official Status)	761	21.3	35.7
Remaining Dorchester Residential Developable Lands (Growth to Meet DC Projections)	4,877	215.0	22.7
Sub-Total Dorchester Residential at Buildout (Based on DC Projections)	**12,100**	**279.7**	**43.3**
Dorchester Commercial + Industrial			
Existing (2016 Pop. with Water Servicing)	1,765		
Future Dorchester Commercial Developable Lands (Growth to Meet DC Projections)	586	10.8	54.3
Future Dorchester Industrial Developable Lands (Growth to Meet DC Projections)	0	0.0	0.0
Sub-Total Dorchester Commercial + Industrial at Buildout (Based on DC Projections)	**2,351**	**10.8**	**216.0**
Sub-Total Dorchester Equivalent Population at Buildout (Based on DC Projections)	**14,451**	**290.6**	**49.7**

Summary of Growth Projections
Method 2: Based on Proposed Density Targets within Settlement Boundary; DC Background Study Projections outside Settlement Boundary

Developable Area by Official Plan Land Use	Projected Growth at Buildout (Equivalent Population)		
	Equiv. Pop. / Jobs	Area (Ha)	Density (pph-a)
Dorchester Residential			
Existing (2016 Pop. with Water Servicing)	5,348		
Proposed Developments Under Construction / With Draft Plan Approval	1,114	43.4	25.7
Proposed Developments with Preliminary / Concept Plans (No Official Status)	761	21.3	35.7
Remaining Dorchester Residential Developable Lands (Growth to Meet Proposed Density Targets)	10,764	215.0	50.0
Sub-Total Dorchester Residential at Buildout (Based on Proposed Density Targets)	**17,975**	**279.7**	**64.3**
Dorchester Commercial + Industrial			
Existing (2016 Pop. with Water Servicing)	1,765		
Future Dorchester Commercial Developable Lands (Growth to Meet Proposed Density Targets)	542	10.8	50.0
Future Dorchester Industrial Developable Lands (Growth to Meet Proposed Density Targets)	0	0.0	0.0
Sub-Total Dorchester Commercial + Industrial at Buildout (Based on Proposed Density Targets)	**2,307**	**10.8**	**212.8**
Sub-Total Dorchester Equivalent Population at Buildout (Based on Proposed Density Targets)	**20,282**	**290.6**	**69.8**

Summary of Growth Projections
Method 3: Based on Proposed Density Targets

Developable Area by Official Plan Land Use	Projected Growth at Buildout (Equivalent Population)		
	Equiv. Pop. / Jobs	Area (Ha)	Density (pph-a)
Dorchester Residential			
Existing (2016 Pop. with Water Servicing)	5,348		
Proposed Developments Under Construction / With Draft Plan Approval	1,114	43.4	25.7
Proposed Developments with Preliminary / Concept Plans (No Official Status)	761	21.3	35.7
Remaining Dorchester Residential Developable Lands (Growth to Meet Proposed Density Targets)	10,764	215.0	50.0
Sub-Total Dorchester Residential at Buildout (Based on Proposed Density Targets)	**17,975**	**279.7**	**64.3**
Dorchester Commercial + Industrial			
Existing (2016 Pop. with Water Servicing)	1,765		
Future Dorchester Commercial Developable Lands (Growth to Meet Proposed Density Targets)	542	10.8	50.0
Future Dorchester Industrial Developable Lands (Growth to Meet Proposed Density Targets)	0	0.0	0.0
Sub-Total Dorchester Commercial + Industrial at Buildout (Based on Proposed Density Targets)	**2,307**	**10.8**	**212.8**
Sub-Total Dorchester Equivalent Population at Buildout (Based on Proposed Density Targets)	**20,282**	**290.6**	**69.8**

Summary of Growth Projections
Method 1: Based on DC Background Study Projections

Developable Area by Official Plan Land Use	Projected Growth at Buildout (Equivalent Population)		
	Equiv. Pop. / Jobs	Area (ha)	Density (pp/ha)
Dorchester Peripheral Lands Residential			
Future Dorchester Peripheral Residential Developable Lands (Growth to Meet DC Projections)	240	90.5	2.7
Sub-Total Dorchester Peripheral Lands Residential at Buildout (Based on DC Projections)	240	90.5	2.7
Dorchester Peripheral Lands Commercial + Industrial			
Future Dorchester Peripheral Commercial Developable Lands (Growth to Meet DC Projections)	47	6.1	7.7
Future Dorchester Peripheral Industrial Developable Lands (Growth to Meet DC Projections)	0	0.2	0.0
Sub-Total Dorchester Peripheral Lands Commercial + Industrial at Buildout (Based on DC Projections)	47	6.3	7.4
Sub-Total Dorchester Peripheral Lands Equivalent Population at Buildout (Based on DC Projections)	287	96.8	3.0
Sub-Total Dorchester + Peripheral Lands Equivalent Population at Buildout (Based on DC Projections)	14,730	387.4	38.0
401 Corridor Lands Commercial + Industrial			
Future 401 Corridor Lands Commercial Developable Lands (Growth to Meet DC Projections)	0	9.6	0.0
Future 401 Corridor Lands Industrial Developable Lands (Growth to Meet DC Projections)	132	222.7	0.6
Sub-Total 401 Corridor Lands Commercial + Industrial at Buildout (Based on DC Projections)	132	232.3	0.6
Total Dorchester + Peripheral + 401 Corridor Lands Equivalent Population at Buildout (Based on DC Projections)	14,870	619.6	24.2

Summary of Growth Projections
Method 2: Based on Proposed Density Targets within Settlement Boundary, DC Background Study Projections outside Settlement Boundary

Developable Area by Official Plan Land Use	Projected Growth at Buildout (Equivalent Population)		
	Equiv. Pop. / Jobs	Area (ha)	Density (pp/ha)
Dorchester Peripheral Lands Residential			
Future Dorchester Peripheral Residential Developable Lands (Growth to Meet DC Projections)	240	90.5	2.7
Sub-Total Dorchester Peripheral Lands Residential at Buildout (Based on Proposed Density Targets)	240	90.5	2.7
Dorchester Peripheral Lands Commercial + Industrial			
Future Dorchester Peripheral Commercial Developable Lands (Growth to Meet DC Projections)	47	6.1	7.7
Future Dorchester Peripheral Industrial Developable Lands (Growth to Meet DC Projections)	0	0.2	0.0
Sub-Total Dorchester Peripheral Lands Commercial + Industrial at Buildout (Based on Proposed Density Targets)	47	6.3	7.4
Sub-Total Dorchester Peripheral Lands Equivalent Population at Buildout (Based on DC Projections)	287	96.8	3.0
Sub-Total Dorchester + Peripheral Lands Equivalent Population at Buildout (Based on Proposed Density Targets)	20,570	387.4	53.1
401 Corridor Lands Commercial + Industrial			
Future 401 Corridor Lands Commercial Developable Lands (Growth to Meet DC Projections)	0	9.6	0.0
Future 401 Corridor Lands Industrial Developable Lands (Growth to Meet DC Projections)	132	222.7	0.6
Sub-Total 401 Corridor Lands Commercial + Industrial at Buildout (Based on Proposed Density Targets)	132	232.3	0.6
Total Dorchester + Peripheral + 401 Corridor Lands Equivalent Population at Buildout (Based on Proposed Density Targets)	20,701	619.6	33.4

Summary of Growth Projections
Method 3: Based on Proposed Density Targets

Developable Area by Official Plan Land Use	Projected Growth at Buildout (Equivalent Population)		
	Equiv. Pop. / Jobs	Area (ha)	Density (pp/ha)
Dorchester Peripheral Lands Residential			
Future Dorchester Peripheral Residential Developable Lands (Growth to Meet Proposed Density Targets)	4,527	90.5	50.0
Sub-Total Dorchester Peripheral Lands Residential at Buildout (Based on Proposed Density Targets)	4,527	90.5	50.0
Dorchester Peripheral Lands Commercial + Industrial			
Future Dorchester Peripheral Commercial Developable Lands (Growth to Meet Proposed Density Targets)	305	6.1	50.0
Future Dorchester Peripheral Industrial Developable Lands (Growth to Meet Proposed Density Targets)	8	0.2	0.0
Sub-Total Dorchester Peripheral Lands Commercial + Industrial at Buildout (Based on Proposed Density Targets)	313	6.3	50.0
Sub-Total Dorchester Peripheral Lands Equivalent Population at Buildout (Based on Proposed Density Targets)	4,840	96.8	50.0
Sub-Total Dorchester + Peripheral Lands Equivalent Population at Buildout (Based on Proposed Density Targets)	25,173	387.4	64.9
401 Corridor Lands Commercial + Industrial			
Future 401 Corridor Lands Commercial Developable Lands (Growth to Meet Proposed Density Targets)	0	9.6	0.0
Future 401 Corridor Lands Industrial Developable Lands (Growth to Meet Proposed Density Targets)	11,613	222.7	52.1
Sub-Total 401 Corridor Lands Commercial + Industrial at Buildout (Based on Proposed Density Targets)	11,613	232.3	50.0
Total Dorchester + Peripheral + 401 Corridor Lands Equivalent Population at Buildout (Based on Proposed Density Targets)	36,786	619.6	59.3

Summary of Growth Projections
Method 1: Based on DC Background Study Projections

Developable Area by Official Plan Land Use	Projected Growth at Buildout (Equivalent Population)		
	Equiv. Pop. / Jobs	Area (ha)	Density (pp/ha)
Thorndale Residential			
Existing (2018 Pop. with Water Servicing)	1,218		
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
Remaining Thorndale Residential Developable Lands (Growth to Meet DC Projections)	365	4.1	88.9
Total Thorndale Residential at Buildout (Based on DC Projections)	**3,379**	**90.6**	**37.3**
Thorndale Commercial + Industrial			
Existing (2018 Pop. with Water Servicing)	402		
Future Thorndale Commercial Developable Lands (Growth to Meet DC Projections)	101	1.8	56.1
Future Thorndale Industrial Developable Lands (Growth to Meet DC Projections)	273	68.6	4.0
Total Thorndale Commercial + Industrial at Buildout (Based on DC Projections)	**776**	**70.4**	**11.0**
Total Thorndale Equivalent Population at Buildout (Based on DC Projections)	**4,154**	**161.0**	**25.8**
Thorndale Peripheral Lands Residential			
Future Thorndale Peripheral Residential Developable Lands (Growth to Meet DC Projections)	321	121.1	2.7
Sub-Total Thorndale + Peripheral Lands Residential at Buildout (Based on DC Projections)	**321**	**121.1**	**2.7**
Total Thorndale + Peripheral Lands Equivalent Population at Buildout (Based on DC Projections)	**4,475**	**282.1**	**15.9**

Summary of Growth Projections
Method 2: Based on Proposed Density Targets within Settlement Boundary, DC Background Study Projections outside Settlement Boundary

Developable Area by Official Plan Land Use	Projected Growth at Buildout (Equivalent Population)		
	Equiv. Pop. / Jobs	Area (ha)	Density (pp/ha)
Thorndale Residential			
Existing (2018 Pop. with Water Servicing)	1,218		
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
Remaining Thorndale Residential Developable Lands (Growth to Meet Proposed Density Targets)	208	4.1	50.0
Total Thorndale Residential at Buildout (Based on Proposed Density Targets)	**3,218**	**90.6**	**35.5**
Thorndale Commercial + Industrial			
Existing (2018 Pop. with Water Servicing)	402		
Future Thorndale Commercial Developable Lands (Growth to Meet Proposed Density Targets)	90	1.8	50.0
Future Thorndale Industrial Developable Lands (Growth to Meet Proposed Density Targets)	3,430	68.6	50.0
Total Thorndale Commercial + Industrial at Buildout (Based on Proposed Density Targets)	**3,923**	**70.4**	**55.7**
Total Thorndale Equivalent Population at Buildout (Based on Proposed Density Targets)	**7,141**	**161.0**	**44.4**
Thorndale Peripheral Lands Residential			
Future Thorndale Peripheral Residential Developable Lands (Growth to Meet DC Projections)	321	121.1	2.7
Sub-Total Thorndale + Peripheral Lands Residential at Buildout (Based on Proposed Density Targets)	**321**	**121.1**	**2.7**
Total Thorndale + Peripheral Lands Equivalent Population at Buildout (Based on Proposed Density Targets)	**7,462**	**282.1**	**26.5**

Summary of Growth Projections
Method 3: Based on Proposed Density Targets

Developable Area by Official Plan Land Use	Projected Growth at Buildout (Equivalent Population)		
	Equiv. Pop. / Jobs	Area (ha)	Density (pp/ha)
Thorndale Residential			
Existing (2018 Pop. with Water Servicing)	1,218		
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
Remaining Thorndale Residential Developable Lands (Growth to Meet Proposed Density Targets)	208	4.1	50.0
Total Thorndale Residential at Buildout (Based on Proposed Density Targets)	**3,218**	**90.6**	**35.5**
Thorndale Commercial + Industrial			
Existing (2018 Pop. with Water Servicing)	402		
Future Thorndale Commercial Developable Lands (Growth to Meet Proposed Density Targets)	90	1.8	50.0
Future Thorndale Industrial Developable Lands (Growth to Meet Proposed Density Targets)	3,430	68.6	50.0
Total Thorndale Commercial + Industrial at Buildout (Based on Proposed Density Targets)	**3,923**	**70.4**	**55.7**
Total Thorndale Equivalent Population at Buildout (Based on Proposed Density Targets)	**7,141**	**161.0**	**44.4**
Thorndale Peripheral Lands Residential			
Future Thorndale Peripheral Residential Developable Lands (Growth to Meet Proposed Density Targets)	6,055	121.1	50.0
Sub-Total Thorndale + Peripheral Lands Residential at Buildout (Based on Proposed Density Targets)	**6,055**	**121.1**	**50.0**
Total Thorndale + Peripheral Lands Equivalent Population at Buildout (Based on Proposed Density Targets)	**13,196**	**282.1**	**46.8**

Dorchester
Growth Projections based on DC Background Study Projections

Population Summary

	Dorchester (Ha)	Thorndale (Ha)
Residential	274.776	40.397
Residential - Available	215.271	41.140

Dorchester	2019 - 2028 (Persons)	2019 - 2039 (Persons)	2019 - Buildout (Persons)
Single & Semi Detached	1110	2486	5759
Multiples	81	217	485
Apartments	36	106	748
Institutional	7	9	5
Total	1204	2840	6754

Employment Summary

	Dorchester (Ha)	Thorndale (Ha)
Industrial	4.865	86.080
Commercial	10.941	1.089
Institutional	0	0

Jobs	2019 - 2028 (Jobs)	2019 - 2039 (Jobs)	2019 - Buildout (Jobs)
Industrial	0.00	0.00	0.00
Commercial	125.60	204.74	585.70
Institutional	0.00	0.00	0.00
Total	125.60	204.74	585.70

Residential and Employment Development Details

Development Number	Description	Land Use	Area (Ha)	Total Equivalent Population (Incremental Change) 2019 - 2028	2019 - 2039	2019 - Buildout	Assumed Density (ppha)
1a	Da Vinci Innovation Park	Settlement Industrial	22.0	0	0	0	0.0
1b	Hamilton Industrial Park	Settlement Industrial	10.9	0	0	0	0.0
2	Foster Subdivision	Residential	14.7	0	0	0	0.0
3	Ross Allen Subdivision	Residential	9.5	0	0	0	0.0
4	D.E.L.A.	Residential	10.0	0	0	0	0.0
5	Barry Harber	Residential	1.1	1	6	28	22.7
6	Harber Subdivision	Residential	40.1	28	210	1047	22.7
7	Freshway	Residential	3.5	2	16	80	22.7
8	Ryanstown	Residential	4.6	3	22	106	22.7
9	Manors at Diana (Richd Property)	Residential	15.0	9	68	340	22.7
10	Baird Harber	Residential	3.9	3	16	77	22.7
11	ACJ Holdings	Residential	3.7	2	17	84	22.7
12	298 North Street	Residential	2.6	2	12	60	22.7
13	Village Gate	Residential	5.6	0	0	0	0.0
14	Clark Street Subdivision (Golf House)	Residential	3.6	3	0	86	22.7
15	Ballygill Developments	Residential	3.5	3	0	89	22.7
17a	Hamilton Road - Vanderspank	Residential	11.5	7	51	258	22.7
17b	Hamilton Road - Vanderspank	General Commercial	3.7	40	114	200	54.0
18	Christie Drive Extension	Residential	40.7	30	227	1133	22.7
19	Dean Subdivision	Residential	24.4	0	0	0	0.0
20	Pondview	Residential	4.6	0	0	0	0.0
21	Mill Pond	Residential	14.0	0	0	0	0.0
22	Boardwalk at Mill Pond (Steve Sousa)	Residential	26.0	16	118	590	22.7
23a	Vista Gardens Subdivision (Don Connally)	Residential	4.5	140	146	149	33.0
23b	Vista Gardens Subdivision (Don Connally)	General Commercial	2.6	35	88	152	54.0
24	Community Gardens (Vista Gardens)	Residential	1.1	0	0	0	0.0
25	Dorchester South of Crane	Residential	40.7	492	885	984	24.2
26	Shoppers Drug Mart	General Commercial	3.2	0	0	0	0.0
27	Dorchester Terrace	Residential	1.3	76	75	76	59.1
28	Middleton Gate Hamlet Bryce Ave	Residential	1.9	59	59	59	37.9
29a	Zen Dover Lands	Residential	16.5	201	600	603	36.5
29b	Zen Dover Lands	General Commercial	4.3	50	110	233	54.0
30	Vista Woods Heritical	Residential	15.5	0	0	0	0.0
31	Dead Run	Residential	58.7	0	0	0	0.0
32	Dead Run Condo	Residential	5.3	0	0	0	0.0
33	Dead Run (Future)	Residential	7.9	5	36	179	22.7
34	Village on the Thames	Residential	4.0	0	0	0	0.0
35	Valley View 1	Residential	7.6	0	0	0	0.0
36	Valley View "Tail"	Residential	6.2	0	0	0	0.0
37	Valley View 3	Residential	18.1	0	0	0	0.0
38	Valley View 4	Residential	3.5	0	0	0	0.0
39	Condo - Mazza Homes	Residential	5.4	0	0	0	0.0
40	Condo - Rosen	Residential	5.2	0	0	0	0.0
41	Dorchester Street South (Existing)	Residential	4.0	2	18	91	22.7
42	Southeast Development Area	Residential	10.9	7	49	246	22.7
43	Southwest Development Area	Residential	17.6	11	80	400	22.7

Dorchester
Growth Projections based on Proposed Density Targets

Residential Summary

Area		Density	
		Minimum	Maximum
Description	(Ha)	(PPHA)	(PPHA)
With Available Development Information	64.44	[illegible]	[illegible]
Remaining Development Areas	215.28		
Total	279.72		

	Dorchester	Thorndale
	(Ha)	(Ha)
Residential	279.719	80.586
Residential Remaining	215.275	4.100

Dorchester	2018 - 2028	2018 - 2038	2018 - Buildout
	(Persons)	(Persons)	(Persons)
Singles/ Semi Detached	1110	2488	5593
Multiples	56	217	978
Apartments	39	33	714
Institutional	1	4	5
Total	1204	2848	6754

Employment Summary

Area			Den
			Minimum
Description		(Ha)	(PPHA)
Industrial	With Available Development Information	0.00	0
	Remaining Development Areas	0.00	10
	Total	0.00	
Commercial	With Available Development Information	0.00	0
	Remaining Development Areas	10.84	
	Total	10.84	
Institutional	With Available Development Information	0.00	0
	Remaining Development Areas	0.00	
	Total	0.00	

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	Dorchester	Thorndale
	(Ha)	(Ha)
Industrial	0.000	83.680
Commercial	10.841	1.698
Institutional	0	0

Urban	2018 - 2028	2018 - 2038	2018 - Buildout
	(Jobs)	(Jobs)	(Jobs)
Industrial	0.00	0.00	0.00
Commercial	125.00	334.74	598.73
Institutional	0.00	0.00	0.00
Total	125.00	334.74	598.73

Dorchester
Growth Projections based on Proposed Density Targets

Residential and Employment Development Details

Development Number	Description	Land Use	Area (ha)	Total Equivalent Population (Increment & Change)			Buildout Density (p/ha)
				2019 - 2029	2019 - 2038	2019 - Buildout	
1a	Da Vinci Innovation Park	Settlement Industrial	22.0	0	0	0	
1b	Hamilton Industrial Park	Settlement Industrial	10.9	0	0	0	
2	Porter Subdivision	Residential	14.7	0	0	0	
3	Ron Allen Subdivision	Residential	9.0	0	0	0	
4	DIFLA	Residential	10.6	0	0	0	
5	Barry Hunter	Residential	1.1			57	50.0
6	Hunter Subdivision	Residential	46.1			2306	50.0
7	Sanctuary	Residential	3.5			177	50.0
8	Francisco	Residential	4.8			239	50.0
9	Malcom at Clara (Ritchie Property)	Residential	15.0			749	50.0
10	Passionate	Residential	3.4			169	50.0
11	ADJ Holdings	Residential	3.7			184	50.0
12	246 North Street	Residential	2.9			172	50.0
13	Village Gate	Residential	9.6	0	0	0	0.0
14	Clara Street Subdivision (Jeff House)	Residential	3.8			189	50.0
15	Bungalo Developments	Residential	3.7			184	50.0
17a	Harris Road / Vanderploeg	Residential	11.3			563	50.0
17b	Harris Road - Vanderploeg	General Commercial	3.7	43	114	185	50.0
18	Chestnut Drive Extension	Residential	49.7			2483	50.0
19	Trine Subdivision	Residential	24.9	0	0	0	
20	Ponyview	Residential	4.8	0	0	0	
21	Mill Pond	Residential	14.8	0	0	0	
22	Boardwalk at Mill Pond (Steve Spicig)	Residential	26.0			1300	50.0
23a	Vista Gardens Subdivision (Don Cromarty)	Residential	4.5	149	149	149	33.0
23b	Vista Gardens Subdivision (Don Cromarty)	General Commercial	2.8	31	85	142	50.0
24	Cromarty Gardens (Vista Gardens)	Residential	1.1	0	0	0	
25	Cromarty South of Creek	Residential	40.7	492	984	984	24.2
26	Shoppers Drug Mart	General Commercial	3.2	0	0	0	
27	Dorchester Terrace	Residential	1.3	76	76	76	59.1
28	McMillan Sons Homes Byron Ave	Residential	1.4	54	54	54	37.5
29a	DonDave Lands	Residential	19.5	291	602	603	30.5
29b	DonDave Lands	General Commercial	4.3	50	133	215	50.0
30	Villa Woods Historical	Residential	15.3	0	0	0	
31	Quail Run	Residential	14.1	0	0	0	
32	Quail Run Condo	Residential	1.3	0	0	0	
33	Quail Run (Future)	Residential	7.9			395	49.5
34	Village on the Thames	Residential	4.0	0	0	0	
35	Valley View 1	Residential	2.8	0	0	0	
36	Valley View "Two"	Residential	9.3	0	0	0	
37	Valley View 3	Residential	10.1	0	0	0	
38	Valley View 4	Residential	3.1	0	0	0	
39	Condo - Marion Homes	Residential	1.4	0	0	0	
40	Condo - Ripley	Residential	1.2	0	0	0	
41	Dorchester Road South (Existing)	Residential	4.0			201	
47		Residential	10.8			540	50.0
48		Residential	17.9			895	50.0

Thorndale
Growth Projections based on DC Background Study Projections

Residential Summary

	Dorchester (Ha)	Thorndale (Ha)
Residential	279.719	93.565
Residential (vacant)	215.275	4.110

Thorndale	2018 - 2028 (Persons)	2018 - 2038 (Persons)	2018 - Buildout (Persons)
Single & Semi-Detached	420	942	1915
Multiples	22	38	159
Apartments	15	24	78
Institutional	2	6	8
Total	**459**	**1010**	**2162**

Employment Summary

	Dorchester (Ha)	Thorndale (Ha)
Industrial	0.000	80.580
Commercial	10.840	1.869
Institutional	0	0

Urban	2018 - 2028 (Jobs)	2018 - 2038 (Jobs)	2018 - Buildout (Jobs)
Industrial	62.77	149.18	273.38
Commercial	21.66	57.71	100.99
Institutional	0.00	0.00	0.00
Total	**84.43**	**206.89**	**374.37**

Residential and Employment Development Details

Development Number	Description	Land Use	Area (ha)	Total Equivalent Population (Incremental Change)			Buildout Density (pp/ha)
				2018 - 2028	2018 - 2038	2018 - Buildout	
1	Thorndale Business Park	Settlement Industrial	59.4	54	129	237	4.0
2	Certified Industrial Site within Thorndale Business Park	Settlement Industrial	9.3	8	20	37	4.0
3	Inteli Pipe	Settlement Industrial	23.4	0	0	0	0.0
4	Thorndale Roof Truss	Settlement Industrial	3.7	0	0	0	0.0
5	Thorndale Commercial Block	General Commercial	1.6	16	49	86	54.0
5a	Northwest of Thorndale Rd. and Nissouri Rd.	Residential	3.5	1	1	312	88.9
6	Trails at Wye Creek Phase 1-4 (Elliott)	Residential	15.0	0	0	0	0.0
7	Trails at Wye Creek Phase 5-6 (Elliott)	Residential	15.0	132	132	130	8.3
8	Rosewood ([illegible] Farm)	Residential	35.6	173	465	714	19.4
9	Foxborough (Norquay Developments)	Residential	15.0	92	247	375	25.1
10a	Fairview Road Subdivision (Elliott)	Residential	7.4	61	165	252	33.9
10b	Fairview Road Subdivision (Elliott)	General Commercial	0.3	3	9	15	54.0
10c	New Growth Area near Fairview Road	Residential	0.6	0	0	53	88.9
11	Meadow Park Phase 1	Residential	13.9	0	0	0	0.0
12	Meadow Park Phase 2	Residential	9.0	0	0	0	0.0
13	Meadow Park Phase 3	Residential	11.5	324	324	324	28.2

Thorndale
Growth Projections based on Proposed Density Targets

Residential Summary

Area		Density	
		Minimum	Maximum
Description	(Ha)	(P/Ha)	(P/Ha)
With Available Development Information	116.41	8.20	20.67
Remaining Development Areas	8.13		
Total	99.07		

	Dorchester	Thorndale
	(Ha)	(Ha)
Residential	210.716	97.959
Residential (vacant)	235.235	4.110

Thorndale	2019 - 2023	2019 - 2028	2019 - Buildout
	(Persons)	(Persons)	(Persons)
Single & Semi Detached	427	842	1510
Multiples	23	39	658
Apartments	15	24	79
Institutional	2	5	8
Total	469	1010	2162

Employment Summary

Area			Density
			Minimum
Description		(Ha)	(P/Ha)
Industrial	With Available Development Information	0.00	0.00
	Remaining Development Areas	69.55	
	Total	69.59	
Commercial	With Available Development Information	0.00	0.00
	Remaining Development Areas	5.57	
	Total	5.57	
Institutional	With Available Development Information	0.00	0.00
	Remaining Development Areas	0.00	
	Total	0.00	

	Dorchester	Thorndale
	(Ha)	(Ha)
Industrial	0.000	69.590
Commercial	10.841	1.089
Institutional	0	0

Jobs	2019 - 2023	2019 - 2028	2019 - Buildout
	(Jobs)	(Jobs)	(Jobs)
Industrial	62.71	149.19	273.39
Commercial	21.65	57.21	100.99
Institutional	0.00	0.00	0.00
Total	84.40	206.40	374.37

Residential and Employment Development Details

Development Number	Description	Land Use	Area (ha)	Total Equivalent Population (Incremental Change)			Build-out Density (upha)
				2019 - 2023	2019 - 2028	2019 - Buildout	
1	Thorndale Business Park	Settlement Industrial	59.4	54	123	2368	
2	Certified Industrial Site within Thorndale Business Park	Settlement Industrial	4.2	8	20	480	
3	Ideal Pipe	Settlement Industrial	23.4	0	0	0	
4	Thorndale Root Truck	Settlement Industrial	3.7	0	0	0	
5	Thorndale Commercial Block	General Commercial	1.8	18	49	79	
5a	Northeast of Thorndale Rd and Nissouri Rd	Residential	4.8	1	1	176	
6	Trails at Wye Creek Phase 1-4 (Elliott)	Residential	16.0	0	0	0	
7	Trails at Wye Creek Phase 5-8 (Elliott)	Residential	15.5	103	132	132	8.3
8	Foxwood (Sifton/Lagris Farm)	Residential	30.8	173	400	513	19.4
9	Foxborough (Nissouri Subdivision)	Residential	15.0	92	247	378	25.4
10a	Fairview Road Subdivision (Elliott)	Residential	7.4	61	165	252	33.9
10b	Fairview Road Subdivision (Elliott)	General Commercial	0.2	1	8	14	
10c	[illegible]	Residential	0.8	0	0	20	
11	Meadow Park Phase 1	Residential	13.6	0	0	0	
12	Meadow Park Phase 2	Residential	9.0	0	0	0	
13	Meadow Park Phase 3	Residential	11.5			529	

Rural (Peripheral Lands and 401 Corridor Lands)
Growth Projections based on DC Background Study Projections

Residential Summary

	Rural (ha)
Residential	211.614

Rural	2016 - 2028 (Persons)	2016 - 2038 (Persons)	2016 - Buildout (Persons)
Single & Semi-Detached	180	300	561
Multiples	0	0	0
Apartments	0	0	0
Institutional	0	0	0
Total	**180**	**300**	**561**

Employment Summary

	Rural (ha)
Industrial	232.251
Commercial	6.259
Institutional	0.000

Rural	2016 - 2028 (Jobs)	2016 - 2038 (Jobs)	2016 - Buildout (Jobs)
Industrial	30.23	71.83	131.63
Commercial	15.74	32.55	47.37
Institutional	0.00	0.00	0.00
Total	**43.97**	**104.37**	**179.00**

Residential and Employment Development Details

Development Number	Description	Land Use	Area (ha)	Total Equivalent Population (Incremental Change) 2016 - 2028	2016 - 2038	2016 - Buildout	Buildout Density (pp/ha)
15 (Dorchester)	Weaver Property	General Commercial	6.3	14	30	47	7.6
42 (Dorchester)	Future Residential (Outside Settlement Area)	Residential	89.5	77	126	243	2.7
43 (401 Corridor)	Donnybrook Industrial Lands "East"	Industrial	42.5	6	13	34	0.8
44a (401 Corridor)	Hudson Industrial	Industrial	27.0	5	11	21	0.8
45 (401 Corridor)	Donnybrook Industrial Lands "West"	Industrial	152.7	30	47	87	0.6
14 (Thorndale)		Residential	35.1	31	51	95	2.7
15 (Thorndale)		Residential	40.5	35	58	108	2.7
16 (Thorndale)		Residential	44.1	38	63	117	2.7

Rural (Peripheral Lands and 401 Corridor Lands)
Growth Projections based on Proposed Density Targets

Residential Summary

	Rural (ha)
Residential	211.614

Area		Density	
		Minimum	Maximum
Description	(ha)	(PPHA)	(PPHA)
With Available Development Information	0.00	0.00	0.00
Remaining Development Areas	211.61		
Total	211.61		

Rural	2018 - 2028 (Persons)	2018 - 2038 (Persons)	2018 - Buildout (Persons)
Single & Semi-Detached	180	300	561
Multiples	0	0	0
Apartments	0	0	0
Institutional	0	0	0
Total	180	300	561

Employment Summary

	Rural (ha)
Industrial	232.251
Commercial	6.259
Institutional	0.000

Area			Den
			Minimum
Description		(ha)	(PPHA)
Industrial	With Available Development Information	0.00	0.00
	Remaining Development Areas	232.25	
	Total	232.25	
Commercial	With Available Development Information	0.00	0.00
	Remaining Development Areas	6.26	
	Total	6.26	
Institutional	With Available Development Information	0.00	0.00
	Remaining Development Areas	0.00	
	Total	0.00	

Rural	2018 - 2028 (Jobs)	2018 - 2038 (Jobs)	2018 - Buildout (Jobs)
Industrial	30.23	71.83	131.63
Commercial	13.74	32.55	47.37
Institutional	0.00	0.00	0.00
Total	43.97	104.37	179.00

Residential and Employment Development Details

Development Number	Description	Land Use	Total Equivalent Population (Incremental Change) 2018 - 2028	2018 - 2038	2018 - Buildout	Buildout Density (ppha)
33 (Dorchester)	Walker Property	General Commercial			312	
41 (Dorchester)	Future Residential (Outside Settlement Area)	Residential			4577	
43 (401 Corridor)	Dorve Brook Industrial Lands "East"	Industrial			2127	
44a (401 Corridor)	Hudson Industrial	Industrial			1646	
45 (401 Corridor)	Dorve Brook Industrial Lands "West"	Industrial			7613	
14 (Thorndale)		Residential			1602	
15 (Thorndale)		Residential			2045	
16 (Thorndale)		Residential			3306	

MUNICIPALITY OF THAMES CENTRE

APPENDIX B

PROJECT WORKSHOP MINUTES AND PRESENTATIONS

Royal Centre 3300 Hwy 7 Suite 402
Vaughan ON L4K 4M3
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Meeting Notes

Project:	Municipality of Thames Centre 2018 Water and Wastewater Master Plan Update	Project No.:	TC-015-18
		GMBP Project No.:	418109
Meeting:	Workshop No. 1 System Understanding, Planning and Design Criteria and Model Development		
Date:	January 9, 2019	Time:	9:30 am – 12:00 pm
Location:	Municipality of Thames Centre (4305 Hamilton Road, Dorchester)		

Attendees:

Municipality of Thames Centre		**County of Middlesex**		**OCWA**		**GM BluePlan**	
Carlos Reyes	✓	Marc Bancroft	✓	Mike Taylor	✓	Julien Bell	✓
Jarrod Craven	✓					Matt Fisher	✓
Jeff Carsey	✓						
Ron Lewis	✓						
Kevin Willson	✓						
Meghan Fletcher	✓						

Agenda Items
Note: Meeting Agenda followed Presentation Slides (included as attachment to these minutes)

1. Introductions

Names and Positions:

Carlos Reyes, Director of Environmental Services, Municipality of Thames Centre
Jarrod Craven, Environmental Services Superintendent, Municipality of Thames Centre
Jeff Carsey, Water Operator, Municipality of Thames Centre
Ron Lewis, Water Operator, Municipality of Thames Centre
Kevin Willson, Water Operator/Public Works Technician
Meghan Fletcher, GIS/Asset Management Technician
Marc Bancroft, Senior Planner, County of Middlesex
Mike Taylor, Senior Operations Manager, OCWA
Julien Bell, Project Manager, GM BluePlan

Agenda Items
Note: Meeting Agenda followed Presentation Slides (included as attachment to these minutes)

Matt Fisher, Project Engineer, GM BluePlan

2. Project Recap

- The updated schedule was reviewed – work completed to date is summarized on Slide 6 of the presentation and the proposed remaining project schedule is summarized on Slide 8. A revised Gantt chart has also been included in the attachments to these minutes.
- There is a small amount of background information that remains outstanding (primarily related to the water and wastewater facilities). Outstanding information is highlighted in the presentation.
- Water and wastewater model builds will continue based on available information and be updated with outstanding background information as it becomes available.
- GMBP are preparing the following draft Technical Memorandums:
  - Growth Projections and Planning Methodology; and,
  - Level of Service and Design Criteria Summary.
- The draft Technical Memorandums will be updated with comments from Workshop No. 1 and submitted to the Municipality for review.

3. Baseline System Understanding

- Dorchester Water System

  Service area, pumping firm capacities and reservoir storage capacities were reviewed and confirmed (noted on Slide 11).
  - See notes on Slide 15 for Dorchester WTP info.
- Thorndale Water System

  Service area, pumping firm capacity of WTP and availability of dedicated feed to ET were reviewed and confirmed (noted on Slide 13).
  - The group noted that there has been a recently approved PTTW upgrade to ~20 L/s from Thorndale Well-2 (upgrade from 8.3 L/s) – See Slide 13 for further notes.
  - See notes on Slide 16 for Thorndale WTP info.
- The group noted that they have not encountered fire flow or pressure / capacity issues in either the Dorchester or Thorndale water system.

- Dorchester Wastewater System

  Service area was reviewed and confirmed.
  - The service area map has been updated per the comments at the meeting and is shown on Slide 19.
  - Slide 20 notes that the installed FM is capped – installed with bridge construction.
  - See notes on Slide 23 for Dorchester WWTP and notes on Slides 24 – 26 for Dorchester SPS.
- Thorndale Wastewater System

  The group noted that wet weather flows within Thorndale appear to be high and the Municipality is currently reviewing this further. High WWF not substantial enough to require second pump at WWTP PS to operate.

Agenda Items
Note: Meeting Agenda followed Presentation Slides (included as attachment to these minutes)

- MT will review WW flows trending and provide best available daily information (may be screenshots of 5 highest flow days over last 2 years).
  - See notes on Slide 23 for Thorndale WWTP and SPS.
- Water and Wastewater Model Development
  - JB reviewed the model development process with the group
    - Model development has been progressed based on the updated GIS information, available facility information and allocation of demands and flows based on the provided billing information.
    - As noted in Section 2, facility information within models will be updated based on information received from this Workshop and model builds with existing scenarios will be completed for review at Workshop No. 2 to be held on February 13.

Actions:

- Municipality to review updated PowerPoint and confirm highlighted items relating to operation of existing water and wastewater facilities / system.

4. Growth Scenarios

- JB reviewed with the group the model allocation process.
- GMBP have reviewed:
  - the growth projections set out in the 2018 DC Background Study;
  - the development maps and supporting draft plans and concepts provided by the Municipality; and,
  - the land use specified in the Municipality's Official Plan.
- Preliminary residential and employment numbers were determined for the existing population and growth projections were completed based on the provided information.
  - Slides 38 to 45 detail the preliminary projections.
  - MB provided comments on developable areas and noted that the buildout residential population taken from the DC Background Study appears to be high (Slides 37 to 44 have been revised to reflect MB's comments).
- MB also noted that vacant land supply across the entirety of Thames Centre must be taken into account when considering potential development outside of the Dorchester and Thorndale Settlement Boundaries. The Municipality cannot extend the Settlement Boundary without absorption of land supply within the existing Boundary first. Vacant land north of the Thames River in Dorchester but within the settlement boundary is less likely to develop with the requirement to be connected to the Dorchester municipal wastewater system and the requirement for pumping of wastewater flows across the river to drain to the Dorchester WWTP. Limited development north of the river will impede the progress of development outside of the Settlement Boundary in Dorchester and Thorndale.
- Initial review of the development proposals within both Dorchester and Thorndale compared to the growth numbers included in the DC Background Study suggests that development is proceeding more quickly than anticipated in the DC Report (this is summarized further on Slide 41).
  - JB noted that based on the above, there are alternative approaches to establishing methods for growth projections and allocation:
  - Within the Dorchester and Thorndale Settlement Boundaries:

Agenda Items
Note: Meeting Agenda followed Presentation Slides (included as attachment to these minutes)

1. Allocation of residential and employment buildout growth based on development plan information (where available) and distribution of remaining growth based on achieving targets identified in the Municipality's DC Background Study.
2. Allocation of residential and employment buildout growth based on development plan information (where available) and buildout of remaining developable lands based on land use and target densities (target densities determined through coordination with the Municipality).
    - It is expected that allocation based on this methodology will produce buildout populations greater than the projections determined through the 2018 DC process.

- Water and wastewater infrastructure upgrades will be developed based on growth triggers; however, a comprehensive review of the phasing of development considering available development information compared to DC numbers will be required to develop a reasonable capital plan.
- Outside of the Dorchester and Thorndale Settlement Boundaries

  In addition to the vacant land supply restrictions, MB noted that there are some areas located outside of the Settlement Boundary identified as developable on the Municipality's Development Maps that will not be developed. MB will review further the Municipality's Development Maps and provide his comments on specific areas.

  Areas outside of the Settlement Boundary will be identified for prospective development, and the draft Growth Projections and Planning Methodology tech memo will compare allocation by 1) distribution of DC Study Buildout projections across prospective developments and 2) buildout of prospective development based on a target density (determined through consultation with the Municipality).

Actions:

- GMBP to update draft technical memorandum detailing proposed growth projections and allocation methodology alternatives for review by the Municipality.

5. Policy and Design Criteria

- JB reviewed Starting Point Methodology with the group – representation of existing demands and flows by the models based on best available information (billing data and flow records) then applying design criteria to future growth to calculate demands and flows. The result of Starting Point Methodology is water and wastewater models that accurately represents the current conditions of the respective systems and then somewhat conservatively represent the future conditions of the water and wastewater systems.
- Water demands over recent years were reviewed with the group.
    - In Dorchester, total water use is generally consistent across recent years with water use trending down. The group confirmed that population within Dorchester has not significantly changed over the past 10 years.
    - In Thorndale, total water use is trending up, and the group confirmed that this is as expected as there has been significant growth within Thorndale over the past 10 years.
- Non-Revenue water is near industry standard targets (It was noted that Thames Centre are doing extremely with respect to water loss in their municipal water systems).
- Per-Capita rates for existing residential and employment users in Dorchester and Thorndale were determined based on billing and production records and calculated persons and jobs numbers.

Agenda Items
Note: Meeting Agenda followed Presentation Slides (included as attachment to these minutes)

- As noted above, there is some uncertainty with the current number of jobs in the municipally serviced sections of Dorchester and Thorndale. A summary of the determination of the residential and employment population is shown on Slide 53.
- The draft per capita numbers will be detailed further in the draft Policy and Design Criteria technical memorandum that will be submitted to the Municipality for review.

- JB reviewed Water Design Criteria with group:
  - Target pressures for the system will be reviewed further at the next Workshop (compared to model results).
  - Fire flow requirements and proposed storage will also be reviewed further at the next Workshop. GMBP will review further the recommended fire flows outlined in Council Report No. ES-017-17 and summarize the initial review in the draft Policy and Design Criteria tech memo. The group agreed that it would be beneficial to invite a representative from the Municipality's fire department to the next Workshop to provide information on the existing system and comments on the fire flow requirements.
    - Municipality to provide information on fire department's capacity (no. of trucks, available flow, etc.) This will be considered when determining required fire flow (preliminary information for Thorndale is available in the ES-017-17 council report).
    - Some sensitivity analysis of the required fire flow will be completed. GMBP to consider further the scope of a fire flow sensitivity analysis and this will be reviewed further at Workshop No. 2.
  - Preliminary water design criteria recommendations are shown on Slide 55. It is recommended that per capita rates be lowered from the 2008 MP numbers to better reflect current trends. It is also recommended that fire flow requirements be reviewed further and
  - WWTP flows from 2016 - 2017 were reviewed and compared to design criteria utilized in the 2008 MP.
  - Preliminary recommendations for wastewater design criteria are shown on Slide 61.

Actions:

- GMBP to issue draft technical memorandum detailing proposed policy and design criteria for review by the Municipality.

6. Next Steps

- Within the next week, GMBP to update draft presentation with meeting comments and submit revised version to attendees with requests for discussed outstanding information to be input into the model builds.
  - Water and wastewater models builds are to be finalized and existing conditions modelled with results presented for review at Workshop No. 2 to be held on February 13.
- Key Considerations during the Servicing Evaluation are summarized on Slide 64.

Actions:

- As noted above in Item 2. Project Scope Overview and Deliverables, GMBP to provide an updated project schedule based on model development utilizing Thames Centre's updated GIS information.

7. Next Meeting

- Workshop No. 2 – Model Review is scheduled for February 13.

Attachments

Updated Project Schedule

Municipality of Thames Centre
Project No. TC-015-18
2018 Water and Wastewater Master Plan Update
Revised Project Schedule (Version 4 - January 2019)
GM BluePlan Engineering Limited

2019

Task	Sub-Task	January				February				March				April					May				June				July					August			
		7	14	21	28	4	11	18	25	4	11	18	25	1	8	15	22	29	6	13	20	27	3	10	17	31	1	8	15	22	29	5	12	19	26
1	**Project Award**																																		
1.1	Project Kickoff Meeting (Completed)																																		
2	**Information Collecting and Understanding**																																		
2.1	Data Collection and Background Review (Completed)																																		
2.2	Baseline System Understanding and Planning Review Workshop	▲																																	
3	**Establish Metrics for Targeted Levels of Service**																																		
3.1	Design Criteria, Policy, and Standards Review																																		
3.2	Criteria Review Workshop	▲																																	
3.3	Model Development																																		
3.6	Model Review Workshop						▲																												
3.7	Servicing Assessment																																		
3.8	Servicing Concepts and Evaluation Criteria Workshop												▲																						
4	**Evaluation of Alternatives and Selection of Preferred Alternative**																																		
4.1	Servicing Alternatives																																		
4.2	Alternatives Evaluation Workshop																▲																		
4.3	Development of Capital Program Implementation Plan																																		
5	**Public and Stakeholder Consultation**																																		
5.1	Notice of Commencement (Completed December 2018)																																		
5.2	PIC 1																			◇															
5.3	Notice of Completion																												◇						
6	**Develop Inventory of Capital Priority Replacements and Upgrades and Future**																																		
6.1	Draft Master Plan Report																							◇											
6.2	Report Review Workshop																									▲									
6.3	Final Master Plan Report																											◇							
6.4	30 Day Review of Final Report and Final Project Documentation																																		

Meeting/Workshop ▲
Deliverable ◇
Holidays

Workshop No. 1 PowerPoint Presentation

(Updated with comments from January 9, 2019 Workshop No. 1)

MUNICIPALITY OF Thames Centre

2018 Water and Wastewater Master Plan Update
Workshop No. 1

Municipality of Thames Centre (4305 Hamilton Road, Dorchester)
January 9, 2019

AGENDA

1. Introductions
2. Project Recap
   - Project Objectives
   - Work to Date
   - RFI Update
   - Updated Project Timelines / Schedule
3. Baseline System Understanding
   - Overview
   - Facilities and Capacities
   - Service Areas
   - Water and Wastewater Model Development
   - Demands and Flows
4. Policy and Design Criteria
   - Sensitivity
   - Preliminary Recommendations and Meeting Takeaways
5. Growth Scenarios
   - Projections and Allocations
   - Starting Point Methodology
   - Phasing Approach
6. Next Steps
   - Now to Workshop No. 2
   - Key Considerations for Servicing Evaluation

OBJECTIVES

1. Outline any data gaps and agree on assumptions to be used going forward
2. Ensure comprehensive system understanding
3. Develop understanding of Policy and Design Criteria and Growth Scenarios Work Completed and Input Required
4. Confirm Next Steps and Schedule

Information to be Confirmed

To be Confirmed (TBC)	Highlighted information throughout the presentation is still to be confirmed

PROJECT RECAP

Master Servicing Plan
Project Objectives & Deliverables

Baseline System Models

- Develop all pipe models for Municipality's Water and Wastewater Systems based on:
  - Updated GIS information
  - Best available billing, and facility SCADA and consumption/ flow information

Growth Scenarios

- 2028, 2038 and Full Buildout
- Ultimate Servicing Strategies
- Upgrade Triggers by Location & Growth Population

Capital Program and Implementation Plan

Provide direction on how to service buildout areas
Development of Capital Plan for recommended servicing strategy
Implementation Plan; timelines and triggers

EA Process

- Standard Notices – Notice of Study Commencement issued in December 2018
- Public Consultation Center
- Stakeholder Consultation
- 30 Day Review – Final Report

Update on Project Progress

End-July - August

- Kick-Off Meeting (August 2)
- Data Collection and Background Review
- Model Software Selection

September

- Communications Plan Drafted and Contact List Confirmed
- Updated WW GIS received from Municipality
- WW Model Build Commenced

October

- W Model Build Commenced
- Drafted Notice of Study Commencement
- Data Received
  - Updated W GIS received from Municipality
  - Water Billing Info
  - WW PAR
  - Development Information
  - Pump Info

November

- Review of Growth Projections and Planning Allocation Methodology
- Data Received
  - Updated W & WW GIS Info
  - WWTP Data (from OCWA)
  - Water Consumption Info
  - Thorndale WWPS Drawings
  - Thorndale Trunk WM Report

December – Early-January

- Issued Notice of Commencement
- Continued work on W and WW Model Builds
- Review of Draft Design Criteria

RFI Status

Water		Wastewater		Other	
WTP and PS Facility Configuration, Elev., Etc.	✓	WTP and PS Facility Configuration, Elev., Etc.	✓	Development Maps and Plans / Submissions	✓
Pump Data	✓ (Partial)	Pump Data	✓ (Partial)	GIS (Parcels, Road Network, Etc.)	✓
Control Narratives / Operations Setpoints	✓ (Partial)	Control Narratives	✓ (Partial)	2018 DC Report	✓
GIS	✓	GIS	✓	Thames Centre Official Plan	✓
SCADA Info.		Performance Assessment Reports	✓		
Billing Info / Consumption Data	✓	WWTP ECAs	✓		
Daily Plant Flows	✓	WWTP Operation Manuals	✓		
Customer Complaints (2017)	✓	Tracked SCADA Parameters	✓		
WTP Operations Manuals	✓	Flow Monitoring (Monitoring completed was noted to be Unreliable at Kickoff Meeting)	✗		
Tracked SCADA Parameters	✓				
Hydrant Tests	✓				

Project Schedule

January
- Workshop No. 1
- Model Development

February
- Workshop No. 2 Model Review
- Servicing Assessment
- Notice of Commencement

March
- Workshop No. 3 Servicing Concepts / Evaluation Criteria Review
- Develop Servicing Alternatives
- Develop Servicing Alternatives

April
- Workshop No. 4 Alternatives Evaluation Workshop
- Development of Implementation Plan

May
- PIC No. 1
- Master Plan Report

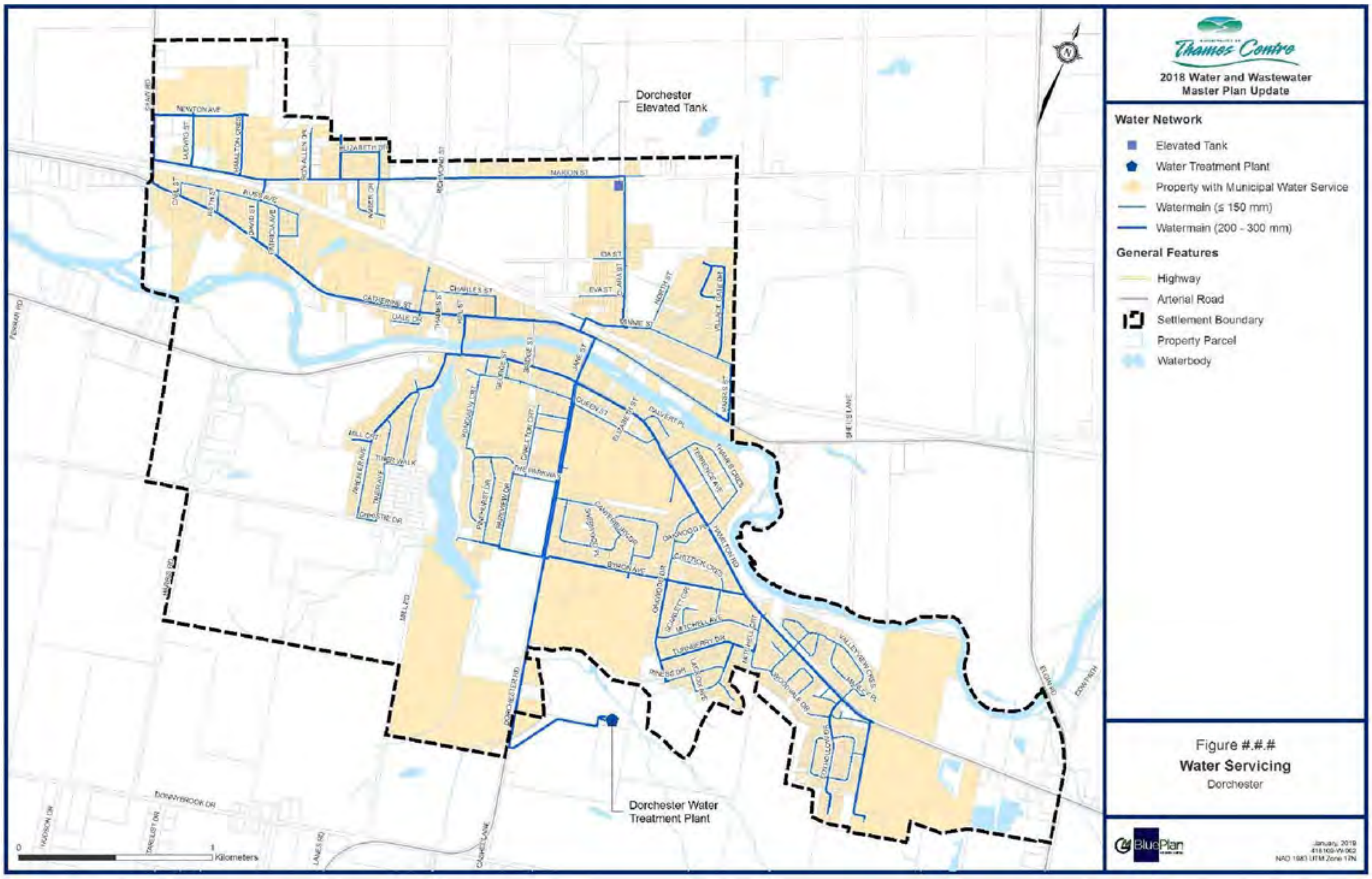
June
- Workshop No. 5 Report Review

July
- File Master Plan
- Notice of Study Completion + 30 Day Review

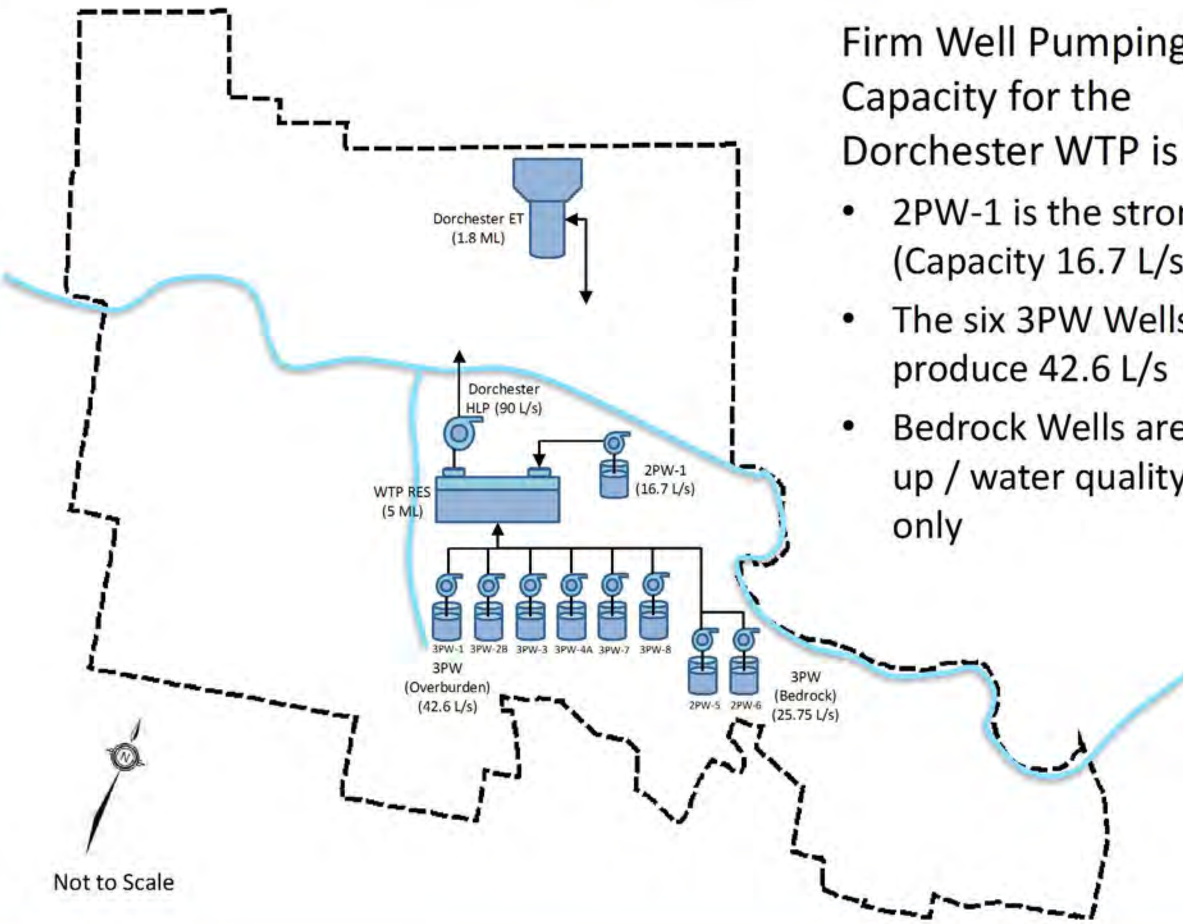
Baseline System Understanding

WATER NETWORK

Dorchester Water Network Service Area



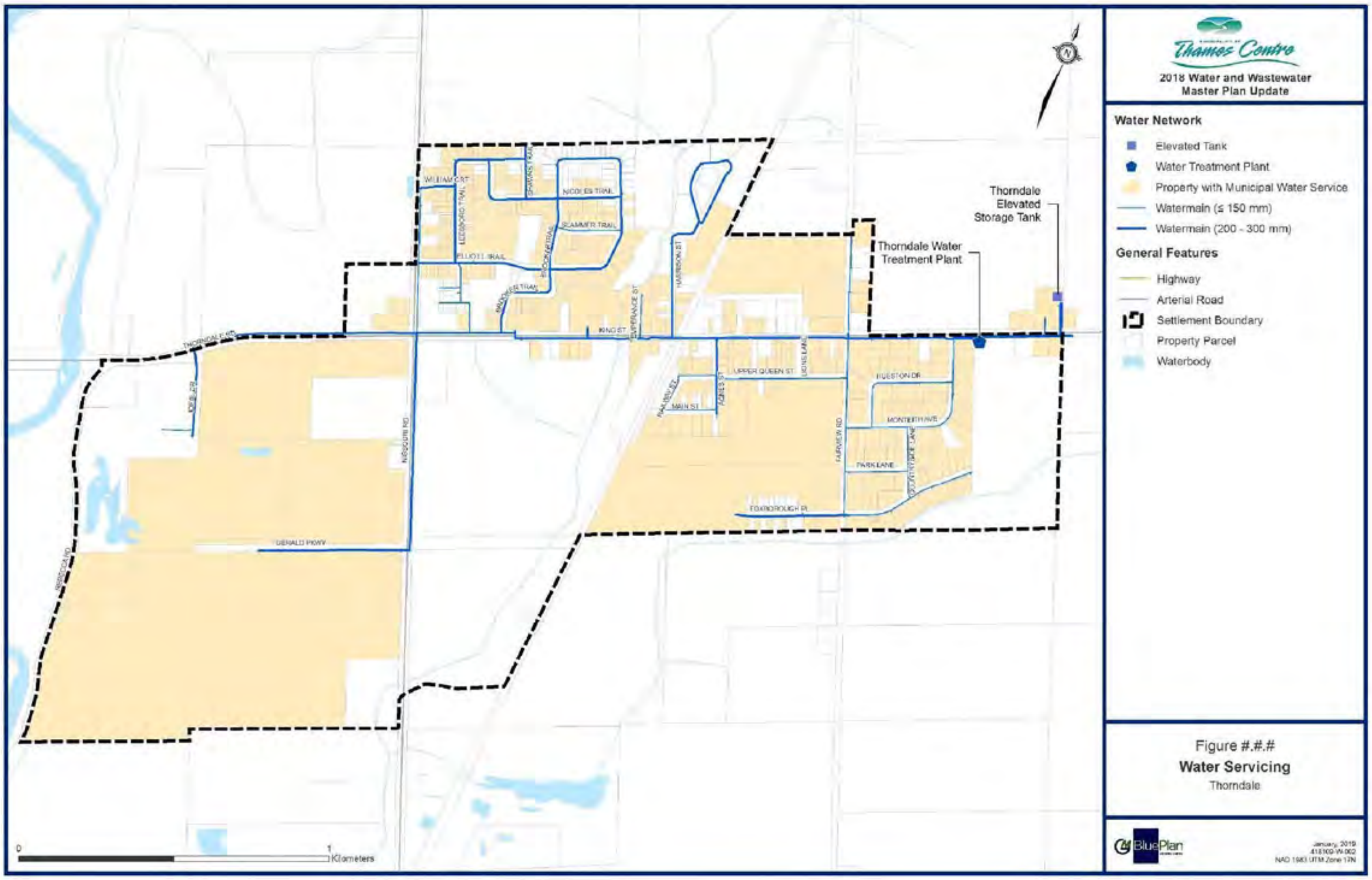
Dorchester Water System Schematics



Firm Well Pumping Capacity for the Dorchester WTP is 42.6 L/s

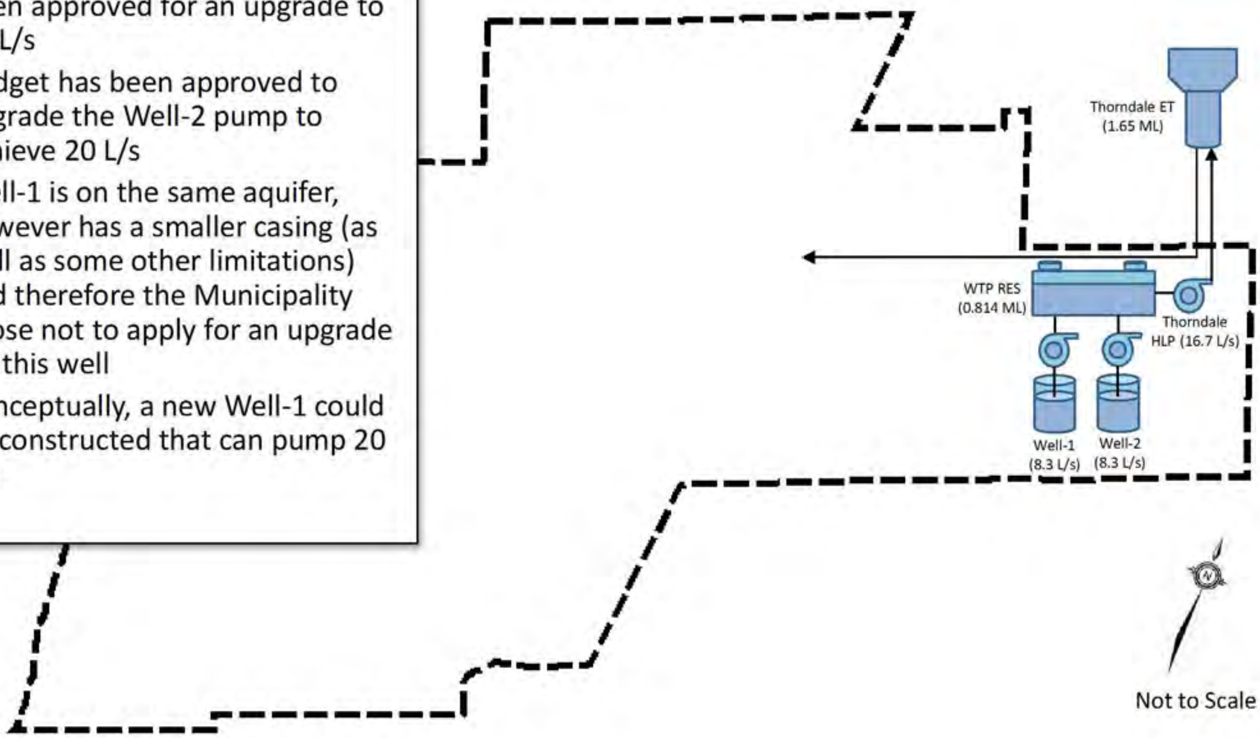
- 2PW-1 is the strongest well (Capacity 16.7 L/s)
- The six 3PW Wells can produce 42.6 L/s
- Bedrock Wells are for back-up / water quality tests only

Thorndale Water Network Service Area



Thorndale Water System Schematics

- The Well-2 PTTW has recently been approved for an upgrade to 20 L/s
- Budget has been approved to upgrade the Well-2 pump to achieve 20 L/s
- Well-1 is on the same aquifer, however has a smaller casing (as well as some other limitations) and therefore the Municipality chose not to apply for an upgrade for this well
- Conceptually, a new Well-1 could be constructed that can pump 20 L/s



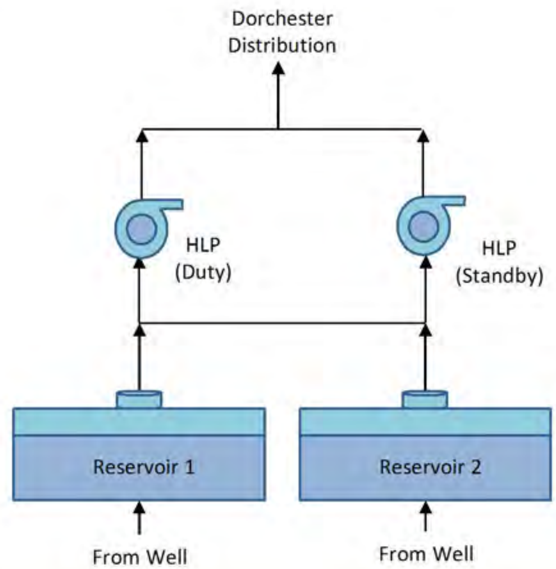
Control Narrative Summary

- Dorchester
  - Supplied by Well Field No. 2 and Well Field No. 3 (Overburden and Bedrock)
    - **PTTW** – 2PW-1 – 1,440 m^3/d, 3PW (Overburden) - 3,681 m^3/d, 3PW (Bedrock) – 2,225 m^3/d – **Total = 7,346 m^3/d (To be Confirmed)**
    - 3 PW (Bedrock) Wells are Backup / for water quality samples
  - Pressures sustained by Elevated Tank
  - HGL → 303 m (To be confirmed)
- Thorndale
  - Supplied by Wells (No. 1 and No. 2)
  - **PTTW** – Well 1 – 720 m^3/d, Well 2 - 1,901 m^3/d – **Total = 1,901 m^3/d**
  - Dedicated feed to Elevated Tank, Pressures sustained by Elevated Tank
  - HGL → 340 m (To be confirmed)

Dorchester Water Treatment Plant

Wellfield, Reservoir, and Pump Station

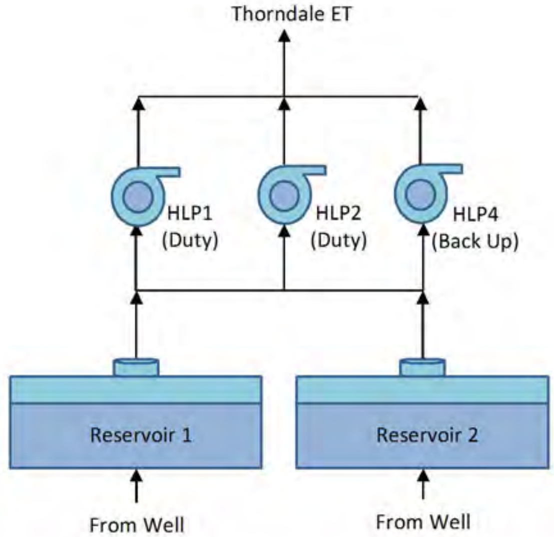
- **Treatment**
  - Elevated iron and manganese are known issues
    - Grease sand filters in plant and frequent well rehabilitation required
  - Chlorination, filtration and UV
  - No significant secondary / water quality issues
- **Station Production Capacity**
  - Treatment Capacity = 7,776 m^3/d
  - Well Supply Capacity = 7,346 m^3/d
- **High Lift Pumps**
  - 2 HLP - Duty and Standby
    - Each with 90 L/s at 59 m TDH
  - Firm Pumping Capacity = 90.0 L/s
    - Pumps have been rebuilt numerous times in the last 15 years and max out at ~80 L/s
  - Pumps on / off based on Dorchester ET levels
    - Duty pump on when tank level <= To be confirmed
    - Duty pump off when tank level >= To be confirmed
- **Reservoirs**
  - 2 Aboveground Storage Reservoirs
    - Each with Volume = 2,500 m^3
    - Volume primarily dedicated to storage (only an insignificant amount required for contact time)



Duty	Pump	Start (m)	Stop (m)
1	HLP	To be confirmed	To be confirmed
2 (Standby)	HLP	Off	Off

Wellfield, Reservoir, and Pump Station

- **Treatment**
  - Chlorination, Sodium Silicate System
  - Bedrock Wells (No GUDI), UV not required
- **Station Production Capacity**
  - Treatment Capacity = 0.72 ML/day
  - Well Supply Capacity = 1.9 ML/day
- **High Lift Pumps**
  - 4 HLP
    - HLP-1 (Duty 1), HLP-2 (Duty 2), HLP-4 (Back Up) all 8.3 L/s @ 45m TDH
    - HLP-3 40.5 L/s @ 50m TDH (Fire Pump Out of Service)
  - Firm Pumping Capacity = 16.7 L/s
  - Pumps on / off based on Thorndale ET level
  - Flow Control Valve set at 8.3 L/s – Revised to 10 L/s after PTTW upgrade to 20 L/s approved
- **Reservoir**
  - Reservoir Cell No. 1 Volume = 363 m^3
  - Reservoir Cell No. 2 Volume = 451 m^3
  - Volume primarily dedicated to storage



Duty	Pump	Start (m)	Stop (m)
1	HLP-1	9.2	9.7
2	HLP-2	8.7	9.2
3	HLP-4	Off	Off
4	HLP-3 (Fire Pump)	Out of Service	Out of Service

Dorchester Elevated Tank

- Volume = 1,800 m^3
- Top water level = 303 m (To be confirmed)
- Operates between 301.7 m (LWL) and 303 m (TWL) all to be confirmed
  - Elevation: 277.4m (TBC)
- Tank cycles approximately 3 times a day in winter, 4 – 5 times a day during summer

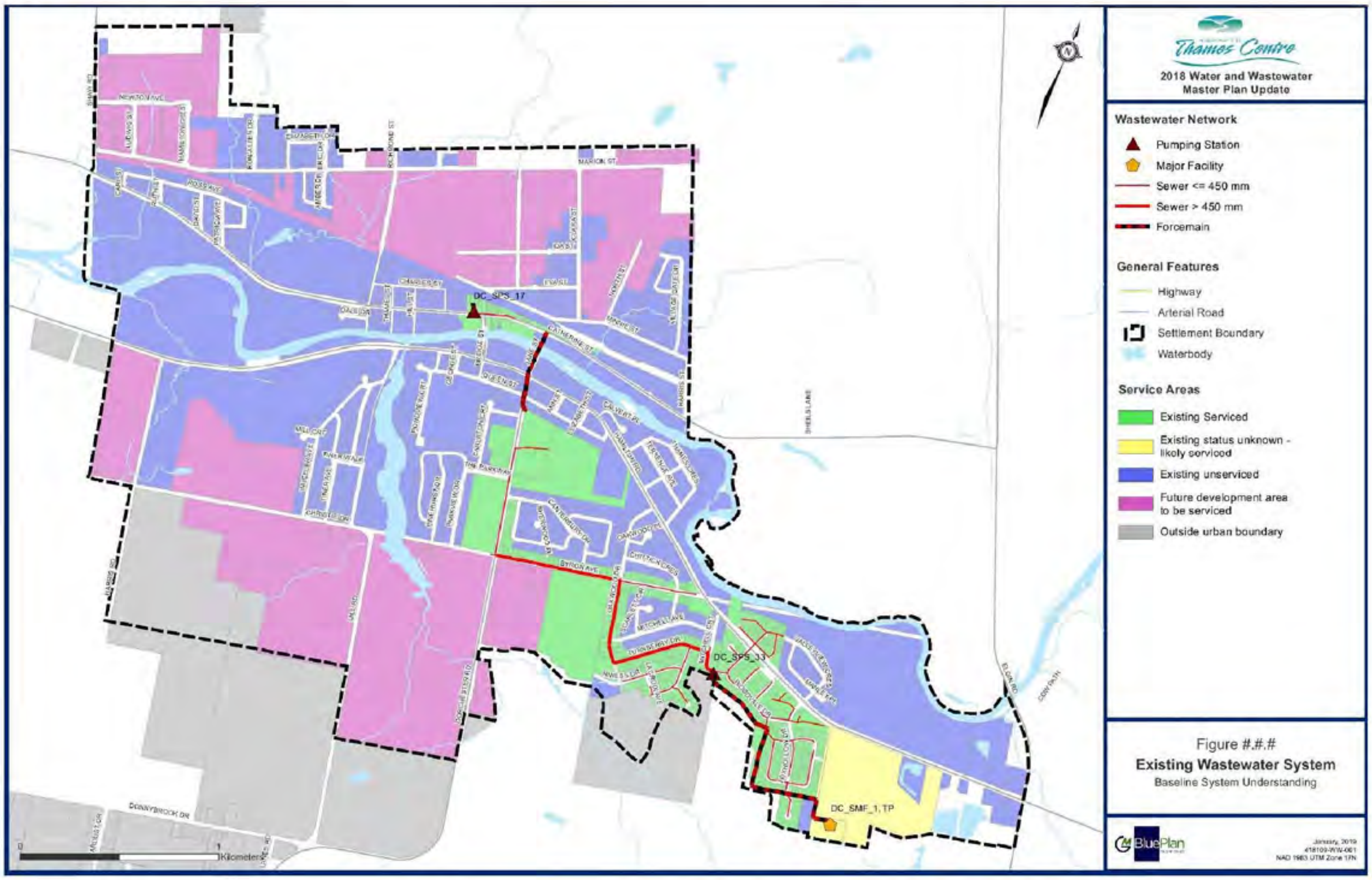
Thorndale Elevated Tank

- Volume = 1,650 m^3
- Top water level = 340 m (TWL) and 330 m (LWL) all to be confirmed
- Operates between 8.5 m and 9.7 m
  - Elevation: 301.80 m (TBC)
- Tank cycles approximately 2 times a day in winter, 3 times a day during summer

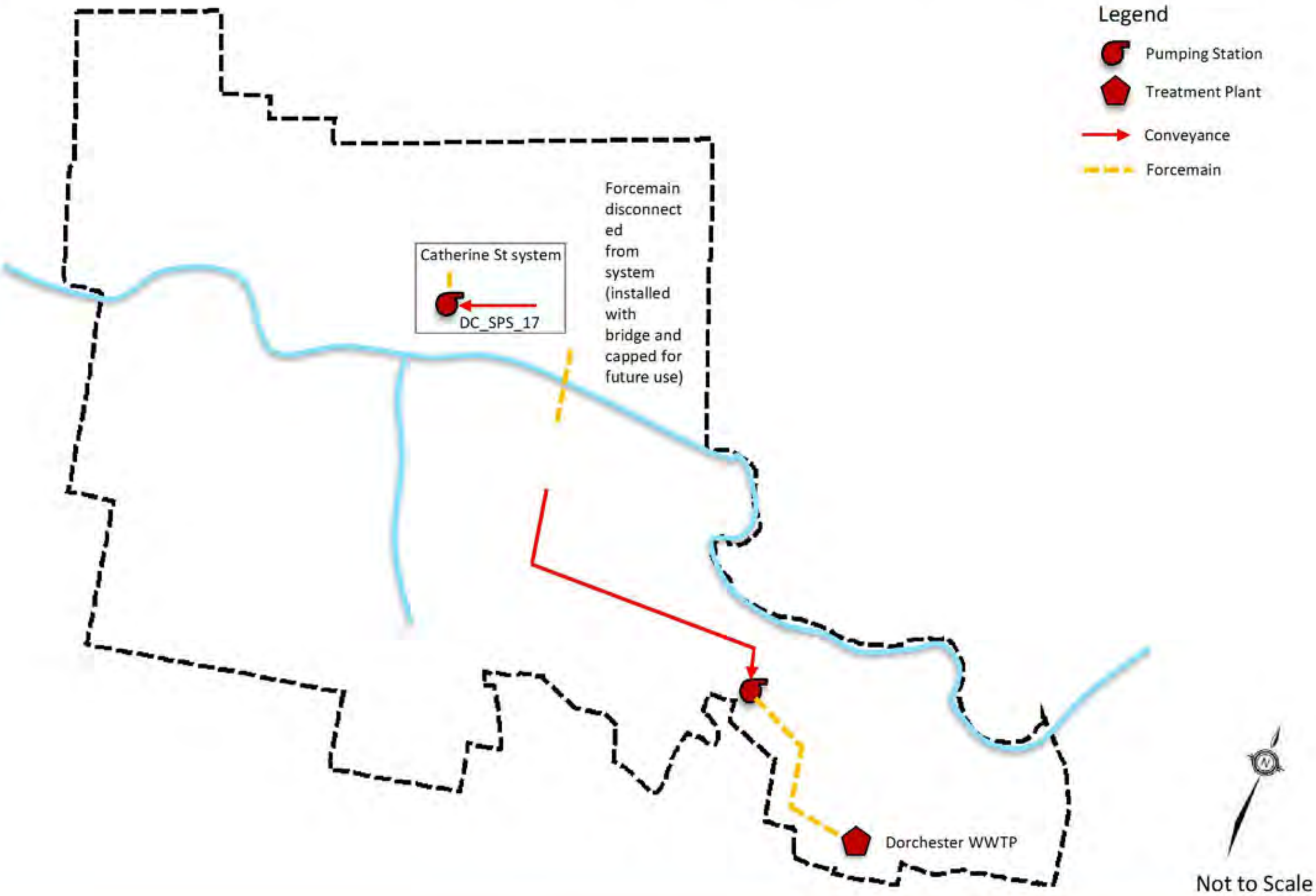
Baseline System Understanding

WASTEWATER NETWORKS

Dorchester Wastewater Network Service Area



Wastewater System Schematics: Dorchester



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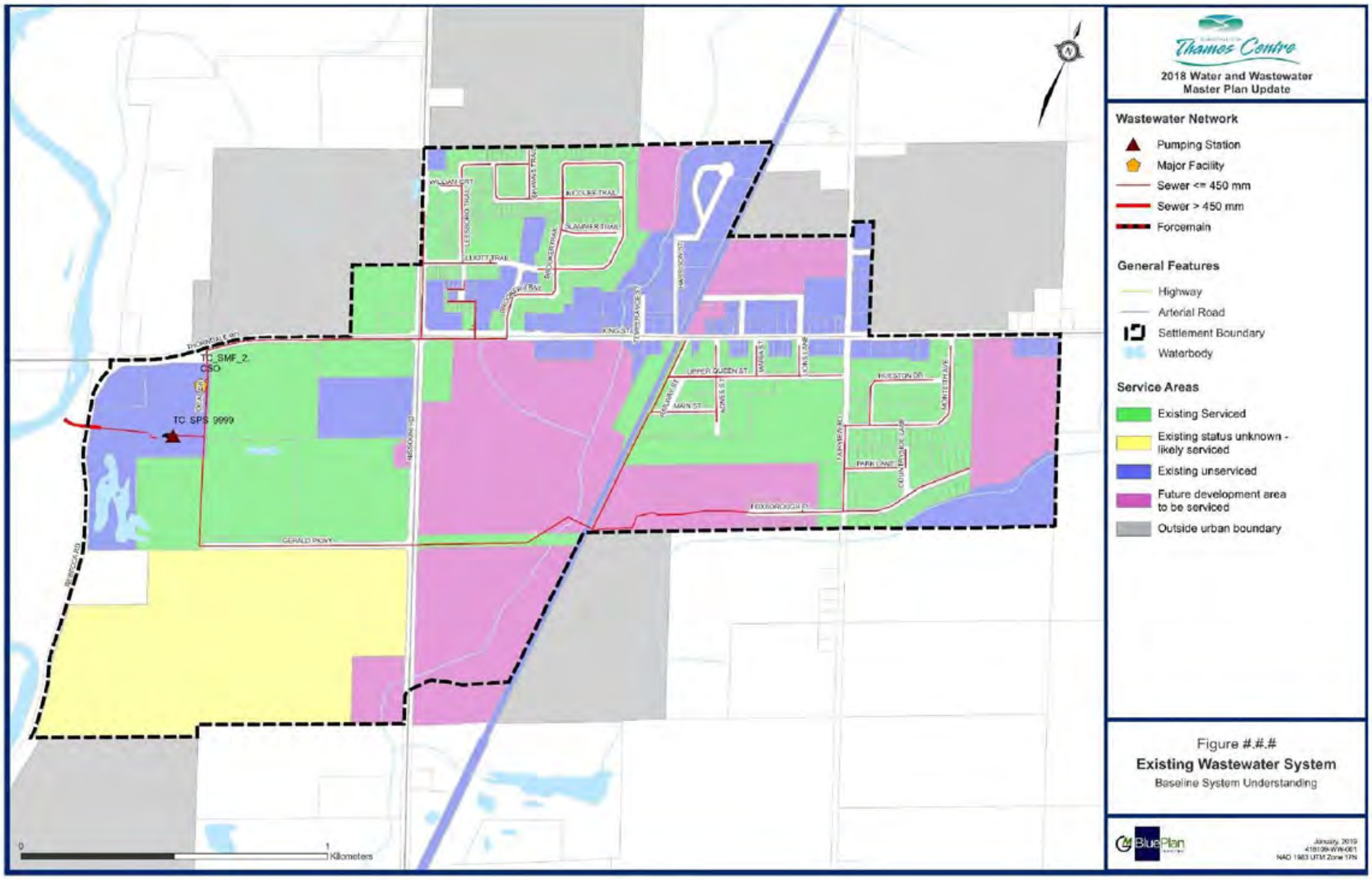
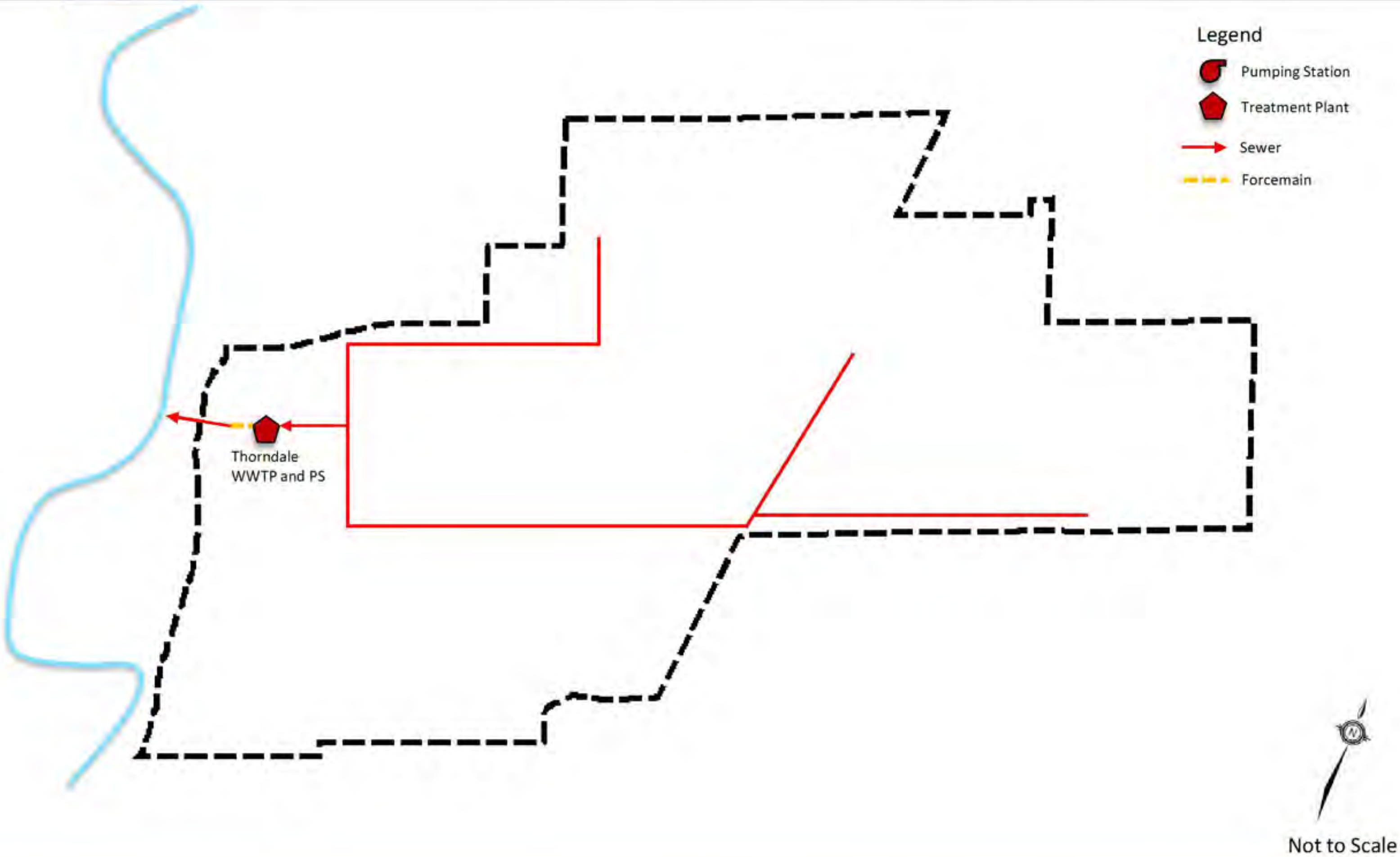
Thorndale Wastewater Service Area



Wastewater System Schematics: Thorndale



Wastewater Treatment Plant

Dorchester Wastewater Treatment Plant

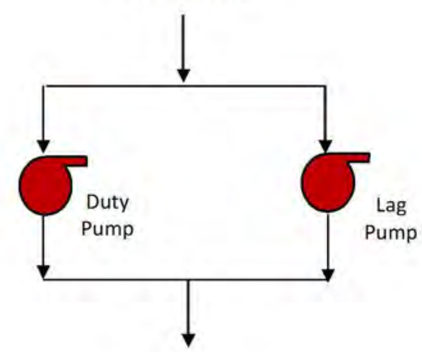
- Rated Capacity = 6.0 L/s (520 m^3/d)
  - Expansion to 13.9 L/s (1,200 m^3/d) by December 2019
- Peak Capacity = 41.4 L/s (3,545 m^3/d)
- Outfall
  - Discharged to the Thames River
    - via a 600mm diameter outfall sewer that outlets to a 900mm storm sewer

Thorndale Wastewater Treatment Plant

- Rated Capacity = 7.8 L/s (674 m^3/d)
  - Planned expansion to be postponed (originally planned for 2019 but not yet required)
- Peak Capacity = 28.2 L/s (2,436 m^3/d)
  - 3 Pumps (2 Duty and 1 Standby)
    - Each at 28.2 L/s
    - Observed is ~20 -28 L/s with 2 pumps running
- **Outfall**
  - Discharged to the Thames River via a 450mm sewer pipe outletting to a 900mm diameter storm sewer

Dorchester SPS

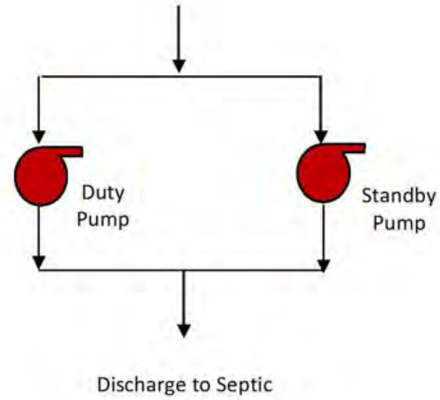
- **Pumps**
  - 2 Pumps (Duty and Standby)
    - Each at 20.7 L/s
  - Design Head To be confirmed
  - Firm Pumping Capacity = 20.7 L/s
  - Room for future third pump
- **Wet Well**
  - 3.0 m Diameter
  - 8.3 m deep
- **Forcemain**
  - 200mm Discharges to the Dorchester WWTP



Pump	Capacity (L/s)	Start (m)	Stop (m)
1 Duty	20.7	1.1	0.60
2 Lag	20.7	1.4	0.75

Catherine St. SPS

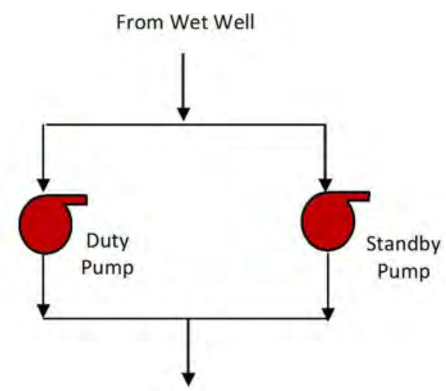
- Small Drainage Area ~3.0 Ha. north of the River
- **Pumps**
  - 2 Pumps (Duty and Standby)
    - Each at 1.6 L/s
  - Design Head To be confirmed
  - Firm Pumping Capacity = 1.6 L/s
- **Wet Well**
  - Diameter to be confirmed
  - Depth to be confirmed
- **Forcemain**
  - FM and Discharge Outlet (septic) to be confirmed



Pump	Capacity (L/s)	Start (m)	Stop (m)
1 Duty	1.6	To be confirmed	To be confirmed
2 Standby	1.6	To be confirmed	To be confirmed

Future DA3 SPS (Under Construction)

- **Services Dorchester Development Area #3**
- **Pumps**
  - 2 Pumps (Duty and Standby)
    - Each at 5 L/s (Initial), 14 L/s (10 years) and 80 L/s (Ultimate)
  - Design Head to be confirmed
  - Firm Pumping Capacity to be confirmed
- **Wet Well**
  - Diameter to be confirmed
  - Depth to be confirmed
- **Forcemain**
  - 150mm Twin FM Discharges at Byron Ave. and Dorchester Rd.



Pump	Capacity (L/s)	Start (m)	Stop (m)
1 Duty	5; 14; 80	To be confirmed	To be confirmed
2 Standby	5; 14; 80	To be confirmed	To be confirmed

Baseline System Understanding

MODELS DEVELOPMENT

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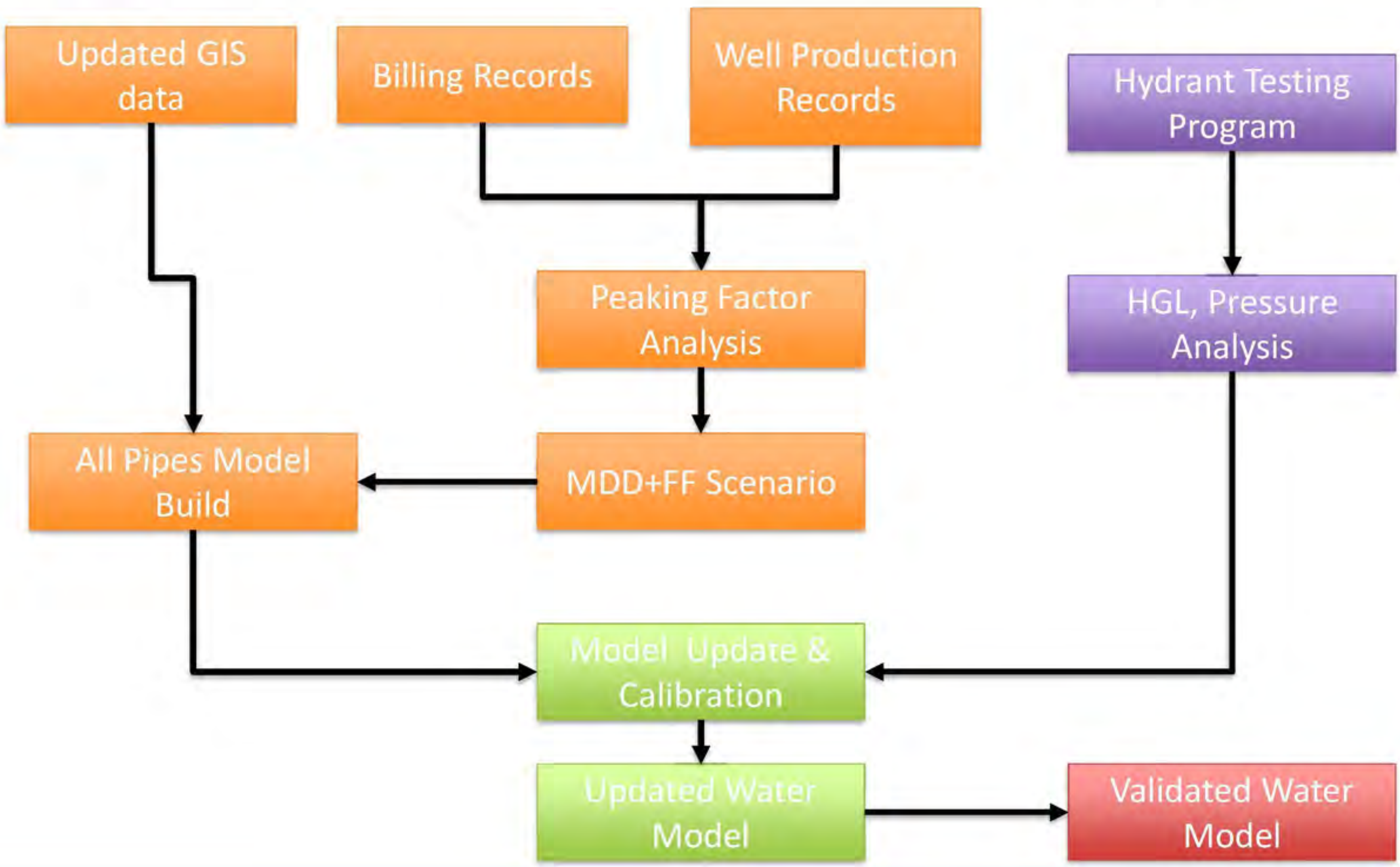
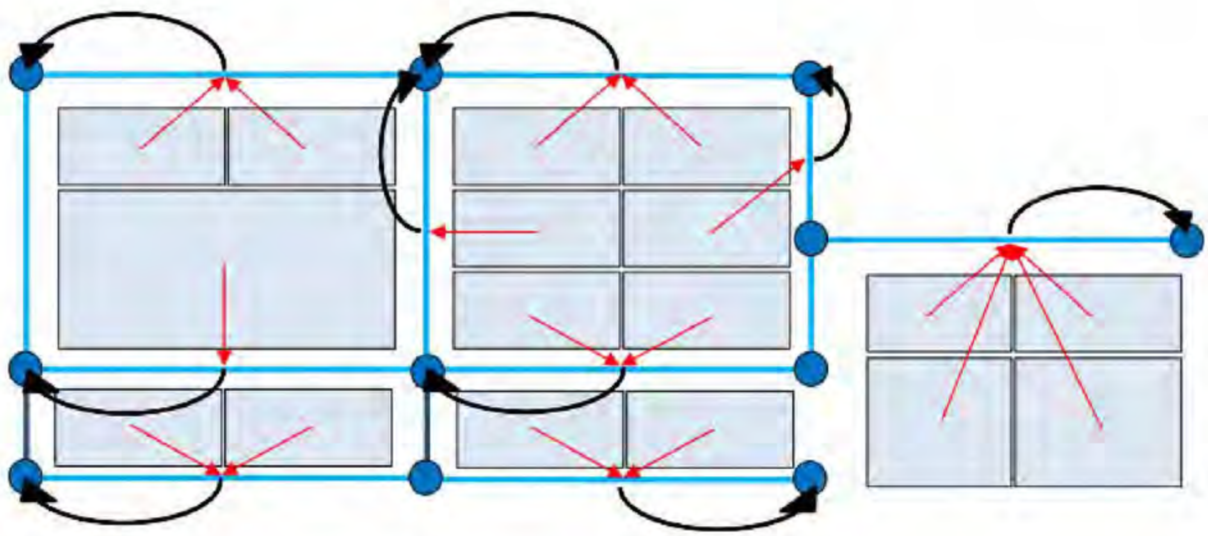
Model Development & Update Process



Process for Allocating System Demands in Water Model



Watermain

- New InfoWater model built based on updated GIS watermain data (alignment, pipe diameter, pipe material)
- Junction IDs updated to match GIS water node labels
- Junction elevations updated based on 1m contours

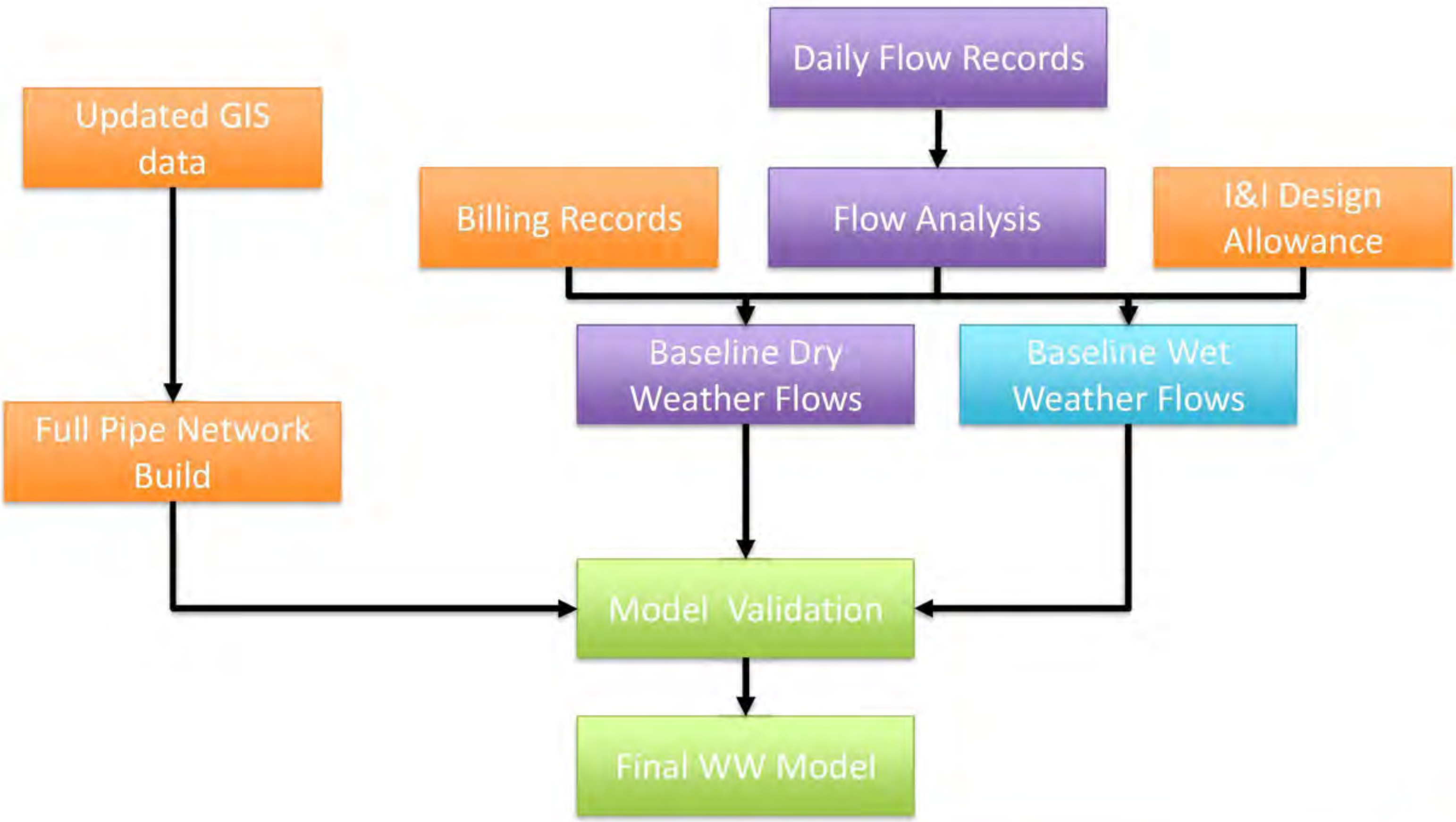
Pumps and Pump Controls

- Confirm Dorchester and Thorndale WTPs Pump Curves and Operation Set Points
- Confirm Dorchester and Thorndale ETs Level vs. Volume and Water Levels

System Demands

- Demands updated using water meter billing data provided by the Municipality of Thames Centre
- Non-Revenue Water estimated using well-production data

Wastewater Model Development Process



Wastewater System Model Development

- All pipe network development
- Baseline allocation from Billing
- Flow data assessment and analysis
- Dry weather and wet weather model calibration

Pumps and Pump Controls

- Confirm Pumping Station Capacities and TDH

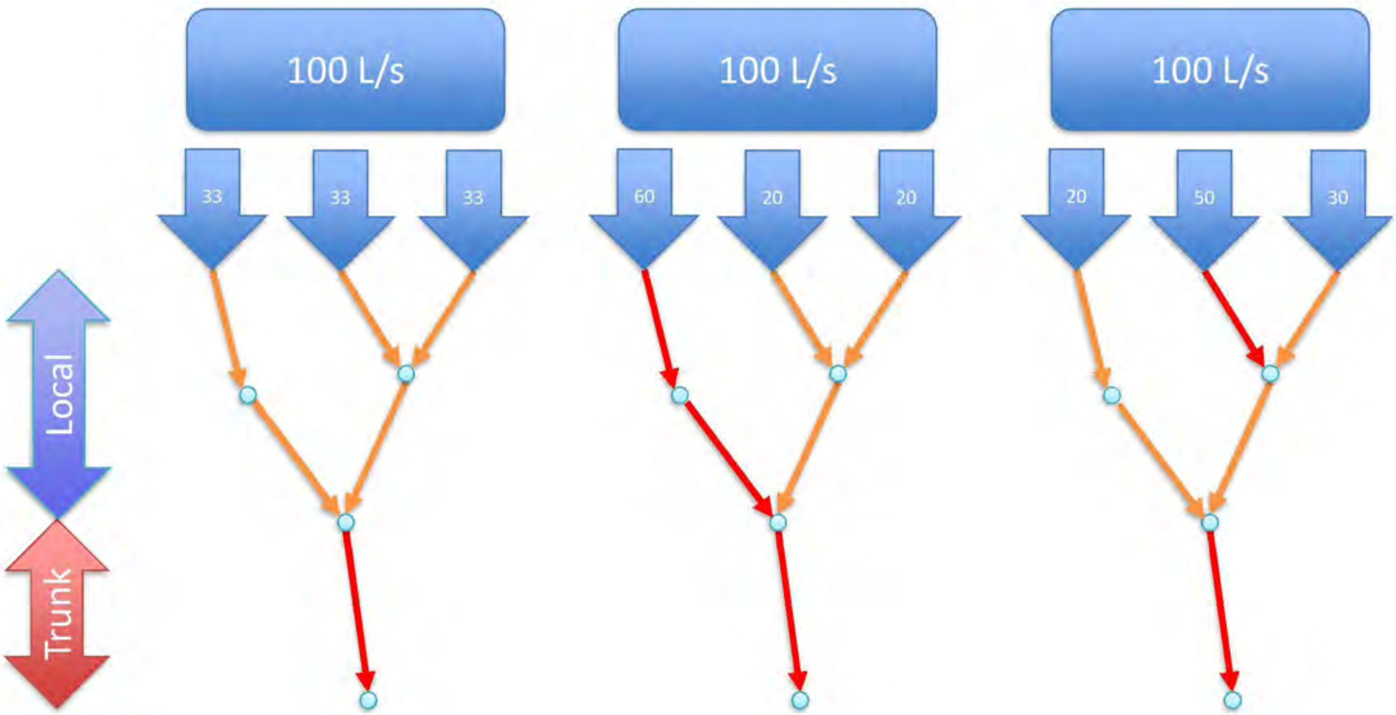
System Flows

- Flows updated using water meter billing data provided by the Municipality of Thames Centre
- I&I estimated based on design allowance

Water and Wastewater Systems

GROWTH SCENARIOS

Importance of Allocation



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Growth Projections Summary

Year	Residential Population	Employment Population	Equivalent Population	Total Growth (from 2018)
2018	13,449	4,138	17,587	-
2028	15,148	4,643	19,791	2,204
2038	17,211	5,392	22,603	5,016
Buildout	**22,368**	**6,570**	**28,938**	**11,351**

Serviced Population at Buildout

Dorchester		
	2018	BO
Residential	5,346	12,100
Employment	1,765	2,578
Total	**7,111**	**14,678**

Thorndale		
	2018	BO
Residential	1,216	3,378
Employment	402	890
Total	**1,618**	**4,268**

Rural		
	2018	BO
Residential	0	561
Employment	0	179
Total	**0**	**740**

From Schedule 2b of the 2018 DC Background Study – Based on 187 Single & Semi-Detached Units within Rural Area for which DC can be imposed

Background Information Provided by Municipality:

- Development Map
- Plan Documents / Notes on Preliminary Discussions with Developers

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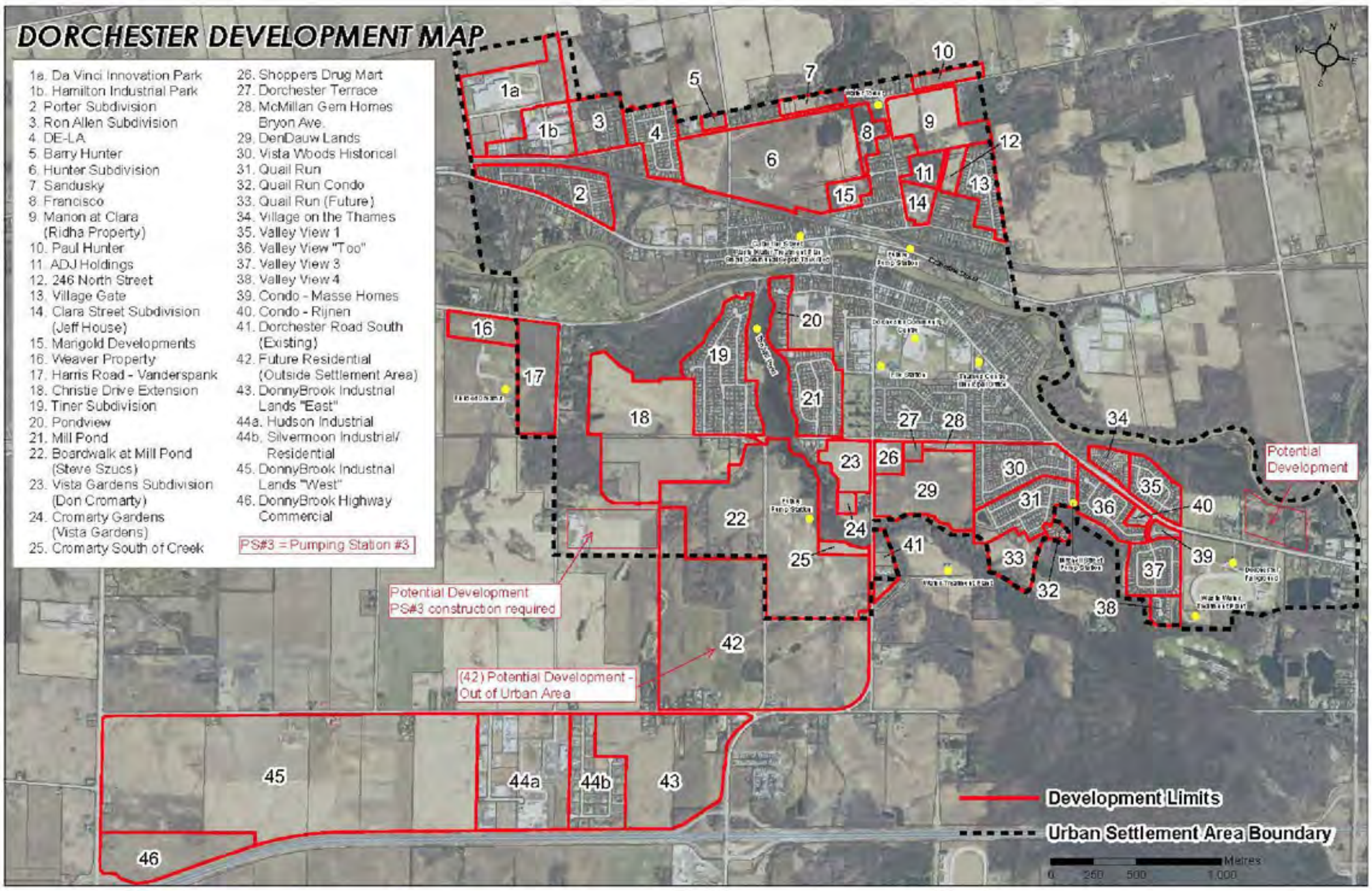
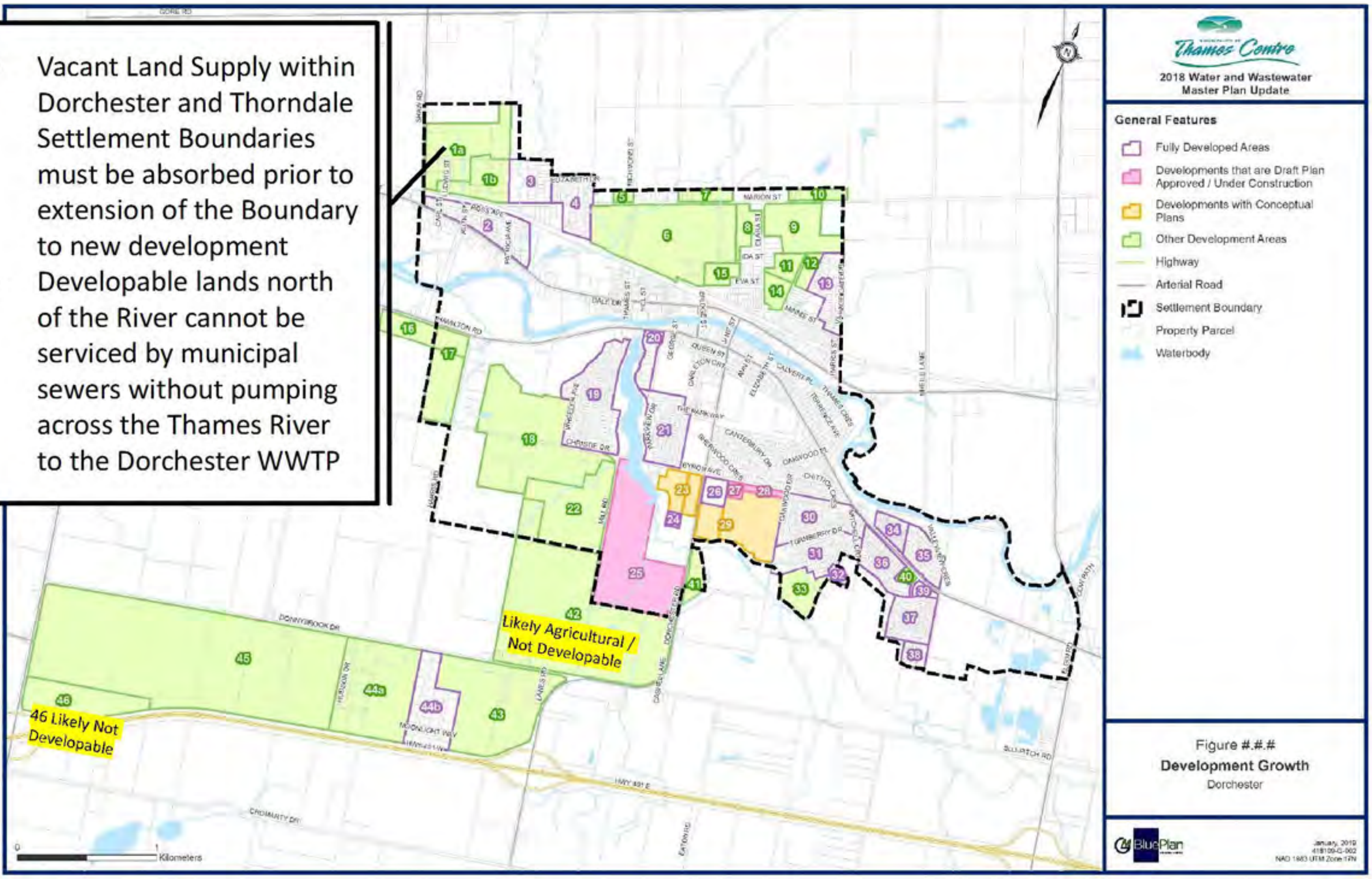
Dorchester Development Map

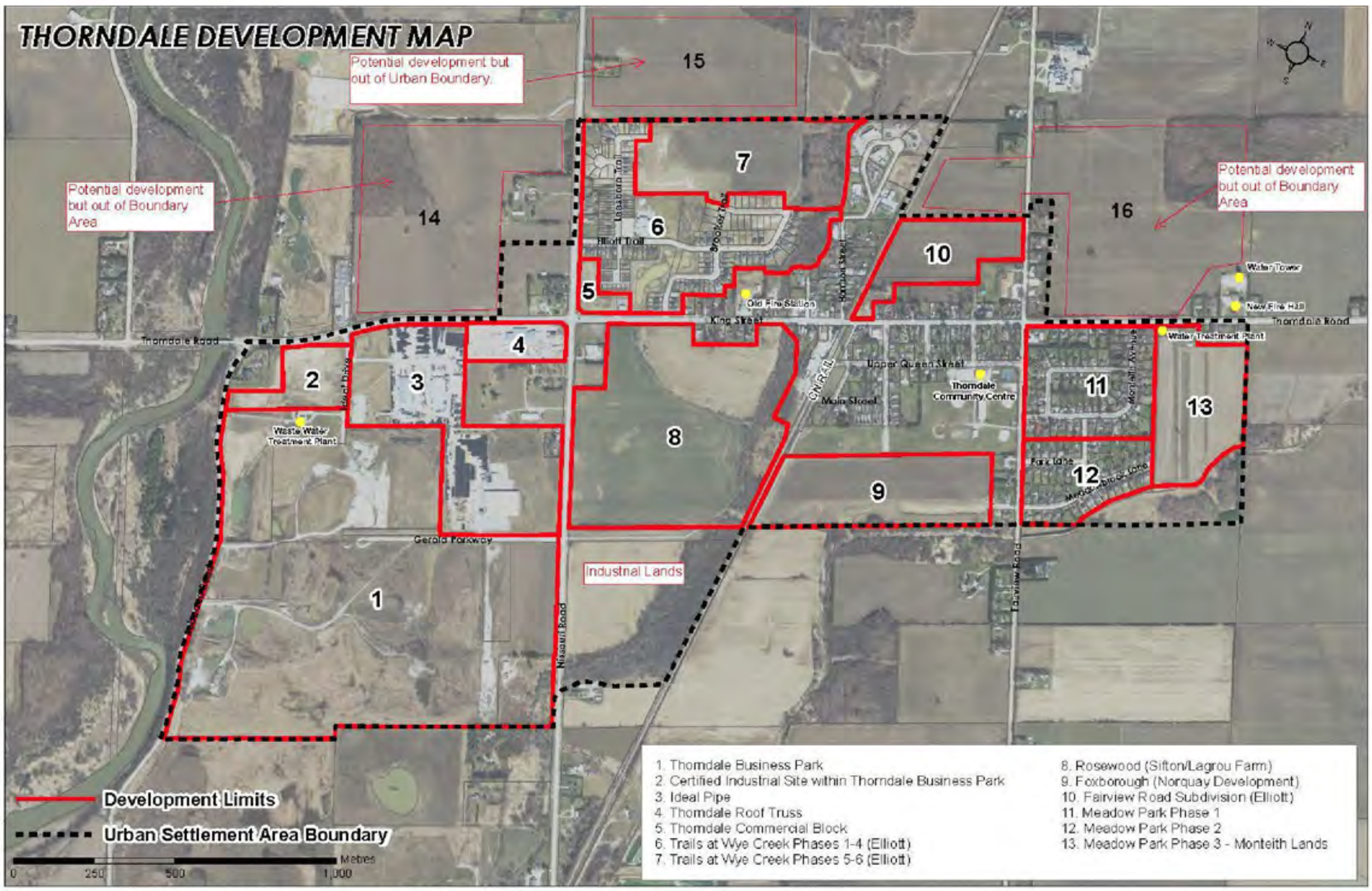


Dorchester Development Map

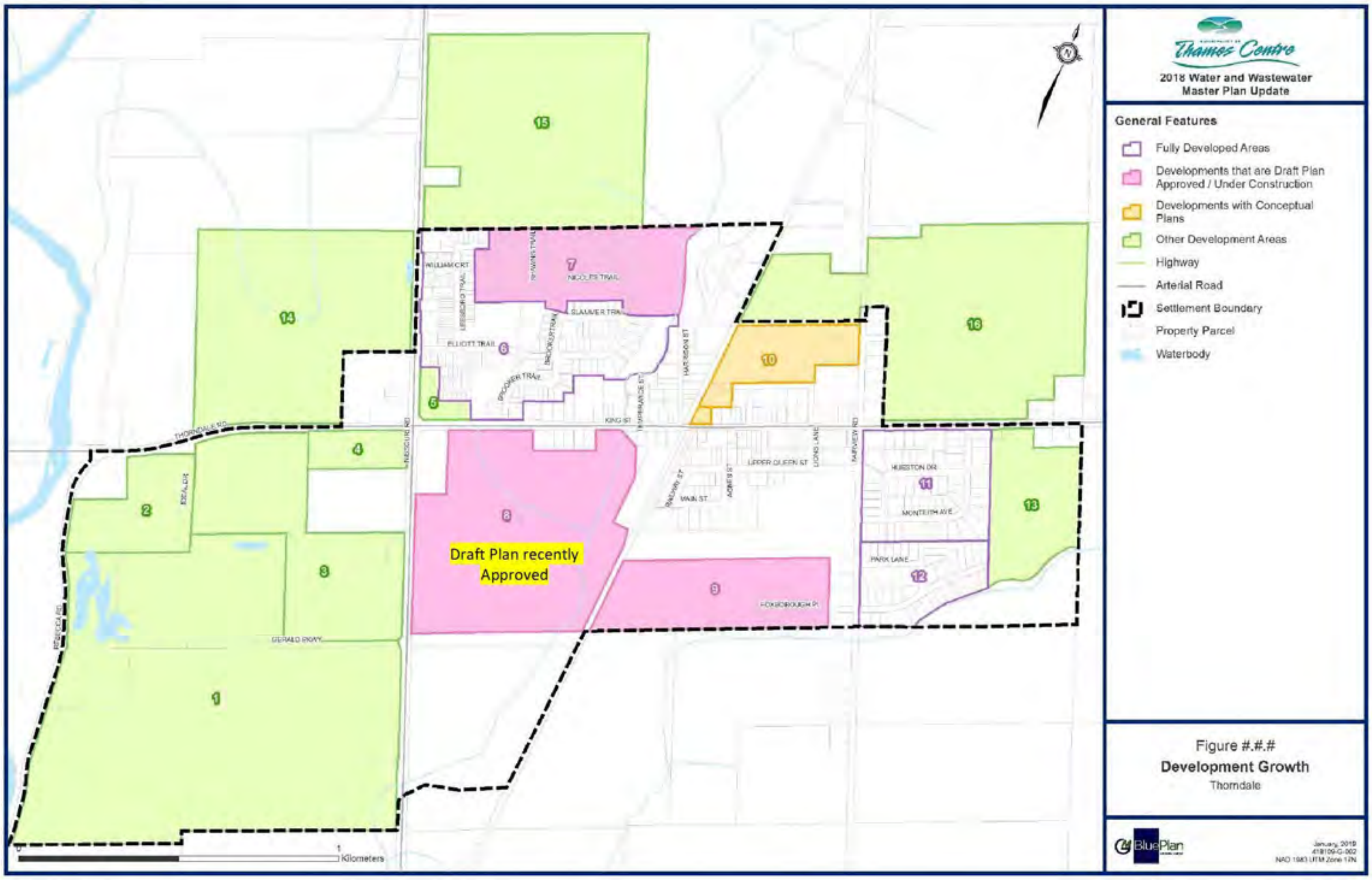
- Vacant Land Supply within Dorchester and Thorndale Settlement Boundaries must be absorbed prior to extension of the Boundary to new development
- Developable lands north of the River cannot be serviced by municipal sewers without pumping across the Thames River to the Dorchester WWTP



Thorndale Development Map



Thorndale Development Map



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Residential Growth (Urban Areas)

Dorchester	2018 – 2028 (Equivalent Pop.)	2018 – 2038 (Equivalent Pop.)	2018 – Buildout (Equivalent Pop.)	Buildout Density (ppha)
Developments that are Draft Plan Approved / Under Construction (25, 27, 28)	1,114	1,114	[illegible]	[illegible]
Developments with Conceptual Plans (23, 29)	751	751	[illegible]	[illegible]
Other Development Areas	-661	983	[illegible]	[illegible]
Total Residential Growth	1,204	2,848	6,754	

Population calculated from Development Proposals indicates that Development is proceeding more quickly than anticipated in the DC Background Study

Total Numbers are based on Information from the 2017 DC Background Study

[illegible]	2018 – 2028 (Equivalent Pop.)	2018 – 2038 (Equivalent Pop.)	2018 – Buildout (Equivalent Pop.)	Buildout Density (ppha)
Developments that are Draft Plan Approved / Under Construction (7, 9)	510	510	510	8.3 – 25.1
Developments with Conceptual Plans (8, 10)	963	963	963	19.4 – 33.9
Other Development Areas	-1,014	-463	689	60.0
Total Residential Growth (Based on 2017 DC Backgro[illegible]	459	1,010	2,162	

To meet Buildout Pop Target in Thorndale, remaining developable lands will be required to be developed at 60 ppha

Employment Growth (Urban Areas)

Employment Growth within Urban Areas assumed to be located within existing Urban Boundaries of Dorchester and Thorndale

Dorchester	2018 – 2028 (Employees)	2018 – 2038 (Employees)	2018 – Buildout (Employees)	Buildout Density (ppha)
Industrial	13	31	57	1.7 (~33 Ha at Buildout)
Commercial	126	335	586	54.0 (~10.8 Ha at Buildout)
Total Industrial and Commercial Employment Growth (Based on 2017 DC Background Study)	**139**	**366**	**643**	

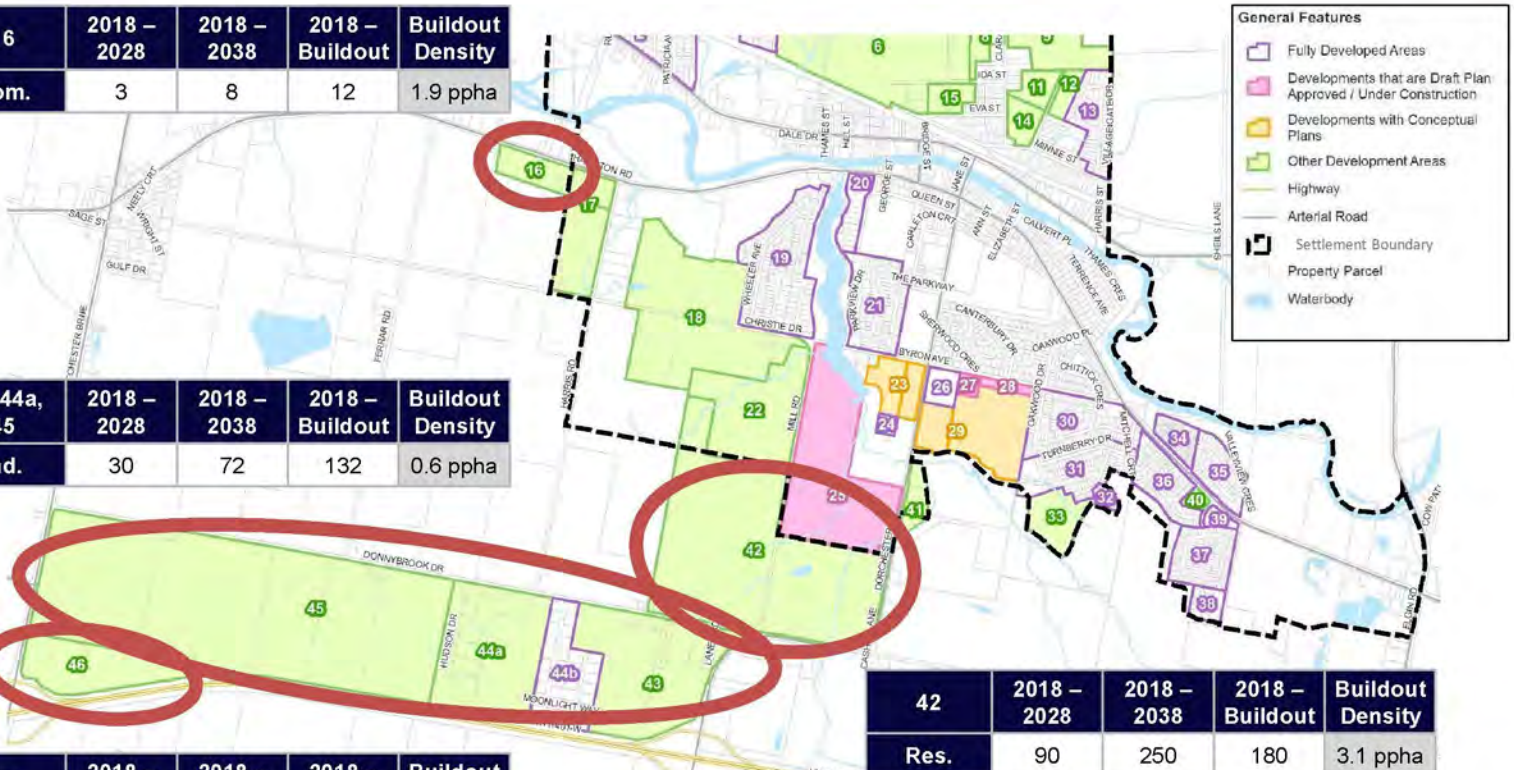
Thorndale	2018 – 2028 (Equivalent Pop.)	2018 – 2038 (Equivalent Pop.)	2018 – Buildout (Equivalent Pop.)	Buildout Density (ppha)
Industrial (~125 Ha at Buildout)	50	118	217	1.7 (~125 Ha at Buildout)
Commercial (~1.9 Ha at Buildout)	22	58	101	54.0 (~1.9 Ha at Buildout)
Total Industrial and Commercial Employment Growth (Based on 2017 DC Background Study)	**71**	**176**	**318**	

Growth in Rural Areas (Outside of Dorchester)

16	2018 – 2028	2018 – 2038	2018 – Buildout	Buildout Density
Com.	3	8	12	1.9 ppha

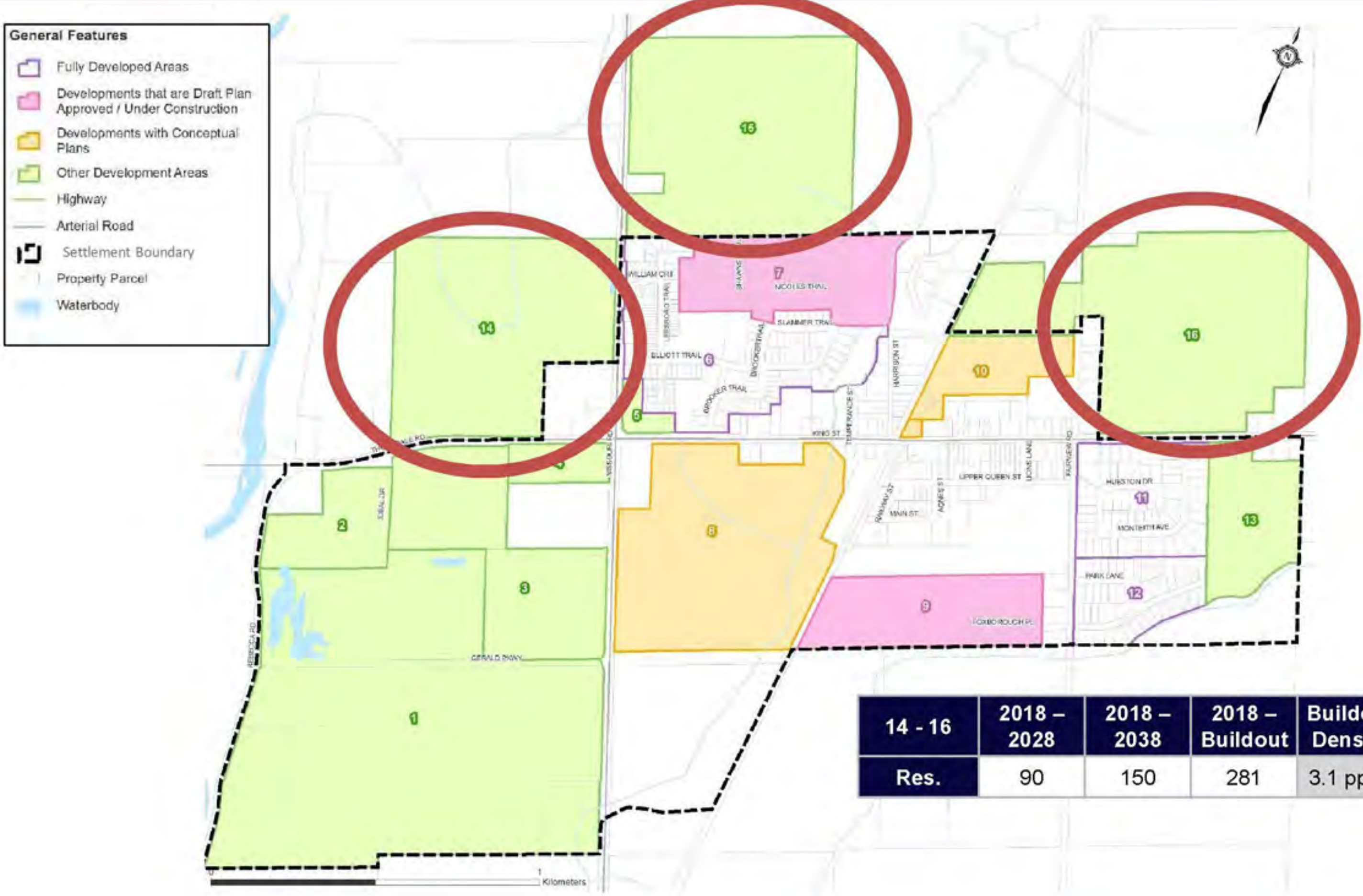
43, 44a, 45	2018 – 2028	2018 – 2038	2018 – Buildout	Buildout Density
Ind.	30	72	132	0.6 ppha

46	2018 – 2028	2018 – 2038	2018 – Buildout	Buildout Density
Com.	10	25	36	1.9 ppha



42	2018 – 2028	2018 – 2038	2018 – Buildout	Buildout Density
Res.	90	250	180	3.1 ppha

Growth in Rural Areas (Outside of Thorndale)



14 - 16	2018 – 2028	2018 – 2038	2018 – Buildout	Buildout Density
Res.	90	150	281	3.1 ppha

Allocation and Growth Methodology

- Residential
  - Use DC values – Consistent densities
- Commercial
  - Use DC values – 54 ppha – inline with other municipalities
- Industrial
  - Use DC values → < 2 ppha – very low
  - Use higher density (inline with Commercial) → Greater than DC

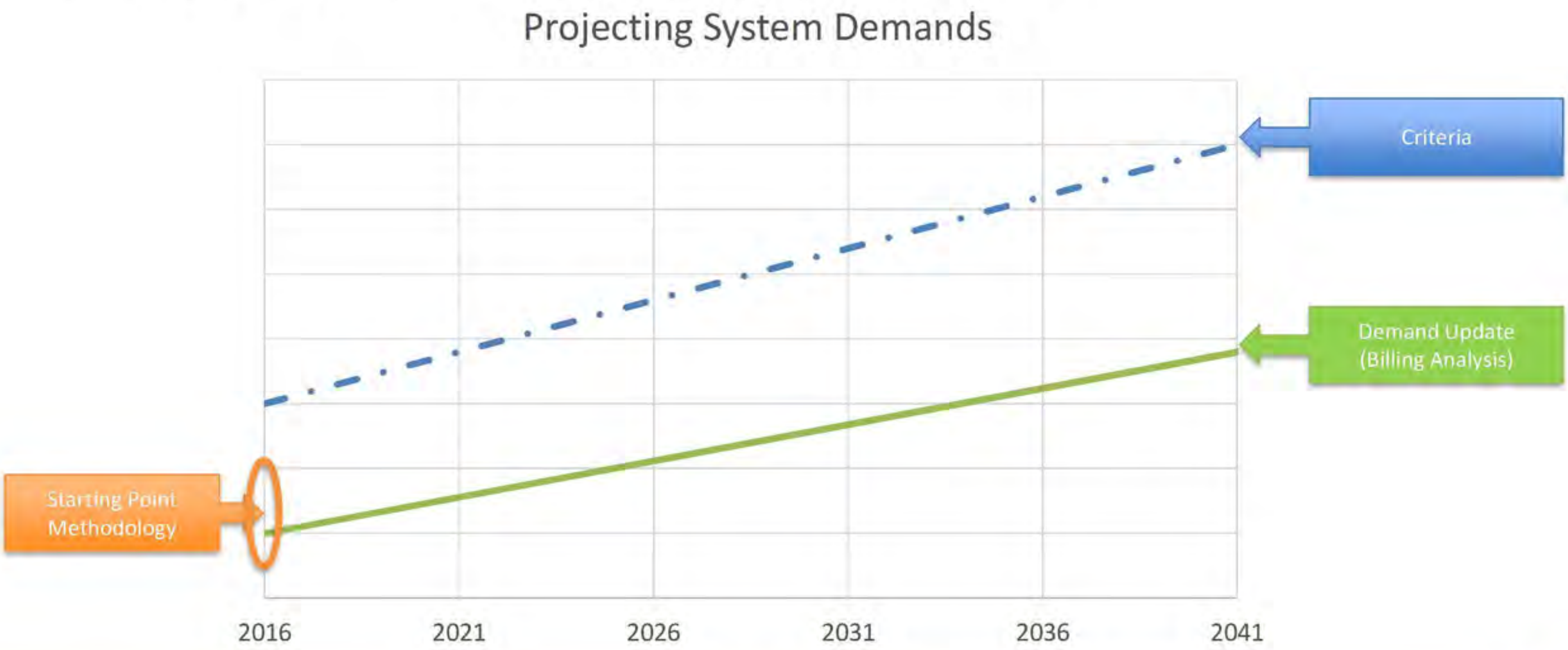
- Develop Preferred Strategy for Full Buildout
  - Identify upgrade triggers by population/area trigger
  - Develop Cost per capita
- Development of Capital Program
  - Assume Build Out Approach
  - Assume Development Phasing based on review with Municipality
  - Service Growth based on identified upgrade triggers

Water and Wastewater Systems

POLICY AND DESIGN CRITERIA

Starting Point Methodology

- Use Existing System Demands/Flow - Historic Projections
- Add Growth Using Criteria
- Less Conservative vs. Full Criteria
- More Accurate of Actual Flow/Demand Needs

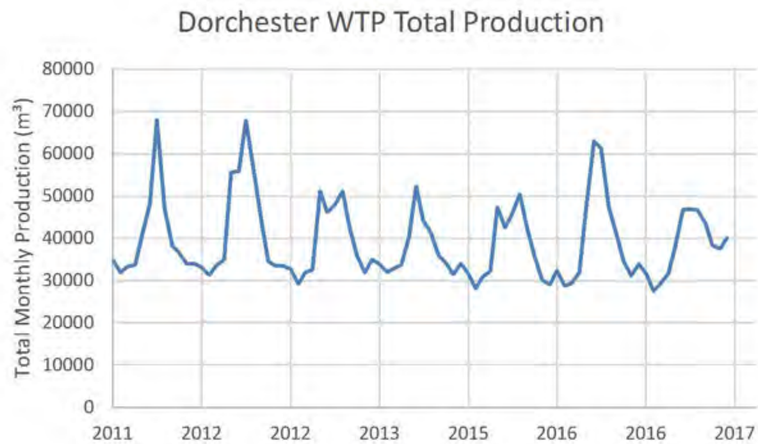


Water System

DEMANDS

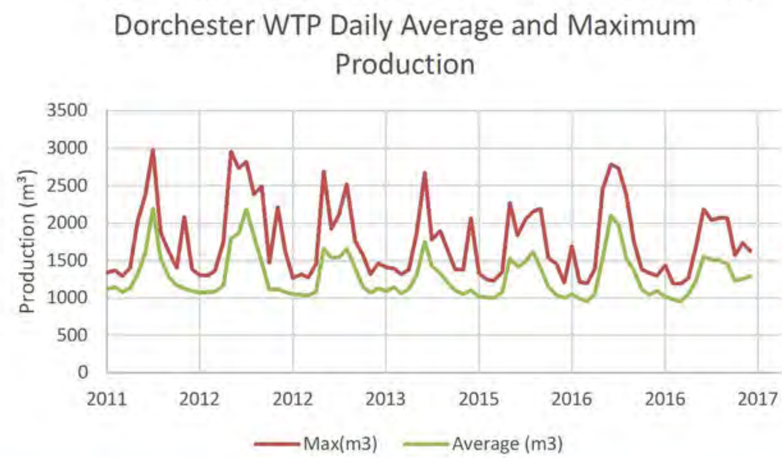
Total Water Production

- Monthly well production and WTP data available from 2011-2017
  - Billing data available from 2015-2018



Last Three Years

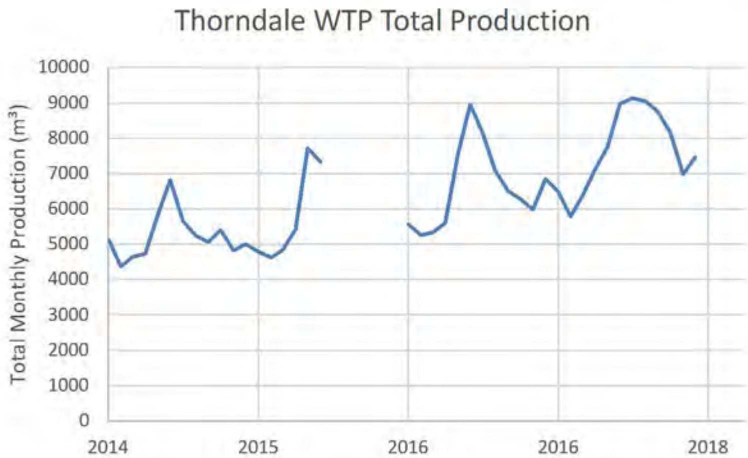
Year	Average Production (m^3/d)	Maximum Production (m^3/d)	Peaking Factor
2015	1,231	2,271	1.84
2016	1,318	2,783	2.11
2017	1,255	2,191	1.75
Average	**1,268**	**2,415**	**1.90**



Thorndale Water Production

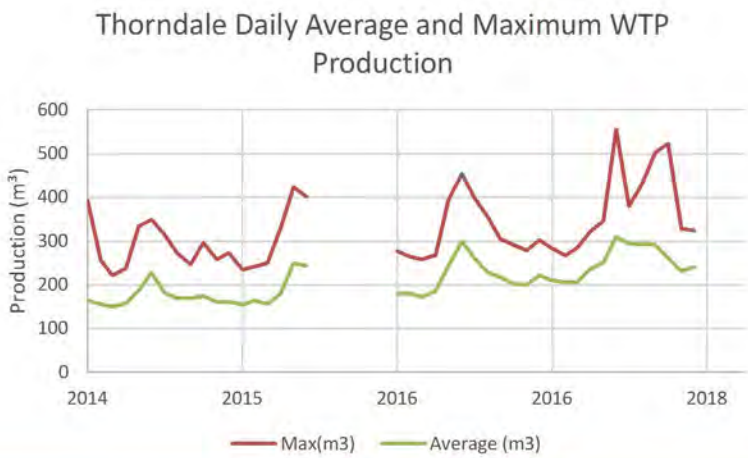
Total Water Production

- Monthly well production and WTP data available from 2014 – June 2015, 2016 - April 2018
  – Billing data available from 2015-2018

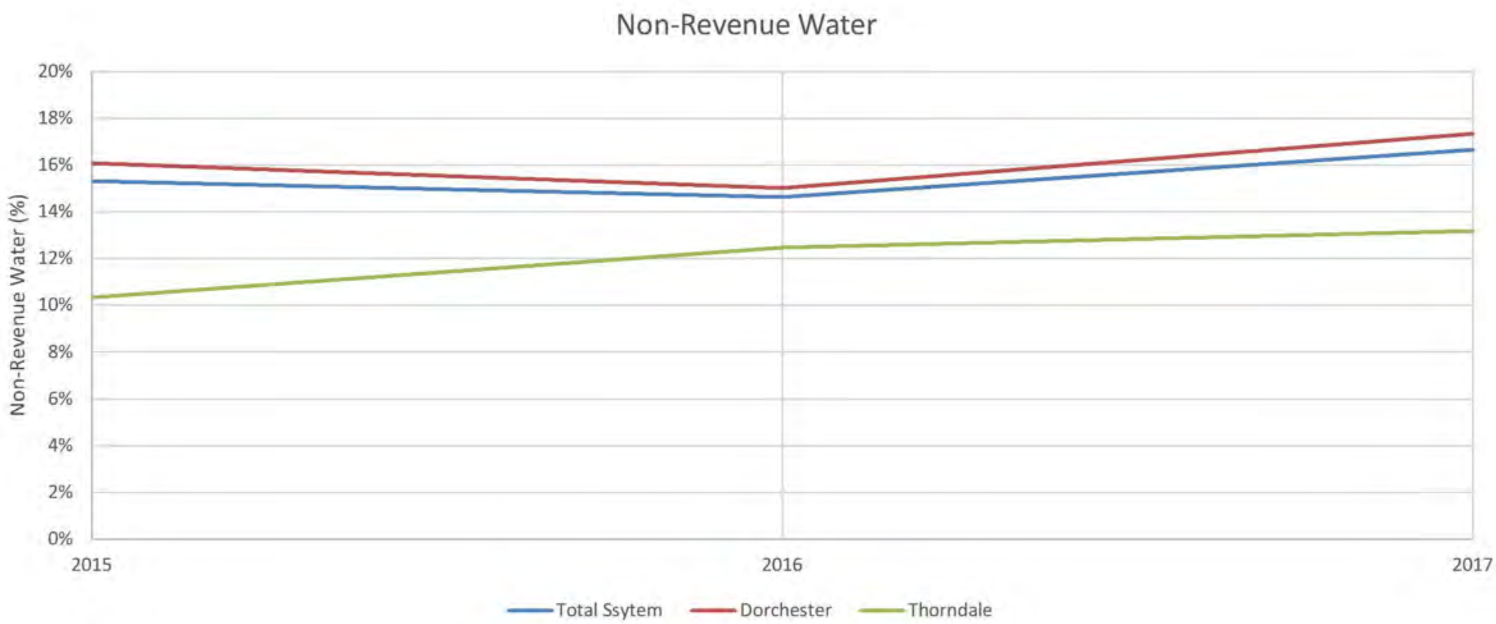


Last Three Years

Year	Average Production (m^3/d)	Maximum Production (m^3/d)	Peaking Factor
2015	192	424	2.21
2016	216	455	2.11
2017	253	555	2.19
Average	**220**	**478**	**2.17**



Water LoS – Non-Revenue Water



- Industry standard targets 10% non-revenue water
- Historically non-revenue water is ~15% in Dorchester and ~12% in Thorndale

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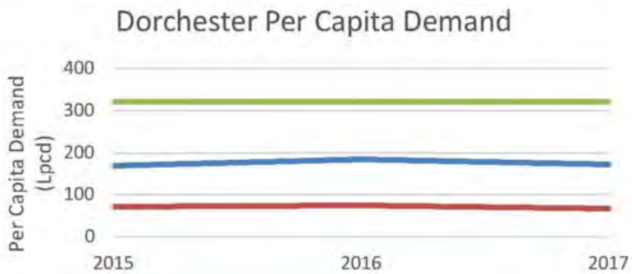
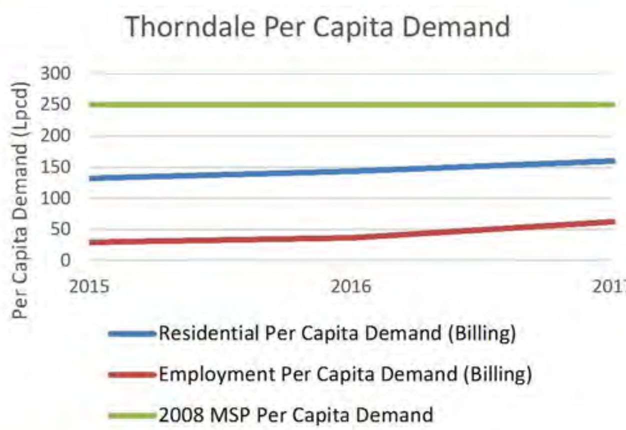
Water LoS – Per Capita Rates

	MECP	Previous MSP
Dorchester	270 - 450 L/c/d	320 L/c/d
Thorndale		250 L/c/d

	Dorchester		Thorndale	
	Billing - Residential Per Capita (L/cap/d)	Billing – Employment Per Capita (L/cap/d)	Billing - Residential Per Capita (L/cap/d)	Billing – Employment Per Capita (L/cap/d)
2015	169.4	72.2	131.6	29.2
2016	184.8	75.2	143.6	36.3
2017	171.6	67.8	159.9	62.3
Avg.	175.3	71.7	145.0	42.3





Residential Populations based on:
- 2018 DC Background Study Dorchester WTP Residential + Other Population = 5,346 people
- 2018 DC Background Study Thorndale WTP Residential + Other Population = 1,216 people

Employment Population based on 2018 DC Background Study Urban jobs/residential population ratio of 2,545 jobs/7,748 persons = 0.33 jobs/p
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

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2008 Master Plan Design Criteria - Water

Pump Station Firm Capacity

– Largest pump out of service

	Dorchester	Thorndale
Design Criteria per capita (Lpcd)	320	250
2006/2007 per capita (Lpcd)	315	240
Max Day Peaking Factor	2.5	
Peaking Factor	3.75	
Pressure	40 psi – 100 psi	
Maximum Velocity (m/s)	2	
Upgrade triggers	90 – 95% firm capacity → upgrade in place	
	100% firm capacity → upgrade in place	

Storage	
A - Fire Storage	Largest expected fire volume
B - Equalization Storage	25% of max day demand
C - Emergency	25% of (A + B)
Total	A + B + C

Fire Flow Requirements	Flow (L/s)	Duration (Hours)
Residential Minimum	76	2
ICI Minimum	227	3

BluePlan ENGINEERING

Water LoS – Water Use Sensitivity

Per Capita Rates

2015 - 2017	Billing - Residential Per Capita (L/cap/d)	Billing - Employment Per Capita (L/cap/d)	Billing - Total Equivalent Per Capita (L/cap/d)	Production - Total Equivalent Per Capita (L/cap/d)*
Dorchester	175	72	150	178
Thorndale	145	42	120	136

	MECP	Previous MSP
Dorchester	270 - 450 L/c/d	320 L/c/d
Thorndale		250 L/c/d

Peaking Factors

2015 – 2017	Average Production (m^3/d)	Maximum Production (m^3/d)	Peaking Factor
Dorchester	4.35	7.27	1.67
Thorndale	4.20	8.87	2.11

Max Day	MECP	Previous MSP
Dorchester	1.90 - 2.00	2.5
Thorndale	2.00 – 2.50	2.5

Peak Hour	MECP	Previous MSP
Dorchester	2.85 – 3.00	3.75
Thorndale	3.00 – 3.75	3.75

MECP Peaking Factors based on existing and buildout population estimates (taken from Table 3-1 of the MECP Guidelines for Drinking Water Systems)

Recommended design criteria

- Per capita demand of **225 L/cap/day**
- **Max Day Peaking Factor** of **2.0 for Dorchester, 2.25 for Thorndale**
  - 2.0 is in line with MECP recommendations for buildout population
  - Still provides the Municipality with some safety factor, when compared to historic records
- **Peak Hour Peaking Factor**
  - Maintain 3.75
  - PHD flow for entire Dorchester system = 3.75 x AD Production = 1,268 m^3/d (14.7 L/s) = 55 L/s
    (PHD 55 L/s (entirety of Dorchester) not comparable to FF requirements – FF requirements will govern)

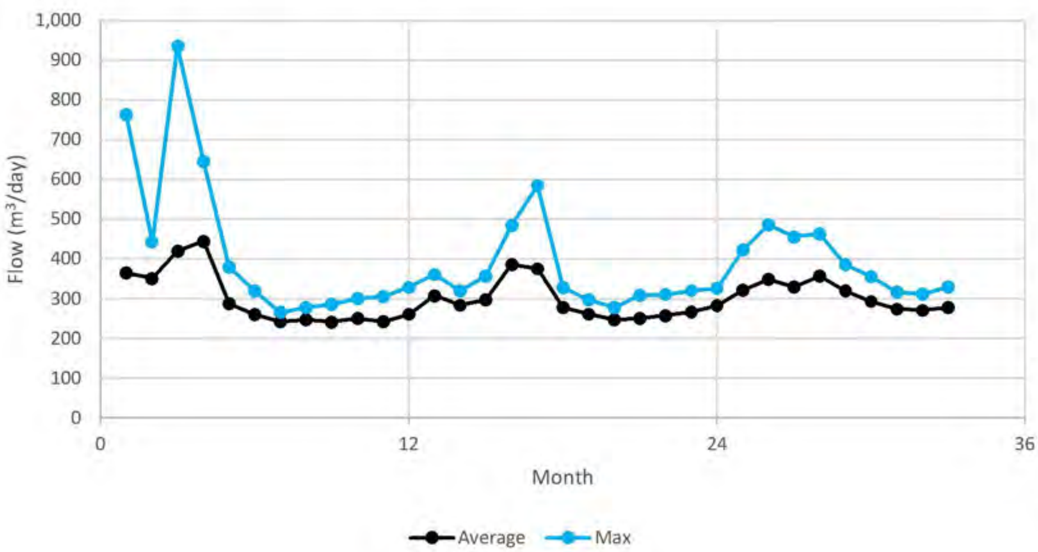
Wastewater System

FLOWS

Dorchester WWTP Flows

- Daily flow data available from 2016 – Sep. 2018

WWTP Rated Design	
Average Daily Flow	6.0 L/s
Peak Daily Flow	41.4 L/s



Year	Total Treated (m^3)
2016	110,049
2017	106,293
2018 (Jan-Sep)	84,577

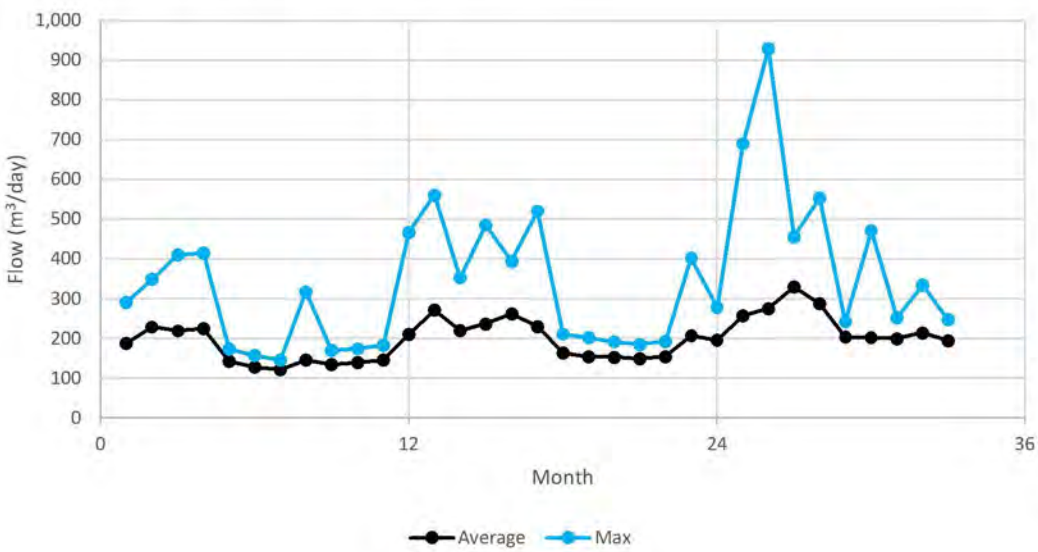
Year	Average Day Flow (L/s)	Max Day Flow (L/s)
2016	3.5	10.8
2017	3.4	6.8
2018 (Jan-Sep)	3.6	5.6

Thorndale WWTP Flows

- Daily flow data available from 2016 – Sep. 2018

WWTP Rated Design	
Average Daily Flow	7.8 L/s
Peak Daily Flow	28.2 L/s

Year	Total Treated (m^3)
2016	61,821
2017	72,874
2018 (Jan-Sep)	65,528



Year	Average Day Flow (L/s)	Max Day Flow (L/s)
2016	2.0	5.4
2017	2.3	6.5
2018 (Jan-Sep)	2.8	10.8

Wastewater LoS – Dry Weather Flows

	MECP	Previous MSP
Dorchester	225 Lpcd – 450 Lpcd	320 L/c/d
Thorndale		430 L/c/d

Dorchester WWTP

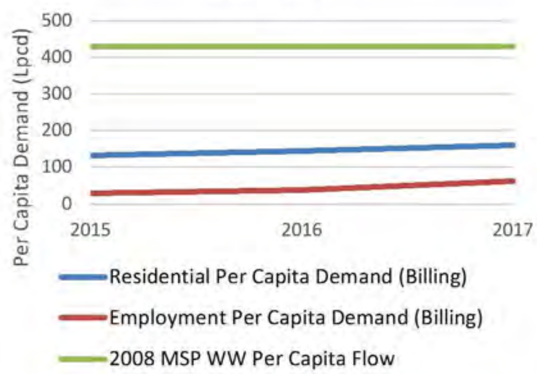
	WWTP Average Flows (m^3/d)	WTP Average Flows (m^3/d)	% of WW flows to Water Consumption	Annual Precipitation (mm)	Precipitation April-August (mm)
2016	301	1,318	23%	1,055	403.4
2017	291	1,255	23%	907 *Data available for Jan 1 – Sep 8	545.8

Thorndale WWTP

	WWTP Average Flows (m^3/d)	WTP Average Flows (m^3/d)	% of WW flows to Water Consumption	Annual Precipitation (mm)	Precipitation April-August (mm)
2016	169	216	78%	1,054.6	403.4
2017	200	253	79%	907.1 *Data available for Jan 1 – Sep 8	545.8

Dorchester Per Capita Flows / Demands

Thorndale Per Capita Flows / Demands



2008 Master Plan Design Criteria - Wastewater

Pump Station Firm Capacity
- Largest pump out of service

System Performance
- Peak wet weather design flows

	Dorchester	Thorndale (MOE)
ADD per capita (L/cap/d)	320	430
Peaking Factor	Harmon's Peaking Factor	
Average Peaking Factor	3.0	3.7
Upgrade triggers	85% - 90% firm capacity → planned upgrade	
	100% firm capacity → upgrade in place	
Surcharging / HGL Target	Moderate surcharging allowed – HGL at least 3 m below grade	

Recommended Design Criteria - Wastewater

Average Dry Weather Flows

- Match water – 225 l/cap/d

Wet Weather Flow Allowance

- Review daily peak WWF data to be provided by OCWA
- Develop design allowance
  - For Reference - London uses 8640 litres/hectare/day (0.100 l/s/ha)

Pump Station Firm Capacity

- Largest pump out of service

System Performance

- Peak wet weather design flows

		Dorchester	Thorndale (MOE Used)
ADD per capita (L/cap/d)		225	225
Peaking Factor		Harmon's Peaking Factor	
Infiltration Allowance		0.100 l/s/ha	
Upgrade triggers		85% - 90% firm capacity → planned upgrade	
		100% firm capacity → upgrade in place	
Surcharging / HGL Target		Moderate surcharging allowed – HGL at least 3 m below grade	
d/D Target	Ex. Sewers	1.0	
	Pr. Sewers	0.7 - 0.8	

NEXT STEPS

Project Schedule

January	February	March	April	May	June	July
• Workshop No. 1 • Model Development	• Workshop No. 2 Model Review • Servicing Assessment • Notice of Commencement	• Workshop No. 3 Servicing Concepts / Evaluation Criteria Review • Develop Servicing Alternatives • Develop Servicing Alternatives	• Workshop No. 4 Alternatives Evaluation Workshop • Development of Implementation Plan	• PIC No. 1 • Master Plan Report	• Workshop No. 5 Report Review	• File Master Plan • Notice of Study Completion + 30 Day Review

- Next Workshop – Wednesday, February 13
- Workshop No. 3 – After March Break

Key Considerations Servicing Evaluation

Dorchester

- Ultimate Buildout Water Supply
  - Requirement for Dorchester Connection to London Water System under Ultimate Buildout
  - Requirement for additional protection wells, more land purchased
- Septic vs. Servicing (Development north of Thames River)
- Servicing of 401 Corridor

Thorndale

- Land required for expansion of Thorndale WTP (Developer interested in purchasing adjacent land)
- Expansion of Thorndale WWTP (within existing property constraints)

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Vaughan ON L4K 4M3
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www.gmblueplan.ca

Meeting Notes

Project:	Municipality of Thames Centre Water and Wastewater Master Plan Update	Project No.:	TC-015-18
		GMBP Project No.:	418109
Meeting:	Workshop No. 2 Water and Wastewater Models Review (Including Review of Required Fire Flow)		
Date:	February 13, 2019	Time:	9:30 am – 1:00 pm
Location:	Municipality of Thames Centre (4305 Hamilton Road, Dorchester)		

Attendees:

Municipality of Thames Centre		**County of Middlesex**		**GM BluePlan**	
Carlos Reyes	✓	Marc Bancroft	✓	Julien Bell	✓
Jarrod Craven	✓			Matt Fisher	✓
Randy Kalan	✓				

Agenda Items
Note: Meeting Agenda followed Presentation Slides (included as attachment to these minutes)

1. Project Progress Recap

- The project schedule was reviewed. The project remains on schedule for completion in July.
- Thames Centre has provided most of the outstanding facility information. Mike Taylor at OCWA has been coordinating with CR and MF to provide available daily flow trending at the WWTPs for select wet weather events:
  - CR noted that OCWA provided available daily flow trend information at Dorchester WWTP just prior to the Workshop (February 13). CR will forward to GMBP. Historical daily flow trend information is not available for the Thorndale WWTP. It was noted that a significant wet weather event occurred on February 6. Daily flow data at Thorndale WWTP may be available for this event. CR to review further and provide GMBP with available information.

Actions:

- CR to provide GMBP with available WWTP daily flow information.

  Note: Subsequent to meeting, on February 5, CR provided GMBP with daily flow trending for the Dorchester and Thorndale WWTPs. GMBP are reviewing.
- GMBP to update wastewater models with available daily flow information and complete validation process.

Agenda Items
Note: Meeting Agenda followed Presentation Slides (included as attachment to these minutes)

2. Model Development and Validation

- The water model validation process has been completed. Results are summarized in Slides 8 – 12.
  - Model results in Thorndale are in line with the provided hydrant testing information.
  - Model results in Dorchester range based on Dorchester WTP HLP status. Modelled pressures and available fire flows are generally in line with hydrant test results. Model results under multiple scenarios were reviewed against hydrant test results. The scenarios were:
    1. Average Day Demand (ADD) Extended Period Simulation (EPS)
    2. Pressures under ADD steady-state with HLP on; and,
    3. Pressures under ADD steady-state with HLP off and Dorchester network is supplied by the elevated tank.
  - There is no record of HLP status at time of hydrant tests, and we are unable to confirm the status for model validation but HLP status can generally be estimated and model runs based on this confirm pressures and available fire flows are in line with real world conditions.
  - Modelled static pressures along the 250mm diameter ductile iron watermain running along Dorchester Road near the Dorchester WTF / HLP are higher than the hydrant test pressures. We have noted through previous detailed model calibration testing assignments that test results for hydrants located near pumps can vary considerably. Test results are significantly influenced by the pump operation, and a single test may not best represent normal operating conditions. As modelled pressures compare well to hydrant tests across the nearly 30 other selected locations across Dorchester, it is expected that the model reasonably represents the water network's operating conditions, and that the difference in modelled and test pressures near the HLP can be attributed to uncertainty with pump operation condition at the time of the hydrant test.
  - It was also noted that the model's EPS shows that tank cycling under maximum day demand (MDD) is in line with operator's notes (approximately 4 times daily).
- Validation of the wastewater model can be completed now that daily flow trend information for the WWTPs has been received.

3. Projection and Allocation Methodologies

- Three alternative methods proposed (summarized in Slide 16 of the attached PowerPoint presentation).
- JB reviewed procedure and purpose of each Method (summarized in Table below):

Agenda Items
Note: Meeting Agenda followed Presentation Slides (included as attachment to these minutes)

Approach Procedure and Purpose		Method 1	Method 2	Method 3
Procedure	For Dorchester and Thorndale	Build-Out to DC Growth Projections	Build-Out by Developable Area x Target Densities	
	For the Peripheral Lands and 401 Corridor Lands	Build-Out to DC Growth Projections		Build-Out 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.	

- Growth projections based on the three alternative methods are summarized in Slides 15 – 26 of the attached PowerPoint presentation.
- There is also a supporting Technical Memorandum Re: Growth Projections and Allocation Methodology (dated February 25, 2019).
- Recommended target densities are as follows:

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

- JB noted that recommended densities have been determined based on municipalities of similar size and compared to the outer areas of London (based on Thames Centre's proximity to London (especially the proximity of Thorndale to north London)).
  - Densities within north London are nearing 50 ppjha – and considering the proximity of Thames Centre to the City of London, it is not unreasonable to expect that development will proceed at 50 ppjha.
  - Industrial employment densities can range significantly. JB cited logistics uses (typically large warehouses with few employees and very little water use) compared to food processing plants (high employee density and large volume water usage) as two opposing examples. A target density of 50 ppha should provide for a reasonable and conservative estimate.
- MB noted that he is generally in agreement with the outlined approach. He requested that potential development lands located directly outside of the Settlement Boundaries in Dorchester and Thorndale be referred to as Peripheral Lands (rather than Rural lands).

Agenda Items
Note: Meeting Agenda followed Presentation Slides (included as attachment to these minutes)

Potential development lands south of Dorchester within the 401 Corridor will be referred to as 401 Corridor Lands. The attached PowerPoint presentation has been updated to reflect this.

- The DC Background Study refers to all lands located outside of the Settlement Boundaries as "Rural".

- MB will review the recommended target densities and provide comments. It was noted that 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. MB will review further and provide comments.

Actions:

- GMBP to issue draft Technical Memorandum Re: Growth Projections and Planning Methodologies to Municipality for review and comment
- GMBP to commence loading water and wastewater models with growth projections by recommended approach.
    - GMBP will adjust model loadings based on Municipality comments on recommended densities, etc.

4. Policy and Design Criteria

a. Water Level of Service

- Recommended Per Capita Demands and Peaking Factors (determined at Workshop No. 1) were recapped:

Per Capita Demand	Max Day Peaking Factor	Peak Hour Peaking Factor
225 Lpcd	2.00 for Dorchester 2.25 for Thorndale	3.75

- Current water pressure level of service in Dorchester is 40 – 90 psi. JC noted that for new homes constructed near the high-elevation area near the ET (Clara Street and Marion Street), individual booster pumps at residences are required to ensure minimum pressures of 40 psi.
- Current water pressure level of service in Thorndale is 55 – 85 psi.
- The recommended target pressure level of service for both communities is 40 – 90 psi. Preferred minimum pressure under normal operating conditions is 50 psi; however, there are existing serviced areas within Dorchester that currently have minimum pressures less than 50 psi, and where increasing the minimum level of service pressures to 50 psi would require significant infrastructure upgrades. Low pressure complaints are not common (there were no complaints about low pressures under normal operating conditions noted in the performance log provided to GMBP).

Fire Flow Level of Service was reviewed. This is summarized on Slide 34 to 47 in the attached PowerPoint Presentation.

- MECP Design Criteria, as well as the recommendations from the May 2017 Report to Council Re: Thorndale Trunk Watermain, and the 2008 Master Plan were reviewed (Slide 37 of the attached presentation).
- It was noted that existing reservoir storage at both the Dorchester and Thorndale WTPs could be utilized to enhance fire storage capabilities for the Municipality. Under scenarios where the WTPs can provide PHD flow and storage, ETs can be fully utilized for fire storage.

Agenda Items
Note: Meeting Agenda followed Presentation Slides (included as attachment to these minutes)

- RK noted that the Municipality also has tanker trucks available that can provide an additional 22 m³ (5,800 gallons) of water to augment available storage.
- The capacity of the existing infrastructure to provide various levels of fire flow in Dorchester and Thorndale is shown in Slides 44 and 45 of the attached PowerPoint presentation.
- The capacity of the existing infrastructure generally limits available fire flow to 150 L/s.
- The recommended fire flow based on the municipality's general building type requirements as well as infrastructure capacity is:

Fire Flow Requirements by Land Use	Flow	Duration
Residential Minimum	75 L/s	2 Hours
ICI Minimum	150 L/s	2 Hours

- CR requested that GMBP provide a summary of recommended fire flow targets for area municipalities as a comparison. The attached PowerPoint presentation has been updated with this information (Slide 36).
- The group agreed that the recommended design fire flows appear reasonable based on the Municipality's available infrastructure and projected Buildout population. Thames Centre will review in more detail and provide comments.

Actions:

- Thames Centre to review recommended design fire flow and confirm / provide further comments.

b. Wastewater Level of Service

- Wastewater Level of Service is reviewed in Slides 48 through 55 of the attached PowerPoint presentation.
- Alternatives for determining wastewater level of service were reviewed:
  - Level of service based on HGL – HGL not to exceed basement elevations (approximately 1.8 m below grade); or,
  - Level of service based on pipe capacity (e.g. d/D not to exceed 1.0 in existing sewers, 0.8 in proposed sewers).
- JB recommended that based on capacity of existing sewers, level of service based on pipe capacity can be applied (there should be no surcharging throughout the separated sanitary systems in Dorchester or Thorndale).
- Daily flow records were reviewed to determine inflow and infiltration. The daily average I/I across Dorchester and Thorndale from 2014 to 2018 ranges from 0.01 to 0.07.
  - Peak I/I is typically 3 to 10 times the daily average.
  - Daily flow trending information is required to determine historical peak I/I.
  - JC and CR noted that they expect that the I/I issues that they are experiencing in Thorndale are due to existing sump pumps being connected to the sanitary sewer. There is a subdivision in the southeast section of Thorndale that was recently switched over to municipal wastewater servicing from septic, and it is likely that sump pumps draining to the septic beds are also now being picked up by the sanitary sewer. Thames Centre is investigating this issue further.

Agenda Items
Note: Meeting Agenda followed Presentation Slides (included as attachment to these minutes)

        - CR requested that GMBP provide preliminary recommendations with cost estimates for flow monitoring within Thorndale. JB to provide this.
    - Recommended I/I for existing areas is 0.2 – 0.3 L/s/ha. This will be validated based on plant records for daily flows.

Actions:

    - On February 26, JB provided commentary on I&I flow monitoring and investigation. CR to review.

5. Other Business

- CR noted that Upper Thames River Conservation Authority (UTRCA) regulated areas are to be considered as part of evaluation. Continued coordination with UTRCA is to be made a priority.

6. Next Steps

- GMBP will continue to build the water and wastewater models to include growth scenarios and commence evaluation of servicing concepts. Proposed servicing concepts will be reviewed at the next workshop (to be held on Wednesday, March 27).
- CR asked about scheduling of PIC No. 1. There are available venues in both Dorchester and Thorndale that can be booked on relatively short notice. The group agreed that the PIC date can be scheduled after Workshop No. 3 on March 27.
    - The PIC is likely to be open house style. The group discussed holding the PIC on two separate dates (one date in Dorchester and one date in Thorndale). This will be reviewed further and confirmed at the March 27 workshop.
    - JB noted that a walkthrough with key stakeholders (Council, UTRCA, First Nations, etc.) can also be scheduled prior to the PIC.
- PIC boards are to be drafted for review at Workshop No. 3 to be held on April 27.

Actions:

- As noted above in Item 2. Project Scope Overview and Deliverables, GMBP to provide an updated project schedule based on model development utilizing Thames Centre's updated GIS information.

7. Next Meeting

- Workshop No. 3 – Servicing Concepts / Evaluation Criteria Review is scheduled for March 27.
- Workshop No. 4 – Alternatives Evaluation Workshop is scheduled for April 19.

Attachments

GM BluePlan ENGINEERING

MUNICIPALITY OF Thames Centre

Water and Wastewater Master Plan Update
Workshop No. 2

Municipality of Thames Centre (4305 Hamilton Road, Dorchester)
February 13, 2019

AGENDA

1. Project Progress Recap
2. Model Development and Validation
   - Water and Wastewater Models Existing Scenario Results and Discussion
3. Projection and Allocation Methodologies
   - Method 1: Meet DC Study Projections
   - Method 2: Establish Target Densities within Settlement Boundaries, Meet DC Study Projections in Peripheral + 401 Corridor Lands
   - Method 3: Establish Target Densities for Urban + Peripheral / 401 Corridor Lands
4. Policy and Design Criteria
   - Recap from Workshop No. 1
   - Fire Flows
   - I&I Sensitivity
5. Next Steps

OBJECTIVES

1. Review Water and Wastewater System Models
2. Review Projection and Allocation Methodologies and refine approach
3. Review Policy and Design Criteria and understand impacts on existing system
4. Work towards determination of Design Criteria to be utilized going forward
5. Confirm Next Steps and Schedule

PROJECT PROGRESS RECAP

BluePlan ENGINEERING

Project Schedule

January	February	March	April	May	June	July
• Workshop No. 1 • Model Development • Outstanding Facility Info received from Thames Centre	• **Workshop No. 2 Model Review** • Servicing Assessment	• **Workshop No. 3 Servicing Concepts / Evaluation Criteria Review** • Develop Servicing Alternatives • Develop Servicing Alternatives	• Workshop No. 4 Alternatives Evaluation Workshop • Development of Implementation Plan	• PIC No. 1 • Master Plan Report	• Workshop No. 5 Report Review	• File Master Plan • Notice of Study Completion + 30 Day Review

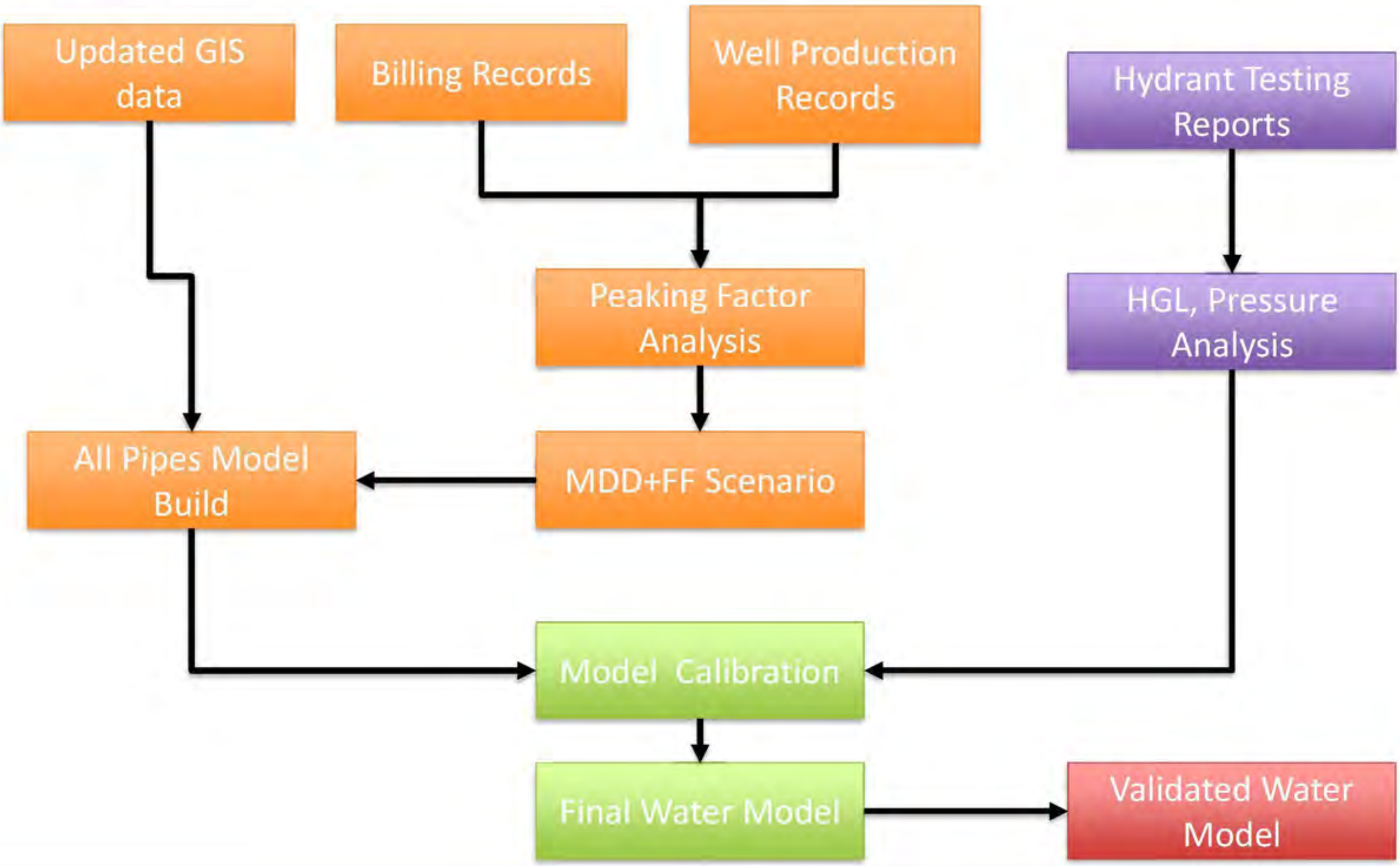
- Most of the required outstanding information has been received and models have been updated
  - Daily Trending at Dorchester and Thorndale WWTPs still required
    - OCWA has noted that this info can likely be made available (currently coordinating with Datasoft)

MODEL DEVELOPMENT AND VALIDATION

Model Development and Validation

WATER MODEL

Water Model Development Process



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Dorchester Water Model – Pressure Ranges

Minimum Pressures
(HLP Off)

Maximum Pressures
(HLP On)

Notes on Water Model Validation (Dorchester)

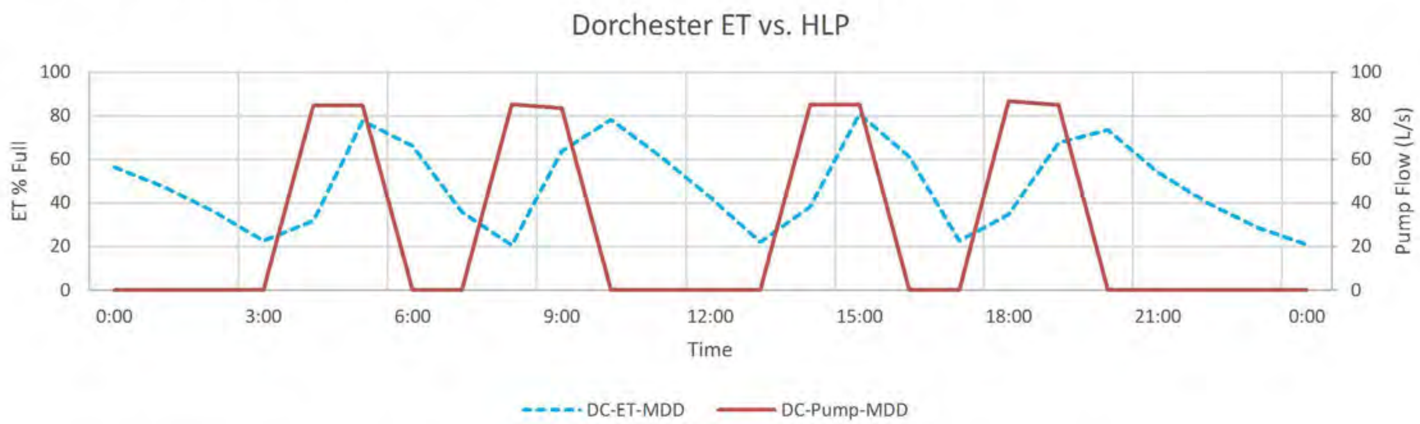
	Pipe Information					Field						Model			Comparison	
	Road	System	Material	Diameter (mm)	Install Year	Flow (L/s)	Flow Hydant ID	Static Pressure (psi)	Residual Preasure (psi)	Drop (psi)	Static Pressure (psi)	Residual Preasure (psi)	Drop (psi)	Static Pressure (psi)	Drop (psi)
D103	249 Hamilton Cres	Dorchester	DI	200	1978		DC_WH_131	53	46	7	49	45	8	4	-1
D105	Ludwig at Newton	Dorchester	PVC	200	n/a		DC_WH_1636	48	40	8	46	42	8	2	0
D115	186 Catherine at David	Dorchester	PVC	150	1973		DC_WH_63	67	53	13	65	53	17	2	-4
D310	4188 Catherine St	Dorchester	DI	250	1983		DC_WH_101	69	61	8	72	64	8	-3	0
D401	across from 4379 Catherine St	Dorchester	DI	150	n/a		GMBP_WH_229	70	50	20	71	49	22	-1	-2
D403	4548 Catherine St at Harris	Dorchester	DI	200	1984		DC_WH_162	66	30	36	65	28	36	1	0
D407	74 Village Gate Dr	Dorchester	PVC	200	1989		DC_WH_47	54	34	20	53	29	24	1	-3
D411	Minnie at North	Dorchester	CI	150	1956		DC_WH_157	59	47	12	60	52	13	-1	-1
D422	on Clara One south of Tower	Dorchester	PVC	150	1988		DC_WH_111	38	33	5	39	37	5	-1	0
D501	156 Wheeler Ave	Dorchester	PVC	150	1986		DC_WH_90	65	48	17	66	44	22	-1	-5
D502	155 Tiner Ave	Dorchester	PVC	150	1986		DC_WH_89	62	48	15	65	46	19	-2	-4
D510	77 Wheeler at Tiner Walk	Dorchester	DI	200	1986		DC_WH_97	61	44	18	60	41	19	1	-1
D511	47 Wheeler Ave	Dorchester	DI	200	1986		DC_WH_98	64	48	16	67	59	17	-3	-2
D508	90 Wheeler at Tiner Ave	Dorchester	DI	200	1986		DC_WH_95	62	35	27	66	44	22	-4	5
D515	Hamilton at Dorchester Rd	Dorchester	PVC	300	1997		DC_WH_152	65	46	20	68	45	23	-3	-3
D520	109 Parkview Dr	Dorchester	DI	150	1990		DC_WH_86	55	38	17	56	53	19	-1	-2
D603	2544 Dorchester Rd	Dorchester	PVC	150	1989		DC_WH_118	81	54	27	67	43	24	13	2
D601	At High lift	Dorchester	PVC	150	1989		DC_WH_120	82	57	25	67	47	20	15	5
D602	2637 Dorchester Rd	Dorchester	PVC	150	1989		DC_WH_119	78	50	28	66	43	23	12	4
D604	2429 Dorchester Rd	Dorchester	PVC	250	2009		DC_WH_117	68	35	33	67	74	36	1	-4
D605	128 Byron Ave	Dorchester	PVC	250	2009		DC_WH_739	61	26	35	60	51	38	1	-3
D606	150 Byron Ave	Dorchester	PVC	250	2009		DC_WH_1585	60	26	34	60	49	39	-1	-5
D614	120 Canterbury Dr	Dorchester	AC	150	1974		DC_WH_140	55	37	18	56	55	16	-2	2
D617	225 Thames Cres	Dorchester	AC	150	1969		DC_WH_145	63	47	16	63	49	14	1	2
D709	260 Mitchell Ave	Dorchester	DI	150	1986		DC_WH_36	68	59	9	70	55	14	-1	-5
D806	78 Mapleridge Cres	Dorchester	DI	150	2001		DC_WH_10	62	36	26	60	44	30	1	-4
D823	65 Valleyview Cres	Dorchester	PVC	150	1990		DC_WH_18	66	43	23	64	40	24	2	-1
D822	90Valleyview Cres	Dorchester	PVC	150	1990		DC_WH_19	65	46	19	64	45	19	1	1
D816	36 Manley Dr	Dorchester	PVC	150	1990		DC_WH_21	65	43	22	70	45	25	-5	-3
D820	16 Manley Dr	Dorchester	PVC	150	1990		DC_WH_20	66	45	21	62	44	18	4	4

- Model was calibrated based on hydrant testing undertaken by Muncipality
  - Subset of 30 hydrant tests was selected for calibration of the model
  - Pipe C-Factors were adjusted to best match field results
  - SCADA Records at Dorchester WTP unavailable for validation of system operations
  - Model simulates higher pressures along Dorchester Road near HLP
    - Expected that difference likely due to uncertainty with pump operation condition at time of hydrant test

Notes on Water Model Validation (Dorchester)

Dorchester Water System

- Impact of Large Fixed Speed HLP on smaller system



- The range of modelled pressures (HLP on / off) is in line with the hydrant test pressures.
  - Static Pressures generally within 2-3 PSI Model/Observed
  - Pressure Drop generally within 5 PSI Model/Observed
  - Some localized Test Model loss much higher – Further investigation with additional hydrant testing results to validate
- Records on status of HLP during hydrant tests are not available, but based on review it is expected that model effectively represents real world conditions.
- Modelled available fire flow in line with hydrant tests
  - Higher modelled flows along Dorchester Rd. near watermain from HLP

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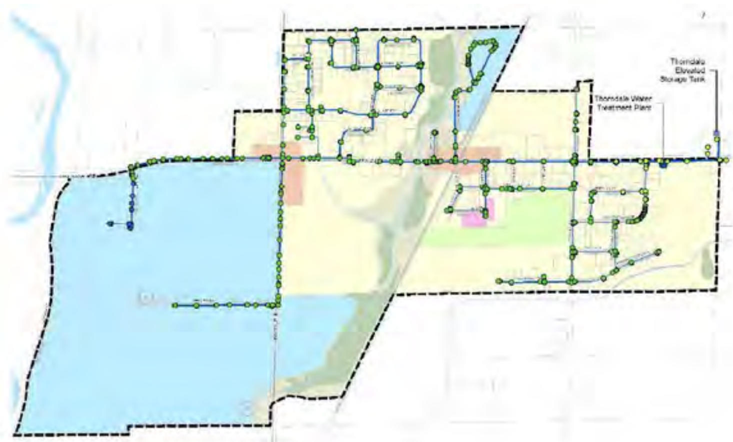
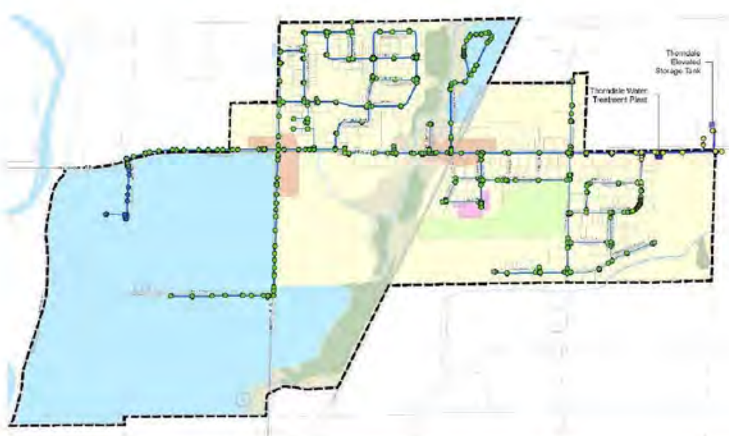
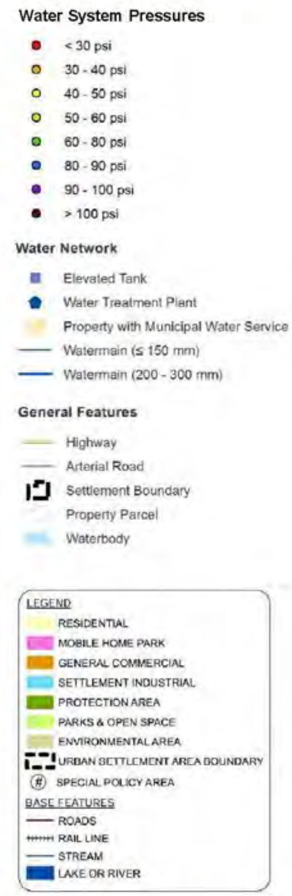
Thorndale Water Model – Pressure Ranges

Minimum Pressures



Maximum Pressures





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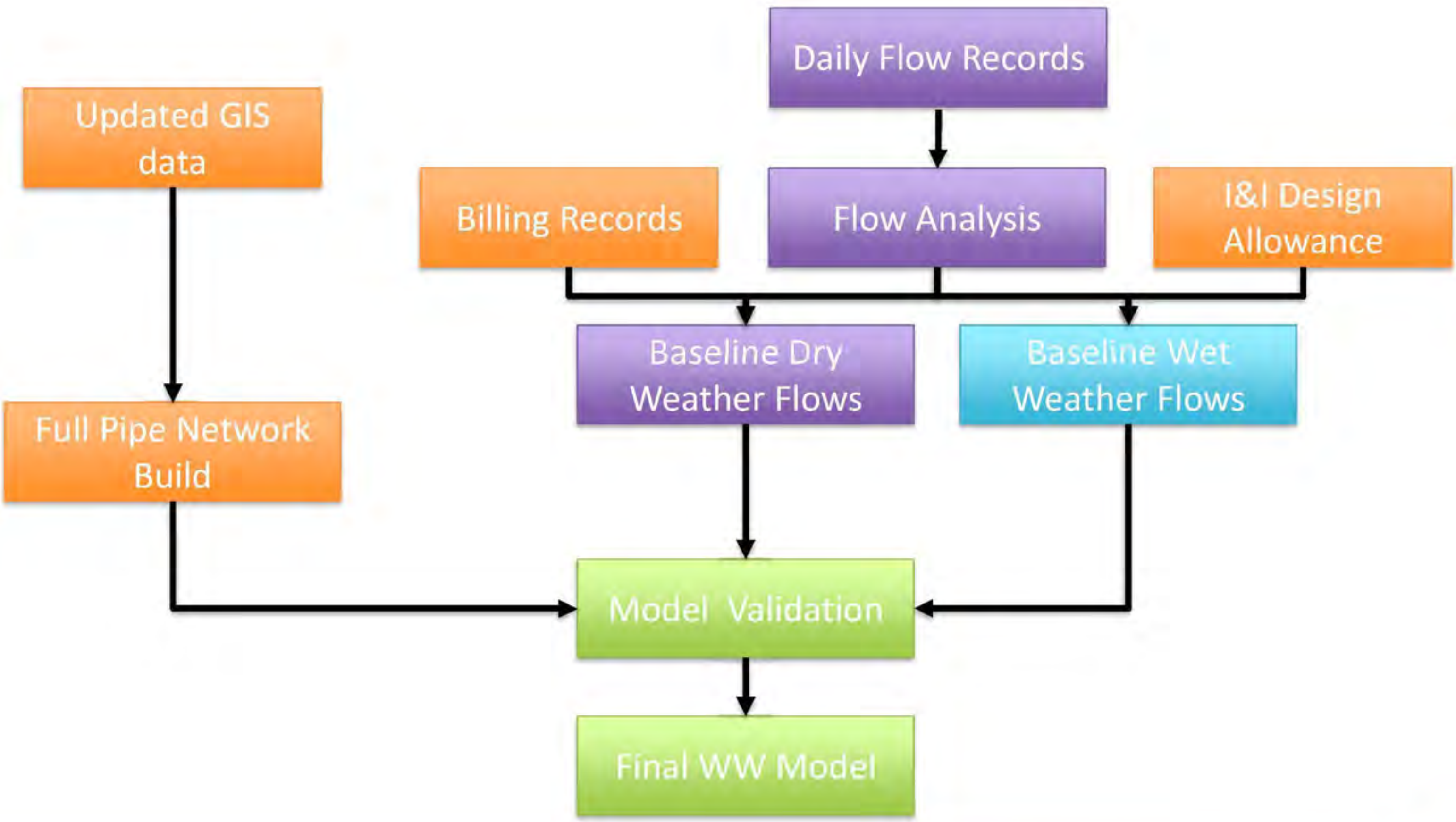
Notes on Water Model Validation (Thorndale)

	Pipe Information					Field					Model			Comparison	
	Road	System	Material	Diameter (mm)	Install Year	Flow (L/s)	Flow Hydant ID	Static Pressure (psi)	Residual Preasure (psi)	Drop (psi)	Static Pressure (psi)	Residual Preasure (psi)	Drop (psi)	Static Pressure (psi)	Drop (psi)
H-49	Leesboro	Thorndale	PVC	200	n/a	81	GMBP_WH_219	75	39	37	70	35	35	5	2
H-48	Elliott Trail Across from School	Thorndale	PVC	200	n/a	81	GMBP_WH_222	76	43	33	74	43	31	2	2
H-42	Harrison across from Chittick	Thorndale	PVC	200	2006	80	TD_WH_11	75	32	43	73	35	38	2	5
H-37	Railway at Upper Queens	Thorndale	PVC	150	2006	108	TD_WH_17	76	`	33	77	45	33	-2	1
H-36	Railway 1 south of Upper Queens	Thorndale	PVC	150	2006	108	TD_WH_16	78	45	33	77	47	31	0	2
H-30	Fairview north	Thorndale	PVC	150	2006	98	TD_WH_24	61	31	29	61	33	29	-1	1
H-29	Fairview north	Thorndale	PVC	150	2006	98	TD_WH_1153	62	34	28	62	37	25	0	3
H-25	23 Meadowbrook	Thorndale	PVC	150	1900	88	TD_WH_1140	70	32	38	70	28	42	0	-4
H-24	Countryside Lane	Thorndale	PVC	150	1990	88	TD_WH_1138	68	37	30	68	37	31	0	-1
H-19	Montieth and Countryside	Thorndale	PVC	150	1977	101	TD_WH_1163	63	38	26	63	37	26	0	0
H-18	8 Hueston	Thorndale	PVC	150	1987	101	TD_WH_1161	64	39	25	64	36	28	0	-3
H-15	Thorndale Rd and Road to sewage plant	Thorndale	PVC	200	2010	70	TC_WH_9997	78	27	51	79	31	48	-1	3
H-14	West Nissuri and Thorndale rd	Thorndale	PVC	200	2010	67	TC_WH_9999	76	47	29	77	53	24	-1	5
H-11	Thorndale Rd at hardware store	Thorndale	PVC	250	2006	92	TD_WH_6	79	48	31	77	50	27	1	3
H-4	17163 Thorndale Rd	Thorndale	PVC	200	2006	142	TC_WH_9993	54	45	9	56	49	7	-2	2

- In Thorndale, modelled pressures in line with hydrant tests
  - Generally within 2 PSI Model/Observed
- Modelled available fire flows in line with hydrant tests
  - Model generally more conservative

Wastewater Model Development Process



Dry Weather Flow Calibration

- Flow Monitoring Catchments
  - Match average/peak dry weather flows
    - Adjust per capital loading rates – historic water billing data provided by Municipality was used to estimate and spatially allocate 90% base sanitary flow
    - Adjust diurnal pattern – Diurnal Average Daily Dry Weather Flow patterns were derived for each flow monitoring catchment

- **Require daily flow trending to effectively calibrate wastewater model**

Growth Scenarios

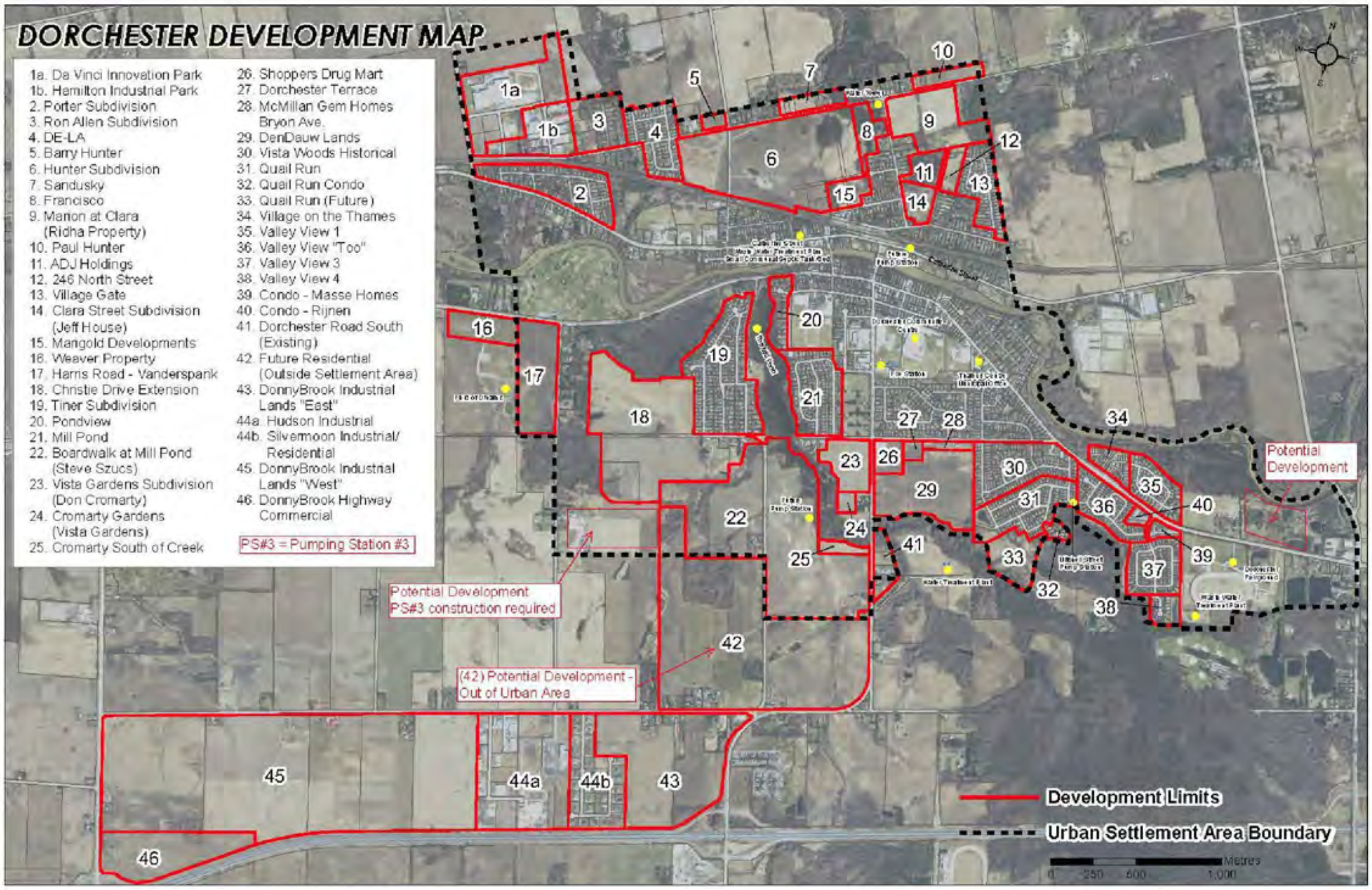
PROJECTION AND ALLOCATION METHODOLIGIES

Growth Projections and Allocation Methodologies

Three Alternative Methodologies

1. Draft Plans / Development Concepts + DC Targets (Urban + Peripheral / 401 Corridor)
   - Allocation per Draft Plans / Development Concepts
   - Distribution of development across outstanding lands by area to meet Buildout DC Targets
   - Phasing for Capital Plan informed by DC Recommendations with input from Municipality
2. Draft Plans / Development Concepts + Target Densities with Dorchester and Thorndale Settlement Boundaries, DC Targets in Peripheral / 401 Corridor
   - Allocation per Draft Plans / Development Concepts
   - **Within Settlement Boundary:** Distribution of development across outstanding lands based on Target Densities (50 ppha suggested for all land uses)
   - **Outside of Settlement Boundary:** Distribution of development across outstanding lands by area to meet Buildout DC Targets for Peripheral Areas and 401 Corridor Lands.
3. Draft Plans / Development Concepts + Target Densities (Urban + Peripheral / 401 Corridor)
   - Allocation per Draft Plans / Development Concepts
   - Distribution of development across outstanding lands based on Target Densities (50 ppha suggested for all land uses)

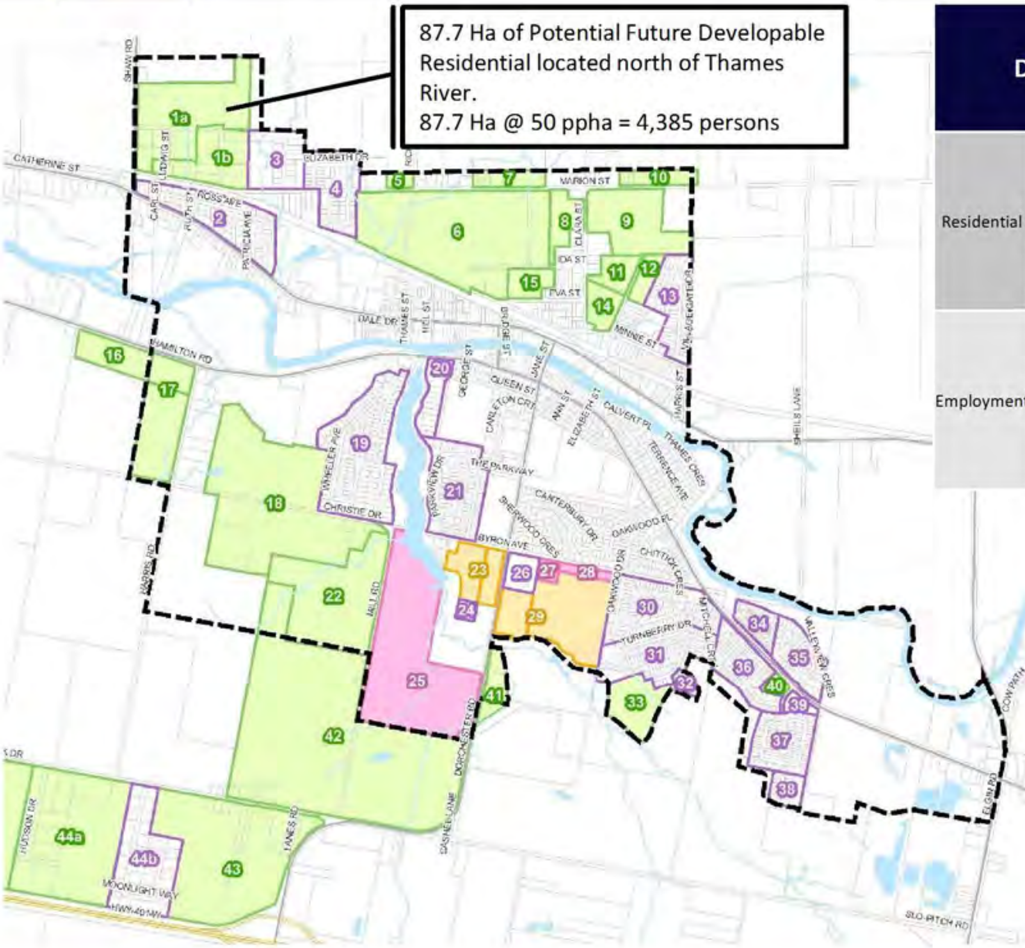
Dorchester Development Map



Build-Out Projections Based on Alternative Methodologies

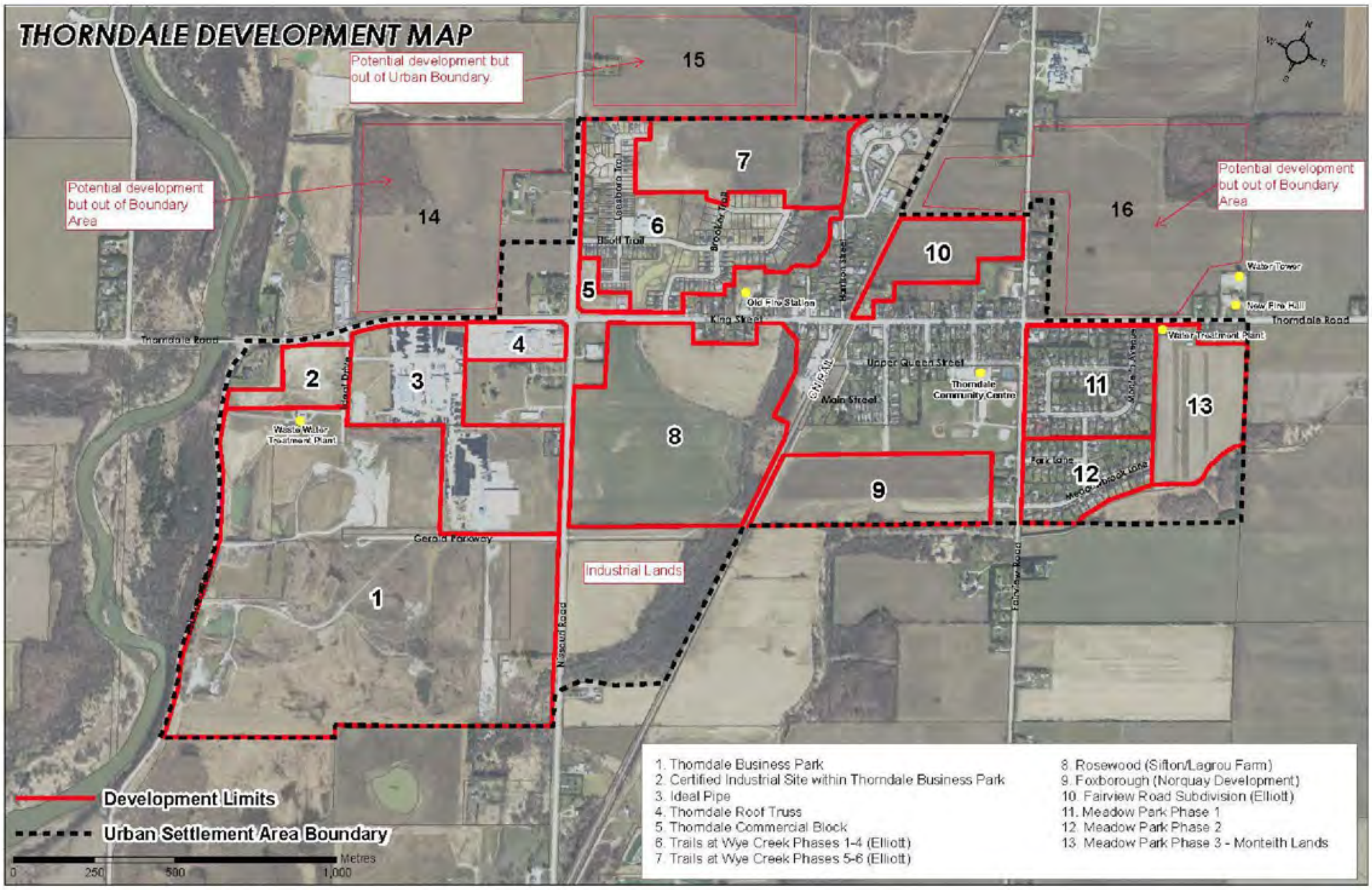
<table>
<tr><th colspan="2" rowspan="3">Dorchester Serviced Population + Jobs</th><th colspan="3">Dorchester Total Serviced Population at Build-Out</th></tr>
<tr><th rowspan="2">Method 1</th><th>Method 2</th><th>Method 3</th></tr>
<tr><th colspan="2">Method 2 and Method 3 produce the same projections within Dorchester + Thorndale Settlement Boundaries</th></tr>
<tr><td rowspan="5">Residential</td><td>Existing</td><td colspan="3">5,346</td></tr>
<tr><td>Draft Plans + Under Construction</td><td colspan="3">1,114</td></tr>
<tr><td>Concepts</td><td colspan="3">752</td></tr>
<tr><td>Future Development with No Plans / Concepts</td><td>4,888
(to match DC Targets)</td><td colspan="2">9,327
(based on 50 ppha)</td></tr>
<tr><td>Total Residential</td><td>12,100</td><td colspan="2">16,539</td></tr>
<tr><td rowspan="3">Industrial + Commercial Employment</td><td>Existing</td><td>1,765</td><td colspan="2">1,765</td></tr>
<tr><td>Future Development</td><td>586
(to match DC Targets)</td><td colspan="2">542
(based on 50 jpha)</td></tr>
<tr><td>Total Industrial + Commercial</td><td>2,351</td><td colspan="2">2,307</td></tr>
<tr><td colspan="2">Total Persons + Jobs</td><td>14,451</td><td colspan="2">18,846</td></tr>
<tr><td colspan="2">Difference</td><td></td><td colspan="2">+4,395</td></tr>
</table>

Dorchester Development Map



Dorchester		Area (Ha.)	Densities (ppha / jpha)	
			Method 1	Method 2 / 3
Residential	Draft Plans + Under Construction	43.4	**24** - 59	
	Concepts	21.0	~35	
	Future Development with No Plans / Concepts	186.5	26	50
Employment	Industrial	0.0	0.0	50
	Commercial	10.8	54.0	50
	Institutional	TBD	TBD	50

Thorndale Development Map



Build-Out Projections Based on Alternative Methodologies

Thorndale Serviced Population + Jobs		Thorndale Total Serviced Population at Build-Out		
			Method 2	Method 3
		Method 1	Method 2 and Method 3 produce the same projections within Dorchester + Thorndale Settlement Boundaries	
Residential	Existing	1,216		
	Draft Plans + Under Construction	1,221		
	Concepts	252		
	Future Development with No Plans	689 (to match DC Targets)	574 (based on 50 ppha)	
	Total Residential	**3,378**	**3,263**	
Industrial + Commercial Employment	Existing	402	402	
	Future Development	374 (to match DC Targets)	3,521 (based on 50 jpha)	
	Total Industrial + Commercial	**776**	**3,923**	
Total Persons + Jobs		**4,154**	**7,186**	
Difference			**+3,032**	

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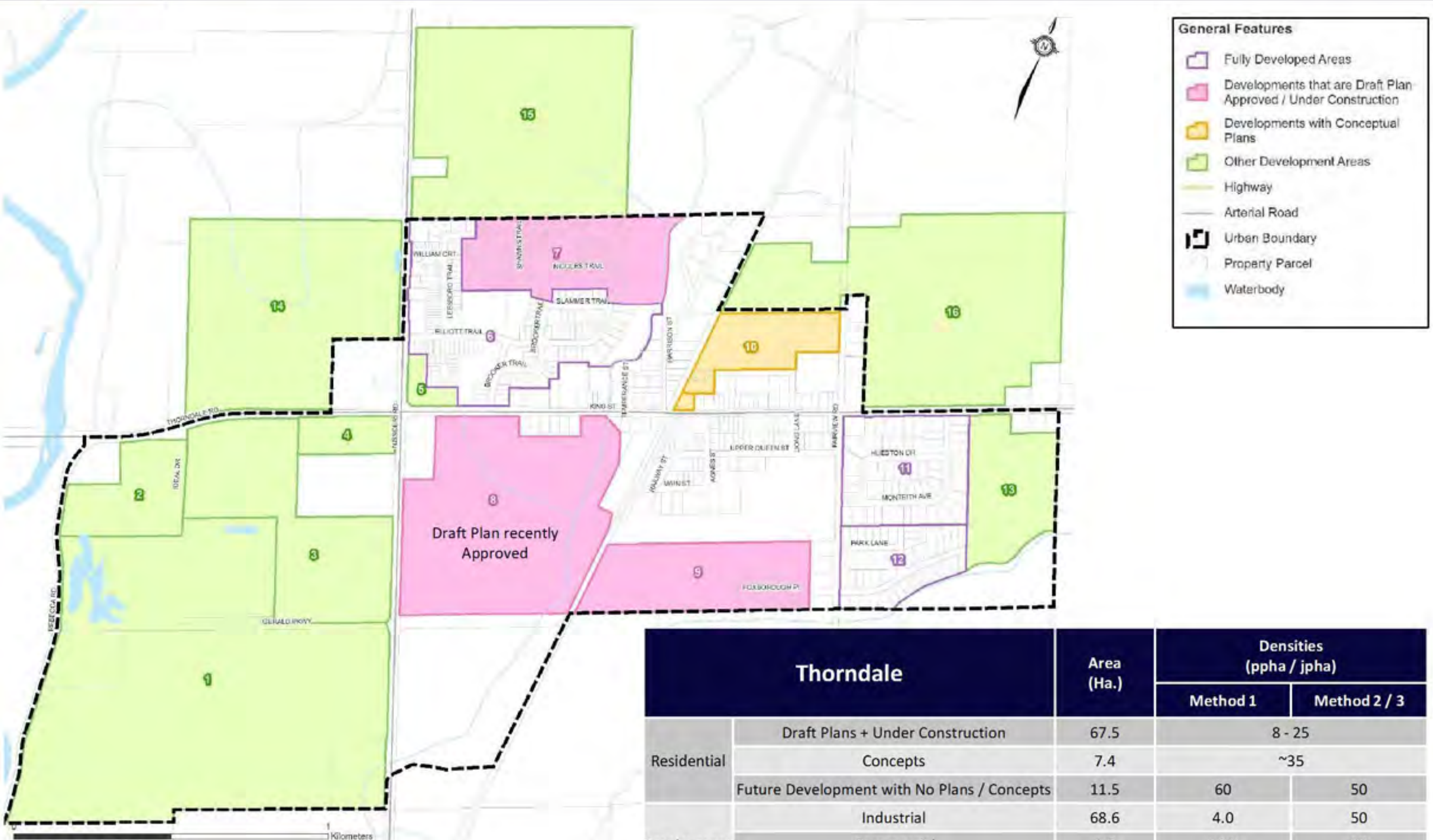
Thorndale Development Map



Thorndale		Area (Ha.)	Densities (ppha / jpha)	
			Method 1	Method 2 / 3
Residential	Draft Plans + Under Construction	67.5	8 - 25	
	Concepts	7.4	~35	
	Future Development with No Plans / Concepts	11.5	60	50
Employment	Industrial	68.6	4.0	50
	Commercial	1.9	54.0	50
	Institutional	TBD	TBD	50

Build-Out Projections Based on Alternative Methodologies

<table>
<tr><th colspan="2" rowspan="3">Dorchester and Thorndale Peripheral Areas and 401 Corridor Lands Serviced Population + Jobs</th><th colspan="3">Peripheral + 401 Corridor Lands Total Serviced Population at Build-Out</th></tr>
<tr><th>Method 1</th><th>Method 2</th><th rowspan="2">Method 3</th></tr>
<tr><th colspan="2">Method 1 and Method 2 produce the same projections within Dorchester + Thorndale Settlement Boundaries</th></tr>
<tr><td rowspan="3">Residential</td><td>Existing</td><td colspan="2">0</td><td>0</td></tr>
<tr><td>Future Development with No Plans</td><td colspan="2">561
(to match DC Targets)</td><td>10,581
(based on 50 ppha)</td></tr>
<tr><td>Total Residential</td><td colspan="2">561</td><td>10,581</td></tr>
<tr><td rowspan="3">Industrial + Commercial Employment</td><td>Existing</td><td colspan="2">0</td><td>0</td></tr>
<tr><td>Future Development</td><td colspan="2">179
(to match DC Targets)</td><td>8,235
(based on 50 jpha)</td></tr>
<tr><td>Total Industrial + Commercial</td><td colspan="2">179</td><td>8,235</td></tr>
<tr><td colspan="2">Total Persons + Jobs</td><td colspan="2">740</td><td>18,816</td></tr>
<tr><td colspan="2">Difference</td><td colspan="2"></td><td>+18,076</td></tr>
</table>

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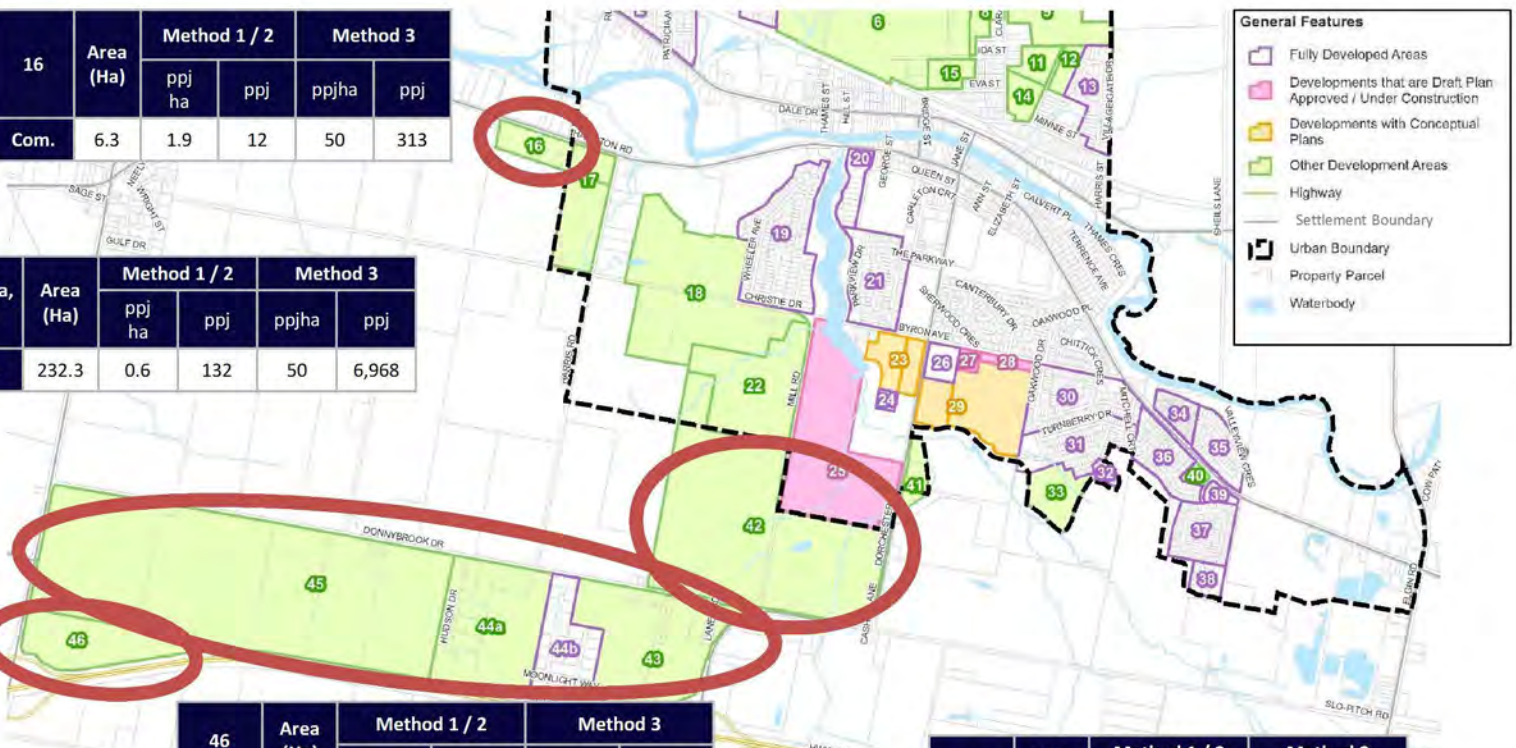
Growth in Dorchester Peripheral Areas and 401 Corridor Lands

16	Area (Ha)	Method 1 / 2		Method 3	
		ppj ha	ppj	ppjha	ppj
Com.	6.3	1.9	12	50	313

43, 44a, 45	Area (Ha)	Method 1 / 2		Method 3	
		ppj ha	ppj	ppjha	ppj
Ind.	232.3	0.6	132	50	6,968



46	Area (Ha)	Method 1 / 2		Method 3	
		ppjha	ppj	ppjha	ppj
Com.	19.1	1.9	36	50	954
	Area 46 noted to likely not be developed.				

42	Area (Ha)	Method 1 / 2		Method 3	
		ppjha	ppj	ppjha	ppj
Res.	90.5	3.1	240	50	4,527
	Area 42 noted to likely not be developed (existing agricultural).				

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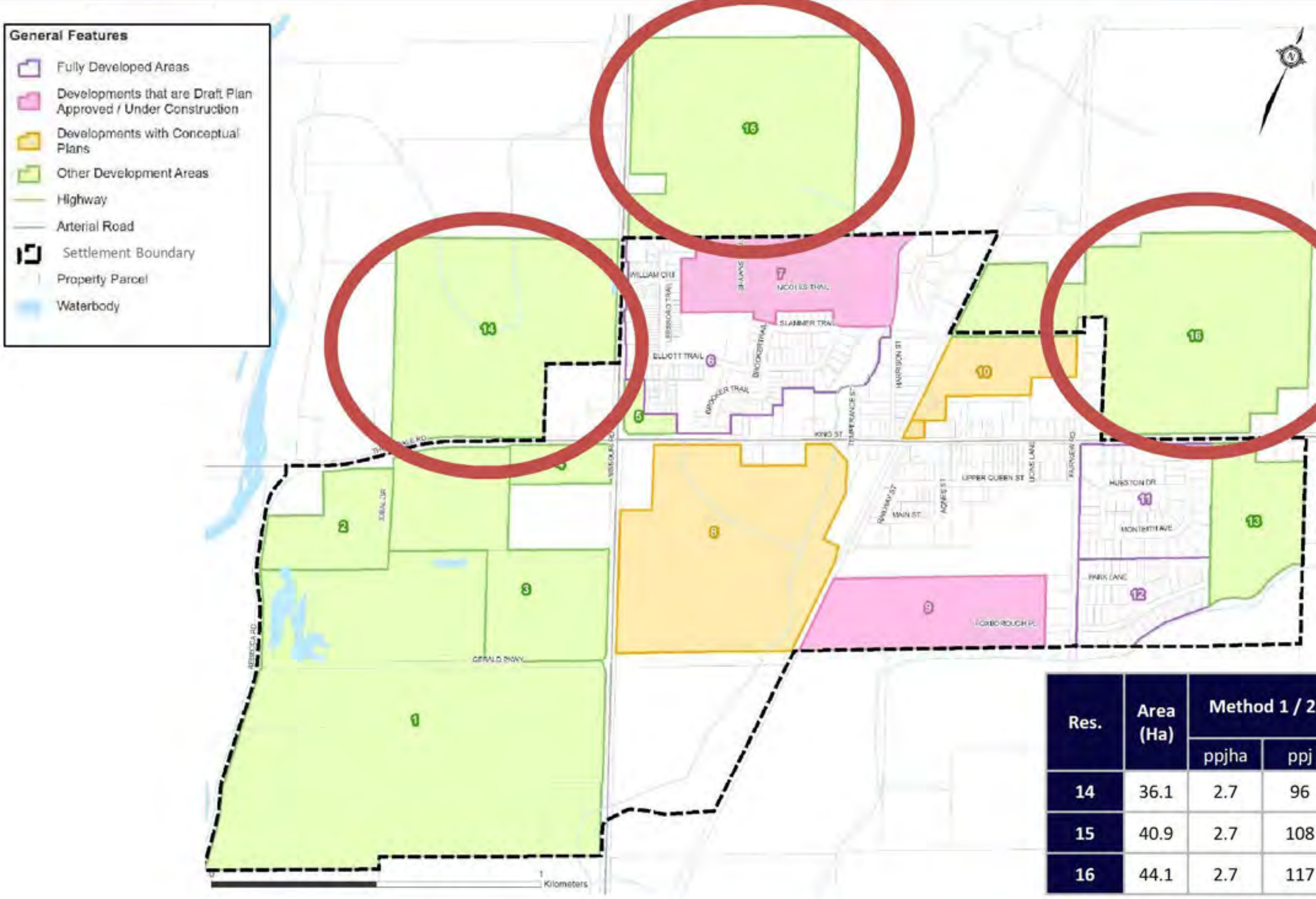
Growth in Thorndale Peripheral Areas



Res.	Area (Ha)	Method 1 / 2		Method 2	
		ppjha	ppj	ppjha	ppj
14	36.1	2.7	96	50	1,803
15	40.9	2.7	108	50	2,045
16	44.1	2.7	117	50	2,206

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Phasing and Timing Approach

- Develop Preferred Strategy for Full Buildout
  - Identify upgrade triggers by population/area trigger
  - Develop cost per capita
- Development of Capital Program
  - Assume Build-Out Approach
  - Assume registered & concepts develop
- Municipality's Perspective to Build-Out
  - Expected timing of Blocks where there is development information available
    - Demand for new residential / employment within Dorchester and Thorndale
    - Large developer / small developer and ability to fund full development
  - Known issues
    - Development north of Thames River in Dorchester and Land Supply Requirements
  - Scenarios

POLICY AND DESIGN CRITERIA

Policy and Design Criteria

WATER LEVEL OF SERVICE

- Pump Station Firm Capacity
  - Largest pump out of service or 100% redundancy

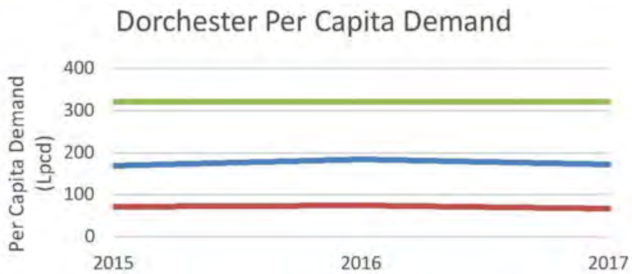
- Capacity Criteria
  - MDD (where sufficient Elevated Storage)
  - Max of PHD or MDD + Fire Flow (Where insufficient Elevated Storage)

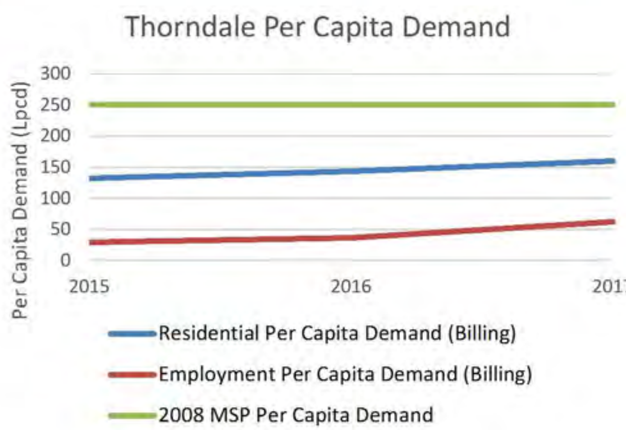
- Opportunity to define a pumping level of service
  - Risk of being over conservative with 100% redundancy through oversized pumps
  - Dorchester's existing higher pumping capacity may increase the system's operational flexibility

Water Level of Service (LoS) Per Capita Rates (Recap)

	MECP	Previous MSP
Dorchester	270 - 450 L/c/d	320 L/c/d
Thorndale		250 L/c/d

	Dorchester		Thorndale	
	Billing - Residential Per Capita (L/cap/d)	Billing – Employment Per Capita (L/cap/d)	Billing - Residential Per Capita (L/cap/d)	Billing – Employment Per Capita (L/cap/d)
2015	169.4	72.2	131.6	29.2
2016	184.8	75.2	143.6	36.3
2017	171.6	67.8	159.9	62.3
Avg.	175.3	71.7	145.0	42.3





Residential Populations based on:

- 2018 DC Background Study Dorchester WTP Residential + Other Population = 5,346 people
- 2018 DC Background Study Thorndale WTP Residential + Other Population = 1,216 people

Employment Population based on 2018 DC Background Study Urban jobs/residential population ratio of 2,545 jobs/7,748 persons = 0.33 jobs/p
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

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Water LoS
Water Use Sensitivity (Recap)

Per Capita Rates

2015 - 2017	Billing - Residential Per Capita (L/cap/d)	Billing - Employment Per Capita (L/cap/d)	Billing - Total Equivalent Per Capita (L/cap/d)	Production - Total Equivalent Per Capita (L/cap/d)*
Dorchester	175	72	150	178
Thorndale	145	42	120	136

	MECP	Previous MSP
Dorchester	270 - 450 L/c/d	320 L/c/d
Thorndale		250 L/c/d

Recommended design criteria

- Per capita demand of **225 L/cap/day**
- **Max Day Peaking Factor** of **2.0 for Dorchester, 2.25 for Thorndale**
  - 2.0 is in line with MECP recommendations for buildout population
  - Still provides the Municipality with some safety factor, when compared to historic records
- **Peak Hour Peaking Factor**
  - Maintain 3.75
  - PHD flow for entire Dorchester system = 3.75 x AD Production = 1,268 m^3/d (14.7 L/s) = 55 L/s (PHD 55 L/s (entirety of Dorchester) not comparable to FF requirements – FF requirements will govern)

Peaking Factors

2015 – 2017	Average Production (m^3/d)	Maximum Production (m^3/d)	Peaking Factor
Dorchester	4.35	7.27	1.67
Thorndale	4.20	8.87	2.11

Max Day	MECP	Previous MSP
Dorchester	1.90 - 2.00	2.5
Thorndale	2.00 – 2.50	2.5

Peak Hour	MECP	Previous MSP
Dorchester	2.85 – 3.00	3.75
Thorndale	3.00 – 3.75	3.75

MECP Peaking Factors based on existing and buildout population estimates (taken from Table 3-1 of the MECP Guidelines for Drinking Water Systems)

Current level of service

- Generally 37 - 90 psi in Dorchester
  - Between 37 – 40 psi near Dorchester ET (Clara St. and Marion St.)
    - 15m higher than Clara St. and Minnie St. (275 m vs. 260 m)
    - Single res. homes – no pressure complaints noted in provided System Performance Log
- 55 – 85 psi in Thorndale
  - Pressures exceeding 80 psi in area of Thorndale Business Park near WWTP
    - Elevations approx. 5m lower than at Ideal Dr. and Thorndale Rd. (275 m vs. 280 m)

Need to maintain minimum 40 psi in Dorchester

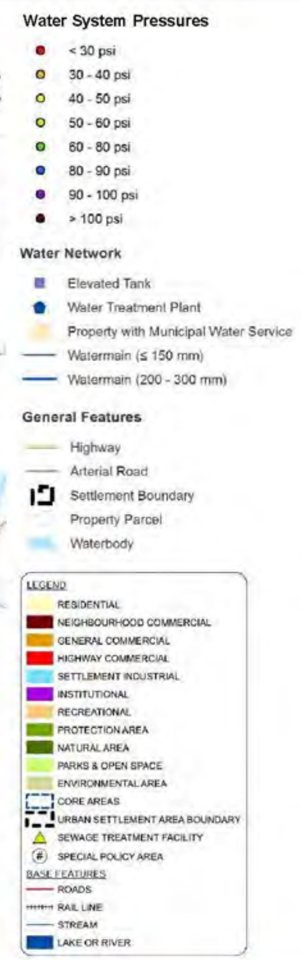
- MECP minimum requirement
  - Small can-style BPS can be commissioned to service localized area
  - Fire Flow can be provided through check valve
- Decreasing high pressures where possible
  - Reduction in NRW and watermain breaks

Maintain Target Pressure LoS bounds to 40 - 90 psi

Dorchester Water Model – Pressure Ranges

Minimum Pressures
(HLP Off)

Maximum Pressures
(HLP On)



Water LoS Storage Needs

MECP	Previous MSP
A – MECP fire flow by equivalent population **B** – 25 % of maximum day demand **C** – 25% of A+B	**A** – Largest expected fire in area (based on land use) **B** – 25 % of maximum day demand **C** – 25% of A+B

Total Storage = Fire Storage (A) + Balancing Storage (B) + Emergency Storage (C)

- MECP and industry standard storage requirements = A + B + C
- Fire Storage (A)
  - MECP equivalent population based guideline
  - Fire Underwriter's Survey (FUS)
- Balancing Storage (B)
  - MECP guideline of 25% of Max Day Demands
  - Peaking factor for calculating MDD
    - Design criteria peaking factor of 2.0 for Dorchester, 2.25 for Thorndale
- Emergency Storage (C)
  - 25% of the Sum of Fire (A) and Balancing (B) Storage

Water LoS
Target Fire Flows

- FUS
  - Building dependent
  - Size, construction, separation, occupation
  - Every building is different
- Land use based
  - Use set Fire Flow targets
- Typical hydrant capacity ~75 L/s
  - Equivalent to 15-20 PSI of hydrant and hose losses
  - Excludes pumper truck

Landuse	Typical FUS Range (L/s)	# of Hydrants
Dead End Residential	27-100 L/s	-
Single/Semi Family	27-162 L/s	1
Townhouse/Row House	100-167 L/s	1-2
Multi Family	117-368 L/s	2
Commercial	111-585 L/s	2-3
Institutional	200-334 L/s	2-3
Industrial	235-583 L/s	3-4

Water LoS
Area Municipalities' Fire Flows

Target Fire Flows developed for similar Area Municipalities through recent Master Plan processes:

Municipality	Equivalent Population (Pop. + Jobs)	Minimum Fire Flow Requirements	Flow (L/s)	Duration (Hours)
Paris (County of Brant)	Existing: ~22,000 Buildout: ~60,000	Residential	37.9	1
		General ICI	56.8	2
		Special Case Industrial	75.8	2
Stratford	Existing: ~50,000 Buildout: ~80,000	Single Family	50 – 75	1.25 - 1.75
		Townhome	90	2
		Multi-Family	100	2
		Commercial	125	2
		Institutional	125	2
		Industrial	150	2
City of Brantford	Existing: ~175,000 Buildout: ~250,000	Single Family	75	1.75
		Townhome	125	2
		Multi-Family	150	2
		Commercial	175	2.5
		Institutional	175	2.5
		Industrial	250	3.5

Town of Fort Erie, Town of Whitchurch-Stouffville and City of Waterloo have also adopted fire flow targets similar to the City of Brantford through their MP projects .

MECP Design Guidelines for Drinking Water System

Development Limits	Serviced Population Scenario	Equivalent Population (ppj)	MECP Suggested Fire Flow (L/s)	Duration (Hours)
Within Settlement Boundary Only	Existing Population	7,111	189	3
	Ultimate Build-Out based on Method 1	14,451	250	4
	Ultimate Build-Out based on Method 2 / 3	18,845	318	5
Within Settlement Boundary and Including Peripheral + 401 Corridor Lands to be Developed	Ultimate Build-Out based on Method 1	14,870	250	4
	Ultimate Build-Out based on Method 2	19,264	318	5
	Ultimate Build-Out based on Method 3	31,608	348	5

2008 Master Plan Recommendations

Largest expected fire volume based on:

Fire Flow Requirements	Flow (L/s)	Duration (Hours)
Residential Minimum	76	2
ICI Minimum	227	3

Institutional Employment Growth is not included in these numbers (land designation to be established through consultation with Municipality). Institutional Employment Growth is not expected to significantly alter fire flow requirements (for instance, there are 340 new institutional jobs estimated for Ultimate Build-Out for all of Thames Centre under the DC Background Study projections).

Available Fire Flow from Dorchester ET

Total Volume = 1,800 m^3

Development Limits	Serviced Population Scenario	Equivalent Population (ppj)	MECP Suggested Fire Flow (L/s)	Available Fire Flow (L/s) Based on Available 1,800m³ in Dorchester ET		
				For 1 hr	For 2 hrs	For 3 hrs
Within Settlement Boundary Only	Existing Population	7,111	189	233	117	78
	Ultimate Build-Out based on Method 1	14,451	250	4	2	1
	Ultimate Build-Out based on Method 2 / 3	18,845	318	N/A	N/A	N/A
Within Settlement Boundary and Including Peripheral + 401 Corridor Lands to be Developed	Ultimate Build-Out based on Method 1	14,870	250	N/A	N/A	N/A
	Ultimate Build-Out based on Method 2	19,264	318	N/A	N/A	N/A
	Ultimate Build-Out based on Method 3	31,608	348	N/A	N/A	N/A

- Based on the provision of Balancing and Emergency Storage solely by the Dorchester ET

Available Fire Flow
Dorchester ET + Dorchester WTF Reservoirs

90 L/s HLP + 2 x 2,500 m³ Aboveground Reservoirs at Dorchester WTF can provide PHD to the system under most Ultimate Build-Out Scenarios

- Under scenarios where HLP + aboveground reservoirs can provide PHD, Dorchester ET can be dedicated entirely to Fire Storage
- Under all scenarios, HLP + Aboveground Reservoirs can be utilized to best provide fire storage and fire flow

Development Limits	Serviced Population Scenario	90 L/s HLP can provide PHD	~5000m³ Reservoirs can provide PHD
Within Settlement Boundary Only	Existing Population	✓	✓
	Ultimate Build-Out based on Method 1	✓	✓
	Ultimate Build-Out based on Method 2 / 3	✗	✗
Within Settlement Boundary and Including Peripheral + 401 Corridor Lands to be Developed	Ultimate Build-Out based on Method 1	✓	✓
	Ultimate Build-Out based on Method 2	✗	✗
	Ultimate Build-Out based on Method 3	✗	✗

Development Limits	Serviced Population Scenario	Equivalent Population (ppj)	MECP Suggested Fire Flow (L/s)	Available Fire Flow (L/s)		
				For 1 hr	For 2 hrs	For 3 hrs
Within Settlement Boundary Only	Existing Population	7,111	189	500	250	167
	Ultimate Build-Out based on Method 1	14,451	250	400	200	133
	Ultimate Build-Out based on Method 2 / 3	18,845	318	N/A	N/A	N/A
Within Settlement Boundary and Including Peripheral + 401 Corridor Lands to be Developed	Ultimate Build-Out based on Method 1	14,870	250	400	200	133
	Ultimate Build-Out based on Method 2	19,264	318	N/A	N/A	N/A
	Ultimate Build-Out based on Method 3	31,608	348	N/A	N/A	N/A

Water LoS
Fire Flows Design Guidelines (Thorndale)

MECP Design Guidelines for Drinking Water System (Thorndale)

Development Limits	Serviced Population Scenario	Equivalent Population (ppj)	MECP Suggested Fire Flow (L/s)	Duration (Hours)
Within Settlement Boundary Only	Existing Population	1,618	95	2
	Ultimate Build-Out based on Method 1	4,154	144	2
	Ultimate Build-Out based on Method 2 / 3	7,186	189	3
Within Settlement Boundary and Including Peripheral + 401 Corridor Lands to be Developed	Ultimate Build-Out based on Method 1	4,475	144	2
	Ultimate Build-Out based on Method 2	7,507	189	3
	Ultimate Build-Out based on Method 3	13,239	250	4

May 2017 Report to Council (Thorndale Trunk Watermain)

Report noted that the existing Thorndale ET can supply 225 L/s for 1 hour or 150 L/s for 1.5 hours:

Fire Flow Requirements	Flow (L/s)	Duration (Hours)
Industrial	165	0.5

2008 Master Plan Recommendations

Largest expected fire volume based on:

Fire Flow Requirements	Flow (L/s)	Duration (Hours)
Residential Minimum	76	2
ICI Minimum	227	3

Available Fire Flow from Thorndale ET

Total Volume = 1,650 m^3

Development Limits	Serviced Population Scenario	Equivalent Population (ppj)	MECP Suggested Fire Flow (L/s)	Available Fire Flow (L/s) Based on Available 1,650m³ in Thorndale ET		
				For 1 hr	For 2 hrs	For 3 hrs
Within Settlement Boundary Only	Existing Population	1,618	95	329	165	110
	Ultimate Build-Out based on Method 1	4,154	144	240	120	80
	Ultimate Build-Out based on Method 2 / 3	7,186	189	134	67	45
Within Settlement Boundary and Including Peripheral + 401 Corridor Lands to be Developed	Ultimate Build-Out based on Method 1	4,475	144	229	114	76
	Ultimate Build-Out based on Method 2	7,507	189	122	61	41
	Ultimate Build-Out based on Method 3	13,239	250	N/A	N/A	N/A

- Based on the provision of Balancing and Emergency Storage solely by the Thorndale ET

Available Fire Flow
Thorndale ET + Thorndale WTF Reservoirs

20 L/s Pump + 814 m^3 Reservoirs at Thorndale WTF can provide PHD to the system under some Ultimate Build-Out Scenarios

- Under Scenarios where HLP + Reservoirs can provide PHD, Thorndale ET can be dedicated entirely to Fire Storage
- Under all scenarios, pump + reservoirs can be utilized to best provide fire storage and fire flow

Development Limits	Serviced Population Scenario	90 L/s HLP can provide PHD	~5000m^3 Reservoirs can provide PHD
Within Settlement Boundary Only	Existing Population	✓	✓
	Ultimate Build-Out based on Method 1	✓	✗
	Ultimate Build-Out based on Method 2 / 3	✗	✗
Within Settlement Boundary and Including Peripheral + 401 Corridor Lands to be Developed	Ultimate Build-Out based on Method 1	✗	✗
	Ultimate Build-Out based on Method 2	✗	✗
	Ultimate Build-Out based on Method 3	✗	✗

Development Limits	Serviced Population Scenario	Equivalent Population (ppj)	MECP Suggested Fire Flow (L/s)	Available Fire Flow (L/s)		
				For 1 hr	For 2 hrs	For 3 hrs
Within Settlement Boundary Only	Existing Population	7,111	189	458	229	153
	Ultimate Build-Out based on Method 1	14,451	250	240	120	80
	Ultimate Build-Out based on Method 2 / 3	18,845	318	134	67	45
Within Settlement Boundary and Including Peripheral + 401 Corridor Lands to be Developed	Ultimate Build-Out based on Method 1	14,870	250	229	114	76
	Ultimate Build-Out based on Method 2	19,264	318	122	61	41
	Ultimate Build-Out based on Method 3	31,608	348	N/A	N/A	N/A

Dorchester Fire Department

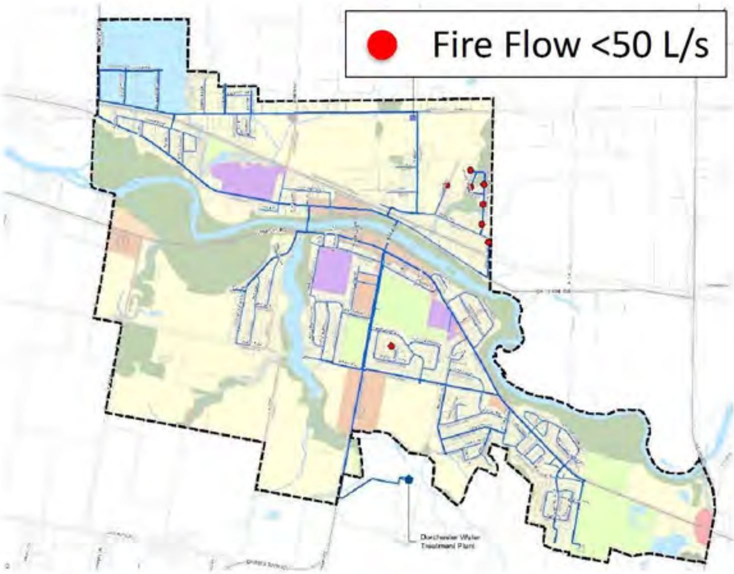
3 Trucks

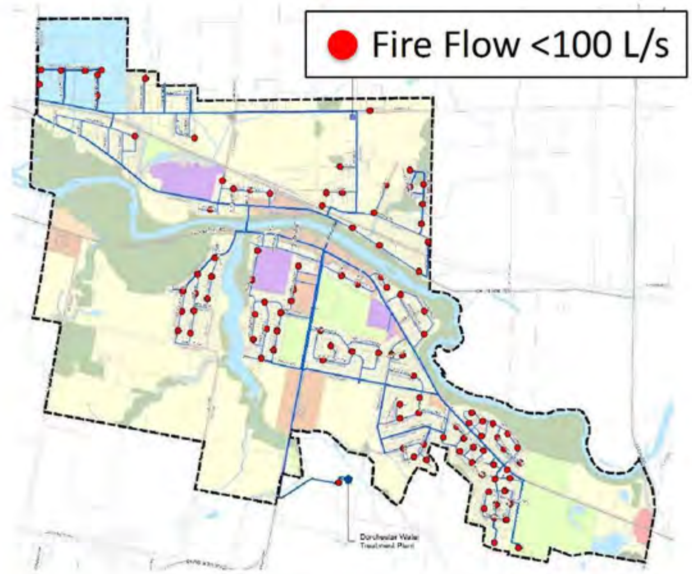
Thorndale Fire Department

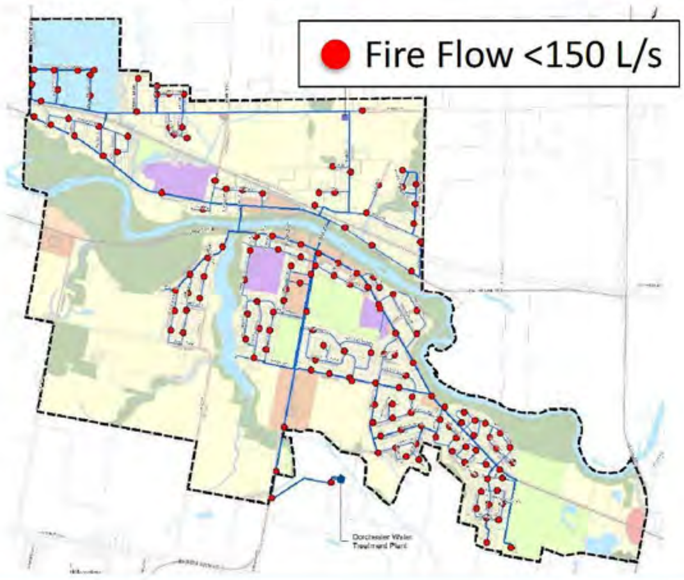
2 Trucks

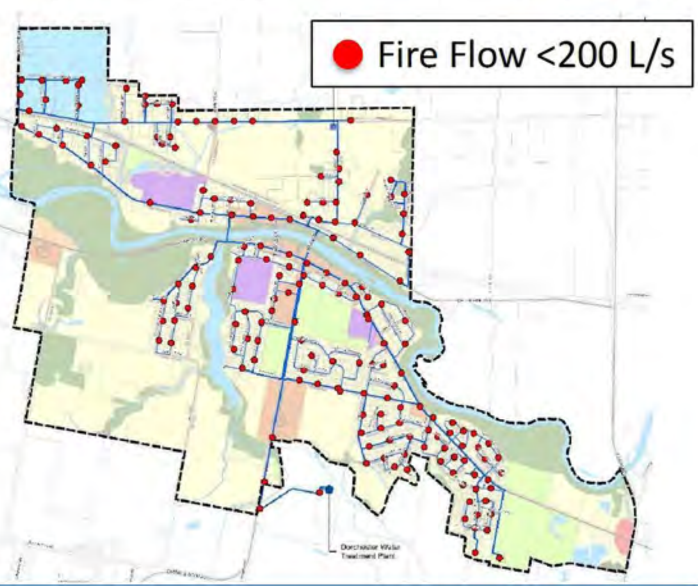
Fire Pumps on Trucks – 76 L/s (1200 GPM)

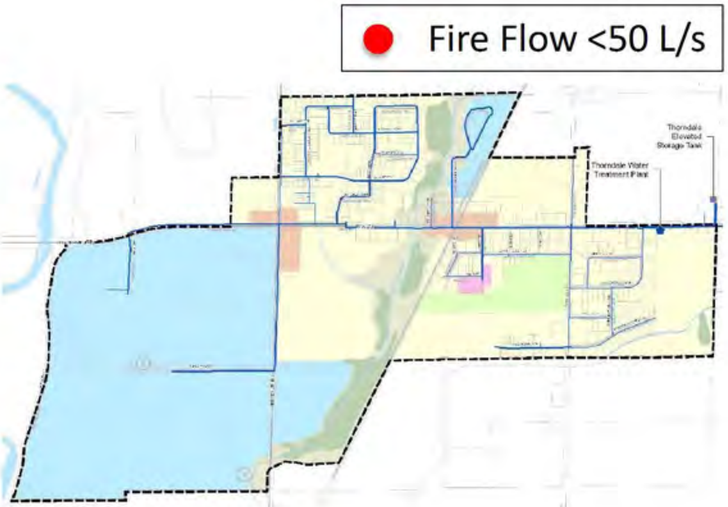
Tanker Trucks Capacity = 22 m^3 (5800 gallons)

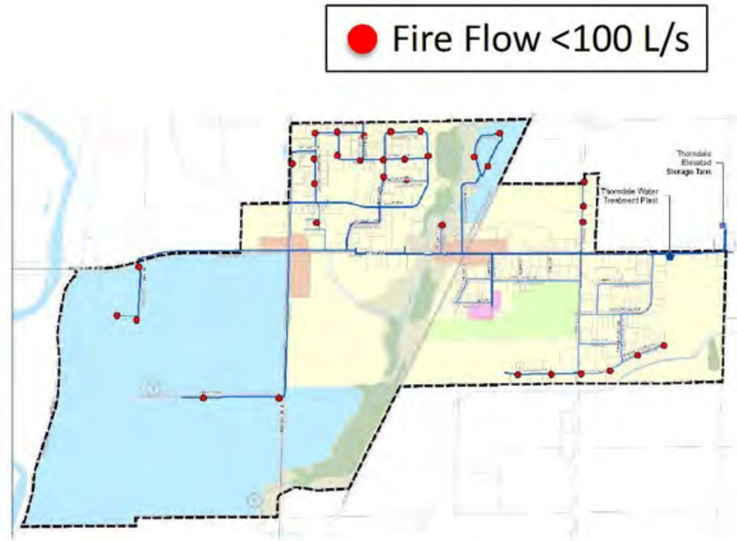

Fire Flow <50 L/s
Dorchester Water Treatment Plant

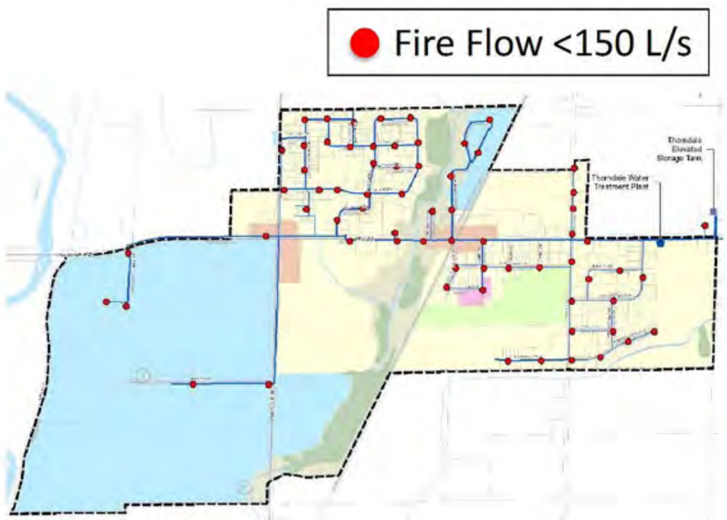

Fire Flow <100 L/s
Dorchester Water Treatment Plant

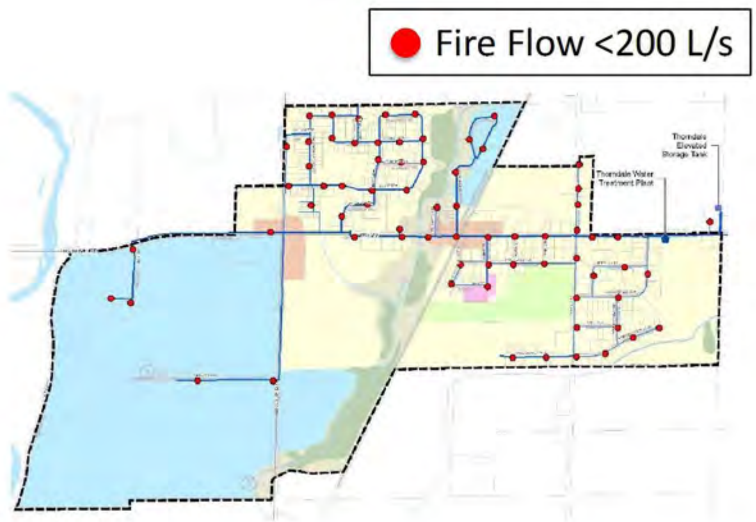

Fire Flow <150 L/s
Dorchester Water Treatment Plant


Fire Flow <200 L/s
Dorchester Water Treatment Plant


Fire Flow <50 L/s
Thorndale Elevated Storage Tank
Thorndale Water Treatment Plant


Fire Flow <100 L/s
Thorndale Elevated Storage Tank
Thorndale Water Treatment Plant


Fire Flow <150 L/s
Thorndale Elevated Storage Tank
Thorndale Water Treatment Plant


Fire Flow <200 L/s
Thorndale Elevated Storage Tank
Thorndale Water Treatment Plant

- Issues
  - Current storage capacity limits sustainable system FF
  - Distribution network limited local fire flow capacity
- Previous FF Criteria
  - 76 L/s Residential
    - In range of FUS targets
    - Sustainable from a storage
    - Improvement to trunk network needed to support system wide
  - 227 L/s ICI
    - In range of FUS targets
    - Not sustainable from storage – long-term
    - Local system cannot support
- Recommendation
  - Maintain 76 L/s for Residential
  - Utilize 150 L/s for ICI
    - Sustainable from storage
    - Inline with more rural system and ICI land use
    - Manageable trunk network upgrades
    - Consider duration of 1 hour Thorndale & 2 Hours Dorchester

Summary of Design Criteria - Water

Pump Station Firm Capacity

- Largest pump out of service

Watermain Performance

- Will provide a solution if peak velocities exceed 2.0 m/s under MDD/PHD

Water Quality

- MSP to review and make broad commentary on water quality level of service
- Areas of high water age will be flagged

	Dorchester	Thorndale
Design Criteria per capita (Lpcd)	225	225
Max Day Peaking Factor	2.0	2.25
Peaking Factor	3.75	
Pressure	40 psi – 90 psi	
Maximum Velocity (m/s)	2	
Upgrade triggers	80% – 90% firm capacity → upgrade in place	
	100% firm capacity → upgrade in place	

Storage	
A - Fire Storage	Largest expected fire volume
B - Equalization Storage	25% of max day demand
C - Emergency	25% of (A + B)
Total	A + B + C

Fire Flow Requirements	Flow (L/s)	Duration (Hours)
Residential Minimum	75	2
ICI Minimum	150	2

Policy and Design Criteria

WASTEWATER LEVEL OF SERVICE

Wastewater LoS – Dry Weather Flows (Recap)

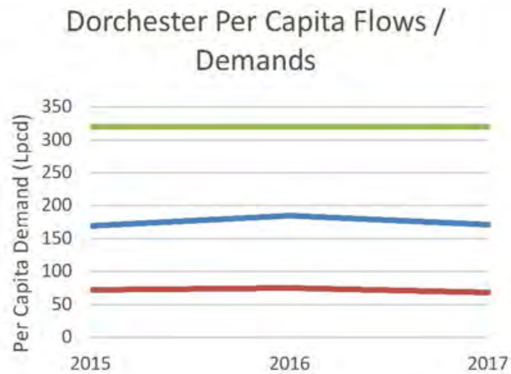
	MECP	Previous MSP
Dorchester	225 Lpcd – 450 Lpcd	320 L/c/d
Thorndale		430 L/c/d

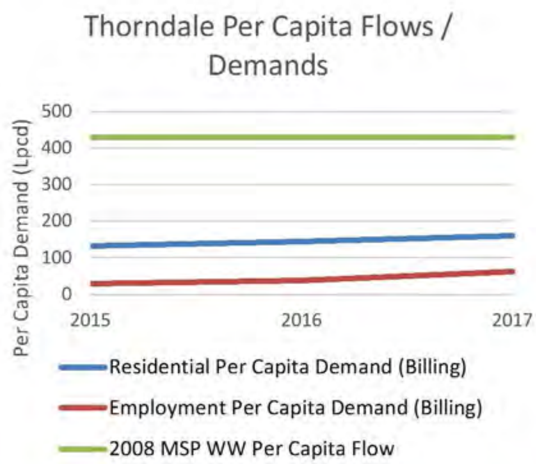
Dorchester WWTP

	WWTP Average Flows (m^3/d)	WTP Average Flows (m^3/d)	% of WW flows to Water Consumption	Annual Precipitation (mm)	Precipitation April-August (mm)
2016	301	1,318	23%	1,055	403.4
2017	291	1,255	23%	907 *Data available for Jan 1 – Sep 8	545.8

Thorndale WWTP

	WWTP Average Flows (m^3/d)	WTP Average Flows (m^3/d)	% of WW flows to Water Consumption	Annual Precipitation (mm)	Precipitation April-August (mm)
2016	169	216	78%	1,054.6	403.4
2017	200	253	79%	907.1 *Data available for Jan 1 – Sep 8	545.8





GM BluePlan ENGINEERING

Design Criteria – Wastewater

Average Dry Weather Flows

- Match water – 225 l/cap/d

Wet Weather Flow Allowance

- Review daily peak WWF data to be provided by OCWA (if available)
- Develop design allowance
  - For Reference - London uses 8640 litres/hectare/day (0.100 l/s/ha)

Pump Station Firm Capacity

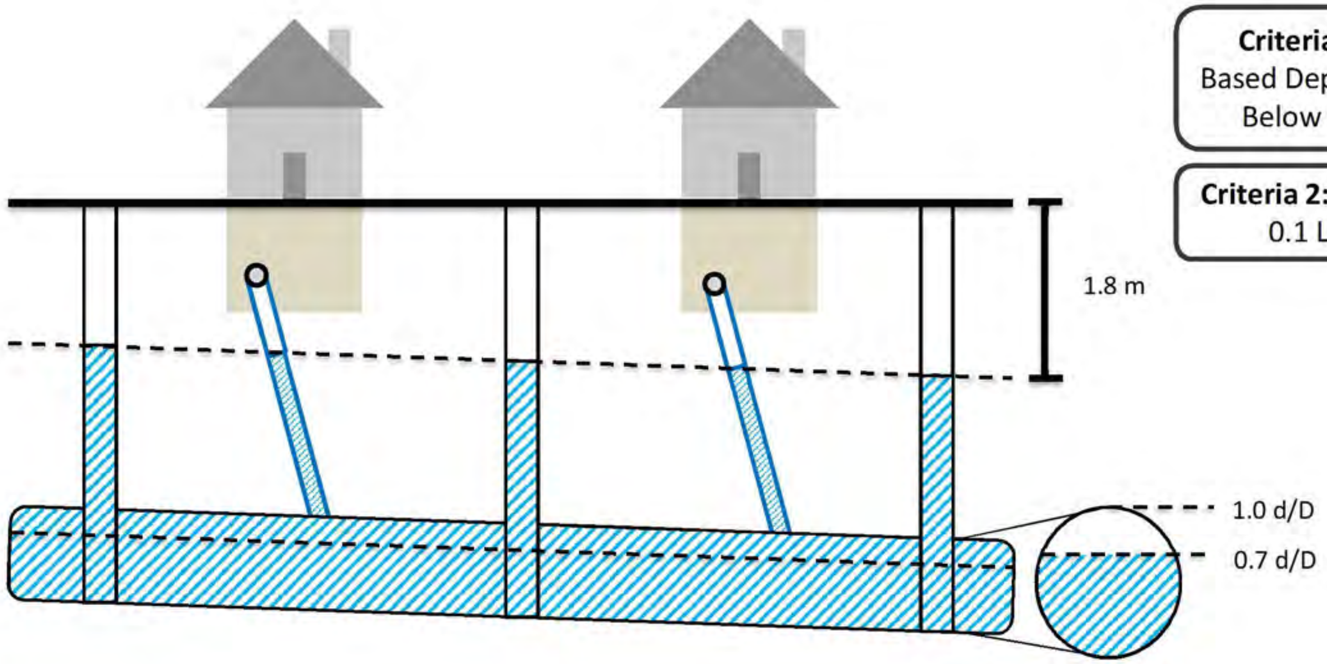
- Largest pump out of service

System Performance

- Peak wet weather design flows

		Dorchester	Thorndale (MOE Used)
ADD per capita (L/cap/d)		225	225
Peaking Factor		Harmon's Peaking Factor	
Infiltration Allowance		0.3 l/s/ha	
Upgrade triggers		80% - 90% firm capacity → planned upgrade	
		100% firm capacity → upgrade in place	
Surcharging / HGL Target		Moderate surcharging allowed – HGL at least 3 m below grade	
d/D Target	Ex. Sewers	1.0	
	Pr. Sewers	0.7 - 0.8	

Wastewater LoS
Sewer Capacity

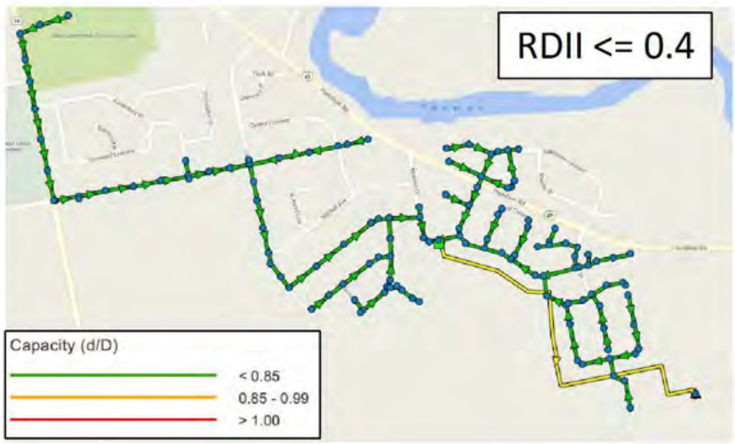


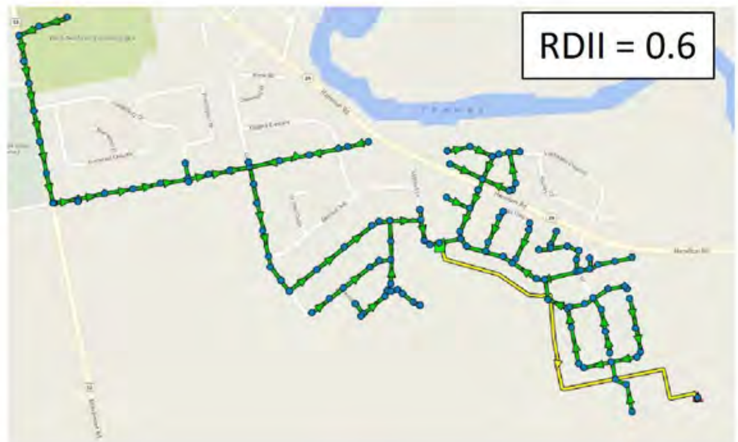
Criteria 1: HGL Based Depth – 1.8 m Below Ground

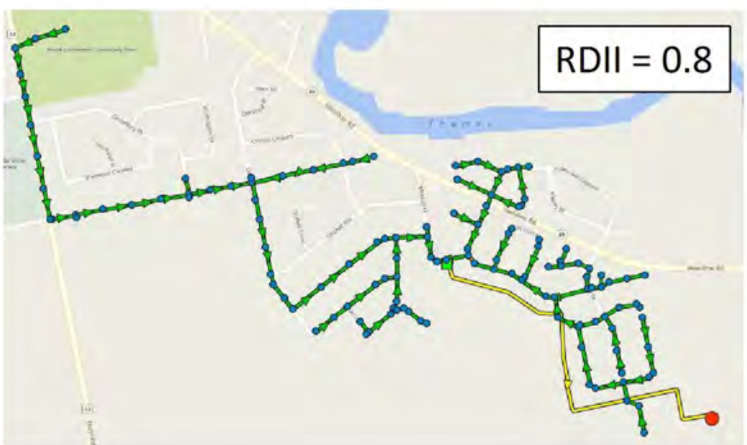
Criteria 2: 1.0 d/D at 0.1 L/s/ha

Representative I/I – Daily Average

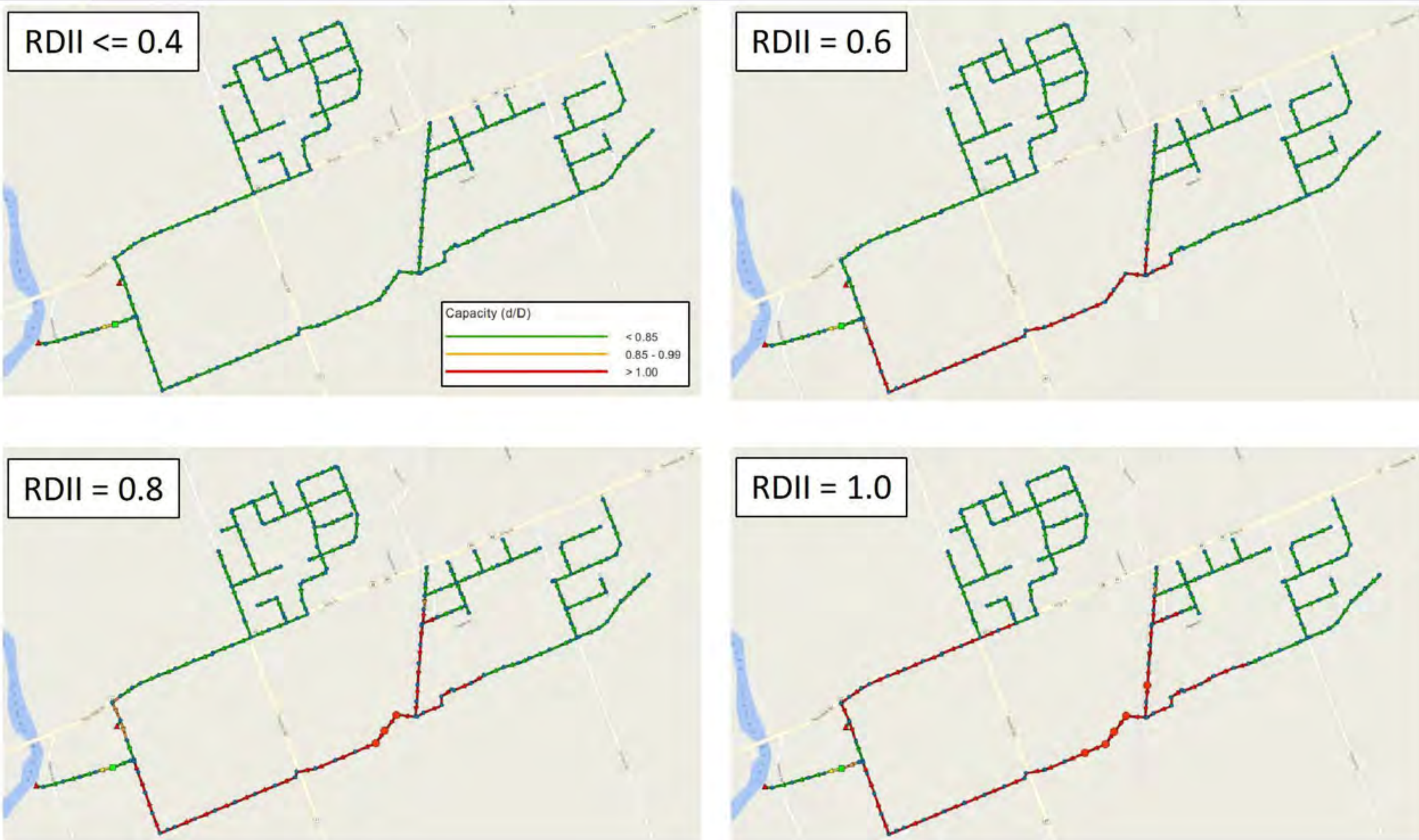
I&I Sensitivity Analysis (Dorchester)







I&I Sensitivity Analysis (Thorndale)



Setting performance targets (Tentative)

- Context
  - London uses 0.100 l/s/ha
  - Previous plant records peak daily average <0.100 L/s/ha
  - Waiting on trending to see ratio of short-term peak vs. daily average (typically 2-10)
  - Existing system can support >0.4 L/s/ha
- Recommendation
  - Use of 0.2 L/s/ha target for sewer capacity in existing areas (d/D Target)
  - Validate based on plant records (once available)
  - Provides flexibility to accommodate changes in growth & potential for climate change

NEXT STEPS

Project Schedule

January	February	March	April	May	June	July
•Workshop No. 1 •Model Development	•Workshop No. 2 Model Review •Servicing Assessment	•**Workshop No. 3 Servicing Concepts / Evaluation Criteria Review** •Develop Servicing Alternatives •Develop Servicing Alternatives	•Workshop No. 4 Alternatives Evaluation Workshop •Development of Implementation Plan	•PIC No. 1 •Master Plan Report	•Workshop No. 5 Report Review	•File Master Plan •Notice of Study Completion + 30 Day Review

- Next Workshop – Servicing Concepts / Evaluation Criteria Review – Wednesday, March 27
- Workshop No. 4 – Alternative Evaluation Workshop – Wednesday, April 17 (before Easter)

Royal Centre 3300 Hwy 7 Suite 402
Vaughan ON L4K 4M3
P: 416.703.0667 F: 416.703.2501
www.gmblueplan.ca

Meeting Notes

Project:	Municipality of Thames Centre Water and Wastewater Master Plan Update	Project No.:	TC-015-18
		GMBP Project No.:	418109
Meeting:	Workshop No. 3 Servicing Concepts / Evaluation Criteria Review		
Date:	March 27, 2019	Time:	9:30 am – 12:30 pm
Location:	Municipality of Thames Centre (4305 Hamilton Road, Dorchester)		
Attendees:			

Municipality of Thames Centre		**County of Middlesex**		**GM BluePlan**	
Carlos Reyes	✓	Marc Bancroft	✓	Julien Bell	✓
Jarrod Craven				Matt Fisher	✓

Agenda Items
Note: Meeting Agenda followed Presentation Slides (included as attachment to these minutes)

1. Project Progress Recap

- The project schedule was reviewed. The project remains on schedule for completion in July.
  - The wastewater model has been calibrated and validated based on the SCADA information received from the Municipality for the Dorchester and Thorndale WWTPs.
  - Calibrated water and wastewater models are now available. CR requested that the calibrated water and wastewater models be provided.

Actions:

- GMBP provided calibrated water and wastewater models to CR (May 3).

2. Wastewater Model Development and Validation

- The wastewater model validation process has been completed. Results are summarized in Slides 5 – 13.
  - 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 WWTP for dates prior to January 2019.
  - Representative inflow and infiltration (I/I) within the calibrated model ranges from 0.2 to 0.6 L/s/ha within Dorchester and 0.15 to 0.35 L/s/ha within Thorndale.

Agenda Items
Note: Meeting Agenda followed Presentation Slides (included as attachment to these minutes)

- Based on review of the results of the calibrated model, the following Level of Service criteria is recommended:
  - Level of service criteria for sewer: d/D less than 1.0 for existing and proposed sewers based on I/I of 0.2 L/s.
  - Level of service criteria for HGL: less than 1.8 m below grade for existing and proposed sewers based on I/I of 0.6 L/s.

3. Projection and Allocation Methodologies Recap

- The three proposed alternative methods for projection and allocation methodologies were recapped (summarized in Slide 15 of the attached PowerPoint presentation).
- For quick reference, the procedure and purpose of each Method is summarized in the Table below:

Approach Procedure and Purpose		Method 1	Method 2	Method 3
Procedure	For Dorchester and Thorndale	Build-Out to DC Growth Projections	Build-Out by Developable Area x Target Densities	
	For the Peripheral Lands and 401 Corridor Lands	Build-Out to DC Growth Projections		Build-Out 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.	

- Growth projections based on the three alternative methods is summarized in Slide 16 of the attached PowerPoint presentation.
- The water and wastewater models have been loaded with demands and flows based on the growth projections determined through the alternative Methods noted above.

4. Growth Impacts and Servicing Concepts

a. Dorchester Water System

- Existing and planned treatment, pumping and storage capacity for the Dorchester WTF and ET compared to growth projections are summarized in Slides 20 to 23.

Storage

- If the existing in-ground reservoirs at the Dorchester WTF are utilized for storage, there is enough total storage within the Dorchester system to provide the recommended design fire flow of 150 L//s for 2 hours plus equalization and emergency storage to build-out for all growth projection methods.

Pumping

Agenda Items
Note: Meeting Agenda followed Presentation Slides (included as attachment to these minutes)

- Water supply must be upgraded to meet the MDD demands under build-out scenarios for Method 2 and Method 3
- Pumping from the Dorchester WTF in-ground reservoirs must be upgraded to meet the system's peak hour demands under build-out for all growth projection methods.

System Servicing Constraints

- Water servicing constraints within the Dorchester system are summarized on Slide 23.

Supply

- Dorchester's primary constraint is water supply. The existing WTF and wells have capacity to service approximately 3,500 additional persons plus jobs (PPJ).
- There are generally two alternative servicing concepts that can be evaluated.
  1. Supply from London / Lake Huron; and,
  2. Well Exploration in support of Additional Well Supply.
  - Opportunities and constraints for each of these alternatives are summarized on Slide 24.
  - It was noted that the position of Thames Centre council is that the Municipality should prioritize control of their water supply. Based on this directive, the expansion of the well supply is the preferred supply alternative.
  - Additional study is required to determine the availability of additional water supply from groundwater wells in the Dorchester area. Typically, the timing for exploration and determination of groundwater availability is minimum four years. Hydrogeological study must first be completed, followed by groundwater modelling and comprehensive pump testing.
  - If suitable additional well supply capacity is found to be available, the timeframe for the environmental assessment, design, permitting, construction and commissioning is four to five years. Total estimated timeframe for construction is eight to nine years.
  - The estimated timeframe for commissioning a connection to water supply from London (or Lake Huron and Elgin Area Primary Water Systems) is a similar seven to eight years. The most significant benefit to this water servicing alternative is that there is certainty that sufficient supply will be available. The estimated timeline for commissioning of a London connection would be two years to establish agreement, and five to six years for the Class EA, design, permitting, construction and commissioning.
  - It was noted that the Municipality is interested in maintaining its existing allocation with the Lake Huron and Elgin Area Primary Water Systems for future demand. This will be a recommendation of the Master Plan Update.

Conveyance

- Watermain improvements focused on looping and upgrade of the trunk watermains are required to service growth to buildout under the three alternative methods. Two primary servicing concepts included:
  1. Upgrade of the waterman "spine" along Dorchester Road running from the WTF to the ET; and,
  2. Additional "western" crossing of Thames River (if there is opportunity to construct alongside a required wastewater crossing).
  - CR noted that, if possible, the Municipality would like to focus on utilizing the existing river crossing alignments to service growth.

Agenda Items
Note: Meeting Agenda followed Presentation Slides (included as attachment to these minutes)

- Natural Heritage Systems (NHS) are to be considered for all servicing alternatives. There needs to be comprehensive evaluation of NHS impacts and required approvals when evaluating location of facilities and proposed pipe alignments.

- Water servicing concepts for the 401 Corridor Lands are summarized on Slide 26. It is anticipated that timing for growth to occur within these lands is at least more than 10 years away, and there is a higher-level of uncertainty around how development in the area will proceed. The four servicing concepts being considered are to be costed with high-level evaluation that considers the anticipated timeline.

b. Thorndale Water System

- Existing and planned treatment, pumping and storage capacity for the Thorndale WTF and ET compared to growth projections are summarized in Slides 29 to 31.

Storage

- If the existing in-ground reservoirs at the Thorndale WTF are utilized for storage, there is enough total storage within the Thorndale system to provide design fire flow of 150 L/s for 2 hours plus equalization and emergency storage to build-out within the Settlement Boundary. Buildout based on Method 3 projections (that include the 120 ha or residential lands located outside of the Settlement Boundary) will require additional storage.

Pumping

- Water supply must be upgraded from the recently approved 20 L/s PTTW to meet the MDD demands under build-out scenarios for Method 2 and Method 3.
- Pumping from the Dorchester WTF in-ground reservoirs must be upgraded to meet the system's peak hour demands under all build-out scenarios.

System Servicing Constraints

- Water servicing constraints within the Thorndale system are summarized on Slide 32.

Supply

- Thorndale requires additional water supply to service growth to build out based on Method 2 and Method 3 projections.
- As noted above, the Municipality is interested in prioritizing control of their water supply, and similar to Dorchester, the preferred servicing concept is to find additional supply from new groundwater wells rather than commission a connection to the London system.
    - Opportunities and constraints for each of these alternatives are summarized on Slide 33.
    - Additional study is required to determine the availability of additional water supply from groundwater wells in the Thorndale area. As noted above under Item 2.a. Dorchester Supply, the timing for exploration and determination of groundwater availability is minimum four years.

Conveyance

Agenda Items
Note: Meeting Agenda followed Presentation Slides (included as attachment to these minutes)

- Watermain improvements focused on looping and upgrade of the trunk watermains are required to provide sufficient fire flow to the Industrial Park and service the proposed residential developments located outside of the Settlement Boundary.
- GMBP is considering the council-approved upgrades to the south trunk through the Foxborough development (crossing the CN Railway) and through the Rosewood development, as well as improved looping through the Industrial Park. The approved upgrades will be incorporated into the servicing alternatives evaluation.
- Also, to be considered further is the benefit of upgrades to the existing watermain along King Street.

c. Dorchester Wastewater System

- Dorchester treatment, and pumping station capacities compared to growth projections are summarized in Slides 36 to 38.

Treatment

- The Dorchester WWTP has planned expansions with capacity to accommodate growth for Dorchester plus peripheral lands (including existing unserviced lands) under Method 1, Method 2 and Method 3.
  - Utilization of the Dorchester WWTP for wastewater treatment (rather than the construction and commissioning of a second wastewater treatment plant) is preferred. Proposed upgrades at the Dorchester WWTP have already been approved and planned and where reasonable, the WWTP upgrades should be utilized.

Pumping Stations

- Upgrades will be required at the Dorchester SPS in order to convey flows from growth in the stations' existing catchments under Method 2 and Method 3 projections. The existing PS does not have capacity to convey flows from growth areas additional to its existing catchments under any of the growth projection methodologies.

- Dorchester SPS #3 can pump flows from the design catchments (located within the Settlement Boundary) under Method 1 projections. Design catchment areas for the Dorchester SPS #3 are shown on Slide 39. Upgrades will be required at the PS to pump flows under other servicing concept scenarios, including:
  - Method 2 and 3 growth projections for the SPS's design catchment areas, and,
  - Growth flows from additional catchments located outside of the Settlement Boundary (under all growth projections methods).
- GMBP will also review the potential for servicing developable lands located north of the SPS design catchment areas by gravity sewer to the Dorchester SPS #3, including Developments 17 and 16. Development 16 is located outside of the Settlement Boundary.

- Pumping station(s) (or a new WWTP) will be required to service lands located directly south of the Thames River as well as all lands located north of the Thames River. Servicing concepts for the lands located north of the Thames River and the lower elevation lands located directly south of the Thames River are shown on Slides 41 to 50.

Agenda Items
Note: Meeting Agenda followed Presentation Slides (included as attachment to these minutes)

- The Municipality is interested in evaluation of servicing alternatives for lands north of the Thames River based on servicing of:
  1. developable lands plus existing unserviced lands; and
  2. developable lands ahead of existing unserviced lands.
- There is limited interest from existing unserviced lands to connect to the municipal wastewater system. Focus on servicing of developable lands located north of Thames River should help encourage development within the area.

Conveyance within South Dorchester

- A local pumping station will be required to service developable lands located in southeast Dorchester (fronting Hamilton Road (north side) and located east of the Dorchester Fairground properties).
- There are potential capacity constraints within the existing Dorchester Road sewer flowing south to Byron Avenue.

- Servicing of the 401 Corridor Lands will require a new PS (or upgrades to the under-construction Dorchester SPS #3).

d. Thorndale Wastewater System

- Thorndale treatment and pumping capacities compared to growth projections are summarized on Slides 55 and 56.

Thorndale WWTP

- The Thorndale WWTP has planned capacity upgrades to service proposed growth under Method 1. Further upgrades at the WWTP will be required to service growth under Method 2 and Method 3 growth projections. Most significantly, upgrades will be required to service the Peripheral Lands residential development areas. It was noted that there is available land for future expansion of the WWTP facilities within the existing Thorndale WWTP property.

Thorndale SPS

- The pumping station at the Thorndale WWTP has capacity to service projected growth within the Thorndale Settlement Boundary under all methods. Upgrades will be required to service growth within the Peripheral Lands.

Conveyance

- Existing sewers running along King Street and the south trunk (through the Foxborough development, crossing the CN railway) do not have capacity to convey flows from the Peripheral Lands located outside of the Settlement Boundary. Upgrade of existing trunk sewers will be evaluated compared to new sewer alignments and a second southerly crossing of the CN railway.

Actions for 4. Growth Impacts and Servicing Concepts

- GMBP will progress evaluation of servicing concepts and develop and evaluate alternatives to be presented to the Municipality at the April 17 Workshop No. 4.

5. Alternatives Evaluation

- Alternative Evaluation Criteria are summarized on Slides 62 and 63.

Agenda Items Note: Meeting Agenda followed Presentation Slides (included as attachment to these minutes)
• Selection of Preferred Alternatives will be based on the “Reasoned Argument Approach”. This approach is based on presentation of the tradeoffs among the various criteria; with a focus on reasons why the Preferred Alternative has been selected. The Reasoned Argument Approach moves away from detailed scoring or ranking of each alternative.
6. Next Steps and Next Meeting • The next meeting will be Workshop No. 4 – Alternatives Evaluation Workshop is scheduled for April 19. • Open-house style PICs will be held in Dorchester and Thorndale in May. The Municipality would prefer to schedule the PICs on consecutive nights. Schedule and presentation material will be discussed further at Workshop No. 4.

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Attachments

MUNICIPALITY OF Thames Centre

Water and Wastewater Master Plan Update

Workshop No. 3

Municipality of Thames Centre (4305 Hamilton Road, Dorchester)

March 27, 2019

AGENDA

1. Project Progress Recap
2. Wastewater Model Development and Validation
   - Wastewater Models Existing Scenario Results and Discussion
   - I&I Sensitivity
3. Projection and Allocation Methodologies Recap
   - Method 1, 2, and 3
4. Review Water and Wastewater Servicing Concepts
   - Opportunities and Constraints
   - Concepts
5. Alternatives Evaluation Criteria and Approach
6. Next Steps

OBJECTIVES

1. Review Wastewater System Model Validation
2. Review Water and Wastewater Servicing Concepts
3. Determine Concepts to be Evaluated Further as Alternatives
4. Confirm Next Steps and Schedule

PROJECT PROGRESS RECAP

Project Schedule

January	February	March	April	May	June	July
• Workshop No. 1 • Model Development • Outstanding Facility Info received from Thames Centre	• Workshop No. 2 Model Review • Servicing Assessment	• **Workshop No. 3 Servicing Concepts / Evaluation Criteria Review** • Develop Servicing Alternatives	• Workshop No. 4 Alternatives Evaluation Workshop • Development of Implementation Plan	• PIC No. 1 • Master Plan Report	• Workshop No. 5 Report Review	• File Master Plan • Notice of Study Completion + 30 Day Review

- Wastewater Model has been validated based on SCADA information received

MODEL DEVELOPMENT AND VALIDATION

Model Development and Validation

WASTEWATER MODEL

Notes on Wastewater Model Calibration

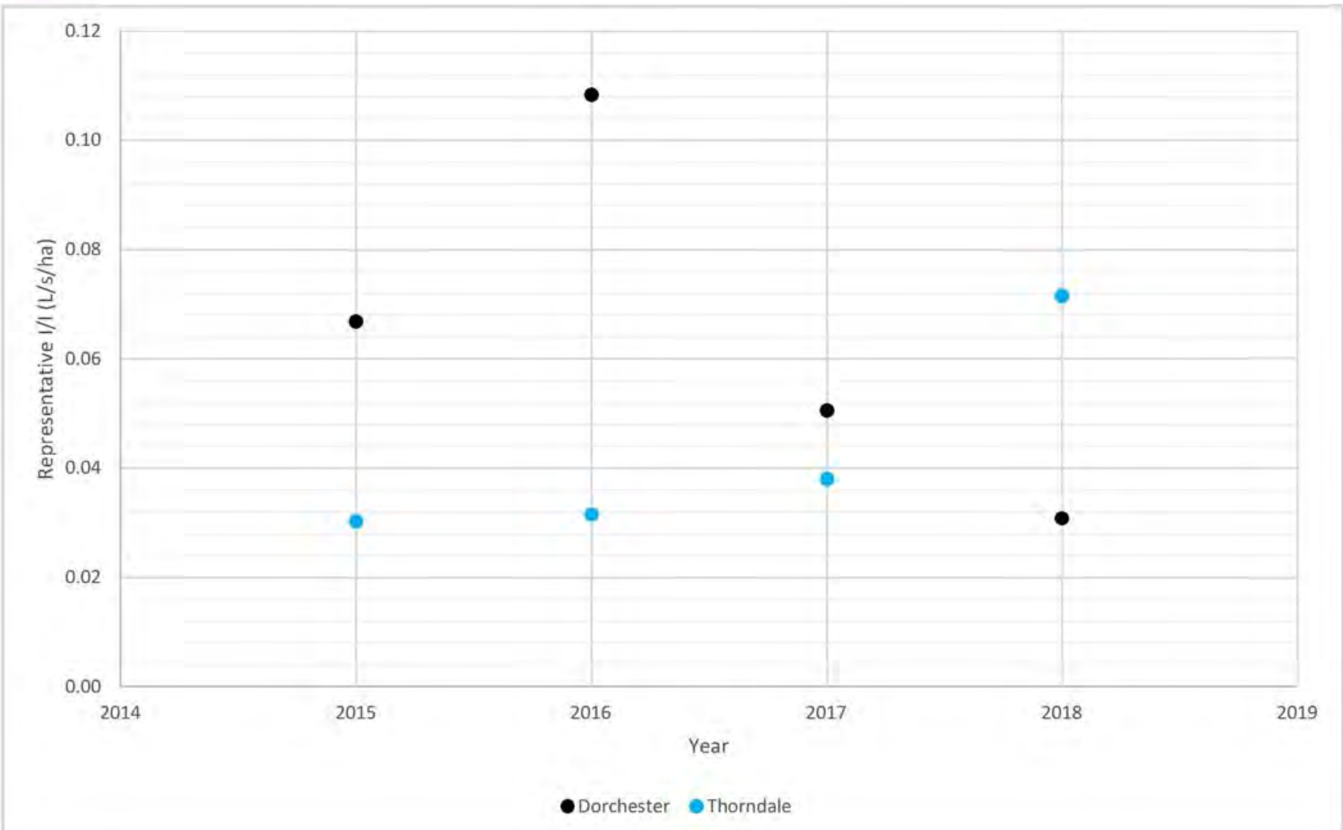
Dry Weather Flow Calibration

- Flow Monitoring Catchments
  - Match average/peak dry weather flows
    - Adjust per capital loading rates – historic water billing data provided by Municipality was used to estimate and spatially allocate 90% base sanitary flow
    - Adjust diurnal pattern – Diurnal Average Daily Dry Weather Flow patterns were derived for each flow monitoring catchment

Wet Weather Flow Calibration

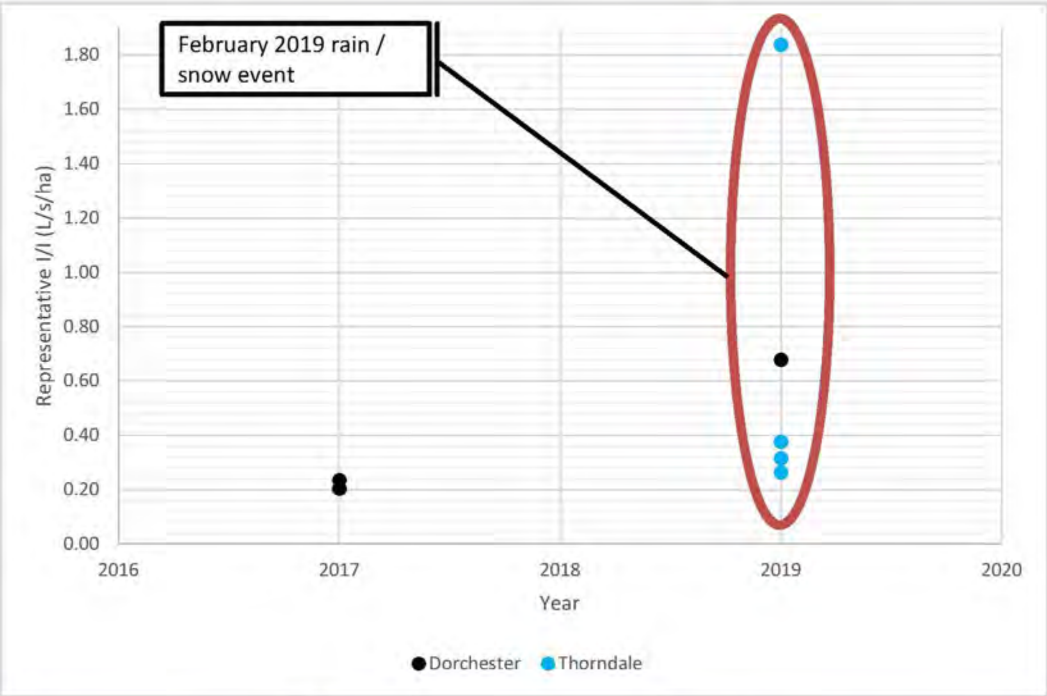
- Flow Monitoring Catchments
  - Identify wet weather flow events based on wet weather flow days
    - Events were selected based on large rain events with corresponding high flows at WWTP's
  - Match peak/total wet weather flows

Representative I/I – Daily Average



Representative I/I – Wet Weather Events

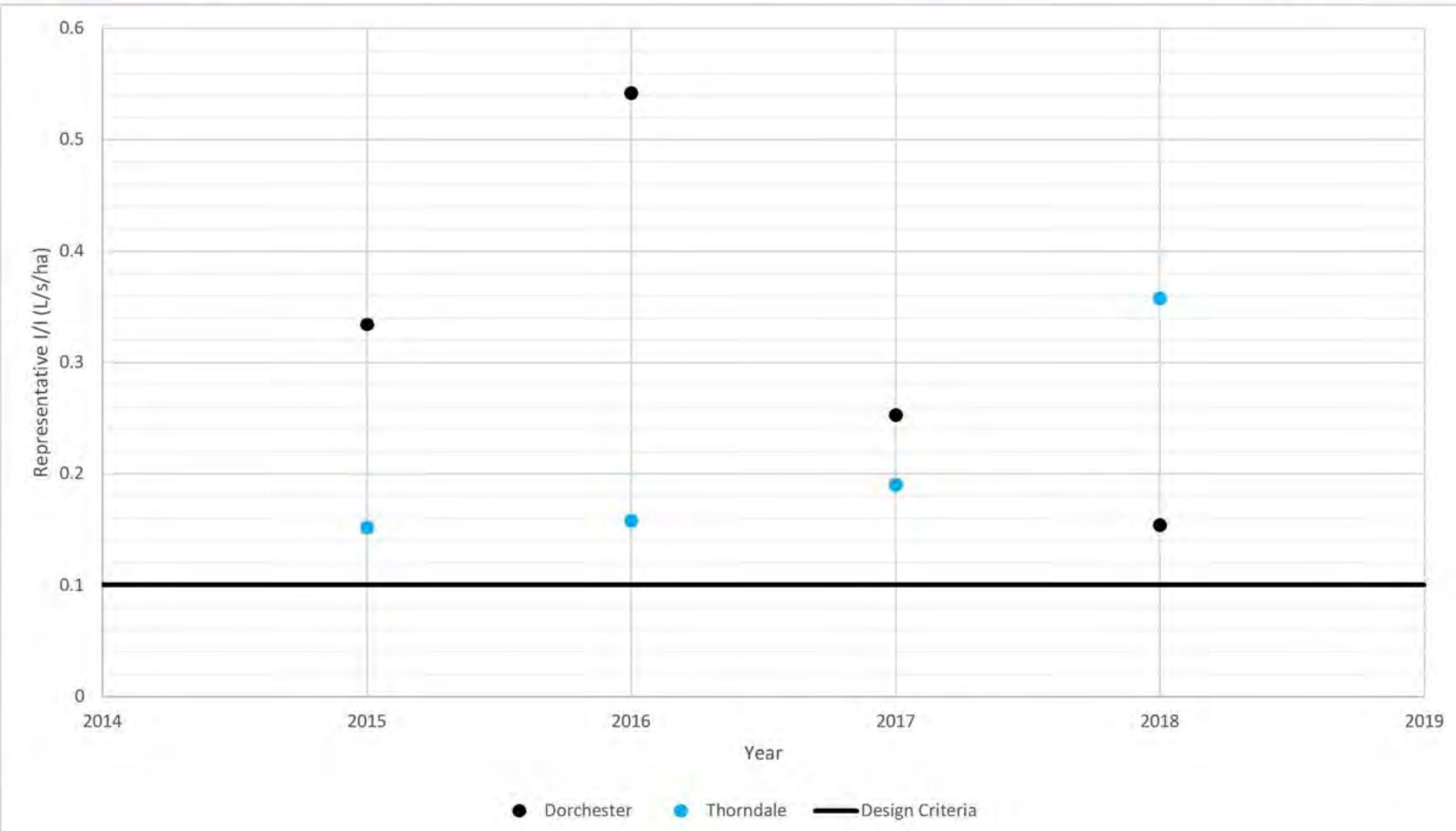
Representative I&I with peaking factors applied



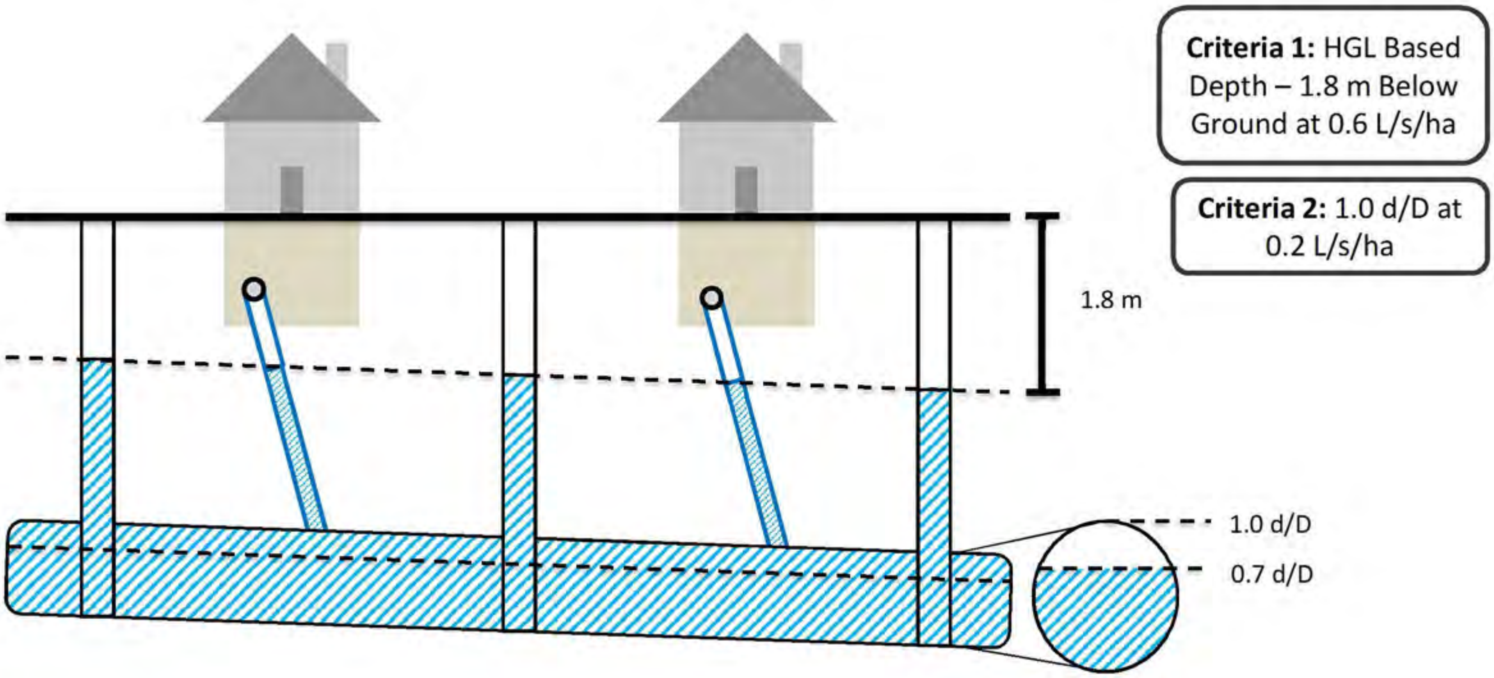
Dorchester			
Event	Representative I/I (L/s/ha)	Peaking Factor	RDII with PF (L/s/ha)
2/4/2019	0.07	16.05	1.13
5/4/2017	0.05	6.82	0.34
5/5/2017	0.09	4.35	0.39
5/6/2017	0.11	3.20	0.34

Thorndale			
Event	Representative I/I (L/s/ha)	Peaking Factor	RDII with PF (L/s/ha)
2/5/2019	0.29	5.39	1.58
2/6/2019	0.07	3.93	0.27
2/7/2019	0.05	4.38	0.23
2/8/2019	0.06	5.01	0.32

Representative I/I – Daily Average with Peaking Factors

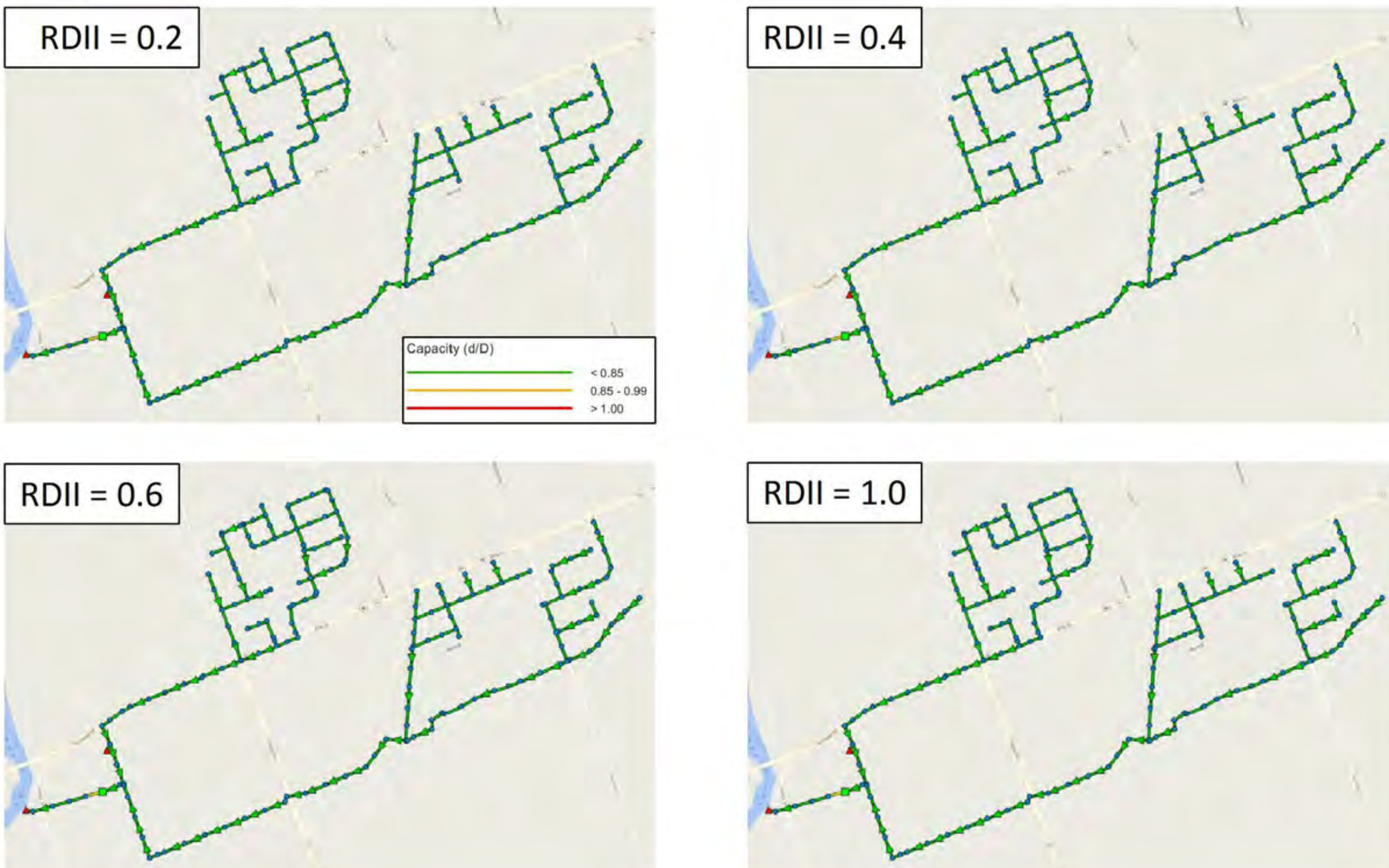


Wastewater LoS
Sewer Capacity



I&I Sensitivity Analysis (Dorchester)

I&I Sensitivity Analysis (Thorndale)



Growth Scenarios

GROWTH PROJECTIONS AND FACILITY CAPACITIES

Growth Projections and Allocation Methodologies

Three Alternative Methodologies

1. Draft Plans / Development Concepts + DC Targets (Urban + Peripheral / 401 Corridor)
   - Allocation per Draft Plans / Development Concepts
   - Distribution of development across outstanding lands by area to meet Buildout DC Targets
   - Phasing for Capital Plan informed by DC Recommendations with input from Municipality
2. Draft Plans / Development Concepts + Target Densities with Dorchester and Thorndale Settlement Boundaries, DC Targets in Peripheral / 401 Corridor
   - Allocation per Draft Plans / Development Concepts
   - **Within Settlement Boundary:** Distribution of development across outstanding lands based on Target Densities (50 ppha suggested for all land uses)
   - **Outside of Settlement Boundary:** Distribution of development across outstanding lands by area to meet Buildout DC Targets for Peripheral Areas and 401 Corridor Lands.
3. Draft Plans / Development Concepts + Target Densities (Urban + Peripheral / 401 Corridor)
   - Allocation per Draft Plans / Development Concepts
   - Distribution of development across outstanding lands based on Target Densities (50 ppha suggested for all land uses)

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Growth Projections Summary

Table 3-5: 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	18,846	
Within Settlement Boundary and Including Peripheral and 401 Corridor Lands to be Developed	Ultimate Buildout	14,871	19,266	31,608

Table 3-6: 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	7,186	
Within Settlement Boundary and Including Peripheral Lands to be Developed	Ultimate Buildout	4,475	7,507	13,239

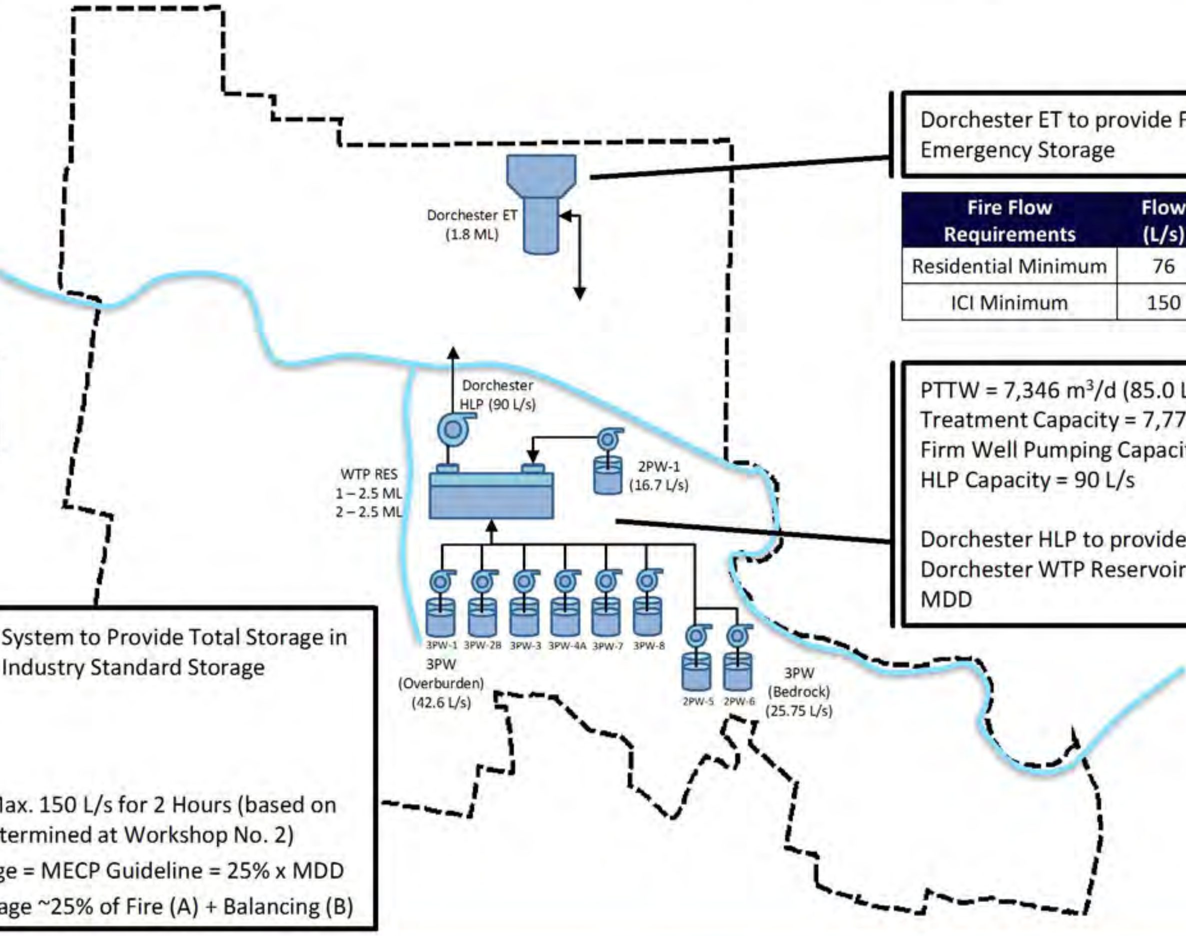
Phasing and Timing Approach (Recap)

- Develop Preferred Strategy for Full Buildout
  - Identify upgrade triggers by population/area trigger
  - Develop cost per capita
- Development of Capital Program
  - Assume Build-Out Approach
  - Assume Registered & Concepts develop
- Municipality's Perspective to Build-Out
  - Expected timing of Blocks where there is development information available
    - Demand for new residential / employment within Dorchester and Thorndale
    - Large developer / small developer and ability to fund full development
  - Known issues
    - Development north of Thames River in Dorchester and Land Supply Requirements
  - Scenarios

Growth Impacts and Servicing Concepts

DORCHESTER WATER SYSTEM

Dorchester Water System



Dorchester ET to provide Fire Flow + Emergency Storage

Fire Flow Requirements	Flow (L/s)	Duration (Hours)
Residential Minimum	76	2
ICI Minimum	150	2

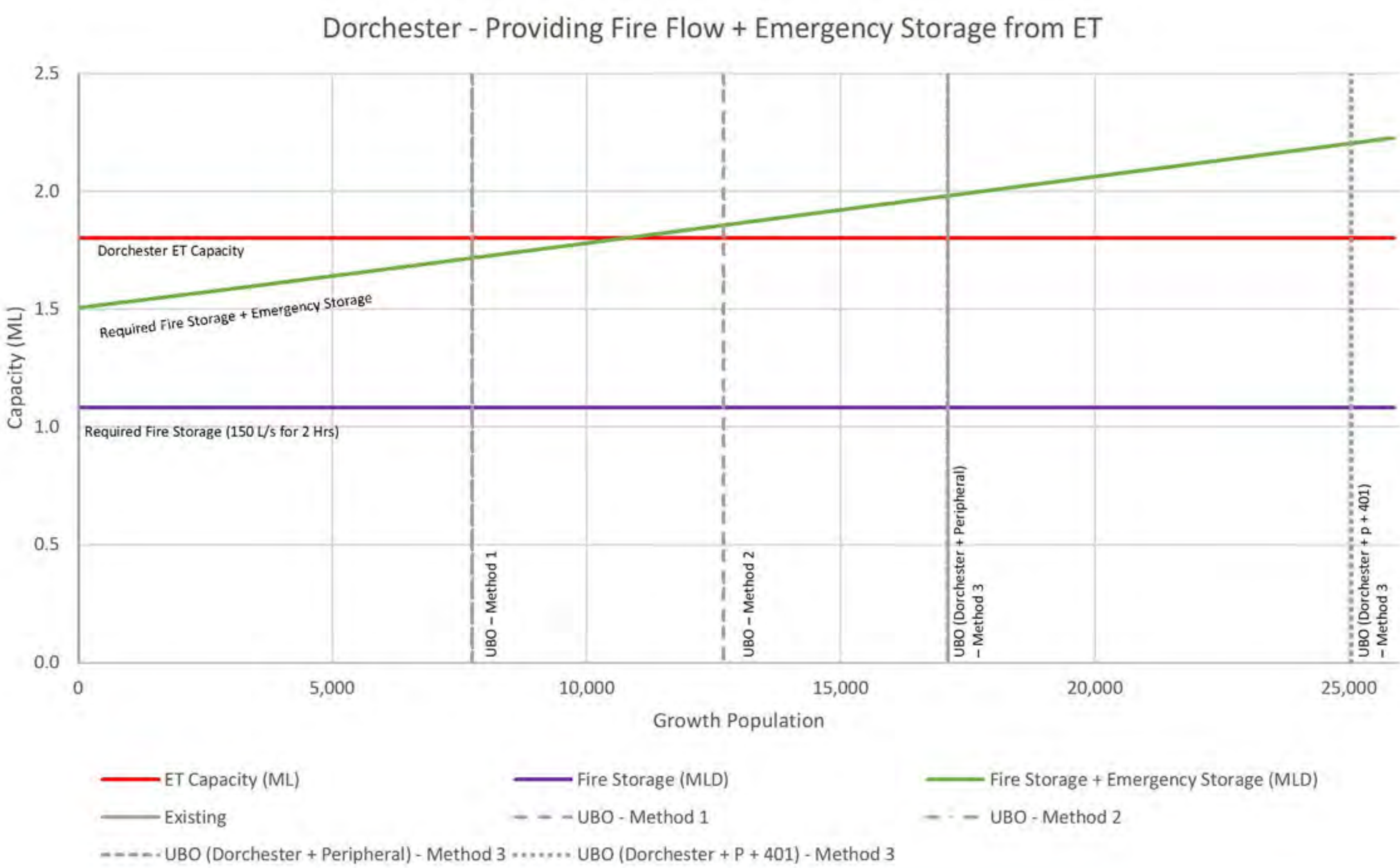
PTTW = 7,346 m^3/d (85.0 L/s)
Treatment Capacity = 7,776 m^3/d (90 L/s)
Firm Well Pumping Capacity = 42.6 L/s
HLP Capacity = 90 L/s

Dorchester HLP to provide MDD + PHD
Dorchester WTP Reservoirs to provide MDD

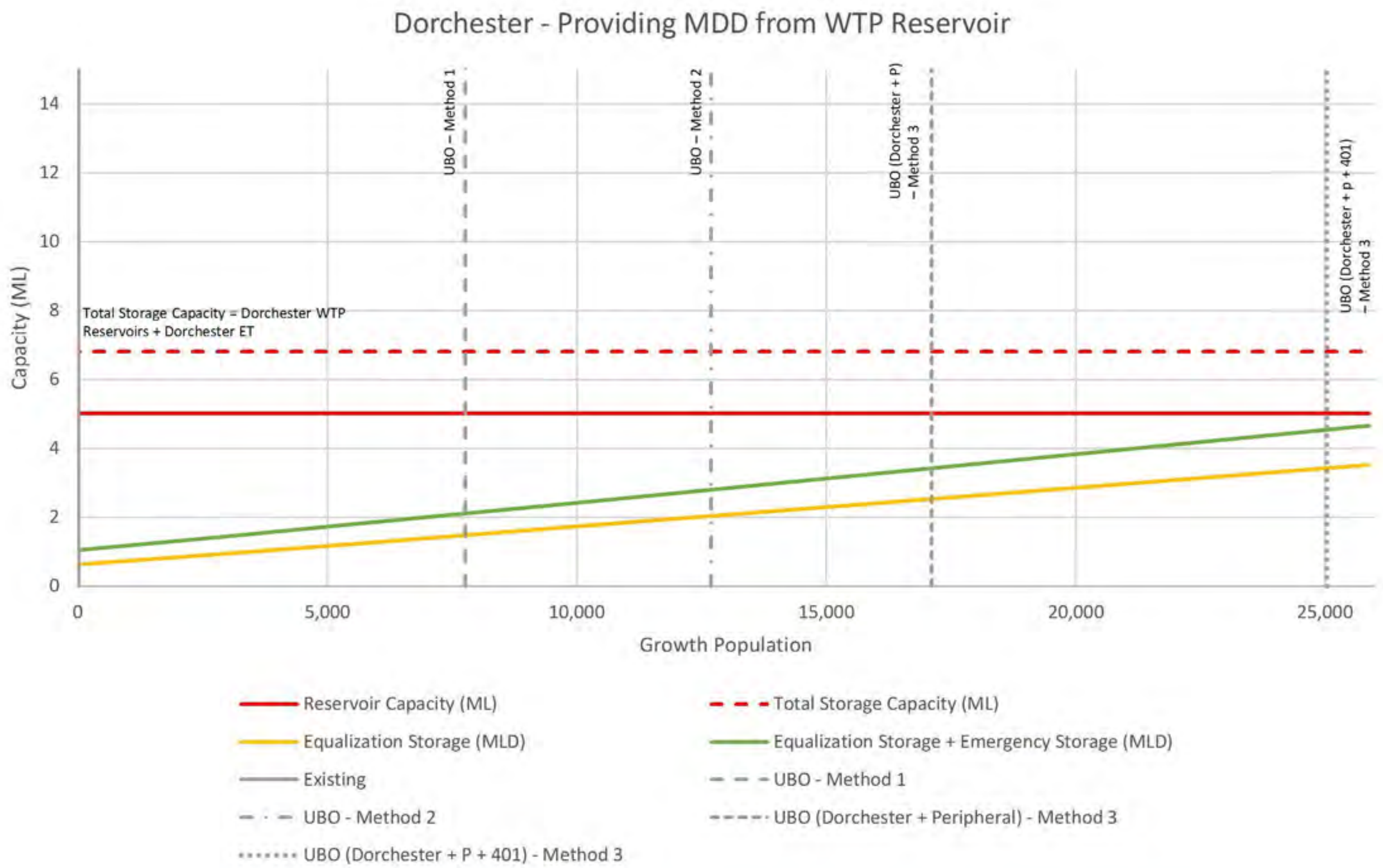
Review of Ability of System to Provide Total Storage in line with MECP and Industry Standard Storage Requirements

A + B + C
A = Fire Storage = Max. 150 L/s for 2 Hours (based on Design Fire Flow Determined at Workshop No. 2)
B = Balancing Storage = MECP Guideline = 25% x MDD
C = Emergency Storage ~25% of Fire (A) + Balancing (B)

Dorchester Elevated Tank



Dorchester WTP Storage



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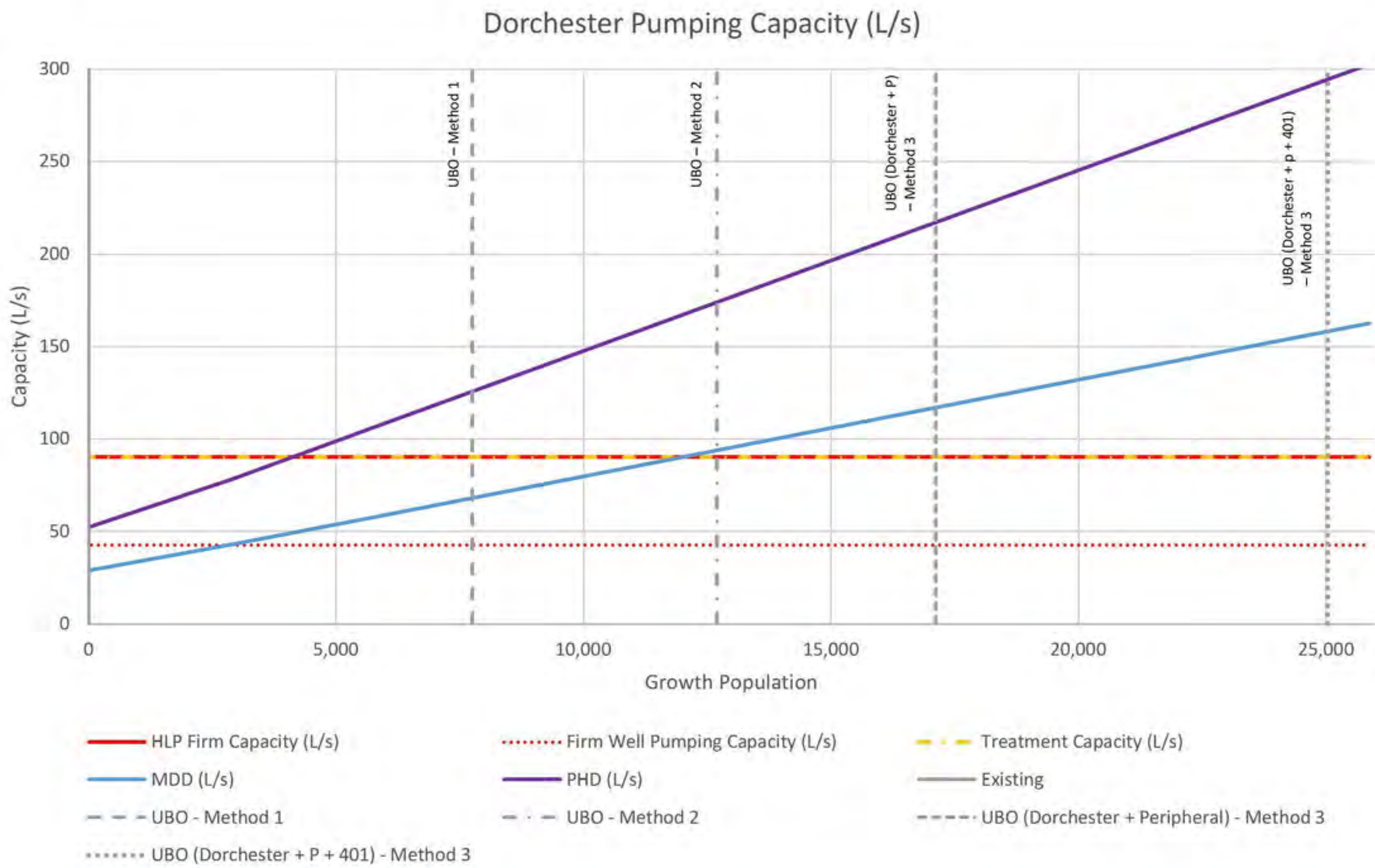
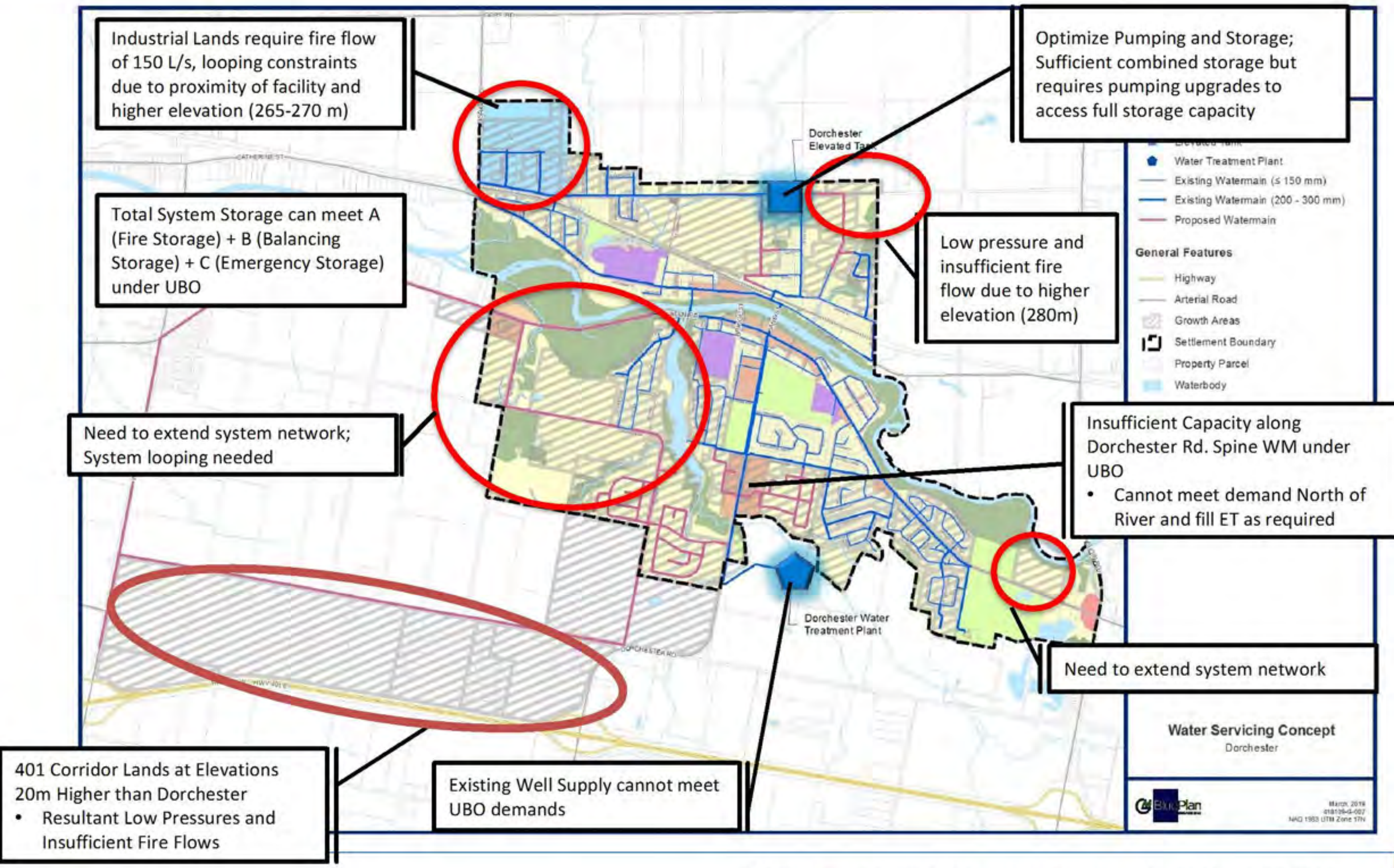
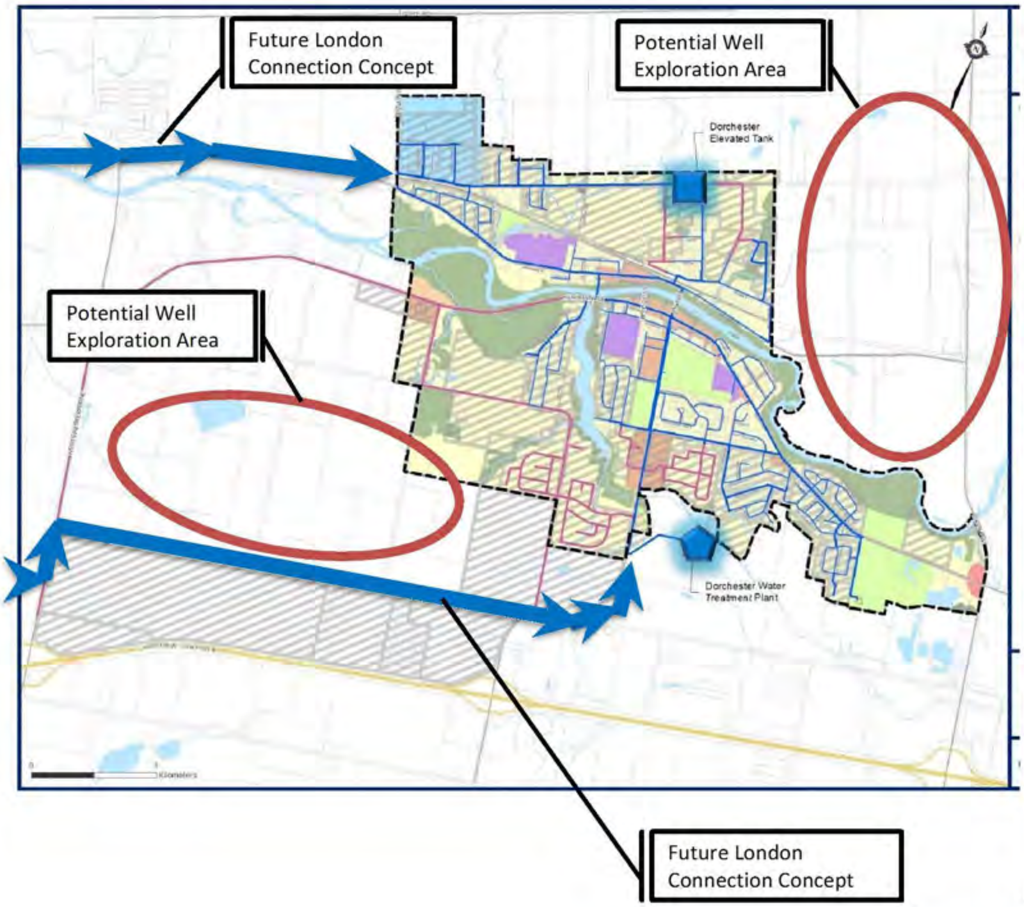
Dorchester WTP Pumping



Dorchester Water Servicing Constraints



Dorchester Water Servicing Concepts Supply



Supply from London

- Supply from London north of River or along north of 401 Corridor Lands can provide additional capacity to Dorchester and Peripheral Areas
- London Supply can easily provide for full buildout demand within Dorchester and Peripheral Areas
- Opportunity to decommission Dorchester WTP and provide supply entirely through London connection
- London Supply north of the River likely can supply Dorchester ET without additional BPS (Further Details of London Future SE Pressure Zone to be Investigated)
- Construction Costs for this alternative likely less than for new facilities within Dorchester (~ 4km of watermain per feed + meter chamber(s))

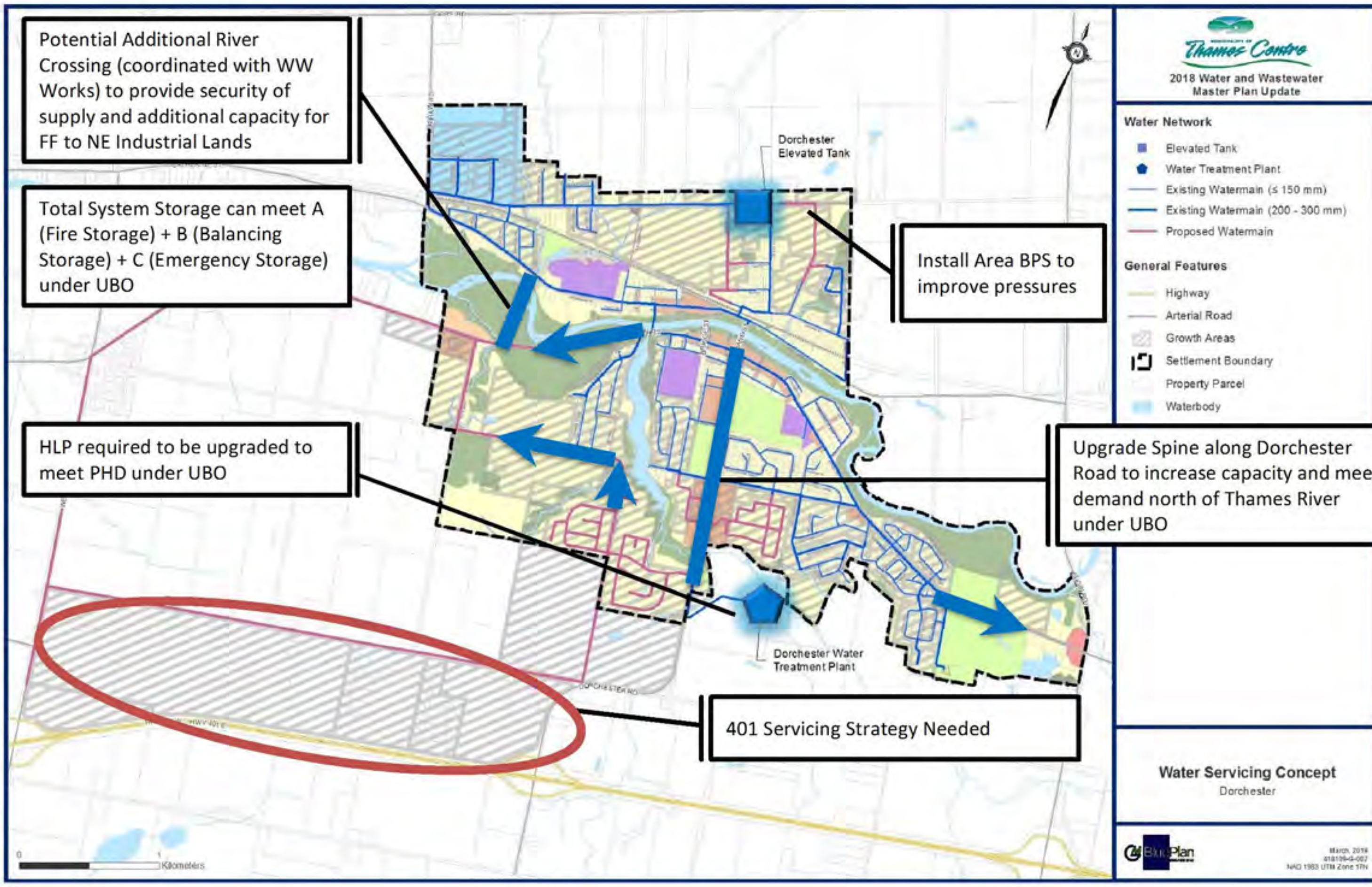
Well Exploration

- Considered in 2008 Master Plan
- Alternative to Future Connection to London
- Potential opportunity to provide Dorchester with self-sufficient supply to service Buildout demand
- Identification / availability of enhanced aquifer can provide Dorchester with opportunity to construct and operate new WTP at less cost over life-cycle than connection to London
- Anticipated that there may be quality issues similar to existing wells
- There is limited Information available supporting identification of source
- High level of uncertainty and years of study required to determine availability

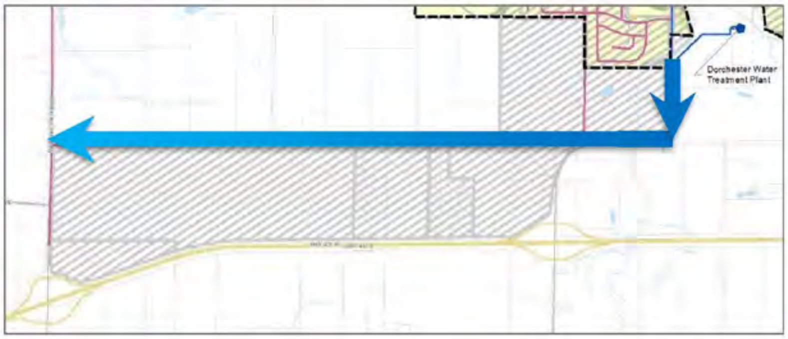
401 Corridor Lands

- 401 Corridor Lands at elevations nearly 20 metres higher than Dorchester
- East London buildout to boundary (near Bradley Ave. and Commissioners Pkwy) at similar elevations as 401 Corridor
  - Can supply 401 Corridor Lands from Dorchester WTP with low pressures and no fire flow provided
  - Can provide low lift BPS to provide service pressures greater than 40 psi
  - Construction of a BPS to provide domestic + fire flow

Dorchester Water Servicing Concepts
Storage and Conveyance



401 Corridor Lands Water Servicing Concepts

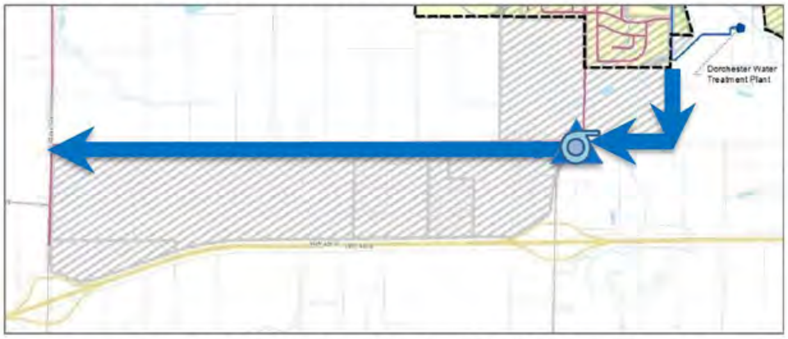


Concept 1 – Supply 401 Corridor Lands from Dorchester WTP

- Low pressures (<40 psi) with no fire flow provided
- Service pressures >50 psi likely available if London Supply commissioned
- Sufficient Fire Flow may be available from London Supply

Concept 2 – Supply 401 Corridor Lands from with Low Lift BPS

- Provides service pressures (>40 psi) with no fire flow provided
- Potential for low Lift BPS could be decommissioned if London supply is commissioned



Concept 3 – Supply 401 Corridor Lands with BPS + Fire Pump

- Provides industry with service pressures >50 psi + fire flow
- Significant increase to capital + O&M costs to service area

Concept 4 – Supply 401 Corridor Lands with BPS + Storage Facility

- Provision of sufficient service pressures and fire flows to area
- Can provide additional storage to South Dorchester
- Can be use to eliminate pump upgrades at WTP

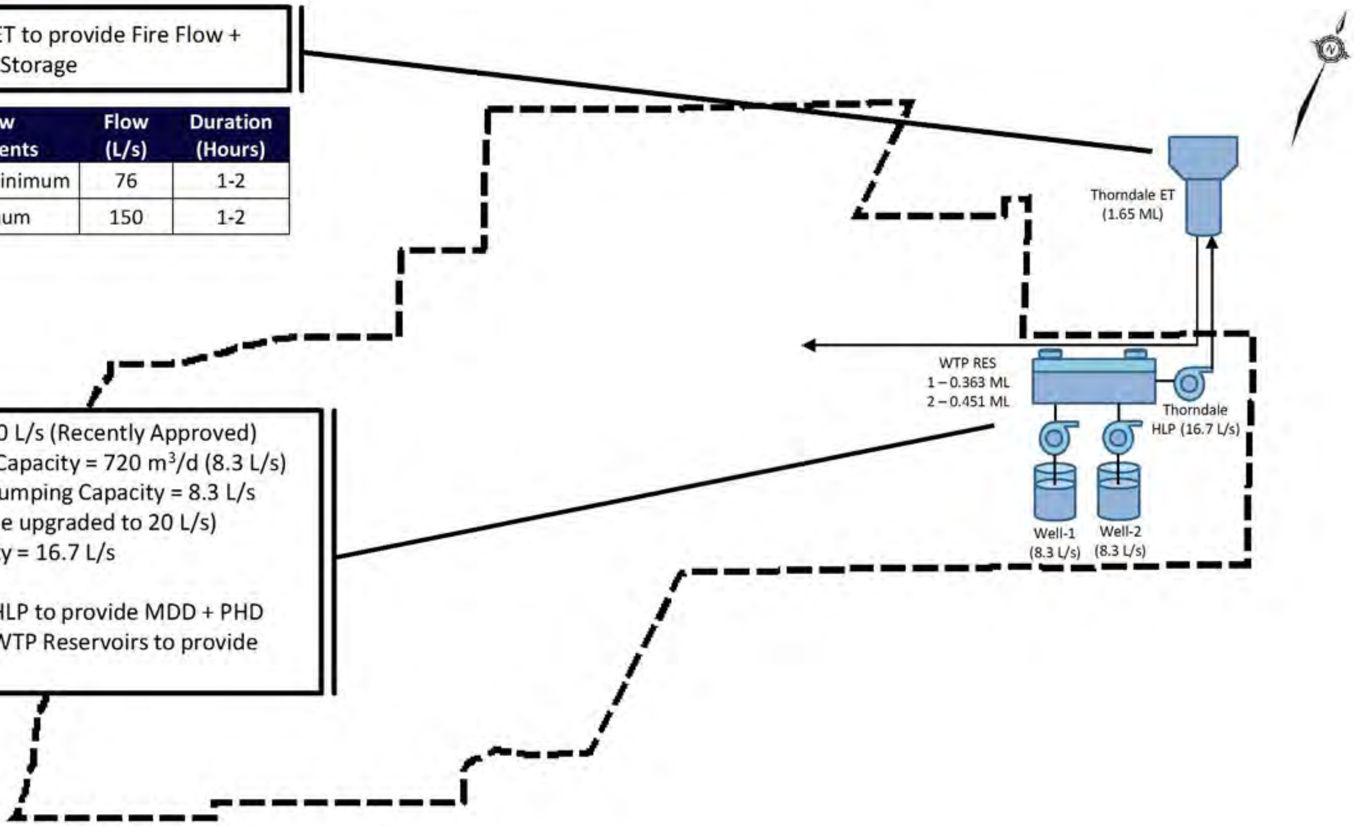
Growth Impacts and Servicing Concepts

THORNDALE WATER SYSTEM

Thorndale Water System Schematics

Thorndale ET to provide Fire Flow + Emergency Storage

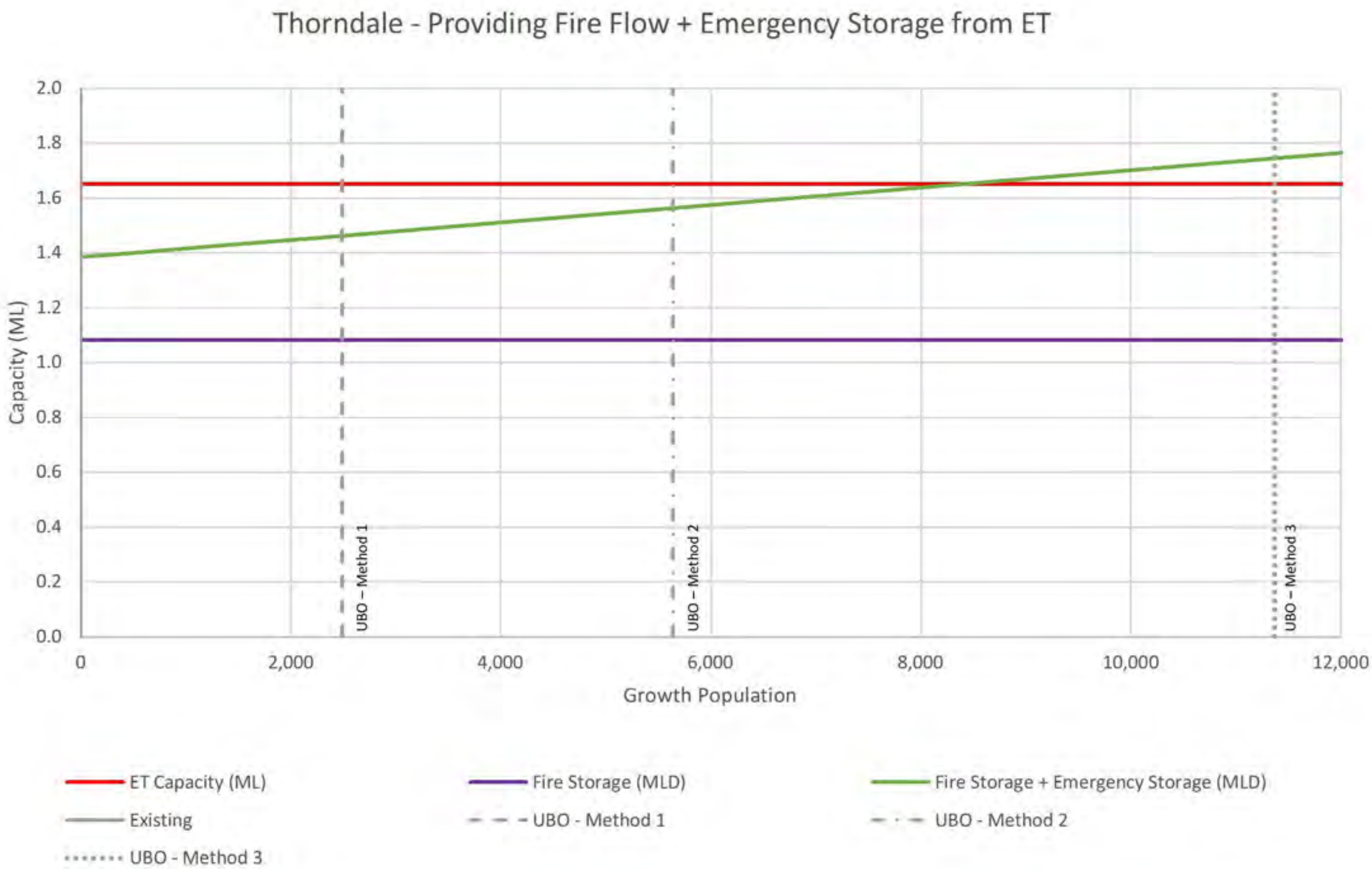
Fire Flow Requirements	Flow (L/s)	Duration (Hours)
Residential Minimum	76	1-2
ICI Minimum	150	1-2



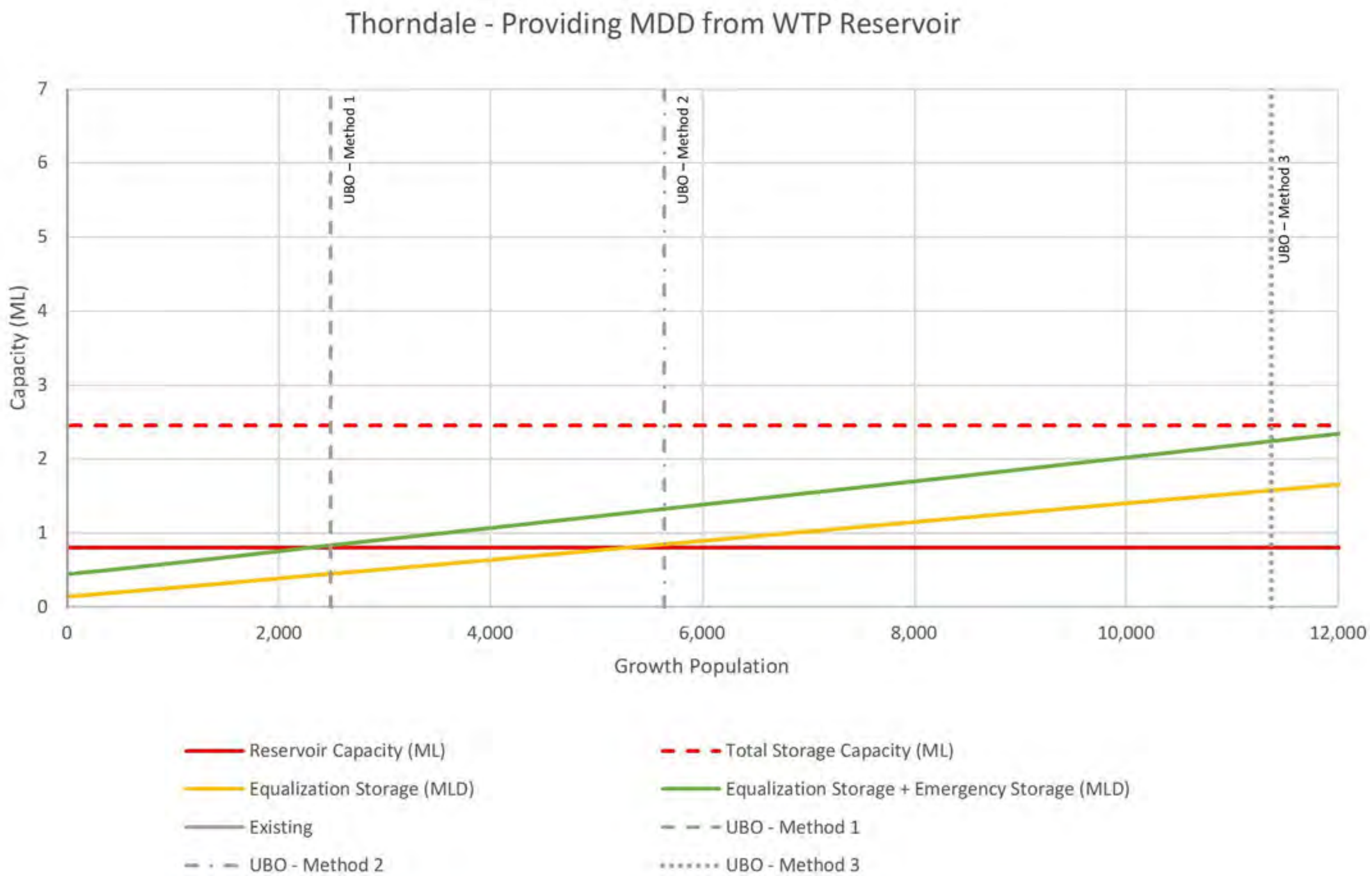
PTTW = 20.0 L/s (Recently Approved)
Treatment Capacity = 720 m^3/d (8.3 L/s)
Firm Well Pumping Capacity = 8.3 L/s
(Well-2 to be upgraded to 20 L/s)
HLP Capacity = 16.7 L/s

Thorndale HLP to provide MDD + PHD
Thorndale WTP Reservoirs to provide MDD

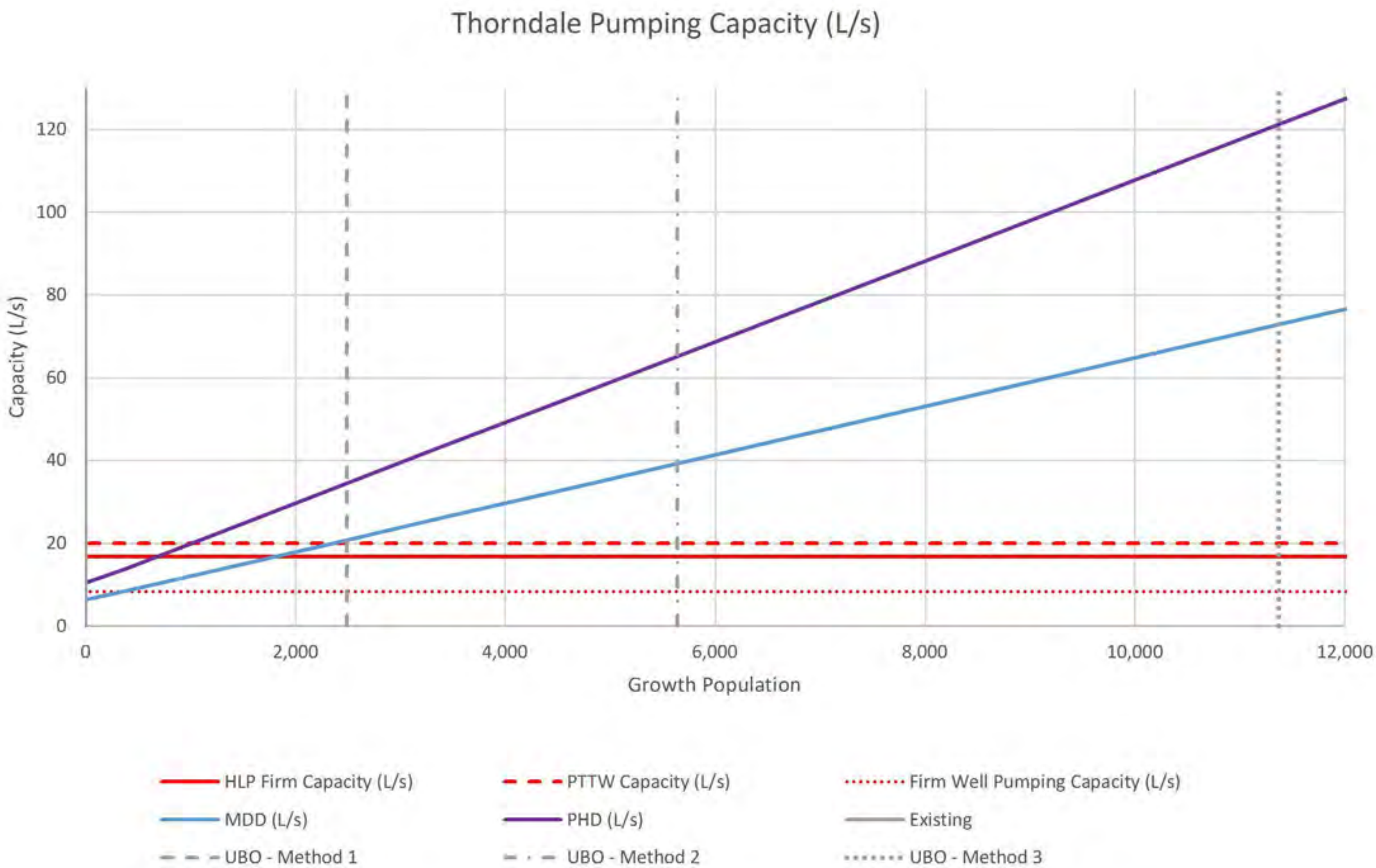
Thorndale Elevated Tank Storage



Thorndale WTP Storage

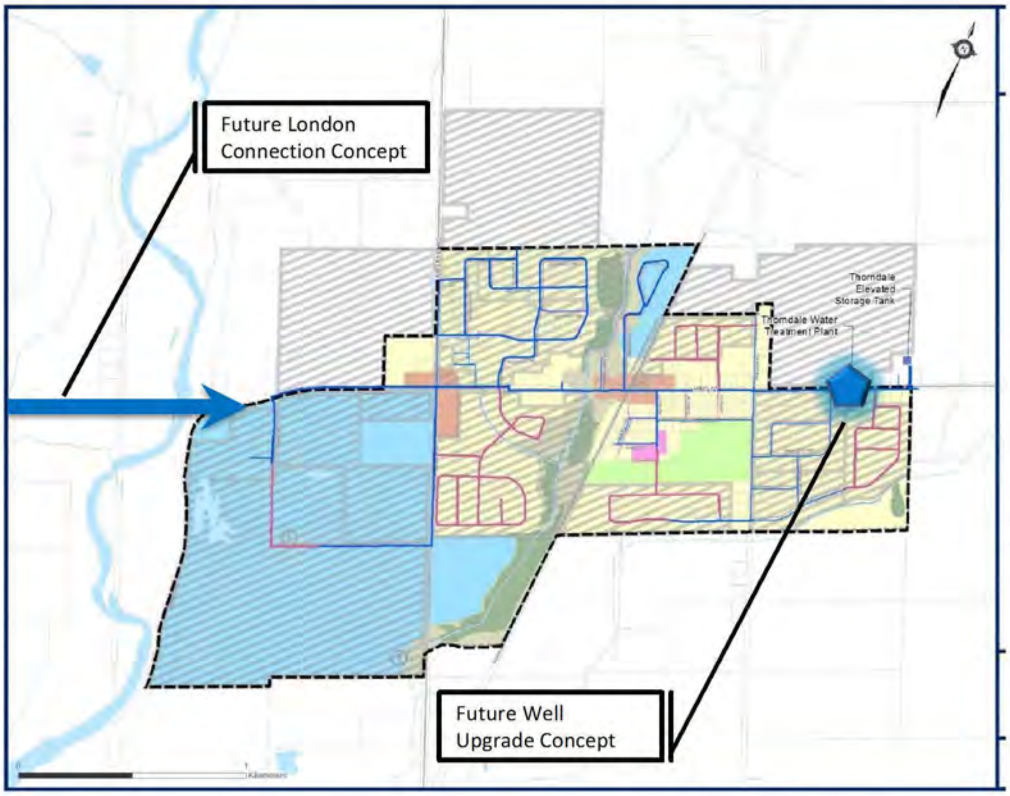


Thorndale WTP Pumping



Thorndale Water Servicing Constraints

Thorndale Water Servicing Concepts
Supply



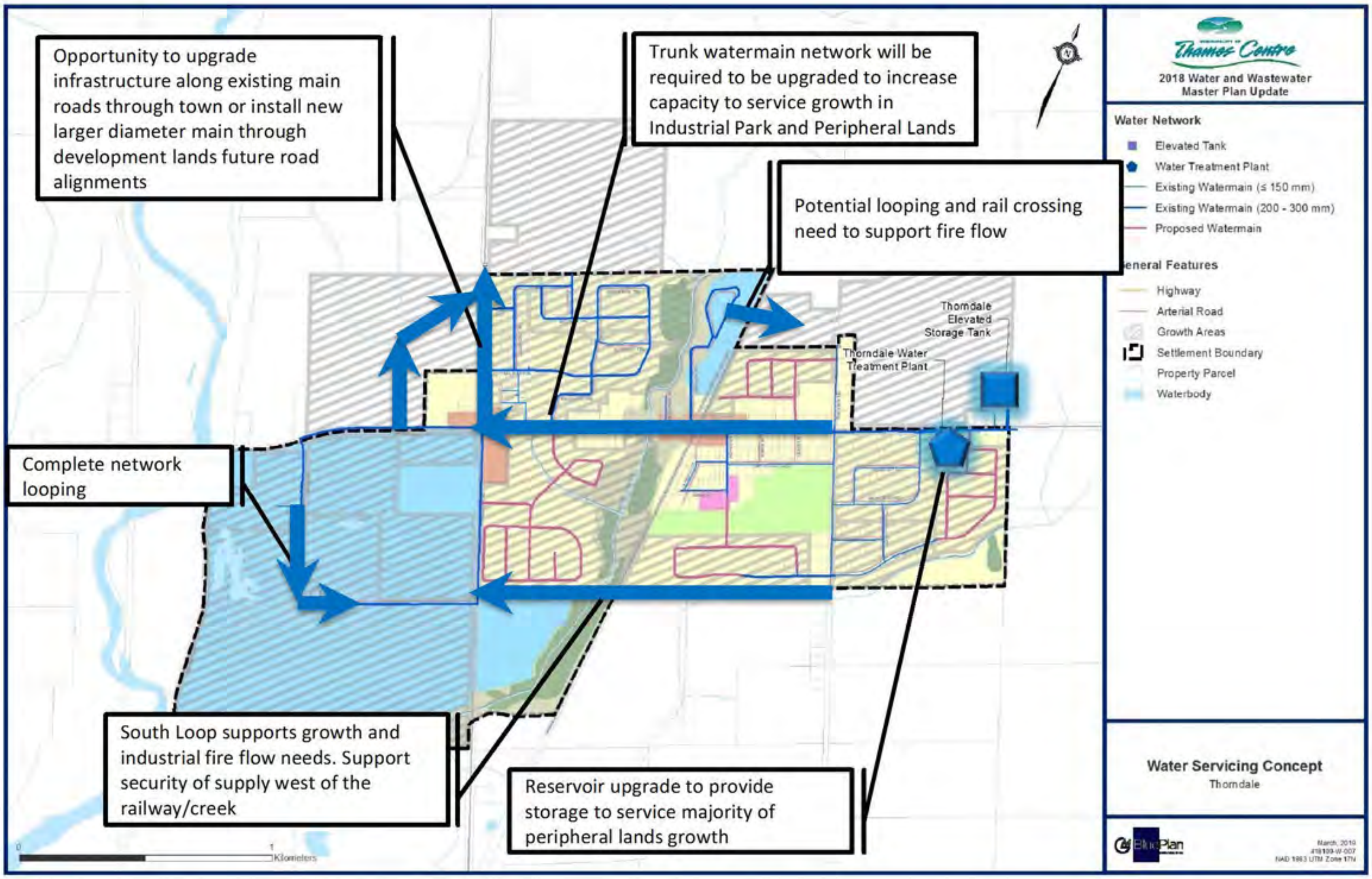
Supply from London

- Potential supply from along north limit of London Urban Growth Boundary
- Nearly 8 km along Thorndale Rd. from east limit of London Urban Growth Boundary to connection in east Thorndale
- London Supply can easily provide for full buildout demand within Thorndale and Peripheral Areas
- Opportunity to decommission Thorndale WTP Wells and provide supply entirely through London connection
- HLP to ET will likely be required (London feed would be from City's High Pressure Zone and HGL would need to be reviewed further)
- Similar elevations (280 – 285) in north London as Thorndale

Well Expansion

- What is the Ultimate Capacity of the Well Supply at the Thorndale WTP?
- Can supply demand within Settlement Boundary utilizing existing infrastructure (with some upgrades)
- Time to complete study required to upgrade wells and WTP to service peripheral areas (versus anticipated timing of development)
- Significant cost savings compared to construction and maintenance of 8 km of watermain connecting to London

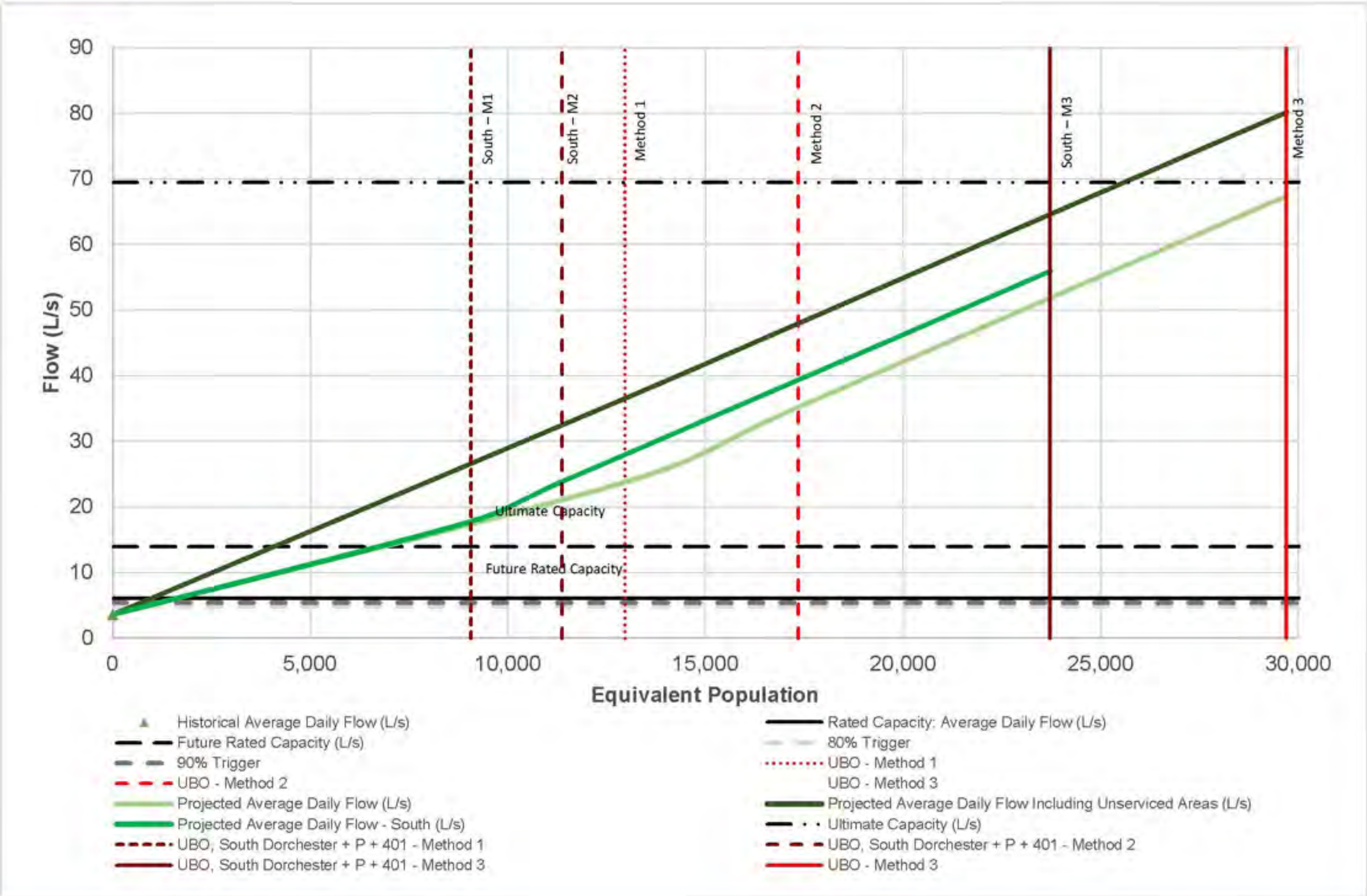
Thorndale Water Servicing Concepts
Storage and Conveyance



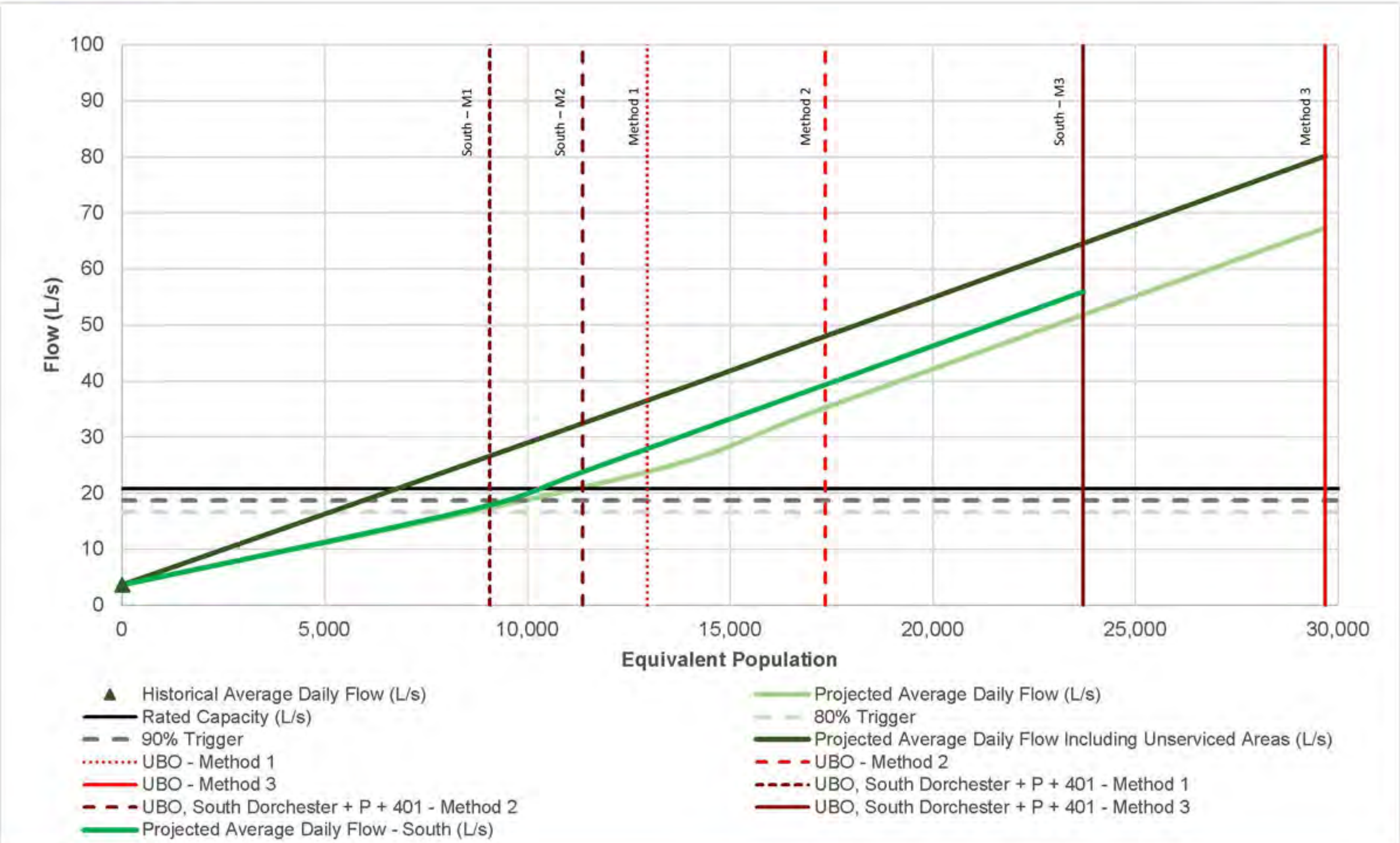
Growth Impacts and Servicing Concepts

DORCHESTER WASTEWATER SYSTEM

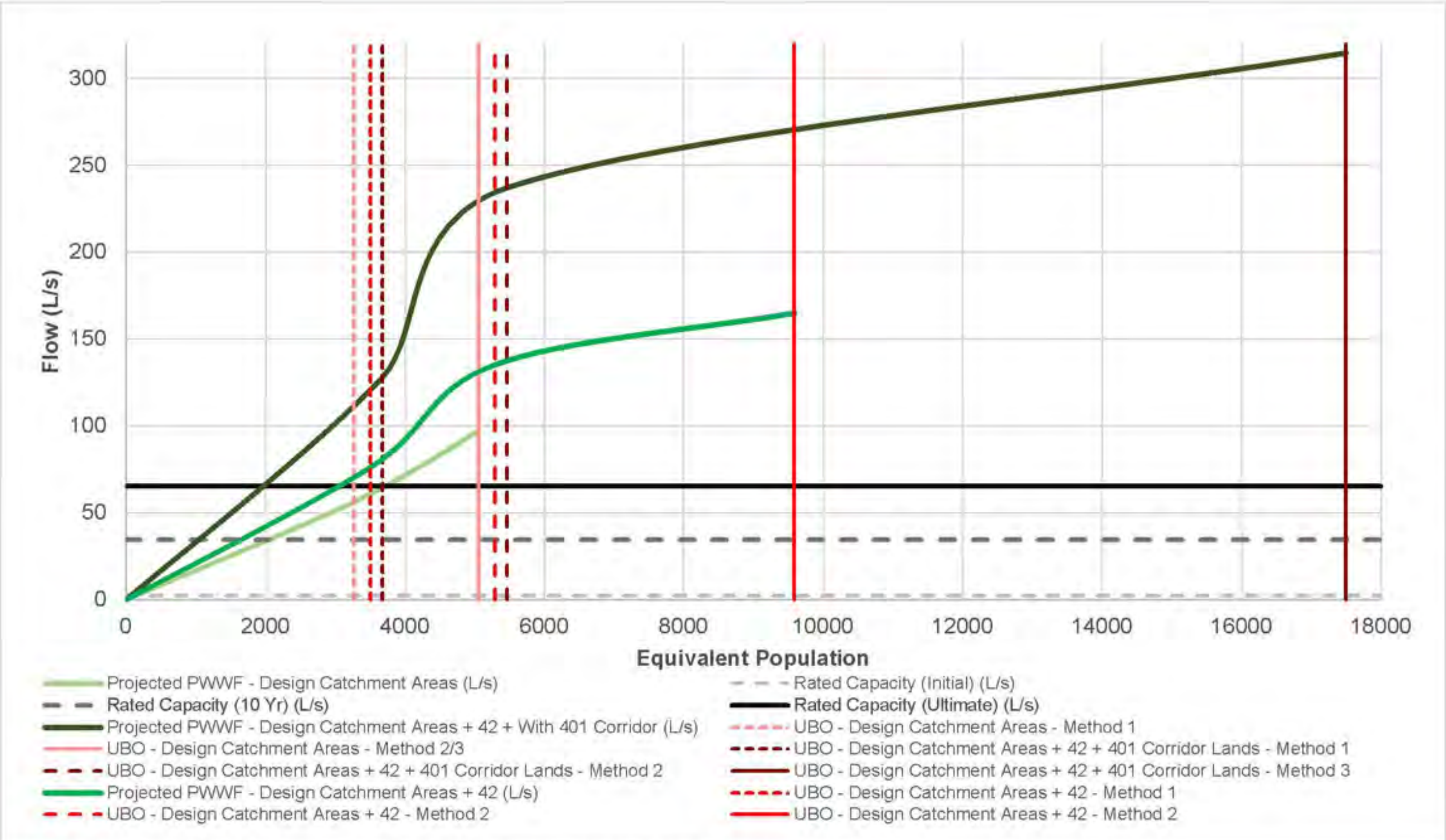
Dorchester WWTP



Dorchester SPS

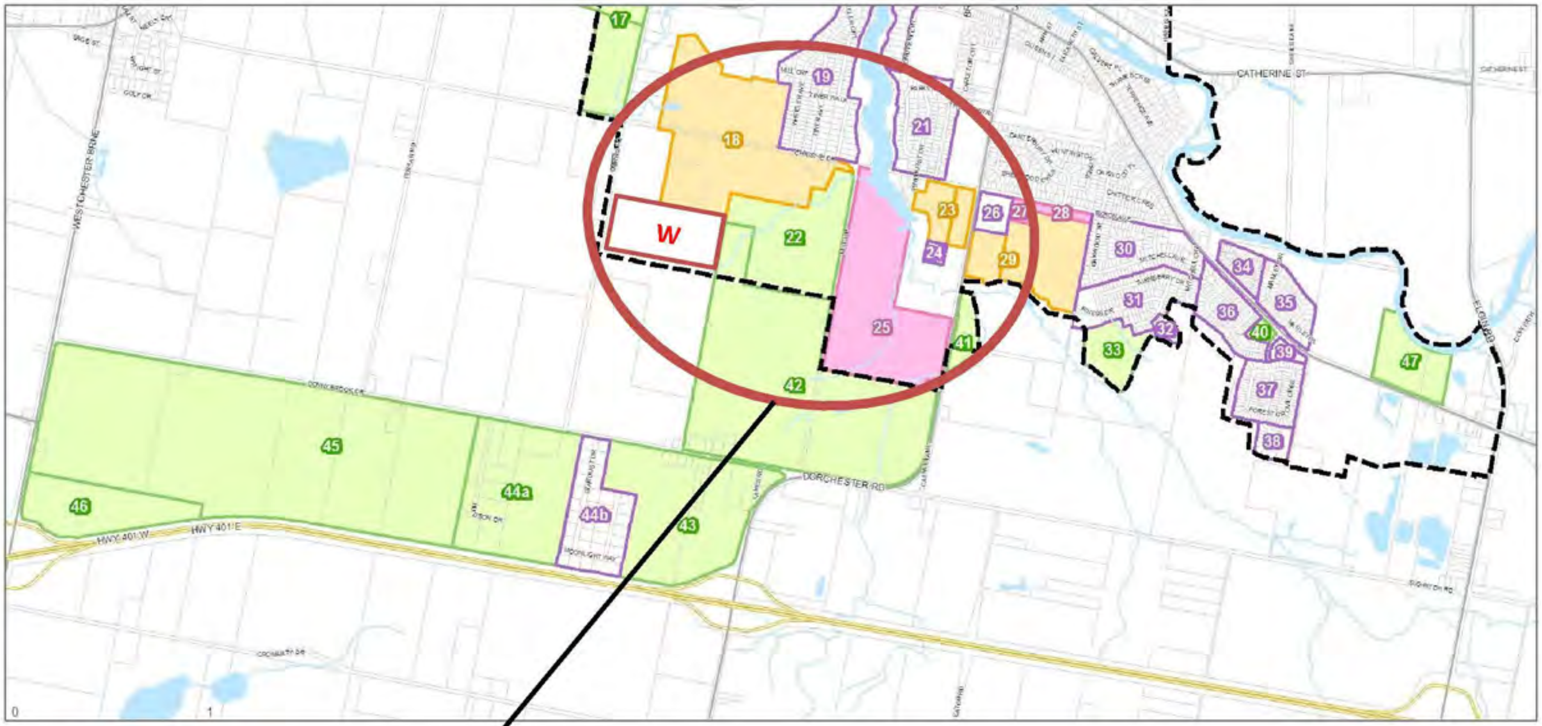


Dorchester PS3



- Design Catchments for Dorchester PS3 are all located within the Settlement Boundary.

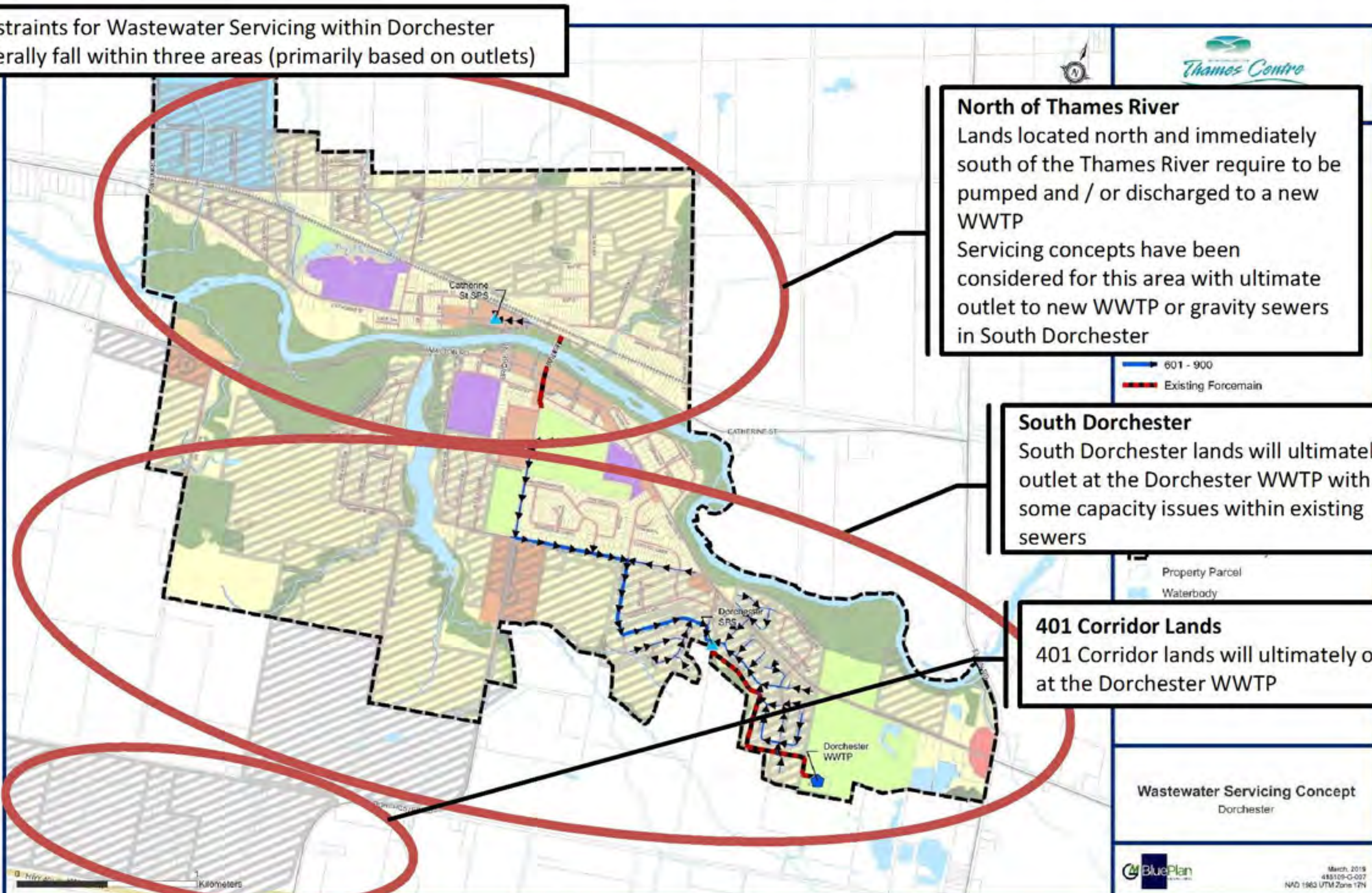
Dorchester PS#3 Design Catchment Areas



Design Catchment Area for Dorchester PS#3 includes Development Properties: 18, 22, 23, 25, west half of 29, W and south half of 19

Dorchester Wastewater Servicing Constraints and Concepts Overview

Constraints for Wastewater Servicing within Dorchester generally fall within three areas (primarily based on outlets)

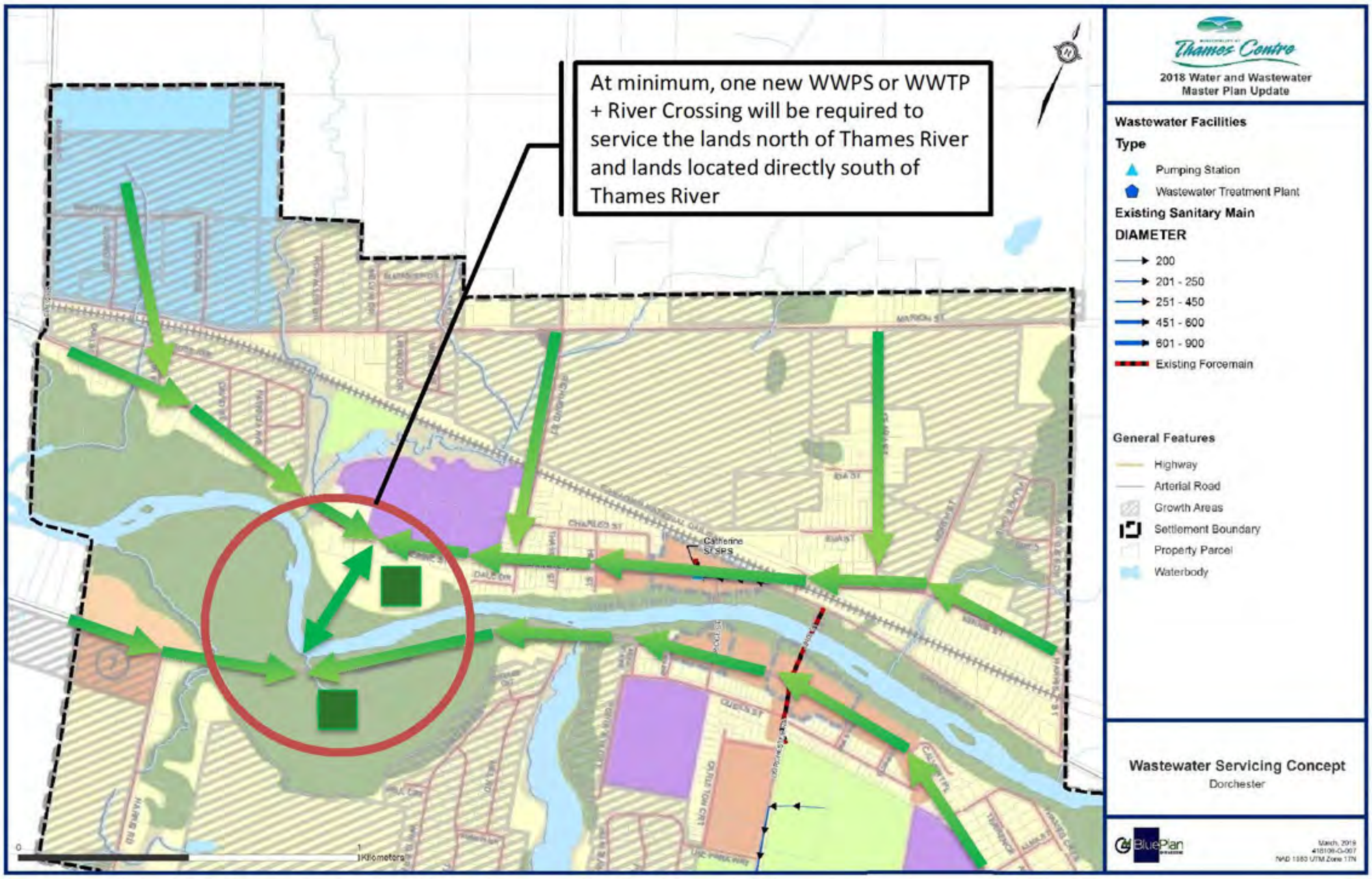


North of Thames River
Lands located north and immediately south of the Thames River require to be pumped and / or discharged to a new WWTP
Servicing concepts have been considered for this area with ultimate outlet to new WWTP or gravity sewers in South Dorchester

South Dorchester
South Dorchester lands will ultimately outlet at the Dorchester WWTP with some capacity issues within existing sewers

401 Corridor Lands
401 Corridor lands will ultimately outlet at the Dorchester WWTP

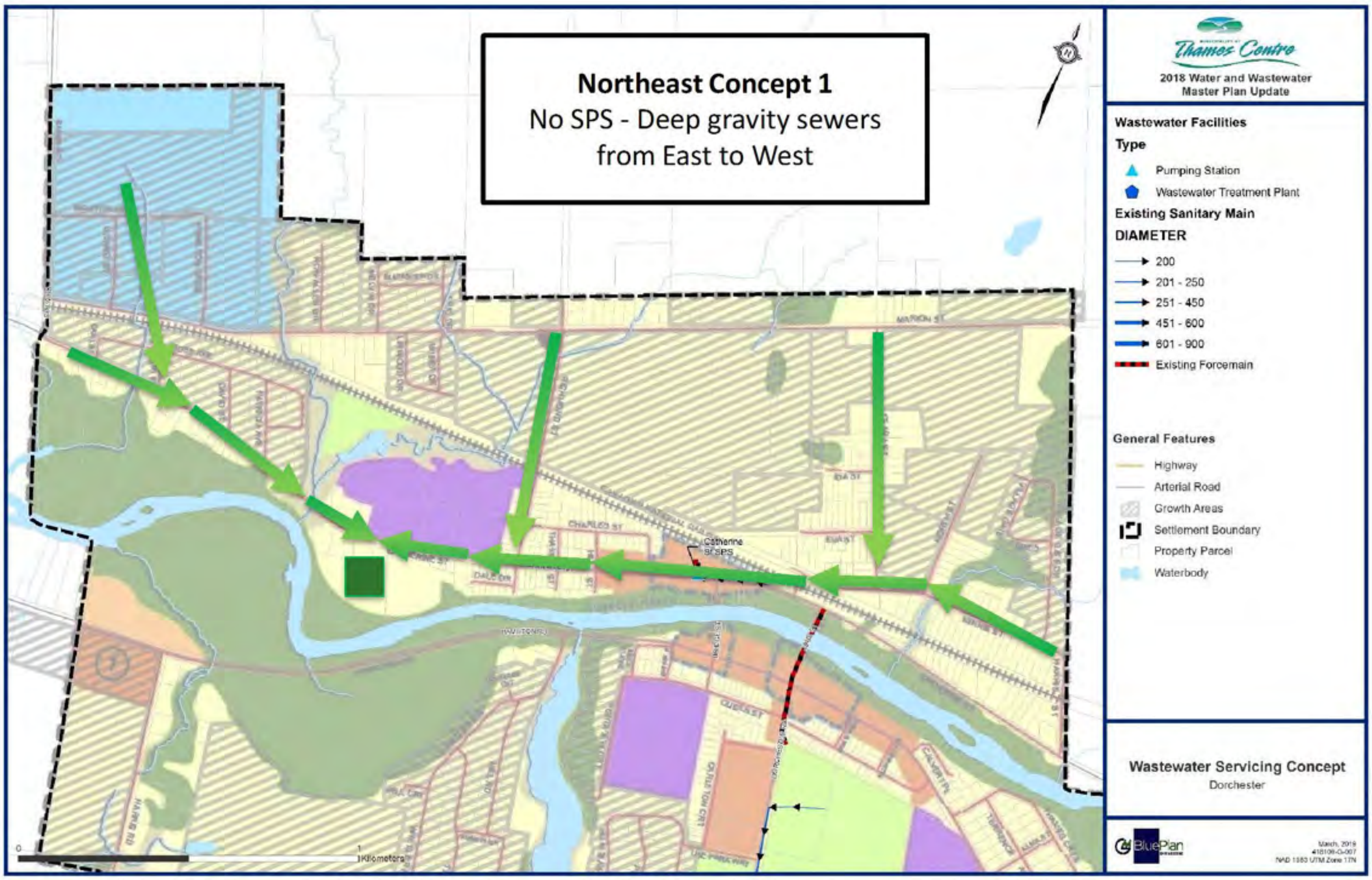
Dorchester Wastewater Servicing at Thames River



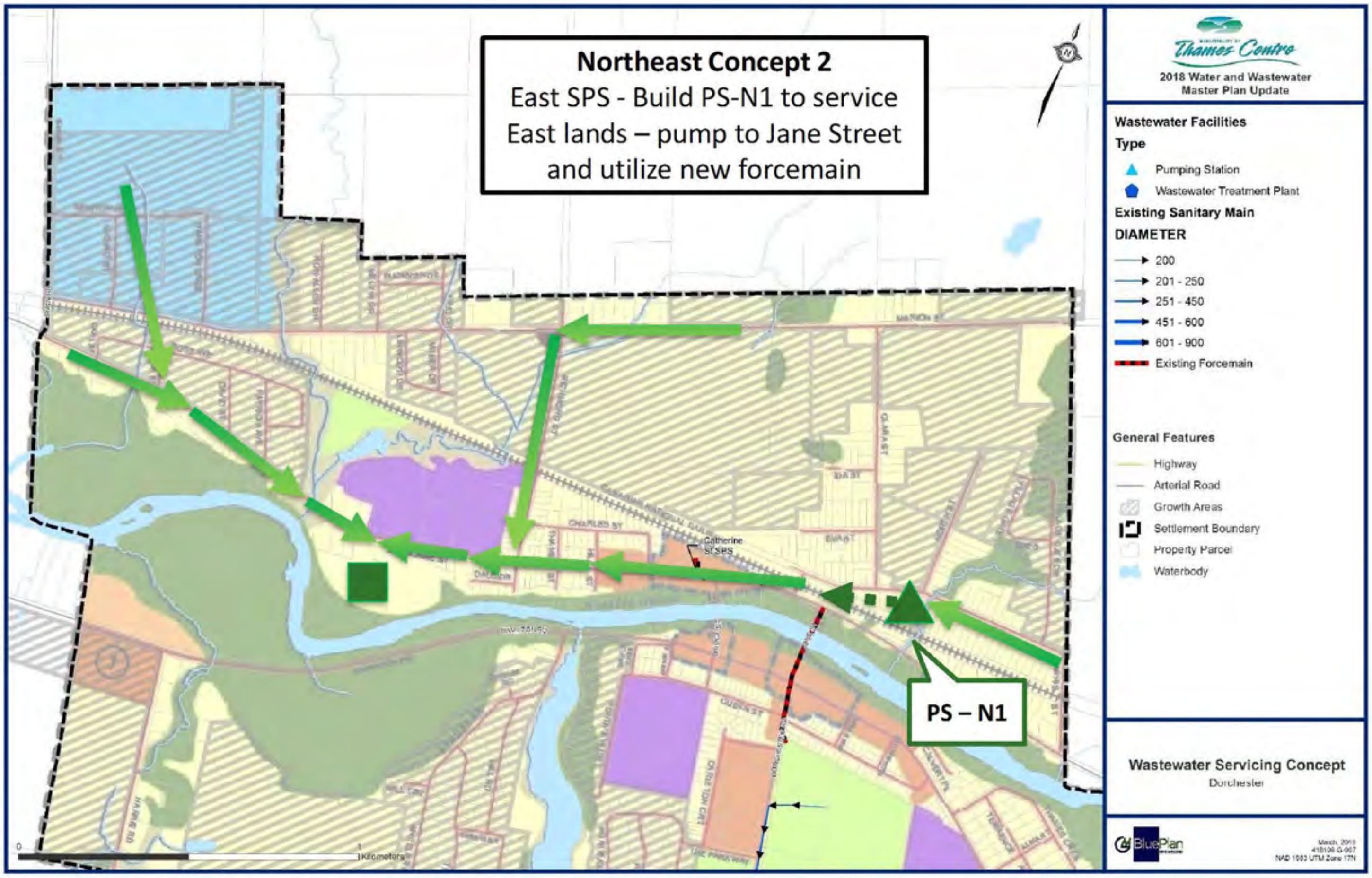
Dorchester Wastewater North Servicing Concepts

Option	Advantages	Disadvantages
Northeast Concept 1 Gravity North Dorchester flows from East to West	• Reduces number of SPS required for Dorchester	• Requires sewer to be up to 4 m deeper than if East SPS (PS-N1) is constructed • Localized sections up to 10m deep
Northeast Concept 2 Build PS-N1 to service lands north of river, east of bridge	• Doesn't require deep sewers • Opportunity to utilize new forcemain along Jane Street	• Requires additional SPS to service small section east of Jane Street
Northwest Concept 1A Build PS-N2 to service lands north of river	• Opportunity to utilize new forcemain along Jane Street	• Requires additional SPS and forcemain
Northwest Concept 1B Build new WWTP and discharge to Thames River	• Reduces need for SPS and forcemain • Reduces upgrades required for existing sewers along Dorchester Road • Reduces upgrades at existing Dorchester WWTP	• Costs to operate two WWTP in Dorchester • Capital costs for permitting
Northwest Concept 2 Gravity across river	• Reduces number of SPS • Could be completed with potential watermain crossing	• Requires deep trunk sewer and deep wet well as PS-S1 • River crossing • Additional capacity required at PS-S1

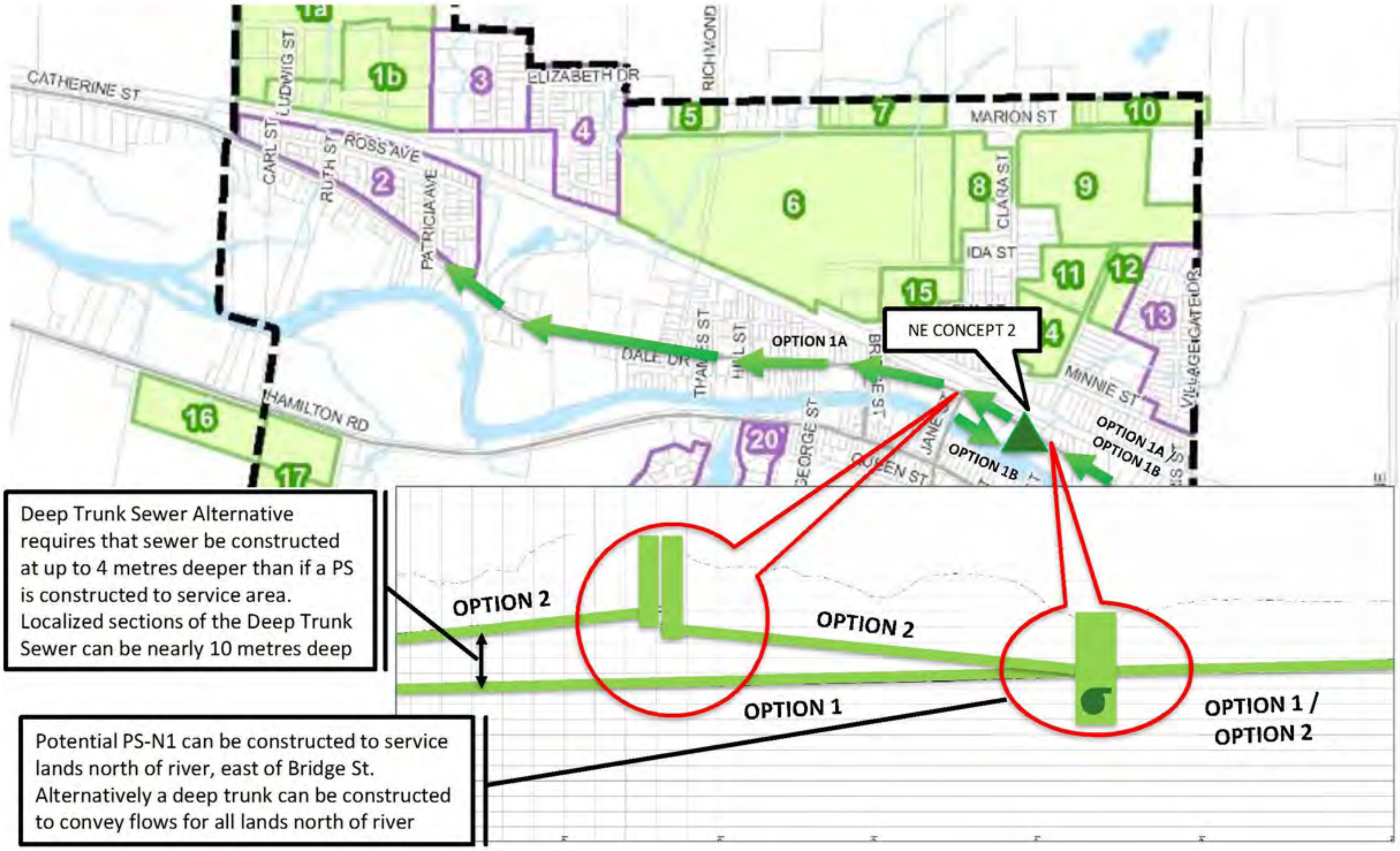
Dorchester Wastewater Northeast Concept 1



Dorchester Wastewater Northeast Concept 2



Options North of River – East Section

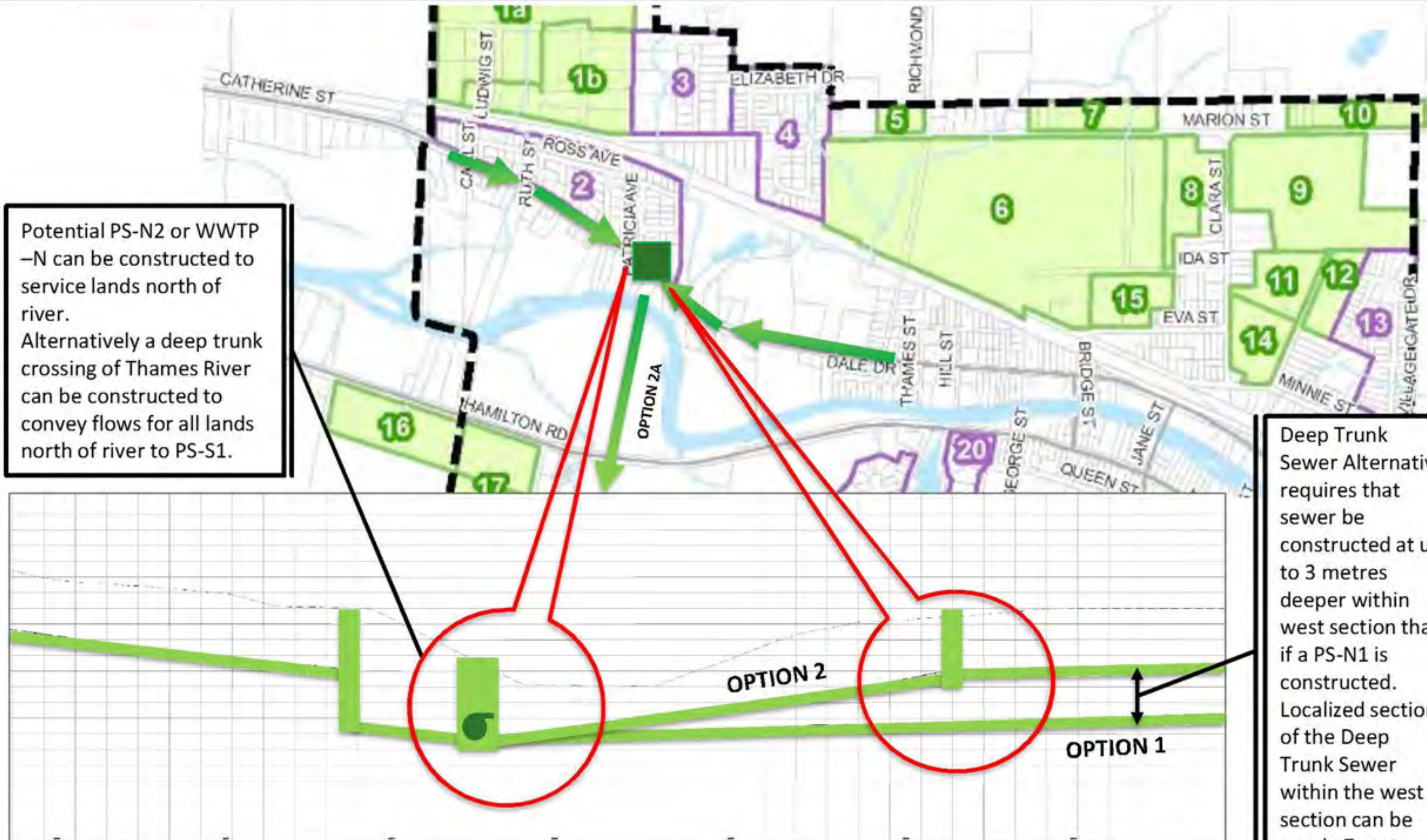


Deep Trunk Sewer Alternative requires that sewer be constructed at up to 4 metres deeper than if a PS is constructed to service area. Localized sections of the Deep Trunk Sewer can be nearly 10 metres deep

Potential PS-N1 can be constructed to service lands north of river, east of Bridge St. Alternatively a deep trunk can be constructed to convey flows for all lands north of river

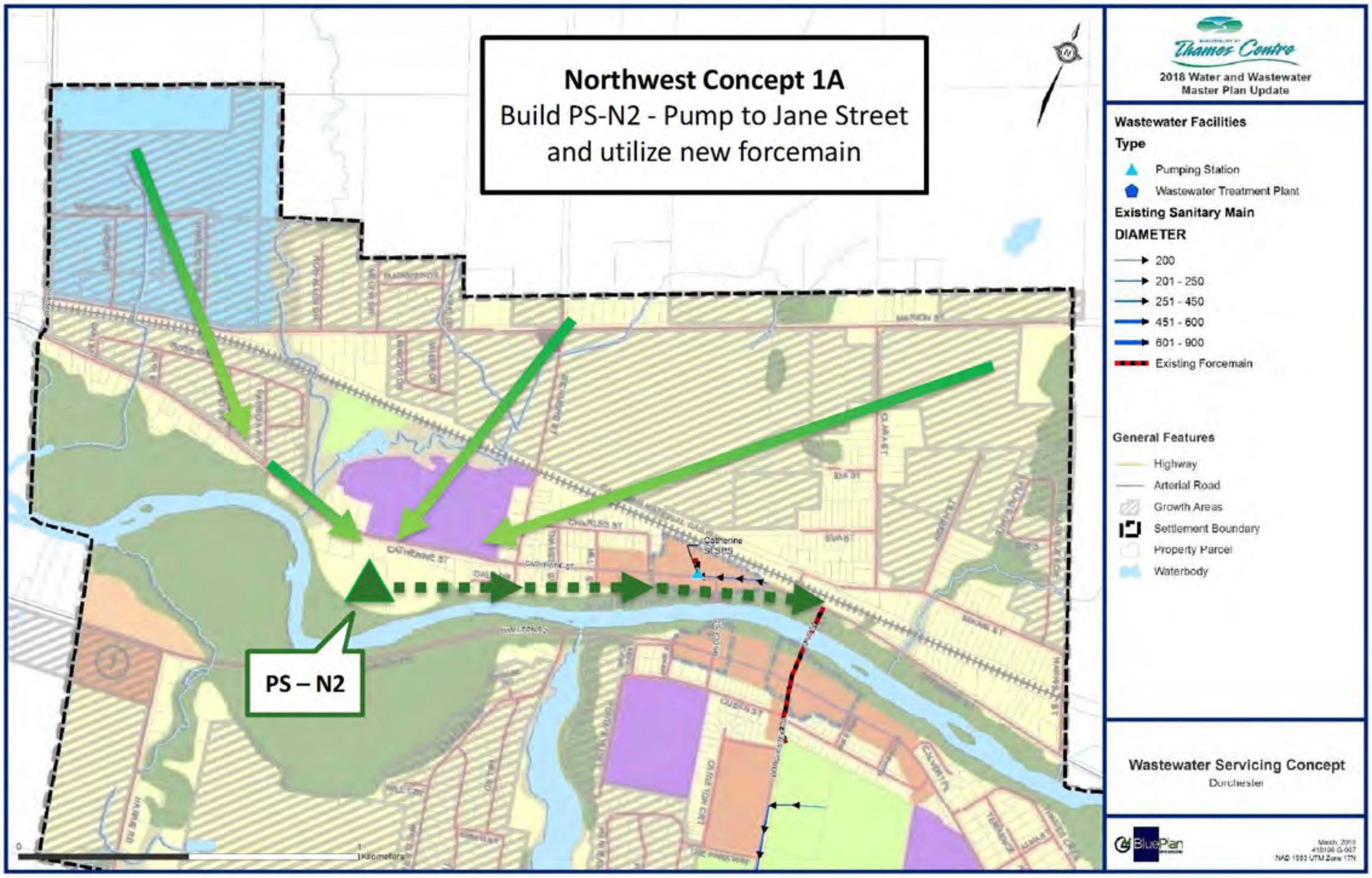
Options North of River – West Section

Potential PS-N2 or WWTP –N can be constructed to service lands north of river.
Alternatively a deep trunk crossing of Thames River can be constructed to convey flows for all lands north of river to PS-S1.

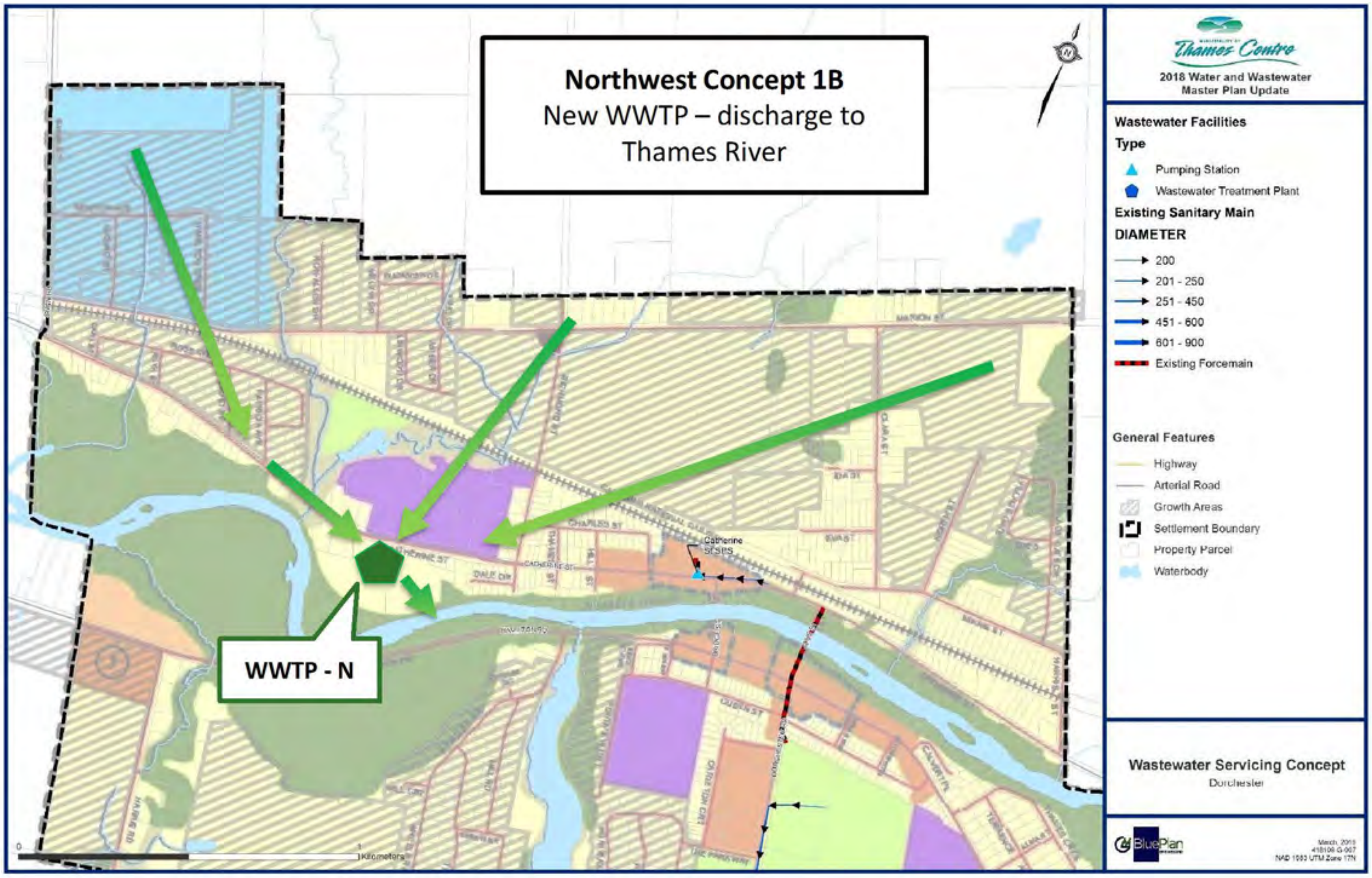


Deep Trunk Sewer Alternative requires that sewer be constructed at up to 3 metres deeper within west section than if a PS-N1 is constructed. Localized sections of the Deep Trunk Sewer within the west section can be nearly 7 metres deep

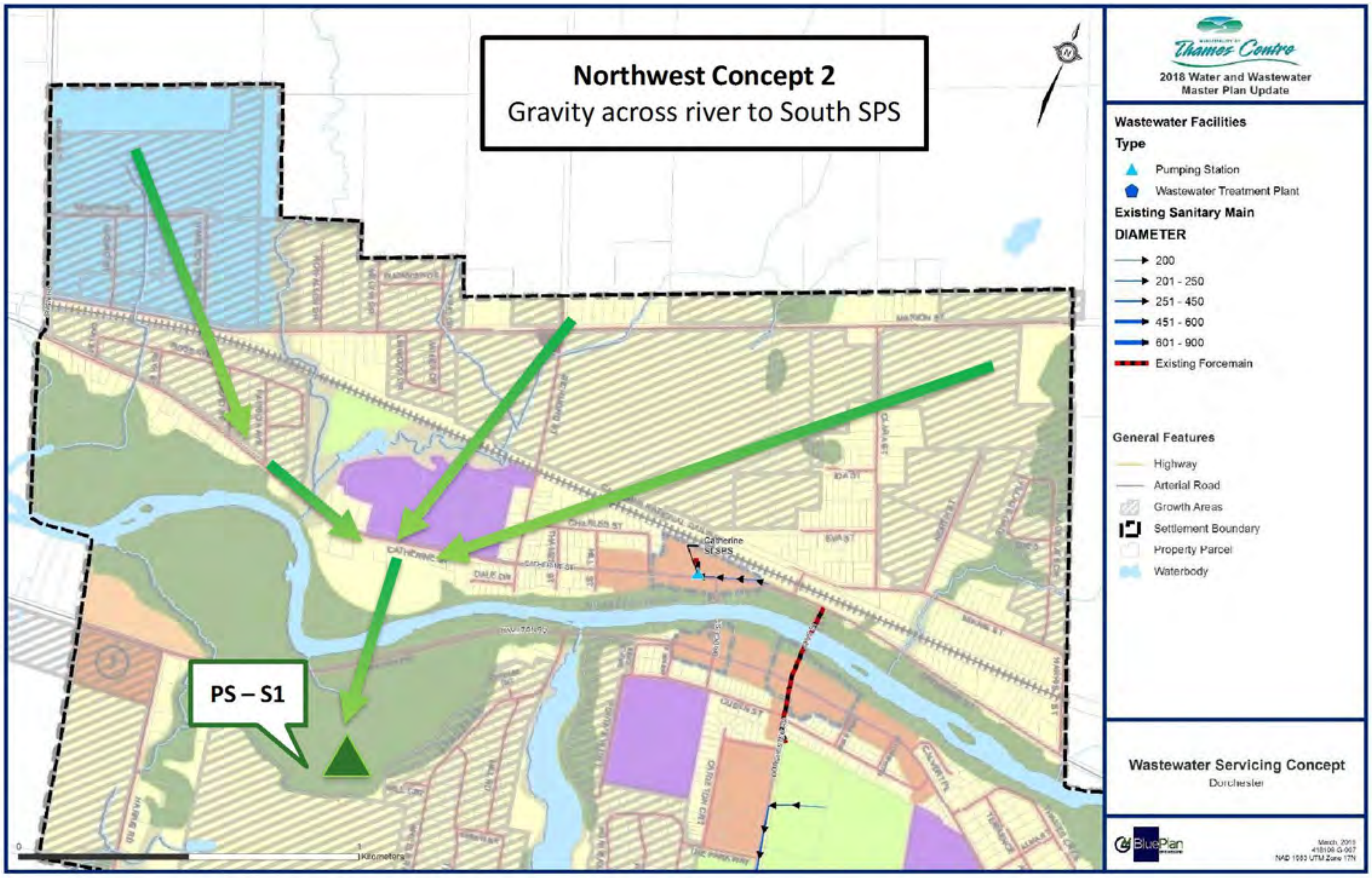
Dorchester Wastewater Northwest Concept 1A



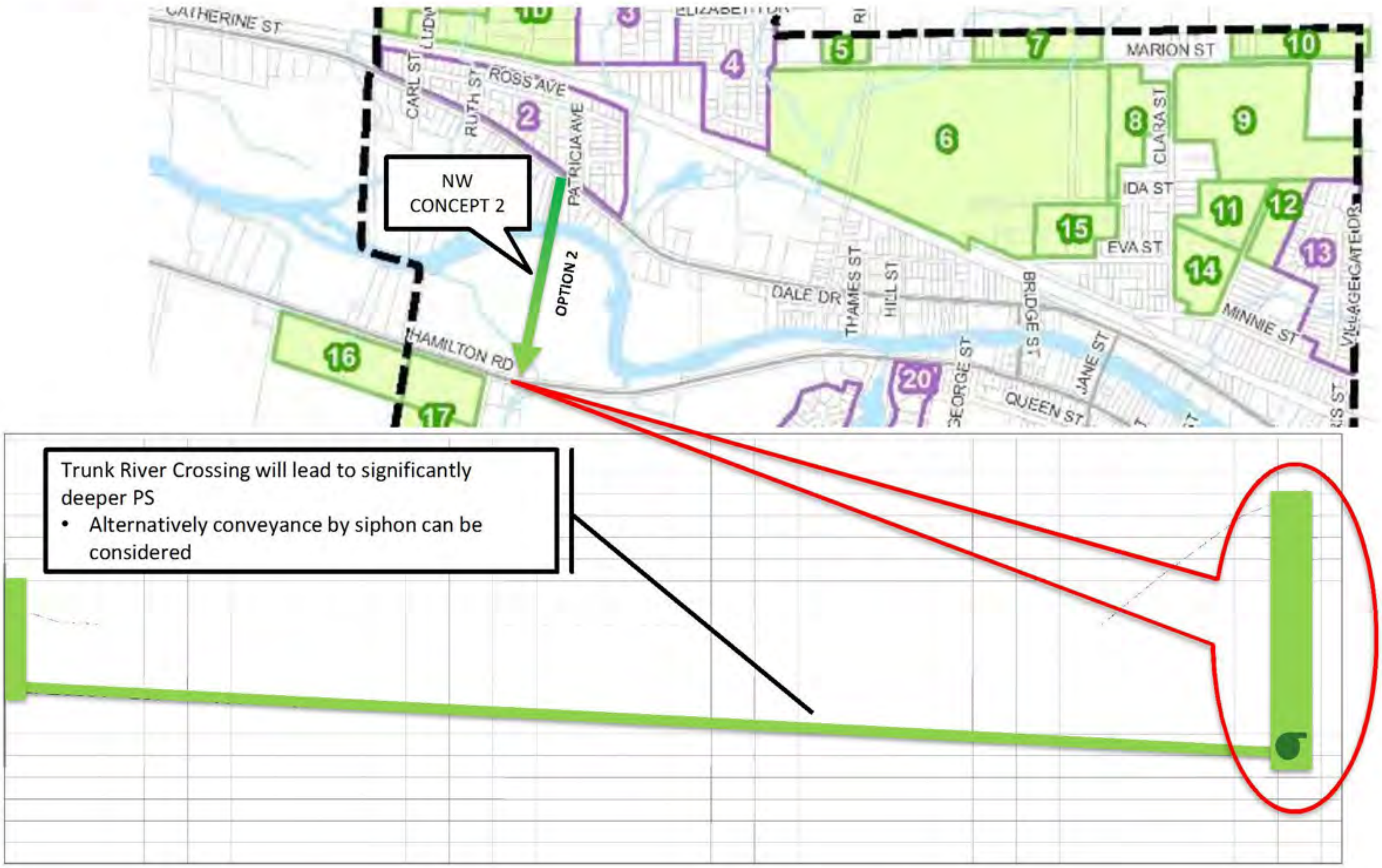
Dorchester Wastewater Northwest Concept 1B



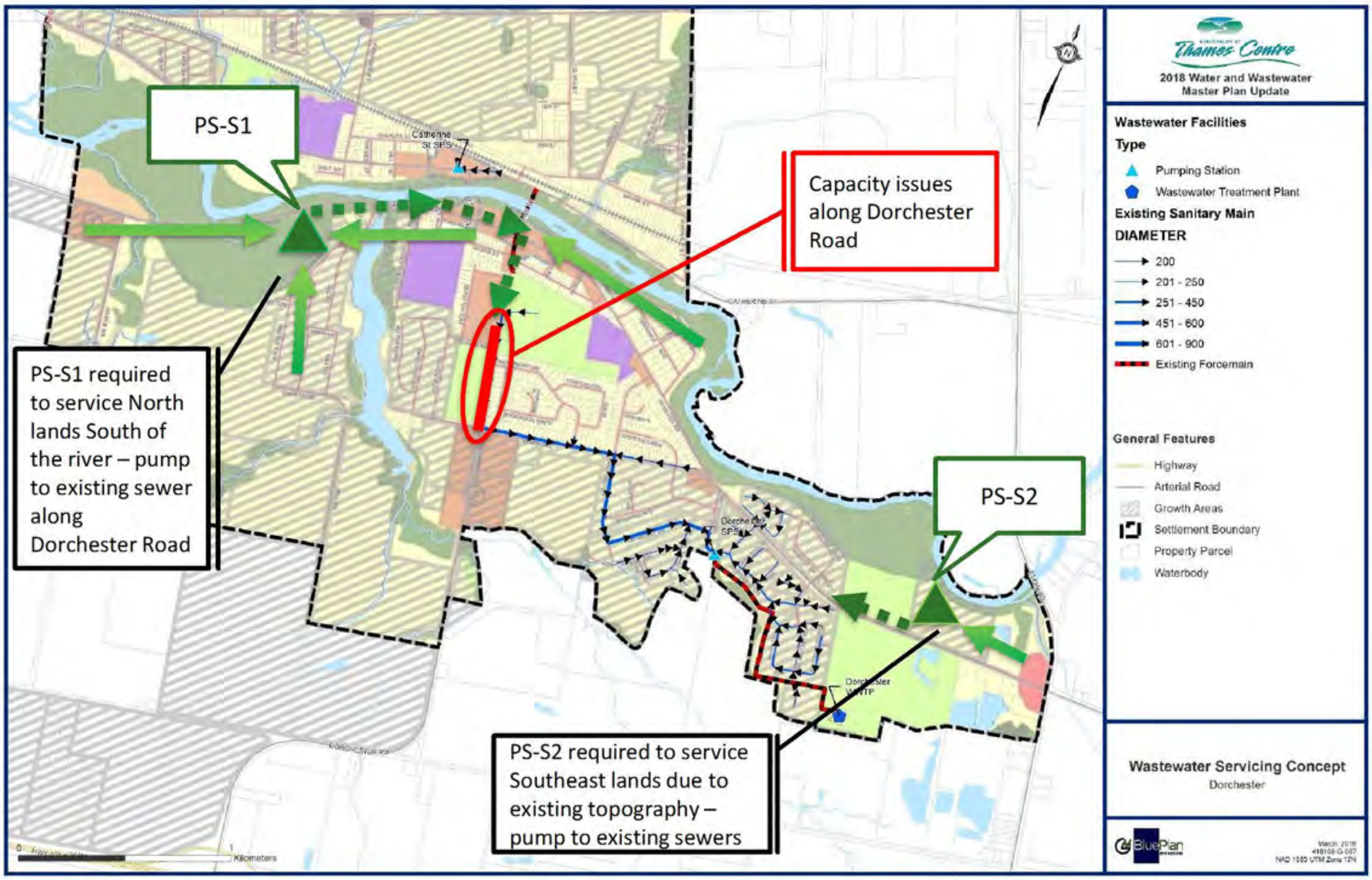
Dorchester Wastewater Northwest Concept 2



Options North of River – River Crossing



Dorchester Wastewater South Servicing Concepts

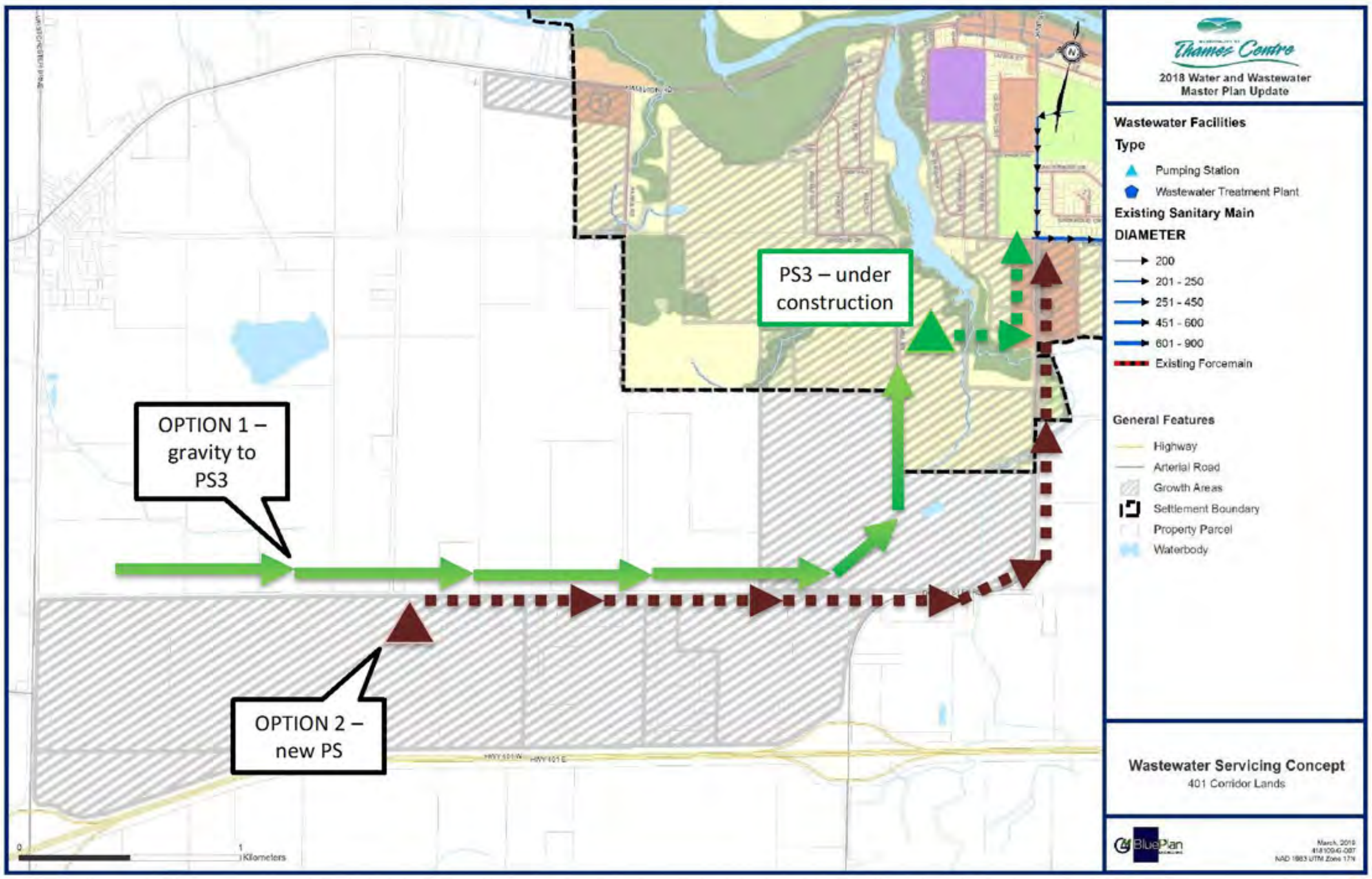


401 Corridor Lands Wastewater Servicing

Alternative	Advantages	Disadvantages
Option 1 Gravity to PS3	• Does not require additional SPS	• Will require additional upsizing at PS3
Option 2 New PS and pump to Byron Ave trunk sewer	• Will not require additional upsizing at PS3	• Requires an additional SPS

- No opportunity to gravity to existing sewers along Byron Ave due to topography along Dorchester Road at Thames River crossing

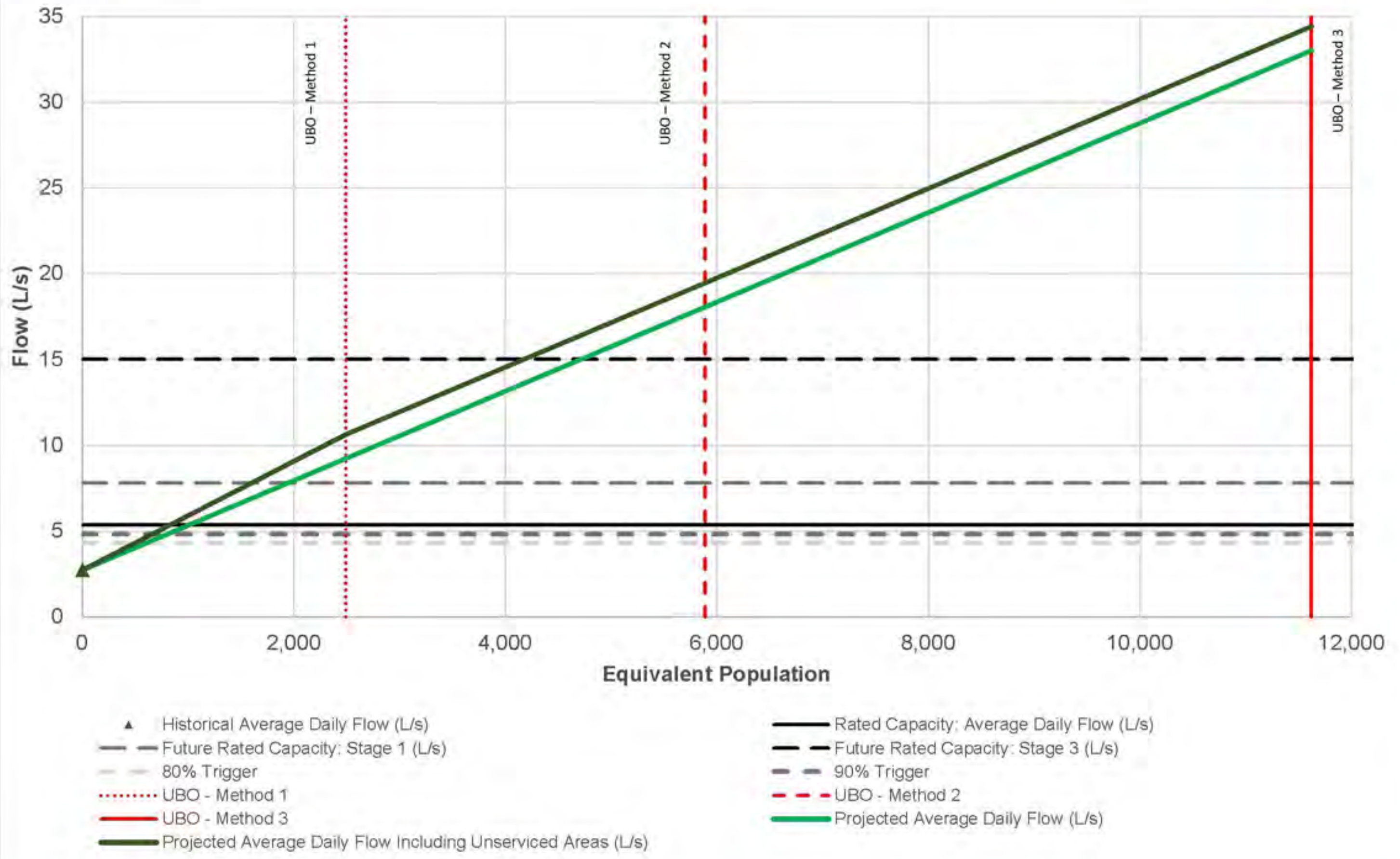
401 Corridor Lands Wastewater Servicing



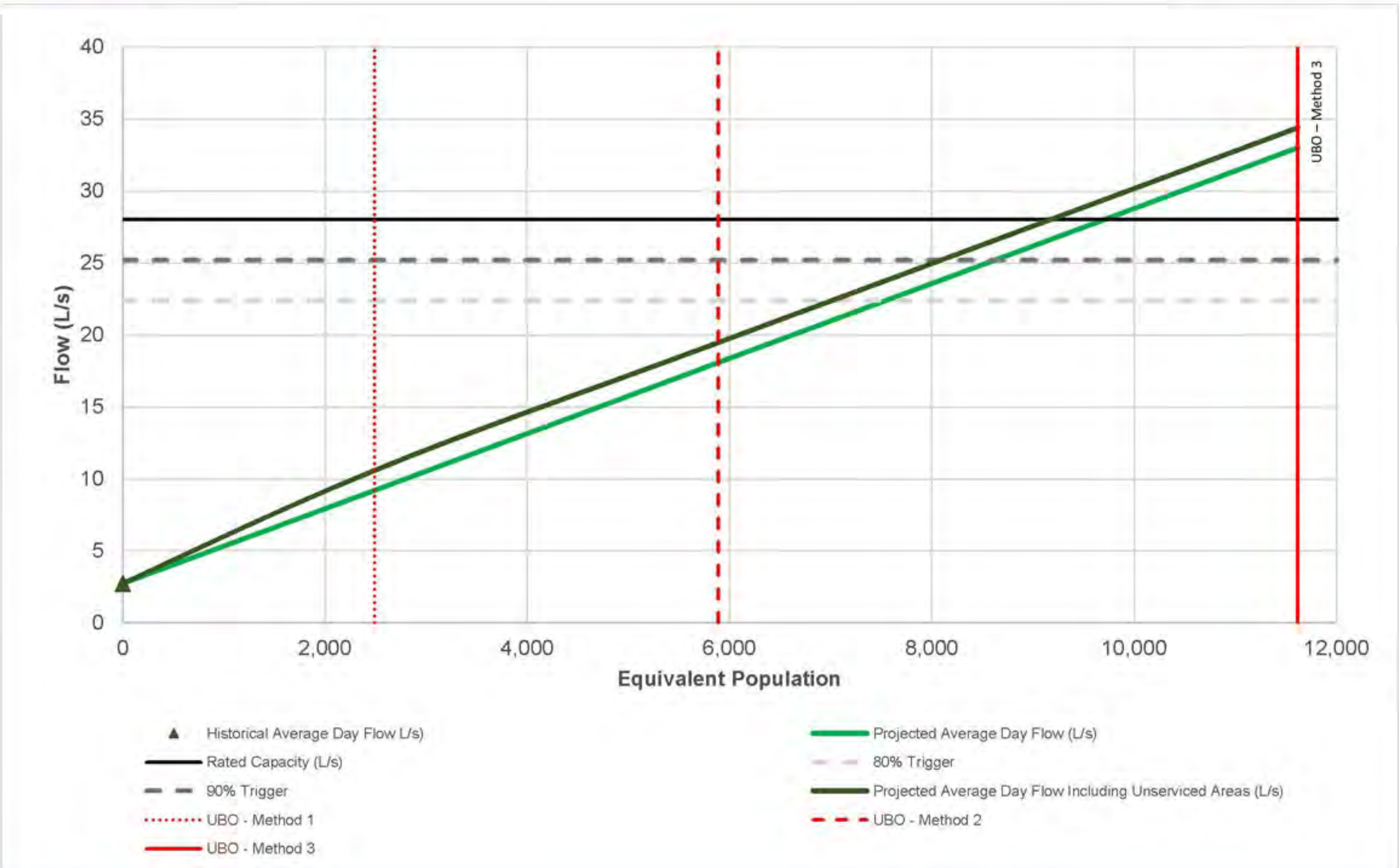
Growth Impacts and Servicing Concepts

THORNDALE WASTEWATER SYSTEM

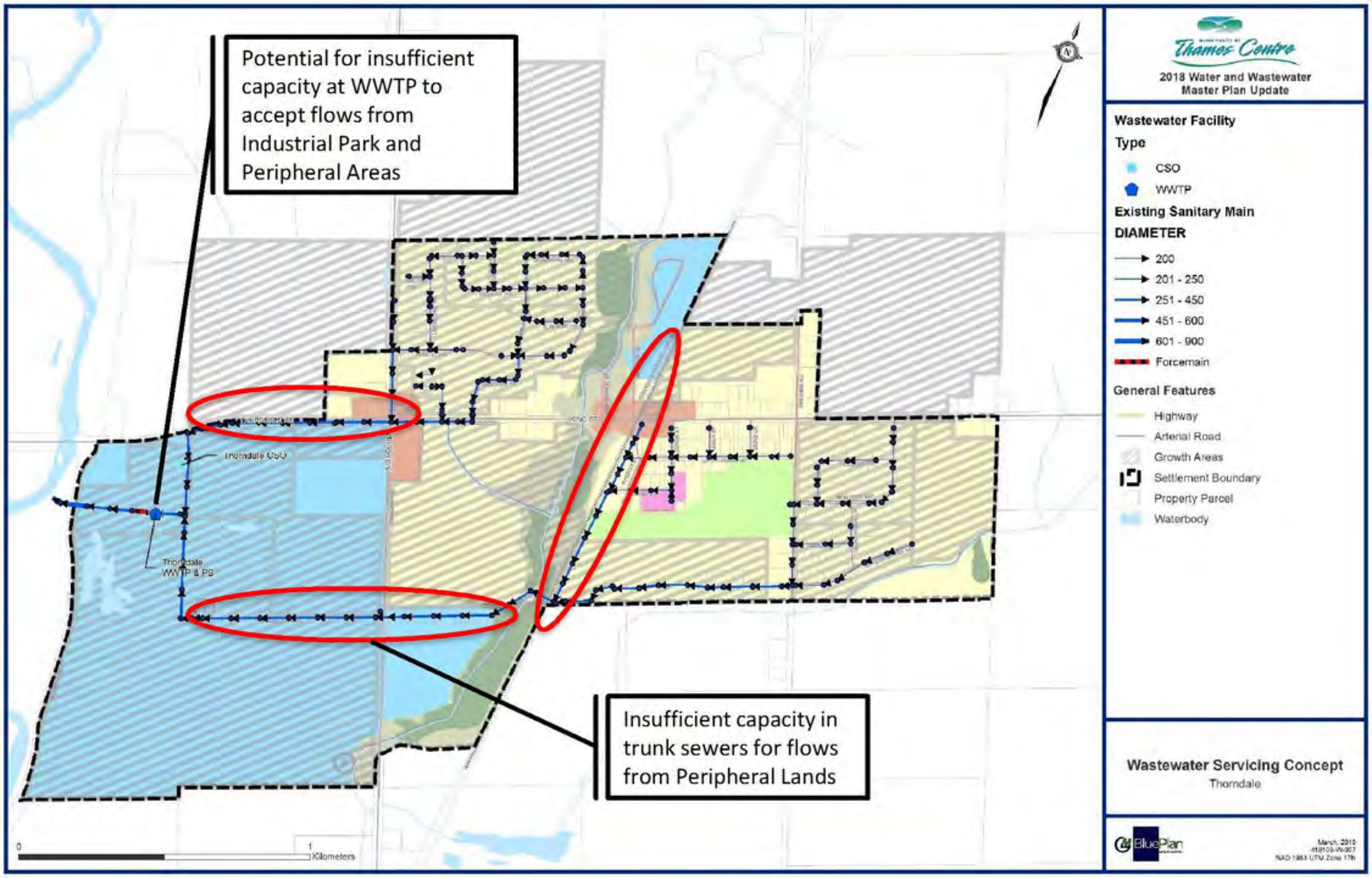
Thorndale WWTP



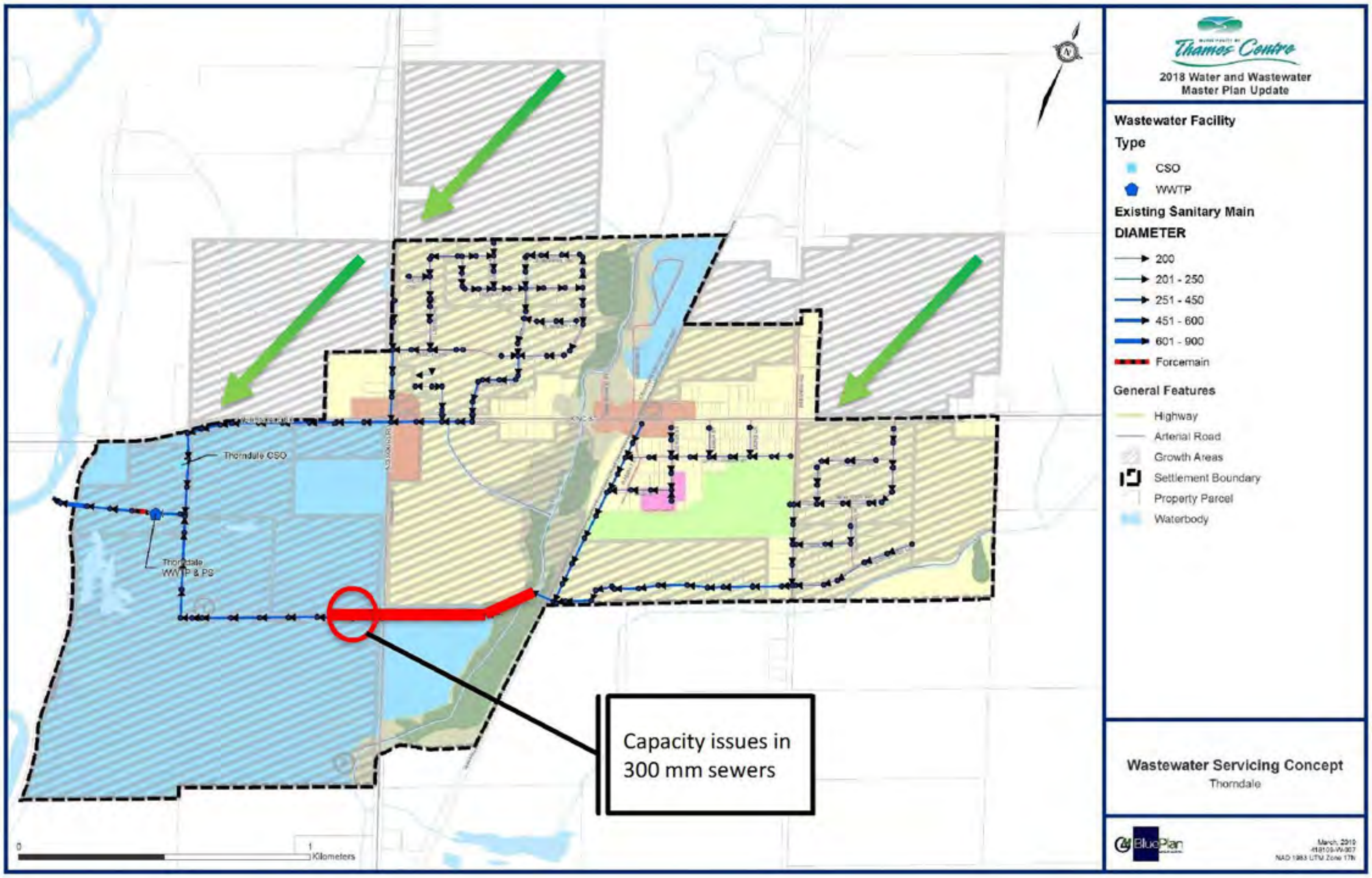
Thorndale SPS



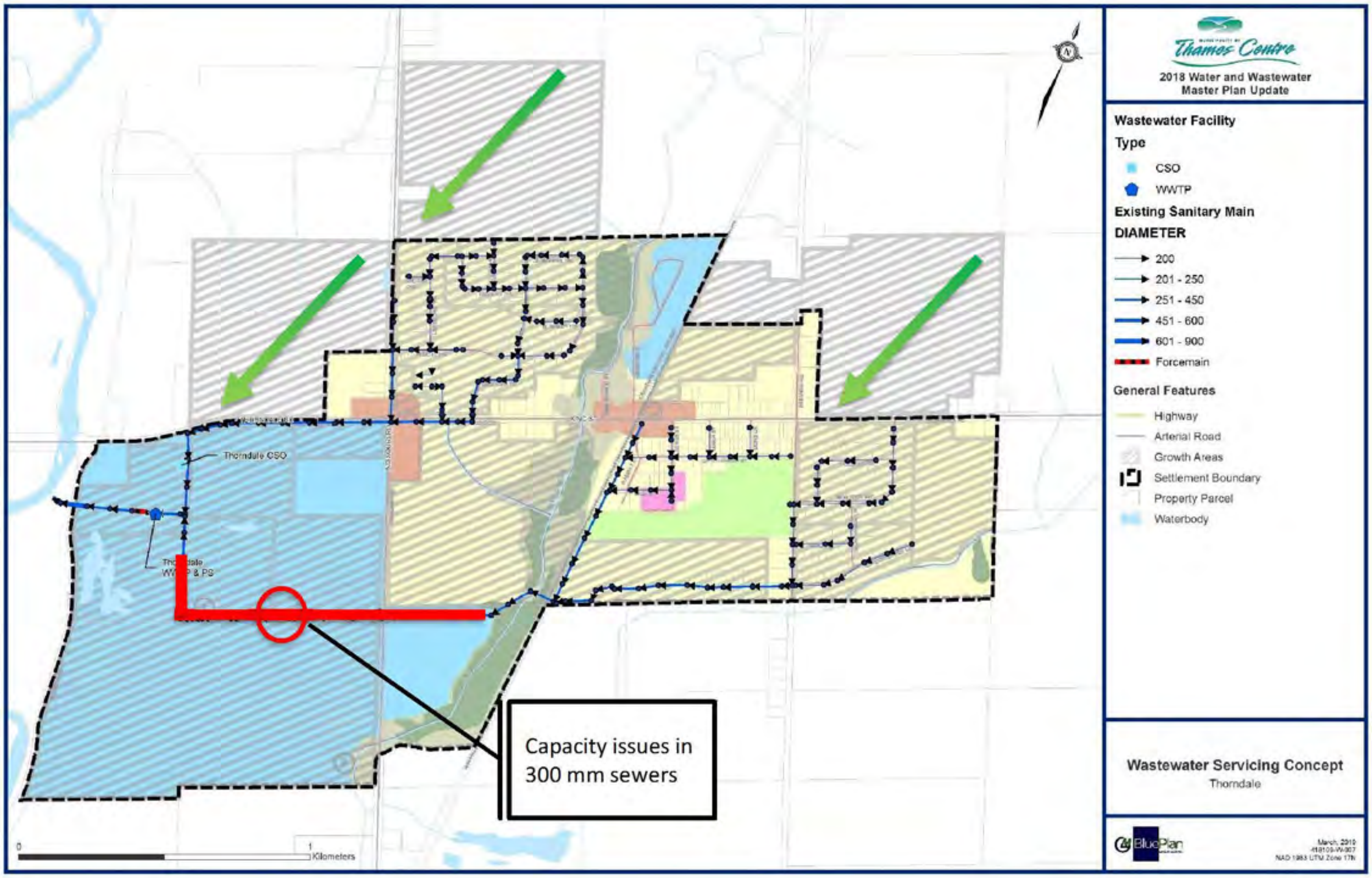
Thorndale Wastewater Servicing Constraints



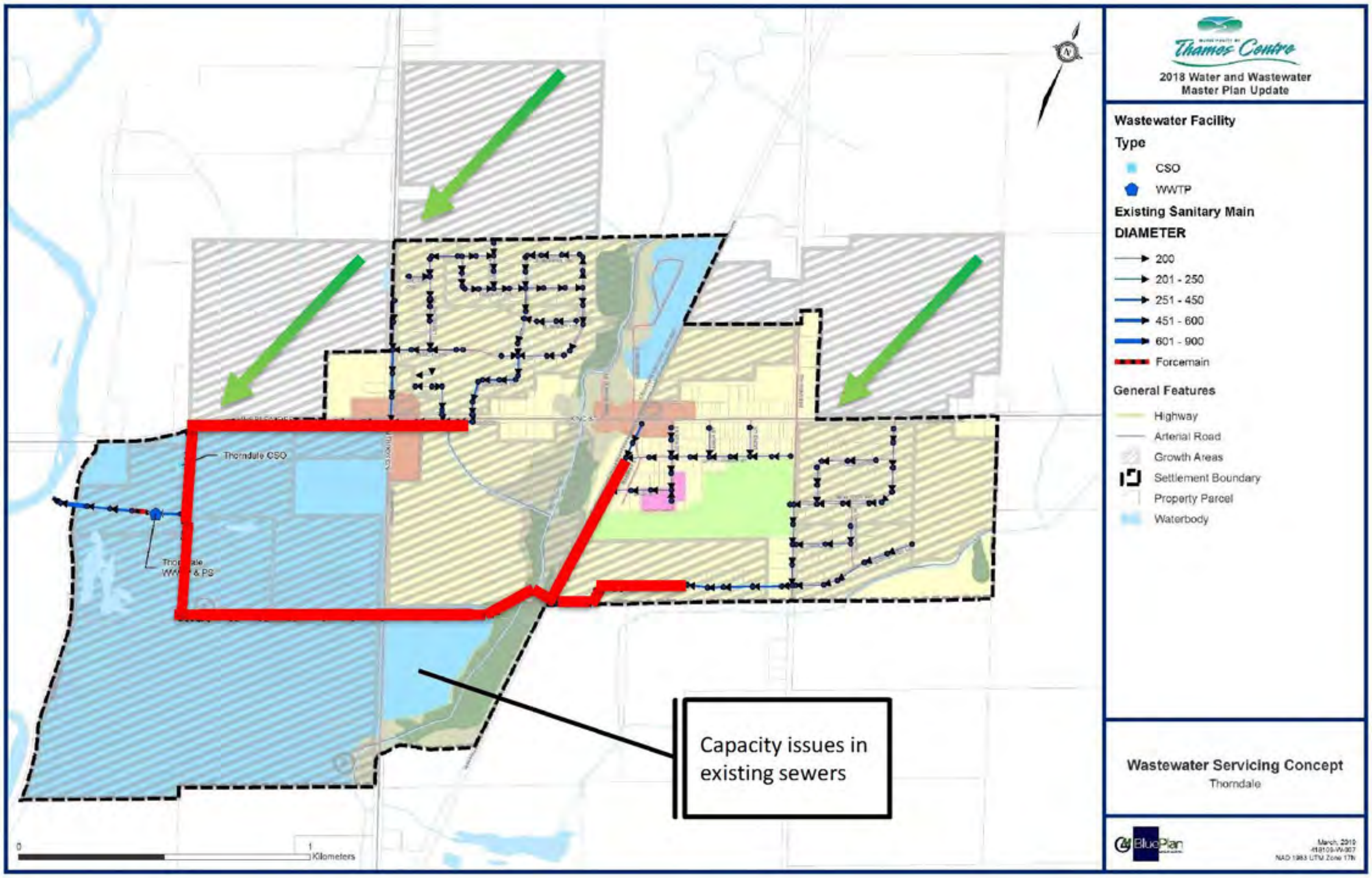
Thorndale Wastewater Servicing Concepts
Method 1



Thorndale Wastewater Servicing Concepts
Method 2



Thorndale Wastewater Servicing Concepts
Method 3



ALTERNATIVES EVALUATION

Alternatives Evaluation Criteria

Category	Criteria
Technical Feasibility	Meets existing and future servicing needs
	Support phased expansion of the system
	Provides reliable service (redundancy, minimize reliance on pump stations)
	Minimizes and manages construction risk
	Aligns with approval and permitting process
Environmental Impacts	Protects environment features
	Protects wildlife and Species at Risk
Social / Cultural Impacts	Protects resident quality of life
	Manages and minimizes construction impacts
	Protects cultural heritage features
Financial viability	Be Cost Effective
	Operation and maintenance Cost

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Alternatives Evaluation - Approach

- Will complete individual evaluation of each Criteria using the following ranking approach:
  - "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

- Selection will be guided by the Reasoned Argument Approach
  - Clear and thorough rationale of the tradeoffs among the various criteria
  - Highlights the reasons why one is the best Alternative

NEXT STEPS

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Project Schedule

January	February	March	April	May	June	July
•Workshop No. 1 •Model Development	•Workshop No. 2 Model Review •Servicing Assessment	•**Workshop No. 3 Servicing Concepts / Evaluation Criteria Review** •Develop Servicing Alternatives •Develop Servicing Alternatives	•Workshop No. 4 Alternatives Evaluation Workshop •Development of Implementation Plan	•PIC No. 1 •Master Plan Report	•Workshop No. 5 Report Review	•File Master Plan •Notice of Study Completion + 30 Day Review

- Workshop No. 4 – Alternative Evaluation Workshop – Wednesday, April 17 (before Easter)
- PIC

Royal Centre 3300 Hwy 7 Suite 402
Vaughan ON L4K 4M3
P: 416.703.0667 F: 416.703.2501
www.gmblueplan.ca

Meeting Notes

Project:	Municipality of Thames Centre Water and Wastewater Master Plan Update	Project No.:	TC-015-18
		GMBP Project No.:	418109
Meeting:	Workshop No. 4 Alternatives Evaluation		
Date:	April 17, 2019	Time:	9:00 am – 11:45 am
Location:	Municipality of Thames Centre (4305 Hamilton Road, Dorchester)		
Attendees:			

Municipality of Thames Centre		**County of Middlesex**		**GM BluePlan**	
Carlos Reyes	✓	Marc Bancroft	✓	Julien Bell	✓
Jarrod Craven	✓			Matt Fisher	✓

Agenda Items
Note: Meeting Agenda followed Presentation Slides (included as attachment to these minutes)

1. Project Progress Recap

- The project schedule was reviewed. The project remains on schedule for completion in July.
  - Calibrated water and wastewater models have been provided to the Municipality.

Actions:

- GMBP provided calibrated water and wastewater models to CR (May 3).

2. Alternatives Evaluation Approach Recap

- Alternative Evaluation Criteria are recapped on Slides 6 and 7.
- Selection of Preferred Alternatives will be based on the "Reasoned Argument Approach". This approach is based on presentation of the tradeoffs among the various criteria; with a focus on reasons why the Preferred Alternative has been selected. The Reasoned Argument Approach moves away from detailed scoring or ranking of each alternative.

3. Water Servicing Alternatives

- Water Servicing Alternatives with Notes from the Workshop on the Preferred Servicing Alternatives are detailed on Slides 8 to 48.

Agenda Items
Note: Meeting Agenda followed Presentation Slides (included as attachment to these minutes)

a. Dorchester Water System (Slides 8 – 33)

The preferred water servicing alternatives for Dorchester are as follows:

Preferred Water Supply Alternative

Maximize existing facilities, and supply new groundwater source within Dorchester

- Existing WTF supply can accommodate additional 2,844 persons + jobs;

Preferred Storage and Pumping Alternative

Upgrade pumps at Dorchester WTF to service MDD and PHD

- There is enough total storage within the ET and WTF reservoirs to service growth to Buildout.
- The preferred storage and pumping alternative requires additional water supply through Dorchester WTF.

Preferred Local Alternatives include:

- watermain upgrades along Dorchester Road spine route to ET;
- new watermain loop via Mill Court, Harris Road and Christie Drive;
- extension of watermain along Hamilton Road to service growth in east Dorchester; and,
- Upgrade of Catherine Street watermain as part of the Municipality's watermain replacement program.

Preferred 401 Corridor Servicing

Undertake future cost-benefit analysis for servicing of 401 Corridor Lands

- The 2019 MP Update is to include the four servicing concepts outlined in the presentation with preliminary costing and levels of service for future evaluation.

b. Thorndale Water System (Slides 34 – 48)

The preferred water servicing alternatives for Thorndale are as follows:

Preferred Water Supply Alternative

Maximize existing facilities and supply new groundwater source within Thorndale

- Existing WTP can service additional 2,353 persons + jobs.
- Additional draft plan approved and concept plan residential growth within Thorndale = 1,796 persons.

Preferred Storage and Pumping Alternative

Upgrade pumps and reservoirs at Thorndale WTF to service MDD and PHD (monitor, track and manage growth)

- Existing available total storage can service additional 5,892 persons + jobs.
- Twinning existing 0.451 ML reservoir can service additional 8,863 persons + jobs.
- Existing pump capacity can service additional 1,790 person + jobs (under MDD) and 670 persons + jobs (under PHD).

Agenda Items
Note: Meeting Agenda followed Presentation Slides (included as attachment to these minutes)

Preferred Local Alternatives include:

- Secondary trunk watermain through Foxborough to form loop with Industrial Park watermain.
- Deficient available fire flows within Harrison Street area will require looping in future (potential opportunity to upgrade looping as part of servicing of Thorndale Peripheral Lands).

4. Wastewater Servicing Alternatives

- Wastewater servicing alternatives with notes from the workshop on the preferred servicing alternatives are detailed on Slides 49 to 90.

a. Dorchester Wastewater System (Slides 49 – 82)

The preferred wastewater servicing alternatives for Dorchester are as follows:

North Dorchester Preferred Wastewater Alternative

Construct new SPS within development lands to service growth areas, utilize existing forcemain bridge crossing, and future construction of local sewage pump stations to service existing unserviced lands:

- Preferred alternative allows for more straightforward development of lands north of the Thames River as well as more flexible timing for unserviced lands to come online (i.e. the preferred alternative does not require commissioning of infrastructure for unserviced properties in order to service growth needs)
- The forcemain to be extended south of Thames River initially to outlet into existing 250mm diameter gravity sewer. Ultimately, the forcemain is to be extended to outlet into the 600mm diameter gravity sewer at Byron Avenue. PS design is to be phased to accommodate future forcemain extension.
- The existing 250mm diameter gravity along Dorchester Road south of Thames River can accommodate flows from an additional 3,060 persons + jobs.
- Proposed growth for developments within North Dorchester is as follows:
  - Method 1: 2,172 persons + jobs; and,
  - Method 2 / Method 3: 4,384 persons + jobs.
- The existing 200mm diameter forcemain crossing the bridge will require to be upgraded to service Method 2 / Method 3 buildout.

Dorchester Treatment Preferred Alternative

Utilize approved future upgrades at Dorchester WWTP and pump wastewater flows to single WWTP, and monitor, track and manage growth

- Planned future upgrades cannot fully accommodate Build-Out under Growth Projections Method 3 (track and monitor growth within 401 Corridor Lands).

South Dorchester Preferred Wastewater Alternative includes:

- Servicing of west growth areas to PS #3 by new gravity sewer
  - Stantec to confirm that lands upstream of under-construction PS3 can be serviced by gravity sewer (proposed sewer cover at Rath-Harris municipal drain crossing to be reviewed);
  - Upgraded gravity sewer along Dorchester Road from proposed forcemain outlet to Byron Avenue 600mm diameter sewer; and,
  - Existing Dorchester PS and Forcemain to be upgraded to accommodate growth flows.

Agenda Items
Note: Meeting Agenda followed Presentation Slides (included as attachment to these minutes)

Preferred 401 Corridor Servicing

Similar to Preferred Water Servicing Alternative, undertake future cost-benefit analysis for servicing of 401 Corridor Lands

- The 2019 MP Update is to include the three servicing concepts outlined in the presentation with preliminary costing and levels of service for future evaluation.

b. Thorndale Wastewater System (Slides 83 – 90)

The preferred wastewater servicing alternatives for Thorndale are as follows:

Preferred Treatment Alternative

Utilize Approved Future Upgrades at Thorndale WWTP and monitor, track and manage growth

- Thorndale WWTP has planned expansion capacity to treat flows to Buildout under Method 1 growth projections;
- Growth to Method 2 projections may require capacity upgrades (deficiency of 5 L/s)
- Growth to Method 3 projections will require capacity upgrades to service residential peripheral development lands
- There is planned treatment capacity upgrades for an additional 4,700 persons plus jobs in Thorndale (this includes connection of existing unserviced properties located within the Settlement Boundary).

Preferred Conveyance Alternative

Sewer upgrades in the area of the Industrial Park will be required to service growth to Method 2 and Method 3 Buildout projections.

Actions for 3 and 4. Water and Wastewater Servicing Alternatives

- GMBP will prepare draft water and wastewater capital program, including cost estimates based on the preferred water and wastewater servicing alternatives.

5. Next Steps and Next Meeting

- GMBP will prepare capital plan and PIC presentation boards.
- Consultation meetings with stakeholders' groups (including developers and First Nations) are to be tentatively scheduled for the week after the Victoria Day long weekend (May 21 to May 24).
- Open-house style PICs will be held in Dorchester and Thorndale on Thursday, May 30. The Thorndale PIC is tentatively scheduled for 6 – 8 pm at the Thorndale Fire Department building and the Dorchester PIC is tentatively scheduled for 7 – 9 pm at the Flight Exec Centre.

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Attachments

MUNICIPALITY OF *Thames Centre*

Water and Wastewater Master Plan Update
Workshop No. 4

Municipality of Thames Centre (4305 Hamilton Road, Dorchester)
April 17, 2019

AGENDA

1. Project Progress Recap
2. Alternatives Evaluation Approach Recap
   - Reasoned Argument Approach
3. Water Servicing Alternatives
4. Wastewater Servicing Alternatives
5. Stakeholder and Public Consultation
6. Next Steps

OBJECTIVES

1. Recap Alternatives Evaluation Approach
2. Recap Servicing Concept Priorities
3. Review Water and Wastewater Servicing Alternatives
4. Confirm Next Steps and Schedule

PROJECT PROGRESS RECAP

Project Schedule

January	February	March	April	May	June	July
• Workshop No. 1 • Model Development • Outstanding Facility Info received from Thames Centre	• Workshop No. 2 Model Review • Servicing Assessment	• Workshop No. 3 Servicing Concepts / Evaluation Criteria Review • Develop Servicing Alternatives	• **Workshop No. 4 Alternatives Evaluation Workshop** • Development of Implementation Plan	• PIC No. 1 • Master Plan Report	• Workshop No. 5 Report Review	• File Master Plan • Notice of Study Completion + 30 Day Review

ALTERNATIVES EVALUATION

Alternatives Evaluation Criteria

Category	Criteria
Technical Feasibility	Meets existing and future servicing needs
	Support phased expansion of the system
	Provides reliable service (redundancy, minimize reliance on pump stations)
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	Protects wildlife and Species at Risk
Social / Cultural Impacts	Protects resident quality of life
	Manages and minimizes Construction impacts
	Protects cultural heritage features
Financial viability	Be Cost Effective
	Operation and maintenance Cost

Alternatives Evaluation - Approach

- Will complete individual evaluation of each Criteria using the following ranking approach:
  - "High" Solution generates beneficial impacts and/or has no substantial technical challenges
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  - "Low" Solution presents permanent negative impacts and/or presents significant technical challenges

- Selection will be guided by the Reasoned Argument Approach
  - Clear and thorough rationale of the trade-offs among the various criteria
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Servicing Alternatives Evaluation

DORCHESTER WATER SYSTEM

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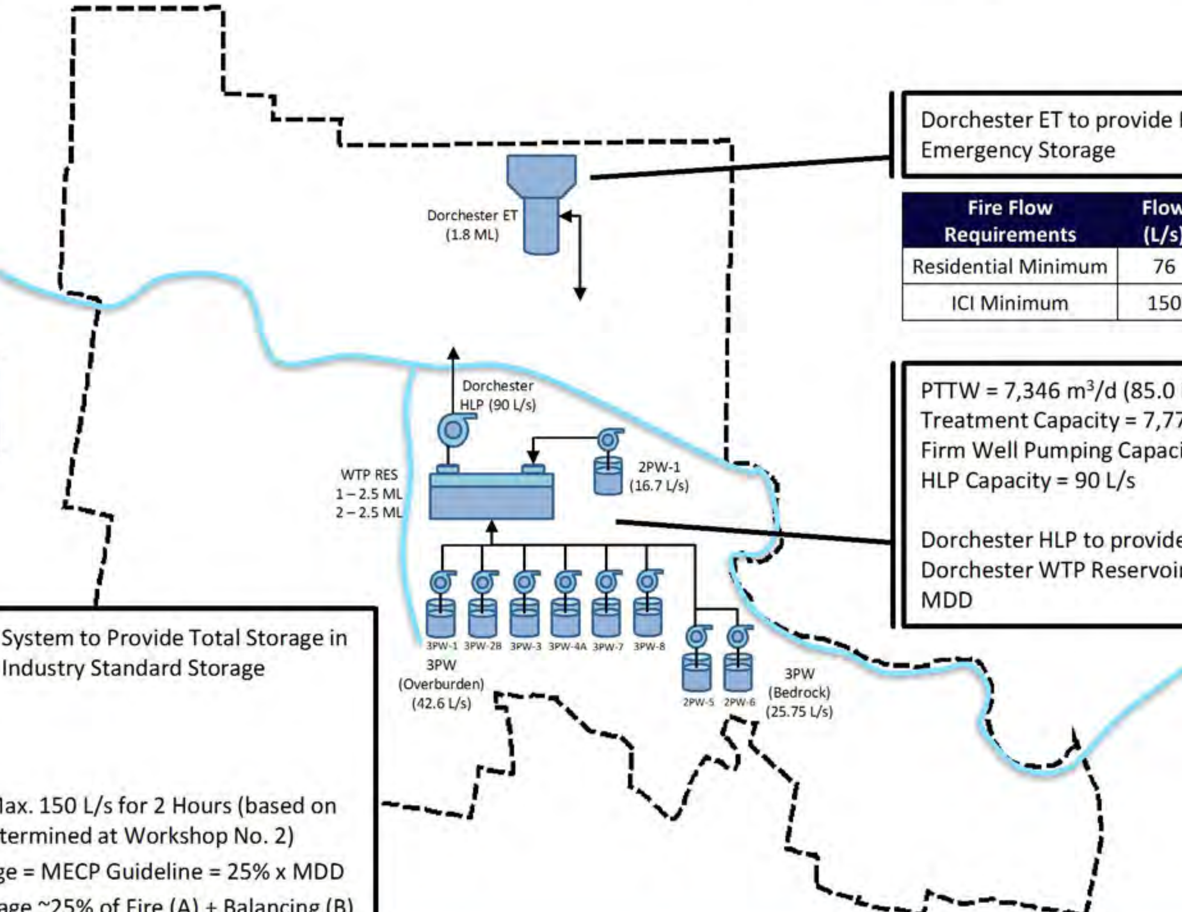
Dorchester Water System



Dorchester ET to provide Fire Flow + Emergency Storage

Fire Flow Requirements	Flow (L/s)	Duration (Hours)
Residential Minimum	76	2
ICI Minimum	150	2

PTTW = 7,346 m^3/d (85.0 L/s)
Treatment Capacity = 7,776 m^3/d (90 L/s)
Firm Well Pumping Capacity = 42.6 L/s
HLP Capacity = 90 L/s

Dorchester HLP to provide MDD + PHD
Dorchester WTP Reservoirs to provide MDD

Review of Ability of System to Provide Total Storage in line with MECP and Industry Standard Storage Requirements

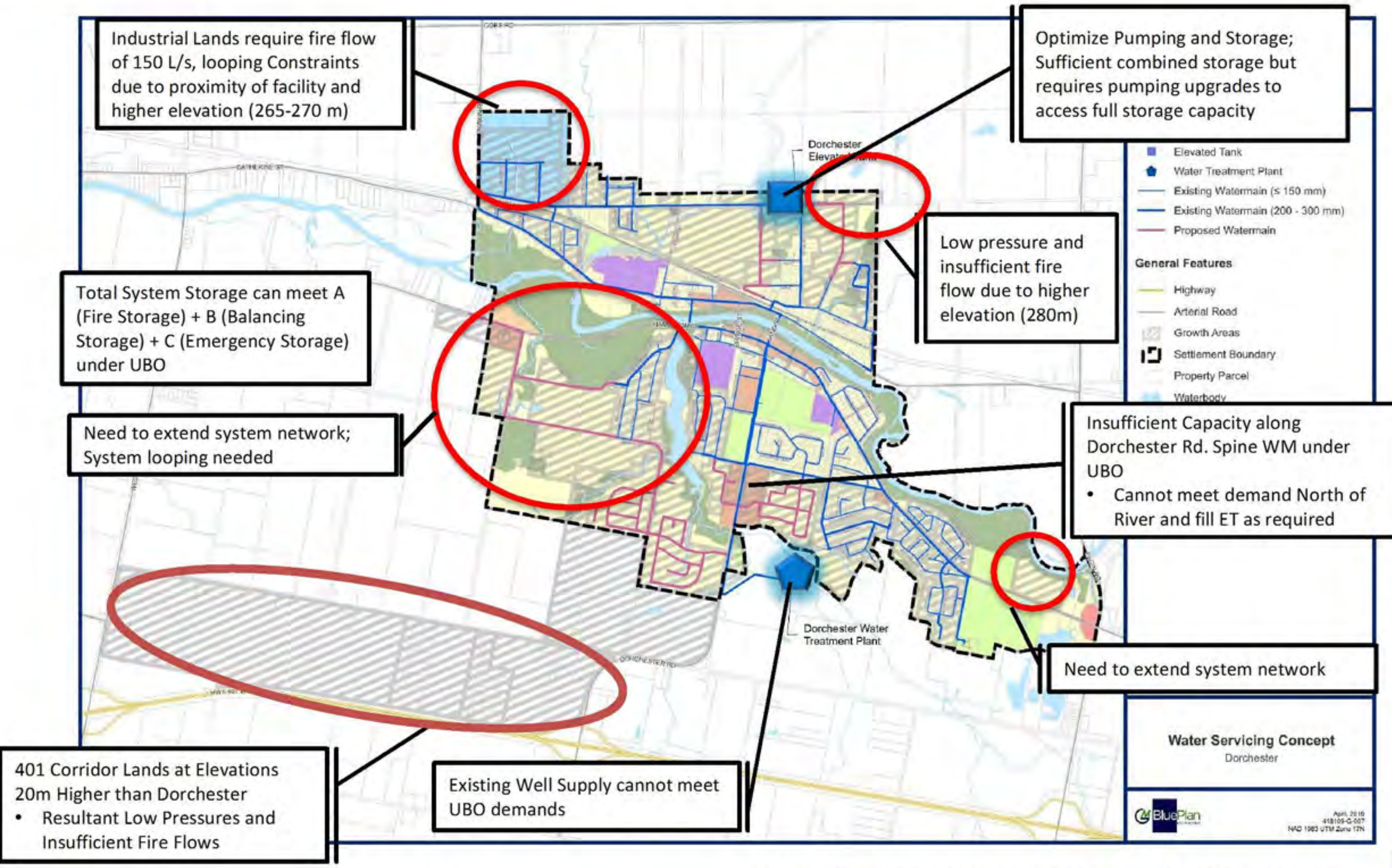
A + B + C

A = Fire Storage = Max. 150 L/s for 2 Hours (based on Design Fire Flow Determined at Workshop No. 2)

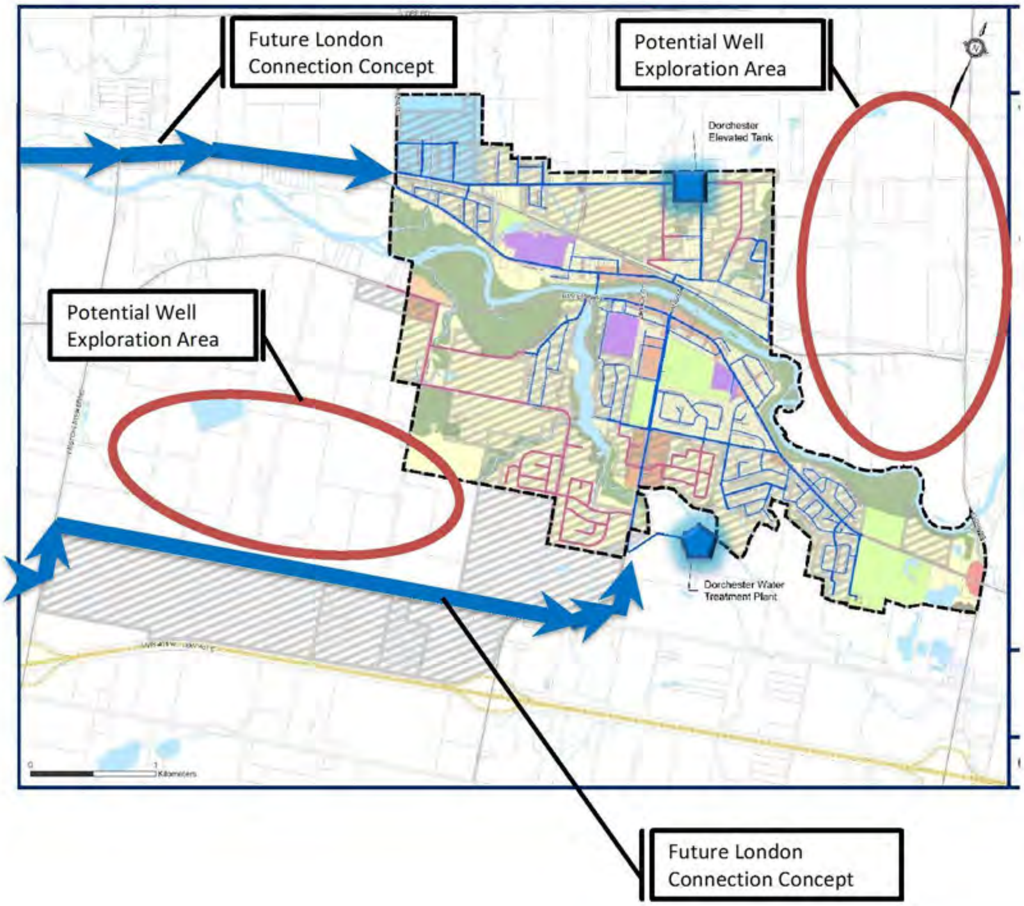
B = Balancing Storage = MECP Guideline = 25% x MDD

C = Emergency Storage ~25% of Fire (A) + Balancing (B)

Dorchester Water Servicing Constraints



Dorchester Water Servicing Concepts Supply



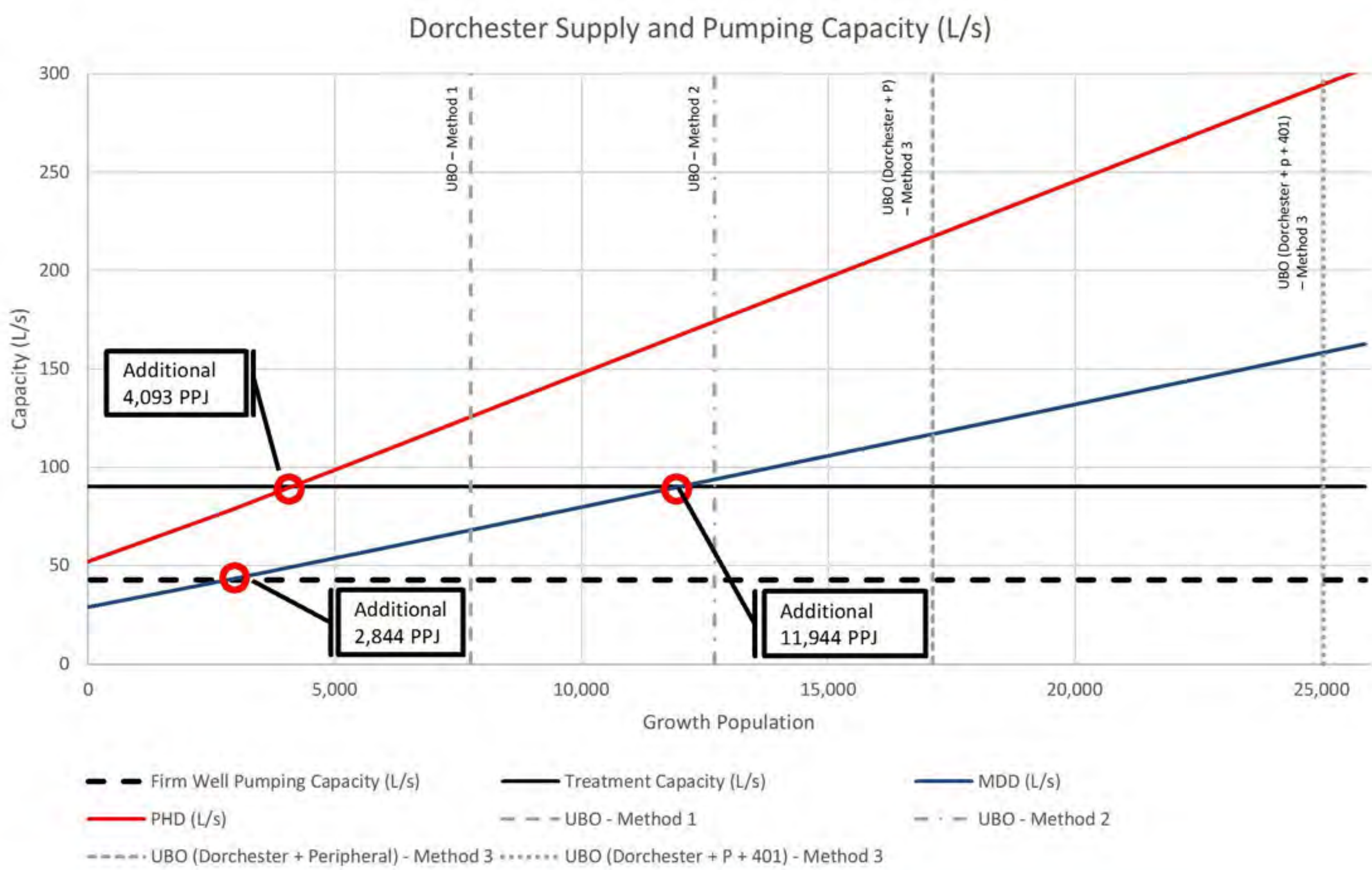
Supply from London

- Supply from London north of River or along north of 401 Corridor Lands can provide additional capacity to Dorchester and Peripheral Areas
- London Supply can easily provide for full buildout demand within Dorchester and Peripheral Areas
- Opportunity to decommission Dorchester WTP and provide supply entirely through London connection
- London Supply north of the River likely can supply Dorchester ET without additional BPS (Further Details of London Future SE Pressure Zone to be Investigated)
- Construction Costs for this alternative likely less than for new facilities within Dorchester (~ 4km of watermain per feed + meter chamber(s))

Well Exploration

- Considered in 2008 Master Plan
- Alternative to Future Connection to London
- Potential opportunity to provide Dorchester with self-sufficient supply to service Buildout demand
- Identification / availability of enhanced aquifer can provide Dorchester with opportunity to Construct and operate new WTP at less cost over life-cycle than connection to London
- Anticipated that there may be quality issues similar to existing wells
- There is limited Information available supporting identification of source
- High level of uncertainty and years of study required to determine availability

Dorchester Supply Capacity



Dorchester Supply Alternatives Evaluation

Alternative	Advantages	Disadvantages	Estimated Timing	Estimated Cost
Alternative 1 • Maximize Well Capacity at Existing WTF to Service As Much Growth as Possible • Limit Growth	• Availability of some additional capacity to supply growth within short term • Minimizes new infrastructure • May provide interim solution to service growth while investigation of available well supply is completed	• Not enough capacity within existing wellfield to service growth to Build-Out	1 – 2 years Well rehab and groundwater testing to maximize capacity PTTW Approval	$2.0M Rehab wells, replace / add pumps, expand capacity and supply pumps
Alternative 2 • New groundwater source within Dorchester	• Identification of sufficient available well capacity will provide Municipality with full control over Water Supply	• Uncertainty that there is available well capacity to supply growth to Build-Out • Limited information means that location of supply is unknown and infrastructure requirements also unknown (new pumps, WM, WTP?)	4 years prior to identification of available source and location, 7 – 10 years total • Desktop Study, identification of secure test and monitoring wells, pump and well testing • Class EA • Hydrogeological Report + Groundwater Modelling to support yields + treatment needs • PTTW Approval • Design and Construction	Method 1: $1.0M - $4.0M Method 2: $2.0M - $10.0M Method 3: $3.0 M - $15.0M
Alternative 3 • Commission London / Lake Huron-Elgin Water Supply Connection	• Provides certainty of supply for growth to Build-Out • Allocation of supply is available for Thames Centre; can be maintained for use if available well supply is not identified • Provides trunk WM to service 401 Corridor Lands	• Does not provide Municipality with preferred level of control over water supply • Extensive watermain Construction and maintenance required	6 – 7 years Total • Agreement – 2years • EA for alignment – 2 years • Design and Construction - 2 – 3 years	All Methods: $15.0M (to 401 Corridor Lands) - $30.0M (to Dorchester WTF)

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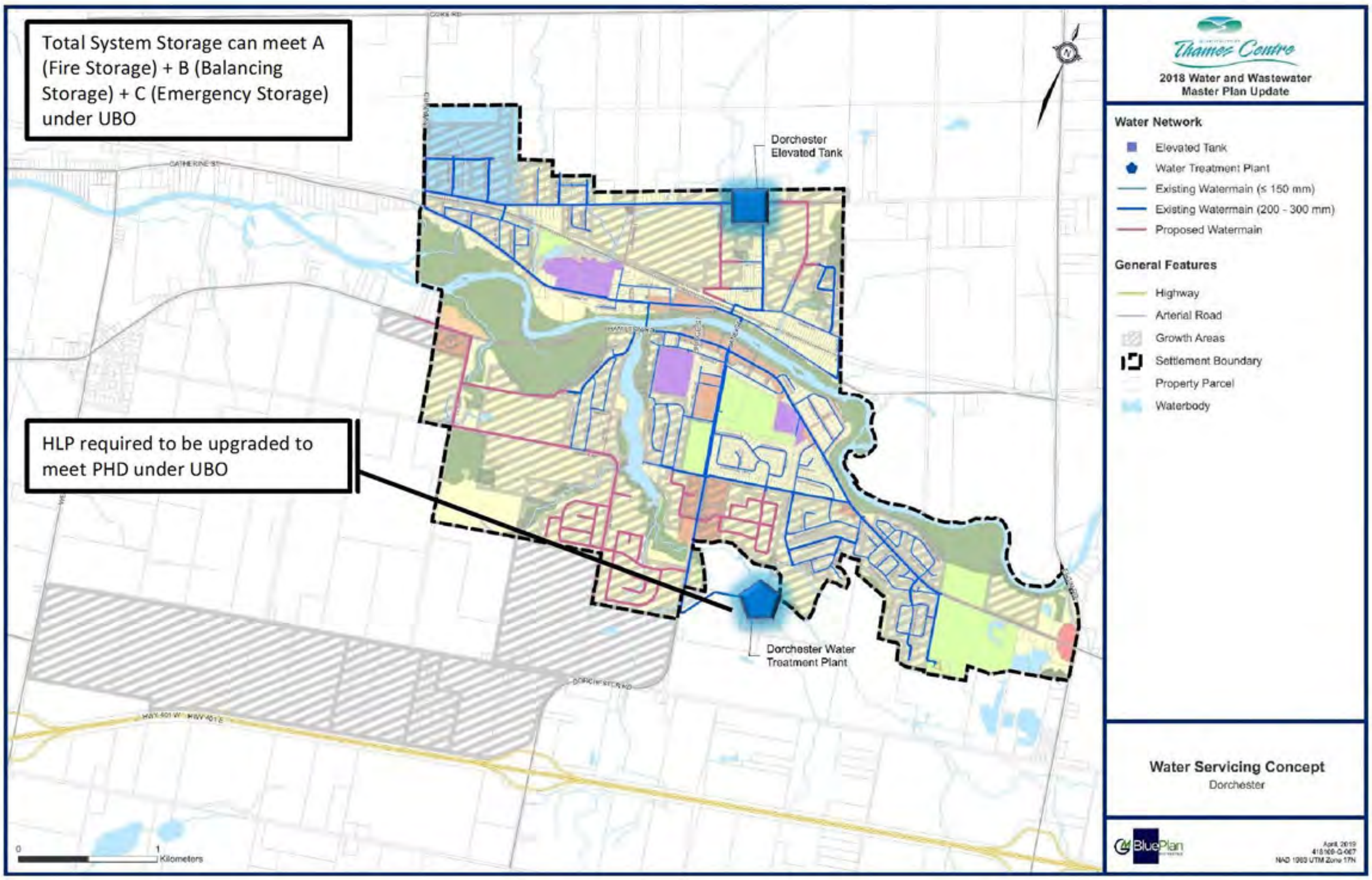
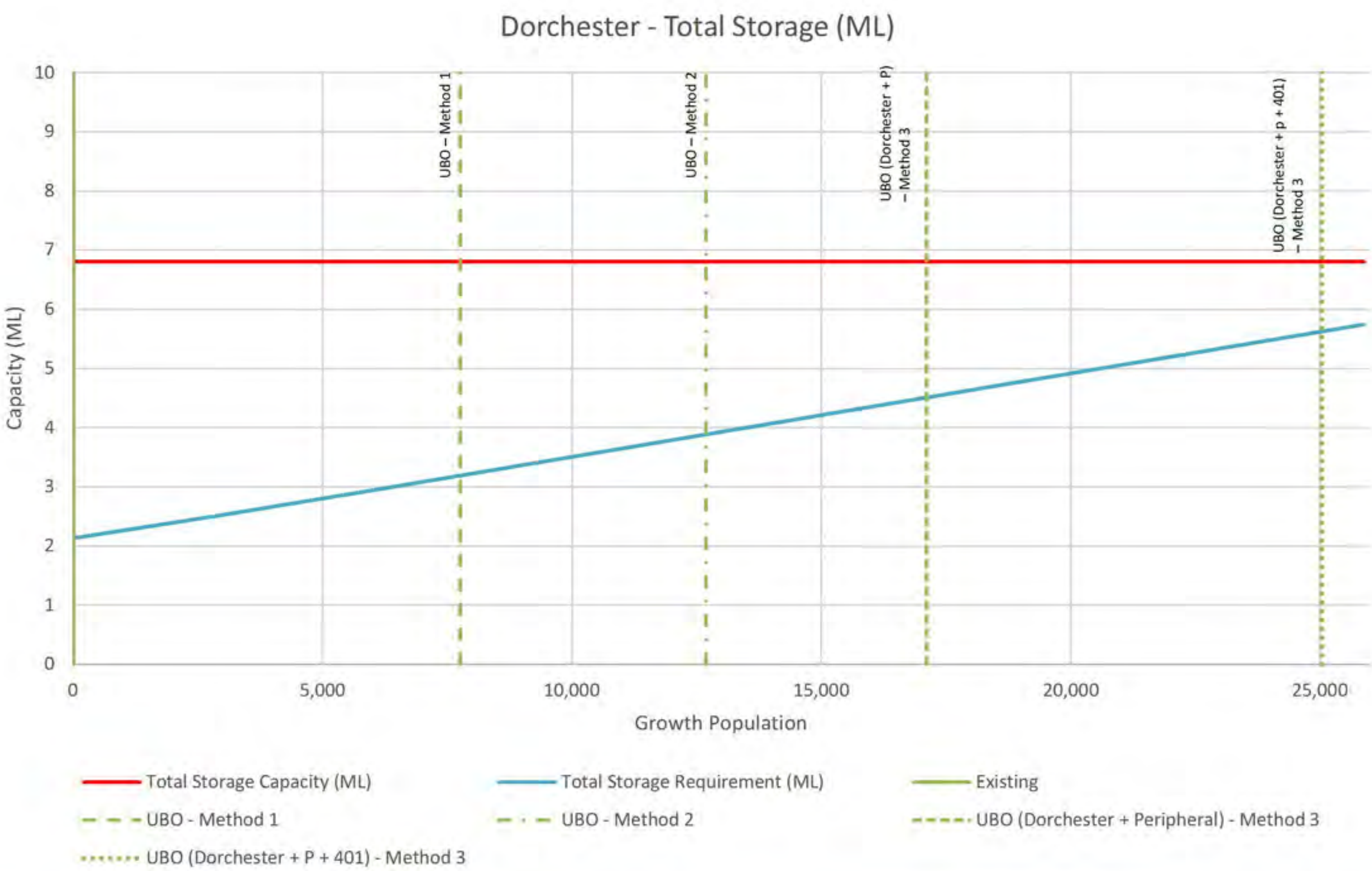
Dorchester Supply Alternatives Evaluation

	Advantages	Disadvantages	Estimated Timing	Estimated Cost
Alternative 4 (Preferred) ▪ Maximize Existing Facilities + Supply New groundwater source within Dorchester	• Availability of some additional capacity to supply growth within short term while Well Exploration is commenced • Initially maximizing facilities safeguards against potential that no new groundwater availability is found by permitting some growth to offset the 4-year delay for studies before Huron / Elgin Area connection commenced • Identification of sufficient available well capacity will provide Municipality with full control over Water Supply	• Not enough capacity within existing wellfield to service growth to Build-Out • Uncertainty that there is available well capacity to supply growth to Build-Out • Limited information means that location of supply is unknown and infrastructure requirements also unknown (new pumps, WM, WTP?)	Maximizing Existing Facilities / Well Field • 1 – 2 years with rehab and groundwater testing Well Exploration • 4 years prior to identification of available source and location, 7 – 10 years total	Method 1: $3.0M - $5.0M Method 2: $4.0M - $12.0M Method 3: $5.0 M - $17.0M

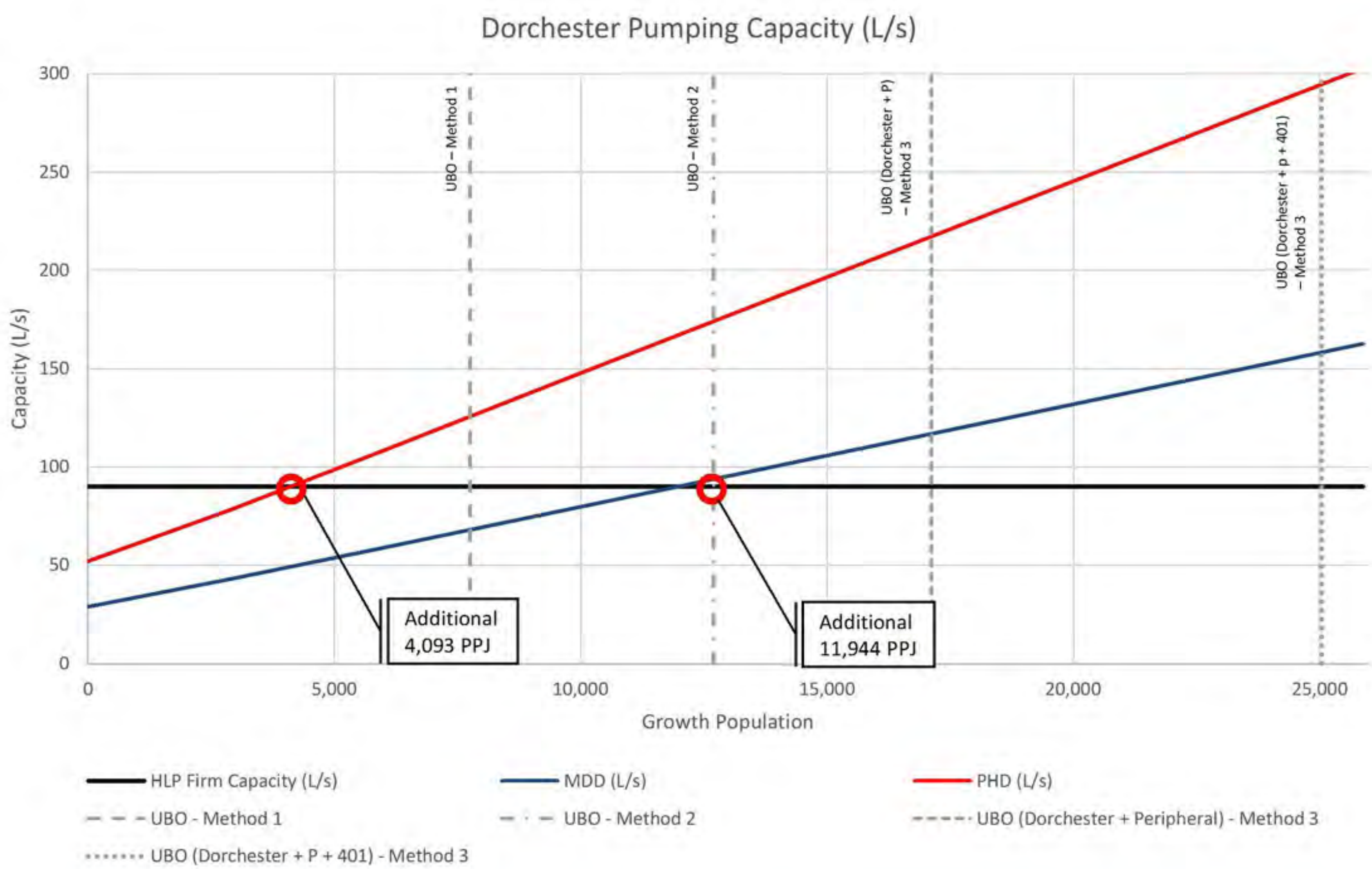
Dorchester Water Servicing Concepts
Storage and Pumping



Dorchester Total Storage



Dorchester WTP Pumping



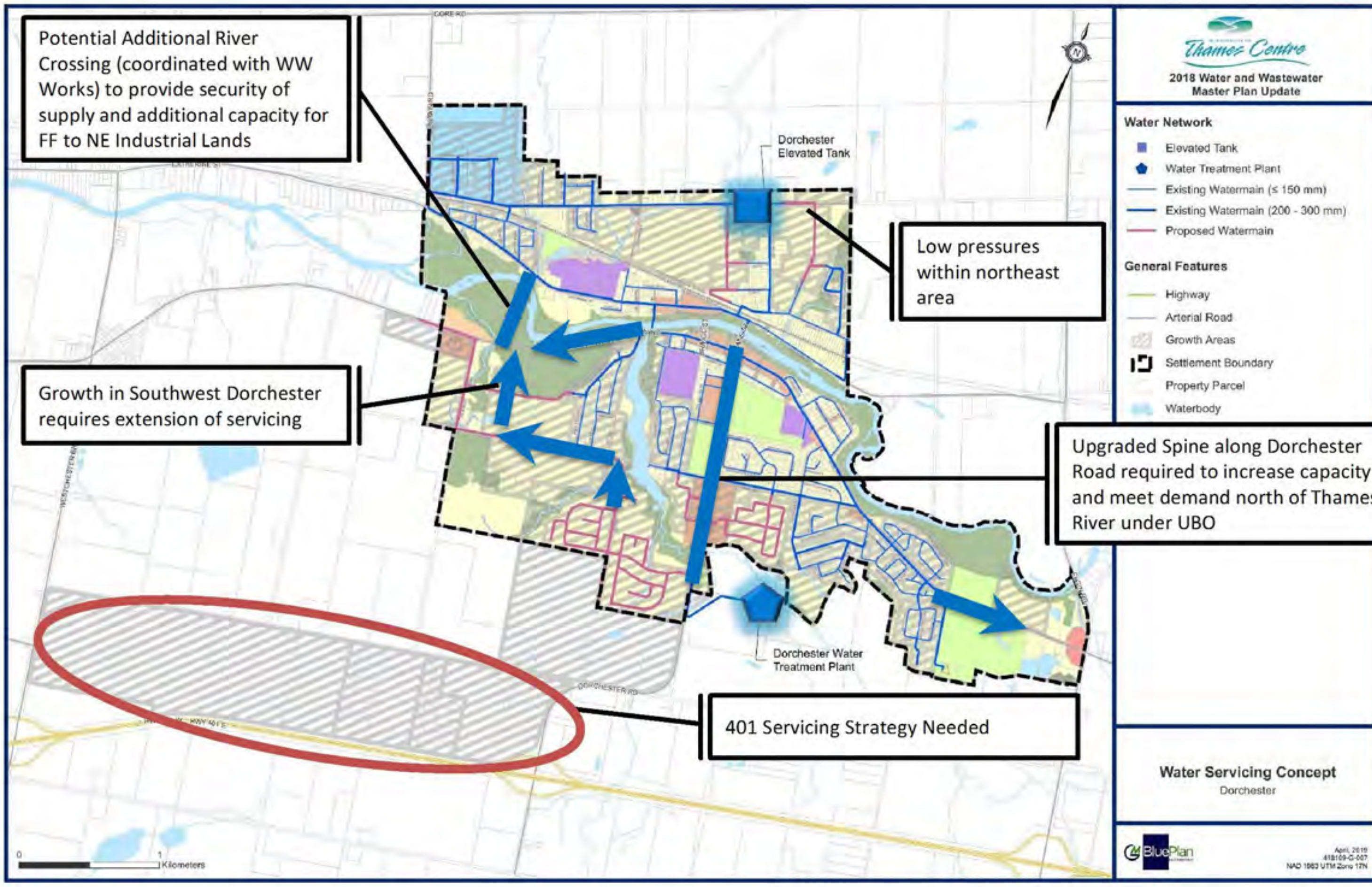
Dorchester Storage and Pumping Alternatives Evaluation

	Advantages	Disadvantages	Estimated Timing	Estimated Cost
Alternative 1 (Preferred) Upgrade Pumps at Dorchester WTF to service MDD and PHD	• Minimizes infrastructure upgrades in Dorchester (can utilize storage within the existing inground reservoirs at Dorchester WTF)	• Requires that additional water supply be conveyed to Dorchester WTF • Feasibility of this is dependent on the Well Investigation Studies	• Design and Construction at WTF (includes pump replacements) – 1 – 3 years • New supply infrastructure will be required with timing tied to preferred supply alternative	$1.0 M
Alternative 2 Construct Additional Storage Facility	• Can be located to service 401 Corridor Lands as well as provide security 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 connection if available well supply is not found	• Likely more extensive infrastructure upgrade requirements than to utilize existing WTF	4 – 6 years total • EA – 2 years • Design and Construction – 2 – 4 years	$5.0M

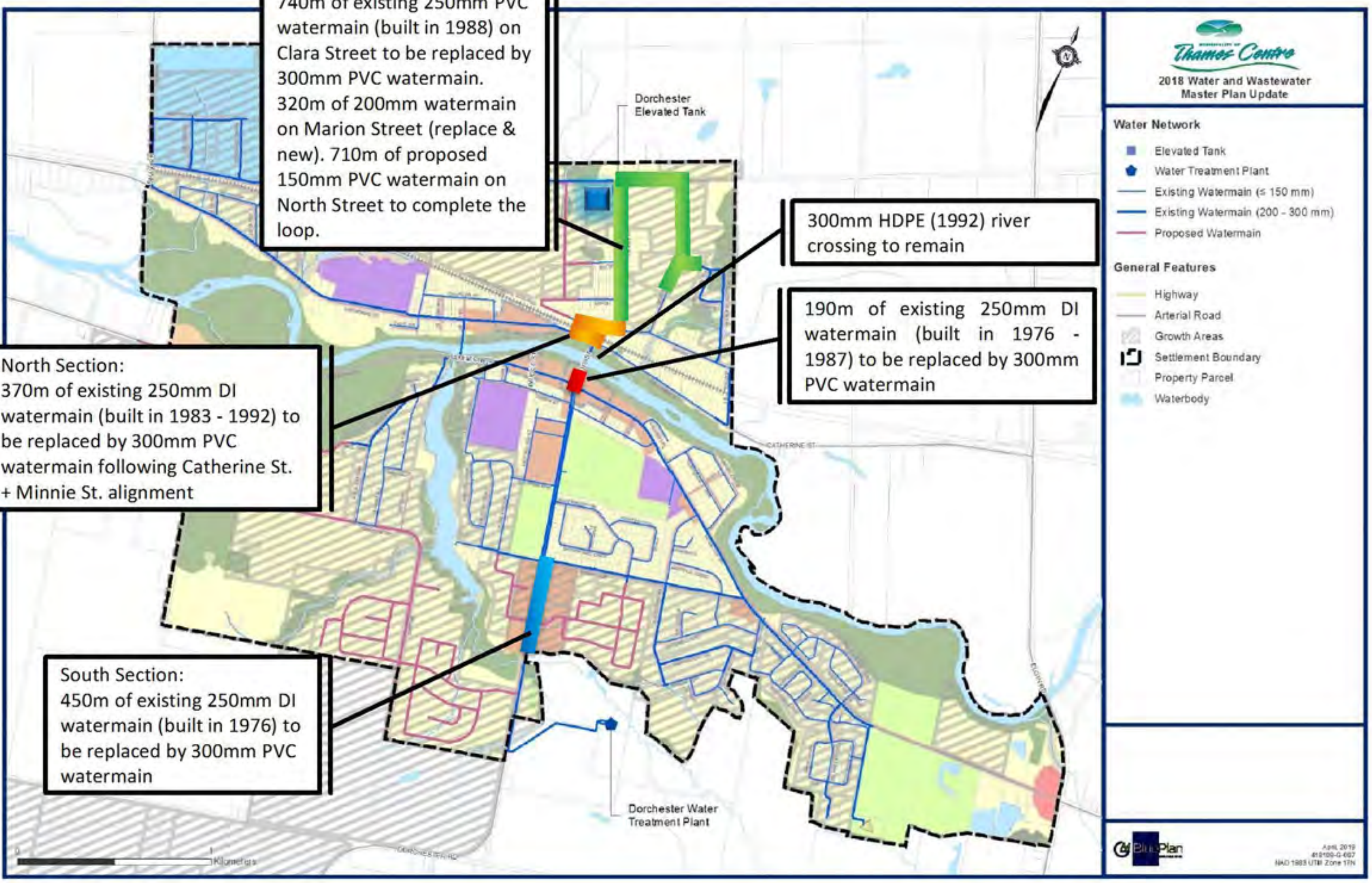
Servicing Alternatives Evaluation

DORCHESTER LOCAL WATER SERVICING ALTERNATIVES

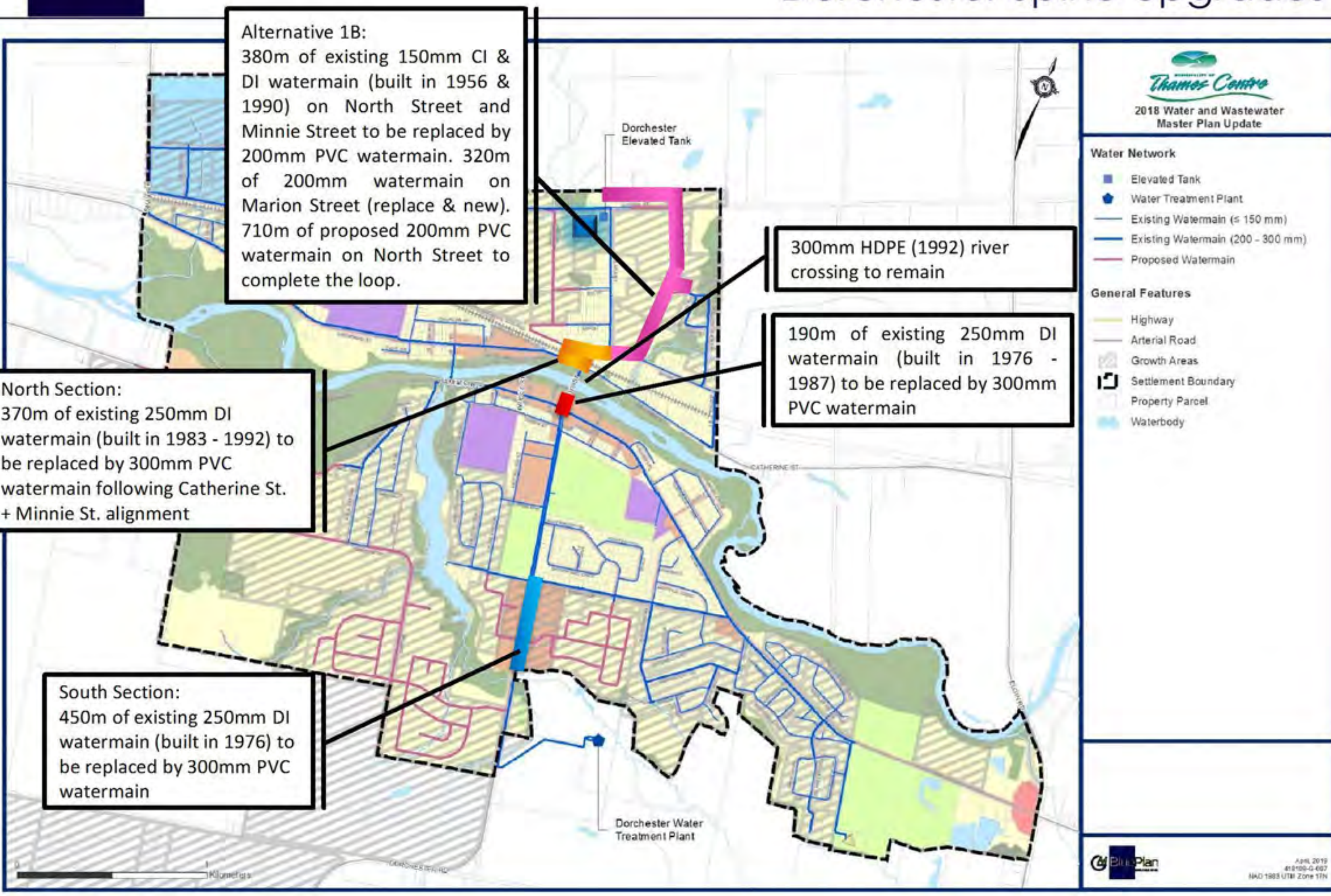
Dorchester Water Servicing Concepts
Conveyance



Dorchester Water Local Alternatives Review
Dorchester Spine Upgrades



Dorchester Water Local Alternatives Review
Dorchester Spine Upgrades



Dorchester Water Local Alternatives Review
Dorchester Spine Upgrades

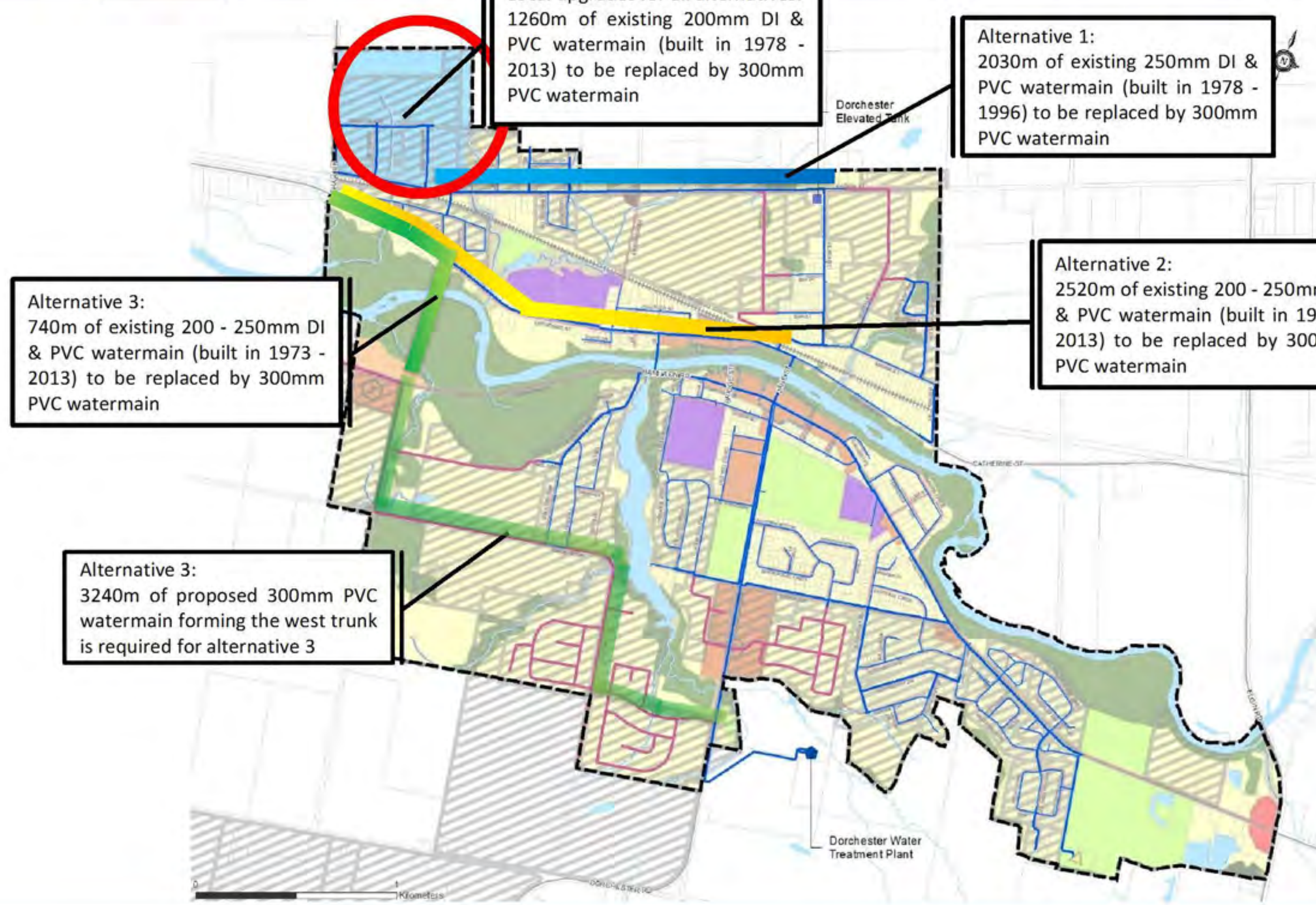
Alternatives	Description	Advantages	Disadvantages	Estimated Cost
Alternative 1A WM upgrades along Dorchester Rd. south of Thames River WM upgrades along Dorchester Rd. North of Thames River to Dorchester ET	**Clara St** - 570m of existing 250mm PVC watermain (built in 1988) on Clara Street to be replaced by 300mm PVC watermain **Marion St** - 320m of 200mm watermain on Marion (100m of replacing existing 150mm PVC (2011) WM & 220m of new WM) **North St loop** - 710m of proposed 150mm PVC watermain to complete the loop	• Upgrade of Dorchester Rd. Spine provides capacity to maintain Dorchester ET levels to Buildout under all methods • Upgrade alignment under Thames Centre control	• Construction will require extensive plan to ensure that WTF / ET connections and conveyance is maintained along Dorchester Rd. • Requires more costly Construction of upgrades north of River along built-up Dorchester Rd. Traffic management and possibly temporary water supply will be required	$5.4 M
Alternative 1B (Preferred) WM upgrades along Dorchester Rd. south of Thames River WM upgrades through Development and along Marion St. to Dorchester ET	**Marion St** - 320m of 200mm watermain on Marion (100m of replacing existing 150mm PVC (2011) WM & 220m of new WM) **North St loop** - 710m of proposed 200mm PVC watermain to complete the loop **Minnie St & North St** - 380m of existing 150mm CI & DI watermain (built in 1956 & 1990) on North Street and Minnie Street to be replaced by 200mm PVC watermain Ex. 300mm dia. HDPE River Crossing (Constructed in 1992) to remain	• Upgrade of Dorchester Rd. spine along this alignment provides similar benefits to Alternative 1A. • North of Thames River, more cost efficient Construction of WM through greenfield development to service growth (rather than along Dorchester Rd.) • Also easier to maintain existing servicing north of Thames River.	• Upgrade north of river tied to development of lands northeast of Catherine St. • Similar to Alternative 1A, Construction will require extensive plan to ensure that WTF / ET connections and conveyance is maintained along Dorchester Rd.	$4.6 M

- Both Alternative 1A and 1B include the same upgrades south of Thames River:
- **Dorchester Road**
  - 450m of existing 250mm DI watermain (built in 1976) to be replaced by 300mm PVC watermain
  - 190m of existing 250mm DI watermain (built in 1976 - 1987) south of Thames River crossing to be replaced by 300mm PVC watermain

  300mm HDPE (1992) river crossing to remain for both Alternative 1A and Alternative 1B

- North of Thames River, both Alternative 1A and Alternative 1B include:
- **Catherine St. and Minnie St.**
  - 540m of existing 250mm DI watermain (built in 1983 - 1992) to be replaced by 300mm PVC watermain

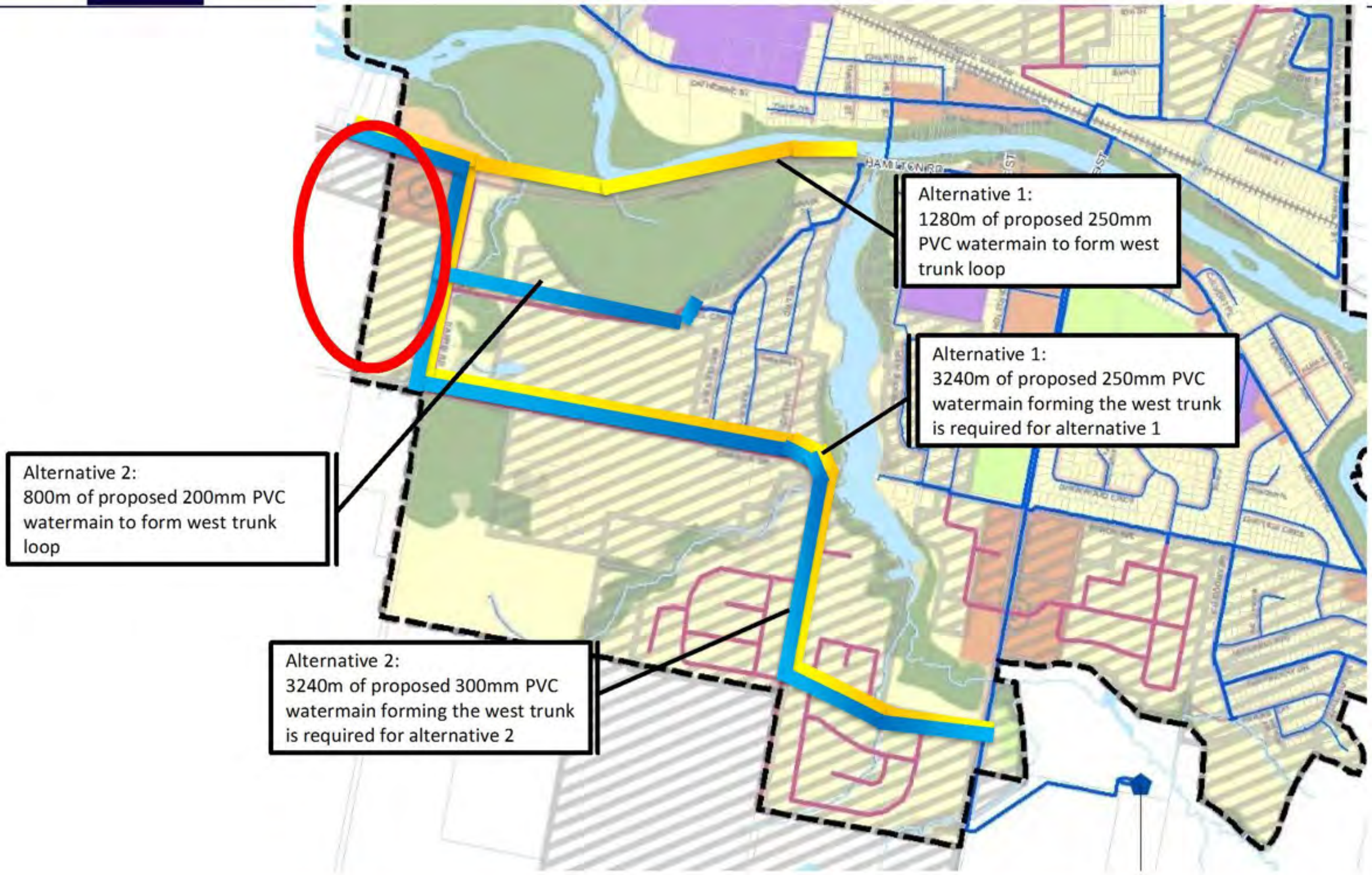
Dorchester Water Local Alternatives Review
Northwest Industrial Lands



Dorchester Water Local Alternatives Review
Northwest Industrial Lands

Alternatives	Description	Advantages	Disadvantages	Cost
Alternative 1 WM upgrades on Marion St. and within industrial lands	**Marion St** - 2030m of existing 250mm DI & PVC watermain (built in 1978 - 1996) to be replaced by 300mm PVC watermain **Industrial Lands** - 1260m of existing 200mm DI & PVC watermain (built in 1978 - 2013) to be replaced by 300mm PVC watermain	• Improves available fire flow for Northwest Industrial Area • Minimizes infrastructure upgrades and cost • Align upgrade development buildout	• Watermain to be replaced still has remaining service life (installed in the late 80s) • Significant Construction disruption (single lane road)	$6.4M
Alternative 2 (Preferred) WM upgrades on Catherine St. and within Industrial Lands	**Catherine St** - 2520m of existing 200 - 250mm DI & PVC watermain (built in 1973 - 2013) to be replaced by 300mm PVC watermain **Industrial Lands** - 1260m of existing 200mm DI & PVC watermain (built in 1978 - 2013) to be replaced by 300mm PVC watermain	• Provides additional security of supply for industrial area (improves FF) • Replaces old watermain on Catherine Street (can be incorporated into Municipality's WM Replacement Program)	• Increased infrastructure requirements and costs - primarily due to railway crossing, and longer WM replacement section • Significant Construction disruption (single lane road)	$7.3M (Project is to be completed as part of watermain replacement program)
Alternative 3 Additional river crossing + WM upgrades on Catherine St + South Dorchester West Trunk	**Catherine St** - 740m of existing 200 - 250mm DI & PVC watermain (built in 1973 - 2013) to be replaced by 300mm PVC watermain **Industrial Lands** - 1260m of existing 200mm DI & PVC watermain (built in 1978 - 2013) to be replaced by 300mm PVC watermain **West Trunk** - 3240m of proposed 300mm PVC watermain forming the west trunk	• Provides security of supply for industrial area (improve FF) • Opportunity to coordinate project with WW river crossing to reduce costs • Opportunity to align with proposed servicing of West Development Lands	• Requires crossings of natural heritage areas (complex permitting and Construction requirements) • Increased infrastructure requirements and costs - primarily due to railway crossing, and longer WM replacement section • Significant Construction disruption (single lane road)	$6.4 M (Excludes West Trunk WM – costed independently in next section)

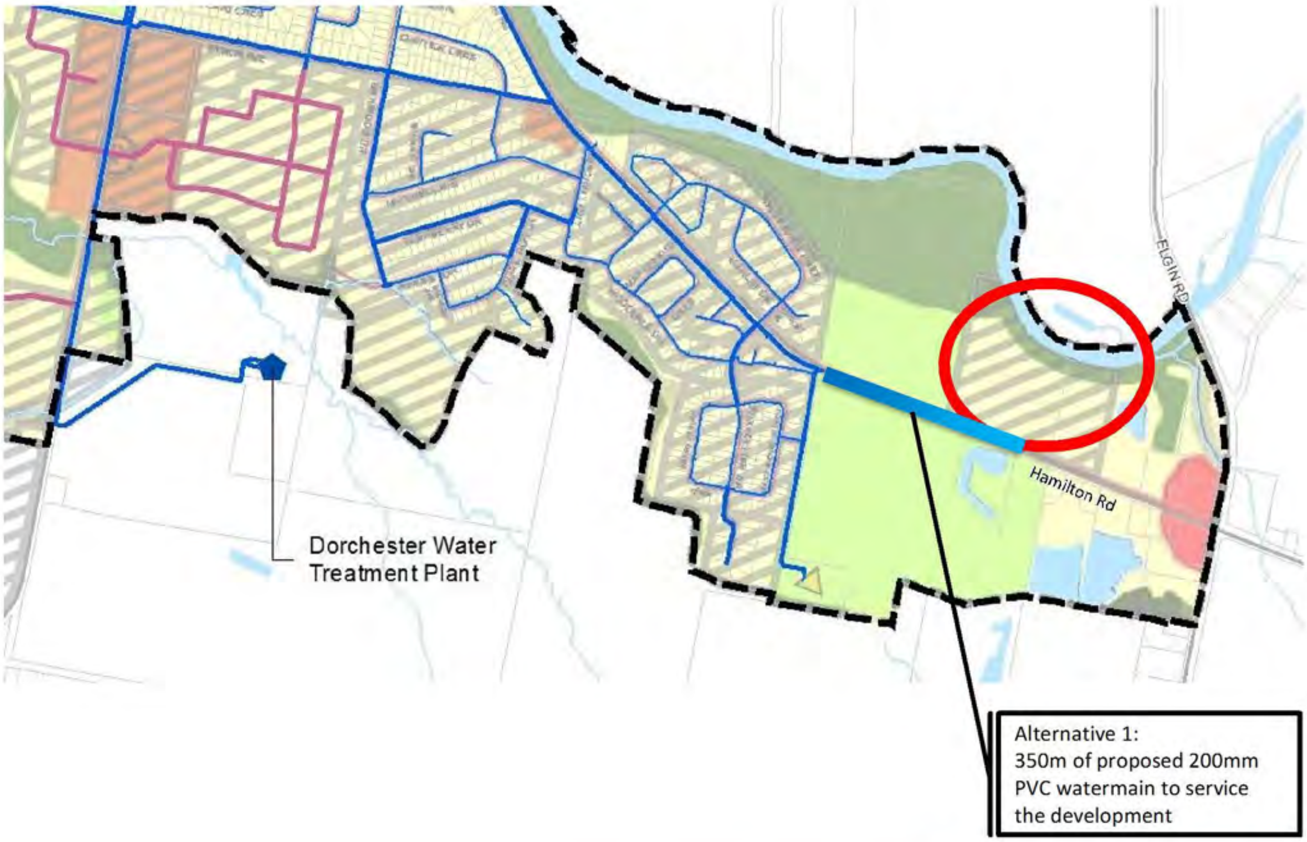
Dorchester Water Local Alternatives Review
West Development Lands



Dorchester Water Local Alternatives Review West Development Lands

Alternatives	Description	Advantages	Disadvantages	Cost
Alternative 1 Loop via Hamilton Rd., Harris Rd., to Christie Dr.	**Hamilton Rd** - 1280m of proposed 250mm PVC watermain **West Trunk** - 3240m of proposed 250mm PVC watermain	• Provides extension / strengthened feed along Hamilton Rd. that can be utilized if potential future Huron / Elgin Area is routed along Hamilton Rd.	• Requires long section of new WM along Hamilton Rd. that does not service fronting properties • Construction of WM along Hamilton Rd. through natural heritage system area • Increased permitting and Construction complexity through this section	$9.6M
Alternative 2 Loop via Mill Ct., Harris Rd., to Christie Dr.	**Mill Ct** - 800m of proposed 200mm PVC watermain **West Trunk** - 3240m of proposed 300mm PVC watermain	• More directly services growth through West Development Lands • More cost efficient Construction through greenfield areas as part of future development	• Crossing of natural heritage system feature is required to connect along Harris Rd.	$7.3M

Dorchester Water Local Alternatives Review
Southeast Development Lands



Dorchester Water Local Alternatives Review
Southeast Development Lands

Alternatives	Description	Advantages	Disadvantages	Cost
Alternative 1 Extend WM on Hamilton Rd.	**Hamilton Rd.** - 350m of proposed 200mm PVC watermain to service the development	• Required to provide service to potential development northeast of Dorchester Fairgrounds	• Single dead-end feed to potential development area	$0.7M

Servicing Alternatives Evaluation

401 CORRIDOR WATER SERVICING ALTERNATIVES

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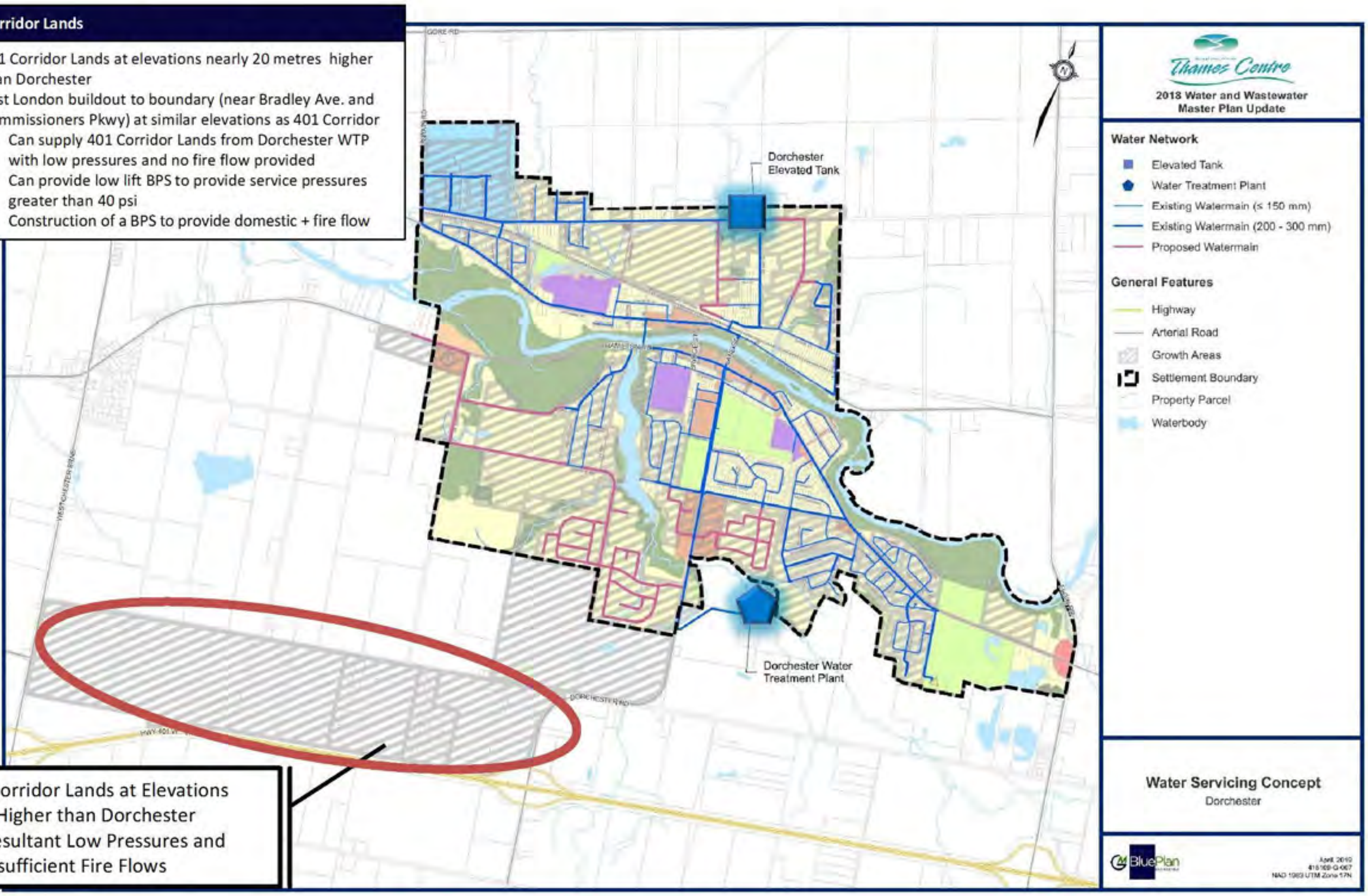
401 Corridor Lands Water Servicing Constraints

401 Corridor Lands

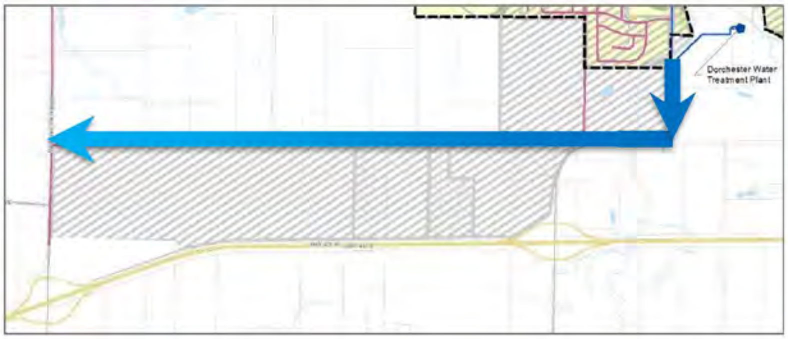
- 401 Corridor Lands at elevations nearly 20 metres higher than Dorchester
- East London buildout to boundary (near Bradley Ave. and Commissioners Pkwy) at similar elevations as 401 Corridor
  - Can supply 401 Corridor Lands from Dorchester WTP with low pressures and no fire flow provided
  - Can provide low lift BPS to provide service pressures greater than 40 psi
  - Construction of a BPS to provide domestic + fire flow



401 Corridor Lands at Elevations 20m Higher than Dorchester

- Resultant Low Pressures and Insufficient Fire Flows

401 Corridor Lands Water Servicing Concepts

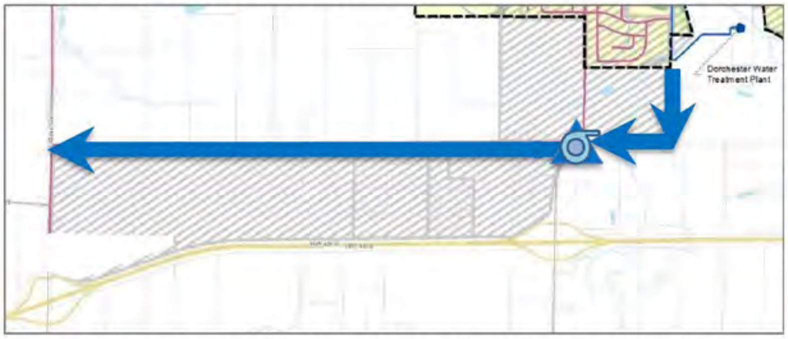


Option 1 – Supply 401 Corridor Lands from Dorchester WTP

- Low pressures (<40 psi) with no fire flow provided
- Service pressures >50 psi likely available if London Supply commissioned
- Sufficient Fire Flow may be available from London Supply

Option 2 – Supply 401 Corridor Lands with Low Lift BPS

- Provides service pressures (>40 psi) with no fire flow provided
- Potential for low Lift BPS could be decommissioned if London supply is commissioned



Option 3 – Supply 401 Corridor Lands with BPS + Fire Pump

- Provides industry with service pressures >50 psi + fire flow
- Significant increase to capital + O&M costs to service area

Option 4 – Supply 401 Corridor Lands with BPS + Storage Facility

- Provision of sufficient service pressures and fire flows to area
- Can provide additional storage to South Dorchester
- Can be use to eliminate pump upgrades at WTP

401 Corridor Lands Alternatives Evaluation

	Advantages	Disadvantages	Estimated Timing	Estimated Cost
Alternative 1 Supply from Dorchester WTF	• Minimal infrastructure upgrades required relative to other options • Provides opportunity for potential future connection to provisional supply from Lake Huron-Elgin	• Can only provide low service pressures (30 - 40 psi) under Method 1 and Method 2 • Operational pressures are deficient under Method 3 Build Out • Cannot provide sufficient fire flow	• Design and Construction – 1 – 3 years • Schedule A+ Class EA	$10M - $12.0M
Alternative 2 Supply 401 Corridor Lands with Low Lift BPS	• Provides area with sufficient operating pressures • Smaller PS, better quality	• Additional infrastructure capital and O&M costs • May be "throwaway" costs if Lake Huron-Elgin connection is commissioned (Low Lift BPS would be ineffective and no longer required) • Cannot provide sufficient fire flow	Total 3 – 5 years • Design and Construction – 1 – 3 years • Schedule B Class EA – 1 years	$10.5M - $13.0M
Alternative 3 Supply with BPS plus Fire Pump	• Provides area with sufficient operating pressures and available fire flow	• Extensive infrastructure upgrade costs and future O&M costs for BPS	Total 4 – 6 years • Schedule B Class EA – 2 years • Design and Construction – 2 – 4 years	$12.0M - $15.0M
Alternative 4 Supply with BPS plus Storage Facility • Not preferred	• Provides area with sufficient operating pressures and available fire flow • Can be utilized to provide additional storage to South Dorchester • Potential to replace required storage and pumping upgrades at Dorchester WTF	• Most extensive infrastructure upgrade costs and future O&M costs for BPS • A second storage facility is likely redundant – Dorchester can be service by utilization of existing storage.	Total 4 – 6 years • Schedule B Class EA – 2 years • Design and Construction – 2 – 4 years	$17.0M - $20.0M

- Alternative 1 is the preferred alternative based on the available information. It is recommended that Municipality undertake further analysis to review cost-benefits of providing sufficient operating pressures and fire flows to the 401 Corridor Lands
  - Will land value increases, tax for development, economic feasibility justify low lift BPS alternative, fire pump alternative?
  - It is expected that the minor incremental upgrade costs to improve operational pressures in 401 Corridor will be justifiable
  - It is not expected that major incremental upgrades costs to provide sufficient fire flow to the 401 Corridor will be justifiable

Servicing Alternatives Evaluation

THORNDALE WATER SYSTEM

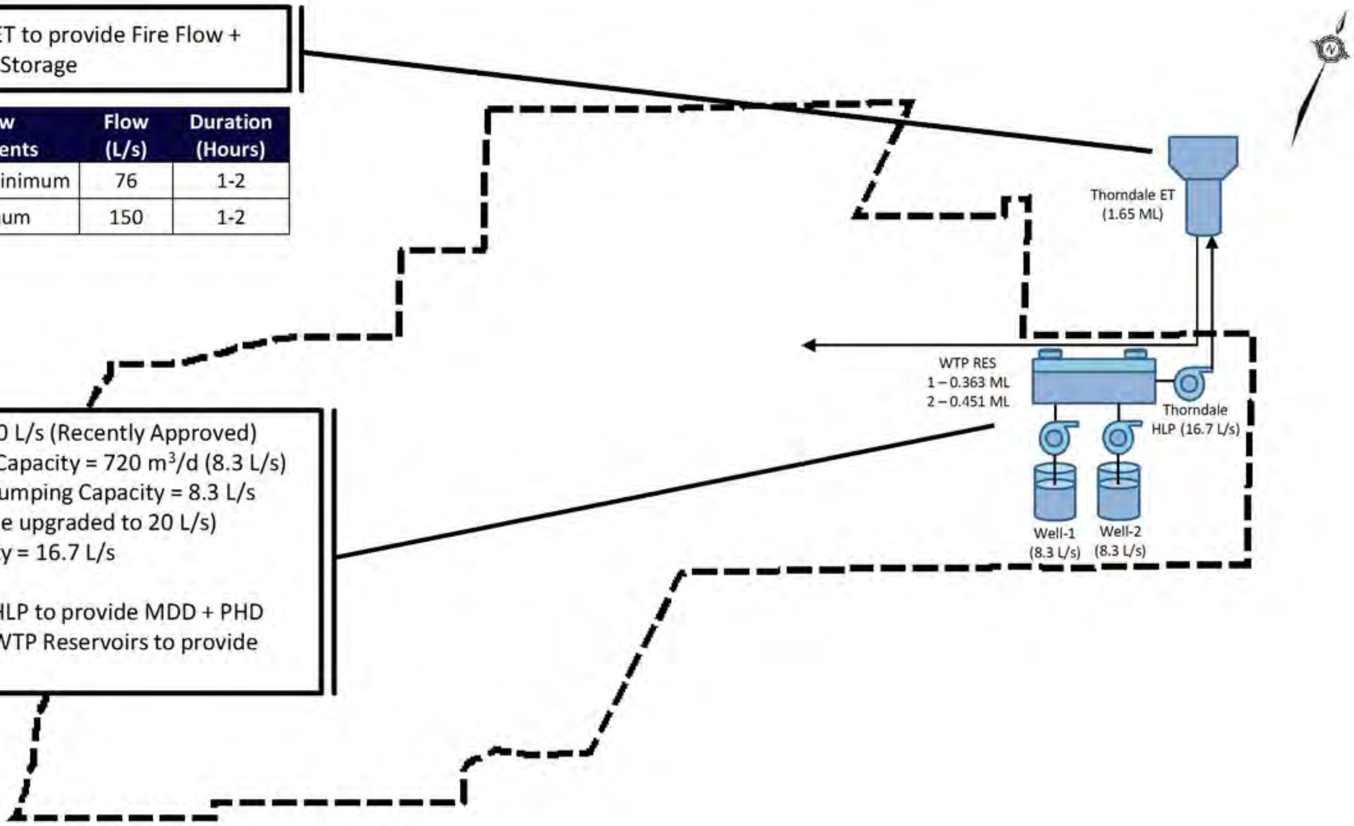
Thorndale Water System Schematics

Thorndale ET to provide Fire Flow + Emergency Storage

Fire Flow Requirements	Flow (L/s)	Duration (Hours)
Residential Minimum	76	1-2
ICI Minimum	150	1-2

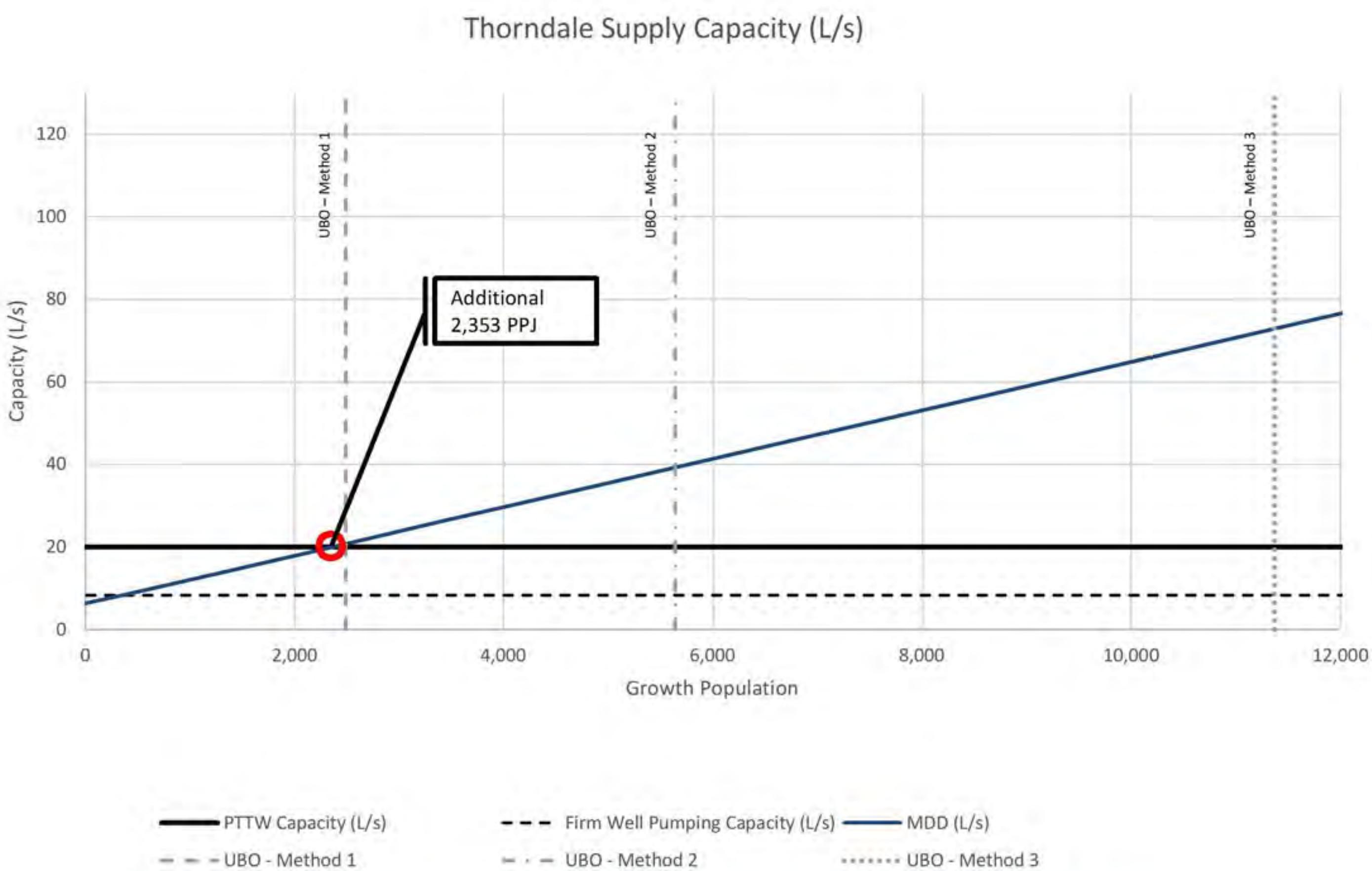
PTTW = 20.0 L/s (Recently Approved)
Treatment Capacity = 720 m^3/d (8.3 L/s)
Firm Well Pumping Capacity = 8.3 L/s
(Well-2 to be upgraded to 20 L/s)
HLP Capacity = 16.7 L/s

Thorndale HLP to provide MDD + PHD
Thorndale WTP Reservoirs to provide MDD

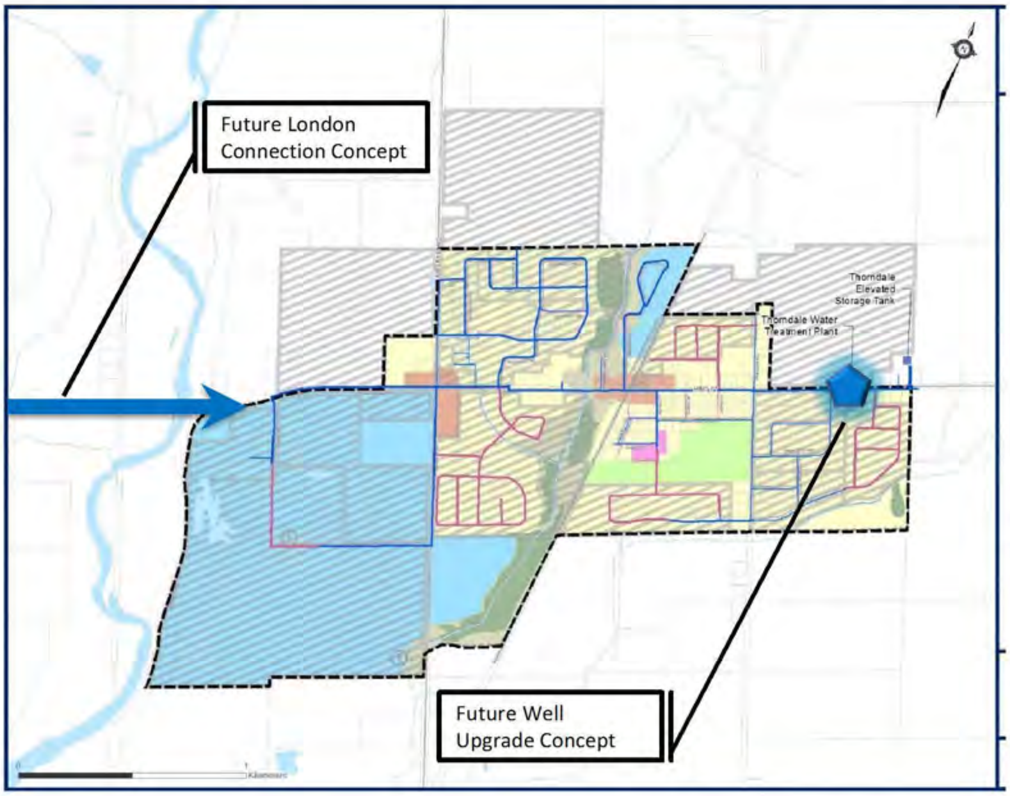


Thorndale Water Servicing Constraints

Thorndale Supply Capacity



Thorndale Water Servicing Concepts Supply



Supply from London

- Potential supply from along north limit of London Urban Growth Boundary
- Nearly 8 km along Thorndale Rd. from east limit of London Urban Growth Boundary to connection in east Thorndale
- London Supply can easily provide for full buildout demand within Thorndale and Peripheral Areas
- Opportunity to decommission Thorndale WTP Wells and provide supply entirely through London connection
- HLP to ET will likely be required (London feed would be from City's High Pressure Zone and HGL would need to be reviewed further)
- Similar elevations (280 – 285) in north London as Thorndale

Well Expansion

- What is the Ultimate Capacity of the Well Supply at the Thorndale WTP?
- Can supply demand within Settlement Boundary utilizing existing infrastructure (with some upgrades)
- Time to complete study required to upgrade wells and WTP to service peripheral areas (versus anticipated timing of development)
- Significant cost savings compared to Construction and maintenance of 8 km of watermain connecting to London

Thorndale Supply Alternatives Evaluation

	Advantages	Disadvantages	Estimated Timing	Estimated Cost
Alternative 1 Maximize Well Capacity at Existing WTF to Service As Much Growth as Possible (Monitor, track and manage growth)	• Availability of additional capacity to supply growth within Settlement Boundary • Minimizes new infrastructure • May provide interim solution to service growth while investigation of available well supply is completed • Allows support of growth to Method 1 Build-Out • May be able to accommodate some additional Peripheral Lands Growth	• Likely not enough capacity within existing wellfield to service Build-Out growth outside of Settlement Boundary	1 – 2 years Well rehab and groundwater testing to maximize capacity PTTW Approval	\$1.0M - \$2.0M Rehab wells, replace / add pumps, expand capacity and supply pumps
Alternative 2 Additional Groundwater Supply	• Identification of sufficient available well capacity will provide Municipality with full control over Water Supply	• Uncertainty that there is available well capacity to supply growth to Build-Out • Limited information means that location of supply is unknown and infrastructure requirements also unknown (new pumps, WM, WTF?)	4 years prior to identification of available source and location, 7 – 10 years total • Desktop Study, identification of secure test and monitoring wells, pump and well testing • Class EA • Hydrogeological Report + Groundwater Modelling to support yields + treatment needs • PTTW Approval • Design and Construction	Method 1: \$1.0M - \$4.0M Method 2: \$2.0M - \$10.0M Method 3: \$3.0 M - \$15.0M
Alternative 3 Commission London / Lake Huron-Elgin Water Supply Connection	• Provides certainty of supply for growth to Build-Out • Allocation of supply is available for Thames Centre; can be maintained for use if available well supply is not identified • Provides trunk WM to service 401 Corridor Lands	• Does not provide Municipality with preferred level of control over water supply • Extensive watermain Construction and maintenance required	6 – 7 years Total • Agreement – 2years • EA for alignment – 2 years • Design and Construction - 2 – 3 years	All Methods: \$30.0M

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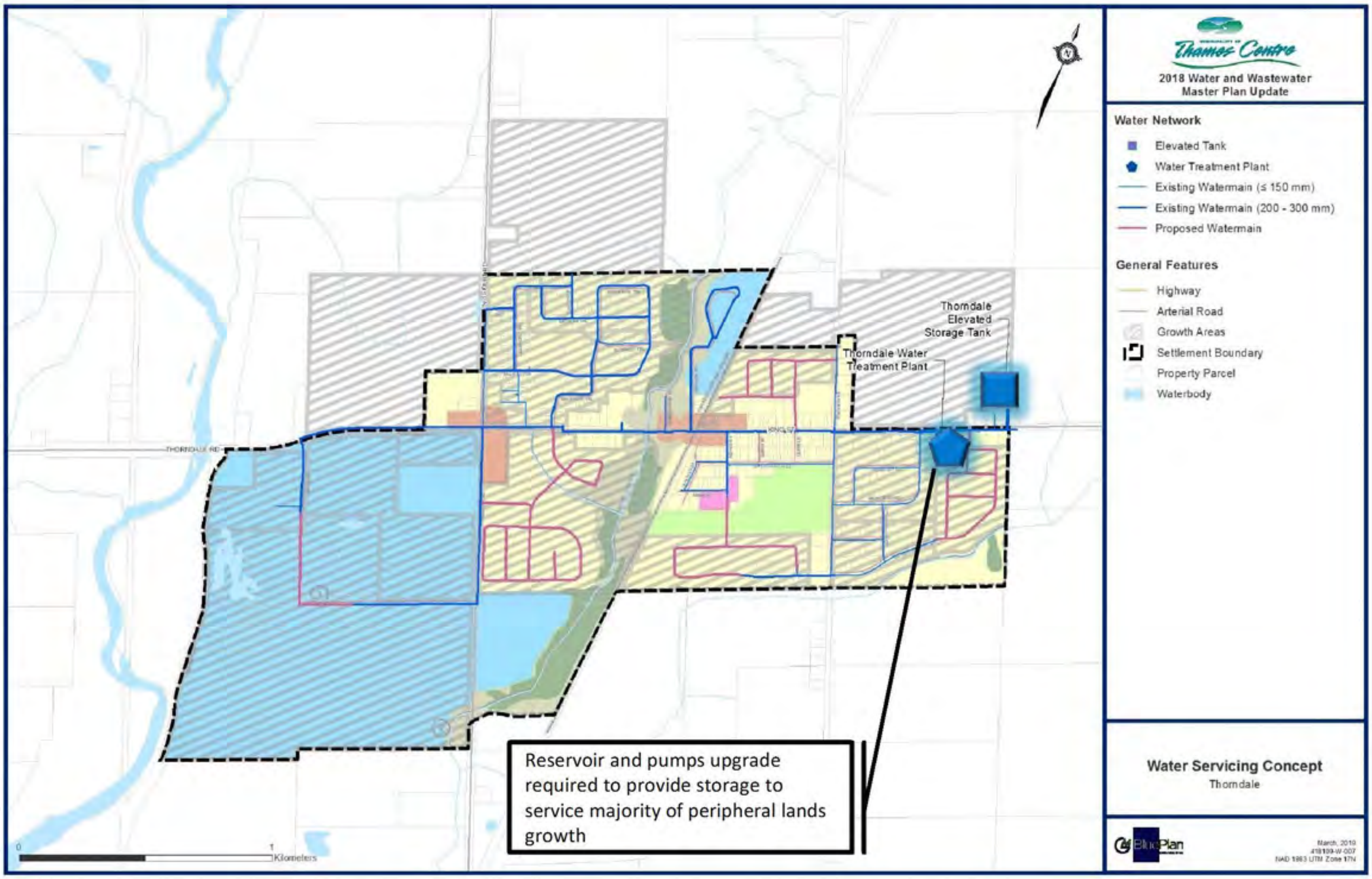
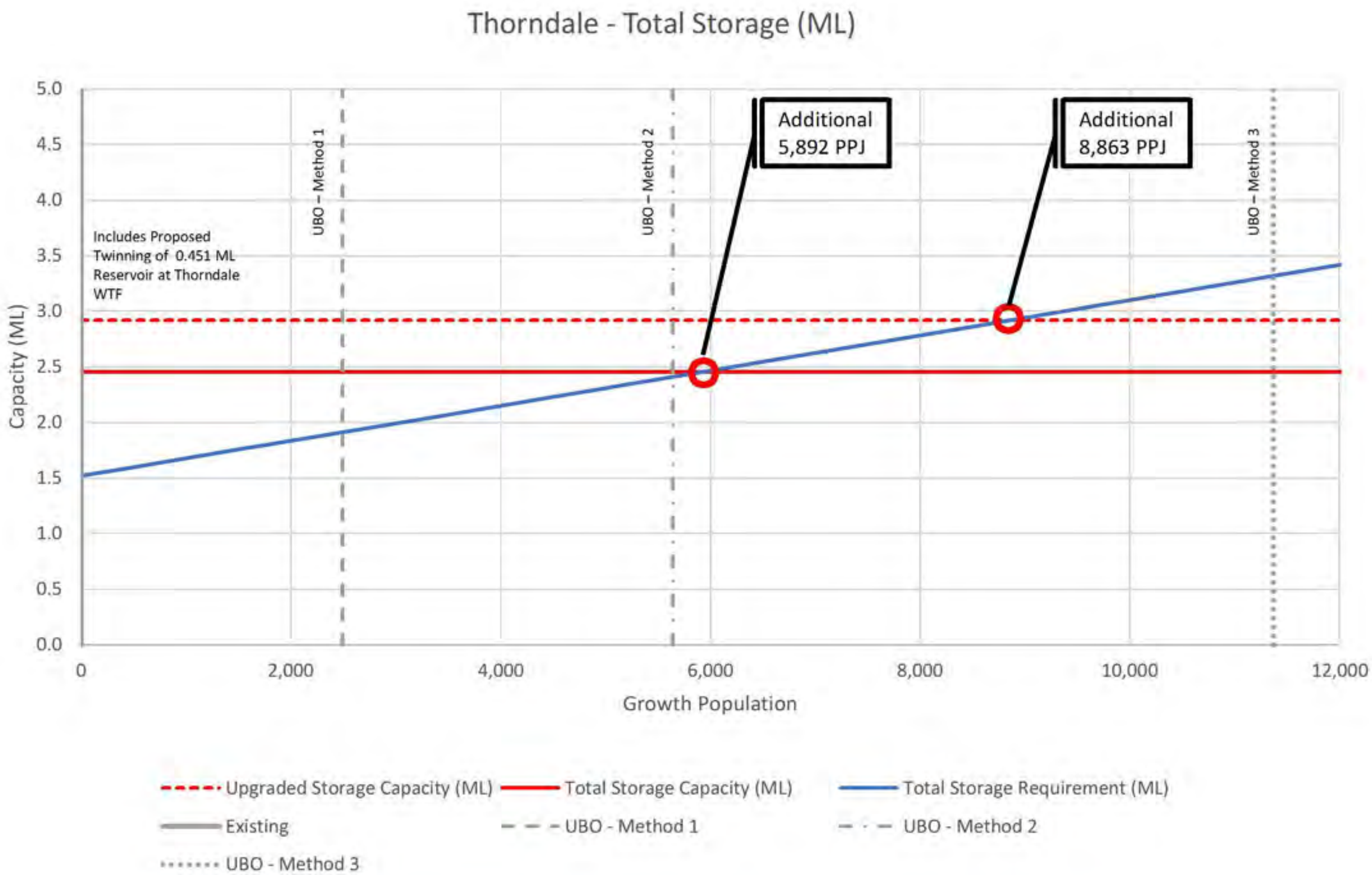
Thorndale Supply Alternatives Evaluation

	Advantages	Disadvantages	Estimated Timing	Estimated Cost
Alternative 4 (Preferred) Maximize Well Capacity at Existing WTF to Service As Much Growth as Possible (Monitor, track and manage growth) + Explore Additional Groundwater Supply	• Availability of additional capacity to supply growth within short term while Well Exploration is commenced • Supply deficiency is triggered primarily by Method 3 Res located outside of Settlement Boundary • Maximizing facilities and monitoring and managing growth will help Municipality optimize existing supply capacity and best determine future needs • Identification now of available well capacity will provide Municipality with certainty of supply options for future planning • Identification of sufficient available well capacity will provide Municipality with full control over Water Supply	• Not enough capacity within existing wellfield to service growth to Build-Out under Method 3 (with future Res located outside of Settlement Boundary) • Uncertainty that there is available well capacity to supply growth to Build-Out • Limited information means that location of supply is unknown and infrastructure requirements also unknown (new pumps, WM, WTF required?)	Maximizing Existing Facilities / Well Field • 1 – 2 years with rehab and groundwater testing Well Exploration • 4 years prior to identification of available source and location, 7 – 10 years total	Method 1: $2.0M - $6.0M Method 2: $3.0M - $12.0M Method 3: $4.0 M - $17.0M

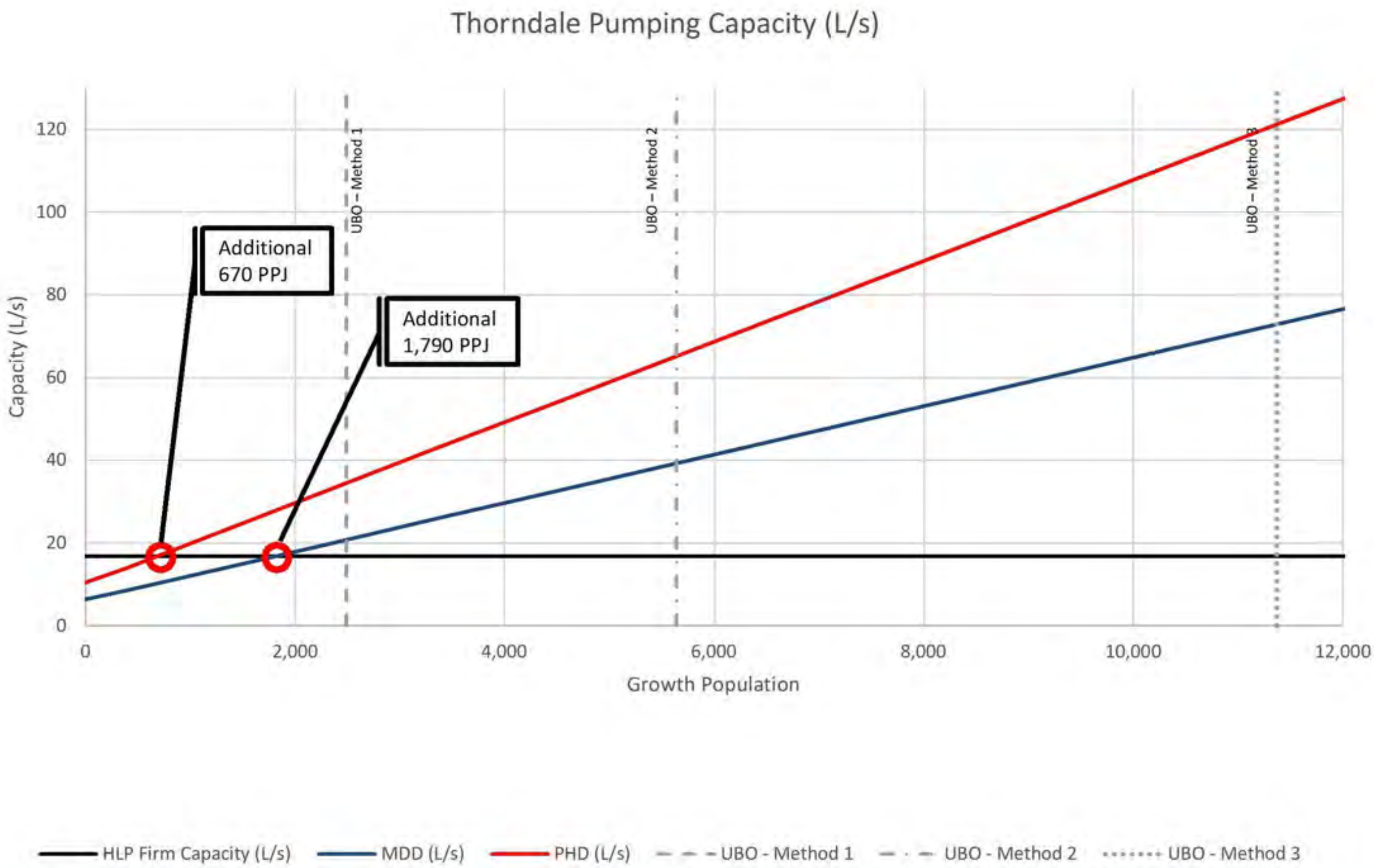
Thorndale Water Servicing Concepts
Storage and Pumping



Thorndale Total Storage



Thorndale WTP Pumping



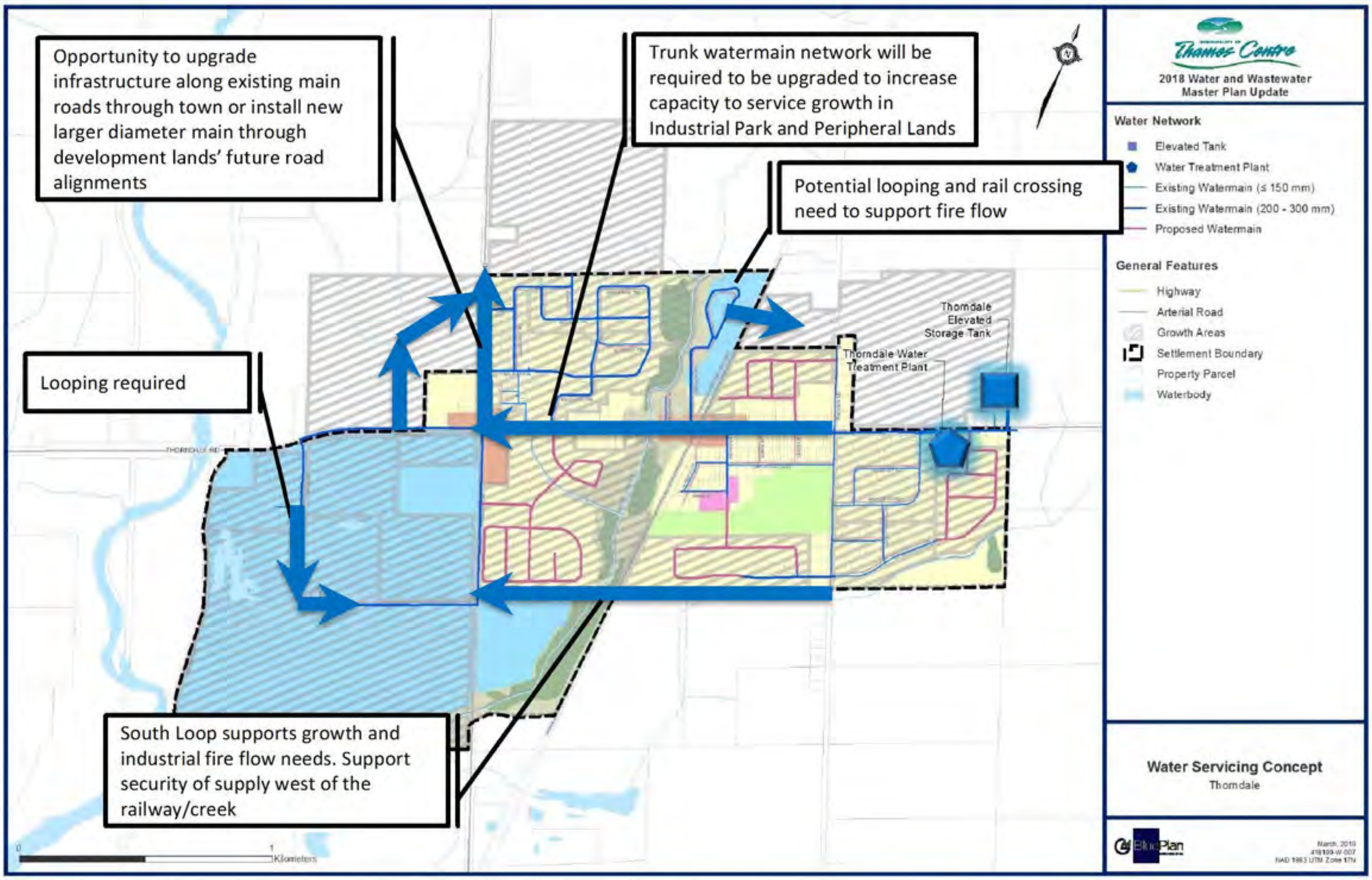
Thorndale Storage and Pumping Alternatives Evaluation

	Advantages	Disadvantages	Estimated Timing	Estimated Cost
Option 1 (Preferred) Upgrade Pumps and Reservoirs at Thorndale WTF to service MDD and PHD (Monitor, track and manage growth)	• Minimizes infrastructure upgrades in Thorndale (can utilize storage within the existing inground reservoirs at Thorndale WTF) • Storage deficiency is triggered primarily by Method 3 Res located outside of Settlement Boundary • Maximizing facilities (twin ex. Reservoir at WTF) and monitoring and managing growth will help Municipality optimize existing supply capacity and best determine future needs • Provides for opportunity to coordinate any required storage upgrades with Preferred Supply Alternative	• Not enough total storage capacity (even with reservoir expansion at Thorndale WTF) to service growth to Build-Out under Method 3	• Design and Construction at WTF (includes pump replacements) – 1 – 3 years • New supply infrastructure will be required with timing tied to preferred supply alternative	$2.0M
Option 2 Construct Additional Storage Facility	• 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 connection if available well supply is not found	• Extensive infrastructure upgrade requirements (and associated costs) • New ET was recently Constructed (2014) – may be perception issues if additional storage facility is Constructed so soon after Thorndale ET	4 – 6 years total • EA – 2 years • Design and Construction – 2 – 4 years	$5.0M

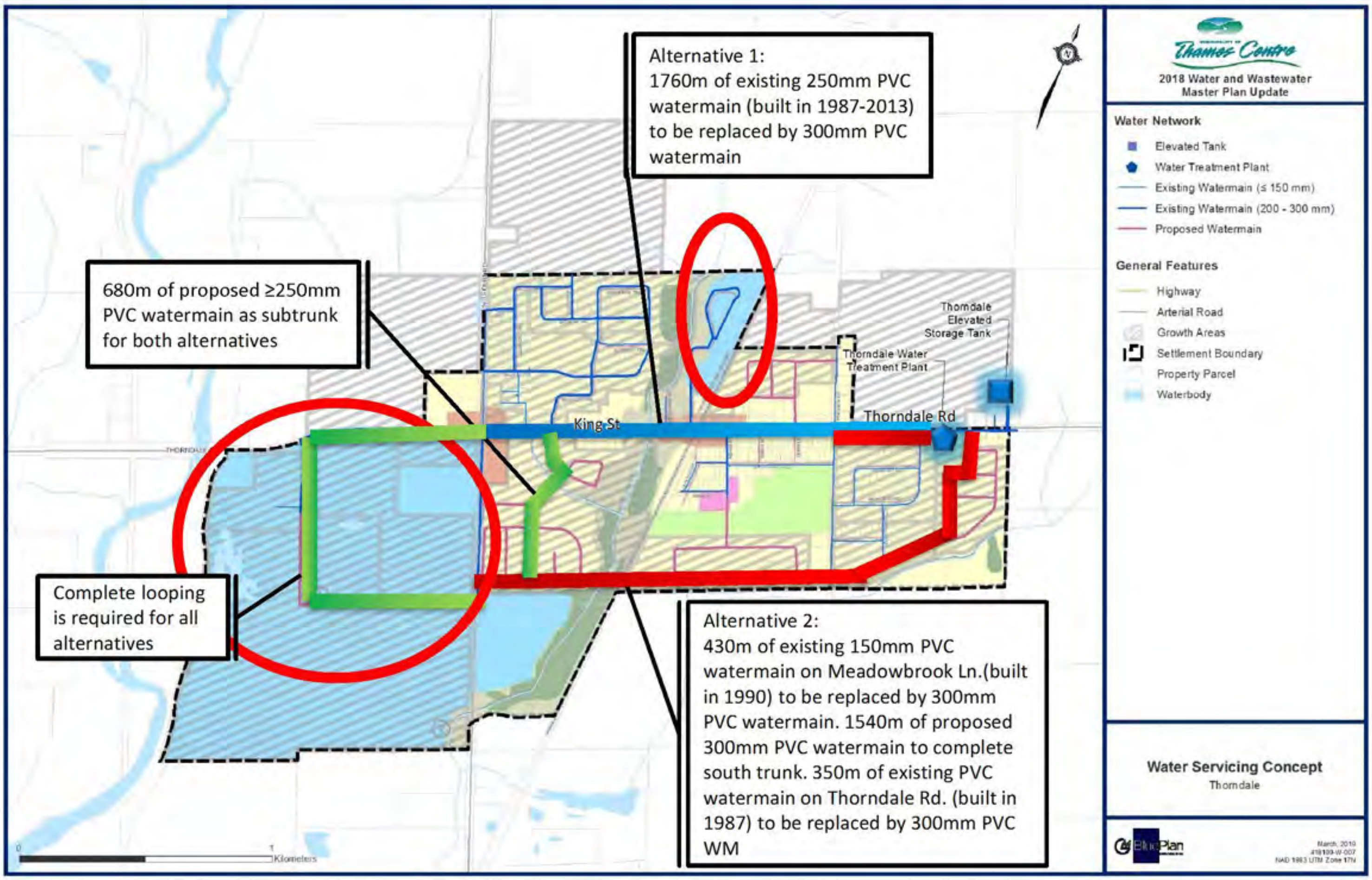
Servicing Alternatives Evaluation

THORNDALE LOCAL WATER SERVICING ALTERNATIVES

Thorndale Water Servicing Concepts
Conveyance Constraints



Thorndale Water Trunk Upgrade Alternatives Review Conveyance



Thorndale Water Trunk Upgrade Alternatives Review Conveyance

Alternatives	Description	Advantages	Disadvantages	Cost Estimate
Alternative 1 Upgrade Existing Trunk WM along King Street	**King St** - 1760m of existing 250mm PVC watermain (built in 1987-2013) to be replaced by 300mm PVC watermain	• Provides sufficient fire flows to Thorndale Industrial Park under Method 1, Method 2 and Method 3	• Does not provide additional security of supply from Thorndale WTF and ET • Requires upgrade of recently installed watermain on King Street (2006) • Significant construction disruption on major road through Thorndale (also adding increased costs) • Cost increase due to longer WM replacement section • Does not significantly improve fire flows within Harrison St. area (70 L/s to 90 L/s)	$10.0M
Alternative 2 (Preferred) Secondary Trunk WM through Foxborough to form Loop	**South Trunk** - 430m of existing 150mm PVC watermain on Meadowbrook Ln.(built in 1990) to be replaced by 300mm PVC watermain **South Trunk** - 1970m of proposed 300mm PVC watermain to complete south trunk **Thorndale Rd.** - 350m of existing PVC watermain on Thorndale Rd. (built in 1987) to be replaced by 300mm PVC WM	• Provides additional security of supply and sufficient fire flows for Thorndale Industrial Park • Aligns with Thames Centre's approved servicing strategy for Thorndale (approved in 2017) • Construction under the CN Railway through greenfield development areas more cost efficient (more room for staging, HDPE pipe, alternative methods, etc.) • Opportunity to phase upgrades within Industrial Park from south to north and provide sufficient fire flow	• Potential for poor water quality in secondary trunk in interim prior to growth demand coming online • Requires replacement of 150mm servicing Meadowbrook Lane • Does not significantly improve fire flows within Harrison St. area (70 L/s to 80 L/s)	$9.1M

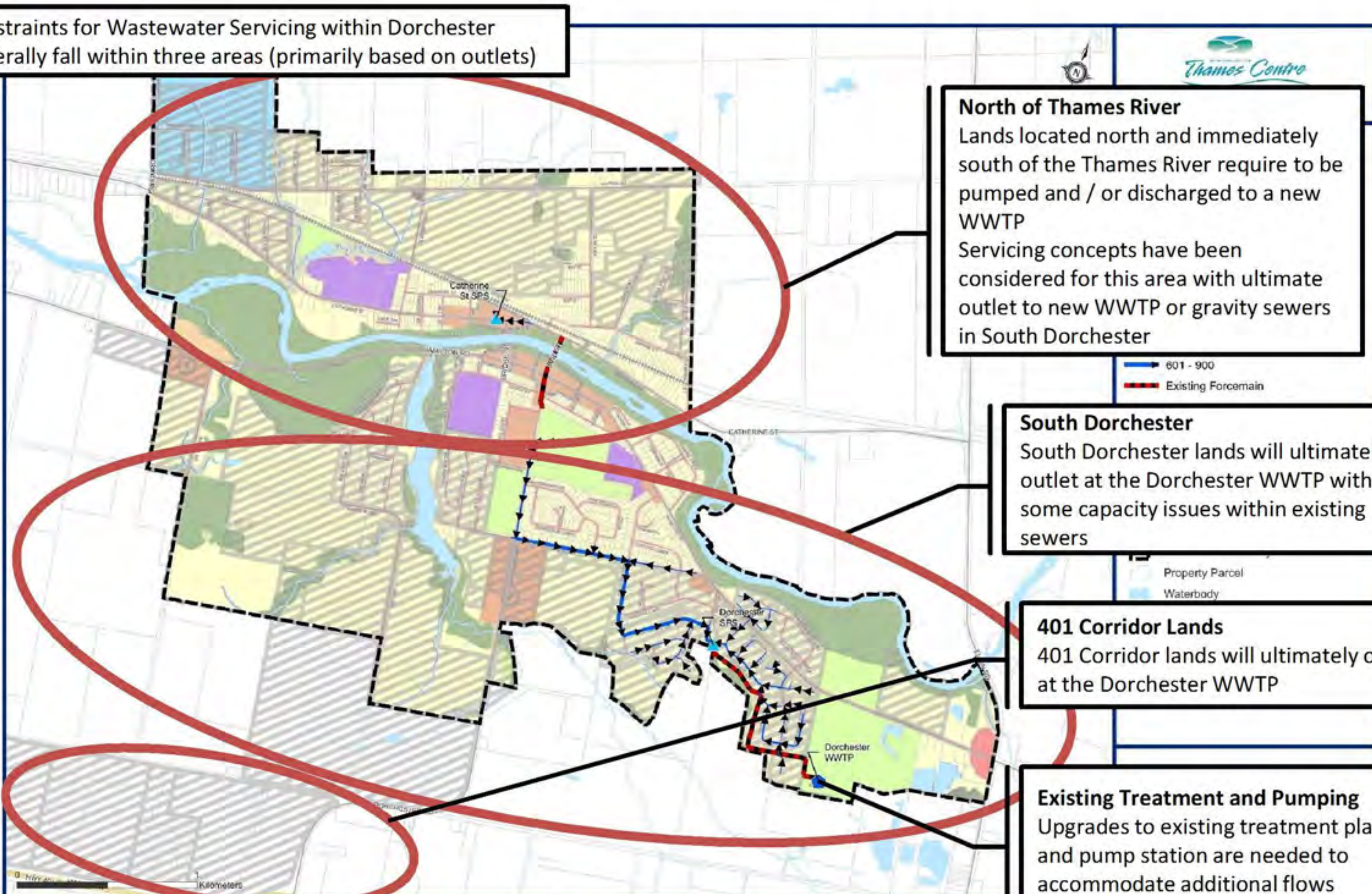
- Deficient available fire flows within the Harrison St. area cannot be improved to minimum requirements without additional looping or substantial local watermain upsizing.

Servicing Alternatives Evaluation

DORCHESTER WASTEWATER SYSTEM

Dorchester Wastewater Servicing Constraints and Concepts Overview

Constraints for Wastewater Servicing within Dorchester generally fall within three areas (primarily based on outlets)



North of Thames River
Lands located north and immediately south of the Thames River require to be pumped and / or discharged to a new WWTP
Servicing concepts have been considered for this area with ultimate outlet to new WWTP or gravity sewers in South Dorchester

South Dorchester
South Dorchester lands will ultimately outlet at the Dorchester WWTP with some capacity issues within existing sewers

401 Corridor Lands
401 Corridor lands will ultimately outlet at the Dorchester WWTP

Existing Treatment and Pumping
Upgrades to existing treatment plant and pump station are needed to accommodate additional flows

Dorchester Wastewater System

NORTH DORCHESTER WASTEWATER ALTERNATIVES

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Dorchester Wastewater North - Concept 1A

Dorchester North Concept 1A

- Construct new SPS in Northwest Dorchester along River
- All growth areas and all existing unserviced areas North of River go to one SPS
- Utilize new forcemain under Dorchester Road bridge

Pumping & Forcemain

- New SPS for all development and existing flows in North Dorchester
- New forcemain from SPS to forcemain under Dorchester Road bridge

Downstream Pumping & Forcemain

- Accumulative impacts on Dorchester WWTP and SPS

Conveyance

- New local mains in North Dorchester
- Upgrades to existing sewers along Dorchester Road

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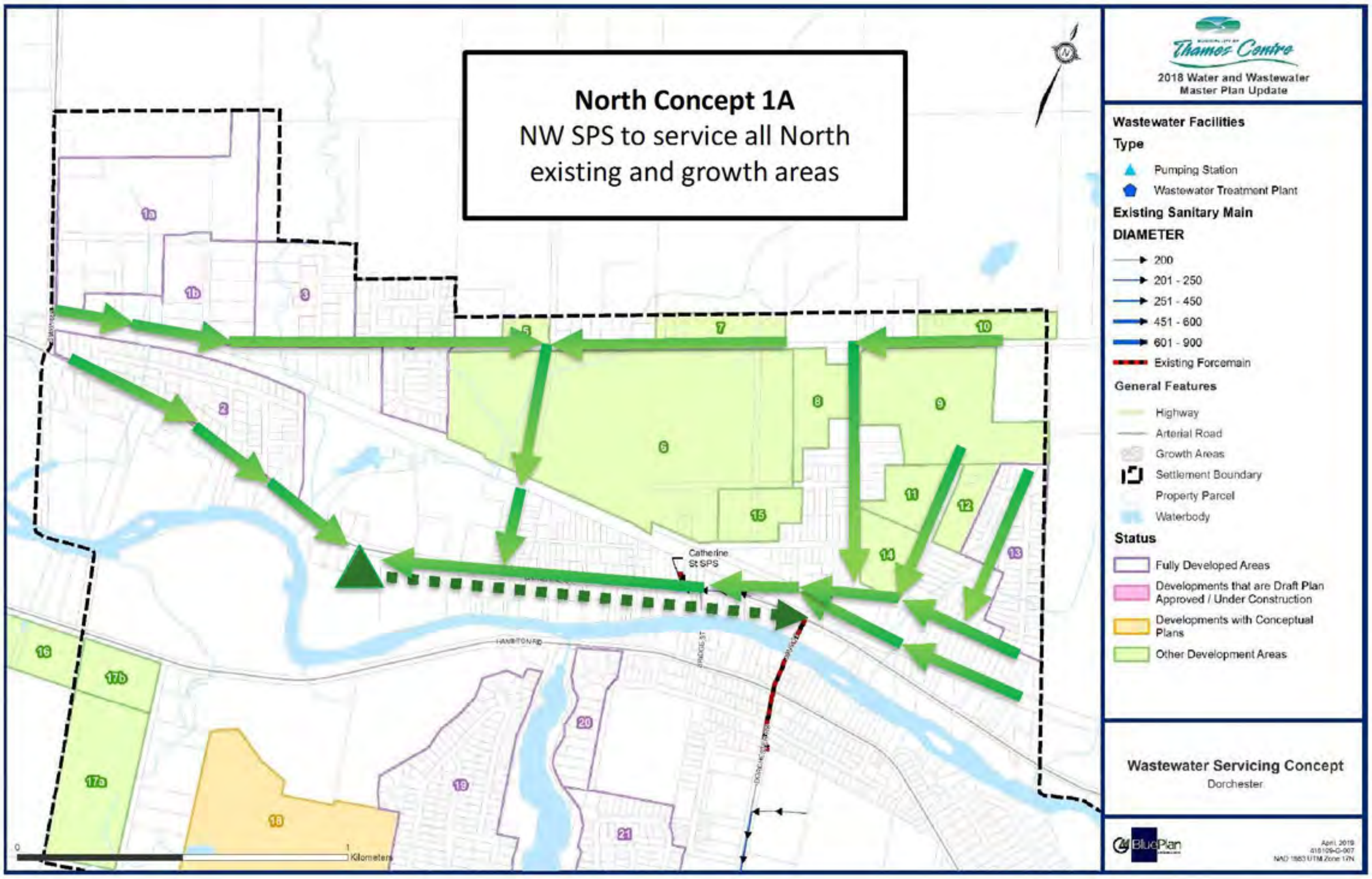
Dorchester Wastewater North - Concept 1A



Dorchester Wastewater North - Concept 1B

Dorchester North Concept 1B

- Construct new SPS in Northwest Dorchester and new SPS in Northeast Dorchester along River
- Utilize new forcemain at Dorchester Road bridge

Pumping & Forcemain

- New SPS for all growth development and existing North flows West of Dorchester Road bridge
- New SPS for existing unserviced lands East of Dorchester Road bridge
- New forcemain from East SPS to gravity sewer along Catherine Street going to West SPS
- New forcemain from West SPS to existing forcemain under Dorchester Road bridge

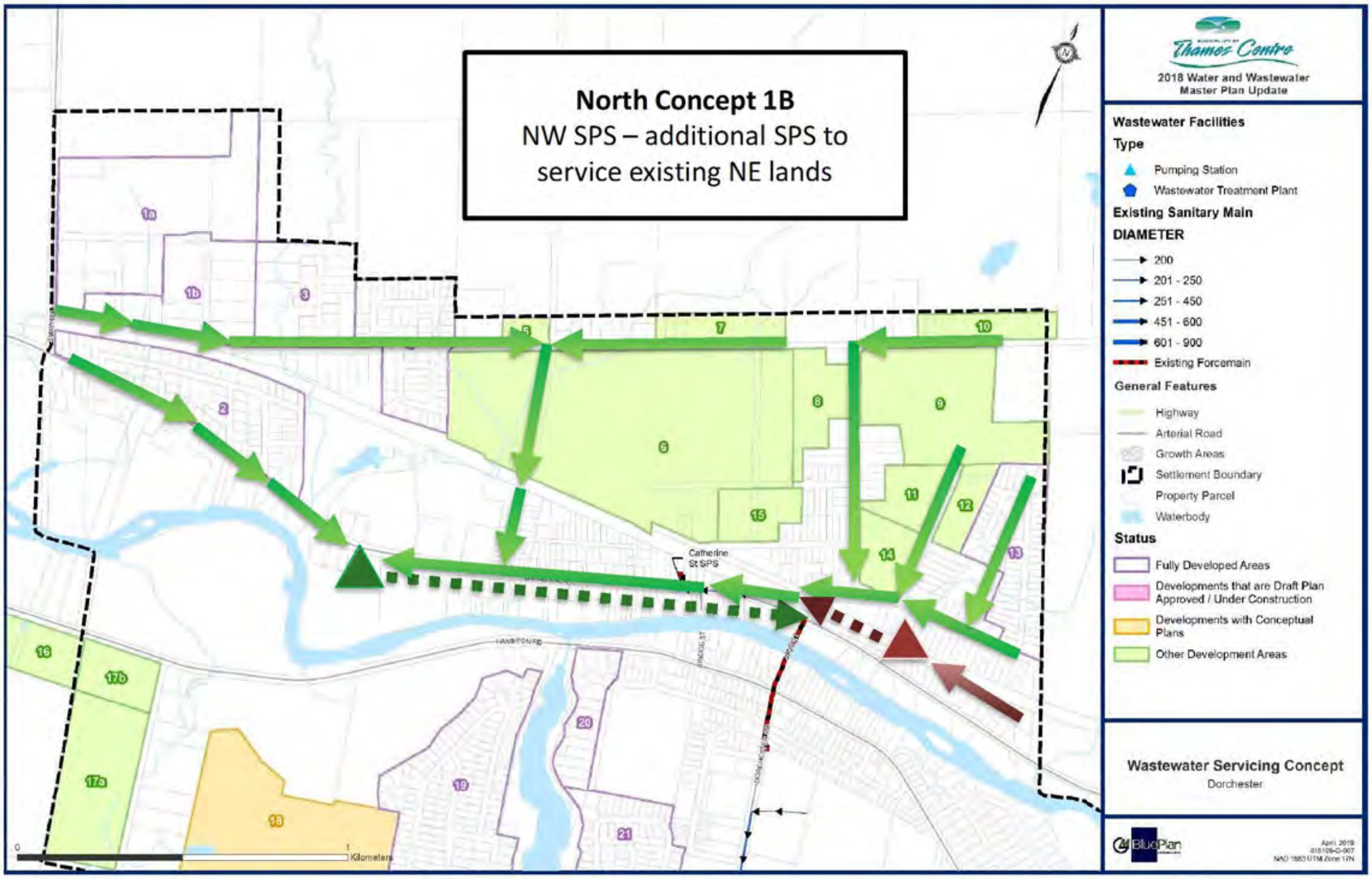
Downstream Pumping & Forcemain

- Accumulative impacts on Dorchester WWTP and SPS

Conveyance

- New local mains in North
- Upgrades to existing sewers along Dorchester Road

Dorchester Wastewater North - Concept 1B



Dorchester Wastewater North - Concept 2

Dorchester North Concept 2

- Construct new SPS in Northwest Dorchester and new SPS in Northeast Dorchester along River
- Utilize new forcemain at Dorchester Road bridge

Pumping & Forcemain

- New SPS for all growth development and existing unserviced areas east of Development 6
- New SPS for all growth development and existing unserviced areas west of Development 6
- New forcemain from East SPS to existing forcemain under Dorchester Road bridge
- New forcemain from West SPS to gravity sewer along Catherine St going to East SPS

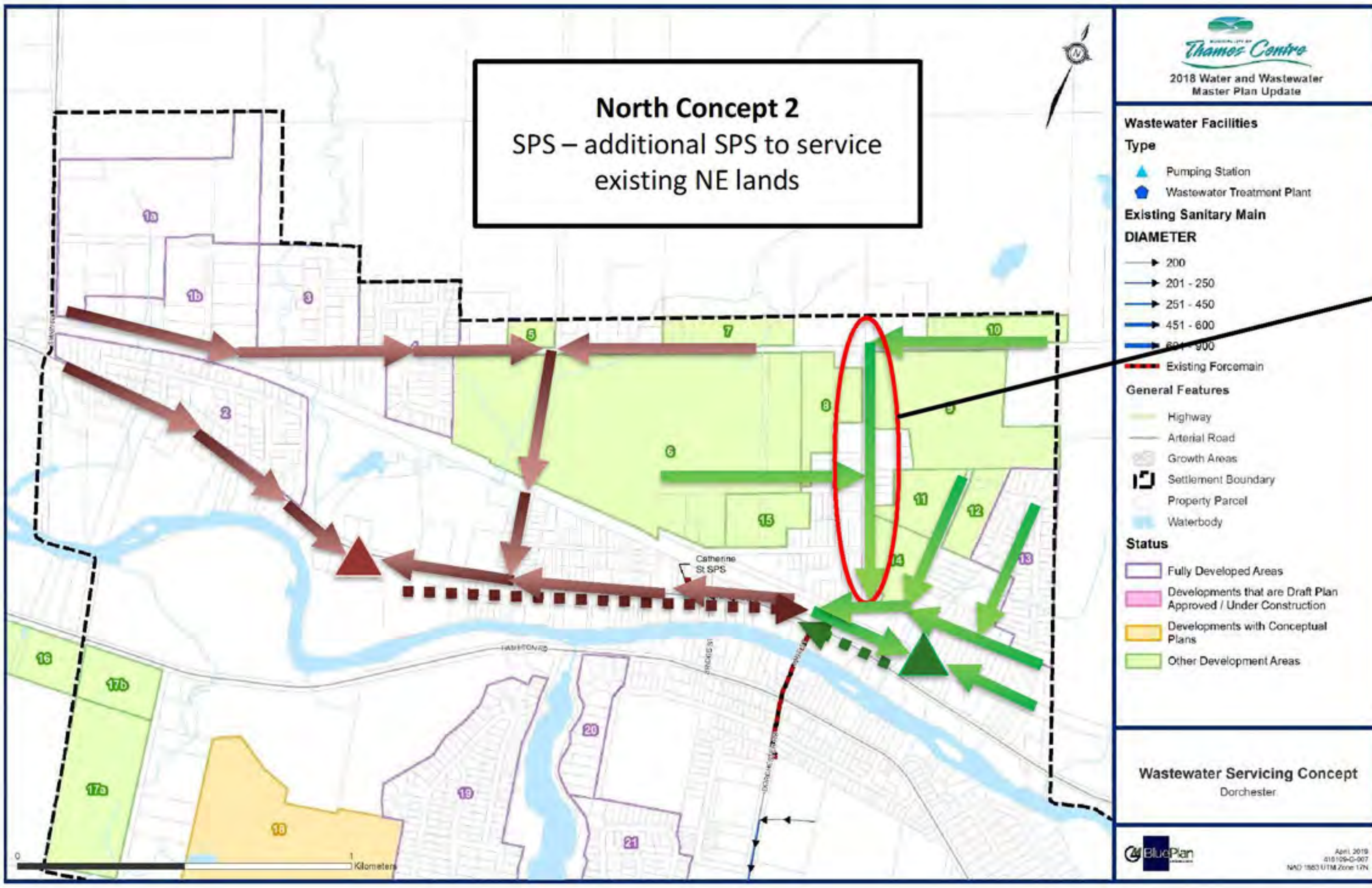
Downstream Pumping & Forcemain

- Accumulative impacts on Dorchester WWTP and SPS

Conveyance

- New local mains in North
- Upgrades to existing sewers along Dorchester Road

Dorchester Wastewater North - Concept 2



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Dorchester Wastewater North - Concept 3

Dorchester North Concept 2

- Construct new SPS in Development 6 or 15 to service new growth areas North of rail and two additional SPS along river in Northwest and/or Northeast for existing unserviced areas and Development 2
- Utilize new forcemain at Dorchester Road bridge

Pumping & Forcemain

- New SPS for all growth development and existing flows North of CN rail
- New SPS for existing unserviced lands South of CN rail and East of Dorchester Road bridge
- New SPS for growth and existing unserviced lands South of CN rail and West of Dorchester Road bridge
- New forcemain from New Development to existing forcemain under Dorchester Road bridge
- New forcemain from West SPS to Richmond St gravity sewer going to New Development SPS
- New forcemain from East SPS to Minnie St gravity sewer going to New Development SPS

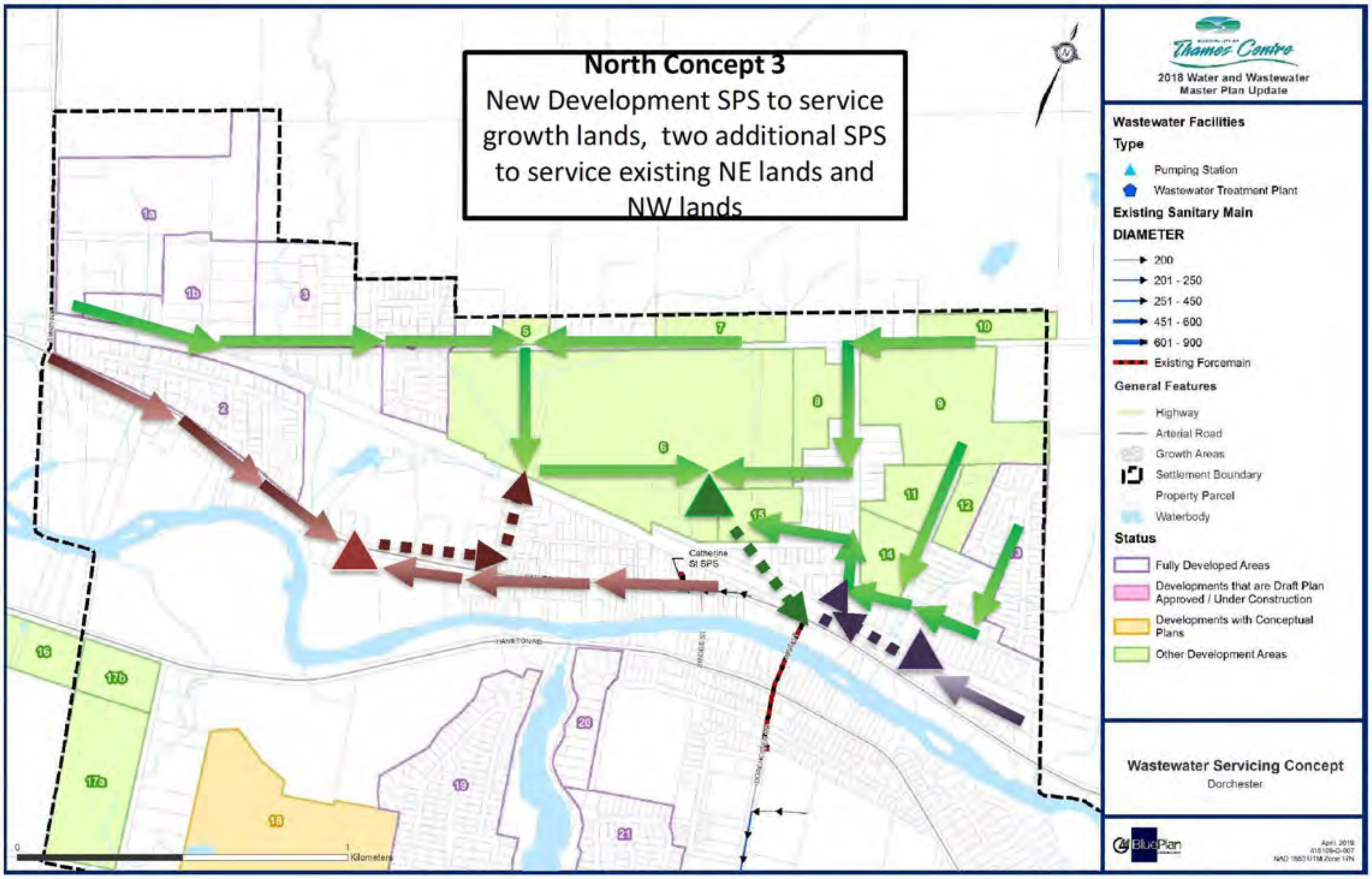
Downstream Pumping & Forcemain

- Accumulative impacts on Dorchester WWTP and SPS

Conveyance

- New local mains in North
- Upgrades to existing sewers along Dorchester Road

Dorchester Wastewater North - Concept 3



Dorchester Wastewater North - Concept 4

Dorchester North Concept 4

- Construct new WWTP in Northwest Dorchester and new SPS in Northeast Dorchester along River
- Utilize new forcemain at Dorchester Road bridge for Northeast SPS

Treatment

- New WWTP for all growth development and existing North flows West of Dorchester Road bridge

Pumping & Forcemain

- New SPS for existing unserviced lands East of Dorchester Road bridge
- New forcemain from East SPS to existing forcemain under Dorchester Road bridge

Downstream Pumping & Forcemain

- Minor impacts on Dorchester WWTP and SPS

Conveyance

- New local mains in North

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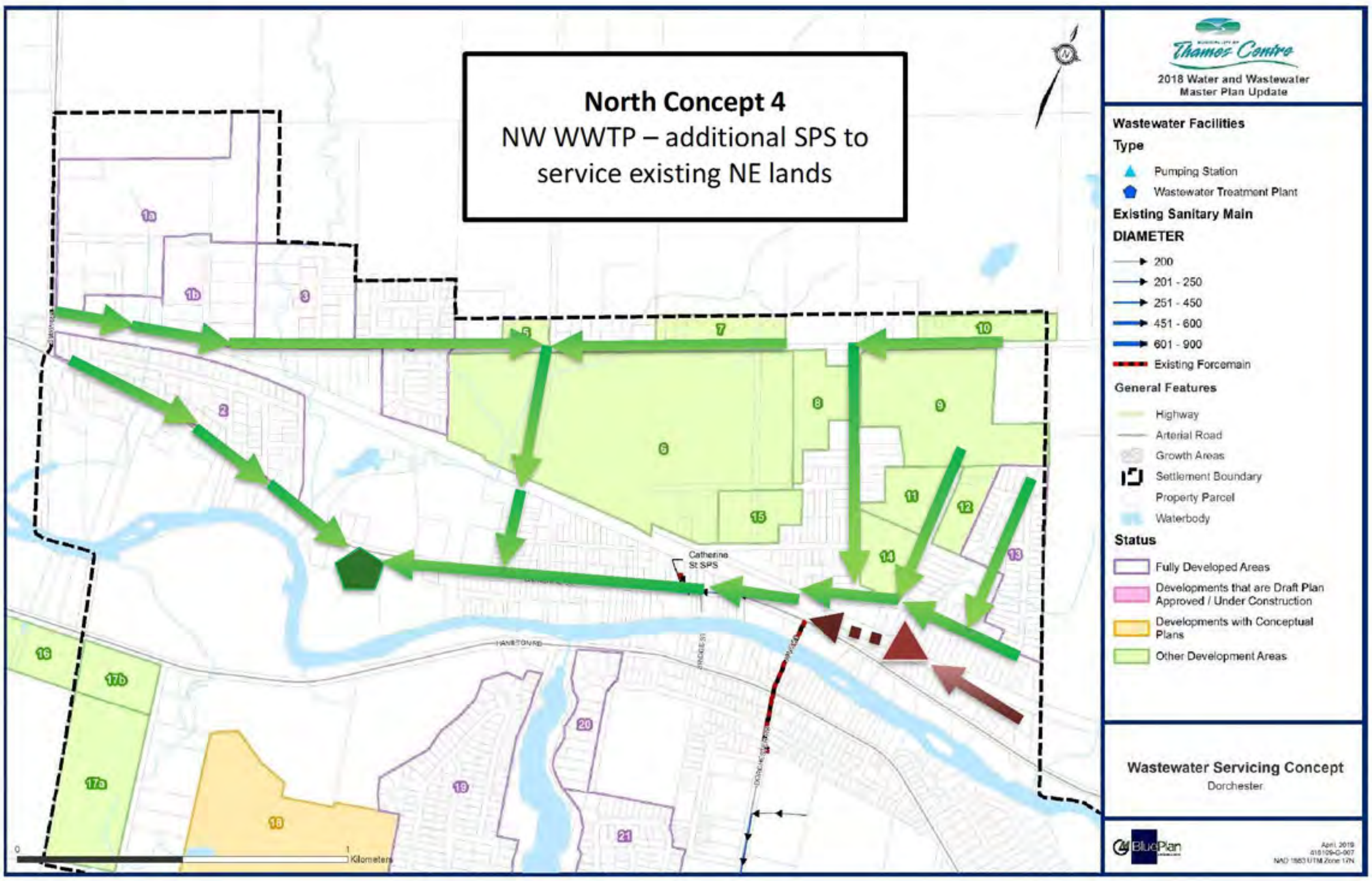
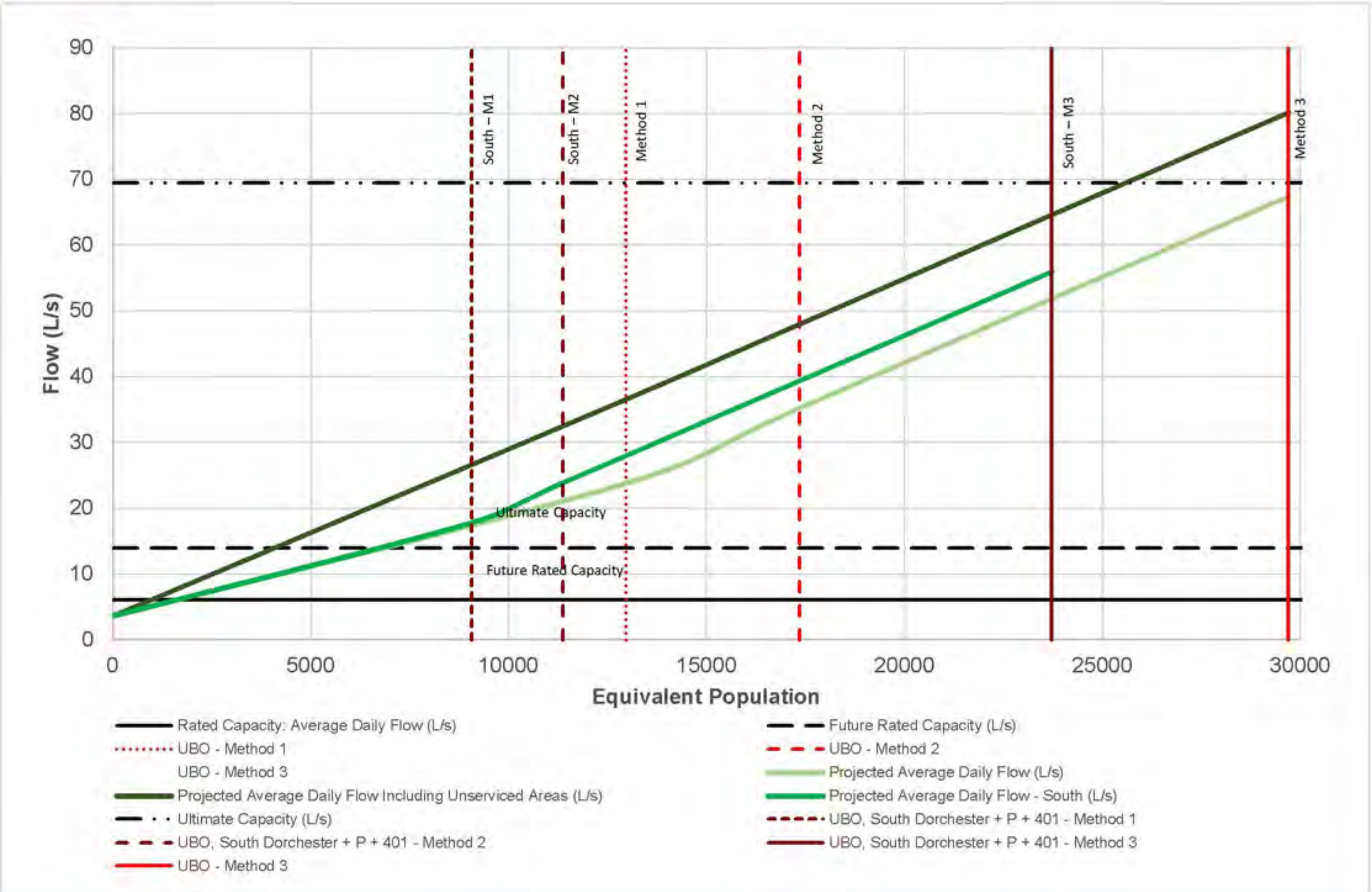
Dorchester Wastewater North - Concept 4



Dorchester WWTP



Dorchester Treatment Alternatives Evaluation

	Advantages	Disadvantages	Estimated Timing	Estimated Cost
Alternative 1 (Preferred) Utilize Approved Future Upgrades at Dorchester WWTP and Pump WW Flows to Single WWTP Monitor, track and manage growth	• Sufficient treatment capacity upgrades have already been planned for and approved to service growth to Build-Out under most projection methods • Minimizes infrastructure upgrade and operation costs	• Requires additional pumping to service growth within North Dorchester (and lands directly south of Thames River) • Planned future upgrades cannot fully accommodate Build-Out under Method 3	Upgrades at Dorchester WWTP are approved and planned for Pumping Station and Forcemain • Class EA – 1 year • Design and Construction - 2 -3 years	$5.0 M (Next Phase) $25.0 M Total
Alternative 2 Construct and Commission Second WWTP	• Buy-In from Developers Group in North Dorchester – will help kickstart development in North Dorchester	• Underutilizes planned upgrades at existing Dorchester WWTP • Additional infrastructure upgrade and operation costs • Additional study and permitting required	Total 5 – 8 years • Class EA – 2 – 3 years • Design (including Environmental Approvals) and Construction – 3 – 5 years	$5.0M - $10.0M

Dorchester Wastewater North – Alternative Evaluation

Category	Alternative 1A	Alternative 1B	Alternative 2	Alternative 3	Alternative 4
Description	Northwest SPS - all growth areas and all existing areas gravity to NW SPS	Northwest and Northeast SPS – all growth areas and existing areas	Northeast SPS - all growth East of Development 6 can gravity to NESPS, remaining areas gravity to Northwest SPS	New Development SPS - all growth North of CN rail can gravity to New Development SPS, remaining areas gravity to Northwest SPS and Northeast SPS	Northwest WWTP and Northeast SPS – all growth and existing areas
Technical Feasibility	• Developable Lands plus existing unserviced lands • More upfront costs to be provided by Municipality; slowing down development areas	• Developable Lands plus existing unserviced lands • More upfront costs to be provided by Municipality; slowing down development areas	• Developable lands ahead of existing unserviced lands	• Developable lands ahead of existing unserviced lands	• Developable lands plus existing unserviced lands • More upfront costs to be provided by Municipality
Environmental Impacts	• no new river crossing	• no new river crossing	• no new river crossing	• no new river crossing	• new WWTP outlet to river
Social / Cultural Impacts	• Minimizes construction impacts by utilizing new forcemain crossing Dorchester Road Bridge • Immediate construction impact on existing developments	• Minimizes construction impacts by utilizing new forcemain crossing Dorchester Road Bridge • Immediate construction impact on existing developments	• Minimizes immediate construction impacts on existing developments West of Dorchester Road bridge	• Minimizes immediate construction impacts on existing developments	• Immediate construction impacts on existing developments to construct new WWTP
Financial Viability	• Operations and Maintenance Costs significantly less to operate one pump station for North Dorchester	• Operations and Maintenance Costs increased to operate two pump stations for North Dorchester	• Operations and Maintenance Costs increased to operate two pump stations for North Dorchester	• Operations and Maintenance Costs increased to operate 3 SPS • Increased costs for 3 rail crossings for forcemains	• High Capital Costs to construct new WWTP • Does not utilize planned for capacity upgrades at existing WWTP
	Preferred Consolidated Alternative			**Preferred Growth Alternative**	

Dorchester Wastewater North – Cost Comparison

Category	Alternative 1A			Alternative 1B			Alternative 2			Alternative 3			Alternative 4		
	Method 1	Method 2	Method 3	Method 1	Method 2	Method 3	Method 1	Method 2	Method 3	Method 1	Method 2	Method 3	Method 1	Method 2	Method 3
Treatment Plant															
North WWTP													$3.8	$6.4	$6.4
Pump Station															
Northwest SPS	$3.4	$4.3	$4.3	$3.4	$4.3	$4.3	$1.6	$1.7	$1.7	$0.6	$0.6	$0.6			
Northeast SPS				$0.5	$0.5	$0.5	$3.4	$4.3	$4.3	$0.5	$0.5	$0.5	$0.5	$0.5	$0.5
New Development SPS										$3.4	$4.3	$4.3			
Forcemain															
Northwest SPS	$1.7	$1.9	$1.9	$1.7	$1.9	$1.9	$1.3	$1.3	$1.3	$0.9	$0.9	$0.9			
Northeast SPS				$0.5	$0.5	$0.5	$0.4	$0.5	$0.5	$0.7	$0.7	$0.7	$0.5	$0.5	$0.5
New Development SPS										$0.8	$0.9	$0.9			
Sewer															
200 mm	$14.7	$12.1	$12.1	$14.5	$11.9	$11.9	$14.7	$14.4	$14.4	$12.2	$11.7	$11.7	$14.7	$12.1	$12.1
250 mm	$1.0	$4.1	$4.1	$0.9	$4.1	$4.1	$1.3	$0.4	$0.4	$0.7	$1.1	$1.1	$1.0	$4.1	$4.1
300 mm	$1.0	$1.1	$1.1	$1.1	$1.1	$1.1	$0.7	$2.7	$2.7	$0.0	$0.4	$0.4	$1.0	$1.1	$1.1
TOTAL	**$21.7**	**$23.5**	**$23.5**	**$22.5**	**$24.3**	**$24.3**	**$23.5**	**$25.4**	**$25.4**	**$19.8**	**$21.2**	**$21.2**	**$21.3**	**$24.7**	**$24.7**

Recommendation Options

Overall Strategy

- Alternative 1A: one SPS for North Dorchester

Development Focused Strategy

- Alternative 3: Construct SPS in Development 6/15 for growth areas in North Dorchester and construct additional SPS for existing unserviced areas when required

Dorchester Wastewater System

SOUTH DORCHESTER WASTEWATER ALTERNATIVES

Dorchester Wastewater South - Concept

Dorchester South Concept

- Growth areas all gravity to PS3
- Existing unserviced areas in North areas of South Dorchester gravity to localized point and pump to existing sewers

Pumping & Forcemain

- All growth (16, 17a, 17b, 18, south half of 19, 22, 25, west half of 29, W) gravity to PS3
- New SPS for all growth development and existing flows North of CN rail

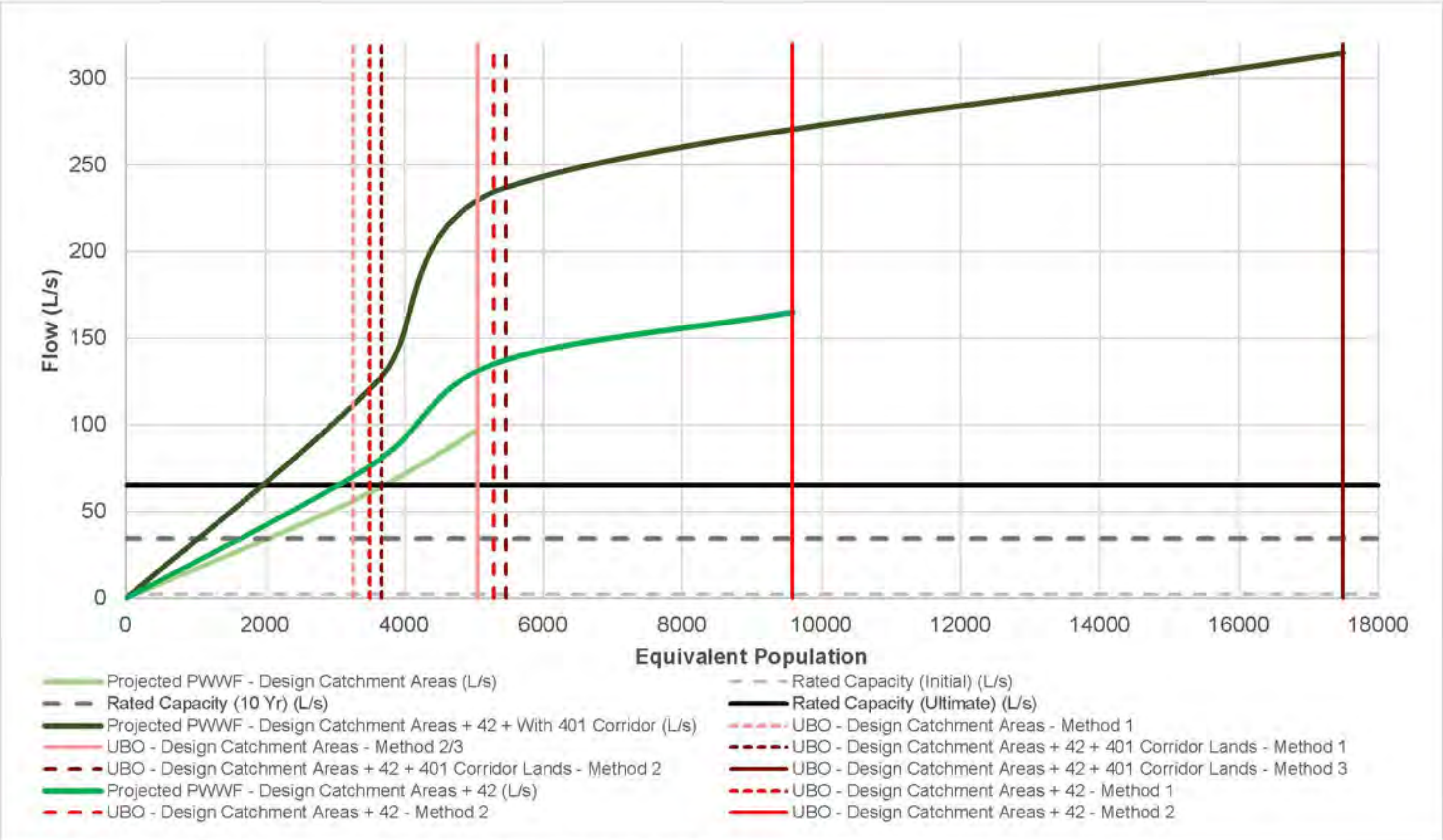
Downstream Pumping & Forcemain

- Upsizing at PS3
- Accumulative impacts on Dorchester WWTP and SPS

Conveyance

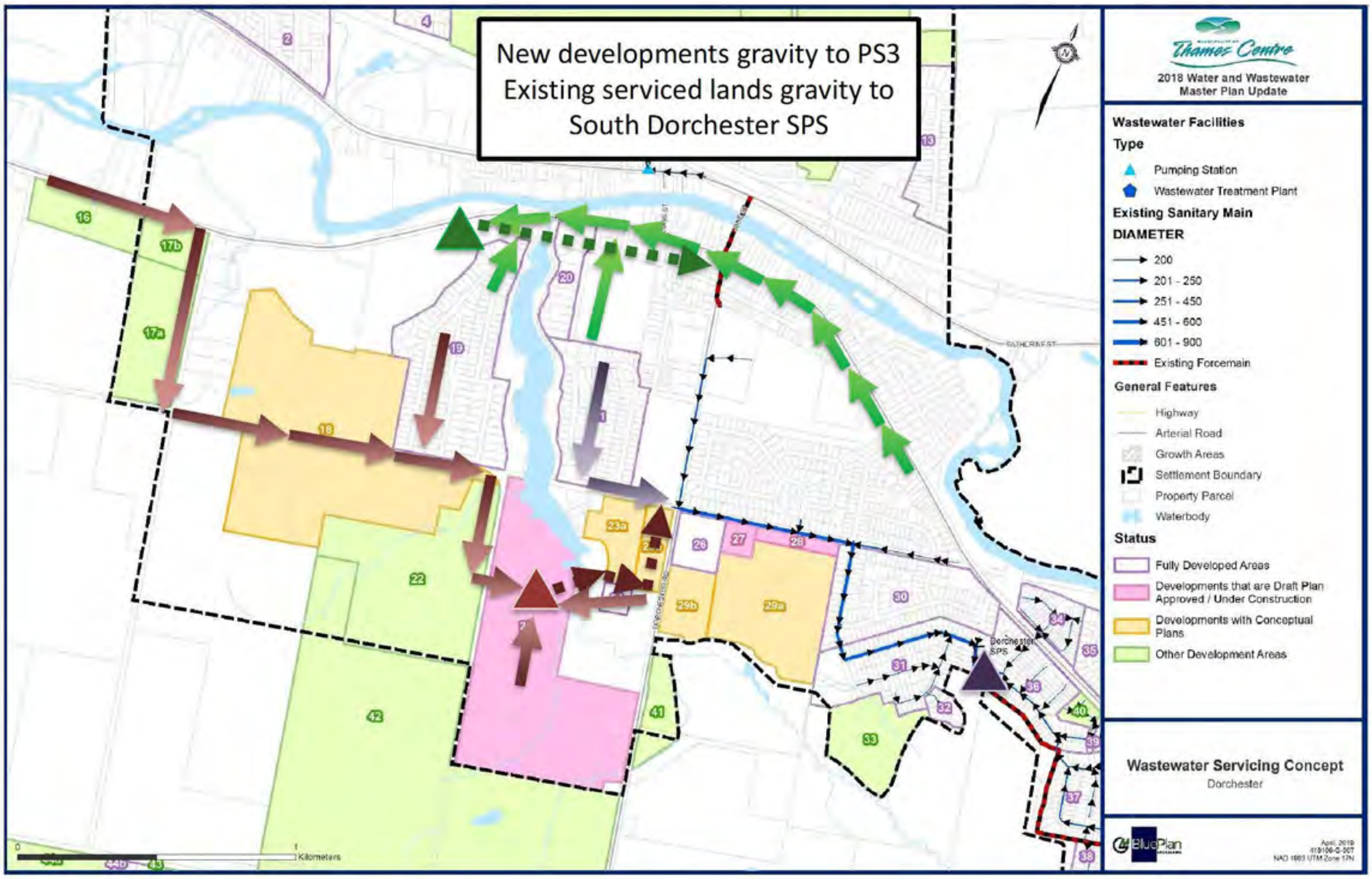
- New local mains in South

Dorchester PS3

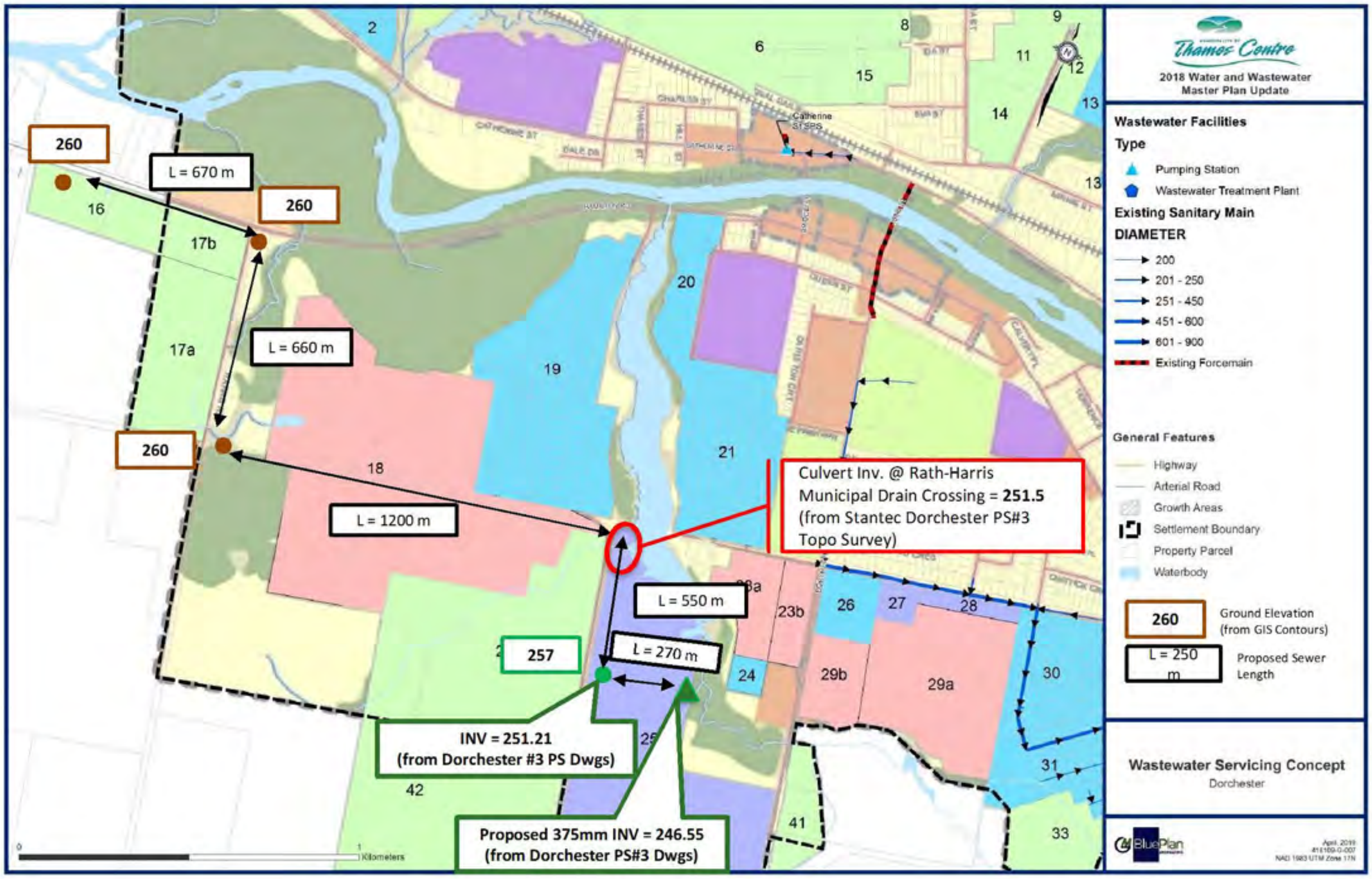


- Design Catchments for Dorchester PS3 are all located within the Settlement Boundary.

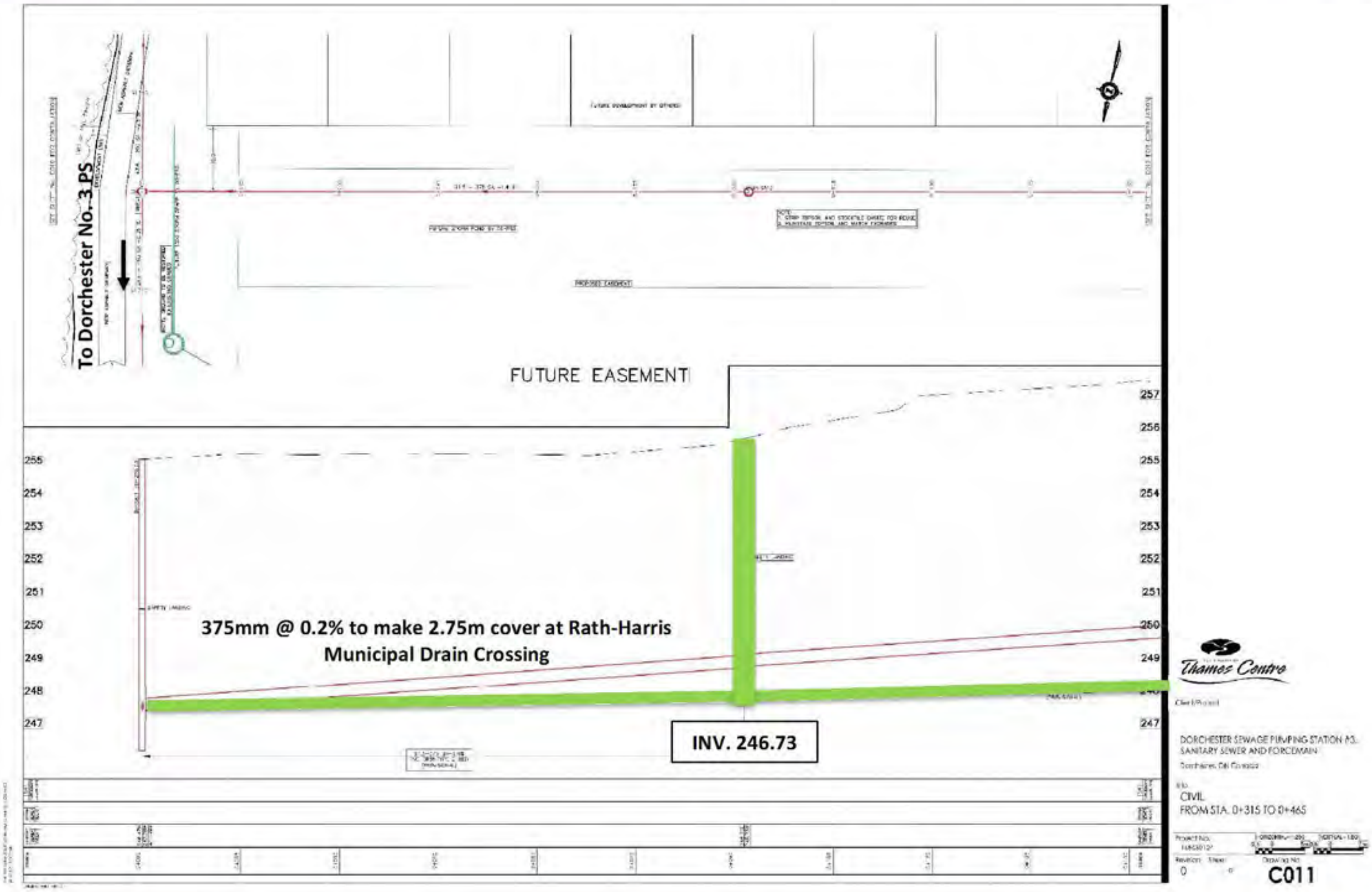
Dorchester Wastewater South - Alternatives



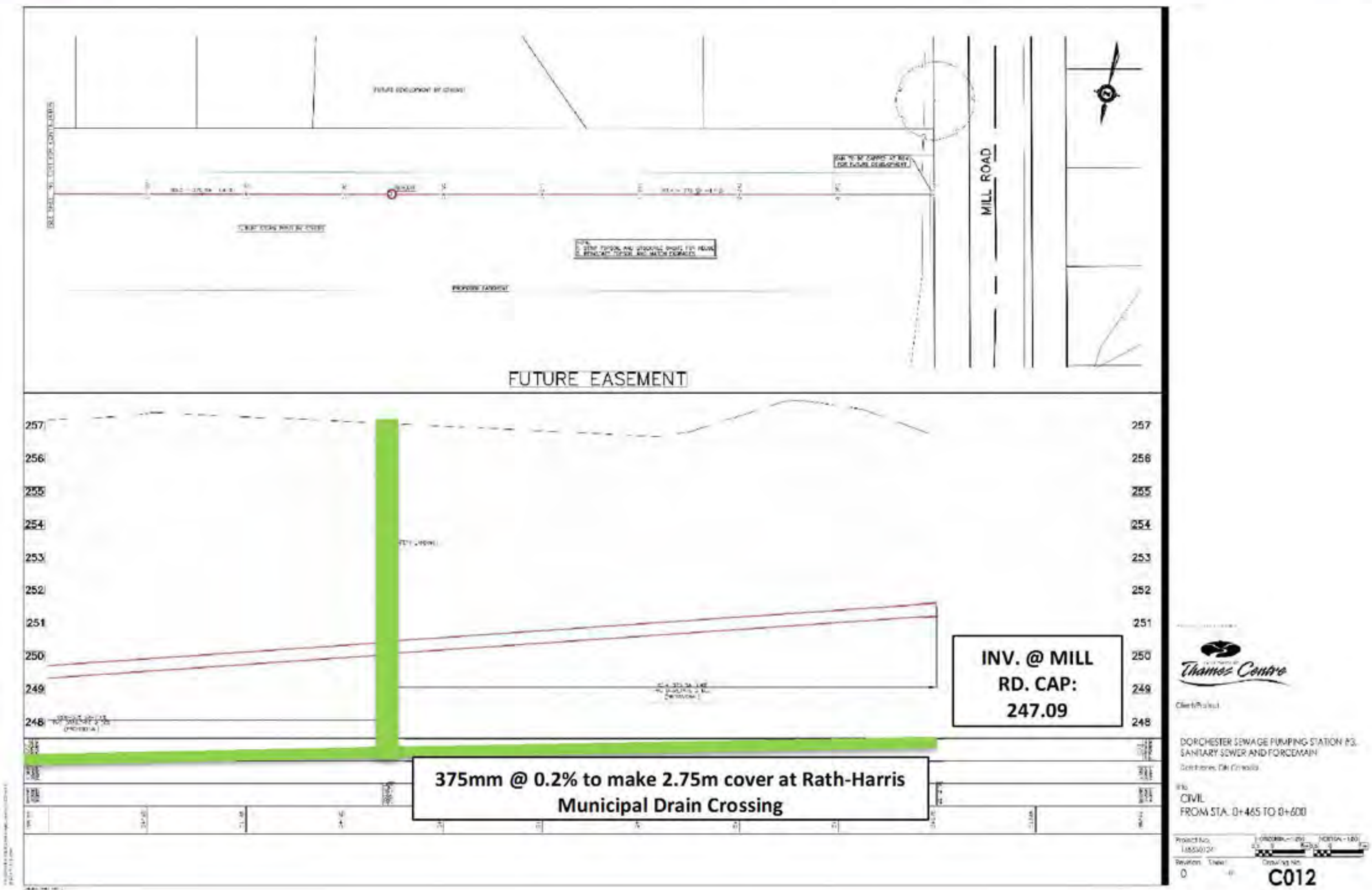
Dorchester Wastewater South Gravity Sewer to Dorchester No. 3 PS



Dorchester Wastewater South
Gravity Sewer to Dorchester No. 3 PS



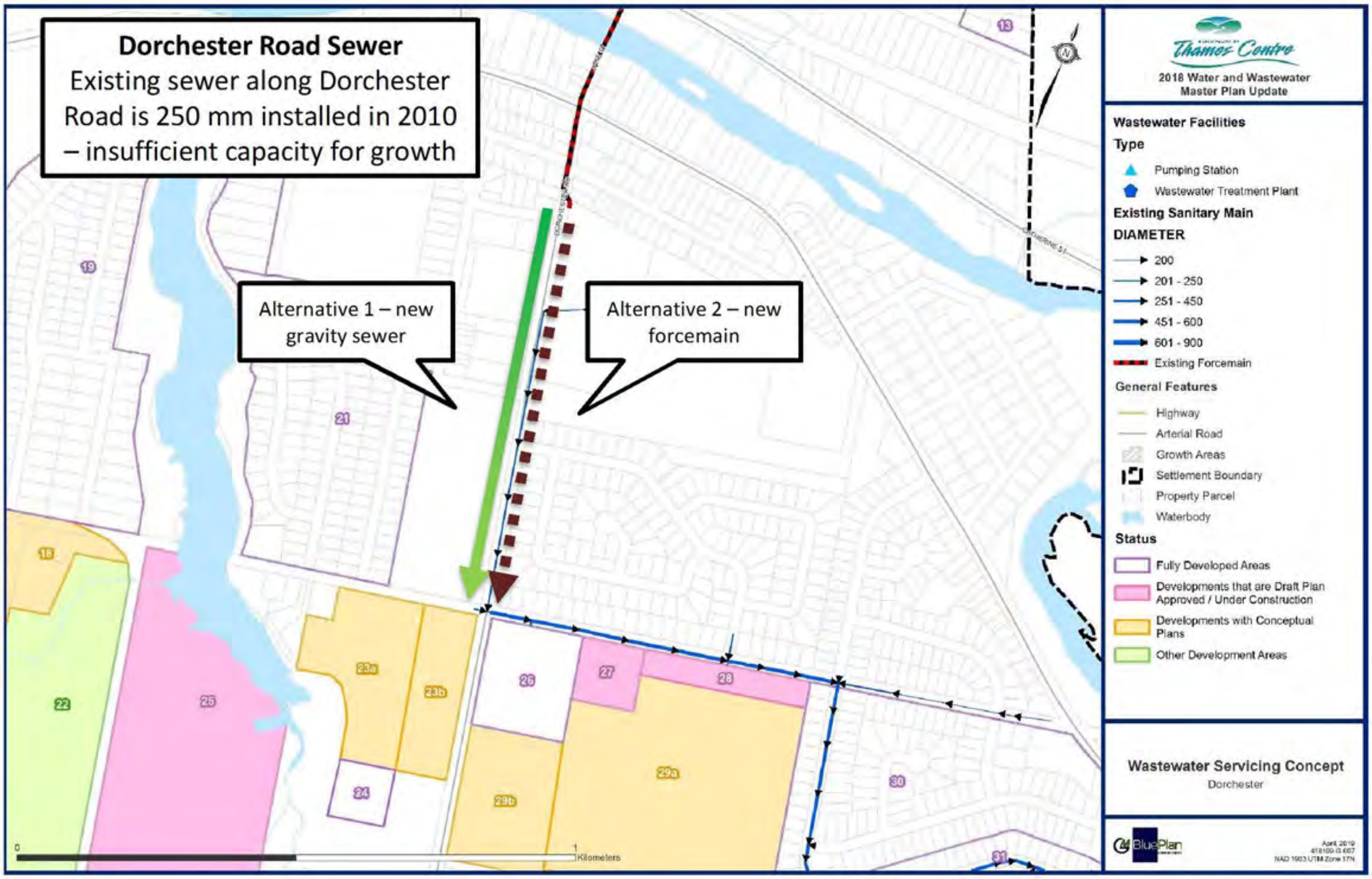
Dorchester Wastewater South
Gravity Sewer to Dorchester No. 3 PS



South Dorchester Wastewater Alternatives Evaluation

	Advantages	Disadvantages	Estimated Timing	Estimated Cost
Alternative 1 (Preferred)	**PS3** Growth areas all gravity to PS3. **South SPS** Existing unserviced areas gravity to new SPS and pump to Dorchester Road sewer	• Utilizes PS3 for all growth areas	• Requires additional SPS for existing unserviced areas in South Paris	$9M Total – All Methods SPS: $0.8 M FM: $0.8 M Sewers: $7.5 M

Dorchester Wastewater – Dorchester Road Sewer



Dorchester Road Sewer Alternatives Evaluation

	Advantages	Disadvantages	Estimated Cost
Alternative 1 New Gravity Sewer	• Best provides for conveyance of flows from North Dorchester and future South Dorchester PS (located directly south of Thames River) • PS forcemains can outlet to upgraded sewer – reduces infrastructure within Dorchester Road cross-section	• More upfront construction required (accommodating existing flows)	All Methods: $1.5M
Alternative 2 New Forcemain to Byron Ave. connecting from ex. FM along Dorchester Rd. Bridge	• Less extensive construction required to service initial North Dorchester development growth • Continuation of proposed forcemain to existing sewer at Byron Avenue reduces construction costs	• At buildout, 2 FM and 1 gravity main will be required to service North Dorchester and South Dorchester growth and unserviced lands – significantly congesting Dorchester Road utilities cross-section	All Methods: $1.0M

Alternative 2a (Preferred)
New FM to Ex. 250mm Gravity Sewer along Dorchester Rd. under Interim Conditions Ultimately Extend FM to 600mm Sewer along Byron Ave.
	• Under interim conditions utilizes existing deep 250mm gravity sewer to:
	  • reduce construction costs
	  • Add additional flow to 250mm sewer to improve cleansing velocities and reduce maintenance (currently low flows within this sewer until growth / unserviced lands come online)
	• Extending the forcemain to the 600mm Byron Sewer eliminates the need to construct an upgraded deep sewer along Dorchester Rd.
		• In addition to further congesting Dorchester cross-section with additional FM infrastructure, North Dorchester PS and FM must be designed to be staged to accommodate different discharge outlets	All Methods:
			Interim: $0.5M
			Ultimate: $1.5M

Dorchester Wastewater System

401 CORRIDOR LANDS WASTEWATER ALTERNATIVES

Dorchester Wastewater 401 Corridor Lands - Alternatives

Alternative 1

- Gravity to PS3

Pumping & Forcemain

- No local pump station or forcemain required

Downstream Pumping & Forcemain

- Upgrades required at PS3
- Accumulative impacts on Dorchester WWTP and SPS

Downstream Conveyance

- Upsizing required along X

Alternative 2

- New pump station and forcemain to Byron Avenue trunk sewer

Pumping & Forcemain

- New pump station
- New forcemain from pump station to Byron Avenue trunk sewer

Downstream Pumping & Forcemain

- Accumulative impacts on Dorchester WWTP and SPS

Downstream Conveyance

- Upsizing required along X

Alternative 3

- Gravity along Dorchester Road and siphon under Thames River

Pumping & Forcemain

- No local pump station or forcemain required

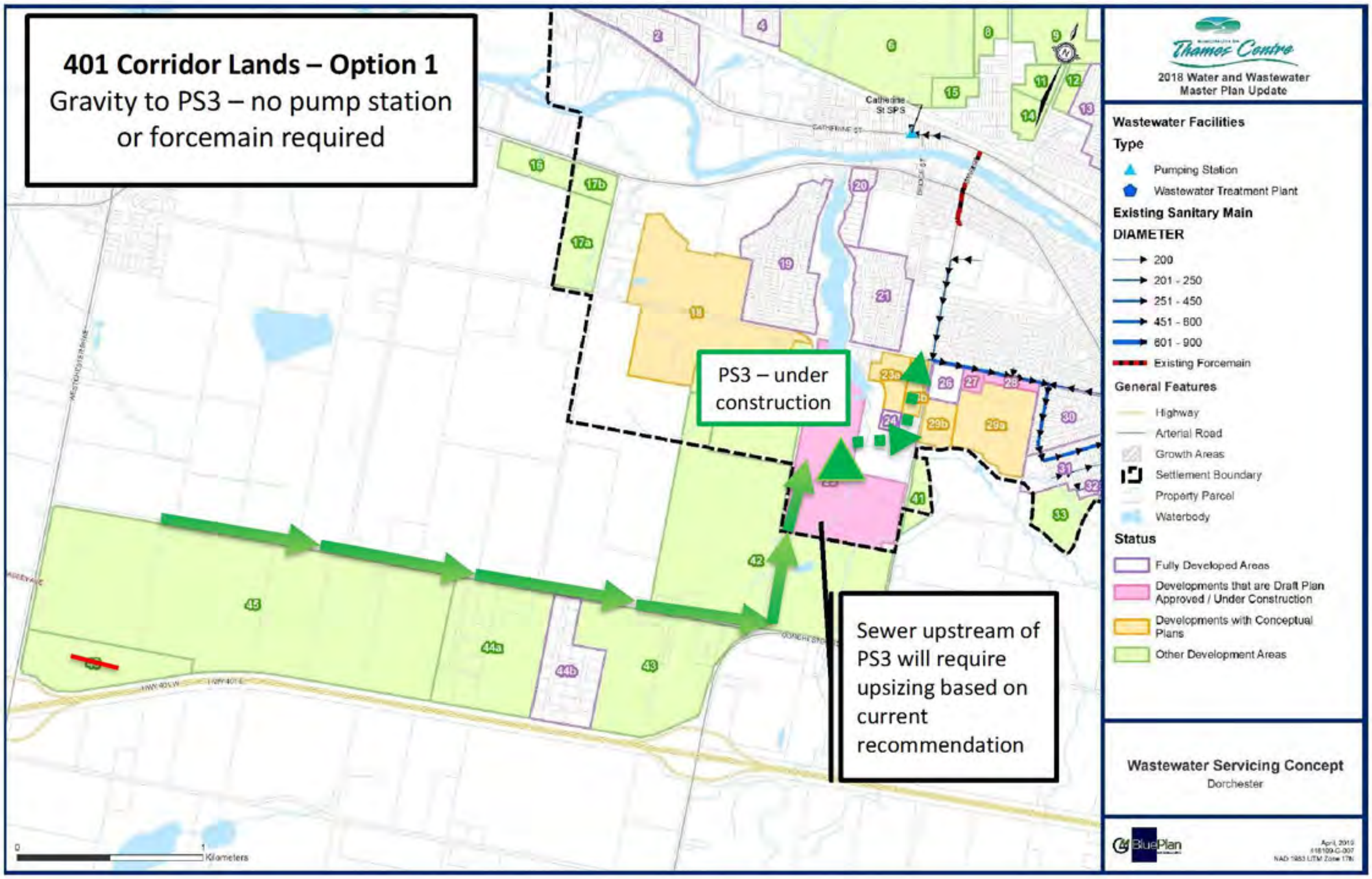
Downstream Pumping & Forcemain

- Accumulative impacts on Dorchester WWTP and SPS

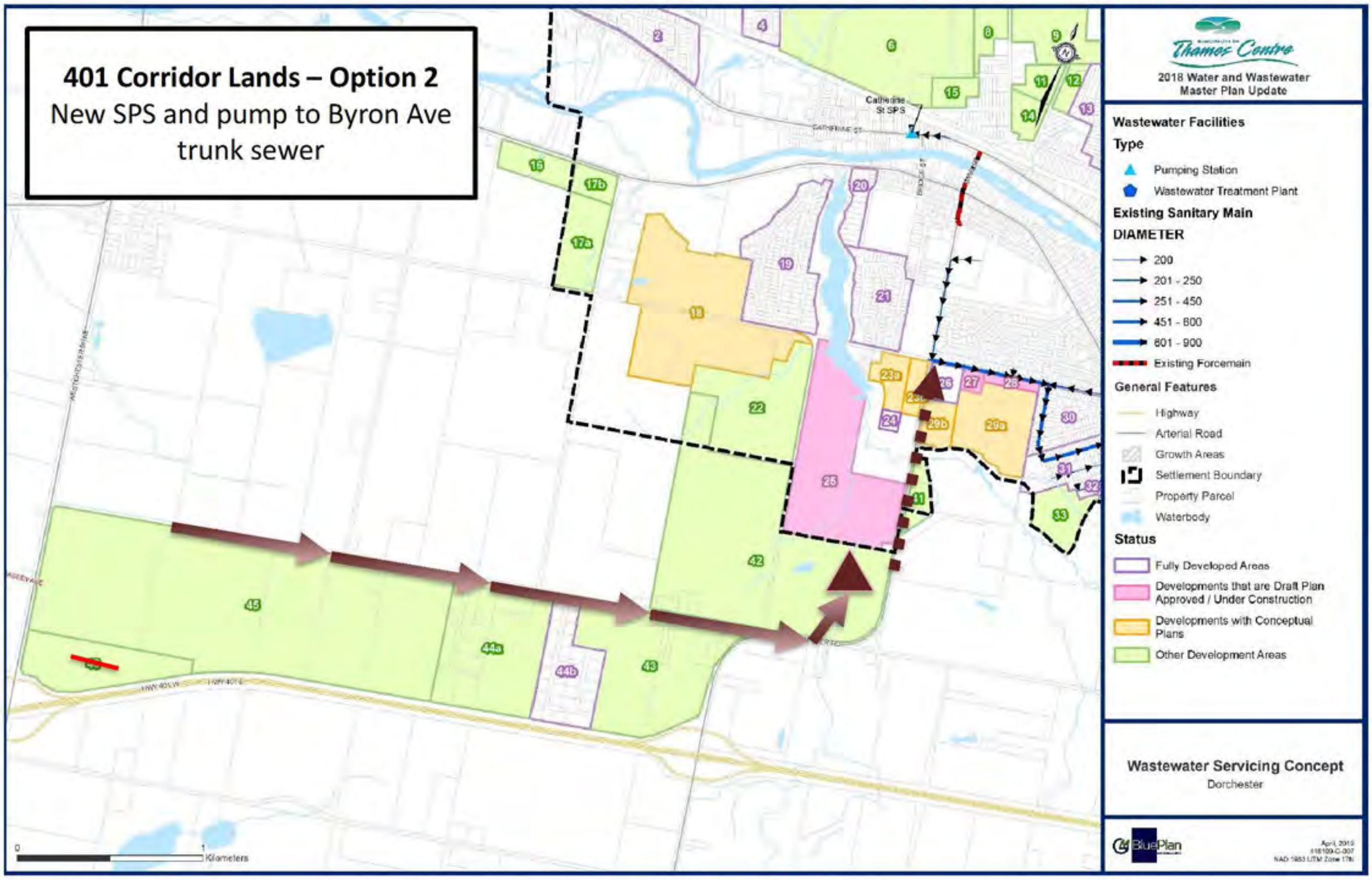
Downstream Conveyance

- Upsizing required along X
- Siphon at Thames River

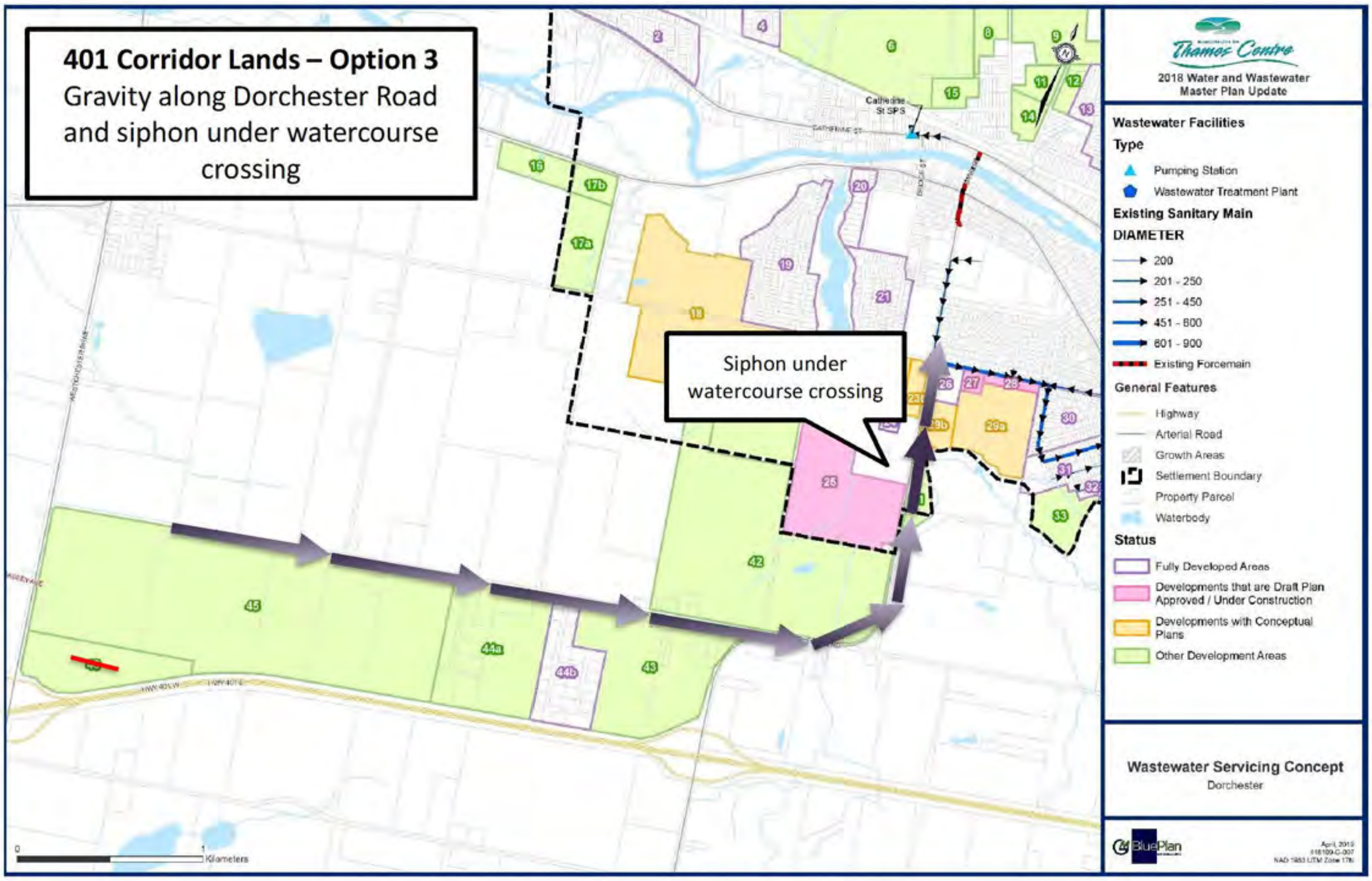
Dorchester Wastewater 401 Corridor Lands - Alternative 1



Dorchester Wastewater 401 Corridor Lands - Alternative 2



Dorchester Wastewater 401 Corridor Lands - Alternative 3



GM BluePlan ENGINEERING

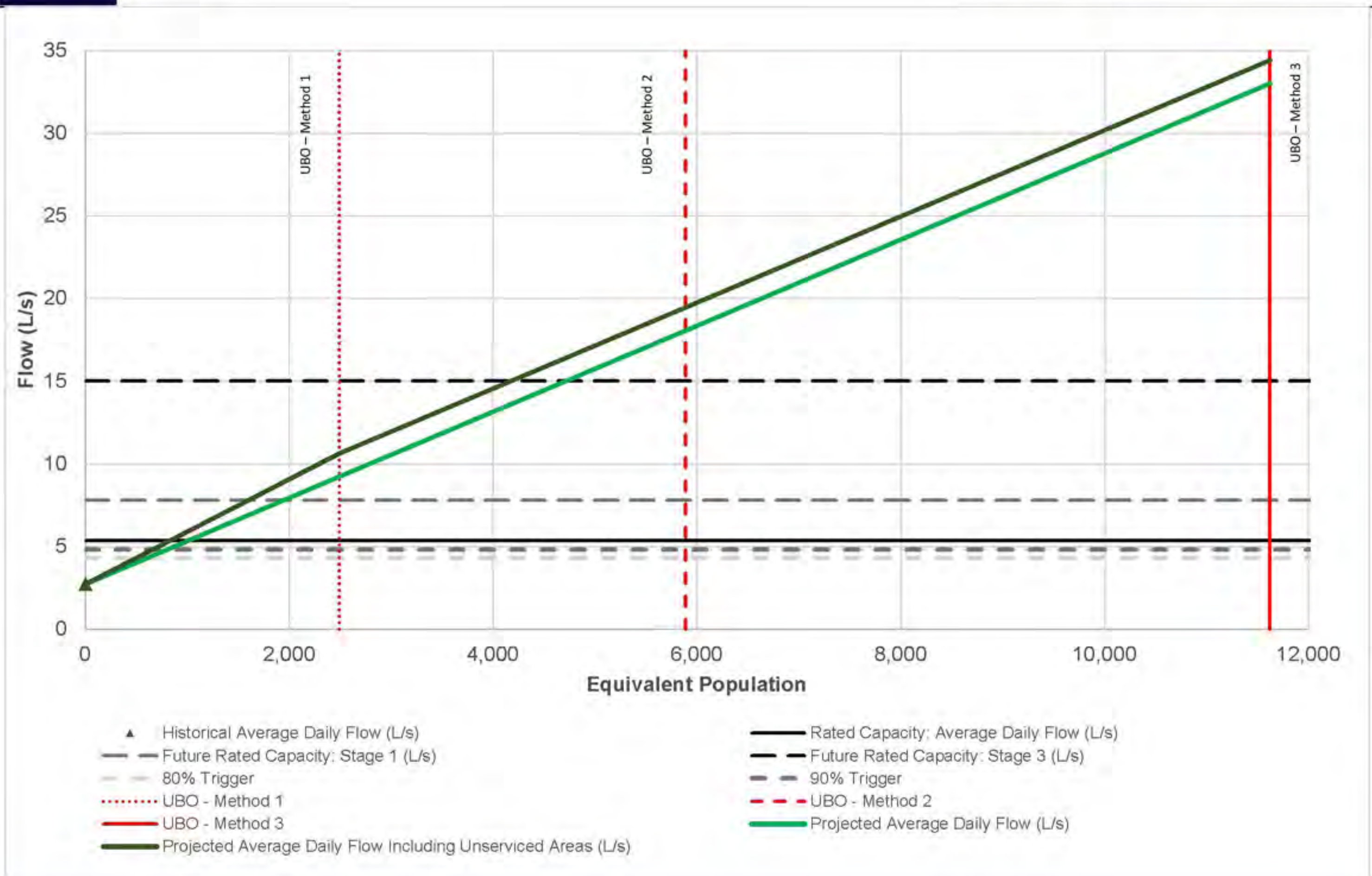
401 Corridor Lands Alternatives Evaluation

	Description	Advantages	Disadvantages	Estimated Cost
Alternative 1 Gravity to PS No. 3	Approximately 4km of new 200mm/ 375mm-450mm dia. gravity sewer to service the 401 Corridor Lands outletting to PS No. 3. PS No. 3 Upgrades will be required, including planned upgrade of pumps for Method 1 and Method 2. PS Pumps and FM will be required to be upgraded for Method 3.	• Minimizes number of PS and watercourse crossings within Dorchester • Potential for cost efficient upgrades of the PS under Method 1 and Method 2 • Proposed twin 150mm dia. FM may have capacity to accept flows from 401 Corridor Lands if buildout density is minimal	• Under Method 3 Buildout, this alternative requires significant upgrades at Dorchester No. 3 PS (including forcemain replacement)	**Method 1 and 2:** 200mm Sewer - $3M PS Upgrades- $1.0M **Method 3** 375mm - 450mm Sewer – $3.5M PS and FM Upgrades: $2.0M - $3.0M
Alternative 2 Gravity to New SPS to Byron Ave. Trunk Sewer	• Approximately 4km of new 200mm/ 375mm-450mm dia. gravity sewer outletting to new PS and FM along Dorchester Rd. eventually outletting to 600mm dia. sewer running east along Byron Ave. • Potential to divert FM to outlet directly to Dorchester WWTP SPS flows under (Method 1&2 – 6.08 L/s, Method 3 – 160.43)	• Opportunity to outlet proposed FM directly to Dorchester WWTP to alleviate capacity issues at Dorchester SPS.	• Most extensive infrastructure upgrade costs • Extensive permitting likely required for construction within watercourse / bypass pumping	**Method 1/2** $4.5M **Method 3** $12.3M
Alternative 3 Gravity to New Siphon under Dorchester Rd. watercourse crossing + New Gravity along Dorchester Rd. to Byron Ave.	• Approximately 5km of new gravity	• Minimizes PS costs within Dorchester • Minimizes infrastructure upgrade costs	• Extensive permitting likely required for construction within watercourse / bypass pumping	**Method 1 and 2:** 200mm Sewer + Siphon - $4.5M **Method 3** 375mm - 450mm Sewer + Siphon – $6M

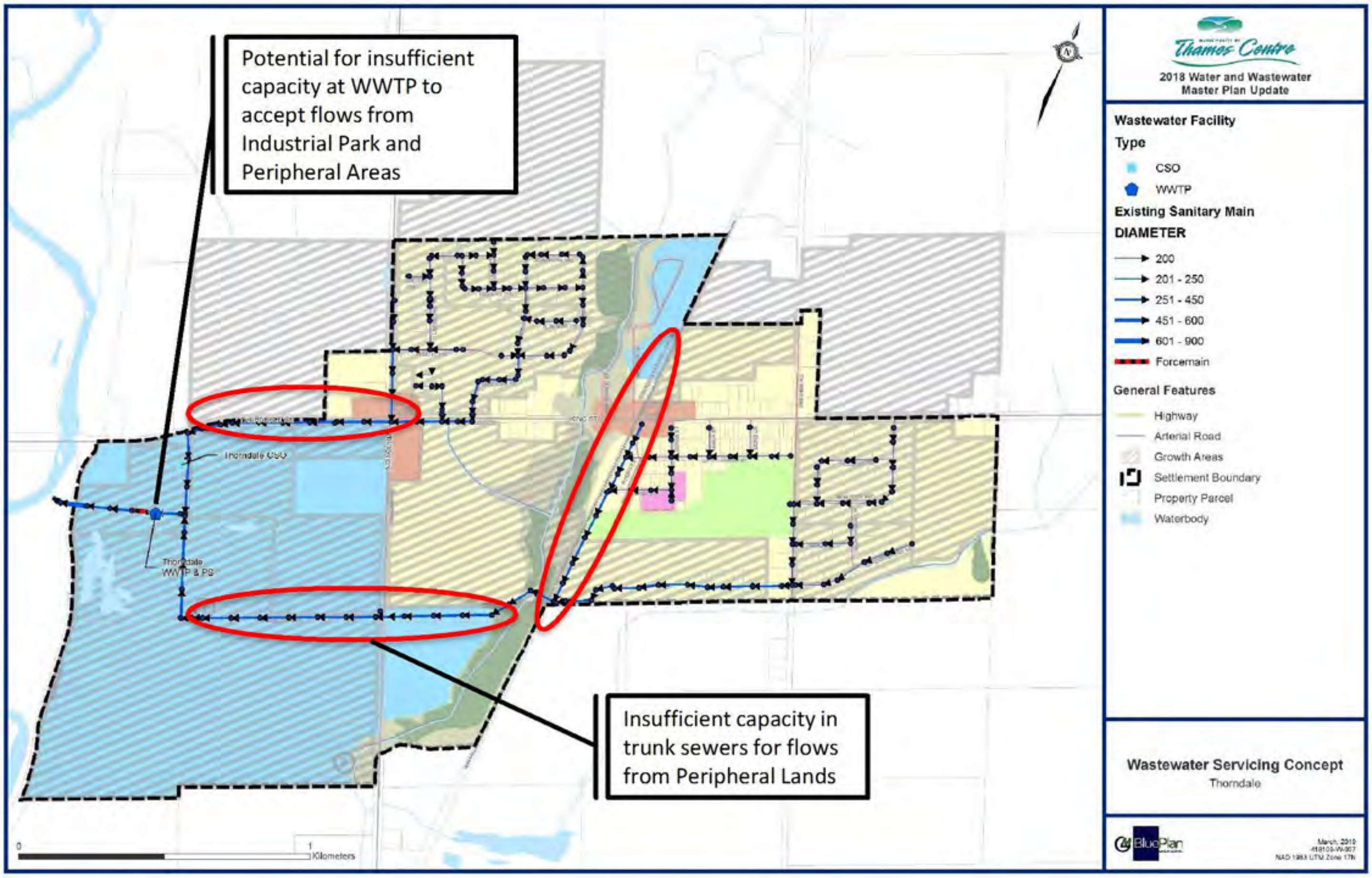
Servicing Alternatives Evaluation

THORNDALE WASTEWATER SYSTEM

Thorndale WWTP



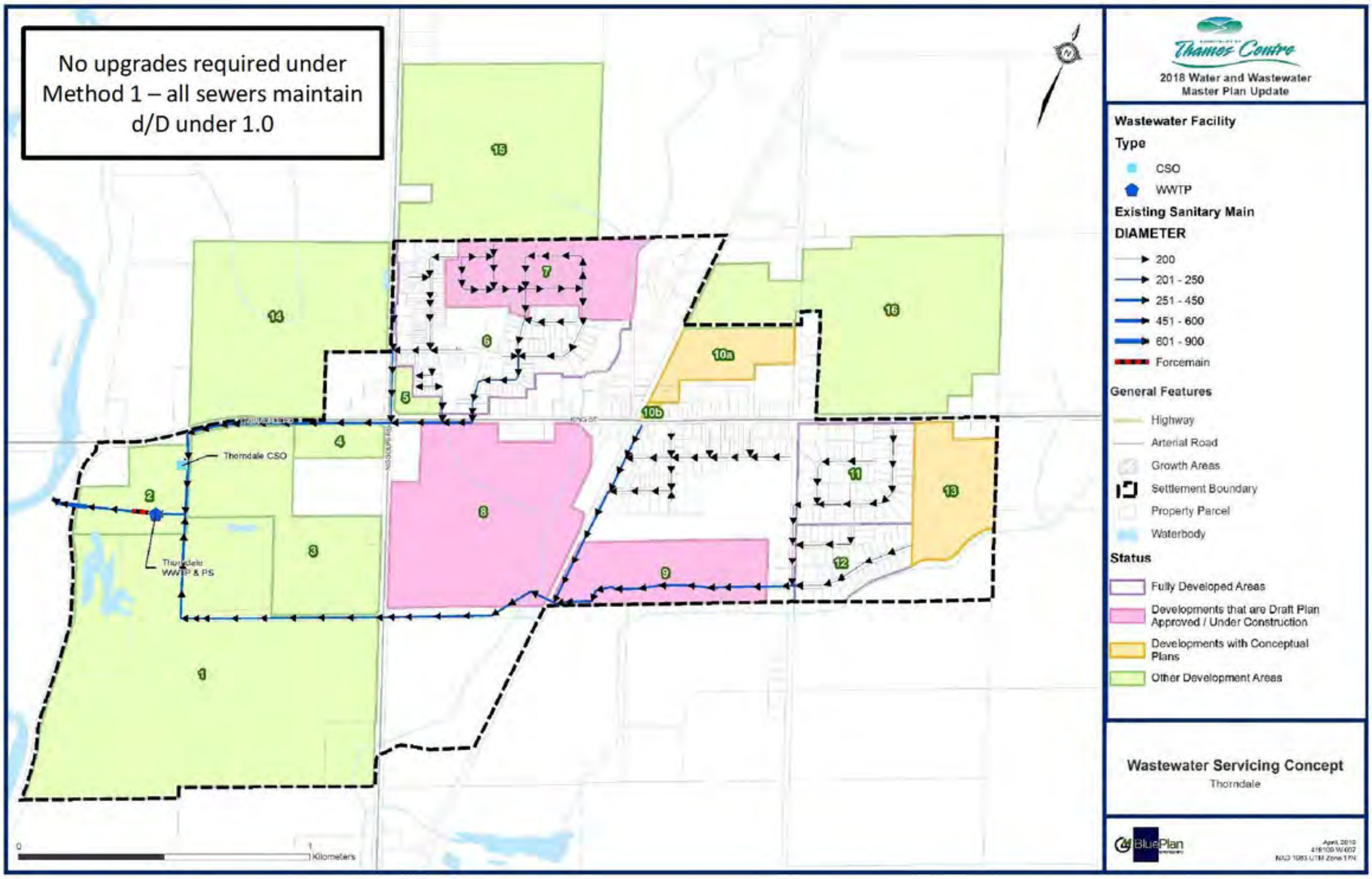
Thorndale Wastewater Servicing Constraints



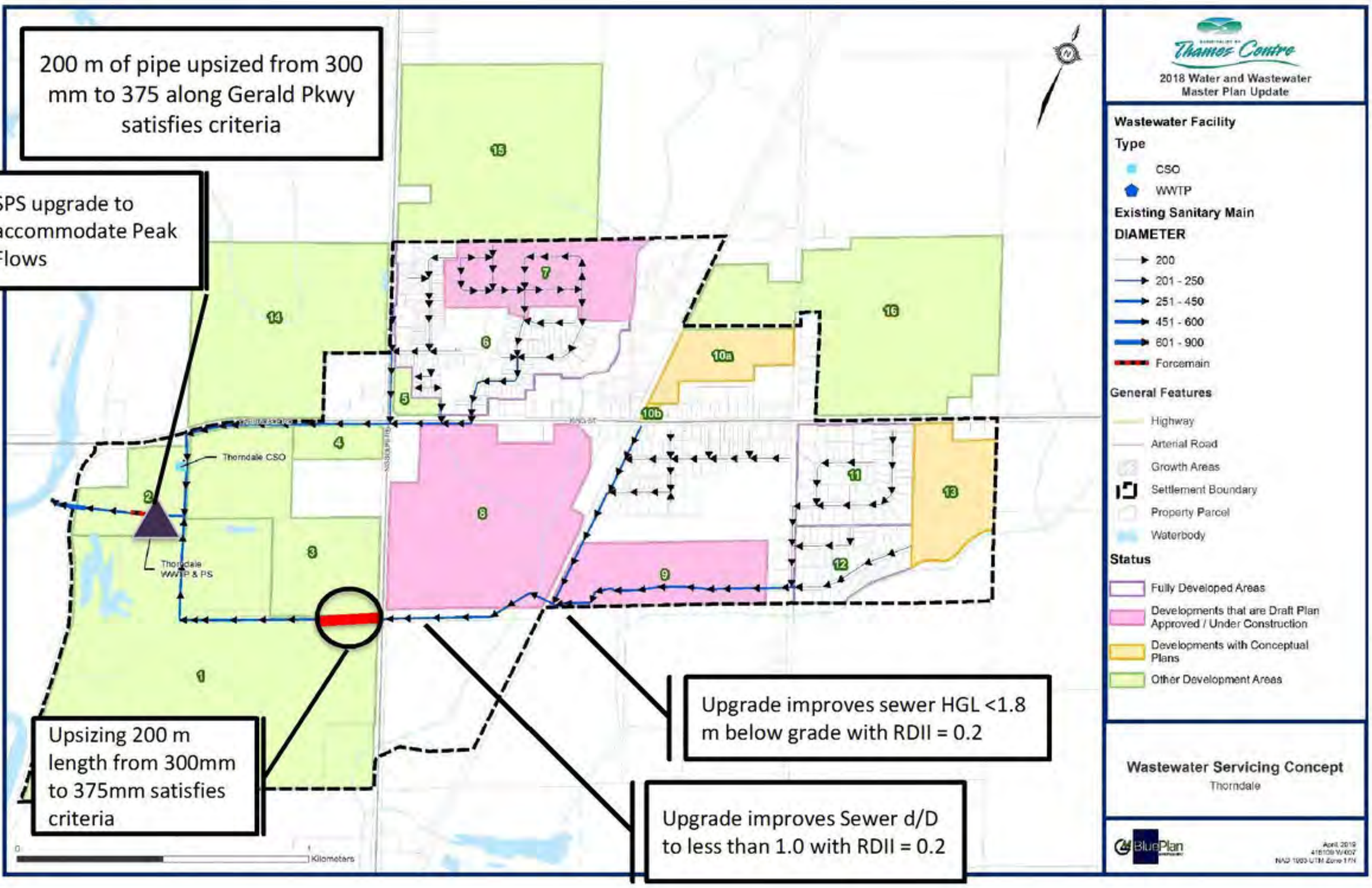
Thorndale Wastewater Level of Service

1. Level of Service criteria for sewer: d/D less than 1.0 for existing and proposed sewers based on I/I of 0.2 L/s.
2. Level of Service criteria for HGL: less than 1.8 m below grade for existing and proposed sewers based on I/I of 0.6 L/s.

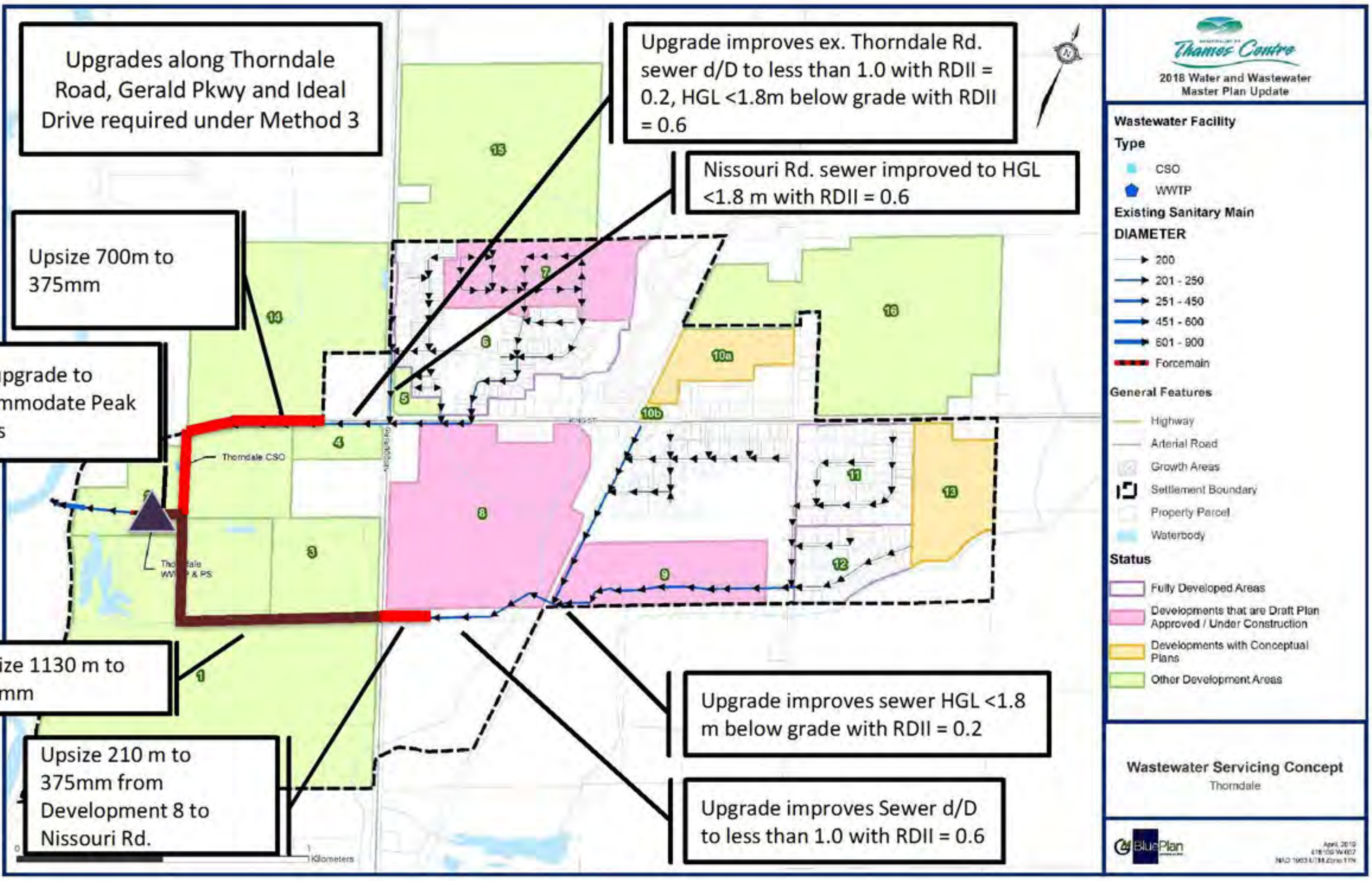
Thorndale – Method 1



Thorndale – Method 2 – Upgrades



Thorndale – Method 3 - Upgrades



Thorndale Wastewater – Costs

Alternatives	Description	Advantages	Disadvantages	Estimated Cost
Alternative 1 (Preferred)	Upsize trunk sewers upstream of Thorndale WWTP for Method 3 flows. **Method 1** No upgrades required **Method 2** **Gerald Parkway** – upsize 200 m to 375 mm where sewer decreases from 375mm to 300mm **Method3** **Gerald Parkway** – upsize 210 m to 375 mm from Development 8 to Thorndale Road crossing **Gerald Parkway & Ideal Drive** – upsize 11130 m to 450 mm from Road crossing to WWTP **Thorndale Road and Ideal Road** – upsize 700 m to 375 mm along Thorndale Road and Ideal Road	• Utilizes existing sanitary sewers and CN rail crossing until capacity is reached	• Will require upsizing sewers	Method 1 $0 Method 2 $0.25 M Method 3 $2.5 M

NEXT STEPS

Project Schedule

January	February	March	April	May	June	July
• Workshop No. 1 • Model Development	• Workshop No. 2 Model Review • Servicing Assessment	• Workshop No. 3 Servicing Concepts / Evaluation Criteria Review • Develop Servicing Alternatives • Develop Servicing Alternatives	• **Workshop No. 4 Alternatives Evaluation Workshop** • Development of Implementation Plan	• PIC No. 1 • Master Plan Report	• Workshop No. 5 Report Review	• File Master Plan • Notice of Study Completion + 30 Day Review

- Meetings / Presentations with Stakeholders
  - Oneida First Nation Request
- Public Information Centre(s) in May
- Final Workshop in June

MUNICIPALITY OF THAMES CENTRE

APPENDIX C

COST ESTIMATING PAPER

Cost Estimating Framework

Water and Wastewater Master Study

Prepared by:
GM BluePlan Engineering

April 2018

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Figures

Appendices

1 Introduction

The Municipality of Thames Centre retained GM BluePlan Engineering Limited to complete the Water and Wastewater Master Study which provides a review, evaluation and development of water and wastewater servicing strategies for servicing within the Municipality. The project scope included development of new frameworks and policies related to long-term planning, cost estimation at the Master Plan level, and updated linear and vertical unit rates. This memorandum presents the new Cost Estimation Framework, including updated unit rates, which will be applied to the Municipality's capital projects in the Water and Wastewater Master Plan.

This memorandum is intended to formalize and document a Cost Estimation Framework that provides a consistent, transparent, and auditable approach to costing capital projects.

The primary aims of this task are to:

- Provide a formal cost estimation framework for the Municipality; and
- Provide guidance to Municipality staff on the use of the framework.

To achieve the aims, the objectives of the task are to:

- Establish and define different levels or classes of cost estimates appropriate to the information that is available, which will relate to the type of study that is being undertaken; and
- Identify the key information requirements to generate each level of class estimate.

2 Cost Estimation Framework

The proposed Cost Estimation Framework for capital projects at the Master Plan level will be based on an overall project unit cost approach. In this approach, project costs are generated from unit rates with added contingency and other additional costs.

The goal of the Cost Estimation Framework is to provide a consistent and traceable approach for estimating capital project costs to minimize the variance between cost estimates and final project budgets. The approach will also improve communication and understanding between stakeholders.

2.1 Approach and Methodology

The total length or capacity needs of the required infrastructure is multiplied by a unit rate, applicable to the size or capacity and particular construction type (e.g., 5-metre depth sewer, 10-metre depth sewer, water main, wastewater force main, tunnelling). Additional costs are added to account for creek, road, railway or utility crossings, valves, tunneling requirements, etc., where applicable.

In cases where construction will occur in built up areas, such as intensification areas, a cost escalation factor is applied to the installation cost. This factor provides additional project costs to account for utility coordination/relocation, urban reinstatement, and urban construction impacts.

The sum of the base cost plus additional cost results in the *Base Construction Cost*.

Soft costs such as geotechnical/hydrogeological, property/easements, engineering and design, contract administration and contingency allowances, are added to the Base Construction Cost to arrive at the *Total Project Cost*.

Figure 1 shows the cost estimating process flow diagram. Each of the key components of the diagram is described below, including:

- Project Type,
- Cost Estimate Classification,
- Project Complexity,
- Unit Rates,
- Construction Uplift,
- Additional Costs,
- Construction Provisional Allowance,
- Other Project Costs (Geotechnical, Property, Design, In-house costs, etc.), and
- Project Contingency.

The unit costs and all the above components are contained in excel spreadsheets that include the Municipality's project sheets and the Water and Wastewater Capital Programs. The spreadsheet is the working tool that brings all the cost components together to create project cost estimates for the capital programs. The template spreadsheet is provided in Appendix A.

The following sections describe the methodology for each cost component.

Figure 1 - Cost Estimation Process Flow Diagram

Step 1. Define Project

Project Description
Define basic project details. Description can include: - Project status - new/replacement - Project infrastructure type (sewer, watermain, PS, WWPS, etc) - Geographic location and/or alignment(s) - Diameter or Capacity

Step 2. Define Project Classification

Estimate Class	Estimate Class Description	End Usage/Major Deliverables
Class 5	Conceptual Planning Cost Estimate	Concept screening, justification for project funding, minimal information requirements.
Class 4	Infrastructure Planning Cost Estimate	Study to support investment decisions based on sufficient knowledge to identify high-level risk.
Class 3	Conceptual Design Cost Estimate	Basis for budgeting and approvals.
Class 2	Preliminary Design Cost Estimate	Used for project cost control during design; initial design estimate.
Class 1	Detailed Design Cost Estimate	Final cost review in preparation for construction; tender-ready.

Step 3. Define Project Complexity

Project Complexity	Complexity Description
High complexity	Projects with high cost, broad scope of work, multiple alternatives/alignments, etc.
Moderate complexity	Projects with moderate cost, larger scope of work, several alternatives/alignments, etc.
Low complexity	Projects with low cost, defined scope of work, few if any altenatives

Step 4. Define Project Details

Project Detail	Detail Description
Diameter	Nominal diameter of the proposed water main to provide the required level of service.
Length	Approximate length of the proposed pipe based on the alignment (whether assumed or determine through more rigorous analysis).
Construction Methodology	The method by which the pipe will be installed (e.g., open cut, trenchless).
Construction Depth	The depth of excavation required to install the pipe assuming that open cut construction is chosen (e.g., normal, deep).
Construction Environment	The general environment within which the pipe will be constructed (e.g., greenfield, suburban, urban).
Crossings	Identification of the type and number of crossings associated with the pipe installation (e.g., creeks, roads, railways, major utilities).
Appurtenances	Identification of the type and number of appurtenances required for the proposed water main (e.g., valves, chambers, hydrants, etc.).
Capacity	Proposed capacity of vertical infrastructure (e.g. pump stations).

Step 5. Calculate Total Construction Cost

❶ INSTALLATION COST
Basic cost to install linear infrastructure and associated appurtenances calculated using various unit rates for pipe, valve and chamber sizes and type of crossings.

Includes: pipe installation (unit rate x length), crossings (count x unit rate for size and type of crossing), manholes and chambers (included in unit rate).

For vertical infrastructure, includes facility construction (unit rate x capacity).

+

❷ CONSTRUCTION UPLIFT
Allowance for the increased cost of constructing in built-up areas, applied to the base construction cost.

Construction Environment		
Greenfield	Suburban	Urban
0%	20%	40%

=

❸ BASE CONSTRUCTION COST
Total cost to construct the actual linear or vertical infrastructure and associated appurtenances, not including tasks such as traffic management, mobilization, inspections, etc.

❸ = ❶ + ❷

+

❹ ADDITIONAL CONSTRUCTION COSTS
Additional costs associated with construction not covered under the base construction cost or the construction uplift, including mobilization, traffic management, inspections, etc. A percentage is applied to the water main construction cost based on the complexity of the project.

Project Complexity		
Low	Moderate	High
5.0%	7.5%	10.0%

+

❺ PROVISIONAL ALLOWANCE
Provisional allowance for labour and materials over and above the construction cost, a standard item on construction tenders. A provisional allowance of 10% is applied to all projects.

=

❻ TOTAL CONSTRUCTION COST
Total cost of constructing the project including all items that make up a construction tender.

❻ = ❸ + ❹ + ❺

Step 6. Calculate Project Contingency

❼ PROJECT CONTINGENCY
An allowance for contingency that recognizes both the complexity of the project and the project classification in terms of the certainty regarding scope of work, alignment, construction methodology, property requirements, geotechnical/hydrogeological issues, etc. The contingency will become smaller as the project moves closer to implementation.

	Project Complexity		
	Low	Moderate	High
Class 4	15%	20%	25%
Class 3	10%	15%	20%
Class 2	5%	10%	15%
Class 1	0%	0%	5%

Step 7. Calculate Soft Costs

a) For new infrastructure (i.e., growth-related)

❾ GEOTECHNICAL/ HYDROGEOLOGICAL
Allowance for geotechnical/hydrogeological investigations during detailed design.

Project Complexity		
Low	Moderate	High
0.5%	1.0%	2.0%

+

❿ PROPERTY/EASEMENTS
Allowance for temporary and permanent easements and for property acquisition.

Project Complexity		
Low	Moderate	High
1.0%	1.5%	2.0%

+

⓫ ENGINEERING/DESIGN (INTERNAL)

Total Cost		
<$10m	$10-$50m	>$50m
4%	6%	8%

+

⓬ DESIGN/CONTRACT ADMINISTRATION (EXTERNAL)

Total Cost		
<$10m	$10-$50m	>$50m
10%	12%	15%

=

⓭ TOTAL SOFT COSTS (GROWTH)

⓭ = ❾ + ❿ + ⓫ + ⓬

⓮ NON REFUNDABLE HST
Non Refundable HST has been defined as 1.76%

Step 8. Total Project Cost

⓯ TOTAL COST ESTIMATE (2018 Dollars)
Total cost of the project including construction costs, additional project related costs and soft costs.

⓯ = ❻ + ❼ + ⓭ + ⓮

Step 9. Determine Funding Source(s)

Determine the funding source or sources based on the key driver(s) of the project.

2.1.1 Project Type

New Infrastructure

New infrastructure projects involve construction of new linear or vertical infrastructure that is are growth related and typically funded from Development Charges (DCs). The majority of the capital projects identified in the Master Plan fall into this category and their cost will be developed using the new cost estimation framework.

Replacement

Projects involving replacement, relining and other works on existing infrastructure. These projects are generally not growth related and fall in the State of Good Repair (SoGR) category.

2.1.2 Cost Estimate Classification

The cost estimation approach uses a classification system to categorize cost estimate classes. These classes represent different phases of planning and design and, therefore, different methods of cost estimation and levels of accuracy. This framework complements the generic approach developed by the Association of Advancement in Cost Estimating (AACE) International, and also has similarities to the Government of Canada (GOC) approach.

For the purposes of the Water and Wastewater Master Plan, the cost estimates that are derived using this methodology will mostly follow a **Class 4** estimate. If this methodology is further used through subsequent phases of the project, the Class can be updated to reflect the higher level of confidence in the estimate and the additional effort used to develop the estimate.

Table 1 provides descriptions of the proposed estimate classes and their end usage or deliverables. Appendix B includes expanded details on each Class, including the basis for the estimate and the associated accuracy range that can be expected based on the project complexity.

Table 1. Cost Estimation Classes

Estimate Class	Estimate Class Description	End Usage / Major Deliverables
Class 5	Order of Magnitude Estimate	Limited or no available information used in the cost estimate. Used at an early stage in absence of better information.
Class 4	Infrastructure Planning Cost Estimate	Infrastructure Planning/Master Planning. Justification for project planning funding. Limited available information used in the cost estimate.
Class 3	Conceptual Design Cost Estimate	Basis for budgeting and approvals.
Class 2	Preliminary Design Cost Estimate	Used for project cost control during design. Initial detailed estimate.
Class 1	Detailed Design Cost Estimate	Final cost review in preparation for construction; tender ready.

2.1.3 Project Complexity

A Master Plan level project can vary widely in scope. When developing the cost estimate within a Master Plan context, it should be recognized that not all project costs have the same level of complexity. As part of the new cost estimating framework, the project complexity is estimated during development of the project cost estimate. As the anticipated complexity of a project increases from low to high there is a greater risk of unforeseen costs. As such, the contingency and additional cost items are adjusted to reflect the project complexity.

Table 2 provides general definitions of project complexity – high, medium and low – as will be used in the Water and Wastewater Master Plan. An estimate of the complexity is made after reviewing the project details that are available at the Master Planning stage. The definitions of high, medium and low complexity are provided to maximize the consistency in complexity selection on a given project and to minimize the subjectivity of the estimate.

The complexity estimate is intended to represent the best assumption of the overall complexity of the project with details available at the time.

Table 2. Project Complexity Descriptions

Project Complexity	Complexity Description
High Complexity	• Large in scale, scope and, ultimately, cost. • Uncommon project, not frequently constructed. • Complex project details that, in general, have high uncertainty and may potentially change in later stages of the project (EA, scoping study, design, construction) • Multiple options and project details for design and construction (alignment, dimensions, facility layout, construction methodology) that are not yet confirmed • Other anticipated project details that can contribute to consideration as a High Complexity project: o Existing utility and linear infrastructure conflicts, that may not be known at the Master Planning Stage o Unknown subsurface conditions – Soil, rock, groundwater o Significant restoration requirements o Environmental features that may require additional approvals and/or mitigation during construction o Potentially long construction duration o Linear – Deep sewer/water main, force main o Linear – Large Diameter o Facility – Deep Wet Well o Facility – Large Capacity (Reservoir, Elevated Tank, Pumping Station) The nature of the project details in a high complexity project (e.g. many unknowns, utility conflicts, large diameter, high base construction costs, etc.) necessitate the inclusion of further additional costs to account for the risk of construction cost increases.
Medium Complexity	• Moderate in scale, scope and, ultimately, cost. • Medium complexity projects where most project details generally fall in between high and low complexity. • Medium complexity projects may have some elements that fit the High Complexity category, while some elements falling within Low complexity category. (e.g., short section of small diameter water main constructed within a built-up area with several utility conflicts).

Project Complexity	Complexity Description
Low Complexity	• Smaller in scale, scope and, ultimately, cost. • Common project, frequently constructed. • Straightforward project details that, in general have low uncertainty and are not likely to change in later stages of the project (EA, scoping study, design, construction) • Most options and project details for design and construction (alignment, dimensions, facility layout, construction methodology) are generally confirmed at this stage • Other anticipated project details that can contribute to consideration as a Low Complexity project o Few existing utility and linear infrastructure conflicts – generally associated with greenfield/rural construction o Subsurface conditions are known or assumed with high level of certainty o Minimal restoration required or restoration primarily to be coordinated with road construction/widening o Little to no environmental features within project construction area o Short anticipated construction duration o Linear – Shallow sewer, water main, force main o Linear – Small diameter o Facility – Shallow wet well o Facility – Small Capacity (Reservoir, Elevated Tank, Pumping Station) The nature of project details in a low complexity project (e.g., few unknowns, few utility conflicts, small diameter, low base construction cost, etc.) do not necessitate significant additional costs.

2.1.4 Unit Rates

Unit rates require periodic updating to ensure they are consistent with current market conditions. GM BluePlan compiled recent tenders for linear and facility projects within the GTA to provide guidance to the update of unit rates. Unit rates are estimated to be high level cost for construction, which is assumed to include General Contractor profit.

The linear unit rate for a given pipe diameter is made up of the following components:

- Excavation ($/m^3)
- Bedding ($/m^3)
- Pipe Supply ($/m)
- Pipe Install ($/m)
- Backfill ($/m^3)
- Restoration ($/m)
- Manhole Allowance ($/m)
- Valve Allowance ($/m)

Each component was broken down to a $/m linear unit rate to generate the total base construction cost for a given diameter of pipe. Unit rates for facilities are not broken down to the same level of detail as linear projects. Facility unit rates are based on $/L/s or $/ML.

The proposed Master Plan unit rates are provided in Appendix D. They are based on a combination of supplier material costs, tender analysis and historic project costs from multiple municipalities across southern Ontario. In this recommended approach, the unit rates are the starting point or base for a cost estimate. Many other factors and criteria are applied to the unit rates. Therefore, caution is advised when comparing recommended unit rates in isolation with those used for previous studies. Only full and complete costs estimates should be compared.

Creeks, roads, railways and utility corridor crossings are also identified during the cost estimating process. The costs associated with these crossings, where applicable, are part of the installation cost. The costs of crossings are calculated as follows:

- Major Creek / Major Road → 150 m x Trenchless Unit Rate
- Minor Road / Utilities Corridor → 60 m x Trenchless Unit Rate
- Minor Creek → 20 m x Trenchless Unit Rate

Cost for crossings are considered a premium over and above the installation cost for the project and, as such, the total length of the water main or sanitary sewer is not adjusted to remove the length of the crossing.

2.1.5 Construction Uplift

Construction uplift introduces an allowance for the increased cost of constructing in built-up areas and is applied to the installation cost. This uplift accounts for additional costs related to restoration, utility conflicts, traffic management and additional restoration that are often encountered in an urban or suburban area as opposed to greenfield construction.

Table 3 provides a definition and the construction uplift percentages applicable for the different area conditions in the Water and Wastewater Master Plan.

Table 3. Construction Uplift Descriptions

Construction Environment	Environment Description	Construction Cost Uplift %
Greenfield	Greenfield construction with limited environmental constraints.	0%
Suburban	Developed built-up environment.	20%
Urban	Heavily developed built-up environment (e.g., downMunicipality area).	30%

2.1.6 Additional Construction Costs

Additional construction costs account for costs that are incurred but not included in the base construction cost. These costs generally include mobilization and demobilization, pipe inter-connections, inspection, hydrants, signage, traffic management, bonding, insurance, etc.

Additional construction costs are adjusted based on assumed project complexity, as follows:

- Low Complexity → Additional Construction Costs = 10%
- Medium Complexity → Additional Construction Costs = 15%
- High Complexity → Additional Construction Costs = 20%

2.1.7 Construction Provisional Allowance

A provisional allowance is applied to the base construction cost in the event of increased construction labour or material costs. The provisional allowance remains separate from the primary project cost but must be accounted for budgeting purposes. Regardless of estimate class or project complexity it is recommended that 10 per cent of the base construction cost is applied as a Provisional Allowance.

2.1.8 Other Project Costs

Other costs that can be included within a project in addition to the base construction costs are listed in Table 4. If available, actual quoted costs should be used. In the absence of this information, percentages are applied to the base construction costs. Some of these costs are related to project complexity. Table 4 shows the percentages to be applied for high, medium and low complexity projects.

Table 4 – Additional Cost Components

Cost Component	High Complexity	Medium Complexity	Low Complexity
Geotechnical / Hydrogeological / Materials	2.0% of construction cost	1.5% of construction cost	0.5% of construction cost
Property / Easements – (applicable to all projects)	2.0% of construction cost	1.5% of construction cost	1.0% of construction cost
Engineering / Design (Internal)			
Total Cost < $10M	8% of construction cost		
Total Cost = $10M - $50M	6% of construction cost		
Total Cost > $50M	4% of construction cost		
Design / Contract Administration (External)			
Total Cost < $10M	15% of construction cost		
Total Cost = $10M - $50M	12% of construction cost		
Total Cost > $50M	10% of construction cost		
Project Contingency	(See section 2.10)		
Non Refundable HST	**1.76%** of (construction cost + geotechnical/hydrogeological/materials + property requirements + consultant engineering + project contingency)		

2.1.9 Project Contingency

The associated risk and uncertainty of a project cost estimate is minimized with the addition of a contingency. Contingencies are allowances for risks that are known or anticipated at early stages of the project definition. That is, they represent probable events that are "known unknowns" and, experience has shown, are likely to occur. They cannot be attributed to specific items in the base cost estimate but need to be considered in addition to the base cost. A project contingency does not cover major changes in scope, which would require a re-assessment and re-costing of a project. Project Contingency is applied to all projects that are costed using this methodology.

The Project Contingency for this methodology is adjusted based on the cost estimate classification and project complexity as follow:

Table 5 – Project Contingency

	Project Complexity		
	Low	Moderate	High
Class 5	30%		
Class 4	10%	15%	25%
Class 3	10%	15%	20%
Class 2	10%	10%	15%
Class 1	10%	10%	10%

Appendix A – Cost Estimation Spreadsheet Template

BluePlan

TOWN OF WHITCHURCH-STOUFFVILLE
WATER AND WASTEWATER MASTER PLAN
PROJECT TRACKING AND COSTING SHEET

WHITCHURCH–STOUFFVILLE

Class Estimate Type:	Class 4	Class adjusts Construction Contingency and expected accuracy			= Field has drop down
Project Complexity	Low	Complexity adjusts Construction Contingency, and expected accuracy			= Field must be manually populated
Accuracy Range:	30%				= Field auto-filled based on project details
Area Condition:	Rural	Area Condition uplifts unit cost and restoration			

PROPOSED DIAMETER:				**CLASS EA REQUIREMENTS:**	A+
TOTAL LENGTH:				**CONSTRUCTION ASSUMPTION:**	Sewer Sn
	Tunnelled		#DIV/0!		
	Open Cut		#DIV/0!		

COST ESTIMATION SPREADSHEET

COMPONENT	RATE (%)	RATE ($)	UNIT	ESTIMATED QUANTITY	COST PER UNIT	SUB-TOTAL	COMMENTS
Construction Cost							
Pipe Construction - Open Cut			m	0 m	#N/A	#N/A	Existing road ROW
Pipe Construction - Tunneling			m	0 m	#N/A	#N/A	
Pipe Construction Uplift (Based on Area Conditions)	0%					#N/A	
Minor Creek Crossings			ea.	0	#N/A	#N/A	
Major Creek Crossings			ea.	0	#N/A	#N/A	
Road Crossings			ea.	0	#N/A	#N/A	
Major Road Crossings (Highway)			ea.	0	#N/A	#N/A	
Utility Crossings			ea.	0	#N/A	#N/A	
Additional Construction Costs	10%		ea.			#N/A	Includes Mod/Demob.connections, inspection, hydrants, signage, traffic management, bonding, insurance
Provisional & Allowance	10%		ea.			#N/A	Provisional Labour and Materials in addition to base construction cost
Sub-Total Construction Base Costs						**#N/A**	
Geotechnical / Hydrogeological / Materials	0.5%					#N/A	
Geotechnical Sub-Total Cost						**#N/A**	
Property Requirements	1.0%					#N/A	
Property Requirements Sub-Total						**#N/A**	
Consultant Engineering/Design	#N/A					#N/A	Includes planning, pre-design, detailed design, training, CA, commissioning
Engineering/Design Sub-Total						**#N/A**	
In House Labour/Engineering/Wages/CA	#N/A					#N/A	
In-house Labour/Wages Sub-Total						**#N/A**	
Project Contingency	10%					#N/A	Construction Contingency is dependent on Cost Estimate Class and Project Complexity
Project Contingency Sub-Total						**#N/A**	
Non-Refundable HST	1.76%					#N/A	
Non-Refundable HST Sub-Total						**#N/A**	
Total (2018 Dollars)						**#N/A**	Rounded to nearest $1,000
Other Estimate							
Chosen Estimate						**#N/A**	**2018 Estimate**

Appendix B – Cost Estimate Classes

CLASS 5 ESTIMATE: Order of Magnitude Estimate	
Description: Includes high level cost estimate with a long-term project horizon. Desktop level analysis based on previous similar projects and engineer's informed approximation formed on limited available information. **Example of Typical Study/Design Level:** Master Plan, Infrastructure Plan, Capital Budgeting **End Usage:** Concept screening and feasibility; used at an early stage in absence of better information.	**Estimating Methods Used:** Experience and judgement, historical values, rules of thumb, factor estimating base on similar projects, among other basic calculations. **Expected Accuracy Range:** Low Complexity → High Complexity +/- 40% → +/- 70%

CLASS 4 ESTIMATE: Planning Cost Estimate	
Description: Includes high level cost estimate with a long-term project horizon. Desktop level analysis based on preliminary investigations, anticipated project needs, and engineer's best judgement based on limited available information. **Example of Typical Study/Design Level:** Master Plan, Infrastructure Plan, Capital Budgeting **End Usage:** Concept screening; justification for project planning funding. Useful for planning purposes in preparation for project pre-design. Shall be included in Capital Projects List.	**Estimating Methods Used:** An approximate method of estimating using an inclusive "all in" unit rates, typically based on historic data. (e.g. sewer cost per meter) **Expected Accuracy Range:** Low Complexity → High Complexity +/- 20% → +/- 40%

CLASS 3 ESTIMATE: Concept Design Cost Estimate	
Description: Includes detailed costing for budgeting purposes. Includes more detailed knowledge of specific criteria to generate more component related costing. **Example of Typical Study/Design Level:** 5-Year Business Plan Conceptual Design **End Usage:** Basis for budgeting and approvals.	**Estimating Methods Used:** Uses features from both the unit rate method (for low risk items) and first principles method (for high risk items). **Expected Accuracy Range:** Low Complexity → High Complexity +/- 15% → +/- 20%

CLASS 2 ESTIMATE: Preliminary Design Cost Estimate	
Description: The cost estimate generated from this class can be used as a basis for fund appropriation. Uses more detailed knowledge and more costing components including more field investigations and preliminary design reports. **Example of Typical Study/Design Level:** Preliminary Design **End Usage:** Used for project cost control during design. Initial detailed estimate.	**Estimating Methods Used:** Uses features from both the unit rate method (for low risk items) and first principles method (for high risk items). **Expected Accuracy Range:** Low Complexity → High Complexity +/- 10% → +/- 15%

CLASS 1 ESTIMATE: Detailed Design Cost Estimate	
Description: This class will generate a cost estimate representing the Engineer's final estimate based on completed plans. The estimated cost will reflect current market conditions in the constructing community. The goal of this cost estimate is to match the median bid received during the bidding process. **Example of Typical Study/Design Level:** Detailed Design **End Usage:** Final cost review in preparation for construction; tender ready.	**Estimating Methods Used:** Project specific costs based on detailed study of work methods, resources and materials. For example, material costs based on current supplier quotes. All project components costed individually. **Expected Accuracy Range:** Low Complexity → High Complexity +/- 5% → +/- 10%

Appendix C – Data Confidence and Availability for Cost Estimate Classes

Linear Projects

General Project Data	Class 5	Class 4	Class 3	Class 2	Class 1
Location	Assumed	Assumed	Preliminary	Defined	Defined
Project Complexity	Assumed	Assumed	Preliminary	Defined	Defined
Area Condition	Assumed	Assumed	Preliminary	Defined	Defined
Diameter/Capacity	Assumed	Preliminary	Defined	Defined	Defined
Length	Assumed	Preliminary	Defined	Defined	Defined
Tunnelled / Open Cut	Assumed	Assumed	Preliminary	Defined	Defined
Construction Assumption (water main, 5m sewer, 10m sewer, force main, tunnel)	Assumed	Preliminary	Preliminary	Defined	Defined
Crossings (Road, Creek, Utilities)	Assumed	Preliminary	Defined	Defined	Defined
Hydraulic Requirements (Valves, Chambers)	Assumed	Preliminary	Preliminary	Defined	Defined
Hydrogeological, Geotechnical	Assumed	Assumed	Preliminary	Defined	Defined
Property Requirements	Assumed	Assumed	Defined	Defined	Defined
Approval Requirements	Assumed	Assumed	Preliminary	Defined	Defined

Vertical Projects

General Project Data	Class 5	Class 4	Class 3	Class 2	Class 1
Location	Assumed	Assumed	Preliminary	Defined	Defined
Hydrogeological, Geotechnical	Assumed	Assumed	Preliminary	Defined	Defined
Building/Structural Type and Requirements	Assumed	Assumed	Preliminary	Defined	Defined
Hydraulic Requirements, Equipment Selection	Assumed	Preliminary	Preliminary	Defined	Defined
Technology	Assumed	Assumed	Preliminary	Defined	Defined
Building Schematics	Assumed	Assumed	Preliminary	Defined	Defined
Property Requirements	Assumed	Assumed	Preliminary	Defined	Defined
Approval Requirements	Assumed	Assumed	Preliminary	Defined	Defined

Appendix D – Updated Unit Rates

Table D.1 Sanitary sewer unit rates for 5-metre deep open cut construction

Diameter	Excavation			Granular Bedding			Pipe			Backfill			Subtotal Unit Cost	Restoration	Manhole Allowance	Total Unit Cost
	Volume	Cost	Unit Cost	Volume	Cost	Unit Cost	Supply Cost	Installation	Pipe Supply +Install	Vol	Cost	Unit Cost				
(mm)	(m^3/m)	($/$m^3$)	($/m)	(m^3/m)	($/$m^3$)	($/m)	($/m)	($/m)	($/m)	(m^3/m)	($/$m^3$)	($/m)	($/m)	($/m)	($/m)	(2016$/m)
200	4.0	32	$128	1.0	67	$67	$51	$46	$97	4.0	14	54	$346	$110	$110	**$567**
250	4.5	32	$144	1.0	67	$67	$78	$46	$124	4.0	14	54	$389	$110	$110	**$610**
300	5.0	32	$160	1.0	67	$67	$81	$46	$127	4.0	14	54	$409	$110	$110	**$629**
375	5.5	32	$176	1.0	67	$67	$100	$46	$146	4.5	14	61	$450	$110	$110	**$671**
450	6.0	32	$192	1.1	67	$74	$129	$46	$175	4.9	14	66	$507	$111	$110	**$729**
525	6.5	32	$208	1.2	67	$81	$155	$46	$202	5.3	14	72	$562	$113	$110	**$785**
600	7.0	32	$224	1.4	67	$94	$205	$46	$251	5.6	14	76	$645	$113	$250	**$1,007**
675	8.5	32	$272	1.9	67	$128	$310	$55	$365	6.6	14	89	$854	$127	$250	**$1,231**
750	9.0	32	$288	2.0	67	$134	$410	$55	$465	7.0	14	95	$982	$128	$250	**$1,360**
825	9.5	32	$304	2.2	67	$148	$475	$55	$530	7.3	14	99	$1,081	$130	$250	**$1,460**
900	9.5	32	$304	2.4	67	$161	$570	$55	$625	7.1	14	96	$1,186	$131	$400	**$1,717**
975	10.0	32	$320	2.5	67	$168	$656	$55	$711	7.5	14	101	$1,301	$144	$400	**$1,845**
1050	11.5	32	$368	3.1	67	$208	$751	$55	$806	8.4	14	114	$1,496	$145	$400	**$2,041**
1200	12.5	32	$400	3.4	67	$228	$941	$55	$996	9.1	14	123	$1,747	$148	$400	**$2,295**
1350	13.5	32	$432	3.9	67	$262	$1,209	$62	$1,271	9.6	14	130	$2,094	$150	$333	**$2,577**
1500	14.0	32	$448	4.2	67	$282	$1,479	$62	$1,541	9.8	14	132	$2,404	$164	$333	**$2,902**
1800	16.0	32	$512	5.1	67	$343	$2,142	$62	$2,204	10.9	14	147	$3,206	$169	$333	**$3,708**
2100	17.5	32	$560	6.0	67	$403	$2,847	$62	$2,909	11.5	14	155	$4,028	$172	$400	**$4,600**
2400	19.5	32	$624	7.0	67	$470	$3,787	$62	$3,849	12.5	14	169	$5,113	$177	$400	**$5,689**
3000	23.0	32	$736	9.0	67	$605	$5,803	$62	$5,865	14.0	14	189	$7,395	$185	$400	**$7,980**

Table D.2 Sanitary sewer unit rates for 10-metre deep open cut construction

Diameter	Excavation			Granular Bedding			Pipe			Backfill			Subtotal Unit Cost	Restoration	Manhole Allowance	Total Unit Cost
	Volume	Cost	Unit Cost	Volume	Cost	Unit Cost	Supply Cost	Installation	Pipe Supply +Install	Vol	Cost	Unit Cost				
(mm)	(m^3/m)	(\$/m^3)	($/m)	(m^3/m)	(\$/m^3)	($/m)	($/m)	($/m)	($/m)	(m^3/m)	(\$/m^3)	($/m)	($/m)	($/m)	($/m)	(2016$/m)
200	33.0	$45	$1,485	1.0	67	$67	$51	$46	$97	32.0	14	432	$2,082	$203	$200	**$2,484**
250	34.0	$45	$1,530	1.0	67	$67	$78	$46	$124	33.0	14	446	$2,167	$203	$200	**$2,570**
300	35.0	$45	$1,575	1.0	67	$67	$81	$46	$127	34.0	14	459	$2,229	$203	$200	**$2,632**
375	36.0	$45	$1,620	1.0	67	$67	$100	$46	$146	35.0	14	473	$2,307	$203	$200	**$2,709**
450	37.0	$45	$1,665	1.1	67	$74	$129	$46	$175	35.9	14	485	$2,399	$208	$200	**$2,808**
525	38.0	$45	$1,710	1.2	67	$81	$155	$46	$202	36.8	14	497	$2,490	$208	$200	**$2,898**
600	39.0	$45	$1,755	1.4	67	$94	$205	$46	$251	37.6	14	508	$2,608	$211	$350	**$3,169**
675	42.0	$45	$1,890	1.9	67	$128	$310	$55	$365	40.1	14	542	$2,925	$213	$350	**$3,488**
750	43.0	$45	$1,935	2.0	67	$134	$410	$55	$465	41.0	14	554	$3,088	$216	$350	**$3,655**
825	44.0	$45	$1,980	2.2	67	$148	$475	$55	$530	41.8	14	565	$3,223	$224	$350	**$3,797**
900	44.0	$45	$1,980	2.4	67	$161	$570	$55	$625	41.6	14	562	$3,328	$226	$600	**$4,155**
975	45.0	$45	$2,025	2.5	67	$168	$656	$55	$711	42.5	14	574	$3,479	$229	$600	**$4,307**
1050	48.0	$45	$2,160	3.1	67	$208	$751	$55	$806	44.9	14	607	$3,781	$232	$600	**$4,613**
1200	50.0	$45	$2,250	3.4	67	$228	$941	$55	$996	46.6	14	630	$4,104	$234	$600	**$4,938**
1350	52.0	$45	$2,340	3.9	67	$262	$1,209	$62	$1,271	48.1	14	650	$4,523	$234	$567	**$5,324**
1500	53.0	$45	$2,385	4.2	67	$282	$1,479	$62	$1,541	48.8	14	659	$4,868	$234	$567	**$5,669**
1800	57.0	$45	$2,565	5.1	67	$343	$2,142	$62	$2,204	51.9	14	701	$5,813	$242	$567	**$6,622**
2100	60.0	$45	$2,700	6.0	67	$403	$2,847	$62	$2,909	54.0	14	730	$6,742	$256	$733	**$7,731**
2400	64.0	$45	$2,880	7.0	67	$470	$3,787	$62	$3,849	57.0	14	770	$7,970	$264	$733	**$8,967**
3000	71.0	$45	$3,195	9.0	67	$605	$5,803	$62	$5,865	62.0	14	838	$10,503	$284	$733	**$11,520**

Table D.3 Watermain and force main unit rates for open cut construction

Diameter	Excavation			Granular Bedding			Pipe			Backfill			Subtotal Unit Cost	Restoration	Total Unit Cost
	Volume	Cost	Cost	Volume	Cost	Cost	Supply Cost	Installation	Pipe Supply +Install	Vol	Cost	Cost			
(mm)	(m3/m)	($/m3)	($/m)	(m3/m)	($/m3)	($/m)	($/m)	($/m)	($/m)	(m3/m)	($/m3)	($/m)	($/m)	($/m)	(2016 $/m)
150	3.1	$32	$99	1.4	$67	$92	$72	$61	$131	1.7	$14	$23	$345	$113	**$456**
200	3.4	$32	$108	1.5	$67	$99	$121	$61	$180	1.9	$14	$26	$414	$113	**$524**
250	3.7	$32	$118	1.6	$67	$107	$176	$61	$236	2.1	$14	$29	$490	$113	**$600**
300	4.1	$32	$130	1.7	$67	$114	$227	$61	$286	2.4	$14	$32	$562	$113	**$672**
350	4.4	$32	$142	1.8	$67	$121	$312	$61	$371	2.6	$14	$35	$670	$113	**$780**
400	5.3	$32	$168	1.9	$67	$128	$352	$60	$412	3.4	$14	$45	$753	$111	**$843**
450	5.3	$32	$168	2.0	$67	$134	$438	$60	$498	3.3	$14	$44	$844	$111	**$956**
500	6.3	$32	$202	2.2	$67	$148	$550	$60	$609	4.1	$14	$55	$1,014	$113	**$1,127**
600	6.3	$32	$202	2.4	$67	$161	$626	$169	$795	3.9	$14	$53	$1,211	$113	**$1,324**
750	8.9	$32	$286	2.5	$67	$168	$680	$169	$849	6.4	$14	$87	$1,389	$128	**$1,517**
900	13.3	$32	$426	3.1	$67	$208	$733	$169	$902	10.2	$14	$138	$1,674	$131	**$1,804**
1050	14.4	$32	$461	3.4	$67	$228	$940	$197	$1,137	11.0	$14	$149	$1,976	$145	**$2,122**
1200	16.9	$32	$542	3.9	$67	$262	$1,148	$230	$1,377	13.0	$14	$176	$2,358	$148	**$2,505**
1350	20.6	$32	$660	4.2	$67	$282	$1,418	$315	$1,734	16.4	$14	$222	$2,898	$150	**$3,048**
1500	22.1	$32	$706	3.1	$67	$207	$1,689	$361	$2,051	19.0	$14	$256	$3,220	$164	**$3,384**
1650	23.6	$32	$756	5.1	$67	$343	$2,024	$395	$2,419	18.5	$14	$250	$3,768	$164	**$3,933**
1800	27.6	$32	$882	3.5	$67	$233	$2,359	$414	$2,773	24.1	$14	$326	$4,214	$169	**$4,383**
2100	30.6	$32	$980	6.0	$67	$403	$2,658	$414	$3,073	24.6	$14	$333	$4,789	$172	**$4,961**

Table D.4 Trenchless construction unit rates for water mains or sanitary sewers

Diameter	Total Unit Cost	Diameter	Total Unit Cost	Diameter	Total Unit Cost
(mm)	($/m)	(mm)	($/m)	(mm)	($/m)
150	$ 1,300	500	$ 6,300	1200	$ 9,800
200	$ 1,300	525	$ 6,300	1350	$ 13,000
250	$ 1,300	600	$ 6,300	1500	$ 13,000
300	$ 1,300	675	$ 6,300	1650	$ 13,000
325	$ 1,300	750	$ 6,300	1800	$ 13,000
350	$ 1,300	825	$ 9,800	2100	$ 13,000
375	$ 6,300	900	$ 9,800	2400	$ 13,000
400	$ 6,300	975	$ 9,800	3000	$ 13,000
450	$ 6,300	1050	$ 9,800		

Anticipated trenchless methodology is as follows:

- 1350 mm – 3000 mm: Microtunnel or TBM
- 825 mm – 1200 mm: Microtunnel, Auger Boring, Guided Auger Boring
- 375 mm – 750 mm: Axis Guided Boring, Auger Boring, Guided Auger Boring
- 150 mm – 350 mm: Axis Guided Boring, Horizontal Directional Drilling

Note: Trenchless Cost estimate table provides estimated high level cost for tunnelling, pipe installation and shafts for ranges of diameter. Tunnelling project costs can vary widely depending on project details that are not fully known at the Master Plan / DC stage (e.g., number of shafts, subsurface conditions, site conditions, contractor preferred tunnelling method, depth, location (urban, greenfield) etc.).

Table D.5 Facilities

Facility	Total Unit Cost	Unit
Reservoirs - New Construction	$900,000	($/ML)
New Water / Sewage Pumping Stations ≤ 150L/s	$23,000	($/L/s)
New Water / Sewage Pumping Stations > 150 L/s ≤ 600 L/s	$13,000	($/L/s)
New Water / Sewage Pumping Stations > 600 L/s	$11,000	($/L/s)

Notes: Unit rate is intended to provide the base construction cost for a basic pumping facility. These costs are not assumed to account for force mains (for WWPS) or overflow storage tanks (WWPS) or unique items such as deep wet wells (WWPS), extensive architectural features or extensive site works.

MUNICIPALITY OF THAMES CENTRE

APPENDIX D

CAPITAL PROGRAM PROJECT SHEETS COST ESTIMATES

Municipality of Thames Centre
Water and Wastewater Master Plan
Capital Program Cost Estimate

1	**PROJECT NO.:**	**W-D-SUP-01**	**CAPITAL BUDGET YEAR:**
	PROJECT NAME:	**Maxmize Dorchester WTF Supply**	**VERSION:**
	PROJECT DESCRIPTION:	Maximize Well Capacity at Existing WTF	**DATE UPDATED:**
			UPDATED BY:

2	**Class Estimate Type:**	Class 4	Class adjusts Construction Contingency and expected accuracy
3	**Project Complexity**	Med	Complexity adjusts Construction Contingency, and expected accuracy
4	**Accuracy Range:**	40%	
5	**Area Condition:**	Suburban	Area Condition uplifts unit cost and restoration

= Field has drop down
= Field must be manually populated
= Field auto-filled based on project details

6	**PROPOSED CAPACITY**	20 L/s	
7			

CLASS EA REQUIREMENTS:	A
CONSTRUCTION ASSUMPTION:	Other

Pump	Existing (L/s)	Future (L/s)
1	16.7	20
2	0	20
3	42.6	42.6
4		
5		

COST ESTIMATION SPREADSHEET

COMPONENT	RATE (%)	RATE ($)	UNIT	ESTIMATED QUANTITY	COST PER UNIT	SUB-TOTAL	COMMENTS
Construction Cost							
Number of Pumps (including well casing upgrades)			Pumps	2	$200,000	$400,000	Pump replacement and upgrades
Electrical and Process			Lump Sum		$100,000	$100,000	
8							
Additional Construction Costs	25%		ea.			$125,000	Includes Mod/Demob,connections, inspection, hydrants, signage, traffic management, bonding, insurance
Provisional & Allowance	10%		ea.			$62,500	Provisional Labour and Materials in addition to base construction cost
Sub-Total Construction Base Costs						**$688,000**	
Geotechnical / Hydrogeological / Materials	20.0%					$ 100,000	
Geotechnical Sub-Total Cost						**$100,000**	
Property Requirements	1.5%					$ -	
Property Requirements Sub-Total						**$0**	
Consultant Engineering/Design	15%					$ 103,200	includes planning, pre-design, detailed design, training, CA, commissioning
Engineering/Design Sub-Total						**$103,200**	
In House Labour/Engineering/Wages/CA	3%					$ 20,600	
In-house Labour/Wages Sub-Total						**$20,600**	
Project Contingency	15%					$137,000	Construction Contingency is dependent on Cost Estimate Class and Project Complexity
Project Contingency Sub-Total						**$137,000**	
Non-Refundable HST	1.76%					$18,100	
Non-Refundable HST Sub-Total						**$18,100**	
Total (2019 Dollars)						**$1,067,000**	Rounded to nearest $1,000
Other Estimate							
Chosen Estimate						**$1,067,000**	2019 Estimate

COST ESTIMATE SUMMARY - FOR PHASING ESTIMATING ONLY

PROJECT COMPONENT	PROJECT COMPONENT DESCRIPTION	PERCENTAGE	TOTAL	YEAR	COMMENTS
Study	Feasibility study, EA	2%	$21,340		
Design	Design fees, Town fees for design, contract admin	13%	$138,710		
Construction	Town fees, base costs and project contingency	85%	$906,950		
TOTAL			$1,067,000		

Municipality of Thames Centre
Water and Wastewater Master Plan
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PROJECT NO.: W-D-SUP-02

PROJECT NAME: New Dorchester Groundwater Supply

PROJECT DESCRIPTION: 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

CLASS EA REQUIREMENTS:	C

COST ESTIMATE SUMMARY - FOR PHASING ESTIMATING ONLY

PROJECT COMPONENT	PROJECT COMPONENT DESCRIPTION	TOTAL
Study	Feasibility study, EA	$750,000
Design	Design fees, Town fees for design, contract admin	$500,000
Construction	Town fees, base costs and project contingency	$5M - $15M

Municipality of Thames Centre
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1	**PROJECT NO.:**	**W-D-BPS-01**	**CAPITAL BUDGET YEAR:**
	PROJECT NAME:	**Dorchester HLP Upgrades**	**VERSION:**
	PROJECT DESCRIPTION:	Upgrade Dorchester HLPs to supply elevated tank and distribution system from reservoirs	**DATE UPDATED:**
			UPDATED BY:

2	**Class Estimate Type:**	Class 4	Class adjusts Construction Contingency and expected accuracy
3	**Project Complexity**	Med	Complexity adjusts Construction Contingency, and expected accuracy
4	**Accuracy Range:**	40%	
5	**Area Condition:**	Suburban	Area Condition adjusts unit cost and restoration

(grey)	= Field has drop down
(orange)	= Field must be manually populated
(green)	= Field auto-filled based on project details

6	**PROPOSED CAPACITY**	90 L/s
7		

CLASS EA REQUIREMENTS:	A
CONSTRUCTION ASSUMPTION:	Other

Pump	Existing (L/s)	Future (L/s)
1	90	90 L/s
2	90	90 L/s
3		
4		
5		

COST ESTIMATION SPREADSHEET

COMPONENT	RATE (%)	RATE ($)	UNIT	ESTIMATED QUANTITY	COST PER UNIT	SUB-TOTAL	COMMENTS
Construction Cost							
Number of Pumps			Pumps	2	$200,000	$400,000	Pump replacement and upgrades
Electrical and Process			Lump Sum		$100,000	$100,000	
8							
Additional Construction Costs	25%		ea.			$125,000	Includes Mod/Demob,connections, inspection, hydrants, signage, traffic management, bonding, insurance
Provisional & Allowance	10%		ea.			$62,500	Provisional Labour and Materials in addition to base construction cost
Sub-Total Construction Base Costs						**$688,000**	
Geotechnical / Hydrogeological / Materials	20.0%					$ 100,000	
Geotechnical Sub-Total Cost						**$100,000**	
Property Requirements	1.5%					$ -	
Property Requirements Sub-Total						**$0**	
Consultant Engineering/Design	15%					$ 103,200	includes planning, pre-design, detailed design, training, CA, commissioning
Engineering/Design Sub-Total						**$103,200**	
In House Labour/Engineering/Wages/CA	3%					$ 20,600	
In-house Labour/Wages Sub-Total						**$20,600**	
Project Contingency	15%					$137,000	Construction Contingency is dependent on Cost Estimate Class and Project Complexity
Project Contingency Sub-Total						**$137,000**	
Non-Refundable HST	1.76%					$18,100	
Non-Refundable HST Sub-Total						**$18,100**	
Total (2019 Dollars)						**$1,067,000**	Rounded to nearest $1,000
Other Estimate							
Chosen Estimate						**$1,067,000**	2019 Estimate

COST ESTIMATE SUMMARY - FOR PHASING ESTIMATING ONLY

PROJECT COMPONENT	PROJECT COMPONENT DESCRIPTION	PERCENTAGE	TOTAL	YEAR	COMMENTS
Study	Feasibility study, EA	2%	$21,340		
Design	Design fees, Town fees for design, contract admin	13%	$138,710		
Construction	Town fees, base costs and project contingency	85%	$906,950		
TOTAL			$1,067,000		

Municipality of Thames Centre
Water and Wastewater Master Plan
Capital Program Cost Estimate

PROJECT NO.:	W-D-WM-01	CAPITAL BUDGET YEAR:	
PROJECT NAME:	Dorchester Watermain - Spine Trunk Upgrade on Dorchester Rd. (South of Byron Ave.)	VERSION:	
PROJECT DESCRIPTION:	450m of existing 250mm DI watermain (built in 1976) to be replaced by 300mm PVC watermain	DATE UPDATED:	
		UPDATED BY:	

Class Estimate Type:	Class 4	Class adjusts Construction Contingency and expected accuracy	
Project Complexity	High	Complexity adjusts Construction Contingency and expected accuracy	
Accuracy Range:	50%		
Area Condition:	Suburban	Area Condition uplifts unit cost and restoration	

= Field has drop down
= Field must be manually populated
= Field auto-filled based on project details

PROPOSED DIAMETER:		300 mm	
TOTAL LENGTH:		450 m	
	Tunnelled	0 m	0%
	Open Cut	450 m	100%

CLASS EA REQUIREMENTS:	A+
CONSTRUCTION ASSUMPTION:	Watermain

COST ESTIMATION SPREADSHEET

COMPONENT	RATE (%)	RATE ($)	UNIT	ESTIMATED QUANTITY	COST PER UNIT	SUB-TOTAL	COMMENTS
Construction Cost							
Pipe Construction - Open Cut			m	450 m	$777	$349,483	Existing road ROW
Pipe Construction - Tunneling			m	0 m	$1,300	$0	
Pipe Construction Uplift (Based on Area Conditions)	20%					$69,897	
Minor Creek Crossings			ea.	0	$38,000	$0	
Major Creek Crossings			ea.	0	$207,000	$0	
Road Crossings			ea.	0	$90,000	$0	
Major Road / Rail Crossings			ea.	0	$207,000	$0	
Utility Crossings			ea.	0	$90,000	$0	
Valve and Chamber			ea.	3	$6,000	$18,000	2 valves minimum
Additional Construction Costs	20%		ea.			$87,476	Includes Mod/Demob,connections, inspection, hydrants, signage, traffic management, bonding, insurance
Provisional & Allowance	10%		ea.			$52,486	Provisional Labour and Materials in addition to base construction cost
Sub-Total Construction Base Costs						$577,000	
Geotechnical / Hydrogeological / Materials	2.0%					$11,500	
Geotechnical Sub-Total Cost						$11,500	
Property Requirements	2.0%					$ 11,500	
Property Requirements Sub-Total						$11,500	
Consultant Engineering/Design	15%					$ 86,600	includes planning, pre-design, detailed design, training, CA, commissioning
Engineering/Design Sub-Total						$86,600	
In House Labour/Engineering/Wages/CA	8%					$ 46,200	
In-house Labour/Wages Sub-Total						$46,200	
Project Contingency	25%					$183,000	Construction Contingency is dependent on Cost Estimate Class and Project Complexity
Project Contingency Sub-Total						$183,000	
Non-Refundable HST	1.76%					$15,300	
Non-Refundable HST Sub-Total						$15,300	
Total (2019 Dollars)						$931,000	Rounded to nearest $1,000
Other Estimate							
Chosen Estimate						$931,000	2019 Estimate

COST ESTIMATE SUMMARY - FOR PHASING ESTIMATING ONLY

PROJECT COMPONENT	PROJECT COMPONENT DESCRIPTION	PERCENTAGE	TOTAL	YEAR	COMMENTS
Study	Feasibility study, EA	2%	$18,620		
Design	Design fees, Town fees for design, contract admin	13%	$121,030		
Construction	Town fees, base costs and project contingency	85%	$791,350		
TOTAL			$931,000		

Municipality of Thames Centre
Water and Wastewater Master Plan
Capital Program Cost Estimate

PROJECT NO.:	W-D-WM-02	CAPITAL BUDGET YEAR:	
❶ PROJECT NAME:	Dorchester Watermain - Spine Trunk Upgrade on Dorchester Rd. (River Bank)	VERSION:	
PROJECT DESCRIPTION:	190m of existing 250mm DI watermain (built in 1976 - 1987) to be replaced by 300mm PVC watermain	DATE UPDATED:	
		UPDATED BY:	

❷	Class Estimate Type:	Class 4	Class adjusts Construction Contingency and expected accuracy
❸	Project Complexity	High	Complexity adjusts Construction Contingency and expected accuracy
❹	Accuracy Range:	50%	
❺	Area Condition:	Suburban	Area Condition uplifts unit cost and [illegible]

(grey)	= Field has drop down
(yellow)	= Field must be manually populated
(green)	= Field auto-filled based on project details

❻	PROPOSED DIAMETER:	300 mm	
❼	TOTAL LENGTH:	190 m	
	Tunnelled	0 m	0%
	Open Cut	190 m	100%

CLASS EA REQUIREMENTS:	A+
CONSTRUCTION ASSUMPTION:	Watermain

COST ESTIMATION SPREADSHEET

COMPONENT	RATE (%)	RATE ($)	UNIT	ESTIMATED QUANTITY	COST PER UNIT	SUB-TOTAL	COMMENTS
Construction Cost							
Pipe Construction - Open Cut			m	190 m	$777	$147,559	Existing road ROW
Pipe Construction - Tunneling			m	0 m	$1,300	$0	
Pipe Construction Uplift (Based on Area Conditions)	20%					$29,512	
Minor Creek Crossings			ea.	0	$38,000	$0	
Major Creek Crossings			ea.	0	$207,000	$0	
❽ Road Crossings			ea.	0	$90,000	$0	
Major Road / Rail Crossings			ea.	0	$207,000	$0	
Utility Crossings			ea.	0	$90,000	$0	
Valve and Chamber			ea.	2	$6,000	$12,000	2 valves minimum
Additional Construction Costs	20%		ea.			$37,814	Includes Mod/Demob,connections, inspection, hydrants, signage, traffic management, bonding, insurance
Provisional & Allowance	10%		ea.			$22,689	Provisional Labour and Materials in addition to base construction cost
Sub-Total Construction Base Costs						$250,000	
Geotechnical / Hydrogeological / Materials	2.0%					$5,000	
Geotechnical Sub-Total Cost						$5,000	
Property Requirements	2.0%					$ 5,000	
Property Requirements Sub-Total						$5,000	
Consultant Engineering/Design	15%					$ 37,500	includes planning, pre-design, detailed design, training, CA, commissioning
Engineering/Design Sub-Total						$37,500	
In House Labour/Engineering/Wages/CA	8%					$ 20,000	
In-house Labour/Wages Sub-Total						$20,000	
Project Contingency	25%					$79,000	Construction Contingency is dependent on Cost Estimate Class and Project Complexity
Project Contingency Sub-Total						$79,000	
Non-Refundable HST	1.76%					$6,600	
Non-Refundable HST Sub-Total						$6,600	
Total (2019 Dollars)						$403,000	Rounded to nearest $1,000
Other Estimate							
Chosen Estimate						$403,000	2019 Estimate

COST ESTIMATE SUMMARY - FOR PHASING ESTIMATING ONLY

PROJECT COMPONENT	PROJECT COMPONENT DESCRIPTION	PERCENTAGE	TOTAL	YEAR	COMMENTS
Study	Feasibility study, EA	2%	$8,060		
Design	Design fees, Town fees for design, contract admin	13%	$52,390		
Construction	Town fees, base costs and project contingency	85%	$342,550		
TOTAL			$403,000		

Municipality of Thames Centre
Water and Wastewater Master Plan
Capital Program Cost Estimate

1

PROJECT NO.:	W-D-WM-03	**CAPITAL BUDGET YEAR:**	
PROJECT NAME:	**Dorchester Watermain - Spine Trunk Upgrade on Catherine St. and Minnie Rd. (North Section)**	**VERSION:**	
PROJECT DESCRIPTION:	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	**DATE UPDATED:**	
		UPDATED BY:	

2	**Class Estimate Type:**	Class 4	Class adjusts Construction Contingency and expected accuracy
3	**Project Complexity**	High	Complexity adjusts Construction Contingency and expected accuracy
4	**Accuracy Range:**	50%	
5	**Area Condition:**	Suburban	Area Condition uplifts unit cost and reinstatation

(grey)	= Field has drop down
(yellow)	= Field must be manually populated
(green)	= Field auto-filled based on project details

6	**PROPOSED DIAMETER:**		300 mm	
7	**TOTAL LENGTH:**		390 m	
		Tunnelled	100 m	26%
		Open Cut	290 m	74%

CLASS EA REQUIREMENTS:	A+
CONSTRUCTION ASSUMPTION:	Watermain

COST ESTIMATION SPREADSHEET

COMPONENT	RATE (%)	RATE ($)	UNIT	ESTIMATED QUANTITY	COST PER UNIT	SUB-TOTAL	COMMENTS
Construction Cost							
Pipe Construction - Open Cut			m	290 m	$777	$225,222	Existing road ROW
Pipe Construction - Tunneling			m	100 m	$1,300	$130,000	
Pipe Construction Uplift (Based on Area Conditions)	20%					$45,044	
Minor Creek Crossings			ea.	0	$38,000	$0	
Major Creek Crossings			ea.	0	$207,000	$0	
8 Road Crossings			ea.	0	$90,000	$0	
Major Road / Rail Crossings			ea.	1	$207,000	$207,000	
Utility Crossings			ea.	0	$90,000	$0	
Valve and Chamber			ea.	4	$6,000	$24,000	2 valves minimum
Additional Construction Costs	20%		ea.			$126,253	Includes Mod/Demob,connections, inspection, hydrants, signage, traffic management, bonding, insurance
Provisional & Allowance	10%		ea.			$75,752	Provisional Labour and Materials in addition to base construction cost
Sub-Total Construction Base Costs						**$833,000**	
Geotechnical / Hydrogeological / Materials	2.0%					$16,700	
Geotechnical Sub-Total Cost						**$16,700**	
Property Requirements	2.0%					$ 16,700	
Property Requirements Sub-Total						**$16,700**	
Consultant Engineering/Design	15%					$ 125,000	includes planning, pre-design, detailed design, training, CA, commissioning
Engineering/Design Sub-Total						**$125,000**	
In House Labour/Engineering/Wages/CA	8%					$ 66,600	
In-house Labour/Wages Sub-Total						**$66,600**	
Project Contingency	25%					$265,000	Construction Contingency is dependent on Cost Estimate Class and Project Complexity
Project Contingency Sub-Total						**$265,000**	
Non-Refundable HST	1.76%					$22,100	
Non-Refundable HST Sub-Total						**$22,100**	
Total (2019 Dollars)						**$1,345,000**	Rounded to nearest $1,000
Other Estimate							
Chosen Estimate						**$1,345,000**	2019 Estimate

COST ESTIMATE SUMMARY - FOR PHASING ESTIMATING ONLY

PROJECT COMPONENT	PROJECT COMPONENT DESCRIPTION	PERCENTAGE	TOTAL	YEAR	COMMENTS
Study	Feasibility study, EA	2%	$26,900		
Design	Design fees, Town fees for design, contract admin	13%	$174,850		
Construction	Town fees, base costs and project contingency	85%	$1,143,250		
TOTAL			**$1,345,000**		

Municipality of Thames Centre
Water and Wastewater Master Plan
Capital Program Cost Estimate

1	PROJECT NO.:	W-D-WM-04	CAPITAL BUDGET YEAR:
	PROJECT NAME:	Dorchester Watermain - North St. Upgrade	VERSION:
	PROJECT DESCRIPTION:	360m of existing 150mm CI watermain (built in 1956) on North Street and Minnie Street to be replaced by 200mm PVC watermain.	DATE UPDATED:
			UPDATED BY:

2	Class Estimate Type:	Class 4	Class adjusts Construction Contingency and expected accuracy
3	Project Complexity	Med	Complexity adjusts Construction Contingency and expected accuracy
4	Accuracy Range:	40%	
5	Area Condition:	Suburban	Area Condition uplifts unit cost and restoration

= Field has drop down
= Field must be manually populated
= Field auto-filled based on project details

6	PROPOSED DIAMETER:		200 mm	
7	TOTAL LENGTH:		360 m	
		Tunnelled	0 m	0%
		Open Cut	360 m	100%

CLASS EA REQUIREMENTS:	A+
CONSTRUCTION ASSUMPTION:	Watermain

COST ESTIMATION SPREADSHEET

COMPONENT	RATE (%)	RATE ($)	UNIT	ESTIMATED QUANTITY	COST PER UNIT	SUB-TOTAL	COMMENTS
Construction Cost							
Pipe Construction - Open Cut			m	360 m	$773	$278,294	Existing road ROW
Pipe Construction - Tunneling			m	0 m	$1,300	$0	
Pipe Construction Uplift (Based on Area Conditions)	20%					$55,659	
Minor Creek Crossings			ea.	0	$30,000	$0	
Major Creek Crossings			ea.	0	$199,000	$0	
Road Crossings			ea.	0	$82,000	$0	
Major Road / Rail Crossings			ea.	0	$199,000	$0	
Utility Crossings			ea.	0	$82,000	$0	
Valve and Chamber			ea.	2	$2,000	$4,000	2 valves minimum
Additional Construction Costs	15%		ea.			$50,693	Includes Mod/Demob,connections, inspection, hydrants, signage, traffic management, bonding, insurance
Provisional & Allowance	10%		ea.			$38,865	Provisional Labour and Materials in addition to base construction cost
Sub-Total Construction Base Costs						$428,000	
Geotechnical / Hydrogeological / Materials	1.0%					$4,300	
Geotechnical Sub-Total Cost						$4,300	
Property Requirements	1.5%					$ 6,400	
Property Requirements Sub-Total						$6,400	
Consultant Engineering/Design	15%					$ 64,200	includes planning, pre-design, detailed design, training, CA, commissioning
Engineering/Design Sub-Total						$64,200	
In House Labour/Engineering/Wages/CA	8%					$ 34,200	
In-house Labour/Wages Sub-Total						$34,200	
Project Contingency	15%					$81,000	Construction Contingency is dependent on Cost Estimate Class and Project Complexity
Project Contingency Sub-Total						$81,000	
Non-Refundable HST	1.76%					$10,300	
Non-Refundable HST Sub-Total						$10,300	
Total (2019 Dollars)						$628,000	Rounded to nearest $1,000
Other Estimate							
Chosen Estimate						$628,000	2019 Estimate

COST ESTIMATE SUMMARY - FOR PHASING ESTIMATING ONLY

PROJECT COMPONENT	PROJECT COMPONENT DESCRIPTION	PERCENTAGE	TOTAL	YEAR	COMMENTS
Study	Feasibility study, EA	2%	$12,560		
Design	Design fees, Town fees for design, contract admin	13%	$81,640		
Construction	Town fees, base costs and project contingency	85%	$533,800		
TOTAL			$628,000		

Municipality of Thames Centre
Water and Wastewater Master Plan
Capital Program Cost Estimate

PROJECT NO.:	W-D-WM-05	CAPITAL BUDGET YEAR:	
PROJECT NAME:	Dorchester Watermain - Northeast Loop	VERSION:	
PROJECT DESCRIPTION:	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.	DATE UPDATED:	
		UPDATED BY:	

2	Class Estimate Type:	Class 4	Class adjusts Construction Contingency and expected accuracy
3	Project Complexity	Med	Complexity adjusts Construction Contingency and expected accuracy
4	Accuracy Range:	40%	
5	Area Condition:	Suburban	Area Condition uplifts unit cost and restoration

	= Field has drop down
	= Field must be manually populated
	= Field auto-filled based on project details

PROPOSED DIAMETER:		200 mm	
TOTAL LENGTH:		590 m	
	Tunnelled	0 m	0%
	Open Cut	590 m	100%

CLASS EA REQUIREMENTS:	A
CONSTRUCTION ASSUMPTION:	Watermain

COST ESTIMATION SPREADSHEET

COMPONENT	RATE (%)	RATE ($)	UNIT	ESTIMATED QUANTITY	COST PER UNIT	SUB-TOTAL	COMMENTS
Construction Cost							
Pipe Construction - Open Cut			m	590 m	$773	$456,092	Existing road ROW
Pipe Construction - Tunneling			m	0 m	$1,300	$0	
Pipe Construction Uplift (Based on Area Conditions)	20%					$91,218	
Minor Creek Crossings			ea.	0	$30,000	$0	
Major Creek Crossings			ea.	0	$199,000	$0	
Road Crossings			ea.	0	$82,000	$0	
Major Road / Rail Crossings			ea.	0	$199,000	$0	
Utility Crossings			ea.	0	$82,000	$0	
Valve and Chamber			ea.	2	$2,000	$4,000	2 valves minimum
Additional Construction Costs	15%		ea.			$82,697	Includes Mod/Demob,connections, inspection, hydrants, signage, traffic management, bonding, insurance
Provisional & Allowance	10%		ea.			$63,401	Provisional Labour and Materials in addition to base construction cost
Sub-Total Construction Base Costs						$697,000	
Geotechnical / Hydrogeological / Materials	1.0%					$7,000	
Geotechnical Sub-Total Cost						$7,000	
Property Requirements	1.5%					$ 10,500	
Property Requirements Sub-Total						$10,500	
Consultant Engineering/Design	15%					$ 104,600	includes planning, pre-design, detailed design, training, CA, commissioning
Engineering/Design Sub-Total						$104,600	
In House Labour/Engineering/Wages/CA	8%					$ 55,800	
In-house Labour/Wages Sub-Total						$55,800	
Project Contingency	15%					$131,000	Construction Contingency is dependent on Cost Estimate Class and Project Complexity
Project Contingency Sub-Total						$131,000	
Non-Refundable HST	1.76%					$16,700	
Non-Refundable HST Sub-Total						$16,700	
Total (2019 Dollars)						$1,023,000	Rounded to nearest $1,000
Other Estimate							
Chosen Estimate						$1,023,000	2019 Estimate

COST ESTIMATE SUMMARY - FOR PHASING ESTIMATING ONLY

PROJECT COMPONENT	PROJECT COMPONENT DESCRIPTION	PERCENTAGE	TOTAL	YEAR	COMMENTS
Study	Feasibility study, EA	2%	$20,460		
Design	Design fees, Town fees for design, contract admin	13%	$132,990		
Construction	Town fees, base costs and project contingency	85%	$869,550		
TOTAL			$1,023,000		

Municipality of Thames Centre
Water and Wastewater Master Plan
Capital Program Cost Estimate

PROJECT NO.:	W-D-WM-06	CAPITAL BUDGET YEAR:	
PROJECT NAME:	Dorchester Watermain - Marion St. Upgrade	VERSION:	
PROJECT DESCRIPTION:	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.	DATE UPDATED:	
		UPDATED BY:	

1	PROJECT NO. / PROJECT NAME / PROJECT DESCRIPTION		
2	Class Estimate Type:	Class 4	Class adjusts Construction Contingency and expected accuracy
3	Project Complexity	Med	Complexity adjusts Construction Contingency, and expected accuracy
4	Accuracy Range:	40%	
5	Area Condition:	Suburban	Area Condition uplifts unit cost and restoration

Legend:
- = Field has drop down
- = Field must be manually populated
- = Field auto-filled based on project details

6	PROPOSED DIAMETER:		200 mm	
7	TOTAL LENGTH:		320 m	
		Tunnelled	0 m	0%
		Open Cut	320 m	100%

CLASS EA REQUIREMENTS:	A+
CONSTRUCTION ASSUMPTION:	Watermain

COST ESTIMATION SPREADSHEET

COMPONENT	RATE (%)	RATE ($)	UNIT	ESTIMATED QUANTITY	COST PER UNIT	SUB-TOTAL	COMMENTS
Construction Cost							
Pipe Construction - Open Cut			m	320 m	$773	$247,372	Existing road ROW
Pipe Construction - Tunneling			m	0 m	$1,300	$0	
Pipe Construction Uplift (Based on Area Conditions)	20%					$49,474	
8 Minor Creek Crossings			ea.	0	$30,000	$0	
Major Creek Crossings			ea.	0	$199,000	$0	
Road Crossings			ea.	0	$82,000	$0	
Major Road / Rail Crossings			ea.	0	$199,000	$0	
Utility Crossings			ea.	0	$82,000	$0	
Valve and Chamber			ea.	1	$2,000	$2,000	2 valves minimum
Additional Construction Costs	15%		ea.			$44,827	Includes Mod/Demob,connections, inspection, hydrants, signage, traffic management, bonding, insurance
Provisional & Allowance	10%		ea.			$34,367	Provisional Labour and Materials in addition to base construction cost
Sub-Total Construction Base Costs						**$378,000**	
Geotechnical / Hydrogeological / Materials	1.0%					$3,800	
Geotechnical Sub-Total Cost						**$3,800**	
Property Requirements	1.5%					$ 5,700	
Property Requirements Sub-Total						**$5,700**	
Consultant Engineering/Design	15%					$ 56,700	includes planning, pre-design, detailed design, training, CA, commissioning
Engineering/Design Sub-Total						**$56,700**	
In House Labour/Engineering/Wages/CA	8%					$ 30,200	
In-house Labour/Wages Sub-Total						**$30,200**	
Project Contingency	15%					$71,000	Construction Contingency is dependent on Cost Estimate Class and Project Complexity
Project Contingency Sub-Total						**$71,000**	
Non-Refundable HST	1.76%					$9,100	
Non-Refundable HST Sub-Total						**$9,100**	
Total (2019 Dollars)						**$555,000**	Rounded to nearest $1,000
Other Estimate							
Chosen Estimate						**$555,000**	2019 Estimate

COST ESTIMATE SUMMARY - FOR PHASING ESTIMATING ONLY

PROJECT COMPONENT	PROJECT COMPONENT DESCRIPTION	PERCENTAGE	TOTAL	YEAR	COMMENTS
Study	Feasibility study, EA	2%	$11,100		
Design	Design fees, Town fees for design, contract admin	13%	$72,150		
Construction	Town fees, base costs and project contingency	85%	$471,750		
TOTAL			**$555,000**		

Municipality of Thames Centre
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PROJECT NO.:	**W-D-WM-07**	**CAPITAL BUDGET YEAR:**	
PROJECT NAME:	**Dorchester Watermain - West Trunk at the Development 25**	**VERSION:**	
PROJECT DESCRIPTION:	Newly proposed West Trunk - 660m of proposed 300mm PVC watermain at Development 25	**DATE UPDATED:**	
		UPDATED BY:	

2	**Class Estimate Type:**	Class 4	Class adjusts Construction Contingency and expected accuracy
3	**Project Complexity**	Med	Complexity adjusts Construction Contingency and expected accuracy
4	**Accuracy Range:**	40%	
5	**Area Condition:**	Rural	Area Condition uplifts unit cost and restoration

(grey)	= Field has drop down
(yellow)	= Field must be manually populated
(green)	= Field auto-filled based on project details

6	**PROPOSED DIAMETER:**		300 mm	
7	**TOTAL LENGTH:**		660 m	
		Tunnelled	0 m	0%
		Open Cut	660 m	100%

CLASS EA REQUIREMENTS:	A
CONSTRUCTION ASSUMPTION:	Watermain

COST ESTIMATION SPREADSHEET

COMPONENT	RATE (%)	RATE ($)	UNIT	ESTIMATED QUANTITY	COST PER UNIT	SUB-TOTAL	COMMENTS
Construction Cost							
Pipe Construction - Open Cut			m	660 m	$777	$512,575	Existing road ROW
Pipe Construction - Tunneling			m	0 m	$1,300	$0	
Pipe Construction Uplift (Based on Area Conditions)	0%					$0	
Minor Creek Crossings			ea.	1	$38,000	$38,000	
Major Creek Crossings			ea.	0	$207,000	$0	
Road Crossings			ea.	0	$90,000	$0	
Major Road / Rail Crossings			ea.	0	$207,000	$0	
Utility Crossings			ea.	0	$90,000	$0	
Valve and Chamber			ea.	4	$6,000	$24,000	2 valves minimum
Additional Construction Costs	15%		ea.			$86,186	Includes Mod/Demob,connections, inspection, hydrants, signage, traffic management, bonding, insurance
Provisional & Allowance	10%		ea.			$66,076	Provisional Labour and Materials in addition to base construction cost
Sub-Total Construction Base Costs						**$727,000**	
Geotechnical / Hydrogeological / Materials	1.0%					$7,300	
Geotechnical Sub-Total Cost						**$7,300**	
Property Requirements	1.5%					$ 10,900	
Property Requirements Sub-Total						**$10,900**	
Consultant Engineering/Design	15%					$ 109,100	Includes planning, pre-design, detailed design, training, CA, commissioning
Engineering/Design Sub-Total						**$109,100**	
In House Labour/Engineering/Wages/CA	8%					$ 58,200	
In-house Labour/Wages Sub-Total						**$58,200**	
Project Contingency	15%					$137,000	Construction Contingency is dependent on Cost Estimate Class and Project Complexity
Project Contingency Sub-Total						**$137,000**	
Non-Refundable HST	1.76%					$17,400	
Non-Refundable HST Sub-Total						**$17,400**	
Total (2019 Dollars)						**$1,067,000**	Rounded to nearest $1,000
Other Estimate							
Chosen Estimate						**$1,067,000**	2019 Estimate

COST ESTIMATE SUMMARY - FOR PHASING ESTIMATING ONLY

PROJECT COMPONENT	PROJECT COMPONENT DESCRIPTION	PERCENTAGE	TOTAL	YEAR	COMMENTS
Study	Feasibility study, EA	2%	$21,340		
Design	Design fees, Town fees for design, contract admin	13%	$138,710		
Construction	Town fees, base costs and project contingency	85%	$906,950		
TOTAL			$1,067,000		

Municipality of Thames Centre
Water and Wastewater Master Plan
Capital Program Cost Estimate

PROJECT NO.:	**W-D-WM-08-Alt1**	**CAPITAL BUDGET YEAR:**	
PROJECT NAME:	**Dorchester Watermain - West Trunk at the Development 22**	**VERSION:**	
PROJECT DESCRIPTION:	Newly proposed West Trunk - 620m of proposed 300mm PVC watermain at Development 22.	**DATE UPDATED:**	
		UPDATED BY:	

2	**Class Estimate Type:**	Class 4	Class adjusts Construction Contingency and expected accuracy
3	**Project Complexity**	Med	Complexity adjusts Construction Contingency and expected accuracy
4	**Accuracy Range:**	40%	
5	**Area Condition:**	Rural	Area Condition uplifts unit cost and restoration

= Field has drop down
= Field must be manually populated
= Field auto-filled based on project details

6	**PROPOSED DIAMETER:**	300 mm	
7	**TOTAL LENGTH:**	620 m	
	Tunnelled	0 m	0%
	Open Cut	620 m	100%

CLASS EA REQUIREMENTS:	A
CONSTRUCTION ASSUMPTION:	Watermain

COST ESTIMATION SPREADSHEET

COMPONENT	RATE (%)	RATE ($)	UNIT	ESTIMATED QUANTITY	COST PER UNIT	SUB-TOTAL	COMMENTS
Construction Cost							
Pipe Construction - Open Cut			m	620 m	$777	$481,510	Existing road ROW
Pipe Construction - Tunneling			m	0 m	$1,300	$0	
Pipe Construction Uplift (Based on Area Conditions)	0%					$0	
Minor Creek Crossings			ea.	1	$38,000	$38,000	
Major Creek Crossings			ea.	0	$207,000	$0	
Road Crossings			ea.	0	$90,000	$0	
Major Road / Rail Crossings			ea.	0	$207,000	$0	
Utility Crossings			ea.	0	$90,000	$0	
Valve and Chamber			ea.	4	$6,000	$24,000	2 valves minimum
Additional Construction Costs	15%		ea.			$81,526	Includes Mod/Demob,connections, inspection, hydrants, signage, traffic management, bonding, insurance
Provisional & Allowance	10%		ea.			$62,504	Provisional Labour and Materials in addition to base construction cost
Sub-Total Construction Base Costs						**$688,000**	
Geotechnical / Hydrogeological / Materials	1.0%					$6,900	
Geotechnical Sub-Total Cost						**$6,900**	
Property Requirements	1.5%					$ 10,300	
Property Requirements Sub-Total						**$10,300**	
Consultant Engineering/Design	15%					$ 103,200	includes planning, pre-design, detailed design, training, CA, commissioning
Engineering/Design Sub-Total						**$103,200**	
In House Labour/Engineering/Wages/CA	8%					$ 55,000	
In-house Labour/Wages Sub-Total						**$55,000**	
Project Contingency	15%					$130,000	Construction Contingency is dependent on Cost Estimate Class and Project Complexity
Project Contingency Sub-Total						**$130,000**	
Non-Refundable HST	1.76%					$16,500	
Non-Refundable HST Sub-Total						**$16,500**	
Total (2019 Dollars)						**$1,010,000**	Rounded to nearest $1,000
Other Estimate							
Chosen Estimate						**$1,010,000**	**2019 Estimate**

COST ESTIMATE SUMMARY - FOR PHASING ESTIMATING ONLY

PROJECT COMPONENT	PROJECT COMPONENT DESCRIPTION	PERCENTAGE	TOTAL	YEAR	COMMENTS
Study	Feasibility study, EA	2%	$20,200		
Design	Design fees, Town fees for design, contract admin	13%	$131,300		
Construction	Town fees, base costs and project contingency	85%	$858,500		
TOTAL			**$1,010,000**		

Municipality of Thames Centre
Water and Wastewater Master Plan
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1	**PROJECT NO.:**	**W-D-WM-09-Alt1**	**CAPITAL BUDGET YEAR:**
	PROJECT NAME:	**Dorchester Watermain - West Trunk river crossing at Development 22.**	**VERSION:**
	PROJECT DESCRIPTION:	Newly proposed West Trunk - 140m of proposed 300mm PVC watermain river crossing.	**DATE UPDATED:**
			UPDATED BY:

2	**Class Estimate Type:**	Class 4	Class adjusts Construction Contingency and expected accuracy
3	**Project Complexity**	Med	Complexity adjusts Construction Contingency and expected accuracy
4	**Accuracy Range:**	40%	
5	**Area Condition:**	Rural	Area Condition uplifts unit cost and restoration

(grey)	= Field has drop down
(yellow)	= Field must be manually populated
(green)	= Field auto-filled based on project details

6	**PROPOSED DIAMETER:**		300 mm	
7	**TOTAL LENGTH:**		140 m	
		Tunnelled	40 m	29%
		Open Cut	100 m	71%

CLASS EA REQUIREMENTS:	B
CONSTRUCTION ASSUMPTION:	Watermain

COST ESTIMATION SPREADSHEET

	COMPONENT	RATE (%)	RATE ($)	UNIT	ESTIMATED QUANTITY	COST PER UNIT	SUB-TOTAL	COMMENTS
	Construction Cost							
	Pipe Construction - Open Cut			m	100 m	$777	$77,663	Existing road ROW
	Pipe Construction - Tunneling			m	40 m	$1,300	$52,000	
	Pipe Construction Uplift (Based on Area Conditions)	0%					$0	
8	Minor Creek Crossings			ea.	1	$38,000	$38,000	
	Major Creek Crossings			ea.	0	$207,000	$0	
	Road Crossings			ea.	0	$90,000	$0	
	Major Road / Rail Crossings			ea.	0	$207,000	$0	
	Utility Crossings			ea.	0	$90,000	$0	
	Valve and Chamber			ea.	4	$6,000	$24,000	Assumed chambers at key intersections and crossings
	Additional Construction Costs	15%		ea.			$28,749	Includes Mod/Demob,connections, inspection, hydrants, signage, traffic management, bonding, insurance
	Provisional & Allowance	10%		ea.			$22,041	Provisional Labour and Materials in addition to base construction cost
	Sub-Total Construction Base Costs						**$242,000**	
	Geotechnical / Hydrogeological / Materials	1.0%					$2,400	
	Geotechnical Sub-Total Cost						**$2,400**	
	Property Requirements	1.5%					$ 3,600	
	Property Requirements Sub-Total						**$3,600**	
	Consultant Engineering/Design	15%					$ 36,300	includes planning, pre-design, detailed design, training, CA, commissioning
	Engineering/Design Sub-Total						**$36,300**	
	In House Labour/Engineering/Wages/CA	8%					$ 19,400	
	In-house Labour/Wages Sub-Total						**$19,400**	
	Project Contingency	15%					$46,000	Construction Contingency is dependent on Cost Estimate Class and Project Complexity
	Project Contingency Sub-Total						**$46,000**	
	Non-Refundable HST	1.76%					$5,800	
	Non-Refundable HST Sub-Total						**$5,800**	
	Total (2019 Dollars)						**$356,000**	Rounded to nearest $1,000
	Other Estimate							
	Chosen Estimate						**$356,000**	2019 Estimate

COST ESTIMATE SUMMARY - FOR PHASING ESTIMATING ONLY

PROJECT COMPONENT	PROJECT COMPONENT DESCRIPTION	PERCENTAGE	TOTAL	YEAR	COMMENTS
Study	Feasibility study, EA	2%	$7,120		
Design	Design fees, Town fees for design, contract admin	13%	$46,280		
Construction	Town fees, base costs and project contingency	85%	$302,600		
TOTAL			**$356,000**		

Municipality of Thames Centre
Water and Wastewater Master Plan
Capital Program Cost Estimate

PROJECT NO.:	W-D-WM-10-Alt1	CAPITAL BUDGET YEAR:	
PROJECT NAME:	Dorchester Watermain - West Trunk at Development 22.	VERSION:	
PROJECT DESCRIPTION:	Newly proposed West Trunk - 270m of proposed 300mm PVC watermain at Development 22.	DATE UPDATED:	
		UPDATED BY:	

2	Class Estimate Type:	Class 4	Class adjusts Construction Contingency and expected accuracy
3	Project Complexity	Low	Complexity adjusts Construction Contingency and expected accuracy
4	Accuracy Range:	30%	
5	Area Condition:	Rural	Area Condition uplifts unit cost and restoration

= Field has drop down
= Field must be manually populated
= Field auto-filled based on project details

PROPOSED DIAMETER:		300 mm	
TOTAL LENGTH:		270 m	
	Tunnelled	40 m	15%
	Open Cut	230 m	85%

CLASS EA REQUIREMENTS:	A
CONSTRUCTION ASSUMPTION:	Watermain

COST ESTIMATION SPREADSHEET

COMPONENT	RATE (%)	RATE ($)	UNIT	ESTIMATED QUANTITY	COST PER UNIT	SUB-TOTAL	COMMENTS
Construction Cost							
Pipe Construction - Open Cut			m	230 m	$777	$178,625	Existing road ROW
Pipe Construction - Tunneling			m	40 m	$1,300	$52,000	
Pipe Construction Uplift (Based on Area Conditions)	0%					$0	
Minor Creek Crossings			ea.	0	$38,000	$0	
Major Creek Crossings			ea.	0	$207,000	$0	
Road Crossings			ea.	0	$90,000	$0	
Major Road / Rail Crossings			ea.	0	$207,000	$0	
Utility Crossings			ea.	0	$90,000	$0	
Valve and Chamber			ea.	2	$6,000	$12,000	Assumed chambers at key intersections and crossings
Additional Construction Costs	10%		ea.			$24,262	Includes Mod/Demob,connections, inspection, hydrants, signage, traffic management, bonding, insurance
Provisional & Allowance	10%		ea.			$26,689	Provisional Labour and Materials in addition to base construction cost
Sub-Total Construction Base Costs						$284,000	
Geotechnical / Hydrogeological / Materials	0.5%					$1,500	
Geotechnical Sub-Total Cost						**$1,500**	
Property Requirements	1.0%					$ 2,900	
Property Requirements Sub-Total						**$2,900**	
Consultant Engineering/Design	15%					$ 44,100	includes planning, pre-design, detailed design, training, CA, commissioning
Engineering/Design Sub-Total						**$44,100**	
In House Labour/Engineering/Wages/CA	8%					$ 23,500	
In-house Labour/Wages Sub-Total						**$23,500**	
Project Contingency	10%					$37,000	Construction Contingency is dependent on Cost Estimate Class and Project Complexity
Project Contingency Sub-Total						**$37,000**	
Non-Refundable HST	1.76%					$6,700	
Non-Refundable HST Sub-Total						**$6,700**	
Total (2019 Dollars)						**$410,000**	Rounded to nearest $1,000
Other Estimate							
Chosen Estimate						$410,000	2019 Estimate

COST ESTIMATE SUMMARY - FOR PHASING ESTIMATING ONLY

PROJECT COMPONENT	PROJECT COMPONENT DESCRIPTION	PERCENTAGE	TOTAL	YEAR	COMMENTS
Study	Feasibility study, EA	2%	$8,200		
Design	Design fees, Town fees for design, contract admin	13%	$53,300		
Construction	Town fees, base costs and project contingency	85%	$348,500		
TOTAL			$410,000		

Municipality of Thames Centre
Water and Wastewater Master Plan
Capital Program Cost Estimate

PROJECT NO.:	W-D-WM-08-Alt2	CAPITAL BUDGET YEAR:	
PROJECT NAME:	Dorchester Watermain - West Trunk at the Development 22	VERSION:	
PROJECT DESCRIPTION:	Newly proposed West Trunk - 490m of proposed 300mm PVC watermain at Development 22.	DATE UPDATED:	
		UPDATED BY:	

2	Class Estimate Type:	Class 4	Class adjusts Construction Contingency and expected accuracy
3	Project Complexity	Med	Complexity adjusts Construction Contingency and expected accuracy
4	Accuracy Range:	40%	
5	Area Condition:	Rural	Area Condition uplifts unit cost and restoration

= Field has drop down
= Field must be manually populated
= Field auto-filled based on project details

PROPOSED DIAMETER:		300 mm	
TOTAL LENGTH:		490 m	
	Tunnelled	0 m	0%
	Open Cut	490 m	100%

CLASS EA REQUIREMENTS:	A
CONSTRUCTION ASSUMPTION:	Watermain

COST ESTIMATION SPREADSHEET

COMPONENT	RATE (%)	RATE ($)	UNIT	ESTIMATED QUANTITY	COST PER UNIT	SUB-TOTAL	COMMENTS
Construction Cost							
Pipe Construction - Open Cut			m	490 m	$777	$380,548	Existing road ROW
Pipe Construction - Tunneling			m	0 m	$1,300	$0	
Pipe Construction Uplift (Based on Area Conditions)	0%					$0	
Minor Creek Crossings			ea.	1	$38,000	$38,000	
Major Creek Crossings			ea.	0	$207,000	$0	
Road Crossings			ea.	0	$90,000	$0	
Major Road / Rail Crossings			ea.	0	$207,000	$0	
Utility Crossings			ea.	0	$90,000	$0	
Valve and Chamber			ea.	4	$6,000	$24,000	2 valves minimum
Additional Construction Costs	15%		ea.			$66,382	Includes Mod/Demob,connections, inspection, hydrants, signage, traffic management, bonding, insurance
Provisional & Allowance	10%		ea.			$50,893	Provisional Labour and Materials in addition to base construction cost
Sub-Total Construction Base Costs						$560,000	
Geotechnical / Hydrogeological / Materials	1.0%					$5,600	
Geotechnical Sub-Total Cost						$5,600	
Property Requirements	1.5%					$ 8,400	
Property Requirements Sub-Total						$8,400	
Consultant Engineering/Design	15%					$ 84,000	includes planning, pre-design, detailed design, training, CA, commissioning
Engineering/Design Sub-Total						$84,000	
In House Labour/Engineering/Wages/CA	8%					$ 44,800	
In-house Labour/Wages Sub-Total						$44,800	
Project Contingency	15%					$105,000	Construction Contingency is dependent on Cost Estimate Class and Project Complexity
Project Contingency Sub-Total						$105,000	
Non-Refundable HST	1.76%					$13,400	
Non-Refundable HST Sub-Total						$13,400	
Total (2019 Dollars)						$821,000	Rounded to nearest $1,000
Other Estimate							
Chosen Estimate						$821,000	2019 Estimate

COST ESTIMATE SUMMARY - FOR PHASING ESTIMATING ONLY

PROJECT COMPONENT	PROJECT COMPONENT DESCRIPTION	PERCENTAGE	TOTAL	YEAR	COMMENTS
Study	Feasibility study, EA	2%	$16,420		
Design	Design fees, Town fees for design, contract admin	13%	$106,730		
Construction	Town fees, base costs and project contingency	85%	$697,850		
TOTAL			$821,000		

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PROJECT NO.:	W-D-WM-09-Alt2	CAPITAL BUDGET YEAR:	
1 PROJECT NAME:	Dorchester Watermain - West Trunk river crossing at Development 22.	VERSION:	
PROJECT DESCRIPTION:	Newly proposed West Trunk - 210m of proposed 300mm PVC watermain river crossing.	DATE UPDATED:	
		UPDATED BY:	

2	Class Estimate Type:	Class 4	Class adjusts Construction Contingency and expected accuracy
3	Project Complexity	Med	Complexity adjusts Construction Contingency and expected accuracy
4	Accuracy Range:	40%	
5	Area Condition:	Rural	Area Condition uplifts unit cost and installation

(grey)	= Field has drop down
(yellow)	= Field must be manually populated
(green)	= Field auto-filled based on project details

6	PROPOSED DIAMETER:		300 mm	
7	TOTAL LENGTH:		210 m	
		Tunnelled	40 m	19%
		Open Cut	170 m	81%

CLASS EA REQUIREMENTS:	B
CONSTRUCTION ASSUMPTION:	Watermain

COST ESTIMATION SPREADSHEET

COMPONENT	RATE (%)	RATE ($)	UNIT	ESTIMATED QUANTITY	COST PER UNIT	SUB-TOTAL	COMMENTS
Construction Cost							
Pipe Construction - Open Cut			m	170 m	$777	$132,027	Existing road ROW
Pipe Construction - Tunneling			m	40 m	$1,300	$52,000	
Pipe Construction Uplift (Based on Area Conditions)	0%					$0	
Minor Creek Crossings			ea.	1	$38,000	$38,000	
Major Creek Crossings			ea.	0	$207,000	$0	
8 Road Crossings			ea.	0	$90,000	$0	
Major Road / Rail Crossings			ea.	0	$207,000	$0	
Utility Crossings			ea.	0	$90,000	$0	
Valve and Chamber			ea.	4	$6,000	$24,000	Assumed chambers at key intersections and crossings
Additional Construction Costs	15%		ea.			$36,904	Includes Mod/Demob,connections, inspection, hydrants, signage, traffic management, bonding, insurance
Provisional & Allowance	10%		ea.			$28,293	Provisional Labour and Materials in addition to base construction cost
Sub-Total Construction Base Costs						$311,000	
Geotechnical / Hydrogeological / Materials	1.0%					$3,100	
Geotechnical Sub-Total Cost						$3,100	
Property Requirements	1.5%					$ 4,700	
Property Requirements Sub-Total						$4,700	
Consultant Engineering/Design	15%					$ 46,700	includes planning, pre-design, detailed design, training, CA, commissioning
Engineering/Design Sub-Total						$46,700	
In House Labour/Engineering/Wages/CA	8%					$ 24,900	
In-house Labour/Wages Sub-Total						$24,900	
Project Contingency	15%					$59,000	Construction Contingency is dependent on Cost Estimate Class and Project Complexity
Project Contingency Sub-Total						$59,000	
Non-Refundable HST	1.76%					$7,500	
Non-Refundable HST Sub-Total						$7,500	
Total (2019 Dollars)						$457,000	Rounded to nearest $1,000
Other Estimate							
Chosen Estimate						$457,000	2019 Estimate

COST ESTIMATE SUMMARY - FOR PHASING ESTIMATING ONLY

PROJECT COMPONENT	PROJECT COMPONENT DESCRIPTION	PERCENTAGE	TOTAL	YEAR	COMMENTS
Study	Feasibility study, EA	2%	$9,140		
Design	Design fees, Town fees for design, contract admin	13%	$59,410		
Construction	Town fees, base costs and project contingency	85%	$388,450		
TOTAL			$457,000		

Municipality of Thames Centre
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PROJECT NO.:	W-D-WM-10-Alt2	CAPITAL BUDGET YEAR:	
PROJECT NAME:	Dorchester Watermain - West Trunk at Development 22.	VERSION:	
PROJECT DESCRIPTION:	Newly proposed West Trunk - 290m of proposed 300mm PVC watermain at Development 22.	DATE UPDATED:	
		UPDATED BY:	

2	Class Estimate Type:	Class 4	Class adjusts Construction Contingency and expected accuracy
3	Project Complexity	Low	Complexity adjusts Construction Contingency and expected accuracy
4	Accuracy Range:	30%	
5	Area Condition:	Rural	Area Condition uplifts unit cost and restoration

= Field has drop down
= Field must be manually populated
= Field auto-filled based on project details

PROPOSED DIAMETER:		300 mm	
TOTAL LENGTH:		290 m	
	Tunnelled	40 m	14%
	Open Cut	250 m	86%

CLASS EA REQUIREMENTS:	A
CONSTRUCTION ASSUMPTION:	Watermain

COST ESTIMATION SPREADSHEET

COMPONENT	RATE (%)	RATE ($)	UNIT	ESTIMATED QUANTITY	COST PER UNIT	SUB-TOTAL	COMMENTS
Construction Cost							
Pipe Construction - Open Cut			m	250 m	$777	$194,157	Existing road ROW
Pipe Construction - Tunneling			m	40 m	$1,300	$52,000	
Pipe Construction Uplift (Based on Area Conditions)	0%					$0	
Minor Creek Crossings			ea.	0	$38,000	$0	
Major Creek Crossings			ea.	0	$207,000	$0	
Road Crossings			ea.	0	$90,000	$0	
Major Road / Rail Crossings			ea.	0	$207,000	$0	
Utility Crossings			ea.	0	$90,000	$0	
Valve and Chamber			ea.	2	$6,000	$12,000	Assumed chambers at key intersections and crossings
Additional Construction Costs	10%		ea.			$25,816	Includes Mod/Demob,connections, inspection, hydrants, signage, traffic management, bonding, insurance
Provisional & Allowance	10%		ea.			$28,397	Provisional Labour and Materials in addition to base construction cost
Sub-Total Construction Base Costs						$312,000	
Geotechnical / Hydrogeological / Materials	0.5%					$1,600	
Geotechnical Sub-Total Cost						**$1,600**	
Property Requirements	1.0%					$ 3,100	
Property Requirements Sub-Total						**$3,100**	
Consultant Engineering/Design	15%					$ 46,800	includes planning, pre-design, detailed design, training, CA, commissioning
Engineering/Design Sub-Total						**$46,800**	
In House Labour/Engineering/Wages/CA	8%					$ 25,000	
In-house Labour/Wages Sub-Total						**$25,000**	
Project Contingency	10%					$39,000	Construction Contingency is dependent on Cost Estimate Class and Project Complexity
Project Contingency Sub-Total						**$39,000**	
Non-Refundable HST	1.76%					$7,100	
Non-Refundable HST Sub-Total						**$7,100**	
Total (2019 Dollars)						**$435,000**	Rounded to nearest $1,000
Other Estimate							
Chosen Estimate						$435,000	2019 Estimate

COST ESTIMATE SUMMARY - FOR PHASING ESTIMATING ONLY

PROJECT COMPONENT	PROJECT COMPONENT DESCRIPTION	PERCENTAGE	TOTAL	YEAR	COMMENTS
Study	Feasibility study, EA	2%	$8,700		
Design	Design fees, Town fees for design, contract admin	13%	$56,550		
Construction	Town fees, base costs and project contingency	85%	$369,750		
TOTAL			$435,000		

PROJECT NO.:	W-D-WM-11	CAPITAL BUDGET YEAR:	
PROJECT NAME:	Dorchester Watermain - West Trunk on Christie Dr.	VERSION:	
PROJECT DESCRIPTION:	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	DATE UPDATED:	
		UPDATED BY:	

2	Class Estimate Type:	Class 4	Class adjusts Construction Contingency and expected accuracy
3	Project Complexity	Med	Complexity adjusts Construction Contingency and expected accuracy
4	Accuracy Range:	40%	
5	Area Condition:	Suburban	Area Condition uplifts unit cost and restoration

(grey)	= Field has drop down
(yellow)	= Field must be manually populated
(green)	= Field auto-filled based on project details

6	PROPOSED DIAMETER:		300 mm	
7	TOTAL LENGTH:		980 m	
		Tunnelled	0 m	0%
		Open Cut	980 m	100%

CLASS EA REQUIREMENTS:	A
CONSTRUCTION ASSUMPTION:	Watermain

COST ESTIMATION SPREADSHEET

COMPONENT	RATE (%)	RATE ($)	UNIT	ESTIMATED QUANTITY	COST PER UNIT	SUB-TOTAL	COMMENTS
Construction Cost							
Pipe Construction - Open Cut			m	980 m	$777	$761,096	Existing road ROW
Pipe Construction - Tunneling			m	0 m	$1,300	$0	
Pipe Construction Uplift (Based on Area Conditions)	20%					$152,219	
Minor Creek Crossings			ea.	0	$38,000	$0	
Major Creek Crossings			ea.	0	$207,000	$0	
Road Crossings			ea.	0	$90,000	$0	
Major Road / Rail Crossings			ea.	0	$207,000	$0	
Utility Crossings			ea.	0	$90,000	$0	
Valve and Chamber			ea.	2	$6,000	$12,000	2 valves minimum
Additional Construction Costs	15%		ea.			$138,797	Includes Mod/Demob,connections, inspection, hydrants, signage, traffic management, bonding, insurance
Provisional & Allowance	10%		ea.			$106,411	Provisional Labour and Materials in addition to base construction cost
Sub-Total Construction Base Costs						**$1,171,000**	
Geotechnical / Hydrogeological / Materials	1.0%					$11,700	
Geotechnical Sub-Total Cost						**$11,700**	
Property Requirements	1.5%					$ 17,600	
Property Requirements Sub-Total						**$17,600**	
Consultant Engineering/Design	15%					$ 175,700	Includes planning, pre-design, detailed design, training, CA, commissioning
Engineering/Design Sub-Total						**$175,700**	
In House Labour/Engineering/Wages/CA	8%					$ 93,700	
In-house Labour/Wages Sub-Total						**$93,700**	
Project Contingency	15%					$220,000	Construction Contingency is dependent on Cost Estimate Class and Project Complexity
Project Contingency Sub-Total						**$220,000**	
Non-Refundable HST	1.76%					$28,100	
Non-Refundable HST Sub-Total						**$28,100**	
Total (2019 Dollars)						**$1,718,000**	Rounded to nearest $1,000
Other Estimate							
Chosen Estimate						**$1,718,000**	2019 Estimate

COST ESTIMATE SUMMARY - FOR PHASING ESTIMATING ONLY

PROJECT COMPONENT	PROJECT COMPONENT DESCRIPTION	PERCENTAGE	TOTAL	YEAR	COMMENTS
Study	Feasibility study, EA	2%	$34,360		
Design	Design fees, Town fees for design, contract admin	13%	$223,340		
Construction	Town fees, base costs and project contingency	85%	$1,460,300		
TOTAL			**$1,718,000**		

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PROJECT NO.:	W-D-WM-12	CAPITAL BUDGET YEAR:	
PROJECT NAME:	Dorchester Watermain - West Trunk on Harris Rd. and Hamilton Rd.	VERSION:	
PROJECT DESCRIPTION:	Newly proposed West Trunk - 1080m of proposed 300mm PVC watermain along Harris Rd and Hamilton Rd.	DATE UPDATED:	
		UPDATED BY:	

Class Estimate Type:	Class 4	Class adjusts Construction Contingency and expected accuracy	
Project Complexity	High	Complexity adjusts Construction Contingency and expected accuracy	
Accuracy Range:	50%		
Area Condition:	Rural	Area Condition uplifts unit cost and restoration	

(grey)	= Field has drop down
(yellow)	= Field must be manually populated
(green)	= Field auto-filled based on project details

PROPOSED DIAMETER:		300 mm	
TOTAL LENGTH:		910 m	
	Tunnelled	0 m	0%
	Open Cut	910 m	100%

CLASS EA REQUIREMENTS:	A
CONSTRUCTION ASSUMPTION:	Watermain

COST ESTIMATION SPREADSHEET

COMPONENT	RATE (%)	RATE ($)	UNIT	ESTIMATED QUANTITY	COST PER UNIT	SUB-TOTAL	COMMENTS
Construction Cost							
Pipe Construction - Open Cut			m	910 m	$777	$706,732	Existing road ROW
Pipe Construction - Tunneling			m	0 m	$1,300	$0	
Pipe Construction Uplift (Based on Area Conditions)	0%					$0	
Minor Creek Crossings			ea.	1	$38,000	$38,000	
Major Creek Crossings			ea.	0	$207,000	$0	
Road Crossings			ea.	0	$90,000	$0	
Major Road / Rail Crossings			ea.	0	$207,000	$0	
Utility Crossings			ea.	0	$90,000	$0	
Valve and Chamber			ea.	4	$6,000	$24,000	2 valves minimum
Additional Construction Costs	20%		ea.			$153,746	Includes Mod/Demob,connections, inspection, hydrants, signage, traffic management, bonding, insurance
Provisional & Allowance	10%		ea.			$92,248	Provisional Labour and Materials in addition to base construction cost
Sub-Total Construction Base Costs						$1,015,000	
Geotechnical / Hydrogeological / Materials	2.0%					$20,300	
Geotechnical Sub-Total Cost						**$20,300**	
Property Requirements	2.0%					$ 20,300	
Property Requirements Sub-Total						**$20,300**	
Consultant Engineering/Design	15%					$ 152,300	includes planning, pre-design, detailed design, training, CA, commissioning
Engineering/Design Sub-Total						**$152,300**	
In House Labour/Engineering/Wages/CA	8%					$ 81,200	
In-house Labour/Wages Sub-Total						**$81,200**	
Project Contingency	25%					$322,000	Construction Contingency is dependent on Cost Estimate Class and Project Complexity
Project Contingency Sub-Total						**$322,000**	
Non-Refundable HST	1.76%					$26,900	
Non-Refundable HST Sub-Total						**$26,900**	
Total (2019 Dollars)						**$1,638,000**	Rounded to nearest $1,000
Other Estimate							
Chosen Estimate						**$1,638,000**	2019 Estimate

COST ESTIMATE SUMMARY - FOR PHASING ESTIMATING ONLY

PROJECT COMPONENT	PROJECT COMPONENT DESCRIPTION	PERCENTAGE	TOTAL	YEAR	COMMENTS
Study	Feasibility study, EA	2%	$32,760		
Design	Design fees, Town fees for design, contract admin	13%	$212,940		
Construction	Town fees, base costs and project contingency	85%	$1,392,300		
TOTAL			$1,638,000		

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PROJECT NO.:	**W-D-WM-13**	**CAPITAL BUDGET YEAR:**	
PROJECT NAME:	**Dorchester Watermain - West Trunk at Mill Ct. Loop**	**VERSION:**	
PROJECT DESCRIPTION:	Newly proposed West Trunk - 800m of proposed 200mm PVC watermain on Mill Ct to complete loop	**DATE UPDATED:**	
		UPDATED BY:	

2	**Class Estimate Type:**	Class 4	Class adjusts Construction Contingency and expected accuracy
3	**Project Complexity**	High	Complexity adjusts Construction Contingency and expected accuracy
4	**Accuracy Range:**	50%	
5	**Area Condition:**	Rural	Area Condition uplifts unit cost and restoration

= Field has drop down
= Field must be manually populated
= Field auto-filled based on project details

PROPOSED DIAMETER:		200 mm	
TOTAL LENGTH:		800 m	
	Tunnelled	0 m	0%
	Open Cut	800 m	100%

CLASS EA REQUIREMENTS:	A+
CONSTRUCTION ASSUMPTION:	Watermain

COST ESTIMATION SPREADSHEET

COMPONENT	RATE (%)	RATE ($)	UNIT	ESTIMATED QUANTITY	COST PER UNIT	SUB-TOTAL	COMMENTS
Construction Cost							
Pipe Construction - Open Cut			m	800 m	$773	$618,430	Existing road ROW
Pipe Construction - Tunneling			m	0 m	$1,300	$0	
Pipe Construction Uplift (Based on Area Conditions)	0%					$0	
Minor Creek Crossings			ea.	1	$30,000	$30,000	
Major Creek Crossings			ea.	0	$199,000	$0	
Road Crossings			ea.	0	$82,000	$0	
Major Road / Rail Crossings			ea.	0	$199,000	$0	
Utility Crossings			ea.	0	$82,000	$0	
Valve and Chamber			ea.	3	$2,000	$6,000	2 valves minimum
Additional Construction Costs	20%		ea.			$130,886	Includes Mod/Demob,connections, inspection, hydrants, signage, traffic management, bonding, insurance
Provisional & Allowance	10%		ea.			$78,532	Provisional Labour and Materials in addition to base construction cost
Sub-Total Construction Base Costs						$864,000	
Geotechnical / Hydrogeological / Materials	2.0%					$17,300	
Geotechnical Sub-Total Cost						**$17,300**	
Property Requirements	2.0%					$ 17,300	
Property Requirements Sub-Total						**$17,300**	
Consultant Engineering/Design	15%					$ 129,600	includes planning, pre-design, detailed design, training, CA, commissioning
Engineering/Design Sub-Total						**$129,600**	
In House Labour/Engineering/Wages/CA	8%					$ 69,100	
In-house Labour/Wages Sub-Total						**$69,100**	
Project Contingency	25%					$274,000	Construction Contingency is dependent on Cost Estimate Class and Project Complexity
Project Contingency Sub-Total						**$274,000**	
Non-Refundable HST	1.76%					$22,900	
Non-Refundable HST Sub-Total						**$22,900**	
Total (2019 Dollars)						**$1,394,000**	Rounded to nearest $1,000
Other Estimate							
Chosen Estimate						**$1,394,000**	2019 Estimate

COST ESTIMATE SUMMARY - FOR PHASING ESTIMATING ONLY

PROJECT COMPONENT	PROJECT COMPONENT DESCRIPTION	PERCENTAGE	TOTAL	YEAR	COMMENTS
Study	Feasibility study, EA	2%	$27,880		
Design	Design fees, Town fees for design, contract admin	13%	$181,220		
Construction	Town fees, base costs and project contingency	85%	$1,184,900		
TOTAL			$1,394,000		

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PROJECT NO.:	W-D-WM-14	CAPITAL BUDGET YEAR:	
❶ PROJECT NAME:	Dorchester Watermain - Catherine St. East Section Upgrade	VERSION:	
PROJECT DESCRIPTION:	1020m of existing 250mm DI watermain (built in 1983) to be replaced by 300mm PVC watermain on Catherine St.	DATE UPDATED:	
		UPDATED BY:	

❷	Class Estimate Type:	Class 4	Class adjusts Construction Contingency and expected accuracy
❸	Project Complexity	High	Complexity adjusts Construction Contingency and expected accuracy
❹	Accuracy Range:	50%	
❺	Area Condition:	Suburban	Area Condition uplifts unit cost and restoration

(grey)	= Field has drop down
(yellow)	= Field must be manually populated
(green)	= Field auto-filled based on project details

❻	PROPOSED DIAMETER:		300 mm	
❼	TOTAL LENGTH:		1020 m	
		Tunnelled	0 m	0%
		Open Cut	1020 m	100%

CLASS EA REQUIREMENTS:	A+
CONSTRUCTION ASSUMPTION:	Watermain

COST ESTIMATION SPREADSHEET

COMPONENT	RATE (%)	RATE ($)	UNIT	ESTIMATED QUANTITY	COST PER UNIT	SUB-TOTAL	COMMENTS
Construction Cost							
Pipe Construction - Open Cut			m	1020 m	$777	$792,161	Existing road ROW
Pipe Construction - Tunneling			m	0 m	$1,300	$0	
Pipe Construction Uplift (Based on Area Conditions)	20%					$158,432	
❽ Minor Creek Crossings			ea.	0	$38,000	$0	
Major Creek Crossings			ea.	0	$207,000	$0	
Road Crossings			ea.	0	$90,000	$0	
Major Road / Rail Crossings			ea.	0	$207,000	$0	
Utility Crossings			ea.	0	$90,000	$0	
Valve and Chamber			ea.	5	$6,000	$30,000	2 valves minimum
Additional Construction Costs	20%		ea.			$196,119	Includes Mod/Demob,connections, inspection, hydrants, signage, traffic management, bonding, insurance
Provisional & Allowance	10%		ea.			$117,671	Provisional Labour and Materials in addition to base construction cost
Sub-Total Construction Base Costs						**$1,294,000**	
Geotechnical / Hydrogeological / Materials	2.0%					$25,900	
Geotechnical Sub-Total Cost						**$25,900**	
Property Requirements	2.0%					$ 25,900	
Property Requirements Sub-Total						**$25,900**	
Consultant Engineering/Design	15%					$ 194,100	includes planning, pre-design, detailed design, training, CA, commissioning
Engineering/Design Sub-Total						**$194,100**	
In House Labour/Engineering/Wages/CA	8%					$ 103,500	
In-house Labour/Wages Sub-Total						**$103,500**	
Project Contingency	25%					$411,000	Construction Contingency is dependent on Cost Estimate Class and Project Complexity
Project Contingency Sub-Total						**$411,000**	
Non-Refundable HST	1.76%					$34,300	
Non-Refundable HST Sub-Total						**$34,300**	
Total (2019 Dollars)						**$2,089,000**	Rounded to nearest $1,000
Other Estimate							
Chosen Estimate						**$2,089,000**	2019 Estimate

COST ESTIMATE SUMMARY - FOR PHASING ESTIMATING ONLY

PROJECT COMPONENT	PROJECT COMPONENT DESCRIPTION	PERCENTAGE	TOTAL	YEAR	COMMENTS
Study	Feasibility study, EA	2%	$41,780		
Design	Design fees, Town fees for design, contract admin	13%	$271,570		
Construction	Town fees, base costs and project contingency	85%	$1,775,650		
TOTAL			$2,089,000		

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PROJECT NO.:	W-D-WM-15	CAPITAL BUDGET YEAR:	
1 PROJECT NAME:	Dorchester Watermain - Catherine St. West Section Upgrade	VERSION:	
PROJECT DESCRIPTION:	1390m of existing 200mm PVC watermain (built in 1973 - 2013) to be replaced by 300mm PVC watermain on Catherine St.	DATE UPDATED:	
		UPDATED BY:	

2	Class Estimate Type:	Class 4	Class adjusts Construction Contingency and expected accuracy
3	Project Complexity	High	Complexity adjusts Construction Contingency and expected accuracy
4	Accuracy Range:	50%	
5	Area Condition:	Suburban	Area Condition uplifts unit cost and restoration

(grey)	= Field has drop down
(yellow)	= Field must be manually populated
(green)	= Field auto-filled based on project details

6	PROPOSED DIAMETER:		300 mm	
7	TOTAL LENGTH:		1390 m	
		Tunnelled	0 m	0%
		Open Cut	1390 m	100%

CLASS EA REQUIREMENTS:	A+
CONSTRUCTION ASSUMPTION:	Watermain

COST ESTIMATION SPREADSHEET

	COMPONENT	RATE (%)	RATE ($)	UNIT	ESTIMATED QUANTITY	COST PER UNIT	SUB-TOTAL	COMMENTS
	Construction Cost							
	Pipe Construction - Open Cut			m	1390 m	$777	$1,079,514	Existing road ROW
	Pipe Construction - Tunneling			m	0 m	$1,300	$0	
	Pipe Construction Uplift (Based on Area Conditions)	20%					$215,903	
8	Minor Creek Crossings			ea.	1	$38,000	$38,000	
	Major Creek Crossings			ea.	0	$207,000	$0	
	Road Crossings			ea.	0	$90,000	$0	
	Major Road / Rail Crossings			ea.	0	$207,000	$0	
	Utility Crossings			ea.	0	$90,000	$0	
	Valve and Chamber			ea.	7	$6,000	$42,000	2 valves minimum
	Additional Construction Costs	20%		ea.			$275,083	Includes Mod/Demob,connections, inspection, hydrants, signage, traffic management, bonding, insurance
	Provisional & Allowance	10%		ea.			$165,050	Provisional Labour and Materials in addition to base construction cost
	Sub-Total Construction Base Costs						**$1,816,000**	
	Geotechnical / Hydrogeological / Materials	2.0%					$36,300	
	Geotechnical Sub-Total Cost						**$36,300**	
	Property Requirements	2.0%					$ 36,300	
	Property Requirements Sub-Total						**$36,300**	
	Consultant Engineering/Design	15%					$ 272,400	includes planning, pre-design, detailed design, training, CA, commissioning
	Engineering/Design Sub-Total						**$272,400**	
	In House Labour/Engineering/Wages/CA	8%					$ 145,300	
	In-house Labour/Wages Sub-Total						**$145,300**	
	Project Contingency	25%					$577,000	Construction Contingency is dependent on Cost Estimate Class and Project Complexity
	Project Contingency Sub-Total						**$577,000**	
	Non-Refundable HST	1.76%					$48,200	
	Non-Refundable HST Sub-Total						**$48,200**	
	Total (2019 Dollars)						**$2,932,000**	Rounded to nearest $1,000
	Other Estimate							
	Chosen Estimate						**$2,932,000**	2019 Estimate

COST ESTIMATE SUMMARY - FOR PHASING ESTIMATING ONLY

PROJECT COMPONENT	PROJECT COMPONENT DESCRIPTION	PERCENTAGE	TOTAL	YEAR	COMMENTS
Study	Feasibility study, EA	2%	$58,640		
Design	Design fees, Town fees for design, contract admin	13%	$381,160		
Construction	Town fees, base costs and project contingency	85%	$2,492,200		
TOTAL			**$2,932,000**		

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PROJECT NO.:	**W-D-WM-16**	**CAPITAL BUDGET YEAR:**	
PROJECT NAME:	**Dorchester Watermain - Northwest Industrial Lands Upgrade**	**VERSION:**	
PROJECT DESCRIPTION:	1260m of existing 200mm DI & PVC watermain (built in 1978 - 2013) to be replaced by 300mm PVC watermain	**DATE UPDATED:**	
		UPDATED BY:	

2	**Class Estimate Type:**	Class 4	Class adjusts Construction Contingency and expected accuracy
3	**Project Complexity**	Med	Complexity adjusts Construction Contingency and expected accuracy
4	**Accuracy Range:**	40%	
5	**Area Condition:**	Suburban	Area Condition uplifts unit cost and restoration

= Field has drop down
= Field must be manually populated
= Field auto-filled based on project details

6	**PROPOSED DIAMETER:**		300 mm	
7	**TOTAL LENGTH:**		1260 m	
		Tunnelled	0 m	0%
		Open Cut	1260 m	100%

CLASS EA REQUIREMENTS:	A+
CONSTRUCTION ASSUMPTION:	Watermain

COST ESTIMATION SPREADSHEET

COMPONENT	RATE (%)	RATE ($)	UNIT	ESTIMATED QUANTITY	COST PER UNIT	SUB-TOTAL	COMMENTS
Construction Cost							
Pipe Construction - Open Cut			m	1260 m	$777	$978,552	Existing road ROW
Pipe Construction - Tunneling			m	0 m	$1,300	$0	
Pipe Construction Uplift (Based on Area Conditions)	20%					$195,710	
Minor Creek Crossings			ea.	1	$38,000	$38,000	
Major Creek Crossings			ea.	0	$207,000	$0	
Road Crossings			ea.	0	$90,000	$0	
Major Road / Rail Crossings			ea.	0	$207,000	$0	
Utility Crossings			ea.	0	$90,000	$0	
Valve and Chamber			ea.	3	$6,000	$18,000	2 valves minimum
Additional Construction Costs	15%		ea.			$184,539	Includes Mod/Demob,connections, inspection, hydrants, signage, traffic management, bonding, insurance
Provisional & Allowance	10%		ea.			$141,480	Provisional Labour and Materials in addition to base construction cost
Sub-Total Construction Base Costs						$1,556,000	
Geotechnical / Hydrogeological / Materials	1.0%					$15,600	
Geotechnical Sub-Total Cost						**$15,600**	
Property Requirements	1.5%					$ 23,300	
Property Requirements Sub-Total						**$23,300**	
Consultant Engineering/Design	15%					$ 233,400	includes planning, pre-design, detailed design, training, CA, commissioning
Engineering/Design Sub-Total						**$233,400**	
In House Labour/Engineering/Wages/CA	8%					$ 124,500	
In-house Labour/Wages Sub-Total						**$124,500**	
Project Contingency	15%					$293,000	Construction Contingency is dependent on Cost Estimate Class and Project Complexity
Project Contingency Sub-Total						**$293,000**	
Non-Refundable HST	1.76%					$37,300	
Non-Refundable HST Sub-Total						**$37,300**	
Total (2019 Dollars)						**$2,283,000**	Rounded to nearest $1,000
Other Estimate							
Chosen Estimate						**$2,283,000**	2019 Estimate

COST ESTIMATE SUMMARY - FOR PHASING ESTIMATING ONLY

PROJECT COMPONENT	PROJECT COMPONENT DESCRIPTION	PERCENTAGE	TOTAL	YEAR	COMMENTS
Study	Feasibility study, EA	2%	$45,660		
Design	Design fees, Town fees for design, contract admin	13%	$296,790		
Construction	Town fees, base costs and project contingency	85%	$1,940,550		
TOTAL			$2,283,000		

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PROJECT NO.:	W-D-WM-17	CAPITAL BUDGET YEAR:	
❶ PROJECT NAME:	Dorchester Watermain - Hamilton Rd. Extension	VERSION:	
PROJECT DESCRIPTION:	350m of proposed 200mm PVC watermain along Hamilton Rd.	DATE UPDATED:	
		UPDATED BY:	

❷ Class Estimate Type:	Class 4	Class adjusts Construction Contingency and expected accuracy
❸ Project Complexity	Med	Complexity adjusts Construction Contingency and expected accuracy
❹ Accuracy Range:	40%	
❺ Area Condition:	Suburban	Area Condition uplifts unit cost and restoration

= Field has drop down
= Field must be manually populated
= Field auto-filled based on project details

❻ PROPOSED DIAMETER:		200 mm	
TOTAL LENGTH:		350 m	
❼	Tunnelled	0 m	0%
	Open Cut	350 m	100%

CLASS EA REQUIREMENTS:	A+
CONSTRUCTION ASSUMPTION:	Watermain

COST ESTIMATION SPREADSHEET

COMPONENT	RATE (%)	RATE ($)	UNIT	ESTIMATED QUANTITY	COST PER UNIT	SUB-TOTAL	COMMENTS
Construction Cost							
Pipe Construction - Open Cut			m	350 m	$773	$270,563	Existing road ROW
Pipe Construction - Tunneling			m	0 m	$1,300	$0	
Pipe Construction Uplift (Based on Area Conditions)	20%					$54,113	
Minor Creek Crossings			ea.	0	$30,000	$0	
Major Creek Crossings			ea.	0	$199,000	$0	
❽ Road Crossings			ea.	0	$82,000	$0	
Major Road / Rail Crossings			ea.	0	$199,000	$0	
Utility Crossings			ea.	0	$82,000	$0	
Valve and Chamber			ea.	2	$2,000	$4,000	2 valves minimum
Additional Construction Costs	15%		ea.			$49,301	Includes Mod/Demob,connections, inspection, hydrants, signage, traffic management, bonding, insurance
Provisional & Allowance	10%		ea.			$37,798	Provisional Labour and Materials in addition to base construction cost
Sub-Total Construction Base Costs						$416,000	
Geotechnical / Hydrogeological / Materials	1.0%					$4,200	
Geotechnical Sub-Total Cost						$4,200	
Property Requirements	1.5%					$ 6,200	
Property Requirements Sub-Total						$6,200	
Consultant Engineering/Design	15%					$ 62,400	includes planning, pre-design, detailed design, training, CA, commissioning
Engineering/Design Sub-Total						$62,400	
In House Labour/Engineering/Wages/CA	8%					$ 33,300	
In-house Labour/Wages Sub-Total						$33,300	
Project Contingency	15%					$78,000	Construction Contingency is dependent on Cost Estimate Class and Project Complexity
Project Contingency Sub-Total						$78,000	
Non-Refundable HST	1.76%					$10,000	
Non-Refundable HST Sub-Total						$10,000	
Total (2019 Dollars)						$610,000	Rounded to nearest $1,000
Other Estimate							
Chosen Estimate						$610,000	2019 Estimate

COST ESTIMATE SUMMARY - FOR PHASING ESTIMATING ONLY

PROJECT COMPONENT	PROJECT COMPONENT DESCRIPTION	PERCENTAGE	TOTAL	YEAR	COMMENTS
Study	Feasibility study, EA	2%	$12,200		
Design	Design fees, Town fees for design, contract admin	13%	$79,300		
Construction	Town fees, base costs and project contingency	85%	$518,500		
TOTAL			$610,000		

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PROJECT NO.:	W-D-WM-18	**CAPITAL BUDGET YEAR:**	
PROJECT NAME:	Dorchester Watermain - Benefit to Existing System	**VERSION:**	
PROJECT DESCRIPTION:	370m of proposed 200mm PVC watermain along Mill Rd.	**DATE UPDATED:**	
		UPDATED BY:	

2	**Class Estimate Type:**	Class 4	Class adjusts Construction Contingency and expected accuracy
3	**Project Complexity**	Med	Complexity adjusts Construction Contingency, and expected accuracy
4	**Accuracy Range:**	40%	
5	**Area Condition:**	Suburban	Area Condition uplifts unit cost and restoration

= Field has drop down
= Field must be manually populated
= Field auto-filled based on project details

6	**PROPOSED DIAMETER:**		200 mm	
7	**TOTAL LENGTH:**		370 m	
		Tunnelled	0 m	0%
		Open Cut	370 m	100%

CLASS EA REQUIREMENTS:	A+
CONSTRUCTION ASSUMPTION:	Watermain

COST ESTIMATION SPREADSHEET

COMPONENT	RATE (%)	RATE ($)	UNIT	ESTIMATED QUANTITY	COST PER UNIT	SUB-TOTAL	COMMENTS
Construction Cost							
Pipe Construction - Open Cut			m	370 m	$773	$286,024	Existing road ROW
Pipe Construction - Tunneling			m	0 m	$1,300	$0	
Pipe Construction Uplift (Based on Area Conditions)	20%					$57,205	
Minor Creek Crossings			ea.	0	$30,000	$0	
Major Creek Crossings			ea.	0	$199,000	$0	
8 Road Crossings			ea.	0	$82,000	$0	
Major Road / Rail Crossings			ea.	0	$199,000	$0	
Utility Crossings			ea.	0	$82,000	$0	
Valve and Chamber			ea.	2	$2,000	$4,000	2 valves minimum
Additional Construction Costs	15%		ea.			$52,084	Includes Mod/Demob,connections, inspection, hydrants, signage, traffic management, bonding, insurance
Provisional & Allowance	10%		ea.			$39,931	Provisional Labour and Materials in addition to base construction cost
Sub-Total Construction Base Costs						$439,000	
Geotechnical / Hydrogeological / Materials	1.0%					$4,400	
Geotechnical Sub-Total Cost						**$4,400**	
Property Requirements	1.5%					$ 6,600	
Property Requirements Sub-Total						**$6,600**	
Consultant Engineering/Design	15%					$ 65,900	includes planning, pre-design, detailed design, training, CA, commissioning
Engineering/Design Sub-Total						**$65,900**	
In House Labour/Engineering/Wages/CA	8%					$ 35,100	
In-house Labour/Wages Sub-Total						**$35,100**	
Project Contingency	15%					$83,000	Construction Contingency is dependent on Cost Estimate Class and Project Complexity
Project Contingency Sub-Total						**$83,000**	
Non-Refundable HST	1.76%					$10,500	
Non-Refundable HST Sub-Total						**$10,500**	
Total (2019 Dollars)						**$645,000**	Rounded to nearest $1,000
Other Estimate							
Chosen Estimate						**$645,000**	2019 Estimate

COST ESTIMATE SUMMARY - FOR PHASING ESTIMATING ONLY

PROJECT COMPONENT	PROJECT COMPONENT DESCRIPTION	PERCENTAGE	TOTAL	YEAR	COMMENTS
Study	Feasibility study, EA	2%	$12,900		
Design	Design fees, Town fees for design, contract admin	13%	$83,850		
Construction	Town fees, base costs and project contingency	85%	$548,250		
TOTAL			$645,000		

Municipality of Thames Centre
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PROJECT NO.: W-D-401-ST-01

PROJECT NAME: **Cost Benefit Study to Service 401 Corridor Lands**

PROJECT DESCRIPTION: Cost-benefit study to evaluate servicing options for 401 Corridor Lands, will include recommendations for service pressures and available fire flow

CLASS EA REQUIREMENTS:	-

COST ESTIMATE SUMMARY - FOR PHASING ESTIMATING ONLY

PROJECT COMPONENT	PROJECT COMPONENT DESCRIPTION	TOTAL
Study	Feasibility study, EA	$50,000

BluePlan

Municipality of Thames Centre
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PROJECT NO.:	W-T-SUP-01	**CAPITAL BUDGET YEAR:**	
PROJECT NAME:	Maximize Thorndale WTF Supply	**VERSION:**	
PROJECT DESCRIPTION:	Maximize Well Capacity at Existing WTF	**DATE UPDATED:**	
		UPDATED BY:	

Class Estimate Type:	Class 4	Class adjusts Construction Contingency and expected accuracy
Project Complexity	Low	Complexity adjusts Construction Contingency, and expected accuracy
Accuracy Range:	30%	
Area Condition:	Suburban	Area Condition adjusts unit cost and restoration

= Field has drop down
= Field must be manually populated
= Field auto-filled based on project details

PROPOSED CAPACITY	22 L/s
CLASS EA REQUIREMENTS:	A
CONSTRUCTION ASSUMPTION:	Other

Pump	Existing (L/s)	Future (L/s)
1	8.3	22
2	8.3	22
3	8.3	8.3
4		
5		

COST ESTIMATION SPREADSHEET

COMPONENT	RATE (%)	RATE ($)	UNIT	ESTIMATED QUANTITY	COST PER UNIT	SUB-TOTAL	COMMENTS
Construction Cost							
Number of Pumps (including well casing upgrades)			Pumps	2	$200,000	$400,000	Pump replacement and upgrades
Electrical and Process			Lump Sum		$100,000	$100,000	
Additional Construction Costs	25%		ea.			$125,000	Includes Mod/Demob,connections, inspection, hydrants, signage, traffic management, bonding, insurance
Provisional & Allowance	10%		ea.			$62,500	Provisional Labour and Materials in addition to base construction cost
Sub-Total Construction Base Costs						$688,000	
Geotechnical / Hydrogeological / Materials	20.0%					$ 100,000	
Geotechnical Sub-Total Cost						**$100,000**	
Property Requirements	1.0%					$ -	
Property Requirements Sub-Total						**$0**	
Consultant Engineering/Design	15%					$ 103,200	includes planning, pre-design, detailed design, training, CA, commissioning
Engineering/Design Sub-Total						**$103,200**	
In House Labour/Engineering/Wages/CA	3%					$ 20,600	
In-house Labour/Wages Sub-Total						**$20,600**	
Project Contingency	10%					$91,000	Construction Contingency is dependent on Cost Estimate Class and Project Complexity
Project Contingency Sub-Total						**$91,000**	
Non-Refundable HST	1.76%					$17,300	
Non-Refundable HST Sub-Total						**$17,300**	
Total (2019 Dollars)						**$1,020,000**	Rounded to nearest $1,000
Other Estimate							
Chosen Estimate						**$1,020,000**	2019 Estimate

COST ESTIMATE SUMMARY - FOR PHASING ESTIMATING ONLY

PROJECT COMPONENT	PROJECT COMPONENT DESCRIPTION	PERCENTAGE	TOTAL	YEAR	COMMENTS
Study	Feasibility study, EA	2%	$20,400		
Design	Design fees, Town fees for design, contract admin	13%	$132,600		
Construction	Town fees, base costs and project contingency	85%	$867,000		
TOTAL			$1,020,000		

PROJECT NO.: W-T-SUP-02

PROJECT NAME: New Thorndale Groundwater Supply

PROJECT DESCRIPTION: 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

CLASS EA REQUIREMENTS:	C

COST ESTIMATE SUMMARY - FOR PHASING ESTIMATING ONLY

PROJECT COMPONENT	PROJECT COMPONENT DESCRIPTION	TOTAL
Study	Feasibility study, EA	$750,000
Design	Design fees, Town fees for design, contract admin	$500,000
Construction	Town fees, base costs and project contingency	$5M - $15M

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PROJECT NO.:	W-T-RES-01	CAPITAL BUDGET YEAR:	
PROJECT NAME:	Thorndale Reservoir Upgrade	VERSION:	
PROJECT DESCRIPTION:	Twinning the existing 0.451 ML reservoir and 0.363 ML reservoir	DATE UPDATED:	
		UPDATED BY:	

Class Estimate Type:	Class 4	Class adjusts Construction Contingency and expected accuracy
Project Complexity	Med	Complexity adjusts Construction Contingency, and expected accuracy
Accuracy Range:	40%	
Area Condition:	Suburban	Area Condition uplifts unit cost and restoration

= Field has drop down
= Field must be manually populated
= Field auto-filled based on project details

PROPOSED CAPACITY	0.5 ML

CLASS EA REQUIREMENTS:	A
CONSTRUCTION ASSUMPTION:	Other

COST ESTIMATION SPREADSHEET

COMPONENT	RATE (%)	RATE ($)	UNIT	ESTIMATED QUANTITY	COST PER UNIT	SUB-TOTAL	COMMENTS
Construction Cost							
Facility Construction			ML	0.5 ML	$900,000	$405,900	utiling existing reservoirs, not constructing new
Additional Construction Costs	15%		ea.			$60,885	Includes Mod/Demob,connections, inspection, hydrants, signage, traffic management, bonding, insurance
Provisional & Allowance	10%		ea.			$46,679	Provisional Labour and Materials in addition to base construction cost
Sub-Total Construction Base Costs						$513,000	
Geotechnical / Hydrogeological / Materials	1.0%					$5,100	
Geotechnical Sub-Total Cost						**$5,100**	
Property Requirements	1.5%					$ 7,700	
Property Requirements Sub-Total						**$7,700**	
Consultant Engineering/Design	15%					$ 77,000	includes planning, pre-design, detailed design, training, CA, commissioning
Engineering/Design Sub-Total						**$77,000**	
In House Labour/Engineering/Wages/CA	8%					$ 41,000	
In-house Labour/Wages Sub-Total						**$41,000**	
Project Contingency	15%					$97,000	Construction Contingency is dependent on Cost Estimate Class and Project Complexity
Project Contingency Sub-Total						**$97,000**	
Non-Refundable HST	1.76%					$12,300	
Non-Refundable HST Sub-Total						**$12,300**	
Total (2019 Dollars)						**$753,000**	Rounded to nearest $1,000
Other Estimate							
Chosen Estimate						**$753,000**	**2019 Estimate**

COST ESTIMATE SUMMARY - FOR PHASING ESTIMATING ONLY

PROJECT COMPONENT	PROJECT COMPONENT DESCRIPTION	PERCENTAGE	TOTAL	YEAR	COMMENTS
Study	Feasibility study, EA	2%	$15,060		
Design	Design fees, Town fees for design, contract admin	13%	$97,890		
Construction	Town fees, base costs and project contingency	85%	$640,050		
TOTAL			**$753,000**		

Municipality of Thames Centre
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PROJECT NO.:	W-T-BPS-01	CAPITAL BUDGET YEAR:	
PROJECT NAME:	Thorndale HLP Upgrades	VERSION:	
PROJECT DESCRIPTION:	Upgrade Thorndale HLP to supply elevated tank and distribution system from reservoirs	DATE UPDATED:	
		UPDATED BY:	

Class Estimate Type:	Class 4	Class adjusts Construction Contingency and expected Accuracy	
Project Complexity	Low	Complexity adjusts Construction Contingency, and expected accuracy	
Accuracy Range:	30%		
Area Condition:	Suburban	Area Condition uplifts unit cost and restoration	

= Field has drop down
= Field must be manually populated
= Field auto-filled based on project details

PROPOSED CAPACITY	20 L/s
CLASS EA REQUIREMENTS:	A
CONSTRUCTION ASSUMPTION:	Other

Pump	Existing (L/s)	Future (L/s)
1	8.3	20
2	8.3	20
3		
4		
5		

COST ESTIMATION SPREADSHEET

COMPONENT	RATE (%)	RATE ($)	UNIT	ESTIMATED QUANTITY	COST PER UNIT	SUB-TOTAL	COMMENTS
Construction Cost							
Number of Pumps (including well casing upgrades)			Pumps	2	$200,000	$400,000	Pump replacement and upgrades
Electrical and Process			Lump Sum		$100,000	$100,000	
Additional Construction Costs	25%		ea.			$125,000	Includes Mod/Demob,connections, inspection, hydrants, signage, traffic management, bonding, insurance
Provisional & Allowance	10%		ea.			$62,500	Provisional Labour and Materials in addition to base construction cost
Sub-Total Construction Base Costs						$688,000	
Geotechnical / Hydrogeological / Materials	20.0%					$ 100,000	
Geotechnical Sub-Total Cost						$100,000	
Property Requirements	1.0%					$ -	
Property Requirements Sub-Total						$0	
Consultant Engineering/Design	15%					$ 103,200	includes planning, pre-design, detailed design, training, CA, commissioning
Engineering/Design Sub-Total						$103,200	
In House Labour/Engineering/Wages/CA	3%					$ 20,600	
In-house Labour/Wages Sub-Total						$20,600	
Project Contingency	10%					$91,000	Construction Contingency is dependent on Cost Estimate Class and Project Complexity
Project Contingency Sub-Total						$91,000	
Non-Refundable HST	1.76%					$17,300	
Non-Refundable HST Sub-Total						$17,300	
Total (2019 Dollars)						$1,020,000	Rounded to nearest $1,000
Other Estimate							
Chosen Estimate						$1,020,000	2019 Estimate

COST ESTIMATE SUMMARY - FOR PHASING ESTIMATING ONLY

PROJECT COMPONENT	PROJECT COMPONENT DESCRIPTION	PERCENTAGE	TOTAL	YEAR	COMMENTS
Study	Feasibility study, EA	2%	$20,400		
Design	Design fees, Town fees for design, contract admin	13%	$132,600		
Construction	Town fees, base costs and project contingency	85%	$867,000		
TOTAL			$1,020,000		

Municipality of Thames Centre
Water and Wastewater Master Plan
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PROJECT NO.:	W-T-WM-01	CAPITAL BUDGET YEAR:	
PROJECT NAME:	Thorndale Watermain - Thorndale Rd. Upgrade	VERSION:	
PROJECT DESCRIPTION:	350m of existing PVC watermain on Thorndale Rd. (built in 1987) to be replaced by 300mm PVC watermain	DATE UPDATED:	
		UPDATED BY:	

2	Class Estimate Type:	Class 4	Class adjusts Construction Contingency and expected accuracy
3	Project Complexity	Med	Complexity adjusts Construction Contingency and expected accuracy
4	Accuracy Range:	40%	
5	Area Condition:	Suburban	Area Condition uplifts unit cost and net and...

(grey)	= Field has drop down
(yellow)	= Field must be manually populated
(green)	= Field auto-filled based on project details

PROPOSED DIAMETER:		300 mm	
TOTAL LENGTH:		350 m	
	Tunnelled	0 m	0%
	Open Cut	350 m	100%

CLASS EA REQUIREMENTS:	A+
CONSTRUCTION ASSUMPTION:	Watermain

COST ESTIMATION SPREADSHEET

COMPONENT	RATE (%)	RATE ($)	UNIT	ESTIMATED QUANTITY	COST PER UNIT	SUB-TOTAL	COMMENTS
Construction Cost							
Pipe Construction - Open Cut			m	350 m	$777	$271,820	Existing road ROW
Pipe Construction - Tunneling			m	0 m	$1,300	$0	
Pipe Construction Uplift (Based on Area Conditions)	20%					$54,364	
Minor Creek Crossings			ea.	0	$38,000	$0	
Major Creek Crossings			ea.	0	$207,000	$0	
Road Crossings			ea.	0	$90,000	$0	
Major Road / Rail Crossings			ea.	0	$207,000	$0	
Utility Crossings			ea.	1	$90,000	$90,000	
Valve and Chamber			ea.	4	$6,000	$24,000	2 valves minimum
Additional Construction Costs	15%		ea.			$66,028	Includes Mod/Demob,connections, inspection, hydrants, signage, traffic management, bonding, insurance
Provisional & Allowance	10%		ea.			$50,621	Provisional Labour and Materials in addition to base construction cost
Sub-Total Construction Base Costs						**$557,000**	
Geotechnical / Hydrogeological / Materials	1.0%					$5,600	
Geotechnical Sub-Total Cost						**$5,600**	
Property Requirements	1.5%					$ 8,400	
Property Requirements Sub-Total						**$8,400**	
Consultant Engineering/Design	15%					$ 83,600	includes planning, pre-design, detailed design, training, CA, commissioning
Engineering/Design Sub-Total						**$83,600**	
In House Labour/Engineering/Wages/CA	8%					$ 44,600	
In-house Labour/Wages Sub-Total						**$44,600**	
Project Contingency	15%					$105,000	Construction Contingency is dependent on Cost Estimate Class and Project Complexity
Project Contingency Sub-Total						**$105,000**	
Non-Refundable HST	1.76%					$13,400	
Non-Refundable HST Sub-Total						**$13,400**	
Total (2019 Dollars)						**$818,000**	Rounded to nearest $1,000
Other Estimate							
Chosen Estimate						**$818,000**	2019 Estimate

COST ESTIMATE SUMMARY - FOR PHASING ESTIMATING ONLY

PROJECT COMPONENT	PROJECT COMPONENT DESCRIPTION	PERCENTAGE	TOTAL	YEAR	COMMENTS
Study	Feasibility study, EA	2%	$16,360		
Design	Design fees, Town fees for design, contract admin	13%	$106,340		
Construction	Town fees, base costs and project contingency	85%	$695,300		
TOTAL			$818,000		

Municipality of Thames Centre
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PROJECT NO.:	W-T-WM-02	CAPITAL BUDGET YEAR:	
PROJECT NAME:	Thorndale Watermain - South Trunk at Monteith Lands	VERSION:	
PROJECT DESCRIPTION:	540m of proposed 300mm PVC watermain at Monteith Lands to complete south trunk.	DATE UPDATED:	
		UPDATED BY:	

2	Class Estimate Type:	Class 4	Class adjusts Construction Contingency and expected accuracy
3	Project Complexity	Low	Complexity adjusts Construction Contingency and expected accuracy
4	Accuracy Range:	30%	
5	Area Condition:	Rural	Area Condition uplifts unit cost and restoration

= Field has drop down
= Field must be manually populated
= Field auto-filled based on project details

6	PROPOSED DIAMETER:		300 mm	
7	TOTAL LENGTH:		540 m	
		Tunnelled	0 m	0%
		Open Cut	540 m	100%

CLASS EA REQUIREMENTS:	A
CONSTRUCTION ASSUMPTION:	Watermain

COST ESTIMATION SPREADSHEET

COMPONENT	RATE (%)	RATE ($)	UNIT	ESTIMATED QUANTITY	COST PER UNIT	SUB-TOTAL	COMMENTS
Construction Cost							
Pipe Construction - Open Cut			m	540 m	$777	$419,379	Existing road ROW
Pipe Construction - Tunneling			m	0 m	$1,300	$0	
Pipe Construction Uplift (Based on Area Conditions)	0%					$0	
Minor Creek Crossings			ea.	0	$38,000	$0	
Major Creek Crossings			ea.	0	$207,000	$0	
Road Crossings			ea.	0	$90,000	$0	
Major Road / Rail Crossings			ea.	0	$207,000	$0	
Utility Crossings			ea.	1	$90,000	$90,000	
Valve and Chamber			ea.	4	$6,000	$24,000	2 valves minimum
Additional Construction Costs	10%		ea.			$53,338	Includes Mod/Demob,connections, inspection, hydrants, signage, traffic management, bonding, insurance
Provisional & Allowance	10%		ea.			$58,672	Provisional Labour and Materials in addition to base construction cost
Sub-Total Construction Base Costs						$645,000	
Geotechnical / Hydrogeological / Materials	0.5%					$3,200	
Geotechnical Sub-Total Cost						**$3,200**	
Property Requirements	1.0%					$ 6,500	
Property Requirements Sub-Total						**$6,500**	
Consultant Engineering/Design	15%					$ 96,800	includes planning, pre-design, detailed design, training, CA, commissioning
Engineering/Design Sub-Total						**$96,800**	
In House Labour/Engineering/Wages/CA	8%					$ 51,600	
In-house Labour/Wages Sub-Total						**$51,600**	
Project Contingency	10%					$80,000	Construction Contingency is dependent on Cost Estimate Class and Project Complexity
Project Contingency Sub-Total						**$80,000**	
Non-Refundable HST	1.76%					$14,600	
Non-Refundable HST Sub-Total						**$14,600**	
Total (2019 Dollars)						**$898,000**	Rounded to nearest $1,000
Other Estimate							
Chosen Estimate						$898,000	2019 Estimate

COST ESTIMATE SUMMARY - FOR PHASING ESTIMATING ONLY

PROJECT COMPONENT	PROJECT COMPONENT DESCRIPTION	PERCENTAGE	TOTAL	YEAR	COMMENTS
Study	Feasibility study, EA	2%	$17,960		
Design	Design fees, Town fees for design, contract admin	13%	$116,740		
Construction	Town fees, base costs and project contingency	85%	$763,300		
TOTAL			$898,000		

PROJECT NO.:	W-T-WM-03	CAPITAL BUDGET YEAR:	
PROJECT NAME:	Thorndale Watermain - South Trunk Meadowbrook Ln. Upgrade	VERSION:	
PROJECT DESCRIPTION:	440m of existing 150mm PVC watermain on Meadowbrook Ln.(built in 1990) to be replaced by 300mm PVC watermain	DATE UPDATED:	
		UPDATED BY:	

Class Estimate Type:	Class 4	Class adjusts Construction Contingency and expected accuracy	
Project Complexity	Med	Complexity adjusts Construction Contingency and expected accuracy	
Accuracy Range:	40%		
Area Condition:	Suburban	Area Condition uplifts unit cost and restoration	

	= Field has drop down
	= Field must be manually populated
	= Field auto-filled based on project details

PROPOSED DIAMETER:		300 mm	
TOTAL LENGTH:		440 m	
	Tunnelled	0 m	0%
	Open Cut	440 m	100%

CLASS EA REQUIREMENTS:	A+
CONSTRUCTION ASSUMPTION:	Watermain

COST ESTIMATION SPREADSHEET

COMPONENT	RATE (%)	RATE ($)	UNIT	ESTIMATED QUANTITY	COST PER UNIT	SUB-TOTAL	COMMENTS
Construction Cost							
Pipe Construction - Open Cut			m	440 m	$777	$341,717	Existing road ROW
Pipe Construction - Tunneling			m	0 m	$1,300	$0	
Pipe Construction Uplift (Based on Area Conditions)	20%					$68,343	
Minor Creek Crossings			ea.	0	$38,000	$0	
Major Creek Crossings			ea.	0	$207,000	$0	
Road Crossings			ea.	0	$90,000	$0	
Major Road / Rail Crossings			ea.	0	$207,000	$0	
Utility Crossings			ea.	0	$90,000	$0	
Valve and Chamber			ea.	3	$6,000	$18,000	2 valves minimum
Additional Construction Costs	15%		ea.			$64,209	Includes Mod/Demob,connections, inspection, hydrants, signage, traffic management, bonding, insurance
Provisional & Allowance	10%		ea.			$49,227	Provisional Labour and Materials in addition to base construction cost
Sub-Total Construction Base Costs						$541,000	
Geotechnical / Hydrogeological / Materials	1.0%					$5,400	
Geotechnical Sub-Total Cost						$5,400	
Property Requirements	1.5%					$ 8,100	
Property Requirements Sub-Total						$8,100	
Consultant Engineering/Design	15%					$ 81,200	includes planning, pre-design, detailed design, training, CA, commissioning
Engineering/Design Sub-Total						$81,200	
In House Labour/Engineering/Wages/CA	8%					$ 43,300	
In-house Labour/Wages Sub-Total						$43,300	
Project Contingency	15%					$102,000	Construction Contingency is dependent on Cost Estimate Class and Project Complexity
Project Contingency Sub-Total						$102,000	
Non-Refundable HST	1.76%					$13,000	
Non-Refundable HST Sub-Total						$13,000	
Total (2019 Dollars)						$794,000	Rounded to nearest $1,000
Other Estimate							
Chosen Estimate						$794,000	2019 Estimate

COST ESTIMATE SUMMARY - FOR PHASING ESTIMATING ONLY

PROJECT COMPONENT	PROJECT COMPONENT DESCRIPTION	PERCENTAGE	TOTAL	YEAR	COMMENTS
Study	Feasibility study, EA	2%	$15,880		
Design	Design fees, Town fees for design, contract admin	13%	$103,220		
Construction	Town fees, base costs and project contingency	85%	$674,900		
TOTAL			$794,000		

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PROJECT NO.:	W-T-WM-04	CAPITAL BUDGET YEAR:	
PROJECT NAME:	Thorndale Watermain - South Trunk at Foxborough Subdivision	VERSION:	
PROJECT DESCRIPTION:	280m of proposed 300mm PVC watermain at Foxborough Subdivision to complete south trunk.	DATE UPDATED:	
		UPDATED BY:	

Class Estimate Type:	Class 4	Class adjusts Construction Contingency and expected accuracy
Project Complexity	Low	Complexity adjusts Construction Contingency and expected accuracy
Accuracy Range:	30%	
Area Condition:	Rural	Area Condition uplifts unit cost and restoration

= Field has drop down
= Field must be manually populated
= Field auto-filled based on project details

PROPOSED DIAMETER:		300 mm	
TOTAL LENGTH:		280 m	
	Tunnelled	0 m	0%
	Open Cut	280 m	100%

CLASS EA REQUIREMENTS:	A
CONSTRUCTION ASSUMPTION:	Watermain

COST ESTIMATION SPREADSHEET

COMPONENT	RATE (%)	RATE ($)	UNIT	ESTIMATED QUANTITY	COST PER UNIT	SUB-TOTAL	COMMENTS
Construction Cost							
Pipe Construction - Open Cut			m	280 m	$777	$217,456	Existing road ROW
Pipe Construction - Tunneling			m	0 m	$1,300	$0	
Pipe Construction Uplift (Based on Area Conditions)	0%					$0	
Minor Creek Crossings			ea.	0	$38,000	$0	
Major Creek Crossings			ea.	0	$207,000	$0	
Road Crossings			ea.	0	$90,000	$0	
Major Road / Rail Crossings			ea.	0	$207,000	$0	
Utility Crossings			ea.	0	$90,000	$0	
Valve and Chamber			ea.	2	$6,000	$12,000	2 valves minimum
Additional Construction Costs	10%		ea.			$22,946	Includes Mod/Demob,connections, inspection, hydrants, signage, traffic management, bonding, insurance
Provisional & Allowance	10%		ea.			$25,240	Provisional Labour and Materials in addition to base construction cost
Sub-Total Construction Base Costs						$278,000	
Geotechnical / Hydrogeological / Materials	0.5%					$1,400	
Geotechnical Sub-Total Cost						**$1,400**	
Property Requirements	1.0%					$ 2,800	
Property Requirements Sub-Total						**$2,800**	
Consultant Engineering/Design	15%					$ 41,700	includes planning, pre-design, detailed design, training, CA, commissioning
Engineering/Design Sub-Total						**$41,700**	
In House Labour/Engineering/Wages/CA	8%					$ 22,200	
In-house Labour/Wages Sub-Total						**$22,200**	
Project Contingency	10%					$35,000	Construction Contingency is dependent on Cost Estimate Class and Project Complexity
Project Contingency Sub-Total						**$35,000**	
Non-Refundable HST	1.76%					$6,300	
Non-Refundable HST Sub-Total						**$6,300**	
Total (2019 Dollars)						**$387,000**	Rounded to nearest $1,000
Other Estimate							
Chosen Estimate						$387,000	2019 Estimate

COST ESTIMATE SUMMARY - FOR PHASING ESTIMATING ONLY

PROJECT COMPONENT	PROJECT COMPONENT DESCRIPTION	PERCENTAGE	TOTAL	YEAR	COMMENTS
Study	Feasibility study, EA	2%	$7,740		
Design	Design fees, Town fees for design, contract admin	13%	$50,310		
Construction	Town fees, base costs and project contingency	85%	$328,950		
TOTAL			$387,000		

Municipality of Thames Centre
Water and Wastewater Master Plan
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PROJECT NO.:	**W-T-WM-05**	**CAPITAL BUDGET YEAR:**	
PROJECT NAME:	**Thorndale Watermain - South Trunk at Railway Crossing**	**VERSION:**	
PROJECT DESCRIPTION:	410m of proposed 300mm PVC watermain at railway crossing to complete south trunk.	**DATE UPDATED:**	
		UPDATED BY:	

2	**Class Estimate Type:**	Class 4	Class adjusts Construction Contingency and expected accuracy
3	**Project Complexity**	High	Complexity adjusts Construction Contingency and expected accuracy
4	**Accuracy Range:**	50%	
5	**Area Condition:**	Rural	Area Condition uplifts unit cost and restoration

(grey)	= Field has drop down
(yellow)	= Field must be manually populated
(green)	= Field auto-filled based on project details

6	**PROPOSED DIAMETER:**		300 mm	
7	**TOTAL LENGTH:**		410 m	
		Tunnelled	200 m	49%
		Open Cut	210 m	51%

CLASS EA REQUIREMENTS:	A+
CONSTRUCTION ASSUMPTION:	Watermain

COST ESTIMATION SPREADSHEET

COMPONENT	RATE (%)	RATE ($)	UNIT	ESTIMATED QUANTITY	COST PER UNIT	SUB-TOTAL	COMMENTS
Construction Cost							
Pipe Construction - Open Cut			m	210 m	$777	$163,092	Existing road ROW
Pipe Construction - Tunneling			m	200 m	$1,300	$260,000	
Pipe Construction Uplift (Based on Area Conditions)	0%					$0	
Minor Creek Crossings			ea.	0	$38,000	$0	
Major Creek Crossings			ea.	1	$207,000	$207,000	
Road Crossings			ea.	0	$90,000	$0	
Major Road / Rail Crossings			ea.	1	$207,000	$207,000	
Utility Crossings			ea.	0	$90,000	$0	
Valve and Chamber			ea.	2	$6,000	$12,000	2 valves minimum
Additional Construction Costs	20%		ea.			$169,818	Includes Mod/Demob,connections, inspection, hydrants, signage, traffic management, bonding, insurance
Provisional & Allowance	10%		ea.			$101,891	Provisional Labour and Materials in addition to base construction cost
Sub-Total Construction Base Costs						**$1,121,000**	
Geotechnical / Hydrogeological / Materials	2.0%					$22,400	
Geotechnical Sub-Total Cost						**$22,400**	
Property Requirements	2.0%					$ 22,400	
Property Requirements Sub-Total						**$22,400**	
Consultant Engineering/Design	15%					$ 168,200	includes planning, pre-design, detailed design, training, CA, commissioning
Engineering/Design Sub-Total						**$168,200**	
In House Labour/Engineering/Wages/CA	8%					$ 89,700	
In-house Labour/Wages Sub-Total						**$89,700**	
Project Contingency	25%					$356,000	Construction Contingency is dependent on Cost Estimate Class and Project Complexity
Project Contingency Sub-Total						**$356,000**	
Non-Refundable HST	1.76%					$29,700	
Non-Refundable HST Sub-Total						**$29,700**	
Total (2019 Dollars)						**$1,809,000**	Rounded to nearest $1,000
Other Estimate							
Chosen Estimate						**$1,809,000**	**2019 Estimate**

COST ESTIMATE SUMMARY - FOR PHASING ESTIMATING ONLY

PROJECT COMPONENT	PROJECT COMPONENT DESCRIPTION	PERCENTAGE	TOTAL	YEAR	COMMENTS
Study	Feasibility study, EA	2%	$36,180		
Design	Design fees, Town fees for design, contract admin	13%	$235,170		
Construction	Town fees, base costs and project contingency	85%	$1,537,650		
TOTAL			**$1,809,000**		

Municipality of Thames Centre
Water and Wastewater Master Plan
Capital Program Cost Estimate

PROJECT NO.:	W-T-WM-06	CAPITAL BUDGET YEAR:	
PROJECT NAME:	Thorndale Watermain - South Trunk at Rosewood Subdivision	VERSION:	
PROJECT DESCRIPTION:	390m of proposed 300mm PVC watermain at Rosewood Subdivision to complete south trunk.	DATE UPDATED:	
		UPDATED BY:	

2	Class Estimate Type:	Class 4	Class adjusts Construction Contingency and expected accuracy
3	Project Complexity	Low	Complexity adjusts Construction Contingency and expected accuracy
4	Accuracy Range:	30%	
5	Area Condition:	Rural	Area Condition uplifts unit cost and restoration

(grey)	= Field has drop down
(yellow)	= Field must be manually populated
(green)	= Field auto-filled based on project details

PROPOSED DIAMETER:		300 mm	
TOTAL LENGTH:		390 m	
	Tunnelled	0 m	0%
	Open Cut	390 m	100%

CLASS EA REQUIREMENTS:	A
CONSTRUCTION ASSUMPTION:	Watermain

COST ESTIMATION SPREADSHEET

COMPONENT	RATE (%)	RATE ($)	UNIT	ESTIMATED QUANTITY	COST PER UNIT	SUB-TOTAL	COMMENTS
Construction Cost							
Pipe Construction - Open Cut			m	390 m	$777	$302,885	Existing road ROW
Pipe Construction - Tunneling			m	0 m	$1,300	$0	
Pipe Construction Uplift (Based on Area Conditions)	0%					$0	
Minor Creek Crossings			ea.	0	$38,000	$0	
Major Creek Crossings			ea.	0	$207,000	$0	
Road Crossings			ea.	0	$90,000	$0	
Major Road / Rail Crossings			ea.	0	$207,000	$0	
Utility Crossings			ea.	0	$90,000	$0	
Valve and Chamber			ea.	3	$6,000	$18,000	2 valves minimum
Additional Construction Costs	10%		ea.			$32,089	Includes Mod/Demob,connections, inspection, hydrants, signage, traffic management, bonding, insurance
Provisional & Allowance	10%		ea.			$35,297	Provisional Labour and Materials in addition to base construction cost
Sub-Total Construction Base Costs						$388,000	
Geotechnical / Hydrogeological / Materials	0.5%					$1,900	
Geotechnical Sub-Total Cost						$1,900	
Property Requirements	1.0%					$ 3,900	
Property Requirements Sub-Total						$3,900	
Consultant Engineering/Design	15%					$ 58,200	includes planning, pre-design, detailed design, training, CA, commissioning
Engineering/Design Sub-Total						$58,200	
In House Labour/Engineering/Wages/CA	8%					$ 31,000	
In-house Labour/Wages Sub-Total						$31,000	
Project Contingency	10%					$48,000	Construction Contingency is dependent on Cost Estimate Class and Project Complexity
Project Contingency Sub-Total						$48,000	
Non-Refundable HST	1.76%					$8,800	
Non-Refundable HST Sub-Total						$8,800	
Total (2019 Dollars)						$540,000	Rounded to nearest $1,000
Other Estimate							
Chosen Estimate						$540,000	2019 Estimate

COST ESTIMATE SUMMARY - FOR PHASING ESTIMATING ONLY

PROJECT COMPONENT	PROJECT COMPONENT DESCRIPTION	PERCENTAGE	TOTAL	YEAR	COMMENTS
Study	Feasibility study, EA	2%	$10,800		
Design	Design fees, Town fees for design, contract admin	13%	$70,200		
Construction	Town fees, base costs and project contingency	85%	$459,000		
TOTAL			$540,000		

Municipality of Thames Centre
Water and Wastewater Master Plan
Capital Program Cost Estimate

PROJECT NO.:	W-T-WM-07	CAPITAL BUDGET YEAR:	
PROJECT NAME:	Thorndale Watermain - Subrunk at Rosewood	VERSION:	
PROJECT DESCRIPTION:	680m of proposed 300mm PVC watermain at Rosewood Subdivision.	DATE UPDATED:	
		UPDATED BY:	

Class Estimate Type:	Class 4	Class adjusts Construction Contingency and expected accuracy
Project Complexity	Low	Complexity adjusts Construction Contingency and expected accuracy
Accuracy Range:	30%	
Area Condition:	Rural	Area Condition uplifts unit cost and restoration

(grey)	= Field has drop down
(yellow)	= Field must be manually populated
(green)	= Field auto-filled based on project details

PROPOSED DIAMETER:		300 mm	
TOTAL LENGTH:		680 m	
	Tunnelled	0 m	0%
	Open Cut	680 m	100%

CLASS EA REQUIREMENTS:	A
CONSTRUCTION ASSUMPTION:	Watermain

COST ESTIMATION SPREADSHEET

COMPONENT	RATE (%)	RATE ($)	UNIT	ESTIMATED QUANTITY	COST PER UNIT	SUB-TOTAL	COMMENTS
Construction Cost							
Pipe Construction - Open Cut			m	680 m	$777	$528,107	Existing road ROW
Pipe Construction - Tunneling			m	0 m	$1,300	$0	
Pipe Construction Uplift (Based on Area Conditions)	0%					$0	
Minor Creek Crossings			ea.	1	$38,000	$38,000	
Major Creek Crossings			ea.	0	$207,000	$0	
Road Crossings			ea.	0	$90,000	$0	
Major Road / Rail Crossings			ea.	0	$207,000	$0	
Utility Crossings			ea.	0	$90,000	$0	
Valve and Chamber			ea.	3	$6,000	$18,000	2 valves minimum
Additional Construction Costs	10%		ea.			$59,411	Includes Mod/Demob,connections, inspection, hydrants, signage, traffic management, bonding, insurance
Provisional & Allowance	10%		ea.			$64,252	Provisional Labour and Materials in addition to base construction cost
Sub-Total Construction Base Costs						$707,000	
Geotechnical / Hydrogeological / Materials	0.5%					$3,500	
Geotechnical Sub-Total Cost						$3,500	
Property Requirements	1.0%					$ 7,100	
Property Requirements Sub-Total						$7,100	
Consultant Engineering/Design	15%					$ 106,100	includes planning, pre-design, detailed design, training, CA, commissioning
Engineering/Design Sub-Total						$106,100	
In House Labour/Engineering/Wages/CA	8%					$ 56,600	
In-house Labour/Wages Sub-Total						$56,600	
Project Contingency	10%					$88,000	Construction Contingency is dependent on Cost Estimate Class and Project Complexity
Project Contingency Sub-Total						$88,000	
Non-Refundable HST	1.76%					$16,000	
Non-Refundable HST Sub-Total						$16,000	
Total (2019 Dollars)						$984,000	Rounded to nearest $1,000
Other Estimate							
Chosen Estimate						$984,000	2019 Estimate

COST ESTIMATE SUMMARY - FOR PHASING ESTIMATING ONLY

PROJECT COMPONENT	PROJECT COMPONENT DESCRIPTION	PERCENTAGE	TOTAL	YEAR	COMMENTS
Study	Feasibility study, EA	2%	$19,680		
Design	Design fees, Town fees for design, contract admin	13%	$127,920		
Construction	Town fees, base costs and project contingency	85%	$836,400		
TOTAL			$984,000		

Municipality of Thames Centre
Water and Wastewater Master Plan
Capital Program Cost Estimate

PROJECT NO.:	W-T-WM-08	CAPITAL BUDGET YEAR:	
PROJECT NAME:	Thorndale Watermain Upgrade - Gerald Pkwy. Upgrade	VERSION:	
PROJECT DESCRIPTION:	590m of existing 200mm PVC watermain (built in 2010) on Gerald Pkwy. to be replaced by 250mm PVC watermain.	DATE UPDATED:	
		UPDATED BY:	

Class Estimate Type:	Class 4	Class adjusts Construction Contingency and expected accuracy	= Field has drop down
Project Complexity	Med	Complexity adjusts Construction Contingency, and expected accuracy	= Field must be manually populated
Accuracy Range:	40%		= Field auto-filled based on project details
Area Condition:	Suburban	Area Condition uplifts unit cost and restoration	

PROPOSED DIAMETER:		300 mm	
TOTAL LENGTH:		590 m	
	Tunnelled	0 m	0%
	Open Cut	590 m	100%

CLASS EA REQUIREMENTS:	A+
CONSTRUCTION ASSUMPTION:	Watermain

COST ESTIMATION SPREADSHEET

COMPONENT	RATE (%)	RATE ($)	UNIT	ESTIMATED QUANTITY	COST PER UNIT	SUB-TOTAL	COMMENTS
Construction Cost							
Pipe Construction - Open Cut			m	590 m	$777	$458,211	Existing road ROW
Pipe Construction - Tunneling			m	0 m	$1,300	$0	
Pipe Construction Uplift (Based on Area Conditions)	20%					$91,642	
Minor Creek Crossings			ea.	0	$38,000	$0	
Major Creek Crossings			ea.	0	$207,000	$0	
Road Crossings			ea.	0	$90,000	$0	
Major Road / Rail Crossings			ea.	0	$207,000	$0	
Utility Crossings			ea.	0	$90,000	$0	
Valve and Chamber			ea.	2	$6,000	$12,000	2 valves minimum
Additional Construction Costs	15%		ea.			$84,278	Includes Mod/Demob,connections, inspection, hydrants, signage, traffic management, bonding, insurance
Provisional & Allowance	10%		ea.			$64,613	Provisional Labour and Materials in addition to base construction cost
Sub-Total Construction Base Costs						$711,000	
Geotechnical / Hydrogeological / Materials	1.0%					$7,100	
Geotechnical Sub-Total Cost						**$7,100**	
Property Requirements	1.5%					$ 10,700	
Property Requirements Sub-Total						**$10,700**	
Consultant Engineering/Design	15%					$ 106,700	includes planning, pre-design, detailed design, training, CA, commissioning
Engineering/Design Sub-Total						**$106,700**	
In House Labour/Engineering/Wages/CA	8%					$ 56,900	
In-house Labour/Wages Sub-Total						**$56,900**	
Project Contingency	15%					$134,000	Construction Contingency is dependent on Cost Estimate Class and Project Complexity
Project Contingency Sub-Total						**$134,000**	
Non-Refundable HST	1.76%					$17,100	
Non-Refundable HST Sub-Total						**$17,100**	
Total (2019 Dollars)						**$1,044,000**	Rounded to nearest $1,000
Other Estimate							
Chosen Estimate						$1,044,000	2019 Estimate

COST ESTIMATE SUMMARY - FOR PHASING ESTIMATING ONLY

PROJECT COMPONENT	PROJECT COMPONENT DESCRIPTION	PERCENTAGE	TOTAL	YEAR	COMMENTS
Study	Feasibility study, EA	2%	$20,880		
Design	Design fees, Town fees for design, contract admin	13%	$135,720		
Construction	Town fees, base costs and project contingency	85%	$887,400		
TOTAL			$1,044,000		

Municipality of Thames Centre
Water and Wastewater Master Plan
Capital Program Cost Estimate

PROJECT NO.:	W-T-WM-09	CAPITAL BUDGET YEAR:	
PROJECT NAME:	Thorndale Watermain Upgrade - Industrial Lands Loop	VERSION:	
PROJECT DESCRIPTION:	1000m of 250mm watermain to connect Ideal Dr. and Gerald Pkwy. to complete loop	DATE UPDATED:	
		UPDATED BY:	

Class Estimate Type:	Class 4	Class adjusts Construction Contingency and expected accuracy	
Project Complexity	Med	Complexity adjusts Construction Contingency and expected accuracy	
Accuracy Range:	40%		
Area Condition:	Suburban	Area Condition uplifts unit cost and reinstation	

= Field has drop down
= Field must be manually populated
= Field auto-filled based on project details

PROPOSED DIAMETER:		300 mm	
TOTAL LENGTH:		1000 m	
	Tunnelled	0 m	0%
	Open Cut	1000 m	100%

CLASS EA REQUIREMENTS:	A+
CONSTRUCTION ASSUMPTION:	Watermain

COST ESTIMATION SPREADSHEET

COMPONENT	RATE (%)	RATE ($)	UNIT	ESTIMATED QUANTITY	COST PER UNIT	SUB-TOTAL	COMMENTS
Construction Cost							
Pipe Construction - Open Cut			m	1000 m	$777	$776,629	Existing road ROW
Pipe Construction - Tunneling			m	0 m	$1,300	$0	
Pipe Construction Uplift (Based on Area Conditions)	20%					$155,326	
Minor Creek Crossings			ea.	0	$38,000	$0	
Major Creek Crossings			ea.	0	$207,000	$0	
Road Crossings			ea.	0	$90,000	$0	
Major Road / Rail Crossings			ea.	0	$207,000	$0	
Utility Crossings			ea.	0	$90,000	$0	
Valve and Chamber			ea.	1	$6,000	$6,000	2 valves minimum
Additional Construction Costs	15%		ea.			$140,693	Includes Mod/Demob,connections, inspection, hydrants, signage, traffic management, bonding, insurance
Provisional & Allowance	10%		ea.			$107,865	Provisional Labour and Materials in addition to base construction cost
Sub-Total Construction Base Costs						$1,187,000	
Geotechnical / Hydrogeological / Materials	1.0%					$11,900	
Geotechnical Sub-Total Cost						$11,900	
Property Requirements	1.5%					$ 17,800	
Property Requirements Sub-Total						$17,800	
Consultant Engineering/Design	15%					$ 178,100	includes planning, pre-design, detailed design, training, CA, commissioning
Engineering/Design Sub-Total						$178,100	
In House Labour/Engineering/Wages/CA	8%					$ 95,000	
In-house Labour/Wages Sub-Total						$95,000	
Project Contingency	15%					$223,000	Construction Contingency is dependent on Cost Estimate Class and Project Complexity
Project Contingency Sub-Total						$223,000	
Non-Refundable HST	1.76%					$28,500	
Non-Refundable HST Sub-Total						$28,500	
Total (2019 Dollars)						$1,741,000	Rounded to nearest $1,000
Other Estimate							
Chosen Estimate						$1,741,000	2019 Estimate

COST ESTIMATE SUMMARY - FOR PHASING ESTIMATING ONLY

PROJECT COMPONENT	PROJECT COMPONENT DESCRIPTION	PERCENTAGE	TOTAL	YEAR	COMMENTS
Study	Feasibility study, EA	2%	$34,820		
Design	Design fees, Town fees for design, contract admin	13%	$226,330		
Construction	Town fees, base costs and project contingency	85%	$1,479,850		
TOTAL			$1,741,000		

Municipality of Thames Centre
Water and Wastewater Master Plan
Capital Program Cost Estimate

1	PROJECT NO.:	W-T-WM-10	CAPITAL BUDGET YEAR:	
	PROJECT NAME:	Thorndale Watermain Upgrade - Industrial Lands Upgrade	VERSION:	
	PROJECT DESCRIPTION:	1020m of existing 200mm PVC watermain (built in 2010) on Thorndale Rd. and Ideal Dr. to be replaced by 250mm PVC watermain.	DATE UPDATED:	
			UPDATED BY:	

2	Class Estimate Type:	Class 4	Class adjusts Construction Contingency and expected accuracy
3	Project Complexity	Med	Complexity adjusts Construction Contingency and expected accuracy
4	Accuracy Range:	40%	
5	Area Condition:	Suburban	Area Condition uplifts unit cost and restoration

Legend	
(grey)	= Field has drop down
(yellow)	= Field must be manually populated
(green)	= Field auto-filled based on project details

6	PROPOSED DIAMETER:		300 mm	
7	TOTAL LENGTH:		1020 m	
		Tunnelled	0 m	0%
		Open Cut	1020 m	100%

CLASS EA REQUIREMENTS:	A+
CONSTRUCTION ASSUMPTION:	Watermain

COST ESTIMATION SPREADSHEET

COMPONENT	RATE (%)	RATE ($)	UNIT	ESTIMATED QUANTITY	COST PER UNIT	SUB-TOTAL	COMMENTS
Construction Cost							
Pipe Construction - Open Cut			m	1020 m	$777	$792,161	Existing road ROW
Pipe Construction - Tunneling			m	0 m	$1,300	$0	
Pipe Construction Uplift (Based on Area Conditions)	20%					$158,432	
Minor Creek Crossings			ea.	0	$38,000	$0	
Major Creek Crossings			ea.	0	$207,000	$0	
Road Crossings			ea.	0	$90,000	$0	
Major Road / Rail Crossings			ea.	0	$207,000	$0	
Utility Crossings			ea.	0	$90,000	$0	
Valve and Chamber			ea.	3	$6,000	$18,000	2 valves minimum
Additional Construction Costs	15%		ea.			$145,289	Includes Mod/Demob,connections, inspection, hydrants, signage, traffic management, bonding, insurance
Provisional & Allowance	10%		ea.			$111,388	Provisional Labour and Materials in addition to base construction cost
Sub-Total Construction Base Costs						**$1,225,000**	
Geotechnical / Hydrogeological / Materials	1.0%					$12,300	
Geotechnical Sub-Total Cost						**$12,300**	
Property Requirements	1.5%					$ 18,400	
Property Requirements Sub-Total						**$18,400**	
Consultant Engineering/Design	15%					$ 183,800	includes planning, pre-design, detailed design, training, CA, commissioning
Engineering/Design Sub-Total						**$183,800**	
In House Labour/Engineering/Wages/CA	8%					$ 98,000	
In-house Labour/Wages Sub-Total						**$98,000**	
Project Contingency	15%					$231,000	Construction Contingency is dependent on Cost Estimate Class and Project Complexity
Project Contingency Sub-Total						**$231,000**	
Non-Refundable HST	1.76%					$29,400	
Non-Refundable HST Sub-Total						**$29,400**	
Total (2019 Dollars)						**$1,798,000**	Rounded to nearest $1,000
Other Estimate							
Chosen Estimate						**$1,798,000**	2019 Estimate

(Rows Minor Creek Crossings through Utility Crossings marked 8.)

COST ESTIMATE SUMMARY - FOR PHASING ESTIMATING ONLY

PROJECT COMPONENT	PROJECT COMPONENT DESCRIPTION	PERCENTAGE	TOTAL	YEAR	COMMENTS
Study	Feasibility study, EA	2%	$35,960		
Design	Design fees, Town fees for design, contract admin	13%	$233,740		
Construction	Town fees, base costs and project contingency	85%	$1,528,300		
TOTAL			**$1,798,000**		

BluePlan

Municipality of Thames Centre
Water and Wastewater Master Plan Update
Capital Program Cost Estimates

PROJECT NO.: WW-D-TP-01A
PROJECT NAME: Dorchester Treatment Plant Upgrades
PROJECT DESCRIPTION: Treatment plant capacity upgrades required to accommodate all development flows in Dorchester

Class Estimate Type:	Class 4	Class adjusts Construction Contingency and expected accuracy
Project Complexity	Med	Complexity adjusts Construction Contingency, and expected accuracy
Accuracy Range:	40%	
Area Condition:	Suburban	Area Condition uplifts unit cost and restoration

PROJECT NO.: WW-D-TP-01A

PROPOSED CAPACITY	2.11 MLD

CLASS EA REQUIREMENTS:	C
CONSTRUCTION ASSUMPTION:	Other

COST ESTIMATION SPREADSHEET

COMPONENT	RATE (%)	RATE ($)	UNIT	ESTIMATED QUANTITY	COST PER UNIT	SUB-TOTAL	COMMENTS
Construction Cost							
Facility Construction			MLD	2 MLD	$2,500,000	$5,276,880	$2.5M per MLD
Additional Construction Costs	15%		ea.			$791,532	Includes Mod/Demob,connections, inspection, hydrants, signage, traffic management, bonding, insurance
Provisional & Allowance	10%		ea.			$606,841	Provisional Labour and Materials in addition to base construction cost
Sub-Total Construction Base Costs						$6,675,000	
Geotechnical / Hydrogeological / Materials	1.0%					$66,800	
Geotechnical Sub-Total Cost						**$66,800**	
Property Requirements	1.5%					$ 100,100	
Property Requirements Sub-Total						**$100,100**	
Consultant Engineering/Design	15%					$ 1,001,300	includes planning, pre-design, detailed design, training, CA, commissioning
Engineering/Design Sub-Total						**$1,001,300**	
In House Labour/Engineering/Wages/CA	3%					$ 200,300	
In-house Labour/Wages Sub-Total						**$200,300**	
Project Contingency	15%					$1,207,000	Construction Contingency is dependent on Cost Estimate Class and Project Complexity
Project Contingency Sub-Total						**$1,207,000**	
Non-Refundable HST	1.76%					$159,300	
Non-Refundable HST Sub-Total						**$159,300**	
Total (2019 Dollars)						**$9,410,000**	Rounded to nearest $1,000
Other Estimate							
Chosen Estimate						$9,410,000	2019 Estimate

COST ESTIMATE SUMMARY - FOR PHASING ESTIMATING ONLY

PROJECT COMPONENT	PROJECT COMPONENT DESCRIPTION	PERCENTAGE	TOTAL	YEAR	COMMENTS
Study	Feasibility study, EA	2%	$188,200		
Design	Design fees, Town fees for design, contract admin	13%	$1,223,300		
Construction	Town fees, base costs and project contingency	85%	$7,998,500		
TOTAL			$9,410,000		

PROJECT NO.: WW-D-TP-01B
PROJECT NAME: Dorchester Treatment Plant Upgrades
PROJECT DESCRIPTION: Treatment plant capacity upgrades required to accommodate all development flows in Dorchester

Class Estimate Type:	Class 4	Class adjusts Construction Contingency and expected accuracy
Project Complexity	Med	Complexity adjusts Construction Contingency, and expected accuracy
Accuracy Range:	40%	
Area Condition:	Suburban	Area Condition uplifts unit cost and restoration

PROJECT NO.: WW-D-TP-01B

PROPOSED CAPACITY	3.22 MLD

CLASS EA REQUIREMENTS:	C
CONSTRUCTION ASSUMPTION:	Other

COST ESTIMATION SPREADSHEET

COMPONENT	RATE (%)	RATE ($)	UNIT	ESTIMATED QUANTITY	COST PER UNIT	SUB-TOTAL	COMMENTS
Construction Cost							
Facility Construction			MLD	3 MLD	$2,500,000	$8,052,480	$2.5M per MLD
Additional Construction Costs	15%		ea.			$1,207,872	Includes Mod/Demob,connections, inspection, hydrants, signage, traffic management, bonding, insurance
Provisional & Allowance	10%		ea.			$926,035	Provisional Labour and Materials in addition to base construction cost
Sub-Total Construction Base Costs						$10,186,000	
Geotechnical / Hydrogeological / Materials	1.0%					$101,900	
Geotechnical Sub-Total Cost						**$101,900**	
Property Requirements	1.5%					$ 152,800	
Property Requirements Sub-Total						**$152,800**	
Consultant Engineering/Design	12%					$ 1,222,300	includes planning, pre-design, detailed design, training, CA, commissioning
Engineering/Design Sub-Total						**$1,222,300**	
In House Labour/Engineering/Wages/CA	3%					$ 305,600	
In-house Labour/Wages Sub-Total						**$305,600**	
Project Contingency	15%					$1,795,000	Construction Contingency is dependent on Cost Estimate Class and Project Complexity
Project Contingency Sub-Total						**$1,795,000**	
Non-Refundable HST	1.76%					$236,900	
Non-Refundable HST Sub-Total						**$236,900**	
Total (2019 Dollars)						**$14,001,000**	Rounded to nearest $1,000
Other Estimate							
Chosen Estimate						$14,001,000	2019 Estimate

COST ESTIMATE SUMMARY - FOR PHASING ESTIMATING ONLY

PROJECT COMPONENT	PROJECT COMPONENT DESCRIPTION	PERCENTAGE	TOTAL	YEAR	COMMENTS
Study	Feasibility study, EA	2%	$280,020		
Design	Design fees, Town fees for design, contract admin	13%	$1,820,130		
Construction	Town fees, base costs and project contingency	85%	$11,900,850		
TOTAL			$14,001,000		

PROJECT NO.: WW-D-TP-01C
PROJECT NAME: Dorchester Treatment Plant Upgrades
PROJECT DESCRIPTION: Treatment plant capacity upgrades required to accommodate all development flows in Dorchester

Class Estimate Type:	Class 4	Class adjusts Construction Contingency and expected accuracy
Project Complexity	Med	Complexity adjusts Construction Contingency, and expected accuracy
Accuracy Range:	40%	
Area Condition:	Suburban	Area Condition uplifts unit cost and restoration

PROJECT NO.: WW-D-TP-01C

PROPOSED CAPACITY	6.00 MLD

CLASS EA REQUIREMENTS:	C
CONSTRUCTION ASSUMPTION:	Other

COST ESTIMATION SPREADSHEET

COMPONENT	RATE (%)	RATE ($)	UNIT	ESTIMATED QUANTITY	COST PER UNIT	SUB-TOTAL	COMMENTS
Construction Cost							
Facility Construction			MLD	6 MLD	$2,500,000	$14,996,880	$2.5M per MLD
Additional Construction Costs	15%		ea.			$2,249,532	Includes Mod/Demob,connections, inspection, hydrants, signage, traffic management, bonding, insurance
Provisional & Allowance	10%		ea.			$1,724,641	Provisional Labour and Materials in addition to base construction cost
Sub-Total Construction Base Costs						$18,971,000	
Geotechnical / Hydrogeological / Materials	1.0%					$189,700	
Geotechnical Sub-Total Cost						**$189,700**	
Property Requirements	1.5%					$ 284,600	
Property Requirements Sub-Total						**$284,600**	
Consultant Engineering/Design	12%					$ 2,276,500	includes planning, pre-design, detailed design, training, CA, commissioning
Engineering/Design Sub-Total						**$2,276,500**	
In House Labour/Engineering/Wages/CA	3%					$ 569,100	
In-house Labour/Wages Sub-Total						**$569,100**	
Project Contingency	15%					$3,344,000	Construction Contingency is dependent on Cost Estimate Class and Project Complexity
Project Contingency Sub-Total						**$3,344,000**	
Non-Refundable HST	1.76%					$441,200	
Non-Refundable HST Sub-Total						**$441,200**	
Total (2019 Dollars)						**$26,076,000**	Rounded to nearest $1,000
Other Estimate							
Chosen Estimate						$26,076,000	2019 Estimate

COST ESTIMATE SUMMARY - FOR PHASING ESTIMATING ONLY

PROJECT COMPONENT	PROJECT COMPONENT DESCRIPTION	PERCENTAGE	TOTAL	YEAR	COMMENTS
Study	Feasibility study, EA	2%	$521,520		
Design	Design fees, Town fees for design, contract admin	13%	$3,389,880		
Construction	Town fees, base costs and project contingency	85%	$22,164,600		
TOTAL			$26,076,000		

PROJECT NO.: WW-D-SPS-01A

PROJECT NAME: North Dorchester New Development SPS

PROJECT DESCRIPTION: New SPS needed to support New Development north of railway in North Dorchester

Class Estimate Type:	Class 4	Class adjusts Construction Contingency and expected accuracy
Project Complexity	Med	Complexity adjusts Construction Contingency, and expected accuracy
Accuracy Range:	40%	
Area Condition:	Rural	Area Condition uplifts unit cost and restoration

PROJECT NO.: WW-D-SPS-01A

PROPOSED CAPACITY	61 L/s	Additional capacity

CLASS EA REQUIREMENTS:	B
CONSTRUCTION ASSUMPTION:	Other

Pump	Existing (L/s)	Future (L/s)
1		61
2		61
3		
4		

COST ESTIMATION SPREADSHEET

COMPONENT	RATE (%)	RATE ($)	UNIT	ESTIMATED QUANTITY	COST PER UNIT	SUB-TOTAL	COMMENTS
Construction Cost							
Facility Construction			L/s	61 L/s	$30,000	$1,819,200	
Additional Construction Costs	15%		ea.			$272,880	Includes Mod/Demob,connections, inspection, hydrants, signage, traffic management, bonding, insurance
Provisional & Allowance	10%		ea.			$209,208	Provisional Labour and Materials in addition to base construction cost
Sub-Total Construction Base Costs						**$2,301,000**	
Geotechnical / Hydrogeological / Materials	1.0%						
Geotechnical Sub-Total Cost						**$0**	
Property Requirements	1.5%						
Property Requirements Sub-Total						**$0**	
Consultant Engineering/Design	15%					$ 345,200	Includes planning, pre-design, detailed design, training, CA, commissioning
Engineering/Design Sub-Total						**$345,200**	
In House Labour/Engineering/Wages/CA	3%					$ 100,000	
In-house Labour/Wages Sub-Total						**$100,000**	
Project Contingency	15%					$412,000	Construction Contingency is dependent on Cost Estimate Class and Project Complexity
Project Contingency Sub-Total						**$412,000**	
Non-Refundable HST	1.76%					$53,800	
Non-Refundable HST Sub-Total						**$53,800**	
Total (2019 Dollars)						**$3,212,000**	Rounded to nearest $1,000
Other Estimate							
Chosen Estimate						**$3,212,000**	**2019 Estimate**

COST ESTIMATE SUMMARY - FOR PHASING ESTIMATING ONLY

PROJECT COMPONENT	PROJECT COMPONENT DESCRIPTION	PERCENTAGE	TOTAL	YEAR	COMMENTS
Study	Feasibility study, EA	2%	$64,240		
Design	Design fees, Town fees for design, contract admin	13%	$417,560		
Construction	Town fees, base costs and project contingency	85%	$2,730,200		
TOTAL			**$3,212,000**		

Municipality of Thames Centre
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PROJECT NO.: WW-D-SPS-01B

PROJECT NAME: North Dorchester New Development SPS

PROJECT DESCRIPTION: New SPS needed to support New Development north of railway in North Dorchester

Class Estimate Type:	Class 4	Class adjusts Construction Contingency and expected accuracy
Project Complexity	Med	Complexity adjusts Construction Contingency, and expected accuracy
Accuracy Range:	40%	
Area Condition:	Rural	Area Condition uplifts unit cost and restoration

PROJECT NO.: WW-D-SPS-01B

PROPOSED CAPACITY	90 L/s	Firm capacity

CLASS EA REQUIREMENTS:	B
CONSTRUCTION ASSUMPTION:	Other

Pump	Existing (L/s)	Future (L/s)
1		90
2		90

COST ESTIMATION SPREADSHEET

COMPONENT	RATE (%)	RATE ($)	UNIT	ESTIMATED QUANTITY	COST PER UNIT	SUB-TOTAL	COMMENTS
Construction Cost							
Facility Construction			L/s	90 L/s	$30,000	$2,709,900	
Additional Construction Costs	15%		ea.			$406,485	Includes Mod/Demob,connections, inspection, hydrants, signage, traffic management, bonding, insurance
Provisional & Allowance	10%		ea.			$311,639	Provisional Labour and Materials in addition to base construction cost
Sub-Total Construction Base Costs						**$3,428,000**	
Geotechnical / Hydrogeological / Materials	1.0%						
Geotechnical Sub-Total Cost						**$0**	
Property Requirements	1.5%						
Property Requirements Sub-Total						**$0**	
Consultant Engineering/Design	15%					$ 514,200	Includes planning, pre-design, detailed design, training, CA, commissioning
Engineering/Design Sub-Total						**$514,200**	
In House Labour/Engineering/Wages/CA	3%					$ 102,800	
In-house Labour/Wages Sub-Total						**$102,800**	
Project Contingency	15%					$607,000	Construction Contingency is dependent on Cost Estimate Class and Project Complexity
Project Contingency Sub-Total						**$607,000**	
Non-Refundable HST	1.76%					$80,100	
Non-Refundable HST Sub-Total						**$80,100**	
Total (2019 Dollars)						**$4,732,000**	Rounded to nearest $1,000
Other Estimate							
Chosen Estimate						**$4,732,000**	**2019 Estimate**

COST ESTIMATE SUMMARY - FOR PHASING ESTIMATING ONLY

PROJECT COMPONENT	PROJECT COMPONENT DESCRIPTION	PERCENTAGE	TOTAL	YEAR	COMMENTS
Study	Feasibility study, EA	2%	$94,640		
Design	Design fees, Town fees for design, contract admin	13%	$615,160		
Construction	Town fees, base costs and project contingency	85%	$4,022,200		
TOTAL			**$4,732,000**		

Municipality of Thames Centre
Water and Wastewater Master Plan Update
Capital Program Cost Estimates

PROJECT NO.: WW-D-SPS-02

PROJECT NAME: North Dorchester Northwest SPS

PROJECT DESCRIPTION: New SPS needed to support New Development and existing development south of railway and west of Dorchester Road Bridge in North Dorchester

Class Estimate Type:	Class 4	Class adjusts Construction Contingency and expected accuracy
Project Complexity	Low	Complexity adjusts Construction Contingency, and expected accuracy
Accuracy Range:	30%	
Area Condition:	Suburban	Area Condition uplifts unit cost and restoration

PROJECT NO.: WW-D-SPS-02

PROPOSED CAPACITY	8 L/s	Firm capacity
		Increased capacity

CLASS EA REQUIREMENTS:	B
CONSTRUCTION ASSUMPTION:	Other

Pump	Existing (L/s)	Future (L/s)
1		8
2		8

COST ESTIMATION SPREADSHEET

COMPONENT	RATE (%)	RATE ($)	UNIT	ESTIMATED QUANTITY	COST PER UNIT	SUB-TOTAL	COMMENTS
Construction Cost							
Facility Construction			L/s	8 L/s	$40,000	$328,800	
Additional Construction Costs	10%		ea.			$32,880	Includes Mod/Demob,connections, inspection, hydrants, signage, traffic management, bonding, insurance
Provisional & Allowance	10%		ea.			$36,168	Provisional Labour and Materials in addition to base construction cost
Sub-Total Construction Base Costs						**$398,000**	
Geotechnical / Hydrogeological / Materials	0.5%						
Geotechnical Sub-Total Cost						**$0**	
Property Requirements	1.0%						
Property Requirements Sub-Total						**$0**	
Consultant Engineering/Design	15%					$ 59,700	includes planning, pre-design, detailed design, training, CA, commissioning
Engineering/Design Sub-Total						**$59,700**	
In House Labour/Engineering/Wages/CA	3%					$ 50,000	
In-house Labour/Wages Sub-Total						**$50,000**	
Project Contingency	10%					$51,000	Construction Contingency is dependent on Cost Estimate Class and Project Complexity
Project Contingency Sub-Total						**$51,000**	
Non-Refundable HST	1.76%					$9,000	
Non-Refundable HST Sub-Total						**$9,000**	
Total (2019 Dollars)						**$568,000**	Rounded to nearest $1,000
Other Estimate							
Chosen Estimate						**$568,000**	**2019 Estimate**

COST ESTIMATE SUMMARY - FOR PHASING ESTIMATING ONLY

PROJECT COMPONENT	PROJECT COMPONENT DESCRIPTION	PERCENTAGE	TOTAL	YEAR	COMMENTS
Study	Feasibility study, EA	2%	$11,360		
Design	Design fees, Town fees for design, contract admin	13%	$73,840		
Construction	Town fees, base costs and project contingency	85%	$482,800		
TOTAL			**$568,000**		

PROJECT NO.: WW-D-SPS-03

PROJECT NAME: North Dorchester Northeast SPS

PROJECT DESCRIPTION: New SPS needed to support existing development south of railway and east of Dorchester Road Bridge in North Dorchester

Class Estimate Type:	Class 4	Class adjusts Construction Contingency and expected accuracy
Project Complexity	Low	Complexity adjusts Construction Contingency, and expected accuracy
Accuracy Range:	30%	
Area Condition:	Suburban	Area Condition uplifts unit cost and restoration

PROJECT NO.: WW-D-SPS-03

PROPOSED CAPACITY	1 L/s	Additional capacity

CLASS EA REQUIREMENTS:	B
CONSTRUCTION ASSUMPTION:	Other

Pump	Existing (L/s)	Future (L/s)
1		1
2		1

COST ESTIMATION SPREADSHEET

COMPONENT	RATE (%)	RATE ($)	UNIT	ESTIMATED QUANTITY	COST PER UNIT	SUB-TOTAL	COMMENTS
Construction Cost							
Facility Construction			L/s	1 L/s	$40,000	$42,000	
Additional Construction Costs	10%		ea.			$4,200	Includes Mod/Demob,connections, inspection, hydrants, signage, traffic management, bonding, insurance
Provisional & Allowance	10%		ea.			$4,620	Provisional Labour and Materials in addition to base construction cost
Sub-Total Construction Base Costs						**$51,000**	
Geotechnical / Hydrogeological / Materials	0.5%						
Geotechnical Sub-Total Cost						**$0**	
Property Requirements	1.0%						
Property Requirements Sub-Total						**$0**	
Consultant Engineering/Design	15%					$ 7,700	includes planning, pre-design, detailed design, training, CA, commissioning
Engineering/Design Sub-Total						**$7,700**	
In House Labour/Engineering/Wages/CA	3%					$ 50,000	
In-house Labour/Wages Sub-Total						**$50,000**	
Project Contingency	10%					$11,000	Construction Contingency is dependent on Cost Estimate Class and Project Complexity
Project Contingency Sub-Total						**$11,000**	
Non-Refundable HST	1.76%					$1,200	
Non-Refundable HST Sub-Total						**$1,200**	
Total (2019 Dollars)						**$121,000**	Rounded to nearest $1,000
Other Estimate							Sustainability Upgrades as per Niagara Region capital forecast
Chosen Estimate						**$121,000**	**2019 Estimate**

COST ESTIMATE SUMMARY - FOR PHASING ESTIMATING ONLY

PROJECT COMPONENT	PROJECT COMPONENT DESCRIPTION	PERCENTAGE	TOTAL	YEAR	COMMENTS
Study	Feasibility study, EA	2%	$2,420		
Design	Design fees, Town fees for design, contract admin	13%	$15,730		
Construction	Town fees, base costs and project contingency	85%	$102,850		
TOTAL			**$121,000**		

PROJECT NO.: WW-D-SPS-04

PROJECT NAME: South Dorchester SPS

PROJECT DESCRIPTION: New SPS needed to support existing development south of river and north of PS3 drainage area in South Dorchester

Class Estimate Type:	Class 4	Class adjusts Construction Contingency and expected accuracy
Project Complexity	High	Complexity adjusts Construction Contingency, and expected accuracy
Accuracy Range:	50%	
Area Condition:	Suburban	Area Condition uplifts unit cost and restoration

PROJECT NO.: WW-D-SPS-04

PROPOSED CAPACITY	12 L/s

CLASS EA REQUIREMENTS:	B
CONSTRUCTION ASSUMPTION:	Other

Pump	Existing (L/s)	Future (L/s)
1		12
2		12

COST ESTIMATION SPREADSHEET

COMPONENT	RATE (%)	RATE ($)	UNIT	ESTIMATED QUANTITY	COST PER UNIT	SUB-TOTAL	COMMENTS
Construction Cost							
Facility Construction			L/s	12 L/s	$40,000	$482,400	
Additional Construction Costs	20%		ea.			$96,480	Includes Mod/Demob,connections, inspection, hydrants, signage, traffic management, bonding, insurance
Provisional & Allowance	10%		ea.			$57,888	Provisional Labour and Materials in addition to base construction cost
Sub-Total Construction Base Costs						**$637,000**	
Geotechnical / Hydrogeological / Materials	2.0%						
Geotechnical Sub-Total Cost						**$0**	
Property Requirements	2.0%						
Property Requirements Sub-Total						**$0**	
Consultant Engineering/Design	15%					$ 95,600	includes planning, pre-design, detailed design, training, CA, commissioning
Engineering/Design Sub-Total						**$95,600**	
In House Labour/Engineering/Wages/CA	3%					$ 50,000	
In-house Labour/Wages Sub-Total						**$50,000**	
Project Contingency	25%					$196,000	Construction Contingency is dependent on Cost Estimate Class and Project Complexity
Project Contingency Sub-Total						**$196,000**	
Non-Refundable HST	1.76%					$16,300	
Non-Refundable HST Sub-Total						**$16,300**	
Total (2019 Dollars)						**$995,000**	Rounded to nearest $1,000
Other Estimate							
Chosen Estimate						**$995,000**	**2019 Estimate**

COST ESTIMATE SUMMARY - FOR PHASING ESTIMATING ONLY

PROJECT COMPONENT	PROJECT COMPONENT DESCRIPTION	PERCENTAGE	TOTAL	YEAR	COMMENTS
Study	Feasibility study, EA	2%	$19,900		
Design	Design fees, Town fees for design, contract admin	13%	$129,350		
Construction	Town fees, base costs and project contingency	85%	$845,750		
TOTAL			**$995,000**		

PROJECT NO.: WW-D-SPS-05

PROJECT NAME: Southeast Dorchester SPS

PROJECT DESCRIPTION: New SPS needed to support Development block east of Valleyview Crescent in South Dorchester

Class Estimate Type:	Class 4	Class adjusts Construction Contingency and expected accuracy
Project Complexity	Low	Complexity adjusts Construction Contingency, and expected accuracy
Accuracy Range:	30%	
Area Condition:	Rural	Area Condition uplifts unit cost and restoration

PROJECT NO.: WW-D-SPS-05

PROPOSED CAPACITY	4 L/s

CLASS EA REQUIREMENTS:	B
CONSTRUCTION ASSUMPTION:	Other

Pump	Existing (L/s)	Future (L/s)
1		4
2		4
3		

COST ESTIMATION SPREADSHEET

COMPONENT	RATE (%)	RATE ($)	UNIT	ESTIMATED QUANTITY	COST PER UNIT	SUB-TOTAL	COMMENTS
Construction Cost							
Facility Construction			L/s	4 L/s	$40,000	$157,600	
Additional Construction Costs	10%		ea.			$15,760	Includes Mod/Demob,connections, inspection, hydrants, signage, traffic management, bonding, insurance
Provisional & Allowance	10%		ea.			$17,336	Provisional Labour and Materials in addition to base construction cost
Sub-Total Construction Base Costs						**$191,000**	
Geotechnical / Hydrogeological / Materials	0.5%						
Geotechnical Sub-Total Cost						**$0**	
Property Requirements	1.0%						
Property Requirements Sub-Total						**$0**	
Consultant Engineering/Design	15%					$ 28,700	includes planning, pre-design, detailed design, training, CA, commissioning
Engineering/Design Sub-Total						**$28,700**	
In House Labour/Engineering/Wages/CA	3%					$ 50,000	
In-house Labour/Wages Sub-Total						**$50,000**	
Project Contingency	10%					$27,000	Construction Contingency is dependent on Cost Estimate Class and Project Complexity
Project Contingency Sub-Total						**$27,000**	
Non-Refundable HST	1.76%					$4,300	
Non-Refundable HST Sub-Total						**$4,300**	
Total (2019 Dollars)						**$301,000**	Rounded to nearest $1,000
Other Estimate							
Chosen Estimate						**$301,000**	**2019 Estimate**

COST ESTIMATE SUMMARY - FOR PHASING ESTIMATING ONLY

PROJECT COMPONENT	PROJECT COMPONENT DESCRIPTION	PERCENTAGE	TOTAL	YEAR	COMMENTS
Study	Feasibility study, EA	2%	$6,020		
Design	Design fees, Town fees for design, contract admin	13%	$39,130		
Construction	Town fees, base costs and project contingency	85%	$255,850		
TOTAL			**$301,000**		

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PROJECT NO.:	**WW-D-SPS-05**
PROJECT NAME:	**Southeast Dorchester SPS**
PROJECT DESCRIPTION:	New SPS needed to support Development block east of Valleyview Crescent in South Dorchester

Class Estimate Type:	Class 4	Class adjusts Construction Contingency and expected accuracy
Project Complexity	Low	Complexity adjusts Construction Contingency, and expected accuracy
Accuracy Range:	30%	
Area Condition:	Rural	Area Condition uplifts unit cost and restoration

PROJECT NO.: WW-D-SPS-05

PROPOSED CAPACITY	8 L/s

CLASS EA REQUIREMENTS:	B
CONSTRUCTION ASSUMPTION:	Other

Pump	Existing (L/s)	Future (L/s)
1		8
2		8
3		

COST ESTIMATION SPREADSHEET

COMPONENT	RATE (%)	RATE ($)	UNIT	ESTIMATED QUANTITY	COST PER UNIT	SUB-TOTAL	COMMENTS
Construction Cost							
Facility Construction			L/s	8 L/s	$40,000	$310,000	
Additional Construction Costs	10%		ea.			$31,000	Includes Mod/Demob,connections, inspection, hydrants, signage, traffic management, bonding, insurance
Provisional & Allowance	10%		ea.			$34,100	Provisional Labour and Materials in addition to base construction cost
Sub-Total Construction Base Costs						**$375,000**	
Geotechnical / Hydrogeological / Materials	0.5%						
Geotechnical Sub-Total Cost						**$0**	
Property Requirements	1.0%						
Property Requirements Sub-Total						**$0**	
Consultant Engineering/Design	15%					$ 56,300	Includes planning, pre-design, detailed design, training, CA, commissioning
Engineering/Design Sub-Total						**$56,300**	
In House Labour/Engineering/Wages/CA	3%					$ 50,000	
In-house Labour/Wages Sub-Total						**$50,000**	
Project Contingency	10%					$48,000	Construction Contingency is dependent on Cost Estimate Class and Project Complexity
Project Contingency Sub-Total						**$48,000**	
Non-Refundable HST	1.76%					$8,400	
Non-Refundable HST Sub-Total						**$8,400**	
Total (2019 Dollars)						**$538,000**	Rounded to nearest $1,000
Other Estimate							
Chosen Estimate						**$538,000**	**2019 Estimate**

COST ESTIMATE SUMMARY - FOR PHASING ESTIMATING ONLY

PROJECT COMPONENT	PROJECT COMPONENT DESCRIPTION	PERCENTAGE	TOTAL	YEAR	COMMENTS
Study	Feasibility study, EA	2%	$10,760		
Design	Design fees, Town fees for design, contract admin	13%	$69,940		
Construction	Town fees, base costs and project contingency	85%	$457,300		
TOTAL			**$538,000**		

PROJECT NO.: WW-D-SPS-06A

PROJECT NAME: Dorchester SPS Upgrades

PROJECT DESCRIPTION: Pumping station capacity upgrades required to accommodate growth flows in Dorchester

Class Estimate Type:	Class 4	Class adjusts Construction Contingency and expected accuracy
Project Complexity	High	Complexity adjusts Construction Contingency, and expected accuracy
Accuracy Range:	50%	
Area Condition:	Suburban	Area Condition uplifts unit cost and restoration

PROJECT NO.: WW-D-SPS-06A

PROPOSED CAPACITY	190 L/s

CLASS EA REQUIREMENTS:	B
CONSTRUCTION ASSUMPTION:	Other

Pump	Existing (L/s)	Future (L/s)
1	20.7	210
2	20.7	210

COST ESTIMATION SPREADSHEET

COMPONENT	RATE (%)	RATE ($)	UNIT	ESTIMATED QUANTITY	COST PER UNIT	SUB-TOTAL	COMMENTS
Construction Cost							
Facility Construction			L/s	190 L/s	$20,000	$3,802,000	
Additional Construction Costs	20%		ea.			$760,400	Includes Mod/Demob,connections, inspection, hydrants, signage, traffic management, bonding, insurance
Provisional & Allowance	10%		ea.			$456,240	Provisional Labour and Materials in addition to base construction cost
Sub-Total Construction Base Costs						**$5,019,000**	
Geotechnical / Hydrogeological / Materials	2.0%						
Geotechnical Sub-Total Cost						**$0**	
Property Requirements	2.0%						
Property Requirements Sub-Total						**$0**	
Consultant Engineering/Design	15%					$ 752,900	includes planning, pre-design, detailed design, training, CA, commissioning
Engineering/Design Sub-Total						**$752,900**	
In House Labour/Engineering/Wages/CA	3%					$ 150,600	
In-house Labour/Wages Sub-Total						**$150,600**	
Project Contingency	25%					$1,481,000	Construction Contingency is dependent on Cost Estimate Class and Project Complexity
Project Contingency Sub-Total						**$1,481,000**	
Non-Refundable HST	1.76%					$127,700	
Non-Refundable HST Sub-Total						**$127,700**	
Total (2019 Dollars)						**$7,531,000**	Rounded to nearest $1,000
Other Estimate							
Chosen Estimate						**$7,531,000**	**2019 Estimate**

COST ESTIMATE SUMMARY - FOR PHASING ESTIMATING ONLY

PROJECT COMPONENT	PROJECT COMPONENT DESCRIPTION	PERCENTAGE	TOTAL	YEAR	COMMENTS
Study	Feasibility study, EA	2%	$150,620		
Design	Design fees, Town fees for design, contract admin	13%	$979,030		
Construction	Town fees, base costs and project contingency	85%	$6,401,350		
TOTAL			**$7,531,000**		

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PROJECT NO.: WW-D-SPS-06B

PROJECT NAME: Dorchester SPS Upgrades

PROJECT DESCRIPTION: Pumping station capacity upgrades required to accommodate growth flows in Dorchester

Class Estimate Type:	Class 4	Class adjusts Construction Contingency and expected accuracy
Project Complexity	High	Complexity adjusts Construction Contingency, and expected accuracy
Accuracy Range:	50%	
Area Condition:	Suburban	Area Condition uplifts unit cost and restoration

PROJECT NO.: WW-D-SPS-06B

PROPOSED CAPACITY	254 L/s	Additional capacity

CLASS EA REQUIREMENTS:	B
CONSTRUCTION ASSUMPTION:	Other

Pump	Existing (L/s)	Future (L/s)*
1	21	274
2	21	274

COST ESTIMATION SPREADSHEET

COMPONENT	RATE (%)	RATE ($)	UNIT	ESTIMATED QUANTITY	COST PER UNIT	SUB-TOTAL	COMMENTS
Construction Cost							
Facility Construction			L/s	254 L/s	$20,000	$5,081,800	
Additional Construction Costs	20%		ea.			$1,016,360	Includes Mod/Demob,connections, inspection, hydrants, signage, traffic management, bonding, insurance
Provisional & Allowance	10%		ea.			$609,816	Provisional Labour and Materials in addition to base construction cost
Sub-Total Construction Base Costs						**$6,708,000**	
Geotechnical / Hydrogeological / Materials	2.0%						
Geotechnical Sub-Total Cost						**$0**	
Property Requirements	2.0%						
Property Requirements Sub-Total						**$0**	
Consultant Engineering/Design	15%					$ 1,006,200	includes planning, pre-design, detailed design, training, CA, commissioning
Engineering/Design Sub-Total						**$1,006,200**	
In House Labour/Engineering/Wages/CA	3%					$ 201,200	
In-house Labour/Wages Sub-Total						**$201,200**	
Project Contingency	25%					$1,979,000	Construction Contingency is dependent on Cost Estimate Class and Project Complexity
Project Contingency Sub-Total						**$1,979,000**	
Non-Refundable HST	1.76%					$170,600	
Non-Refundable HST Sub-Total						**$170,600**	
Total (2019 Dollars)						**$10,065,000**	Rounded to nearest $1,000
Other Estimate							
Chosen Estimate						**$10,065,000**	**2019 Estimate**

COST ESTIMATE SUMMARY - FOR PHASING ESTIMATING ONLY

PROJECT COMPONENT	PROJECT COMPONENT DESCRIPTION	PERCENTAGE	TOTAL	YEAR	COMMENTS
Study	Feasibility study, EA	2%	$201,300		
Design	Design fees, Town fees for design, contract admin	13%	$1,308,450		
Construction	Town fees, base costs and project contingency	85%	$8,555,250		
TOTAL			**$10,065,000**		

PROJECT NO.: WW-D-SPS-06C

PROJECT NAME: Dorchester SPS Upgrades

PROJECT DESCRIPTION: Pumping station capacity upgrades required to accommodate growth flows in Dorchester

Class Estimate Type:	Class 4	Class adjusts Construction Contingency and expected accuracy
Project Complexity	High	Complexity adjusts Construction Contingency, and expected accuracy
Accuracy Range:	50%	
Area Condition:	Suburban	Area Condition uplifts unit cost and restoration

PROJECT NO.: WW-D-SPS-06C

PROPOSED CAPACITY	411 L/s	Additional capacity

CLASS EA REQUIREMENTS:	B
CONSTRUCTION ASSUMPTION:	Other

Pump	Existing (L/s)	Future (L/s)*
1	21	431
2	21	431

COST ESTIMATION SPREADSHEET

COMPONENT	RATE (%)	RATE ($)	UNIT	ESTIMATED QUANTITY	COST PER UNIT	SUB-TOTAL	COMMENTS
Construction Cost							
Facility Construction			L/s	411 L/s	$15,000	$6,160,200	
Additional Construction Costs	20%		ea.			$1,232,040	Includes Mod/Demob,connections, inspection, hydrants, signage, traffic management, bonding, insurance
Provisional & Allowance	10%		ea.			$739,224	Provisional Labour and Materials in addition to base construction cost
Sub-Total Construction Base Costs						**$8,131,000**	
Geotechnical / Hydrogeological / Materials	2.0%						
Geotechnical Sub-Total Cost						**$0**	
Property Requirements	2.0%						
Property Requirements Sub-Total						**$0**	
Consultant Engineering/Design	15%					$ 1,219,700	includes planning, pre-design, detailed design, training, CA, commissioning
Engineering/Design Sub-Total						**$1,219,700**	
In House Labour/Engineering/Wages/CA	3%					$ 243,900	
In-house Labour/Wages Sub-Total						**$243,900**	
Project Contingency	25%					$2,399,000	Construction Contingency is dependent on Cost Estimate Class and Project Complexity
Project Contingency Sub-Total						**$2,399,000**	
Non-Refundable HST	1.76%					$206,800	
Non-Refundable HST Sub-Total						**$206,800**	
Total (2019 Dollars)						**$12,200,000**	Rounded to nearest $1,000
Other Estimate							
Chosen Estimate						**$12,200,000**	**2019 Estimate**

COST ESTIMATE SUMMARY - FOR PHASING ESTIMATING ONLY

PROJECT COMPONENT	PROJECT COMPONENT DESCRIPTION	PERCENTAGE	TOTAL	YEAR	COMMENTS
Study	Feasibility study, EA	2%	$244,000		
Design	Design fees, Town fees for design, contract admin	13%	$1,586,000		
Construction	Town fees, base costs and project contingency	85%	$10,370,000		
TOTAL			**$12,200,000**		

PROJECT NO.: WW-D-SPS-07A

PROJECT NAME: PS3

PROJECT DESCRIPTION: Pumping station capacity upgrades required to accommodate growth flows in Dorchester

Class Estimate Type:	Class 4	Class adjusts Construction Contingency and expected accuracy
Project Complexity	Med	Complexity adjusts Construction Contingency, and expected accuracy
Accuracy Range:	40%	
Area Condition:	Suburban	Area Condition uplifts unit cost and restoration

PROJECT NO.: WW-D-SPS-07A

PROPOSED CAPACITY	66 L/s

CLASS EA REQUIREMENTS:	B
CONSTRUCTION ASSUMPTION:	Other

Pump	Existing (L/s)	Future (L/s)
1	20.7	210
2	20.7	210

COST ESTIMATION SPREADSHEET

COMPONENT	RATE (%)	RATE ($)	UNIT	ESTIMATED QUANTITY	COST PER UNIT	SUB-TOTAL	COMMENTS
Construction Cost							
Facility Construction			L/s	66 L/s	$30,000	$1,988,700	
Additional Construction Costs	15%		ea.			$298,305	Includes Mod/Demob,connections, inspection, hydrants, signage, traffic management, bonding, insurance
Provisional & Allowance	10%		ea.			$228,701	Provisional Labour and Materials in addition to base construction cost
Sub-Total Construction Base Costs						**$2,516,000**	
Geotechnical / Hydrogeological / Materials	1.0%						
Geotechnical Sub-Total Cost						**$0**	
Property Requirements	1.5%						
Property Requirements Sub-Total						**$0**	
Consultant Engineering/Design	15%					$ 377,400	includes planning, pre-design, detailed design, training, CA, commissioning
Engineering/Design Sub-Total						**$377,400**	
In House Labour/Engineering/Wages/CA	3%					$ 100,000	
In-house Labour/Wages Sub-Total						**$100,000**	
Project Contingency	15%					$449,000	Construction Contingency is dependent on Cost Estimate Class and Project Complexity
Project Contingency Sub-Total						**$449,000**	
Non-Refundable HST	1.76%					$58,800	
Non-Refundable HST Sub-Total						**$58,800**	
Total (2019 Dollars)						**$3,501,000**	Rounded to nearest $1,000
Other Estimate							
Chosen Estimate						**$3,501,000**	**2019 Estimate**

COST ESTIMATE SUMMARY - FOR PHASING ESTIMATING ONLY

PROJECT COMPONENT	PROJECT COMPONENT DESCRIPTION	PERCENTAGE	TOTAL	YEAR	COMMENTS
Study	Feasibility study, EA	2%	$70,020		
Design	Design fees, Town fees for design, contract admin	13%	$455,130		
Construction	Town fees, base costs and project contingency	85%	$2,975,850		
TOTAL			**$3,501,000**		

PROJECT NO.: WW-D-SPS-07B

PROJECT NAME: PS3

PROJECT DESCRIPTION: Pumping station capacity upgrades required to accommodate growth flows in Dorchester

Class Estimate Type:	Class 4	Class adjusts Construction Contingency and expected accuracy
Project Complexity	Med	Complexity adjusts Construction Contingency, and expected accuracy
Accuracy Range:	40%	
Area Condition:	Suburban	Area Condition uplifts unit cost and restoration

PROJECT NO.: WW-D-SPS-07B

PROPOSED CAPACITY	102 L/s

CLASS EA REQUIREMENTS:	B
CONSTRUCTION ASSUMPTION:	Other

Pump	Existing (L/s)	Future (L/s)
1	20.7	210
2	20.7	210

COST ESTIMATION SPREADSHEET

COMPONENT	RATE (%)	RATE ($)	UNIT	ESTIMATED QUANTITY	COST PER UNIT	SUB-TOTAL	COMMENTS
Construction Cost							
Facility Construction			L/s	102 L/s	$30,000	$3,068,700	
Additional Construction Costs	15%		ea.			$460,305	Includes Mod/Demob,connections, inspection, hydrants, signage, traffic management, bonding, insurance
Provisional & Allowance	10%		ea.			$352,901	Provisional Labour and Materials in addition to base construction cost
Sub-Total Construction Base Costs						**$3,882,000**	
Geotechnical / Hydrogeological / Materials	1.0%						
Geotechnical Sub-Total Cost						**$0**	
Property Requirements	1.5%						
Property Requirements Sub-Total						**$0**	
Consultant Engineering/Design	15%					$ 582,300	includes planning, pre-design, detailed design, training, CA, commissioning
Engineering/Design Sub-Total						**$582,300**	
In House Labour/Engineering/Wages/CA	3%					$ 116,500	
In-house Labour/Wages Sub-Total						**$116,500**	
Project Contingency	15%					$687,000	Construction Contingency is dependent on Cost Estimate Class and Project Complexity
Project Contingency Sub-Total						**$687,000**	
Non-Refundable HST	1.76%					$90,700	
Non-Refundable HST Sub-Total						**$90,700**	
Total (2019 Dollars)						**$5,359,000**	Rounded to nearest $1,000
Other Estimate							
Chosen Estimate						**$5,359,000**	**2019 Estimate**

COST ESTIMATE SUMMARY - FOR PHASING ESTIMATING ONLY

PROJECT COMPONENT	PROJECT COMPONENT DESCRIPTION	PERCENTAGE	TOTAL	YEAR	COMMENTS
Study	Feasibility study, EA	2%	$107,180		
Design	Design fees, Town fees for design, contract admin	13%	$696,670		
Construction	Town fees, base costs and project contingency	85%	$4,555,150		
TOTAL			**$5,359,000**		

PROJECT NO.: WW-D-SPS-07C

PROJECT NAME: Dorchester SPS Upgrades

PROJECT DESCRIPTION: Pumping station capacity upgrades required to accommodate growth flows in Dorchester

Class Estimate Type:	Class 4	Class adjusts Construction Contingency and expected accuracy
Project Complexity	Med	Complexity adjusts Construction Contingency, and expected accuracy
Accuracy Range:	40%	
Area Condition:	Suburban	Area Condition uplifts unit cost and restoration

PROJECT NO.: WW-D-SPS-07C

PROPOSED CAPACITY	156 L/s

CLASS EA REQUIREMENTS:	B
CONSTRUCTION ASSUMPTION:	Other

Pump	Existing (L/s)	Future (L/s)
1	20.7	210
2	20.7	210

COST ESTIMATION SPREADSHEET

COMPONENT	RATE (%)	RATE ($)	UNIT	ESTIMATED QUANTITY	COST PER UNIT	SUB-TOTAL	COMMENTS
Construction Cost							
Facility Construction			L/s	156 L/s	$25,000	$3,890,250	
Additional Construction Costs	15%		ea.			$583,538	Includes Mod/Demob,connections, inspection, hydrants, signage, traffic management, bonding, insurance
Provisional & Allowance	10%		ea.			$447,379	Provisional Labour and Materials in addition to base construction cost
Sub-Total Construction Base Costs						**$4,921,000**	
Geotechnical / Hydrogeological / Materials	1.0%						
Geotechnical Sub-Total Cost						**$0**	
Property Requirements	1.5%						
Property Requirements Sub-Total						**$0**	
Consultant Engineering/Design	15%					$ 738,200	includes planning, pre-design, detailed design, training, CA, commissioning
Engineering/Design Sub-Total						**$738,200**	
In House Labour/Engineering/Wages/CA	3%					$ 147,600	
In-house Labour/Wages Sub-Total						**$147,600**	
Project Contingency	15%					$871,000	Construction Contingency is dependent on Cost Estimate Class and Project Complexity
Project Contingency Sub-Total						**$871,000**	
Non-Refundable HST	1.76%					$114,900	
Non-Refundable HST Sub-Total						**$114,900**	
Total (2019 Dollars)						**$6,793,000**	Rounded to nearest $1,000
Other Estimate							
Chosen Estimate						**$6,793,000**	**2019 Estimate**

COST ESTIMATE SUMMARY - FOR PHASING ESTIMATING ONLY

PROJECT COMPONENT	PROJECT COMPONENT DESCRIPTION	PERCENTAGE	TOTAL	YEAR	COMMENTS
Study	Feasibility study, EA	2%	$135,860		
Design	Design fees, Town fees for design, contract admin	13%	$883,090		
Construction	Town fees, base costs and project contingency	85%	$5,774,050		
TOTAL			**$6,793,000**		

PROJECT NO.: WW-D-FM-01
PROJECT NAME: North Dorchester New Development forcemain
PROJECT DESCRIPTION: New forcemain needed to support new development SPS for development blocks North of CN rail in North Dorchester

Class Estimate Type:	Class 4	Class adjusts Construction Contingency and expected accuracy
Project Complexity	High	Complexity adjusts Construction Contingency, and expected accuracy
Accuracy Range:	50%	
Area Condition:	Suburban	Area Condition uplifts unit cost and restoration

PROJECT NO.: WW-D-FM-01

PROPOSED DIAMETER:	300 mm	
TOTAL LENGTH:	475 m	
Tunnelled	50 m	11%
Open Cut	425 m	89%

CLASS EA REQUIREMENTS:	A+
CONSTRUCTION ASSUMPTION:	Forcemain

COST ESTIMATION SPREADSHEET

COMPONENT	RATE (%)	RATE ($)	UNIT	ESTIMATED QUANTITY	COST PER UNIT	SUB-TOTAL	COMMENTS
Construction Cost							
Pipe Construction - Open Cut			m	425 m	$627	$266,569	New road ROW
Pipe Construction - Tunneling			m	50 m	$1,300	$65,000	
Pipe Construction Uplift (Based on Area Conditions)	20%					$53,314	
Minor Creek Crossings			ea.	0	$37,000	$0	
Major Creek Crossings			ea.	0	$206,000	$0	
Road Crossings			ea.	0	$89,000	$0	
Major Road / Rail Crossings			ea.	1	$206,000	$206,000	Railway Crossing
Utility Crossings			ea.		$89,000	$0	
Additional Construction Costs	20%		ea.			$118,177	Includes Mod/Demob,connections, inspection, hydrants, signage, traffic management, bonding, insurance
Provisional & Allowance	10%		ea.			$70,906	Provisional Labour and Materials in addition to base construction cost
Sub-Total Construction Base Costs						**$780,000**	
Geotechnical / Hydrogeological / Materials	2.0%					$15,600	
Geotechnical Sub-Total Cost						**$15,600**	
Property Requirements	2.0%					$ 15,600	
Property Requirements Sub-Total						**$15,600**	
Consultant Engineering/Design	15%					$ 117,000	includes planning, pre-design, detailed design, training, CA, commissioning
Engineering/Design Sub-Total						**$117,000**	
In House Labour/Engineering/Wages/CA	3%					$ 50,000	
In-house Labour/Wages Sub-Total						**$50,000**	
Project Contingency	25%					$245,000	Construction Contingency is dependent on Cost Estimate Class and Project Complexity
Project Contingency Sub-Total						**$245,000**	
Non-Refundable HST	1.76%					$20,600	
Non-Refundable HST Sub-Total						**$20,600**	
Total (2019 Dollars)						**$1,244,000**	Rounded to nearest $1,000
Other Estimate							
Chosen Estimate						**$1,244,000**	**2019 Estimate**

COST ESTIMATE SUMMARY - FOR PHASING ESTIMATING ONLY

PROJECT COMPONENT	PROJECT COMPONENT DESCRIPTION	PERCENTAGE	TOTAL	YEAR	COMMENTS
Study	Feasibility study, EA	0%	$0		
Design	Design fees, Town fees for design, contract admin	15%	$186,600		
Construction	Town fees, base costs and project contingency	85%	$1,057,400		
TOTAL			**$1,244,000**		

Municipality of Thames Centre
Water and Wastewater Master Plan Update
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PROJECT NO.:	**WW-D-FM-02**
PROJECT NAME:	**Dorchester Road forcemain extension**
PROJECT DESCRIPTION:	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

PROJECT NO.: WW-D-FM-02

Class Estimate Type:	Class 4	Class adjusts Construction Contingency and expected accuracy
Project Complexity	High	Complexity adjusts Construction Contingency, and expected accuracy
Accuracy Range:	50%	
Area Condition:	Suburban	Area Condition uplifts unit cost and restoration

PROPOSED DIAMETER:	300 mm	
TOTAL LENGTH:	200 m	
Tunnelled		0%
Open Cut	200 m	100%

CLASS EA REQUIREMENTS:	A+
CONSTRUCTION ASSUMPTION:	Forcemain

COST ESTIMATION SPREADSHEET

COMPONENT	RATE (%)	RATE ($)	UNIT	ESTIMATED QUANTITY	COST PER UNIT	SUB-TOTAL	COMMENTS
Construction Cost							
Pipe Construction - Open Cut			m	200 m	$627	$125,444	Existing road ROW
Pipe Construction - Tunneling			m	0 m	$1,300	$0	
Pipe Construction Uplift (Based on Area Conditions)	20%					$25,089	
Minor Creek Crossings			ea.	0	$37,000	$0	
Major Creek Crossings			ea.	0	$206,000	$0	
Road Crossings			ea.	0	$89,000	$0	
Major Road / Rail Crossings			ea.	0	$206,000	$0	
Utility Crossings			ea.	0	$89,000	$0	
Additional Construction Costs	20%		ea.			$30,107	Includes Mod/Demob,connections, inspection, hydrants, signage, traffic management, bonding, insurance
Provisional & Allowance	10%		ea.			$18,064	Provisional Labour and Materials in addition to base construction cost
Sub-Total Construction Base Costs						**$199,000**	
Geotechnical / Hydrogeological / Materials	2.0%					$4,000	
Geotechnical Sub-Total Cost						**$4,000**	
Property Requirements	2.0%					$ 4,000	
Property Requirements Sub-Total						**$4,000**	
Consultant Engineering/Design	15%					$ 29,900	includes planning, pre-design, detailed design, training, CA, commissioning
Engineering/Design Sub-Total						**$29,900**	
In House Labour/Engineering/Wages/CA	3%					$ 50,000	
In-house Labour/Wages Sub-Total						**$50,000**	
Project Contingency	25%					$72,000	Construction Contingency is dependent on Cost Estimate Class and Project Complexity
Project Contingency Sub-Total						**$72,000**	
Non-Refundable HST	1.76%					$5,400	
Non-Refundable HST Sub-Total						**$5,400**	
Total (2019 Dollars)						**$364,000**	Rounded to nearest $1,000
Other Estimate							Detailed design estimate
Chosen Estimate						**$364,000**	**2019 Estimate**

COST ESTIMATE SUMMARY - FOR PHASING ESTIMATING ONLY

PROJECT COMPONENT	PROJECT COMPONENT DESCRIPTION	PERCENTAGE	TOTAL	YEAR	COMMENTS
Study	Feasibility study, EA	0%	$0		
Design	Design fees, Town fees for design, contract admin	15%	$54,600		
Construction	Town fees, base costs and project contingency	85%	$309,400		
TOTAL			**$364,000**		

Municipality of Thames Centre
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PROJECT NO.: WW-D-FM-03
PROJECT NAME: Dorchester Road forcemain extension
PROJECT DESCRIPTION: 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

Class Estimate Type:	Class 4	Class adjusts Construction Contingency and expected accuracy
Project Complexity	High	Complexity adjusts Construction Contingency, and expected accuracy
Accuracy Range:	50%	
Area Condition:	Suburban	Area Condition uplifts unit cost and restoration

PROJECT NO.: WW-D-FM-03

PROPOSED DIAMETER:	300 mm	
TOTAL LENGTH:	550 m	
Tunnelled		0%
Open Cut	550 m	100%

CLASS EA REQUIREMENTS:	A+
CONSTRUCTION ASSUMPTION:	Forcemain

COST ESTIMATION SPREADSHEET

COMPONENT	RATE (%)	RATE ($)	UNIT	ESTIMATED QUANTITY	COST PER UNIT	SUB-TOTAL	COMMENTS
Construction Cost							
Pipe Construction - Open Cut			m	550 m	$627	$344,972	Existing road ROW
Pipe Construction - Tunneling			m	0 m	$1,300	$0	
Pipe Construction Uplift (Based on Area Conditions)	20%					$68,994	
Minor Creek Crossings			ea.	0	$37,000	$0	
Major Creek Crossings			ea.	0	$206,000	$0	
Road Crossings			ea.	0	$89,000	$0	
Major Road / Rail Crossings			ea.	0	$206,000	$0	
Utility Crossings			ea.	0	$89,000	$0	
Additional Construction Costs	20%		ea.			$82,793	Includes Mod/Demob,connections, inspection, hydrants, signage, traffic management, bonding, insurance
Provisional & Allowance	10%		ea.			$49,676	Provisional Labour and Materials in addition to base construction cost
Sub-Total Construction Base Costs						**$546,000**	
Geotechnical / Hydrogeological / Materials	2.0%					$10,900	
Geotechnical Sub-Total Cost						**$10,900**	
Property Requirements	2.0%					$ 10,900	
Property Requirements Sub-Total						**$10,900**	
Consultant Engineering/Design	15%					$ 81,900	includes planning, pre-design, detailed design, training, CA, commissioning
Engineering/Design Sub-Total						**$81,900**	
In House Labour/Engineering/Wages/CA	3%					$ 50,000	
In-house Labour/Wages Sub-Total						**$50,000**	
Project Contingency	25%					$175,000	Construction Contingency is dependent on Cost Estimate Class and Project Complexity
Project Contingency Sub-Total						**$175,000**	
Non-Refundable HST	1.76%					$14,500	
Non-Refundable HST Sub-Total						**$14,500**	
Total (2019 Dollars)						**$889,000**	Rounded to nearest $1,000
Other Estimate							Detailed design estimate
Chosen Estimate						**$889,000**	**2019 Estimate**

COST ESTIMATE SUMMARY - FOR PHASING ESTIMATING ONLY

PROJECT COMPONENT	PROJECT COMPONENT DESCRIPTION	PERCENTAGE	TOTAL	YEAR	COMMENTS
Study	Feasibility study, EA	0%	$0		
Design	Design fees, Town fees for design, contract admin	15%	$133,350		
Construction	Town fees, base costs and project contingency	85%	$755,650		
TOTAL			**$889,000**		

Municipality of Thames Centre
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PROJECT NO.:	**WW-D-FM-04**
PROJECT NAME:	**North Dorchester Northwest forcemain**
PROJECT DESCRIPTION:	New forcemain needed to support northwest development SPS for development blocks South of CN rail and West of Dorchester Road Bridge in North Dorchester

Class Estimate Type:	Class 4	Class adjusts Construction Contingency and expected accuracy
Project Complexity	High	Complexity adjusts Construction Contingency, and expected accuracy
Accuracy Range:	50%	
Area Condition:	Suburban	Area Condition uplifts unit cost and restoration

PROJECT NO.: WW-D-FM-04

PROPOSED DIAMETER:		150 mm	
TOTAL LENGTH:		730 m	
	Tunnelled	50 m	7%
	Open Cut	680 m	93%

CLASS EA REQUIREMENTS:	B
CONSTRUCTION ASSUMPTION:	Forcemain

COST ESTIMATION SPREADSHEET

COMPONENT	RATE (%)	RATE ($)	UNIT	ESTIMATED QUANTITY	COST PER UNIT	SUB-TOTAL	COMMENTS
Construction Cost							
Pipe Construction - Open Cut			m	680 m	$551	$374,781	New road and existing road ROW
Pipe Construction - Tunneling			m	50 m	$1,300	$65,000	
Pipe Construction Uplift (Based on Area Conditions)	20%					$74,956	
Minor Creek Crossings			ea.	0	$29,000	$0	
Major Creek Crossings			ea.	0	$198,000	$0	
Road Crossings			ea.	0	$81,000	$0	
Major Road / Rail Crossings			ea.	1	$198,000	$198,000	Railway crossing
Utility Crossings			ea.	0	$81,000	$0	
Additional Construction Costs	20%		ea.			$142,548	Includes Mod/Demob,connections, inspection, hydrants, signage, traffic management, bonding, insurance
Provisional & Allowance	10%		ea.			$85,529	Provisional Labour and Materials in addition to base construction cost
Sub-Total Construction Base Costs						**$941,000**	
Geotechnical / Hydrogeological / Materials	2.0%					$18,800	
Geotechnical Sub-Total Cost						**$18,800**	
Property Requirements	2.0%					$ 18,800	
Property Requirements Sub-Total						**$18,800**	
Consultant Engineering/Design	15%					$ 141,200	includes planning, pre-design, detailed design, training, CA, commissioning
Engineering/Design Sub-Total						**$141,200**	
In House Labour/Engineering/Wages/CA	3%					$ 50,000	
In-house Labour/Wages Sub-Total						**$50,000**	
Project Contingency	25%					$292,000	Construction Contingency is dependent on Cost Estimate Class and Project Complexity
Project Contingency Sub-Total						**$292,000**	
Non-Refundable HST	1.76%					$24,800	
Non-Refundable HST Sub-Total						**$24,800**	
Total (2019 Dollars)						**$1,487,000**	Rounded to nearest $1,000
Other Estimate							
Chosen Estimate						**$1,487,000**	**2019 Estimate**

COST ESTIMATE SUMMARY - FOR PHASING ESTIMATING ONLY

PROJECT COMPONENT	PROJECT COMPONENT DESCRIPTION	PERCENTAGE	TOTAL	YEAR	COMMENTS
Study	Feasibility study, EA	0%	$0		
Design	Design fees, Town fees for design, contract admin	15%	$223,050		
Construction	Town fees, base costs and project contingency	85%	$1,263,950		
TOTAL			**$1,487,000**		

Municipality of Thames Centre
Water and Wastewater Master Plan Update
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PROJECT NO.: WW-D-FM-05
PROJECT NAME: North Dorchester Northeast forcemain
PROJECT DESCRIPTION: New forcemain needed to support northeast SPS for existing development South of CN rail and East of Dorchester Road Bridge in North Dorchester

Class Estimate Type:	Class 4	Class adjusts Construction Contingency and expected accuracy
Project Complexity	High	Complexity adjusts Construction Contingency, and expected accuracy
Accuracy Range:	50%	
Area Condition:	Suburban	Area Condition uplifts unit cost and restoration

PROJECT NO.: WW-D-FM-05

PROPOSED DIAMETER:	150 mm	
TOTAL LENGTH:	500 m	
Tunnelled	50 m	10%
Open Cut	450 m	90%

CLASS EA REQUIREMENTS:	B
CONSTRUCTION ASSUMPTION:	Forcemain

COST ESTIMATION SPREADSHEET

COMPONENT	RATE (%)	RATE ($)	UNIT	ESTIMATED QUANTITY	COST PER UNIT	SUB-TOTAL	COMMENTS
Construction Cost							
Pipe Construction - Open Cut			m	450 m	$551	$248,017	
Pipe Construction - Tunneling			m	50 m	$1,300	$65,000	
Pipe Construction Uplift (Based on Area Conditions)	20%					$49,603	
Minor Creek Crossings			ea.	0	$29,000	$0	
Major Creek Crossings			ea.	0	$198,000	$0	
Road Crossings			ea.	0	$81,000	$0	
Major Road / Rail Crossings			ea.	1	$198,000	$198,000	Railway crossing
Utility Crossings			ea.	0	$81,000	$0	
Additional Construction Costs	20%		ea.			$112,124	Includes Mod/Demob,connections, inspection, hydrants, signage, traffic management, bonding, insurance
Provisional & Allowance	10%		ea.			$67,274	Provisional Labour and Materials in addition to base construction cost
Sub-Total Construction Base Costs						**$740,000**	
Geotechnical / Hydrogeological / Materials	2.0%					$14,800	
Geotechnical Sub-Total Cost						**$14,800**	
Property Requirements	2.0%					$ 14,800	
Property Requirements Sub-Total						**$14,800**	
Consultant Engineering/Design	15%					$ 111,000	includes planning, pre-design, detailed design, training, CA, commissioning
Engineering/Design Sub-Total						**$111,000**	
In House Labour/Engineering/Wages/CA	3%					$ 50,000	
In-house Labour/Wages Sub-Total						**$50,000**	
Project Contingency	25%					$233,000	Construction Contingency is dependent on Cost Estimate Class and Project Complexity
Project Contingency Sub-Total						**$233,000**	
Non-Refundable HST	1.76%					$19,600	
Non-Refundable HST Sub-Total						**$19,600**	
Total (2019 Dollars)						**$1,183,000**	Rounded to nearest $1,000
Other Estimate							
Chosen Estimate						**$1,183,000**	**2019 Estimate**

COST ESTIMATE SUMMARY - FOR PHASING ESTIMATING ONLY

PROJECT COMPONENT	PROJECT COMPONENT DESCRIPTION	PERCENTAGE	TOTAL	YEAR	COMMENTS
Study	Feasibility study, EA	2%	$23,660		
Design	Design fees, Town fees for design, contract admin	13%	$153,790		
Construction	Town fees, base costs and project contingency	85%	$1,005,550		
TOTAL			**$1,183,000**		

BluePlan

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PROJECT NO.: WW-D-FM-06
PROJECT NAME: South Dorchester forcemain
PROJECT DESCRIPTION: New forcemain needed to support south SPS for existing development South of river in Sorth Dorchester

Class Estimate Type:	Class 4	Class adjusts Construction Contingency and expected accuracy
Project Complexity	High	Complexity adjusts Construction Contingency, and expected accuracy
Accuracy Range:	50%	
Area Condition:	Suburban	Area Condition uplifts unit cost and restoration

PROJECT NO.: WW-D-FM-06

PROPOSED DIAMETER:	150 mm	
TOTAL LENGTH:	1800 m	
Tunnelled		0%
Open Cut	1800 m	100%

CLASS EA REQUIREMENTS:	B
CONSTRUCTION ASSUMPTION:	Forcemain

COST ESTIMATION SPREADSHEET

COMPONENT	RATE (%)	RATE ($)	UNIT	ESTIMATED QUANTITY	COST PER UNIT	SUB-TOTAL	COMMENTS
Construction Cost							
Pipe Construction - Open Cut			m	1800 m	$551	$992,069	
Pipe Construction - Tunneling			m	0 m	$1,300	$0	
Pipe Construction Uplift (Based on Area Conditions)	20%					$198,414	
Minor Creek Crossings			ea.	0	$29,000	$0	
Major Creek Crossings			ea.	0	$198,000	$0	
Road Crossings			ea.	0	$81,000	$0	
Major Road / Rail Crossings			ea.	0	$198,000	$0	
Utility Crossings			ea.	0	$81,000	$0	
Additional Construction Costs	20%		ea.			$238,096	Includes Mod/Demob,connections, inspection, hydrants, signage, traffic management, bonding, insurance
Provisional & Allowance	10%		ea.			$142,858	Provisional Labour and Materials in addition to base construction cost
Sub-Total Construction Base Costs						**$1,571,000**	
Geotechnical / Hydrogeological / Materials	2.0%					$31,400	
Geotechnical Sub-Total Cost						**$31,400**	
Property Requirements	2.0%					$ 31,400	
Property Requirements Sub-Total						**$31,400**	
Consultant Engineering/Design	15%					$ 235,700	includes planning, pre-design, detailed design, training, CA, commissioning
Engineering/Design Sub-Total						**$235,700**	
In House Labour/Engineering/Wages/CA	3%					$ 100,000	
In-house Labour/Wages Sub-Total						**$100,000**	
Project Contingency	25%					$492,000	Construction Contingency is dependent on Cost Estimate Class and Project Complexity
Project Contingency Sub-Total						**$492,000**	
Non-Refundable HST	1.76%					$41,600	
Non-Refundable HST Sub-Total						**$41,600**	
Total (2019 Dollars)						**$2,503,000**	Rounded to nearest $1,000
Other Estimate							
Chosen Estimate						**$2,503,000**	**2019 Estimate**

COST ESTIMATE SUMMARY - FOR PHASING ESTIMATING ONLY

PROJECT COMPONENT	PROJECT COMPONENT DESCRIPTION	PERCENTAGE	TOTAL	YEAR	COMMENTS
Study	Feasibility study, EA	0%	$0		
Design	Design fees, Town fees for design, contract admin	15%	$375,450		
Construction	Town fees, base costs and project contingency	85%	$2,127,550		
TOTAL			**$2,503,000**		

BluePlan

Municipality of Thames Centre
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PROJECT NO.: WW-D-FM-07
PROJECT NAME: Southeast Dorchester forcemain
PROJECT DESCRIPTION: New forcemain needed to support southeast SPS for existing development East of serviced developments and North of Hamilton Road in Sorth Dorchester

Class Estimate Type:	Class 4	Class adjusts Construction Contingency and expected accuracy
Project Complexity	Med	Complexity adjusts Construction Contingency, and expected accuracy
Accuracy Range:	40%	
Area Condition:	Suburban	Area Condition uplifts unit cost and restoration

PROJECT NO.: WW-D-FM-07

PROPOSED DIAMETER:	150 mm	
TOTAL LENGTH:	620 m	
Tunnelled	0 m	0%
Open Cut	620 m	100%

CLASS EA REQUIREMENTS:	B
CONSTRUCTION ASSUMPTION:	Forcemain

COST ESTIMATION SPREADSHEET

COMPONENT	RATE (%)	RATE ($)	UNIT	ESTIMATED QUANTITY	COST PER UNIT	SUB-TOTAL	COMMENTS
Construction Cost							
Pipe Construction - Open Cut			m	620 m	$551	$341,713	
Pipe Construction - Tunneling			m	0 m	$1,300	$0	
Pipe Construction Uplift (Based on Area Conditions)	20%					$68,343	
Minor Creek Crossings			ea.	0	$29,000	$0	
Major Creek Crossings			ea.	0	$198,000	$0	
Road Crossings			ea.	0	$81,000	$0	
Major Road / Rail Crossings			ea.	0	$198,000	$0	
Utility Crossings			ea.	0	$81,000	$0	
Additional Construction Costs	15%		ea.			$61,508	Includes Mod/Demob,connections, inspection, hydrants, signage, traffic management, bonding, insurance
Provisional & Allowance	10%		ea.			$47,156	Provisional Labour and Materials in addition to base construction cost
Sub-Total Construction Base Costs						**$519,000**	
Geotechnical / Hydrogeological / Materials	1.0%					$5,200	
Geotechnical Sub-Total Cost						**$5,200**	
Property Requirements	1.5%					$ 7,800	
Property Requirements Sub-Total						**$7,800**	
Consultant Engineering/Design	15%					$ 77,900	includes planning, pre-design, detailed design, training, CA, commissioning
Engineering/Design Sub-Total						**$77,900**	
In House Labour/Engineering/Wages/CA	3%					$ 50,000	
In-house Labour/Wages Sub-Total						**$50,000**	
Project Contingency	15%					$99,000	Construction Contingency is dependent on Cost Estimate Class and Project Complexity
Project Contingency Sub-Total						**$99,000**	
Non-Refundable HST	1.76%					$12,500	
Non-Refundable HST Sub-Total						**$12,500**	
Total (2019 Dollars)						**$771,000**	Rounded to nearest $1,000
Other Estimate							
Chosen Estimate						**$771,000**	**2016 Estimate**

COST ESTIMATE SUMMARY - FOR PHASING ESTIMATING ONLY

PROJECT COMPONENT	PROJECT COMPONENT DESCRIPTION	PERCENTAGE	TOTAL	YEAR	COMMENTS
Study	Feasibility study, EA	2%	$15,420		
Design	Design fees, Town fees for design, contract admin	13%	$100,230		
Construction	Town fees, base costs and project contingency	85%	$655,350		
TOTAL			**$771,000**		

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PROJECT NO.: WW-D-FM-08
PROJECT NAME: Dorchester SPS forcemain
PROJECT DESCRIPTION: New forcemain needed to support Dorchester WWTP SPS for all existing and growth developments in Dorchester.

Class Estimate Type:	Class 4	Class adjusts Construction Contingency and expected accuracy
Project Complexity	High	Complexity adjusts Construction Contingency, and expected accuracy
Accuracy Range:	50%	
Area Condition:	Suburban	Area Condition uplifts unit cost and restoration

PROJECT NO.: WW-D-FM-08

PROPOSED DIAMETER:	350 mm	
TOTAL LENGTH:	1250 m	
Tunnelled		0%
Open Cut	1250 m	100%

CLASS EA REQUIREMENTS:	B
CONSTRUCTION ASSUMPTION:	Forcemain

COST ESTIMATION SPREADSHEET

COMPONENT	RATE (%)	RATE ($)	UNIT	ESTIMATED QUANTITY	COST PER UNIT	SUB-TOTAL	COMMENTS
Construction Cost							
Pipe Construction - Open Cut			m	1250 m	$676	$845,193	
Pipe Construction - Tunneling			m	0 m	$1,300	$0	
Pipe Construction Uplift (Based on Area Conditions)	20%					$169,039	
Minor Creek Crossings			ea.	0	$45,000	$0	
Major Creek Crossings			ea.	0	$214,000	$0	
Road Crossings			ea.	0	$97,000	$0	
Major Road / Rail Crossings			ea.	0	$214,000	$0	
Utility Crossings			ea.	0	$97,000	$0	
Additional Construction Costs	20%		ea.			$202,846	Includes Mod/Demob,connections, inspection, hydrants, signage, traffic management, bonding, insurance
Provisional & Allowance	10%		ea.			$121,708	Provisional Labour and Materials in addition to base construction cost
Sub-Total Construction Base Costs						**$1,339,000**	
Geotechnical / Hydrogeological / Materials	2.0%					$26,800	
Geotechnical Sub-Total Cost						**$26,800**	
Property Requirements	2.0%					$ 26,800	
Property Requirements Sub-Total						**$26,800**	
Consultant Engineering/Design	15%					$ 200,900	includes planning, pre-design, detailed design, training, CA, commissioning
Engineering/Design Sub-Total						**$200,900**	
In House Labour/Engineering/Wages/CA	3%					$ 100,000	
In-house Labour/Wages Sub-Total						**$100,000**	
Project Contingency	25%					$423,000	Construction Contingency is dependent on Cost Estimate Class and Project Complexity
Project Contingency Sub-Total						**$423,000**	
Non-Refundable HST	1.76%					$35,500	
Non-Refundable HST Sub-Total						**$35,500**	
Total (2019 Dollars)						**$2,152,000**	Rounded to nearest $1,000
Other Estimate							
Chosen Estimate						**$2,152,000**	**2019 Estimate**

COST ESTIMATE SUMMARY - FOR PHASING ESTIMATING ONLY

PROJECT COMPONENT	PROJECT COMPONENT DESCRIPTION	PERCENTAGE	TOTAL	YEAR	COMMENTS
Study	Feasibility study, EA	2%	$43,040		
Design	Design fees, Town fees for design, contract admin	13%	$279,760		
Construction	Town fees, base costs and project contingency	85%	$1,829,200		
TOTAL			$2,152,000		

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PROJECT NO.: WW-D-FM-09
PROJECT NAME: PS3 forcemain
PROJECT DESCRIPTION: Twinned forcemains needed to support PS3 for all development in Southeast Dorchester

Class Estimate Type:	Class 2	Class adjusts Construction Contingency and expected accuracy
Project Complexity	High	Complexity adjusts Construction Contingency, and expected accuracy
Accuracy Range:	15%	
Area Condition:	Rural	Area Condition uplifts unit cost and restoration

PROJECT NO.: WW-D-FM-09

PROPOSED DIAMETER:	250 mm	
TOTAL LENGTH:	662 m	
Tunnelled	145 m	22%
Open Cut	517 m	78%

CLASS EA REQUIREMENTS:	B
CONSTRUCTION ASSUMPTION:	Forcemain

COST ESTIMATION SPREADSHEET

COMPONENT	RATE (%)	RATE ($)	UNIT	ESTIMATED QUANTITY	COST PER UNIT	SUB-TOTAL	COMMENTS
Construction Cost							
Pipe Construction - Open Cut			m	517 m	$901	$465,617	Twinned 250mm Forcemain (1.5x $Unit Rate)
Pipe Construction - Tunneling			m	145 m	$1,950	$282,750	Twinned 250mm Forcemain (1.5x $Unit Rate)
Pipe Construction Uplift (Based on Area Conditions)	0%					$0	
Minor Creek Crossings			ea.	0	$30,000	$0	
Major Creek Crossings			ea.	1	$199,000	$199,000	Mill Pond Crossing
Road Crossings			ea.	0	$82,000	$0	
Major Road / Rail Crossings			ea.	0	$199,000	$0	
Utility Crossings			ea.	0	$82,000	$0	
Additional Construction Costs	20%		ea.			$189,473	Includes Mod/Demob,connections, inspection, hydrants, signage, traffic management, bonding, insurance
Provisional & Allowance	10%		ea.			$113,684	Provisional Labour and Materials in addition to base construction cost
Sub-Total Construction Base Costs						**$1,251,000**	
Geotechnical / Hydrogeological / Materials	2.0%					$25,000	
Geotechnical Sub-Total Cost						**$25,000**	
Property Requirements	2.0%					$ 25,000	
Property Requirements Sub-Total						**$25,000**	
Consultant Engineering/Design	15%					$ 187,700	includes planning, pre-design, detailed design, training, CA, commissioning
Engineering/Design Sub-Total		**$0**				**$187,700**	
In House Labour/Engineering/Wages/CA	3%					$ 100,000	
In-house Labour/Wages Sub-Total		**$0**				**$100,000**	
Project Contingency	10%					$159,000	Construction Contingency is dependent on Cost Estimate Class and Project Complexity
Project Contingency Sub-Total		**$0**				**$159,000**	
Non-Refundable HST	1.76%					$29,000	
Non-Refundable HST Sub-Total						**$29,000**	
Total (2019 Dollars)						**$1,777,000**	Rounded to nearest $1,000
Other Estimate							
Chosen Estimate						**$1,777,000**	**2019 Estimate**

COST ESTIMATE SUMMARY - FOR PHASING ESTIMATING ONLY

PROJECT COMPONENT	PROJECT COMPONENT DESCRIPTION	PERCENTAGE	TOTAL	YEAR	COMMENTS
Study	Feasibility study, EA	2%	$35,540		
Design	Design fees, Town fees for design, contract admin	13%	$231,010		
Construction	Town fees, base costs and project contingency	85%	$1,510,450		
TOTAL			**$1,777,000**		

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PROJECT NO.: WW-D-SS-01A
PROJECT NAME: New Development SPS West Sewers
PROJECT DESCRIPTION: New sanitary sewer required for development blocks going to new Development SPS in North Dorchester.

Class Estimate Type:	Class 4	Class adjusts Construction Contingency and expected accuracy
Project Complexity	Low	Complexity adjusts Construction Contingency, and expected accuracy
Accuracy Range:	30%	
Area Condition:	Rural	Area Condition uplifts unit cost and restoration

PROJECT NO.: WW-D-SS-01A

PROPOSED DIAMETER:	250 mm	
TOTAL LENGTH:	420 m	
Tunnelled		0%
Open Cut	420 m	100%

CLASS EA REQUIREMENTS:	A+
CONSTRUCTION ASSUMPTION:	Sewer 5m

COST ESTIMATION SPREADSHEET

COMPONENT	RATE (%)	RATE ($)	UNIT	ESTIMATED QUANTITY	COST PER UNIT	SUB-TOTAL	COMMENTS
Construction Cost							
Pipe Construction - Open Cut			m	420 m	$653	$274,138	
Pipe Construction - Tunneling			m	0 m	$1,300	$0	
Pipe Construction Uplift (Based on Area Conditions)	0%					$0	
Minor Creek Crossings			ea.	0	$66,000	$0	
Major Creek Crossings			ea.	0	$235,000	$0	
Road Crossings			ea.	0	$118,000	$0	
Major Road / Rail Crossings			ea.	0	$235,000	$0	
Utility Crossings			ea.	0	$118,000	$0	
Additional Construction Costs	10%		ea.			$27,414	Includes Mod/Demob,connections, inspection, hydrants, signage, traffic management, bonding, insurance
Provisional & Allowance	10%		ea.			$30,155	Provisional Labour and Materials in addition to base construction cost
Sub-Total Construction Base Costs						**$332,000**	
Geotechnical / Hydrogeological / Materials	0.5%					$1,700	
Geotechnical Sub-Total Cost						**$1,700**	
Property Requirements	1.0%					$ 3,300	
Property Requirements Sub-Total						**$3,300**	
Consultant Engineering/Design	15%					$ 49,800	includes planning, pre-design, detailed design, training, CA, commissioning
Engineering/Design Sub-Total						**$49,800**	
In House Labour/Engineering/Wages/CA	3%					$ 50,000	
In-house Labour/Wages Sub-Total						**$50,000**	
Project Contingency	10%					$44,000	Construction Contingency is dependent on Cost Estimate Class and Project Complexity
Project Contingency Sub-Total						**$44,000**	
Non-Refundable HST	1.76%					$7,600	
Non-Refundable HST Sub-Total						**$7,600**	
Total (2019 Dollars)						**$488,000**	Rounded to nearest $1,000
Other Estimate							
Chosen Estimate						**$488,000**	**2019 Estimate**

COST ESTIMATE SUMMARY - FOR PHASING ESTIMATING ONLY

PROJECT COMPONENT	PROJECT COMPONENT DESCRIPTION	PERCENTAGE	TOTAL	YEAR	COMMENTS
Study	Feasibility study, EA	2%	$9,760		
Design	Design fees, Town fees for design, contract admin	13%	$63,440		
Construction	Town fees, base costs and project contingency	85%	$414,800		
TOTAL			$488,000		

PROJECT NO.: WW-D-SS-01B
PROJECT NAME: New Development SPS West Sewers
PROJECT DESCRIPTION: New sanitary sewer required for development blocks going to new Development SPS in North Dorchester.

Class Estimate Type:	Class 4	Class adjusts Construction Contingency and expected accuracy
Project Complexity	Low	Complexity adjusts Construction Contingency, and expected accuracy
Accuracy Range:	30%	
Area Condition:	Rural	Area Condition uplifts unit cost and restoration

PROJECT NO.: WW-D-SS-01B

PROPOSED DIAMETER:	300 mm	
TOTAL LENGTH:	420 m	
Tunnelled		0%
Open Cut	420 m	100%

CLASS EA REQUIREMENTS:	A+
CONSTRUCTION ASSUMPTION:	Sewer 5m

COST ESTIMATION SPREADSHEET

COMPONENT	RATE (%)	RATE ($)	UNIT	ESTIMATED QUANTITY	COST PER UNIT	SUB-TOTAL	COMMENTS
Construction Cost							
Pipe Construction - Open Cut			m	420 m	$654	$274,867	
Pipe Construction - Tunneling			m	0 m	$1,300	$0	
Pipe Construction Uplift (Based on Area Conditions)	0%					$0	
Minor Creek Crossings			ea.	0	$66,000	$0	
Major Creek Crossings			ea.	0	$235,000	$0	
Road Crossings			ea.	0	$118,000	$0	
Major Road / Rail Crossings			ea.	0	$235,000	$0	
Utility Crossings			ea.	0	$118,000	$0	
Additional Construction Costs	10%		ea.			$27,487	Includes Mod/Demob,connections, inspection, hydrants, signage, traffic management, bonding, insurance
Provisional & Allowance	10%		ea.			$30,235	Provisional Labour and Materials in addition to base construction cost
Sub-Total Construction Base Costs						**$333,000**	
Geotechnical / Hydrogeological / Materials	0.5%					$1,700	
Geotechnical Sub-Total Cost						**$1,700**	
Property Requirements	1.0%					$ 3,300	
Property Requirements Sub-Total						**$3,300**	
Consultant Engineering/Design	15%					$ 50,000	includes planning, pre-design, detailed design, training, CA, commissioning
Engineering/Design Sub-Total						**$50,000**	
In House Labour/Engineering/Wages/CA	3%					$ 50,000	
In-house Labour/Wages Sub-Total						**$50,000**	
Project Contingency	10%					$44,000	Construction Contingency is dependent on Cost Estimate Class and Project Complexity
Project Contingency Sub-Total						**$44,000**	
Non-Refundable HST	1.76%					$7,600	
Non-Refundable HST Sub-Total						**$7,600**	
Total (2019 Dollars)						**$490,000**	Rounded to nearest $1,000
Other Estimate							
Chosen Estimate						**$490,000**	**2019 Estimate**

COST ESTIMATE SUMMARY - FOR PHASING ESTIMATING ONLY

PROJECT COMPONENT	PROJECT COMPONENT DESCRIPTION	PERCENTAGE	TOTAL	YEAR	COMMENTS
Study	Feasibility study, EA	2%	$9,800		
Design	Design fees, Town fees for design, contract admin	13%	$63,700		
Construction	Town fees, base costs and project contingency	85%	$416,500		
TOTAL			$490,000		

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PROJECT NO.: WW-D-SS-02
PROJECT NAME: New Development SPS East Sewers
PROJECT DESCRIPTION: New sanitary sewer required for development blocks going to new Development SPS in North Dorchester.

Class Estimate Type:	Class 4	Class adjusts Construction Contingency and expected accuracy
Project Complexity	Med	Complexity adjusts Construction Contingency, and expected accuracy
Accuracy Range:	40%	
Area Condition:	Suburban	Area Condition uplifts unit cost and restoration

PROJECT NO.: WW-D-SS-02

PROPOSED DIAMETER:	250 mm	
TOTAL LENGTH:	480 m	
Tunnelled		0%
Open Cut	480 m	100%

CLASS EA REQUIREMENTS:	A
CONSTRUCTION ASSUMPTION:	Sewer 5m

COST ESTIMATION SPREADSHEET

COMPONENT	RATE (%)	RATE ($)	UNIT	ESTIMATED QUANTITY	COST PER UNIT	SUB-TOTAL	COMMENTS
Construction Cost							
Pipe Construction - Open Cut			m	480 m	$653	$313,300	
Pipe Construction - Tunneling			m	0 m	$1,300	$0	
Pipe Construction Uplift (Based on Area Conditions)	20%					$62,660	
Minor Creek Crossings			ea.	0	$66,000	$0	
Major Creek Crossings			ea.	0	$235,000	$0	
Road Crossings			ea.	0	$118,000	$0	
Major Road / Rail Crossings			ea.	0	$235,000	$0	
Utility Crossings			ea.	0	$118,000	$0	
Additional Construction Costs	15%		ea.			$56,394	Includes Mod/Demob,connections, inspection, hydrants, signage, traffic management, bonding, insurance
Provisional & Allowance	10%		ea.			$43,235	Provisional Labour and Materials in addition to base construction cost
Sub-Total Construction Base Costs						**$476,000**	
Geotechnical / Hydrogeological / Materials	1.0%					$4,800	
Geotechnical Sub-Total Cost						**$4,800**	
Property Requirements	1.5%					$ 7,100	
Property Requirements Sub-Total						**$7,100**	
Consultant Engineering/Design	15%					$ 71,400	includes planning, pre-design, detailed design, training, CA, commissioning
Engineering/Design Sub-Total						**$71,400**	
In House Labour/Engineering/Wages/CA	3%					$ 50,000	
In-house Labour/Wages Sub-Total						**$50,000**	
Project Contingency	15%					$91,000	Construction Contingency is dependent on Cost Estimate Class and Project Complexity
Project Contingency Sub-Total						**$91,000**	
Non-Refundable HST	1.76%					$11,400	
Non-Refundable HST Sub-Total						**$11,400**	
Total (2019 Dollars)						**$712,000**	Rounded to nearest $1,000
Other Estimate							
Chosen Estimate						**$712,000**	**2019 Estimate**

COST ESTIMATE SUMMARY - FOR PHASING ESTIMATING ONLY

PROJECT COMPONENT	PROJECT COMPONENT DESCRIPTION	PERCENTAGE	TOTAL	YEAR	COMMENTS
Study	Feasibility study, EA	2%	$14,240		
Design	Design fees, Town fees for design, contract admin	13%	$92,560		
Construction	Town fees, base costs and project contingency	85%	$605,200		
TOTAL			$712,000		

PROJECT NO.: WW-D-SS-03
PROJECT NAME: PS3 West Sewers
PROJECT DESCRIPTION: New sanitary sewer required for development blocks going to PS3 in Dorchester.

Class Estimate Type:	Class 4	Class adjusts Construction Contingency and expected accuracy
Project Complexity	High	Complexity adjusts Construction Contingency, and expected accuracy
Accuracy Range:	50%	
Area Condition:	Rural	Area Condition uplifts unit cost and restoration

PROJECT NO.: WW-D-SS-03

PROPOSED DIAMETER:		375 mm	
TOTAL LENGTH:		265 m	
	Tunnelled		0%
	Open Cut	265 m	100%

CLASS EA REQUIREMENTS:	A+
CONSTRUCTION ASSUMPTION:	Sewer 10m

COST ESTIMATION SPREADSHEET

COMPONENT	RATE (%)	RATE ($)	UNIT	ESTIMATED QUANTITY	COST PER UNIT	SUB-TOTAL	COMMENTS
Construction Cost							
Pipe Construction - Open Cut			m	265 m	$2,766	$733,035	
Pipe Construction - Tunneling			m	0 m	$6,300	$0	
Pipe Construction Uplift (Based on Area Conditions)	0%					$0	
Minor Creek Crossings			ea.	0	$166,000	$0	
Major Creek Crossings			ea.	0	$985,000	$0	
Road Crossings			ea.	0	$418,000	$0	
Major Road / Rail Crossings			ea.	0	$985,000	$0	
Utility Crossings			ea.	0	$418,000	$0	
Additional Construction Costs	20%		ea.			$146,607	Includes Mod/Demob,connections, inspection, hydrants, signage, traffic management, bonding, insurance
Provisional & Allowance	10%		ea.			$87,964	Provisional Labour and Materials in addition to base construction cost
Sub-Total Construction Base Costs						**$968,000**	
Geotechnical / Hydrogeological / Materials	2.0%					$19,400	
Geotechnical Sub-Total Cost						**$19,400**	
Property Requirements	2.0%					$ 19,400	
Property Requirements Sub-Total						**$19,400**	
Consultant Engineering/Design	15%					$ 145,200	includes planning, pre-design, detailed design, training, CA, commissioning
Engineering/Design Sub-Total						**$145,200**	
In House Labour/Engineering/Wages/CA	3%					$ 50,000	
In-house Labour/Wages Sub-Total						**$50,000**	
Project Contingency	25%					$301,000	Construction Contingency is dependent on Cost Estimate Class and Project Complexity
Project Contingency Sub-Total						**$301,000**	
Non-Refundable HST	1.76%					$25,600	
Non-Refundable HST Sub-Total						**$25,600**	
Total (2019 Dollars)						**$1,529,000**	Rounded to nearest $1,000
Other Estimate							
Chosen Estimate						**$1,529,000**	**2019 Estimate**

COST ESTIMATE SUMMARY - FOR PHASING ESTIMATING ONLY

PROJECT COMPONENT	PROJECT COMPONENT DESCRIPTION	PERCENTAGE	TOTAL	YEAR	COMMENTS
Study	Feasibility study, EA	2%	$30,580		
Design	Design fees, Town fees for design, contract admin	13%	$198,770		
Construction	Town fees, base costs and project contingency	85%	$1,299,650		
TOTAL			$1,529,000		

BluePlan

Municipality of Thames Centre
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PROJECT NO.: WW-D-SS-04
PROJECT NAME: PS3 West Sewers
PROJECT DESCRIPTION: New sanitary sewer required for development blocks going to PS3 in Dorchester.

Class Estimate Type:	Class 4	Class adjusts Construction Contingency and expected accuracy
Project Complexity	High	Complexity adjusts Construction Contingency, and expected accuracy
Accuracy Range:	50%	
Area Condition:	Rural	Area Condition uplifts unit cost and restoration

PROJECT NO.: WW-D-SS-04

PROPOSED DIAMETER:		450 mm	
TOTAL LENGTH:		45 m	
	Tunnelled		0%
	Open Cut	45 m	100%

CLASS EA REQUIREMENTS:	A+
CONSTRUCTION ASSUMPTION:	Sewer 5m

COST ESTIMATION SPREADSHEET

COMPONENT	RATE (%)	RATE ($)	UNIT	ESTIMATED QUANTITY	COST PER UNIT	SUB-TOTAL	COMMENTS
Construction Cost							
Pipe Construction - Open Cut			m	45 m	$707	$31,796	
Pipe Construction - Tunneling			m	0 m	$6,300	$0	
Pipe Construction Uplift (Based on Area Conditions)	0%					$0	
Minor Creek Crossings			ea.	0	$196,000	$0	
Major Creek Crossings			ea.	0	$1,015,000	$0	
Road Crossings			ea.	0	$448,000	$0	
Major Road / Rail Crossings			ea.	0	$1,015,000	$0	
Utility Crossings			ea.	0	$448,000	$0	
Additional Construction Costs	20%		ea.			$6,359	Includes Mod/Demob,connections, inspection, hydrants, signage, traffic management, bonding, insurance
Provisional & Allowance	10%		ea.			$3,816	Provisional Labour and Materials in addition to base construction cost
Sub-Total Construction Base Costs						**$42,000**	
Geotechnical / Hydrogeological / Materials	2.0%					$800	
Geotechnical Sub-Total Cost						**$800**	
Property Requirements	2.0%					$ 800	
Property Requirements Sub-Total						**$800**	
Consultant Engineering/Design	15%					$ 6,300	includes planning, pre-design, detailed design, training, CA, commissioning
Engineering/Design Sub-Total						**$6,300**	
In House Labour/Engineering/Wages/CA	3%					$ 50,000	
In-house Labour/Wages Sub-Total						**$50,000**	
Project Contingency	25%					$25,000	Construction Contingency is dependent on Cost Estimate Class and Project Complexity
Project Contingency Sub-Total						**$25,000**	
Non-Refundable HST	1.76%					$1,300	
Non-Refundable HST Sub-Total						**$1,300**	
Total (2019 Dollars)						**$126,000**	Rounded to nearest $1,000
Other Estimate							
Chosen Estimate						**$126,000**	**2019 Estimate**

COST ESTIMATE SUMMARY - FOR PHASING ESTIMATING ONLY

PROJECT COMPONENT	PROJECT COMPONENT DESCRIPTION	PERCENTAGE	TOTAL	YEAR	COMMENTS
Study	Feasibility study, EA	2%	$2,520		
Design	Design fees, Town fees for design, contract admin	13%	$16,380		
Construction	Town fees, base costs and project contingency	85%	$107,100		
TOTAL			**$126,000**		

PROJECT NO.: WW-D-SS-05A-ALT-1
PROJECT NAME: Christie Drive and new development sewer
PROJECT DESCRIPTION: New sanitary sewer required for development blocks going to PS3 in Dorchester.

Class Estimate Type:	Class 4	Class adjusts Construction Contingency and expected accuracy
Project Complexity	Med	Complexity adjusts Construction Contingency, and expected accuracy
Accuracy Range:	40%	
Area Condition:	Suburban	Area Condition uplifts unit cost and restoration

PROJECT NO.: WW-D-SS-05A-ALT-1

PROPOSED DIAMETER:	250 mm	
TOTAL LENGTH:	370 m	
Tunnelled	0 m	0%
Open Cut	370 m	100%

CLASS EA REQUIREMENTS:	A+
CONSTRUCTION ASSUMPTION:	Sewer 5m

COST ESTIMATION SPREADSHEET

COMPONENT	RATE (%)	RATE ($)	UNIT	ESTIMATED QUANTITY	COST PER UNIT	SUB-TOTAL	COMMENTS
Construction Cost							
Pipe Construction - Open Cut			m	370 m	$653	$241,502	
Pipe Construction - Tunneling			m	0 m	$1,300	$0	
Pipe Construction Uplift (Based on Area Conditions)	20%					$48,300	
Minor Creek Crossings			ea.	0	$66,000	$0	
Major Creek Crossings			ea.	0	$235,000	$0	
Road Crossings			ea.	0	$118,000	$0	
Major Road / Rail Crossings			ea.	0	$235,000	$0	
Utility Crossings			ea.	0	$118,000	$0	
Additional Construction Costs	15%		ea.			$43,470	Includes Mod/Demob,connections, inspection, hydrants, signage, traffic management, bonding, insurance
Provisional & Allowance	10%		ea.			$33,327	Provisional Labour and Materials in addition to base construction cost
Sub-Total Construction Base Costs						**$367,000**	
Geotechnical / Hydrogeological / Materials	1.0%					$3,700	
Geotechnical Sub-Total Cost						**$3,700**	
Property Requirements	1.5%					$ 5,500	
Property Requirements Sub-Total						**$5,500**	
Consultant Engineering/Design	15%					$ 55,100	includes planning, pre-design, detailed design, training, CA, commissioning
Engineering/Design Sub-Total						**$55,100**	
In House Labour/Engineering/Wages/CA	3%					$ 50,000	
In-house Labour/Wages Sub-Total						**$50,000**	
Project Contingency	15%					$72,000	Construction Contingency is dependent on Cost Estimate Class and Project Complexity
Project Contingency Sub-Total						**$72,000**	
Non-Refundable HST	1.76%					$8,900	
Non-Refundable HST Sub-Total						**$8,900**	
Total (2019 Dollars)						**$562,000**	Rounded to nearest $1,000
Other Estimate							
Chosen Estimate						**$562,000**	**2019 Estimate**

COST ESTIMATE SUMMARY - FOR PHASING ESTIMATING ONLY

PROJECT COMPONENT	PROJECT COMPONENT DESCRIPTION	PERCENTAGE	TOTAL	YEAR	COMMENTS
Study	Feasibility study, EA	2%	$11,240		
Design	Design fees, Town fees for design, contract admin	13%	$73,060		
Construction	Town fees, base costs and project contingency	85%	$477,700		
TOTAL			**$562,000**		

Municipality of Thames Centre
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PROJECT NO.: WW-D-SS-05A-ALT-2
PROJECT NAME: Christie Drive and new development sewer
PROJECT DESCRIPTION: New sanitary sewer required for development blocks going to PS3 in Dorchester.

Class Estimate Type:	Class 4	Class adjusts Construction Contingency and expected accuracy
Project Complexity	Med	Complexity adjusts Construction Contingency, and expected accuracy
Accuracy Range:	40%	
Area Condition:	Rural	Area Condition uplifts unit cost and restoration

PROJECT NO.: WW-D-SS-05A-ALT-2

PROPOSED DIAMETER:	250 mm	
TOTAL LENGTH:	260 m	
Tunnelled	0 m	0%
Open Cut	260 m	100%

CLASS EA REQUIREMENTS:	A
CONSTRUCTION ASSUMPTION:	Sewer 5m

COST ESTIMATION SPREADSHEET

COMPONENT	RATE (%)	RATE ($)	UNIT	ESTIMATED QUANTITY	COST PER UNIT	SUB-TOTAL	COMMENTS
Construction Cost							
Pipe Construction - Open Cut			m	260 m	$653	$169,704	
Pipe Construction - Tunneling			m	0 m	$1,300	$0	
Pipe Construction Uplift (Based on Area Conditions)	0%					$0	
Minor Creek Crossings			ea.	0	$66,000	$0	
Major Creek Crossings			ea.	0	$235,000	$0	
Road Crossings			ea.	0	$118,000	$0	
Major Road / Rail Crossings			ea.	0	$235,000	$0	
Utility Crossings			ea.	0	$118,000	$0	
Additional Construction Costs	15%		ea.			$25,456	Includes Mod/Demob,connections, inspection, hydrants, signage, traffic management, bonding, insurance
Provisional & Allowance	10%		ea.			$19,516	Provisional Labour and Materials in addition to base construction cost
Sub-Total Construction Base Costs						**$215,000**	
Geotechnical / Hydrogeological / Materials	1.0%					$2,200	
Geotechnical Sub-Total Cost						**$2,200**	
Property Requirements	1.5%					$ 3,200	
Property Requirements Sub-Total						**$3,200**	
Consultant Engineering/Design	15%					$ 32,300	includes planning, pre-design, detailed design, training, CA, commissioning
Engineering/Design Sub-Total						**$32,300**	
In House Labour/Engineering/Wages/CA	3%					$ 50,000	
In-house Labour/Wages Sub-Total						**$50,000**	
Project Contingency	15%					$45,000	Construction Contingency is dependent on Cost Estimate Class and Project Complexity
Project Contingency Sub-Total						**$45,000**	
Non-Refundable HST	1.76%					$5,200	
Non-Refundable HST Sub-Total						**$5,200**	
Total (2019 Dollars)						**$353,000**	Rounded to nearest $1,000
Other Estimate							
Chosen Estimate						**$353,000**	**2019 Estimate**

COST ESTIMATE SUMMARY - FOR PHASING ESTIMATING ONLY

PROJECT COMPONENT	PROJECT COMPONENT DESCRIPTION	PERCENTAGE	TOTAL	YEAR	COMMENTS
Study	Feasibility study, EA	2%	$7,060		
Design	Design fees, Town fees for design, contract admin	13%	$45,890		
Construction	Town fees, base costs and project contingency	85%	$300,050		
TOTAL			$353,000		

PROJECT NO.: WW-D-SS-05B-ALT-1
PROJECT NAME: Christie Drive and new Development sewer
PROJECT DESCRIPTION: New sanitary sewer required for development blocks going to PS3 in Dorchester.

Class Estimate Type:	Class 4	Class adjusts Construction Contingency and expected accuracy
Project Complexity	Med	Complexity adjusts Construction Contingency, and expected accuracy
Accuracy Range:	40%	
Area Condition:	Suburban	Area Condition uplifts unit cost and restoration

PROJECT NO.: WW-D-SS-05B-ALT-1

PROPOSED DIAMETER:	300 mm	
TOTAL LENGTH:	370 m	
Tunnelled	0 m	0%
Open Cut	370 m	100%

CLASS EA REQUIREMENTS:	A+
CONSTRUCTION ASSUMPTION:	Sewer 5m

COST ESTIMATION SPREADSHEET

COMPONENT	RATE (%)	RATE ($)	UNIT	ESTIMATED QUANTITY	COST PER UNIT	SUB-TOTAL	COMMENTS
Construction Cost							
Pipe Construction - Open Cut			m	370 m	$654	$242,145	Existing road ROW
Pipe Construction - Tunneling			m	0 m	$1,300	$0	
Pipe Construction Uplift (Based on Area Conditions)	20%					$48,429	
Minor Creek Crossings			ea.	0	$66,000	$0	
Major Creek Crossings			ea.	0	$235,000	$0	
Road Crossings			ea.	0	$118,000	$0	
Major Road / Rail Crossings			ea.	0	$235,000	$0	
Utility Crossings			ea.	0	$118,000	$0	
Additional Construction Costs	15%		ea.			$43,586	Includes Mod/Demob,connections, inspection, hydrants, signage, traffic management, bonding, insurance
Provisional & Allowance	10%		ea.			$33,416	Provisional Labour and Materials in addition to base construction cost
Sub-Total Construction Base Costs						**$368,000**	
Geotechnical / Hydrogeological / Materials	1.0%					$3,700	
Geotechnical Sub-Total Cost						**$3,700**	
Property Requirements	1.5%					$ 5,500	
Property Requirements Sub-Total						**$5,500**	
Consultant Engineering/Design	15%					$ 55,200	includes planning, pre-design, detailed design, training, CA, commissioning
Engineering/Design Sub-Total						**$55,200**	
In House Labour/Engineering/Wages/CA	3%					$ 50,000	
In-house Labour/Wages Sub-Total						**$50,000**	
Project Contingency	15%					$72,000	Construction Contingency is dependent on Cost Estimate Class and Project Complexity
Project Contingency Sub-Total						**$72,000**	
Non-Refundable HST	1.76%					$8,900	
Non-Refundable HST Sub-Total						**$8,900**	
Total (2019 Dollars)						**$563,000**	Rounded to nearest $1,000
Other Estimate							
Chosen Estimate						**$563,000**	**2019 Estimate**

COST ESTIMATE SUMMARY - FOR PHASING ESTIMATING ONLY

PROJECT COMPONENT	PROJECT COMPONENT DESCRIPTION	PERCENTAGE	TOTAL	YEAR	COMMENTS
Study	Feasibility study, EA	2%	$11,260		
Design	Design fees, Town fees for design, contract admin	13%	$73,190		
Construction	Town fees, base costs and project contingency	85%	$478,550		
TOTAL			**$563,000**		

Municipality of Thames Centre
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PROJECT NO.: WW-D-SS-05B-ALT-2
PROJECT NAME: Christie Drive and new Development sewer
PROJECT DESCRIPTION: New sanitary sewer required for development blocks going to PS3 in Dorchester.

Class Estimate Type:	Class 4	Class adjusts Construction Contingency and expected accuracy
Project Complexity	Med	Complexity adjusts Construction Contingency, and expected accuracy
Accuracy Range:	40%	
Area Condition:	Rural	Area Condition uplifts unit cost and restoration

PROJECT NO.: WW-D-SS-05B-ALT-2

PROPOSED DIAMETER:	300 mm	
TOTAL LENGTH:	260 m	
Tunnelled	0 m	0%
Open Cut	260 m	100%

CLASS EA REQUIREMENTS:	A
CONSTRUCTION ASSUMPTION:	Sewer 5m

COST ESTIMATION SPREADSHEET

COMPONENT	RATE (%)	RATE ($)	UNIT	ESTIMATED QUANTITY	COST PER UNIT	SUB-TOTAL	COMMENTS
Construction Cost							
Pipe Construction - Open Cut			m	260 m	$654	$170,156	Existing road ROW
Pipe Construction - Tunneling			m	0 m	$1,300	$0	
Pipe Construction Uplift (Based on Area Conditions)	0%					$0	
Minor Creek Crossings			ea.	0	$66,000	$0	
Major Creek Crossings			ea.	0	$235,000	$0	
Road Crossings			ea.	0	$118,000	$0	
Major Road / Rail Crossings			ea.	0	$235,000	$0	
Utility Crossings			ea.	0	$118,000	$0	
Additional Construction Costs	15%		ea.			$25,523	Includes Mod/Demob,connections, inspection, hydrants, signage, traffic management, bonding, insurance
Provisional & Allowance	10%		ea.			$19,568	Provisional Labour and Materials in addition to base construction cost
Sub-Total Construction Base Costs						**$215,000**	
Geotechnical / Hydrogeological / Materials	1.0%					$2,200	
Geotechnical Sub-Total Cost						**$2,200**	
Property Requirements	1.5%					$ 3,200	
Property Requirements Sub-Total						**$3,200**	
Consultant Engineering/Design	15%					$ 32,300	includes planning, pre-design, detailed design, training, CA, commissioning
Engineering/Design Sub-Total						**$32,300**	
In House Labour/Engineering/Wages/CA	3%					$ 50,000	
In-house Labour/Wages Sub-Total						**$50,000**	
Project Contingency	15%					$45,000	Construction Contingency is dependent on Cost Estimate Class and Project Complexity
Project Contingency Sub-Total						**$45,000**	
Non-Refundable HST	1.76%					$5,200	
Non-Refundable HST Sub-Total						**$5,200**	
Total (2019 Dollars)						**$353,000**	Rounded to nearest $1,000
Other Estimate							
Chosen Estimate						**$353,000**	**2019 Estimate**

COST ESTIMATE SUMMARY - FOR PHASING ESTIMATING ONLY

PROJECT COMPONENT	PROJECT COMPONENT DESCRIPTION	PERCENTAGE	TOTAL	YEAR	COMMENTS
Study	Feasibility study, EA	2%	$7,060		
Design	Design fees, Town fees for design, contract admin	13%	$45,890		
Construction	Town fees, base costs and project contingency	85%	$300,050		
TOTAL			**$353,000**		

PROJECT NO.: WW-D-SS-06A-ALT-1
PROJECT NAME: Rath-Harris Municipal Drain Crossing
PROJECT DESCRIPTION: New sanitary sewer required for development blocks going to PS3 in Dorchester.

Class Estimate Type:	Class 4	Class adjusts Construction Contingency and expected accuracy
Project Complexity	High	Complexity adjusts Construction Contingency, and expected accuracy
Accuracy Range:	50%	
Area Condition:	Rural	Area Condition uplifts unit cost and restoration

PROJECT NO.: WW-D-SS-06A-ALT-1

PROPOSED DIAMETER:		250 mm	
TOTAL LENGTH:		80 m	
	Tunnelled	50 m	63%
	Open Cut	30 m	38%

CLASS EA REQUIREMENTS:	B
CONSTRUCTION ASSUMPTION:	Sewer 5m

COST ESTIMATION SPREADSHEET

COMPONENT	RATE (%)	RATE ($)	UNIT	ESTIMATED QUANTITY	COST PER UNIT	SUB-TOTAL	COMMENTS
Construction Cost							
Pipe Construction - Open Cut			m	30 m	$653	$19,581	Existing road ROW
Pipe Construction - Tunneling			m	50 m	$1,300	$65,000	
Pipe Construction Uplift (Based on Area Conditions)	0%					$0	
Minor Creek Crossings			ea.	1	$66,000	$66,000	Rath-Harris Municipal Drain Crossing
Major Creek Crossings			ea.	0	$235,000	$0	
Road Crossings			ea.	0	$118,000	$0	
Major Road / Rail Crossings			ea.	0	$235,000	$0	
Utility Crossings			ea.	0	$118,000	$0	
Additional Construction Costs	20%		ea.			$30,116	Includes Mod/Demob,connections, inspection, hydrants, signage, traffic management, bonding, insurance
Provisional & Allowance	10%		ea.			$18,070	Provisional Labour and Materials in addition to base construction cost
Sub-Total Construction Base Costs						**$199,000**	
Geotechnical / Hydrogeological / Materials	2.0%					$4,000	
Geotechnical Sub-Total Cost						**$4,000**	
Property Requirements	2.0%					$ 4,000	
Property Requirements Sub-Total						**$4,000**	
Consultant Engineering/Design	15%					$ 29,900	includes planning, pre-design, detailed design, training, CA, commissioning
Engineering/Design Sub-Total						**$29,900**	
In House Labour/Engineering/Wages/CA	3%					$ 50,000	
In-house Labour/Wages Sub-Total						**$50,000**	
Project Contingency	25%					$72,000	Construction Contingency is dependent on Cost Estimate Class and Project Complexity
Project Contingency Sub-Total						**$72,000**	
Non-Refundable HST	1.76%					$5,400	
Non-Refundable HST Sub-Total						**$5,400**	
Total (2019 Dollars)						**$364,000**	Rounded to nearest $1,000
Other Estimate							
Chosen Estimate						**$364,000**	**2019 Estimate**

COST ESTIMATE SUMMARY - FOR PHASING ESTIMATING ONLY

PROJECT COMPONENT	PROJECT COMPONENT DESCRIPTION	PERCENTAGE	TOTAL	YEAR	COMMENTS
Study	Feasibility study, EA	2%	$7,280		
Design	Design fees, Town fees for design, contract admin	13%	$47,320		
Construction	Town fees, base costs and project contingency	85%	$309,400		
TOTAL			**$364,000**		

Municipality of Thames Centre
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PROJECT NO.: WW-D-SS-06A-ALT-2
PROJECT NAME: Rath-Harris Municipal Drain Crossing
PROJECT DESCRIPTION: New sanitary sewer required for development blocks going to PS3 in Dorchester.

Class Estimate Type:	Class 4	Class adjusts Construction Contingency and expected accuracy
Project Complexity	High	Complexity adjusts Construction Contingency, and expected accuracy
Accuracy Range:	50%	
Area Condition:	Rural	Area Condition uplifts unit cost and restoration

PROJECT NO.: WW-D-SS-06A-ALT-2

PROPOSED DIAMETER:		250 mm	
TOTAL LENGTH:		135 m	
	Tunnelled	50 m	37%
	Open Cut	85 m	63%

CLASS EA REQUIREMENTS:	B
CONSTRUCTION ASSUMPTION:	Sewer 10m

COST ESTIMATION SPREADSHEET

COMPONENT	RATE (%)	RATE ($)	UNIT	ESTIMATED QUANTITY	COST PER UNIT	SUB-TOTAL	COMMENTS
Construction Cost							
Pipe Construction - Open Cut			m	85 m	$2,744	$233,232	Existing road ROW
Pipe Construction - Tunneling			m	50 m	$1,300	$65,000	
Pipe Construction Uplift (Based on Area Conditions)	0%					$0	
Minor Creek Crossings			ea.	1	$66,000	$66,000	Rath-Harris Municipal Drain Crossing
Major Creek Crossings			ea.	0	$235,000	$0	
Road Crossings			ea.	0	$118,000	$0	
Major Road / Rail Crossings			ea.	0	$235,000	$0	
Utility Crossings			ea.	0	$118,000	$0	
Additional Construction Costs	20%		ea.			$72,846	Includes Mod/Demob,connections, inspection, hydrants, signage, traffic management, bonding, insurance
Provisional & Allowance	10%		ea.			$43,708	Provisional Labour and Materials in addition to base construction cost
Sub-Total Construction Base Costs						**$481,000**	
Geotechnical / Hydrogeological / Materials	2.0%					$9,600	
Geotechnical Sub-Total Cost						**$9,600**	
Property Requirements	2.0%					$ 9,600	
Property Requirements Sub-Total						**$9,600**	
Consultant Engineering/Design	15%					$ 72,200	includes planning, pre-design, detailed design, training, CA, commissioning
Engineering/Design Sub-Total						**$72,200**	
In House Labour/Engineering/Wages/CA	3%					$ 50,000	
In-house Labour/Wages Sub-Total						**$50,000**	
Project Contingency	25%					$156,000	Construction Contingency is dependent on Cost Estimate Class and Project Complexity
Project Contingency Sub-Total						**$156,000**	
Non-Refundable HST	1.76%					$12,800	
Non-Refundable HST Sub-Total						**$12,800**	
Total (2019 Dollars)						**$791,000**	Rounded to nearest $1,000
Other Estimate							
Chosen Estimate						**$791,000**	**2019 Estimate**

COST ESTIMATE SUMMARY - FOR PHASING ESTIMATING ONLY

PROJECT COMPONENT	PROJECT COMPONENT DESCRIPTION	PERCENTAGE	TOTAL	YEAR	COMMENTS
Study	Feasibility study, EA	2%	$15,820		
Design	Design fees, Town fees for design, contract admin	13%	$102,830		
Construction	Town fees, base costs and project contingency	85%	$672,350		
TOTAL			**$791,000**		

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PROJECT NO.: WW-D-SS-06B-ALT-1
PROJECT NAME: Rath-Harris Municipal Drain Crossing
PROJECT DESCRIPTION: New sanitary sewer required for development blocks going to PS3 in Dorchester.

Class Estimate Type:	Class 4	Class adjusts Construction Contingency and expected accuracy
Project Complexity	High	Complexity adjusts Construction Contingency, and expected accuracy
Accuracy Range:	50%	
Area Condition:	Rural	Area Condition uplifts unit cost and restoration

PROJECT NO.: WW-D-SS-06B-ALT-1

PROPOSED DIAMETER:		300 mm	
TOTAL LENGTH:		80 m	
	Tunnelled	50 m	63%
	Open Cut	30 m	38%

CLASS EA REQUIREMENTS:	B
CONSTRUCTION ASSUMPTION:	Sewer 10m

COST ESTIMATION SPREADSHEET

COMPONENT	RATE (%)	RATE ($)	UNIT	ESTIMATED QUANTITY	COST PER UNIT	SUB-TOTAL	COMMENTS
Construction Cost							
Pipe Construction - Open Cut			m	30 m	$2,746	$82,369	Existing road ROW
Pipe Construction - Tunneling			m	50 m	$1,300	$65,000	
Pipe Construction Uplift (Based on Area Conditions)	0%					$0	
Minor Creek Crossings			ea.	0	$66,000	$0	
Major Creek Crossings			ea.	1	$235,000	$235,000	Rath-Harris Municipal Drain Crossing
Road Crossings			ea.	0	$118,000	$0	
Major Road / Rail Crossings			ea.	0	$235,000	$0	
Utility Crossings			ea.	0	$118,000	$0	
Additional Construction Costs	20%		ea.			$76,474	Includes Mod/Demob,connections, inspection, hydrants, signage, traffic management, bonding, insurance
Provisional & Allowance	10%		ea.			$45,884	Provisional Labour and Materials in addition to base construction cost
Sub-Total Construction Base Costs						**$505,000**	
Geotechnical / Hydrogeological / Materials	2.0%					$10,100	
Geotechnical Sub-Total Cost						**$10,100**	
Property Requirements	2.0%					$ 10,100	
Property Requirements Sub-Total						**$10,100**	
Consultant Engineering/Design	15%					$ 75,800	includes planning, pre-design, detailed design, training, CA, commissioning
Engineering/Design Sub-Total						**$75,800**	
In House Labour/Engineering/Wages/CA	3%					$ 50,000	
In-house Labour/Wages Sub-Total						**$50,000**	
Project Contingency	25%					$163,000	Construction Contingency is dependent on Cost Estimate Class and Project Complexity
Project Contingency Sub-Total						**$163,000**	
Non-Refundable HST	1.76%					$13,400	
Non-Refundable HST Sub-Total						**$13,400**	
Total (2019 Dollars)						**$827,000**	Rounded to nearest $1,000
Other Estimate							
Chosen Estimate						**$827,000**	**2019 Estimate**

COST ESTIMATE SUMMARY - FOR PHASING ESTIMATING ONLY

PROJECT COMPONENT	PROJECT COMPONENT DESCRIPTION	PERCENTAGE	TOTAL	YEAR	COMMENTS
Study	Feasibility study, EA	2%	$16,540		
Design	Design fees, Town fees for design, contract admin	13%	$107,510		
Construction	Town fees, base costs and project contingency	85%	$702,950		
TOTAL			**$827,000**		

PROJECT NO.: WW-D-SS-06B-ALT-2
PROJECT NAME: Rath-Harris Municipal Drain Crossing
PROJECT DESCRIPTION: New sanitary sewer required for development blocks going to PS3 in Dorchester.

Class Estimate Type:	Class 4	Class adjusts Construction Contingency and expected accuracy
Project Complexity	High	Complexity adjusts Construction Contingency, and expected accuracy
Accuracy Range:	50%	
Area Condition:	Rural	Area Condition uplifts unit cost and restoration

PROJECT NO.: WW-D-SS-06B-ALT-2

PROPOSED DIAMETER:	300 mm	
TOTAL LENGTH:	135 m	
Tunnelled	50 m	37%
Open Cut	85 m	63%

CLASS EA REQUIREMENTS:	B
CONSTRUCTION ASSUMPTION:	Sewer 10m

COST ESTIMATION SPREADSHEET

COMPONENT	RATE (%)	RATE ($)	UNIT	ESTIMATED QUANTITY	COST PER UNIT	SUB-TOTAL	COMMENTS
Construction Cost							
Pipe Construction - Open Cut			m	85 m	$2,746	$233,379	Existing road ROW
Pipe Construction - Tunneling			m	50 m	$1,300	$65,000	
Pipe Construction Uplift (Based on Area Conditions)	0%					$0	
Minor Creek Crossings			ea.	0	$66,000	$0	
Major Creek Crossings			ea.	1	$235,000	$235,000	Rath-Harris Municipal Drain Crossing
Road Crossings			ea.	0	$118,000	$0	
Major Road / Rail Crossings			ea.	0	$235,000	$0	
Utility Crossings			ea.	0	$118,000	$0	
Additional Construction Costs	20%		ea.			$106,676	Includes Mod/Demob,connections, inspection, hydrants, signage, traffic management, bonding, insurance
Provisional & Allowance	10%		ea.			$64,006	Provisional Labour and Materials in addition to base construction cost
Sub-Total Construction Base Costs						**$704,000**	
Geotechnical / Hydrogeological / Materials	2.0%					$14,100	
Geotechnical Sub-Total Cost						**$14,100**	
Property Requirements	2.0%					$ 14,100	
Property Requirements Sub-Total						**$14,100**	
Consultant Engineering/Design	15%					$ 105,600	includes planning, pre-design, detailed design, training, CA, commissioning
Engineering/Design Sub-Total						**$105,600**	
In House Labour/Engineering/Wages/CA	3%					$ 50,000	
In-house Labour/Wages Sub-Total						**$50,000**	
Project Contingency	25%					$222,000	Construction Contingency is dependent on Cost Estimate Class and Project Complexity
Project Contingency Sub-Total						**$222,000**	
Non-Refundable HST	1.76%					$18,700	
Non-Refundable HST Sub-Total						**$18,700**	
Total (2019 Dollars)						**$1,129,000**	Rounded to nearest $1,000
Other Estimate							
Chosen Estimate						**$1,129,000**	**2019 Estimate**

COST ESTIMATE SUMMARY - FOR PHASING ESTIMATING ONLY

PROJECT COMPONENT	PROJECT COMPONENT DESCRIPTION	PERCENTAGE	TOTAL	YEAR	COMMENTS
Study	Feasibility study, EA	2%	$22,580		
Design	Design fees, Town fees for design, contract admin	13%	$146,770		
Construction	Town fees, base costs and project contingency	85%	$959,650		
TOTAL			$1,129,000		

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PROJECT NO.: WW-D-SS-07A-ALT-1
PROJECT NAME: New development sewer
PROJECT DESCRIPTION: New sanitary sewer required for development blocks going to PS3 in Dorchester.

Class Estimate Type:	Class 4	Class adjusts Construction Contingency and expected accuracy
Project Complexity	Med	Complexity adjusts Construction Contingency, and expected accuracy
Accuracy Range:	40%	
Area Condition:	Rural	Area Condition uplifts unit cost and restoration

PROJECT NO.: WW-D-SS-07A-ALT-1

PROPOSED DIAMETER:	250 mm	
TOTAL LENGTH:	390 m	
Tunnelled	0 m	0%
Open Cut	390 m	100%

CLASS EA REQUIREMENTS:	A+
CONSTRUCTION ASSUMPTION:	Sewer 10m

COST ESTIMATION SPREADSHEET

COMPONENT	RATE (%)	RATE ($)	UNIT	ESTIMATED QUANTITY	COST PER UNIT	SUB-TOTAL	COMMENTS
Construction Cost							
Pipe Construction - Open Cut			m	390 m	$2,744	$1,070,121	Existing road ROW
Pipe Construction - Tunneling			m	0 m	$1,300	$0	
Pipe Construction Uplift (Based on Area Conditions)	0%					$0	
Minor Creek Crossings			ea.	0	$66,000	$0	
Major Creek Crossings			ea.	0	$235,000	$0	
Road Crossings			ea.	0	$118,000	$0	
Major Road / Rail Crossings			ea.	0	$235,000	$0	
Utility Crossings			ea.	0	$118,000	$0	
Additional Construction Costs	15%		ea.			$160,518	Includes Mod/Demob,connections, inspection, hydrants, signage, traffic management, bonding, insurance
Provisional & Allowance	10%		ea.			$123,064	Provisional Labour and Materials in addition to base construction cost
Sub-Total Construction Base Costs						**$1,354,000**	
Geotechnical / Hydrogeological / Materials	1.0%					$13,500	
Geotechnical Sub-Total Cost						**$13,500**	
Property Requirements	1.5%					$ 20,300	
Property Requirements Sub-Total						**$20,300**	
Consultant Engineering/Design	15%					$ 203,100	includes planning, pre-design, detailed design, training, CA, commissioning
Engineering/Design Sub-Total						**$203,100**	
In House Labour/Engineering/Wages/CA	3%					$ 100,000	
In-house Labour/Wages Sub-Total						**$100,000**	
Project Contingency	15%					$254,000	Construction Contingency is dependent on Cost Estimate Class and Project Complexity
Project Contingency Sub-Total						**$254,000**	
Non-Refundable HST	1.76%					$32,500	
Non-Refundable HST Sub-Total						**$32,500**	
Total (2019 Dollars)						**$1,977,000**	Rounded to nearest $1,000
Other Estimate							
Chosen Estimate						**$1,977,000**	**2019 Estimate**

COST ESTIMATE SUMMARY - FOR PHASING ESTIMATING ONLY

PROJECT COMPONENT	PROJECT COMPONENT DESCRIPTION	PERCENTAGE	TOTAL	YEAR	COMMENTS
Study	Feasibility study, EA	2%	$39,540		
Design	Design fees, Town fees for design, contract admin	13%	$257,010		
Construction	Town fees, base costs and project contingency	85%	$1,680,450		
TOTAL			$1,977,000		

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PROJECT NO.: **WW-D-SS-07A-ALT-2**
PROJECT NAME: **New development sewer**
PROJECT DESCRIPTION: New sanitary sewer required for development blocks going to PS3 in Dorchester.

Class Estimate Type:	Class 4	Class adjusts Construction Contingency and expected accuracy
Project Complexity	Med	Complexity adjusts Construction Contingency, and expected accuracy
Accuracy Range:	40%	
Area Condition:	Rural	Area Condition uplifts unit cost and restoration

PROJECT NO.: WW-D-SS-07A-ALT-2

PROPOSED DIAMETER:	250 mm	
TOTAL LENGTH:	260 m	
Tunnelled	0 m	0%
Open Cut	260 m	100%

CLASS EA REQUIREMENTS:	A+
CONSTRUCTION ASSUMPTION:	Sewer 10m

COST ESTIMATION SPREADSHEET

COMPONENT	RATE (%)	RATE ($)	UNIT	ESTIMATED QUANTITY	COST PER UNIT	SUB-TOTAL	COMMENTS
Construction Cost							
Pipe Construction - Open Cut			m	260 m	$2,744	$713,414	Existing road ROW
Pipe Construction - Tunneling			m	0 m	$1,300	$0	
Pipe Construction Uplift (Based on Area Conditions)	0%					$0	
Minor Creek Crossings			ea.	0	$66,000	$0	
Major Creek Crossings			ea.	0	$235,000	$0	
Road Crossings			ea.	0	$118,000	$0	
Major Road / Rail Crossings			ea.	0	$235,000	$0	
Utility Crossings			ea.	0	$118,000	$0	
Additional Construction Costs	15%		ea.			$107,012	Includes Mod/Demob,connections, inspection, hydrants, signage, traffic management, bonding, insurance
Provisional & Allowance	10%		ea.			$82,043	Provisional Labour and Materials in addition to base construction cost
Sub-Total Construction Base Costs						**$902,000**	
Geotechnical / Hydrogeological / Materials	1.0%					$9,000	
Geotechnical Sub-Total Cost						**$9,000**	
Property Requirements	1.5%					$ 13,500	
Property Requirements Sub-Total						**$13,500**	
Consultant Engineering/Design	15%					$ 135,300	includes planning, pre-design, detailed design, training, CA, commissioning
Engineering/Design Sub-Total						**$135,300**	
In House Labour/Engineering/Wages/CA	3%					$ 50,000	
In-house Labour/Wages Sub-Total						**$50,000**	
Project Contingency	15%					$166,000	Construction Contingency is dependent on Cost Estimate Class and Project Complexity
Project Contingency Sub-Total						**$166,000**	
Non-Refundable HST	1.76%					$21,600	
Non-Refundable HST Sub-Total						**$21,600**	
Total (2019 Dollars)						**$1,297,000**	Rounded to nearest $1,000
Other Estimate							
Chosen Estimate						**$1,297,000**	**2019 Estimate**

COST ESTIMATE SUMMARY - FOR PHASING ESTIMATING ONLY

PROJECT COMPONENT	PROJECT COMPONENT DESCRIPTION	PERCENTAGE	TOTAL	YEAR	COMMENTS
Study	Feasibility study, EA	2%	$25,940		
Design	Design fees, Town fees for design, contract admin	13%	$168,610		
Construction	Town fees, base costs and project contingency	85%	$1,102,450		
TOTAL			**$1,297,000**		

PROJECT NO.: WW-D-SS-07B-ALT-1
PROJECT NAME: New development sewer
PROJECT DESCRIPTION: New sanitary sewer required for development blocks going to PS3 in Dorchester.

Class Estimate Type:	Class 4	Class adjusts Construction Contingency and expected accuracy
Project Complexity	Med	Complexity adjusts Construction Contingency, and expected accuracy
Accuracy Range:	40%	
Area Condition:	Rural	Area Condition uplifts unit cost and restoration

PROJECT NO.: WW-D-SS-07B-ALT-1

PROPOSED DIAMETER:		375 mm	
TOTAL LENGTH:		390 m	
	Tunnelled	0 m	0%
	Open Cut	390 m	100%

CLASS EA REQUIREMENTS:	A+
CONSTRUCTION ASSUMPTION:	Sewer 10m

COST ESTIMATION SPREADSHEET

COMPONENT	RATE (%)	RATE ($)	UNIT	ESTIMATED QUANTITY	COST PER UNIT	SUB-TOTAL	COMMENTS
Construction Cost							
Pipe Construction - Open Cut			m	390 m	$2,766	$1,078,806	Existing road ROW
Pipe Construction - Tunneling			m	0 m	$6,300	$0	
Pipe Construction Uplift (Based on Area Conditions)	0%					$0	
Minor Creek Crossings			ea.	0	$166,000	$0	
Major Creek Crossings			ea.	0	$985,000	$0	
Road Crossings			ea.	0	$418,000	$0	
Major Road / Rail Crossings			ea.	0	$985,000	$0	
Utility Crossings			ea.	0	$418,000	$0	
Additional Construction Costs	15%		ea.			$161,821	Includes Mod/Demob,connections, inspection, hydrants, signage, traffic management, bonding, insurance
Provisional & Allowance	10%		ea.			$124,063	Provisional Labour and Materials in addition to base construction cost
Sub-Total Construction Base Costs						**$1,365,000**	
Geotechnical / Hydrogeological / Materials	1.0%					$13,700	
Geotechnical Sub-Total Cost						**$13,700**	
Property Requirements	1.5%					$ 20,500	
Property Requirements Sub-Total						**$20,500**	
Consultant Engineering/Design	15%					$ 204,800	includes planning, pre-design, detailed design, training, CA, commissioning
Engineering/Design Sub-Total						**$204,800**	
In House Labour/Engineering/Wages/CA	3%					$ 100,000	
In-house Labour/Wages Sub-Total						**$100,000**	
Project Contingency	15%					$256,000	Construction Contingency is dependent on Cost Estimate Class and Project Complexity
Project Contingency Sub-Total						**$256,000**	
Non-Refundable HST	1.76%					$32,700	
Non-Refundable HST Sub-Total						**$32,700**	
Total (2019 Dollars)						**$1,993,000**	Rounded to nearest $1,000
Other Estimate							
Chosen Estimate						**$1,993,000**	**2019 Estimate**

COST ESTIMATE SUMMARY - FOR PHASING ESTIMATING ONLY

PROJECT COMPONENT	PROJECT COMPONENT DESCRIPTION	PERCENTAGE	TOTAL	YEAR	COMMENTS
Study	Feasibility study, EA	2%	$39,860		
Design	Design fees, Town fees for design, contract admin	13%	$259,090		
Construction	Town fees, base costs and project contingency	85%	$1,694,050		
TOTAL			**$1,993,000**		

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PROJECT NO.: WW-D-SS-07B
PROJECT NAME: New development sewer
PROJECT DESCRIPTION: New sanitary sewer required for development blocks going to PS3 in Dorchester.

Class Estimate Type:	Class 4	Class adjusts Construction Contingency and expected accuracy
Project Complexity	Med	Complexity adjusts Construction Contingency, and expected accuracy
Accuracy Range:	40%	
Area Condition:	Rural	Area Condition uplifts unit cost and restoration

PROJECT NO.: WW-D-SS-07B

PROPOSED DIAMETER:	375 mm	
TOTAL LENGTH:	260 m	
Tunnelled	0 m	0%
Open Cut	260 m	100%

CLASS EA REQUIREMENTS:	A+
CONSTRUCTION ASSUMPTION:	Sewer 10m

COST ESTIMATION SPREADSHEET

COMPONENT	RATE (%)	RATE ($)	UNIT	ESTIMATED QUANTITY	COST PER UNIT	SUB-TOTAL	COMMENTS
Construction Cost							
Pipe Construction - Open Cut			m	260 m	$2,766	$719,204	Existing road ROW
Pipe Construction - Tunneling			m	0 m	$6,300	$0	
Pipe Construction Uplift (Based on Area Conditions)	0%					$0	
Minor Creek Crossings			ea.	0	$166,000	$0	
Major Creek Crossings			ea.	0	$985,000	$0	
Road Crossings			ea.	0	$418,000	$0	
Major Road / Rail Crossings			ea.	0	$985,000	$0	
Utility Crossings			ea.	0	$418,000	$0	
Additional Construction Costs	15%		ea.			$107,881	Includes Mod/Demob,connections, inspection, hydrants, signage, traffic management, bonding, insurance
Provisional & Allowance	10%		ea.			$82,708	Provisional Labour and Materials in addition to base construction cost
Sub-Total Construction Base Costs						**$910,000**	
Geotechnical / Hydrogeological / Materials	1.0%					$9,100	
Geotechnical Sub-Total Cost						**$9,100**	
Property Requirements	1.5%					$ 13,700	
Property Requirements Sub-Total						**$13,700**	
Consultant Engineering/Design	15%					$ 136,500	includes planning, pre-design, detailed design, training, CA, commissioning
Engineering/Design Sub-Total						**$136,500**	
In House Labour/Engineering/Wages/CA	3%					$ 50,000	
In-house Labour/Wages Sub-Total						**$50,000**	
Project Contingency	15%					$168,000	Construction Contingency is dependent on Cost Estimate Class and Project Complexity
Project Contingency Sub-Total						**$168,000**	
Non-Refundable HST	1.76%					$21,800	
Non-Refundable HST Sub-Total						**$21,800**	
Total (2019 Dollars)						**$1,309,000**	Rounded to nearest $1,000
Other Estimate							
Chosen Estimate						**$1,309,000**	**2019 Estimate**

COST ESTIMATE SUMMARY - FOR PHASING ESTIMATING ONLY

PROJECT COMPONENT	PROJECT COMPONENT DESCRIPTION	PERCENTAGE	TOTAL	YEAR	COMMENTS
Study	Feasibility study, EA	2%	$26,180		
Design	Design fees, Town fees for design, contract admin	13%	$170,170		
Construction	Town fees, base costs and project contingency	85%	$1,112,650		
TOTAL			$1,309,000		

PROJECT NO.: WW-D-SS-09
PROJECT NAME: Sewer East of PS3
PROJECT DESCRIPTION: New sanitary sewer to accommodate growth flows east of PS3 in Dorchester

Class Estimate Type:	Class 4	Class adjusts Construction Contingency and expected accuracy
Project Complexity	High	Complexity adjusts Construction Contingency, and expected accuracy
Accuracy Range:	50%	
Area Condition:	Rural	Area Condition uplifts unit cost and restoration

PROJECT NO.: WW-D-SS-09

PROPOSED DIAMETER:	250 mm	
TOTAL LENGTH:	400 m	
Tunnelled	100 m	25%
Open Cut	300 m	75%

CLASS EA REQUIREMENTS:	A
CONSTRUCTION ASSUMPTION:	Sewer 5m

COST ESTIMATION SPREADSHEET

COMPONENT	RATE (%)	RATE ($)	UNIT	ESTIMATED QUANTITY	COST PER UNIT	SUB-TOTAL	COMMENTS
Construction Cost							
Pipe Construction - Open Cut			m	300 m	$653	$195,813	Existing road ROW
Pipe Construction - Tunneling			m	100 m	$1,300	$130,000	
Pipe Construction Uplift (Based on Area Conditions)	0%					$0	
Minor Creek Crossings			ea.	0	$66,000	$0	
Major Creek Crossings			ea.	1	$235,000	$235,000	Mill Pond Crossing
Road Crossings			ea.	0	$118,000	$0	
Major Road / Rail Crossings			ea.	0	$235,000	$0	
Utility Crossings			ea.	0	$118,000	$0	
Additional Construction Costs	20%		ea.			$112,163	Includes Mod/Demob,connections, inspection, hydrants, signage, traffic management, bonding, insurance
Provisional & Allowance	10%		ea.			$67,298	Provisional Labour and Materials in addition to base construction cost
Sub-Total Construction Base Costs						**$740,000**	
Geotechnical / Hydrogeological / Materials	2.0%					$14,800	
Geotechnical Sub-Total Cost						**$14,800**	
Property Requirements	2.0%					$ 14,800	
Property Requirements Sub-Total						**$14,800**	
Consultant Engineering/Design	15%					$ 111,000	includes planning, pre-design, detailed design, training, CA, commissioning
Engineering/Design Sub-Total						**$111,000**	
In House Labour/Engineering/Wages/CA	3%					$ 50,000	
In-house Labour/Wages Sub-Total						**$50,000**	
Project Contingency	25%					$233,000	Construction Contingency is dependent on Cost Estimate Class and Project Complexity
Project Contingency Sub-Total						**$233,000**	
Non-Refundable HST	1.76%					$19,600	
Non-Refundable HST Sub-Total						**$19,600**	
Total (2019 Dollars)						**$1,183,000**	Rounded to nearest $1,000
Other Estimate							
Chosen Estimate						**$1,183,000**	**2019 Estimate**

COST ESTIMATE SUMMARY - FOR PHASING ESTIMATING ONLY

PROJECT COMPONENT	PROJECT COMPONENT DESCRIPTION	PERCENTAGE	TOTAL	YEAR	COMMENTS
Study	Feasibility study, EA	2%	$23,660		
Design	Design fees, Town fees for design, contract admin	13%	$153,790		
Construction	Town fees, base costs and project contingency	85%	$1,005,550		
TOTAL			$1,183,000		

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PROJECT NO.:	WW-D-SS-10
PROJECT NAME:	Sewer East of PS3
PROJECT DESCRIPTION:	New sanitary sewer to accommodate growth flows east of PS3 in Dorchester

Class Estimate Type:	Class 4	Class adjusts Construction Contingency and expected accuracy
Project Complexity	High	Complexity adjusts Construction Contingency, and expected accuracy
Accuracy Range:	50%	
Area Condition:	Rural	Area Condition uplifts unit cost and restoration

PROJECT NO.: WW-D-SS-10

PROPOSED DIAMETER:	300 mm	
TOTAL LENGTH:	30 m	
Tunnelled		0%
Open Cut	30 m	100%

CLASS EA REQUIREMENTS:	A
CONSTRUCTION ASSUMPTION:	Sewer 5m

COST ESTIMATION SPREADSHEET

COMPONENT	RATE (%)	RATE ($)	UNIT	ESTIMATED QUANTITY	COST PER UNIT	SUB-TOTAL	COMMENTS
Construction Cost							
Pipe Construction - Open Cut			m	30 m	$654	$19,633	Existing road ROW
Pipe Construction - Tunneling			m	0 m	$1,300	$0	
Pipe Construction Uplift (Based on Area Conditions)	0%					$0	
Minor Creek Crossings			ea.	0	$66,000	$0	
Major Creek Crossings			ea.	0	$235,000	$0	
Road Crossings			ea.	0	$118,000	$0	
Major Road / Rail Crossings			ea.	0	$235,000	$0	
Utility Crossings			ea.	0	$118,000	$0	
Additional Construction Costs	20%		ea.			$3,927	Includes Mod/Demob,connections, inspection, hydrants, signage, traffic management, bonding, insurance
Provisional & Allowance	10%		ea.			$2,356	Provisional Labour and Materials in addition to base construction cost
Sub-Total Construction Base Costs						**$26,000**	
Geotechnical / Hydrogeological / Materials	2.0%					$500	
Geotechnical Sub-Total Cost						**$500**	
Property Requirements	2.0%					$ 500	
Property Requirements Sub-Total						**$500**	
Consultant Engineering/Design	15%					$ 3,900	includes planning, pre-design, detailed design, training, CA, commissioning
Engineering/Design Sub-Total						**$3,900**	
In House Labour/Engineering/Wages/CA	3%					$ 50,000	
In-house Labour/Wages Sub-Total						**$50,000**	
Project Contingency	25%					$20,000	Construction Contingency is dependent on Cost Estimate Class and Project Complexity
Project Contingency Sub-Total						**$20,000**	
Non-Refundable HST	1.76%					$900	
Non-Refundable HST Sub-Total						**$900**	
Total (2019 Dollars)						**$102,000**	Rounded to nearest $1,000
Other Estimate							
Chosen Estimate						**$102,000**	**2019 Estimate**

COST ESTIMATE SUMMARY - FOR PHASING ESTIMATING ONLY

PROJECT COMPONENT	PROJECT COMPONENT DESCRIPTION	PERCENTAGE	TOTAL	YEAR	COMMENTS
Study	Feasibility study, EA	2%	$2,040		
Design	Design fees, Town fees for design, contract admin	13%	$13,260		
Construction	Town fees, base costs and project contingency	85%	$86,700		
TOTAL			$102,000		

PROJECT NO.: WW-D-SS-11A
PROJECT NAME: Christie Drive and new Development sewer
PROJECT DESCRIPTION: New sanitary sewer required for development blocks going to PS3 in Dorchester.

Class Estimate Type:	Class 4	Class adjusts Construction Contingency and expected accuracy
Project Complexity	Med	Complexity adjusts Construction Contingency, and expected accuracy
Accuracy Range:	40%	
Area Condition:	Rural	Area Condition uplifts unit cost and restoration

PROJECT NO.: WW-D-SS-11A

PROPOSED DIAMETER:	250 mm	
TOTAL LENGTH:	505 m	
Tunnelled	0 m	0%
Open Cut	505 m	100%

CLASS EA REQUIREMENTS:	A
CONSTRUCTION ASSUMPTION:	Sewer 5m

COST ESTIMATION SPREADSHEET

COMPONENT	RATE (%)	RATE ($)	UNIT	ESTIMATED QUANTITY	COST PER UNIT	SUB-TOTAL	COMMENTS
Construction Cost							
Pipe Construction - Open Cut			m	505 m	$653	$329,618	Existing road ROW
Pipe Construction - Tunneling			m	0 m	$1,300	$0	
Pipe Construction Uplift (Based on Area Conditions)	0%					$0	
Minor Creek Crossings			ea.	0	$66,000	$0	
Major Creek Crossings			ea.	0	$235,000	$0	
Road Crossings			ea.	0	$118,000	$0	
Major Road / Rail Crossings			ea.	0	$235,000	$0	
Utility Crossings			ea.	0	$118,000	$0	
Additional Construction Costs	15%		ea.			$49,443	Includes Mod/Demob,connections, inspection, hydrants, signage, traffic management, bonding, insurance
Provisional & Allowance	10%		ea.			$37,906	Provisional Labour and Materials in addition to base construction cost
Sub-Total Construction Base Costs						**$417,000**	
Geotechnical / Hydrogeological / Materials	1.0%					$4,200	
Geotechnical Sub-Total Cost						**$4,200**	
Property Requirements	1.5%					$ 6,300	
Property Requirements Sub-Total						**$6,300**	
Consultant Engineering/Design	15%					$ 62,600	includes planning, pre-design, detailed design, training, CA, commissioning
Engineering/Design Sub-Total						**$62,600**	
In House Labour/Engineering/Wages/CA	3%					$ 50,000	
In-house Labour/Wages Sub-Total						**$50,000**	
Project Contingency	15%					$81,000	Construction Contingency is dependent on Cost Estimate Class and Project Complexity
Project Contingency Sub-Total						**$81,000**	
Non-Refundable HST	1.76%					$10,100	
Non-Refundable HST Sub-Total						**$10,100**	
Total (2019 Dollars)						**$631,000**	Rounded to nearest $1,000
Other Estimate							
Chosen Estimate						**$631,000**	**2019 Estimate**

COST ESTIMATE SUMMARY - FOR PHASING ESTIMATING ONLY

PROJECT COMPONENT	PROJECT COMPONENT DESCRIPTION	PERCENTAGE	TOTAL	YEAR	COMMENTS
Study	Feasibility study, EA	2%	$12,620		
Design	Design fees, Town fees for design, contract admin	13%	$82,030		
Construction	Town fees, base costs and project contingency	85%	$536,350		
TOTAL			**$631,000**		

Municipality of Thames Centre
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PROJECT NO.: WW-D-SS-11B
PROJECT NAME: Christie Drive and new Development sewer
PROJECT DESCRIPTION: New sanitary sewer required for development blocks going to PS3 in Dorchester.

Class Estimate Type:	Class 4	Class adjusts Construction Contingency and expected accuracy
Project Complexity	Med	Complexity adjusts Construction Contingency, and expected accuracy
Accuracy Range:	40%	
Area Condition:	Rural	Area Condition uplifts unit cost and restoration

PROJECT NO.: WW-D-SS-11B

PROPOSED DIAMETER:	300 mm	
TOTAL LENGTH:	505 m	
Tunnelled	0 m	0%
Open Cut	505 m	100%

CLASS EA REQUIREMENTS:	A
CONSTRUCTION ASSUMPTION:	Sewer 5m

COST ESTIMATION SPREADSHEET

COMPONENT	RATE (%)	RATE ($)	UNIT	ESTIMATED QUANTITY	COST PER UNIT	SUB-TOTAL	COMMENTS
Construction Cost							
Pipe Construction - Open Cut			m	505 m	$654	$330,495	Existing road ROW
Pipe Construction - Tunneling			m	0 m	$1,300	$0	
Pipe Construction Uplift (Based on Area Conditions)	0%					$0	
Minor Creek Crossings			ea.	0	$66,000	$0	
Major Creek Crossings			ea.	0	$235,000	$0	
Road Crossings			ea.	0	$118,000	$0	
Major Road / Rail Crossings			ea.	0	$235,000	$0	
Utility Crossings			ea.	0	$118,000	$0	
Additional Construction Costs	15%		ea.			$49,574	Includes Mod/Demob,connections, inspection, hydrants, signage, traffic management, bonding, insurance
Provisional & Allowance	10%		ea.			$38,007	Provisional Labour and Materials in addition to base construction cost
Sub-Total Construction Base Costs						**$418,000**	
Geotechnical / Hydrogeological / Materials	1.0%					$4,200	
Geotechnical Sub-Total Cost						**$4,200**	
Property Requirements	1.5%					$ 6,300	
Property Requirements Sub-Total						**$6,300**	
Consultant Engineering/Design	15%					$ 62,700	includes planning, pre-design, detailed design, training, CA, commissioning
Engineering/Design Sub-Total						**$62,700**	
In House Labour/Engineering/Wages/CA	3%					$ 50,000	
In-house Labour/Wages Sub-Total						**$50,000**	
Project Contingency	15%					$81,000	Construction Contingency is dependent on Cost Estimate Class and Project Complexity
Project Contingency Sub-Total						**$81,000**	
Non-Refundable HST	1.76%					$10,100	
Non-Refundable HST Sub-Total						**$10,100**	
Total (2019 Dollars)						**$632,000**	Rounded to nearest $1,000
Other Estimate							
Chosen Estimate						**$632,000**	**2019 Estimate**

COST ESTIMATE SUMMARY - FOR PHASING ESTIMATING ONLY

PROJECT COMPONENT	PROJECT COMPONENT DESCRIPTION	PERCENTAGE	TOTAL	YEAR	COMMENTS
Study	Feasibility study, EA	2%	$12,640		
Design	Design fees, Town fees for design, contract admin	13%	$82,160		
Construction	Town fees, base costs and project contingency	85%	$537,200		
TOTAL			**$632,000**		

BluePlan

Municipality of Thames Centre
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PROJECT NO.: WW-D-SS-12
PROJECT NAME: Clara Street sewer
PROJECT DESCRIPTION: New sanitary sewer to accommodate growth Northeast of New development SPS in North Dorchester

Class Estimate Type:	Class 4	Class adjusts Construction Contingency and expected accuracy
Project Complexity	Med	Complexity adjusts Construction Contingency, and expected accuracy
Accuracy Range:	40%	
Area Condition:	Suburban	Area Condition uplifts unit cost and restoration

PROJECT NO.: WW-D-SS-12

PROPOSED DIAMETER:	200 mm	
TOTAL LENGTH:	605 m	
Tunnelled		0%
Open Cut	605 m	100%

CLASS EA REQUIREMENTS:	A+
CONSTRUCTION ASSUMPTION:	Sewer 5m

COST ESTIMATION SPREADSHEET

COMPONENT	RATE (%)	RATE ($)	UNIT	ESTIMATED QUANTITY	COST PER UNIT	SUB-TOTAL	COMMENTS
Construction Cost							
Pipe Construction - Open Cut			m	605 m	$651	$393,785	Existing road ROW
Pipe Construction - Tunneling			m	0 m	$1,300	$0	
Pipe Construction Uplift (Based on Area Conditions)	20%					$78,757	
Minor Creek Crossings			ea.	0	$66,000	$0	
Major Creek Crossings			ea.	0	$235,000	$0	
Road Crossings			ea.	0	$118,000	$0	
Major Road / Rail Crossings			ea.	0	$235,000	$0	
Utility Crossings			ea.	0	$118,000	$0	
Additional Construction Costs	15%		ea.			$70,881	Includes Mod/Demob,connections, inspection, hydrants, signage, traffic management, bonding, insurance
Provisional & Allowance	10%		ea.			$54,342	Provisional Labour and Materials in addition to base construction cost
Sub-Total Construction Base Costs						**$598,000**	
Geotechnical / Hydrogeological / Materials	1.0%					$6,000	
Geotechnical Sub-Total Cost						**$6,000**	
Property Requirements	1.5%					$ 9,000	
Property Requirements Sub-Total						**$9,000**	
Consultant Engineering/Design	15%					$ 89,700	includes planning, pre-design, detailed design, training, CA, commissioning
Engineering/Design Sub-Total						**$89,700**	
In House Labour/Engineering/Wages/CA	3%					$ 50,000	
In-house Labour/Wages Sub-Total						**$50,000**	
Project Contingency	15%					$113,000	Construction Contingency is dependent on Cost Estimate Class and Project Complexity
Project Contingency Sub-Total						**$113,000**	
Non-Refundable HST	1.76%					$14,400	
Non-Refundable HST Sub-Total						**$14,400**	
Total (2019 Dollars)						**$880,000**	Rounded to nearest $1,000
Other Estimate							
Chosen Estimate						**$880,000**	**2019 Estimate**

COST ESTIMATE SUMMARY - FOR PHASING ESTIMATING ONLY

PROJECT COMPONENT	PROJECT COMPONENT DESCRIPTION	PERCENTAGE	TOTAL	YEAR	COMMENTS
Study	Feasibility study, EA	2%	$17,600		
Design	Design fees, Town fees for design, contract admin	13%	$114,400		
Construction	Town fees, base costs and project contingency	85%	$748,000		
TOTAL			$880,000		

PROJECT NO.: WW-D-SS-13
PROJECT NAME: Marion Street sewer
PROJECT DESCRIPTION: New sanitary sewer to accommodate growth Northeast of New development SPS in North Dorchester

Class Estimate Type:	Class 4	Class adjusts Construction Contingency and expected accuracy
Project Complexity	Med	Complexity adjusts Construction Contingency, and expected accuracy
Accuracy Range:	40%	
Area Condition:	Suburban	Area Condition uplifts unit cost and restoration

PROJECT NO.: WW-D-SS-13

PROPOSED DIAMETER:	200 mm	
TOTAL LENGTH:	210 m	
Tunnelled		0%
Open Cut	210 m	100%

CLASS EA REQUIREMENTS:	A+
CONSTRUCTION ASSUMPTION:	Sewer 5m

COST ESTIMATION SPREADSHEET

COMPONENT	RATE (%)	RATE ($)	UNIT	ESTIMATED QUANTITY	COST PER UNIT	SUB-TOTAL	COMMENTS
Construction Cost							
Pipe Construction - Open Cut			m	210 m	$651	$136,686	Existing road ROW
Pipe Construction - Tunneling			m	0 m	$1,300	$0	
Pipe Construction Uplift (Based on Area Conditions)	20%					$27,337	
Minor Creek Crossings			ea.	0	$66,000	$0	
Major Creek Crossings			ea.	0	$235,000	$0	
Road Crossings			ea.	0	$118,000	$0	
Major Road / Rail Crossings			ea.	0	$235,000	$0	
Utility Crossings			ea.	0	$118,000	$0	
Additional Construction Costs	15%		ea.			$24,603	Includes Mod/Demob,connections, inspection, hydrants, signage, traffic management, bonding, insurance
Provisional & Allowance	10%		ea.			$18,863	Provisional Labour and Materials in addition to base construction cost
Sub-Total Construction Base Costs						**$207,000**	
Geotechnical / Hydrogeological / Materials	1.0%					$2,100	
Geotechnical Sub-Total Cost						**$2,100**	
Property Requirements	1.5%					$ 3,100	
Property Requirements Sub-Total						**$3,100**	
Consultant Engineering/Design	15%					$ 31,100	includes planning, pre-design, detailed design, training, CA, commissioning
Engineering/Design Sub-Total						**$31,100**	
In House Labour/Engineering/Wages/CA	3%					$ 50,000	
In-house Labour/Wages Sub-Total						**$50,000**	
Project Contingency	15%					$44,000	Construction Contingency is dependent on Cost Estimate Class and Project Complexity
Project Contingency Sub-Total						**$44,000**	
Non-Refundable HST	1.76%					$5,100	
Non-Refundable HST Sub-Total						**$5,100**	
Total (2019 Dollars)						**$342,000**	Rounded to nearest $1,000
Other Estimate							
Chosen Estimate						**$342,000**	**2019 Estimate**

COST ESTIMATE SUMMARY - FOR PHASING ESTIMATING ONLY

PROJECT COMPONENT	PROJECT COMPONENT DESCRIPTION	PERCENTAGE	TOTAL	YEAR	COMMENTS
Study	Feasibility study, EA	2%	$6,840		
Design	Design fees, Town fees for design, contract admin	13%	$44,460		
Construction	Town fees, base costs and project contingency	85%	$290,700		
TOTAL			$342,000		

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PROJECT NO.: WW-D-SS-14
PROJECT NAME: North Street to Clara Street sewer
PROJECT DESCRIPTION: New sanitary sewer to accommodate growth Northeast of New development SPS in North Dorchester

Class Estimate Type:	Class 4	Class adjusts Construction Contingency and expected accuracy
Project Complexity	Med	Complexity adjusts Construction Contingency, and expected accuracy
Accuracy Range:	40%	
Area Condition:	Suburban	Area Condition uplifts unit cost and restoration

PROJECT NO.: WW-D-SS-14

PROPOSED DIAMETER:	200 mm	
TOTAL LENGTH:	450 m	
Tunnelled		0%
Open Cut	450 m	100%

CLASS EA REQUIREMENTS:	A
CONSTRUCTION ASSUMPTION:	Sewer 5m

COST ESTIMATION SPREADSHEET

COMPONENT	RATE (%)	RATE ($)	UNIT	ESTIMATED QUANTITY	COST PER UNIT	SUB-TOTAL	COMMENTS
Construction Cost							
Pipe Construction - Open Cut			m	450 m	$651	$292,898	Existing road ROW
Pipe Construction - Tunneling			m	0 m	$1,300	$0	
Pipe Construction Uplift (Based on Area Conditions)	20%					$58,580	
Minor Creek Crossings			ea.	0	$66,000	$0	
Major Creek Crossings			ea.	0	$235,000	$0	
Road Crossings			ea.	0	$118,000	$0	
Major Road / Rail Crossings			ea.	0	$235,000	$0	
Utility Crossings			ea.	0	$118,000	$0	
Additional Construction Costs	15%		ea.			$52,722	Includes Mod/Demob,connections, inspection, hydrants, signage, traffic management, bonding, insurance
Provisional & Allowance	10%		ea.			$40,420	Provisional Labour and Materials in addition to base construction cost
Sub-Total Construction Base Costs						**$445,000**	
Geotechnical / Hydrogeological / Materials	1.0%					$4,500	
Geotechnical Sub-Total Cost						**$4,500**	
Property Requirements	1.5%					$ 6,700	
Property Requirements Sub-Total						**$6,700**	
Consultant Engineering/Design	15%					$ 66,800	includes planning, pre-design, detailed design, training, CA, commissioning
Engineering/Design Sub-Total						**$66,800**	
In House Labour/Engineering/Wages/CA	3%					$ 50,000	
In-house Labour/Wages Sub-Total						**$50,000**	
Project Contingency	15%					$86,000	Construction Contingency is dependent on Cost Estimate Class and Project Complexity
Project Contingency Sub-Total						**$86,000**	
Non-Refundable HST	1.76%					$10,700	
Non-Refundable HST Sub-Total						**$10,700**	
Total (2019 Dollars)						**$670,000**	Rounded to nearest $1,000
Other Estimate							
Chosen Estimate						**$670,000**	**2019 Estimate**

COST ESTIMATE SUMMARY - FOR PHASING ESTIMATING ONLY

PROJECT COMPONENT	PROJECT COMPONENT DESCRIPTION	PERCENTAGE	TOTAL	YEAR	COMMENTS
Study	Feasibility study, EA	2%	$13,400		
Design	Design fees, Town fees for design, contract admin	13%	$87,100		
Construction	Town fees, base costs and project contingency	85%	$569,500		
TOTAL			**$670,000**		

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PROJECT NO.: WW-D-SS-15
PROJECT NAME: North Street Sewer
PROJECT DESCRIPTION: New sanitary sewer to accommodate growth Northeast of New development SPS in North Dorchester

Class Estimate Type:	Class 4	Class adjusts Construction Contingency and expected accuracy
Project Complexity	Med	Complexity adjusts Construction Contingency, and expected accuracy
Accuracy Range:	40%	
Area Condition:	Suburban	Area Condition uplifts unit cost and restoration

PROJECT NO.: WW-D-SS-15

PROPOSED DIAMETER:	200 mm	
TOTAL LENGTH:	325 m	
Tunnelled		0%
Open Cut	325 m	100%

CLASS EA REQUIREMENTS:	A
CONSTRUCTION ASSUMPTION:	Sewer 5m

COST ESTIMATION SPREADSHEET

COMPONENT	RATE (%)	RATE ($)	UNIT	ESTIMATED QUANTITY	COST PER UNIT	SUB-TOTAL	COMMENTS
Construction Cost							
Pipe Construction - Open Cut			m	325 m	$651	$211,537	Existing road ROW
Pipe Construction - Tunneling			m	0 m	$1,300	$0	
Pipe Construction Uplift (Based on Area Conditions)	20%					$42,307	
Minor Creek Crossings			ea.	0	$66,000	$0	
Major Creek Crossings			ea.	0	$235,000	$0	
Road Crossings			ea.	0	$118,000	$0	
Major Road / Rail Crossings			ea.	0	$235,000	$0	
Utility Crossings			ea.	0	$118,000	$0	
Additional Construction Costs	15%		ea.			$38,077	Includes Mod/Demob,connections, inspection, hydrants, signage, traffic management, bonding, insurance
Provisional & Allowance	10%		ea.			$29,192	Provisional Labour and Materials in addition to base construction cost
Sub-Total Construction Base Costs						**$321,000**	
Geotechnical / Hydrogeological / Materials	1.0%					$3,200	
Geotechnical Sub-Total Cost						**$3,200**	
Property Requirements	1.5%					$ 4,800	
Property Requirements Sub-Total						**$4,800**	
Consultant Engineering/Design	15%					$ 48,200	includes planning, pre-design, detailed design, training, CA, commissioning
Engineering/Design Sub-Total						**$48,200**	
In House Labour/Engineering/Wages/CA	3%					$ 50,000	
In-house Labour/Wages Sub-Total						**$50,000**	
Project Contingency	15%					$64,000	Construction Contingency is dependent on Cost Estimate Class and Project Complexity
Project Contingency Sub-Total						**$64,000**	
Non-Refundable HST	1.76%					$7,800	
Non-Refundable HST Sub-Total						**$7,800**	
Total (2019 Dollars)						**$499,000**	Rounded to nearest $1,000
Other Estimate							
Chosen Estimate						**$499,000**	**2019 Estimate**

COST ESTIMATE SUMMARY - FOR PHASING ESTIMATING ONLY

PROJECT COMPONENT	PROJECT COMPONENT DESCRIPTION	PERCENTAGE	TOTAL	YEAR	COMMENTS
Study	Feasibility study, EA	2%	$9,980		
Design	Design fees, Town fees for design, contract admin	13%	$64,870		
Construction	Town fees, base costs and project contingency	85%	$424,150		
TOTAL			**$499,000**		

Municipality of Thames Centre
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PROJECT NO.: WW-D-SS-16
PROJECT NAME: Richmond Street Sewer
PROJECT DESCRIPTION: New sanitary sewer to accommodate growth Northeast of New development SPS in North Dorchester

Class Estimate Type:	Class 4	Class adjusts Construction Contingency and expected accuracy
Project Complexity	Med	Complexity adjusts Construction Contingency, and expected accuracy
Accuracy Range:	40%	
Area Condition:	Rural	Area Condition uplifts unit cost and restoration

PROJECT NO.: WW-D-SS-16

PROPOSED DIAMETER:	200 mm	
TOTAL LENGTH:	405 m	
Tunnelled		0%
Open Cut	405 m	100%

CLASS EA REQUIREMENTS:	A
CONSTRUCTION ASSUMPTION:	Sewer 5m

COST ESTIMATION SPREADSHEET

COMPONENT	RATE (%)	RATE ($)	UNIT	ESTIMATED QUANTITY	COST PER UNIT	SUB-TOTAL	COMMENTS
Construction Cost							
Pipe Construction - Open Cut			m	405 m	$651	$263,608	Existing road ROW
Pipe Construction - Tunneling			m	0 m	$1,300	$0	
Pipe Construction Uplift (Based on Area Conditions)	0%					$0	
Minor Creek Crossings			ea.	0	$66,000	$0	
Major Creek Crossings			ea.	0	$235,000	$0	
Road Crossings			ea.	0	$118,000	$0	
Major Road / Rail Crossings			ea.	0	$235,000	$0	
Utility Crossings			ea.	0	$118,000	$0	
Additional Construction Costs	15%		ea.			$39,541	Includes Mod/Demob,connections, inspection, hydrants, signage, traffic management, bonding, insurance
Provisional & Allowance	10%		ea.			$30,315	Provisional Labour and Materials in addition to base construction cost
Sub-Total Construction Base Costs						**$333,000**	
Geotechnical / Hydrogeological / Materials	1.0%					$3,300	
Geotechnical Sub-Total Cost						**$3,300**	
Property Requirements	1.5%					$ 5,000	
Property Requirements Sub-Total						**$5,000**	
Consultant Engineering/Design	15%					$ 50,000	includes planning, pre-design, detailed design, training, CA, commissioning
Engineering/Design Sub-Total						**$50,000**	
In House Labour/Engineering/Wages/CA	3%					$ 50,000	
In-house Labour/Wages Sub-Total						**$50,000**	
Project Contingency	15%					$66,000	Construction Contingency is dependent on Cost Estimate Class and Project Complexity
Project Contingency Sub-Total						**$66,000**	
Non-Refundable HST	1.76%					$8,000	
Non-Refundable HST Sub-Total						**$8,000**	
Total (2019 Dollars)						**$515,000**	Rounded to nearest $1,000
Other Estimate							
Chosen Estimate						**$515,000**	**2019 Estimate**

COST ESTIMATE SUMMARY - FOR PHASING ESTIMATING ONLY

PROJECT COMPONENT	PROJECT COMPONENT DESCRIPTION	PERCENTAGE	TOTAL	YEAR	COMMENTS
Study	Feasibility study, EA	2%	$10,300		
Design	Design fees, Town fees for design, contract admin	13%	$66,950		
Construction	Town fees, base costs and project contingency	85%	$437,750		
TOTAL			**$515,000**		

Municipality of Thames Centre
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PROJECT NO.: WW-D-SS-17
PROJECT NAME: Hamilton Road to Christie Drive sewer
PROJECT DESCRIPTION: New sanitary sewer to accommodate growth flows east of PS3 in Dorchester

Class Estimate Type:	Class 4	Class adjusts Construction Contingency and expected accuracy
Project Complexity	Med	Complexity adjusts Construction Contingency, and expected accuracy
Accuracy Range:	40%	
Area Condition:	Rural	Area Condition uplifts unit cost and restoration

PROJECT NO.: WW-D-SS-17

PROPOSED DIAMETER:	200 mm	
TOTAL LENGTH:	1250 m	
Tunnelled		0%
Open Cut	1250 m	100%

CLASS EA REQUIREMENTS:	A
CONSTRUCTION ASSUMPTION:	Sewer 5m

COST ESTIMATION SPREADSHEET

COMPONENT	RATE (%)	RATE ($)	UNIT	ESTIMATED QUANTITY	COST PER UNIT	SUB-TOTAL	COMMENTS
Construction Cost							
Pipe Construction - Open Cut			m	1250 m	$651	$813,605	Existing road ROW
Pipe Construction - Tunneling			m	0 m	$1,300	$0	
Pipe Construction Uplift (Based on Area Conditions)	0%					$0	
Minor Creek Crossings			ea.	0	$66,000	$0	
Major Creek Crossings			ea.	0	$235,000	$0	
Road Crossings			ea.	0	$118,000	$0	
Major Road / Rail Crossings			ea.	0	$235,000	$0	
Utility Crossings			ea.	0	$118,000	$0	
Additional Construction Costs	15%		ea.			$122,041	Includes Mod/Demob,connections, inspection, hydrants, signage, traffic management, bonding, insurance
Provisional & Allowance	10%		ea.			$93,565	Provisional Labour and Materials in addition to base construction cost
Sub-Total Construction Base Costs						**$1,029,000**	
Geotechnical / Hydrogeological / Materials	1.0%					$10,300	
Geotechnical Sub-Total Cost						**$10,300**	
Property Requirements	1.5%					$ 15,400	
Property Requirements Sub-Total						**$15,400**	
Consultant Engineering/Design	15%					$ 154,400	includes planning, pre-design, detailed design, training, CA, commissioning
Engineering/Design Sub-Total						**$154,400**	
In House Labour/Engineering/Wages/CA	3%					$ 100,000	
In-house Labour/Wages Sub-Total						**$100,000**	
Project Contingency	15%					$196,000	Construction Contingency is dependent on Cost Estimate Class and Project Complexity
Project Contingency Sub-Total						**$196,000**	
Non-Refundable HST	1.76%					$24,700	
Non-Refundable HST Sub-Total						**$24,700**	
Total (2019 Dollars)						**$1,530,000**	Rounded to nearest $1,000
Other Estimate							
Chosen Estimate						**$1,530,000**	**2019 Estimate**

COST ESTIMATE SUMMARY - FOR PHASING ESTIMATING ONLY

PROJECT COMPONENT	PROJECT COMPONENT DESCRIPTION	PERCENTAGE	TOTAL	YEAR	COMMENTS
Study	Feasibility study, EA	2%	$30,600		
Design	Design fees, Town fees for design, contract admin	13%	$198,900		
Construction	Town fees, base costs and project contingency	85%	$1,300,500		
TOTAL			**$1,530,000**		

BluePlan

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PROJECT NO.: WW-D-SS-18
PROJECT NAME: Sewers for Existing Unserviced (SPS-01B)
PROJECT DESCRIPTION: New sanitary sewers to benefit existing unserviced within North Dorchester (WW-D-SPS-01B catchment)

Class Estimate Type:	Class 4	Class adjusts Construction Contingency and expected accuracy
Project Complexity	Med	Complexity adjusts Construction Contingency, and expected accuracy
Accuracy Range:	40%	
Area Condition:	Suburban	Area Condition uplifts unit cost and restoration

PROJECT NO.: WW-D-SS-18

PROPOSED DIAMETER:	200 mm	
TOTAL LENGTH:	7500 m	
Tunnelled		0%
Open Cut	7500 m	100%

CLASS EA REQUIREMENTS:	A+
CONSTRUCTION ASSUMPTION:	Sewer 5m

COST ESTIMATION SPREADSHEET

COMPONENT	RATE (%)	RATE ($)	UNIT	ESTIMATED QUANTITY	COST PER UNIT	SUB-TOTAL	COMMENTS
Construction Cost							
Pipe Construction - Open Cut			m	7500 m	$651	$4,881,632	Existing road ROW
Pipe Construction - Tunneling			m	0 m	$1,300	$0	
Pipe Construction Uplift (Based on Area Conditions)	20%					$976,326	
Minor Creek Crossings			ea.	0	$66,000	$0	
Major Creek Crossings			ea.	0	$235,000	$0	
Road Crossings			ea.	0	$118,000	$0	
Major Road / Rail Crossings			ea.	0	$235,000	$0	
Utility Crossings			ea.	0	$118,000	$0	
Additional Construction Costs	15%		ea.			$878,694	Includes Mod/Demob,connections, inspection, hydrants, signage, traffic management, bonding, insurance
Provisional & Allowance	10%		ea.			$673,665	Provisional Labour and Materials in addition to base construction cost
Sub-Total Construction Base Costs						**$7,410,000**	
Geotechnical / Hydrogeological / Materials	1.0%					$74,100	
Geotechnical Sub-Total Cost						**$74,100**	
Property Requirements	1.5%					$ 111,200	
Property Requirements Sub-Total						**$111,200**	
Consultant Engineering/Design	15%					$ 1,111,500	includes planning, pre-design, detailed design, training, CA, commissioning
Engineering/Design Sub-Total						**$1,111,500**	
In House Labour/Engineering/Wages/CA	3%					$ 222,300	
In-house Labour/Wages Sub-Total						**$222,300**	
Project Contingency	15%					$1,339,000	Construction Contingency is dependent on Cost Estimate Class and Project Complexity
Project Contingency Sub-Total						**$1,339,000**	
Non-Refundable HST	1.76%					$176,800	
Non-Refundable HST Sub-Total						**$176,800**	
Total (2019 Dollars)						**$10,445,000**	Rounded to nearest $1,000
Other Estimate							
Chosen Estimate						**$10,445,000**	**2019 Estimate**

COST ESTIMATE SUMMARY - FOR PHASING ESTIMATING ONLY

PROJECT COMPONENT	PROJECT COMPONENT DESCRIPTION	PERCENTAGE	TOTAL	YEAR	COMMENTS
Study	Feasibility study, EA	2%	$208,900		
Design	Design fees, Town fees for design, contract admin	13%	$1,357,850		
Construction	Town fees, base costs and project contingency	85%	$8,878,250		
TOTAL			**$10,445,000**		

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PROJECT NO.: WW-D-SS-19
PROJECT NAME: Sewers for Existing Unserviced (SPS-02)
PROJECT DESCRIPTION: New sanitary sewers to benefit existing unserviced within North Dorchester (WW-D-SPS-02 catchment)

Class Estimate Type:	Class 4	Class adjusts Construction Contingency and expected accuracy
Project Complexity	Med	Complexity adjusts Construction Contingency, and expected accuracy
Accuracy Range:	40%	
Area Condition:	Suburban	Area Condition uplifts unit cost and restoration

PROJECT NO.: WW-D-SS-19

PROPOSED DIAMETER:	200 mm	
TOTAL LENGTH:	5640 m	
Tunnelled		0%
Open Cut	5640 m	100%

CLASS EA REQUIREMENTS:	A+
CONSTRUCTION ASSUMPTION:	Sewer 5m

COST ESTIMATION SPREADSHEET

COMPONENT	RATE (%)	RATE ($)	UNIT	ESTIMATED QUANTITY	COST PER UNIT	SUB-TOTAL	COMMENTS
Construction Cost							
Pipe Construction - Open Cut			m	5640 m	$651	$3,670,987	Existing road ROW
Pipe Construction - Tunneling			m	0 m	$1,300	$0	
Pipe Construction Uplift (Based on Area Conditions)	20%					$734,197	
Minor Creek Crossings			ea.	0	$66,000	$0	
Major Creek Crossings			ea.	0	$235,000	$0	
Road Crossings			ea.	0	$118,000	$0	
Major Road / Rail Crossings			ea.	0	$235,000	$0	
Utility Crossings			ea.	0	$118,000	$0	
Additional Construction Costs	15%		ea.			$660,778	Includes Mod/Demob,connections, inspection, hydrants, signage, traffic management, bonding, insurance
Provisional & Allowance	10%		ea.			$506,596	Provisional Labour and Materials in addition to base construction cost
Sub-Total Construction Base Costs						**$5,573,000**	
Geotechnical / Hydrogeological / Materials	1.0%					$55,700	
Geotechnical Sub-Total Cost						**$55,700**	
Property Requirements	1.5%					$ 83,600	
Property Requirements Sub-Total						**$83,600**	
Consultant Engineering/Design	15%					$ 836,000	includes planning, pre-design, detailed design, training, CA, commissioning
Engineering/Design Sub-Total						**$836,000**	
In House Labour/Engineering/Wages/CA	3%					$ 167,200	
In-house Labour/Wages Sub-Total						**$167,200**	
Project Contingency	15%					$1,007,000	Construction Contingency is dependent on Cost Estimate Class and Project Complexity
Project Contingency Sub-Total						**$1,007,000**	
Non-Refundable HST	1.76%					$133,000	
Non-Refundable HST Sub-Total						**$133,000**	
Total (2019 Dollars)						**$7,856,000**	Rounded to nearest $1,000
Other Estimate							
Chosen Estimate						**$7,856,000**	**2019 Estimate**

COST ESTIMATE SUMMARY - FOR PHASING ESTIMATING ONLY

PROJECT COMPONENT	PROJECT COMPONENT DESCRIPTION	PERCENTAGE	TOTAL	YEAR	COMMENTS
Study	Feasibility study, EA	2%	$157,120		
Design	Design fees, Town fees for design, contract admin	13%	$1,021,280		
Construction	Town fees, base costs and project contingency	85%	$6,677,600		
TOTAL			**$7,856,000**		

PROJECT NO.: WW-D-SS-20
PROJECT NAME: Sewers for Existing Unserviced (SPS-03)
PROJECT DESCRIPTION: New sanitary sewers to benefit existing unserviced within North Dorchester (WW-D-SPS-03 catchment)

Class Estimate Type:	Class 4	Class adjusts Construction Contingency and expected accuracy
Project Complexity	Med	Complexity adjusts Construction Contingency, and expected accuracy
Accuracy Range:	40%	
Area Condition:	Suburban	Area Condition uplifts unit cost and restoration

PROJECT NO.: WW-D-SS-20

PROPOSED DIAMETER:	200 mm	
TOTAL LENGTH:	1120 m	
Tunnelled		0%
Open Cut	1120 m	100%

CLASS EA REQUIREMENTS:	A+
CONSTRUCTION ASSUMPTION:	Sewer 5m

COST ESTIMATION SPREADSHEET

COMPONENT	RATE (%)	RATE ($)	UNIT	ESTIMATED QUANTITY	COST PER UNIT	SUB-TOTAL	COMMENTS
Construction Cost							
Pipe Construction - Open Cut			m	1120 m	$651	$728,990	Existing road ROW
Pipe Construction - Tunneling			m	0 m	$1,300	$0	
Pipe Construction Uplift (Based on Area Conditions)	20%					$145,798	
Minor Creek Crossings			ea.	0	$66,000	$0	
Major Creek Crossings			ea.	0	$235,000	$0	
Road Crossings			ea.	0	$118,000	$0	
Major Road / Rail Crossings			ea.	0	$235,000	$0	
Utility Crossings			ea.	0	$118,000	$0	
Additional Construction Costs	15%		ea.			$131,218	Includes Mod/Demob,connections, inspection, hydrants, signage, traffic management, bonding, insurance
Provisional & Allowance	10%		ea.			$100,601	Provisional Labour and Materials in addition to base construction cost
Sub-Total Construction Base Costs						**$1,107,000**	
Geotechnical / Hydrogeological / Materials	1.0%					$11,100	
Geotechnical Sub-Total Cost						**$11,100**	
Property Requirements	1.5%					$ 16,600	
Property Requirements Sub-Total						**$16,600**	
Consultant Engineering/Design	15%					$ 166,100	includes planning, pre-design, detailed design, training, CA, commissioning
Engineering/Design Sub-Total						**$166,100**	
In House Labour/Engineering/Wages/CA	3%					$ 100,000	
In-house Labour/Wages Sub-Total						**$100,000**	
Project Contingency	15%					$210,000	Construction Contingency is dependent on Cost Estimate Class and Project Complexity
Project Contingency Sub-Total						**$210,000**	
Non-Refundable HST	1.76%					$26,600	
Non-Refundable HST Sub-Total						**$26,600**	
Total (2019 Dollars)						**$1,637,000**	Rounded to nearest $1,000
Other Estimate							
Chosen Estimate						**$1,637,000**	**2019 Estimate**

COST ESTIMATE SUMMARY - FOR PHASING ESTIMATING ONLY

PROJECT COMPONENT	PROJECT COMPONENT DESCRIPTION	PERCENTAGE	TOTAL	YEAR	COMMENTS
Study	Feasibility study, EA	2%	$32,740		
Design	Design fees, Town fees for design, contract admin	13%	$212,810		
Construction	Town fees, base costs and project contingency	85%	$1,391,450		
TOTAL			**$1,637,000**		

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PROJECT NO.: WW-D-SS-21
PROJECT NAME: Sewers for Existing Unserviced (SPS-04)
PROJECT DESCRIPTION: New sanitary sewers to benefit existing unserviced within South Dorchester (WW-D-SPS-04 catchment)

Class Estimate Type:	Class 4	Class adjusts Construction Contingency and expected accuracy
Project Complexity	Med	Complexity adjusts Construction Contingency, and expected accuracy
Accuracy Range:	40%	
Area Condition:	Suburban	Area Condition uplifts unit cost and restoration

PROJECT NO.: WW-D-SS-21

PROPOSED DIAMETER:	200 mm	
TOTAL LENGTH:	5300 m	
Tunnelled		0%
Open Cut	5300 m	100%

CLASS EA REQUIREMENTS:	A+
CONSTRUCTION ASSUMPTION:	Sewer 5m

COST ESTIMATION SPREADSHEET

COMPONENT	RATE (%)	RATE ($)	UNIT	ESTIMATED QUANTITY	COST PER UNIT	SUB-TOTAL	COMMENTS
Construction Cost							
Pipe Construction - Open Cut			m	5300 m	$651	$3,449,686	Existing road ROW
Pipe Construction - Tunneling			m	0 m	$1,300	$0	
Pipe Construction Uplift (Based on Area Conditions)	20%					$689,937	
Minor Creek Crossings			ea.	0	$66,000	$0	
Major Creek Crossings			ea.	0	$235,000	$0	
Road Crossings			ea.	0	$118,000	$0	
Major Road / Rail Crossings			ea.	0	$235,000	$0	
Utility Crossings			ea.	0	$118,000	$0	
Additional Construction Costs	15%		ea.			$620,944	Includes Mod/Demob,connections, inspection, hydrants, signage, traffic management, bonding, insurance
Provisional & Allowance	10%		ea.			$476,057	Provisional Labour and Materials in addition to base construction cost
Sub-Total Construction Base Costs						**$5,237,000**	
Geotechnical / Hydrogeological / Materials	1.0%					$52,400	
Geotechnical Sub-Total Cost						**$52,400**	
Property Requirements	1.5%					$ 78,600	
Property Requirements Sub-Total						**$78,600**	
Consultant Engineering/Design	15%					$ 785,600	includes planning, pre-design, detailed design, training, CA, commissioning
Engineering/Design Sub-Total						**$785,600**	
In House Labour/Engineering/Wages/CA	3%					$ 157,100	
In-house Labour/Wages Sub-Total						**$157,100**	
Project Contingency	15%					$947,000	Construction Contingency is dependent on Cost Estimate Class and Project Complexity
Project Contingency Sub-Total						**$947,000**	
Non-Refundable HST	1.76%					$125,000	
Non-Refundable HST Sub-Total						**$125,000**	
Total (2019 Dollars)						**$7,383,000**	Rounded to nearest $1,000
Other Estimate							
Chosen Estimate						**$7,383,000**	**2019 Estimate**

COST ESTIMATE SUMMARY - FOR PHASING ESTIMATING ONLY

PROJECT COMPONENT	PROJECT COMPONENT DESCRIPTION	PERCENTAGE	TOTAL	YEAR	COMMENTS
Study	Feasibility study, EA	2%	$147,660		
Design	Design fees, Town fees for design, contract admin	13%	$959,790		
Construction	Town fees, base costs and project contingency	85%	$6,275,550		
TOTAL			$7,383,000		

PROJECT NO.: WW-D-SS-23
PROJECT NAME: Sewers for Existing Unserviced (SPS-06B)
PROJECT DESCRIPTION: New sanitary sewers to benefit existing unserviced within South Dorchester (WW-D-SPS-06B catchment)

Class Estimate Type:	Class 4	Class adjusts Construction Contingency and expected accuracy
Project Complexity	Med	Complexity adjusts Construction Contingency, and expected accuracy
Accuracy Range:	40%	
Area Condition:	Suburban	Area Condition uplifts unit cost and restoration

PROJECT NO.: WW-D-SS-23

PROPOSED DIAMETER:	200 mm	
TOTAL LENGTH:	8200 m	
Tunnelled		0%
Open Cut	8200 m	100%

CLASS EA REQUIREMENTS:	A+
CONSTRUCTION ASSUMPTION:	Sewer 5m

COST ESTIMATION SPREADSHEET

COMPONENT	RATE (%)	RATE ($)	UNIT	ESTIMATED QUANTITY	COST PER UNIT	SUB-TOTAL	COMMENTS
Construction Cost							
Pipe Construction - Open Cut			m	8200 m	$651	$5,337,251	Existing road ROW
Pipe Construction - Tunneling			m	0 m	$1,300	$0	
Pipe Construction Uplift (Based on Area Conditions)	20%					$1,067,450	
Minor Creek Crossings			ea.	0	$66,000	$0	
Major Creek Crossings			ea.	0	$235,000	$0	
Road Crossings			ea.	0	$118,000	$0	
Major Road / Rail Crossings			ea.	0	$235,000	$0	
Utility Crossings			ea.	0	$118,000	$0	
Additional Construction Costs	15%		ea.			$960,705	Includes Mod/Demob,connections, inspection, hydrants, signage, traffic management, bonding, insurance
Provisional & Allowance	10%		ea.			$736,541	Provisional Labour and Materials in addition to base construction cost
Sub-Total Construction Base Costs						**$8,102,000**	
Geotechnical / Hydrogeological / Materials	1.0%					$81,000	
Geotechnical Sub-Total Cost						**$81,000**	
Property Requirements	1.5%					$ 121,500	
Property Requirements Sub-Total						**$121,500**	
Consultant Engineering/Design	15%					$ 1,215,300	includes planning, pre-design, detailed design, training, CA, commissioning
Engineering/Design Sub-Total						**$1,215,300**	
In House Labour/Engineering/Wages/CA	3%					$ 243,100	
In-house Labour/Wages Sub-Total						**$243,100**	
Project Contingency	15%					$1,464,000	Construction Contingency is dependent on Cost Estimate Class and Project Complexity
Project Contingency Sub-Total						**$1,464,000**	
Non-Refundable HST	1.76%					$193,300	
Non-Refundable HST Sub-Total						**$193,300**	
Total (2019 Dollars)						**$11,420,000**	Rounded to nearest $1,000
Other Estimate							
Chosen Estimate						**$11,420,000**	**2019 Estimate**

COST ESTIMATE SUMMARY - FOR PHASING ESTIMATING ONLY

PROJECT COMPONENT	PROJECT COMPONENT DESCRIPTION	PERCENTAGE	TOTAL	YEAR	COMMENTS
Study	Feasibility study, EA	2%	$228,400		
Design	Design fees, Town fees for design, contract admin	13%	$1,484,600		
Construction	Town fees, base costs and project contingency	85%	$9,707,000		
TOTAL			**$11,420,000**		

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PROJECT NO.: WW-D-SS-24
PROJECT NAME: Sewers for Existing Unserviced (SPS-07B)
PROJECT DESCRIPTION: New sanitary sewers to benefit existing unserviced within North Dorchester (WW-D-SPS-07B catchment)

Class Estimate Type:	Class 4	Class adjusts Construction Contingency and expected accuracy
Project Complexity	Med	Complexity adjusts Construction Contingency, and expected accuracy
Accuracy Range:	40%	
Area Condition:	Suburban	Area Condition uplifts unit cost and restoration

PROJECT NO.: WW-D-SS-24

PROPOSED DIAMETER:	200 mm	
TOTAL LENGTH:	2250 m	
Tunnelled		0%
Open Cut	2250 m	100%

CLASS EA REQUIREMENTS:	A+
CONSTRUCTION ASSUMPTION:	Sewer 5m

COST ESTIMATION SPREADSHEET

COMPONENT	RATE (%)	RATE ($)	UNIT	ESTIMATED QUANTITY	COST PER UNIT	SUB-TOTAL	COMMENTS
Construction Cost							
Pipe Construction - Open Cut			m	2250 m	$651	$1,464,489	Existing road ROW
Pipe Construction - Tunneling			m	0 m	$1,300	$0	
Pipe Construction Uplift (Based on Area Conditions)	20%					$292,898	
Minor Creek Crossings			ea.	0	$66,000	$0	
Major Creek Crossings			ea.	0	$235,000	$0	
Road Crossings			ea.	0	$118,000	$0	
Major Road / Rail Crossings			ea.	0	$235,000	$0	
Utility Crossings			ea.	0	$118,000	$0	
Additional Construction Costs	15%		ea.			$263,608	Includes Mod/Demob,connections, inspection, hydrants, signage, traffic management, bonding, insurance
Provisional & Allowance	10%		ea.			$202,100	Provisional Labour and Materials in addition to base construction cost
Sub-Total Construction Base Costs						**$2,223,000**	
Geotechnical / Hydrogeological / Materials	1.0%					$22,200	
Geotechnical Sub-Total Cost						**$22,200**	
Property Requirements	1.5%					$ 33,300	
Property Requirements Sub-Total						**$33,300**	
Consultant Engineering/Design	15%					$ 333,500	includes planning, pre-design, detailed design, training, CA, commissioning
Engineering/Design Sub-Total						**$333,500**	
In House Labour/Engineering/Wages/CA	3%					$ 100,000	
In-house Labour/Wages Sub-Total						**$100,000**	
Project Contingency	15%					$407,000	Construction Contingency is dependent on Cost Estimate Class and Project Complexity
Project Contingency Sub-Total						**$407,000**	
Non-Refundable HST	1.76%					$53,100	
Non-Refundable HST Sub-Total						**$53,100**	
Total (2019 Dollars)						**$3,172,000**	Rounded to nearest $1,000
Other Estimate							
Chosen Estimate						**$3,172,000**	**2019 Estimate**

COST ESTIMATE SUMMARY - FOR PHASING ESTIMATING ONLY

PROJECT COMPONENT	PROJECT COMPONENT DESCRIPTION	PERCENTAGE	TOTAL	YEAR	COMMENTS
Study	Feasibility study, EA	2%	$63,440		
Design	Design fees, Town fees for design, contract admin	13%	$412,360		
Construction	Town fees, base costs and project contingency	85%	$2,696,200		
TOTAL			**$3,172,000**		

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PROJECT NO.: WW-D-401-ST-01

PROJECT NAME: Cost Benefit Study to Service 401 Corridor Lands

PROJECT DESCRIPTION: Cost-benefit study to evaluate servicing options for 401 Corridor Lands, will include recommendations for gravity, sewage pumping station or siphon options.

CLASS EA REQUIREMENTS: C

COST ESTIMATE SUMMARY - FOR PHASING ESTIMATING ONLY

PROJECT COMPONENT	PROJECT COMPONENT DESCRIPTION	TOTAL
Study	Feasibility study, EA	$50,000

PROJECT NO.: WW-D-TP-01A
PROJECT NAME: Thorndale Treatment Plant Upgrades (includes SPS)
PROJECT DESCRIPTION: Treatment plant capacity upgrades required to accommodate all development flows in Thorndale

Class Estimate Type:	Class 4	Class adjusts Construction Contingency and expected accuracy
Project Complexity	Med	Complexity adjusts Construction Contingency, and expected accuracy
Accuracy Range:	40%	
Area Condition:	Suburban	Area Condition uplifts unit cost and restoration

PROJECT NO.: WW-D-TP-01A

PROPOSED CAPACITY	0.30 MLD

CLASS EA REQUIREMENTS:	C
CONSTRUCTION ASSUMPTION:	Other

COST ESTIMATION SPREADSHEET

COMPONENT	RATE (%)	RATE ($)	UNIT	ESTIMATED QUANTITY	COST PER UNIT	SUB-TOTAL	COMMENTS
Construction Cost							
Facility Construction			MLD	0 MLD	$4,000,000	$1,202,688	$2.5M per MLD
Additional Construction Costs	15%		ea.			$180,403	Includes Mod/Demob,connections, inspection, hydrants, signage, traffic management, bonding, insurance
Provisional & Allowance	10%		ea.			$138,309	Provisional Labour and Materials in addition to base construction cost
Sub-Total Construction Base Costs						**$1,521,000**	
Geotechnical / Hydrogeological / Materials	1.0%					$15,200	
Geotechnical Sub-Total Cost						**$15,200**	
Property Requirements	1.5%					$ 22,800	
Property Requirements Sub-Total						**$22,800**	
Consultant Engineering/Design	15%					$ 228,200	includes planning, pre-design, detailed design, training, CA, commissioning
Engineering/Design Sub-Total						**$228,200**	
In House Labour/Engineering/Wages/CA	3%					$ 100,000	
In-house Labour/Wages Sub-Total						**$100,000**	
Project Contingency	15%					$283,000	Construction Contingency is dependent on Cost Estimate Class and Project Complexity
Project Contingency Sub-Total						**$283,000**	
Non-Refundable HST	1.76%					$36,400	
Non-Refundable HST Sub-Total						**$36,400**	
Total (2019 Dollars)						**$2,207,000**	Rounded to nearest $1,000
Other Estimate							
Chosen Estimate						**$2,207,000**	**2019 Estimate**

COST ESTIMATE SUMMARY - FOR PHASING ESTIMATING ONLY

PROJECT COMPONENT	PROJECT COMPONENT DESCRIPTION	PERCENTAGE	TOTAL	YEAR	COMMENTS
Study	Feasibility study, EA	2%	$44,140		
Design	Design fees, Town fees for design, contract admin	13%	$286,910		
Construction	Town fees, base costs and project contingency	85%	$1,875,950		
TOTAL			**$2,207,000**		

PROJECT NO.: WW-D-TP-01B
PROJECT NAME: Thorndale Treatment Plant Upgrades (includes SPS)
PROJECT DESCRIPTION: Treatment plant capacity upgrades required to accommodate all development flows in Thorndale (includes Thorndale SPS and forcemain)

Class Estimate Type:	Class 4	Class adjusts Construction Contingency and expected accuracy
Project Complexity	Med	Complexity adjusts Construction Contingency, and expected accuracy
Accuracy Range:	40%	
Area Condition:	Suburban	Area Condition uplifts unit cost and restoration

PROJECT NO.: WW-D-TP-01B

PROPOSED CAPACITY	1 MLD

CLASS EA REQUIREMENTS:	C
CONSTRUCTION ASSUMPTION:	Other

COST ESTIMATION SPREADSHEET

COMPONENT	RATE (%)	RATE ($)	UNIT	ESTIMATED QUANTITY	COST PER UNIT	SUB-TOTAL	COMMENTS
Construction Cost							
Facility Construction			MLD	1 MLD	$4,000,000	$4,033,152	$2.5M per MLD
Additional Construction Costs	15%		ea.			$604,973	Includes Mod/Demob,connections, inspection, hydrants, signage, traffic management, bonding, insurance
Provisional & Allowance	10%		ea.			$463,812	Provisional Labour and Materials in addition to base construction cost
Sub-Total Construction Base Costs						$5,102,000	
Geotechnical / Hydrogeological / Materials	1.0%					$51,000	
Geotechnical Sub-Total Cost						**$51,000**	
Property Requirements	1.5%					$ 76,500	
Property Requirements Sub-Total						**$76,500**	
Consultant Engineering/Design	15%					$ 765,300	includes planning, pre-design, detailed design, training, CA, commissioning
Engineering/Design Sub-Total						**$765,300**	
In House Labour/Engineering/Wages/CA	3%					$ 153,100	
In-house Labour/Wages Sub-Total						**$153,100**	
Project Contingency	15%					$922,000	Construction Contingency is dependent on Cost Estimate Class and Project Complexity
Project Contingency Sub-Total						**$922,000**	
Non-Refundable HST	1.76%					$121,700	
Non-Refundable HST Sub-Total						**$121,700**	
Total (2019 Dollars)						**$7,192,000**	Rounded to nearest $1,000
Other Estimate							
Chosen Estimate						$7,192,000	2019 Estimate

COST ESTIMATE SUMMARY - FOR PHASING ESTIMATING ONLY

PROJECT COMPONENT	PROJECT COMPONENT DESCRIPTION	PERCENTAGE	TOTAL	YEAR	COMMENTS
Study	Feasibility study, EA	2%	$143,840		
Design	Design fees, Town fees for design, contract admin	13%	$934,960		
Construction	Town fees, base costs and project contingency	85%	$6,113,200		
TOTAL			$7,192,000		

PROJECT NO.: WW-D-TP-01C
PROJECT NAME: Thorndale Treatment Plant Upgrades (includes SPS)
PROJECT DESCRIPTION: Treatment plant capacity upgrades required to accommodate all development flows in Thorndale (includes Thorndale SPS and forcemain)

Class Estimate Type:	Class 4	Class adjusts Construction Contingency and expected accuracy
Project Complexity	Med	Complexity adjusts Construction Contingency, and expected accuracy
Accuracy Range:	40%	
Area Condition:	Suburban	Area Condition uplifts unit cost and restoration

PROJECT NO.: WW-D-TP-01C

PROPOSED CAPACITY	2 MLD

CLASS EA REQUIREMENTS:	C
CONSTRUCTION ASSUMPTION:	Other

COST ESTIMATION SPREADSHEET

COMPONENT	RATE (%)	RATE ($)	UNIT	ESTIMATED QUANTITY	COST PER UNIT	SUB-TOTAL	COMMENTS
Construction Cost							
Facility Construction			MLD	2 MLD	$4,000,000	$9,192,960	$4M per MLD (includes SPS and FM upgrades)
Additional Construction Costs	15%		ea.			$1,378,944	Includes Mod/Demob,connections, inspection, hydrants, signage, traffic management, bonding, insurance
Provisional & Allowance	10%		ea.			$1,057,190	Provisional Labour and Materials in addition to base construction cost
Sub-Total Construction Base Costs						$11,629,000	
Geotechnical / Hydrogeological / Materials	1.0%					$116,300	
Geotechnical Sub-Total Cost						**$116,300**	
Property Requirements	1.5%					$ 174,400	
Property Requirements Sub-Total						**$174,400**	
Consultant Engineering/Design	12%					$ 1,395,500	includes planning, pre-design, detailed design, training, CA, commissioning
Engineering/Design Sub-Total						**$1,395,500**	
In House Labour/Engineering/Wages/CA	3%					$ 348,900	
In-house Labour/Wages Sub-Total						**$348,900**	
Project Contingency	15%					$2,050,000	Construction Contingency is dependent on Cost Estimate Class and Project Complexity
Project Contingency Sub-Total						**$2,050,000**	
Non-Refundable HST	1.76%					$270,400	
Non-Refundable HST Sub-Total						**$270,400**	
Total (2019 Dollars)						**$15,985,000**	Rounded to nearest $1,000
Other Estimate							
Chosen Estimate						$15,985,000	2019 Estimate

COST ESTIMATE SUMMARY - FOR PHASING ESTIMATING ONLY

PROJECT COMPONENT	PROJECT COMPONENT DESCRIPTION	PERCENTAGE	TOTAL	YEAR	COMMENTS
Study	Feasibility study, EA	2%	$319,700		
Design	Design fees, Town fees for design, contract admin	13%	$2,078,050		
Construction	Town fees, base costs and project contingency	85%	$13,587,250		
TOTAL			$15,985,000		

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PROJECT NO.: WW-T-SS-01
PROJECT NAME: Gerald Parkway sewer upgrades
PROJECT DESCRIPTION: Sewer upgrades along Gerald Parkway to accommodate growth flows in West Thorndale

Class Estimate Type:	Class 4	Class adjusts Construction Contingency and expected accuracy
Project Complexity	Med	Complexity adjusts Construction Contingency, and expected accuracy
Accuracy Range:	40%	
Area Condition:	Suburban	Area Condition uplifts unit cost and restoration

PROJECT NO.: WW-T-SS-01

PROPOSED DIAMETER:	375 mm	
TOTAL LENGTH:	200 m	
Tunnelled		0%
Open Cut	200 m	100%

CLASS EA REQUIREMENTS:	A+
CONSTRUCTION ASSUMPTION:	Sewer 5m

COST ESTIMATION SPREADSHEET

COMPONENT	RATE (%)	RATE ($)	UNIT	ESTIMATED QUANTITY	COST PER UNIT	SUB-TOTAL	COMMENTS
Construction Cost							
Pipe Construction - Open Cut			m	200 m	$675	$134,996	Existing road ROW
Pipe Construction - Tunneling			m	0 m	$6,300	$0	
Pipe Construction Uplift (Based on Area Conditions)	20%					$26,999	
Minor Creek Crossings			ea.	0	$166,000	$0	
Major Creek Crossings			ea.	0	$985,000	$0	
Road Crossings			ea.	0	$418,000	$0	
Major Road / Rail Crossings			ea.	0	$985,000	$0	
Utility Crossings			ea.	0	$418,000	$0	
Additional Construction Costs	15%		ea.			$24,299	Includes Mod/Demob,connections, inspection, hydrants, signage, traffic management, bonding, insurance
Provisional & Allowance	10%		ea.			$18,629	Provisional Labour and Materials in addition to base construction cost
Sub-Total Construction Base Costs						**$205,000**	
Geotechnical / Hydrogeological / Materials	1.0%					$2,100	
Geotechnical Sub-Total Cost						**$2,100**	
Property Requirements	1.5%					$ 3,100	
Property Requirements Sub-Total						**$3,100**	
Consultant Engineering/Design	15%					$ 30,800	includes planning, pre-design, detailed design, training, CA, commissioning
Engineering/Design Sub-Total						**$30,800**	
In House Labour/Engineering/Wages/CA	3%					$ 50,000	
In-house Labour/Wages Sub-Total						**$50,000**	
Project Contingency	15%					$44,000	Construction Contingency is dependent on Cost Estimate Class and Project Complexity
Project Contingency Sub-Total						**$44,000**	
Non-Refundable HST	1.76%					$5,000	
Non-Refundable HST Sub-Total						**$5,000**	
Total (2019 Dollars)						**$340,000**	Rounded to nearest $1,000
Other Estimate							
Chosen Estimate						**$340,000**	**2019 Estimate**

COST ESTIMATE SUMMARY - FOR PHASING ESTIMATING ONLY

PROJECT COMPONENT	PROJECT COMPONENT DESCRIPTION	PERCENTAGE	TOTAL	YEAR	COMMENTS
Study	Feasibility study, EA	2%	$6,800		
Design	Design fees, Town fees for design, contract admin	13%	$44,200		
Construction	Town fees, base costs and project contingency	85%	$289,000		
TOTAL			**$340,000**		

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Capital Program Cost Estimates

PROJECT NO.: WW-T-SS-02
PROJECT NAME: King Street sewer
PROJECT DESCRIPTION: King Street sewer from CN rail to Lions Lane to accommodate East Thorndale growth flows

Class Estimate Type:	Class 4	Class adjusts Construction Contingency and expected accuracy
Project Complexity	Med	Complexity adjusts Construction Contingency, and expected accuracy
Accuracy Range:	40%	
Area Condition:	Suburban	Area Condition uplifts unit cost and restoration

PROJECT NO.: WW-T-SS-02

PROPOSED DIAMETER:	250 mm	
TOTAL LENGTH:	375 m	
Tunnelled		0%
Open Cut	375 m	100%

CLASS EA REQUIREMENTS:	A+
CONSTRUCTION ASSUMPTION:	Sewer 5m

COST ESTIMATION SPREADSHEET

COMPONENT	RATE (%)	RATE ($)	UNIT	ESTIMATED QUANTITY	COST PER UNIT	SUB-TOTAL	COMMENTS
Construction Cost							
Pipe Construction - Open Cut			m	375 m	$653	$244,766	Existing road ROW
Pipe Construction - Tunneling			m	0 m	$1,300	$0	
Pipe Construction Uplift (Based on Area Conditions)	20%					$48,953	
Minor Creek Crossings			ea.	0	$66,000	$0	
Major Creek Crossings			ea.	0	$235,000	$0	
Road Crossings			ea.	0	$118,000	$0	
Major Road / Rail Crossings			ea.	0	$235,000	$0	
Utility Crossings			ea.	0	$118,000	$0	
Additional Construction Costs	15%		ea.			$44,058	Includes Mod/Demob,connections, inspection, hydrants, signage, traffic management, bonding, insurance
Provisional & Allowance	10%		ea.			$33,778	Provisional Labour and Materials in addition to base construction cost
Sub-Total Construction Base Costs						**$372,000**	
Geotechnical / Hydrogeological / Materials	1.0%					$3,700	
Geotechnical Sub-Total Cost						**$3,700**	
Property Requirements	1.5%					$ 5,600	
Property Requirements Sub-Total						**$5,600**	
Consultant Engineering/Design	15%					$ 55,800	includes planning, pre-design, detailed design, training, CA, commissioning
Engineering/Design Sub-Total						**$55,800**	
In House Labour/Engineering/Wages/CA	3%					$ 50,000	
In-house Labour/Wages Sub-Total						**$50,000**	
Project Contingency	15%					$73,000	Construction Contingency is dependent on Cost Estimate Class and Project Complexity
Project Contingency Sub-Total						**$73,000**	
Non-Refundable HST	1.76%					$9,000	
Non-Refundable HST Sub-Total						**$9,000**	
Total (2019 Dollars)						**$569,000**	Rounded to nearest $1,000
Other Estimate							
Chosen Estimate						**$569,000**	**2019 Estimate**

COST ESTIMATE SUMMARY - FOR PHASING ESTIMATING ONLY

PROJECT COMPONENT	PROJECT COMPONENT DESCRIPTION	PERCENTAGE	TOTAL	YEAR	COMMENTS
Study	Feasibility study, EA	2%	$11,380		
Design	Design fees, Town fees for design, contract admin	13%	$73,970		
Construction	Town fees, base costs and project contingency	85%	$483,650		
TOTAL			**$569,000**		

Municipality of Thames Centre
Water and Wastewater Master Plan Update
Capital Program Cost Estimates

PROJECT NO.: WW-T-SS-03
PROJECT NAME: King Street sewer
PROJECT DESCRIPTION: King Street sewer from Lions Lane to Monteith Avenue to accommodate East Thorndale growth flows

Class Estimate Type:	Class 4	Class adjusts Construction Contingency and expected accuracy
Project Complexity	Med	Complexity adjusts Construction Contingency, and expected accuracy
Accuracy Range:	40%	
Area Condition:	Suburban	Area Condition uplifts unit cost and restoration

PROJECT NO.: WW-T-SS-03

PROPOSED DIAMETER:	250 mm	
TOTAL LENGTH:	485 m	
Tunnelled		0%
Open Cut	485 m	100%

CLASS EA REQUIREMENTS:	A+
CONSTRUCTION ASSUMPTION:	Sewer 5m

COST ESTIMATION SPREADSHEET

COMPONENT	RATE (%)	RATE ($)	UNIT	ESTIMATED QUANTITY	COST PER UNIT	SUB-TOTAL	COMMENTS
Construction Cost							
Pipe Construction - Open Cut			m	485 m	$653	$316,564	Existing road ROW
Pipe Construction - Tunneling			m	0 m	$1,300	$0	
Pipe Construction Uplift (Based on Area Conditions)	20%					$63,313	
Minor Creek Crossings			ea.	0	$66,000	$0	
Major Creek Crossings			ea.	0	$235,000	$0	
Road Crossings			ea.	0	$118,000	$0	
Major Road / Rail Crossings			ea.	0	$235,000	$0	
Utility Crossings			ea.	0	$118,000	$0	
Additional Construction Costs	15%		ea.			$56,981	Includes Mod/Demob,connections, inspection, hydrants, signage, traffic management, bonding, insurance
Provisional & Allowance	10%		ea.			$43,686	Provisional Labour and Materials in addition to base construction cost
Sub-Total Construction Base Costs						**$481,000**	
Geotechnical / Hydrogeological / Materials	1.0%					$4,800	
Geotechnical Sub-Total Cost						**$4,800**	
Property Requirements	1.5%					$ 7,200	
Property Requirements Sub-Total						**$7,200**	
Consultant Engineering/Design	15%					$ 72,200	includes planning, pre-design, detailed design, training, CA, commissioning
Engineering/Design Sub-Total						**$72,200**	
In House Labour/Engineering/Wages/CA	3%					$ 50,000	
In-house Labour/Wages Sub-Total						**$50,000**	
Project Contingency	15%					$92,000	Construction Contingency is dependent on Cost Estimate Class and Project Complexity
Project Contingency Sub-Total						**$92,000**	
Non-Refundable HST	1.76%					$11,600	
Non-Refundable HST Sub-Total						**$11,600**	
Total (2019 Dollars)						**$719,000**	Rounded to nearest $1,000
Other Estimate							
Chosen Estimate						**$719,000**	**2019 Estimate**

COST ESTIMATE SUMMARY - FOR PHASING ESTIMATING ONLY

PROJECT COMPONENT	PROJECT COMPONENT DESCRIPTION	PERCENTAGE	TOTAL	YEAR	COMMENTS
Study	Feasibility study, EA	2%	$14,380		
Design	Design fees, Town fees for design, contract admin	13%	$93,470		
Construction	Town fees, base costs and project contingency	85%	$611,150		
TOTAL			**$719,000**		

PROJECT NO.: WW-T-SS-04
PROJECT NAME: King Street sewer
PROJECT DESCRIPTION: King Street sewer from Wye Creek to existing sewers to accommodate existing development flows

Class Estimate Type:	Class 4	Class adjusts Construction Contingency and expected accuracy
Project Complexity	Med	Complexity adjusts Construction Contingency, and expected accuracy
Accuracy Range:	40%	
Area Condition:	Suburban	Area Condition uplifts unit cost and restoration

PROJECT NO.: WW-T-SS-04

PROPOSED DIAMETER:	200 mm	
TOTAL LENGTH:	340 m	
Tunnelled		0%
Open Cut	340 m	100%

CLASS EA REQUIREMENTS:	A+
CONSTRUCTION ASSUMPTION:	Sewer 5m

COST ESTIMATION SPREADSHEET

COMPONENT	RATE (%)	RATE ($)	UNIT	ESTIMATED QUANTITY	COST PER UNIT	SUB-TOTAL	COMMENTS
Construction Cost							
Pipe Construction - Open Cut			m	340 m	$651	$221,301	Existing road ROW
Pipe Construction - Tunneling			m	0 m	$1,300	$0	
Pipe Construction Uplift (Based on Area Conditions)	20%					$44,260	
Minor Creek Crossings			ea.	0	$66,000	$0	
Major Creek Crossings			ea.	0	$235,000	$0	
Road Crossings			ea.	0	$118,000	$0	
Major Road / Rail Crossings			ea.	0	$235,000	$0	
Utility Crossings			ea.	0	$118,000	$0	
Additional Construction Costs	15%		ea.			$39,834	Includes Mod/Demob,connections, inspection, hydrants, signage, traffic management, bonding, insurance
Provisional & Allowance	10%		ea.			$30,539	Provisional Labour and Materials in addition to base construction cost
Sub-Total Construction Base Costs						**$336,000**	
Geotechnical / Hydrogeological / Materials	1.0%					$3,400	
Geotechnical Sub-Total Cost						**$3,400**	
Property Requirements	1.5%					$ 5,000	
Property Requirements Sub-Total						**$5,000**	
Consultant Engineering/Design	15%					$ 50,400	includes planning, pre-design, detailed design, training, CA, commissioning
Engineering/Design Sub-Total						**$50,400**	
In House Labour/Engineering/Wages/CA	3%					$ 50,000	
In-house Labour/Wages Sub-Total						**$50,000**	
Project Contingency	15%					$67,000	Construction Contingency is dependent on Cost Estimate Class and Project Complexity
Project Contingency Sub-Total						**$67,000**	
Non-Refundable HST	1.76%					$8,100	
Non-Refundable HST Sub-Total						**$8,100**	
Total (2019 Dollars)						**$520,000**	Rounded to nearest $1,000
Other Estimate							
Chosen Estimate						**$520,000**	**2019 Estimate**

COST ESTIMATE SUMMARY - FOR PHASING ESTIMATING ONLY

PROJECT COMPONENT	PROJECT COMPONENT DESCRIPTION	PERCENTAGE	TOTAL	YEAR	COMMENTS
Study	Feasibility study, EA	2%	$10,400		
Design	Design fees, Town fees for design, contract admin	13%	$67,600		
Construction	Town fees, base costs and project contingency	85%	$442,000		
TOTAL			$520,000		

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PROJECT NO.: WW-T-SS-05
PROJECT NAME: King Street sewer
PROJECT DESCRIPTION: King Street sewer under Wye Creek to accommodate existing development flows

Class Estimate Type:	Class 4	Class adjusts Construction Contingency and expected accuracy
Project Complexity	High	Complexity adjusts Construction Contingency, and expected accuracy
Accuracy Range:	50%	
Area Condition:	Suburban	Area Condition uplifts unit cost and restoration

PROJECT NO.: WW-T-SS-05

PROPOSED DIAMETER:	200 mm	
TOTAL LENGTH:	70 m	
Tunnelled	70 m	100%
Open Cut	0 m	0%

CLASS EA REQUIREMENTS:	B
CONSTRUCTION ASSUMPTION:	Sewer 5m

COST ESTIMATION SPREADSHEET

COMPONENT	RATE (%)	RATE ($)	UNIT	ESTIMATED QUANTITY	COST PER UNIT	SUB-TOTAL	COMMENTS
Construction Cost							
Pipe Construction - Open Cut			m	0 m	$651	$0	Existing road ROW
Pipe Construction - Tunneling			m	70 m	$1,300	$91,000	
Pipe Construction Uplift (Based on Area Conditions)	20%					$0	
Minor Creek Crossings			ea.	0	$66,000	$0	
Major Creek Crossings			ea.	1	$235,000	$235,000	Wye Creek
Road Crossings			ea.	0	$118,000	$0	
Major Road / Rail Crossings			ea.	0	$235,000	$0	
Utility Crossings			ea.	0	$118,000	$0	
Additional Construction Costs	20%		ea.			$65,200	Includes Mod/Demob,connections, inspection, hydrants, signage, traffic management, bonding, insurance
Provisional & Allowance	10%		ea.			$39,120	Provisional Labour and Materials in addition to base construction cost
Sub-Total Construction Base Costs						**$430,000**	
Geotechnical / Hydrogeological / Materials	2.0%					$8,600	
Geotechnical Sub-Total Cost						**$8,600**	
Property Requirements	2.0%					$ 8,600	
Property Requirements Sub-Total						**$8,600**	
Consultant Engineering/Design	15%					$ 64,500	includes planning, pre-design, detailed design, training, CA, commissioning
Engineering/Design Sub-Total						**$64,500**	
In House Labour/Engineering/Wages/CA	3%					$ 50,000	
In-house Labour/Wages Sub-Total						**$50,000**	
Project Contingency	25%					$140,000	Construction Contingency is dependent on Cost Estimate Class and Project Complexity
Project Contingency Sub-Total						**$140,000**	
Non-Refundable HST	1.76%					$11,500	
Non-Refundable HST Sub-Total						**$11,500**	
Total (2019 Dollars)						**$713,000**	Rounded to nearest $1,000
Other Estimate							
Chosen Estimate						**$713,000**	**2019 Estimate**

COST ESTIMATE SUMMARY - FOR PHASING ESTIMATING ONLY

PROJECT COMPONENT	PROJECT COMPONENT DESCRIPTION	PERCENTAGE	TOTAL	YEAR	COMMENTS
Study	Feasibility study, EA	2%	$14,260		
Design	Design fees, Town fees for design, contract admin	13%	$92,690		
Construction	Town fees, base costs and project contingency	85%	$606,050		
TOTAL			**$713,000**		

PROJECT NO.: WW-T-SS-06
PROJECT NAME: King Street sewer
PROJECT DESCRIPTION: King Street sewer from Harrison Street to before Wye Creek to accommodate existing development flows

Class Estimate Type:	Class 4	Class adjusts Construction Contingency and expected accuracy
Project Complexity	Med	Complexity adjusts Construction Contingency, and expected accuracy
Accuracy Range:	40%	
Area Condition:	Suburban	Area Condition uplifts unit cost and restoration

PROJECT NO.: WW-T-SS-06

PROPOSED DIAMETER:		200 mm	
TOTAL LENGTH:		130 m	
	Tunnelled	0 m	0%
	Open Cut	130 m	100%

CLASS EA REQUIREMENTS:	A+
CONSTRUCTION ASSUMPTION:	Sewer 5m

COST ESTIMATION SPREADSHEET

COMPONENT	RATE (%)	RATE ($)	UNIT	ESTIMATED QUANTITY	COST PER UNIT	SUB-TOTAL	COMMENTS
Construction Cost							
Pipe Construction - Open Cut			m	130 m	$651	$84,615	Existing road ROW
Pipe Construction - Tunneling			m	0 m	$1,300	$0	
Pipe Construction Uplift (Based on Area Conditions)	20%					$16,923	
Minor Creek Crossings			ea.	0	$66,000	$0	
Major Creek Crossings			ea.	0	$235,000	$0	
Road Crossings			ea.	0	$118,000	$0	
Major Road / Rail Crossings			ea.	0	$235,000	$0	
Utility Crossings			ea.	0	$118,000	$0	
Additional Construction Costs	15%		ea.			$15,231	Includes Mod/Demob,connections, inspection, hydrants, signage, traffic management, bonding, insurance
Provisional & Allowance	10%		ea.			$11,677	Provisional Labour and Materials in addition to base construction cost
Sub-Total Construction Base Costs						**$128,000**	
Geotechnical / Hydrogeological / Materials	1.0%					$1,300	
Geotechnical Sub-Total Cost						**$1,300**	
Property Requirements	1.5%					$ 1,900	
Property Requirements Sub-Total						**$1,900**	
Consultant Engineering/Design	15%					$ 19,200	includes planning, pre-design, detailed design, training, CA, commissioning
Engineering/Design Sub-Total						**$19,200**	
In House Labour/Engineering/Wages/CA	3%					$ 50,000	
In-house Labour/Wages Sub-Total						**$50,000**	
Project Contingency	15%					$30,000	Construction Contingency is dependent on Cost Estimate Class and Project Complexity
Project Contingency Sub-Total						**$30,000**	
Non-Refundable HST	1.76%					$3,200	
Non-Refundable HST Sub-Total						**$3,200**	
Total (2019 Dollars)						**$234,000**	Rounded to nearest $1,000
Other Estimate							
Chosen Estimate						**$234,000**	**2019 Estimate**

COST ESTIMATE SUMMARY - FOR PHASING ESTIMATING ONLY

PROJECT COMPONENT	PROJECT COMPONENT DESCRIPTION	PERCENTAGE	TOTAL	YEAR	COMMENTS
Study	Feasibility study, EA	2%	$4,680		
Design	Design fees, Town fees for design, contract admin	13%	$30,420		
Construction	Town fees, base costs and project contingency	85%	$198,900		
TOTAL			**$234,000**		

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PROJECT NO.: WW-T-SS-07
PROJECT NAME: Sewers for Existng Unserviced within Thorndale
PROJECT DESCRIPTION: New sanitary sewers to benefit existing unserviced within Thorndale

Class Estimate Type:	Class 4	Class adjusts Construction Contingency and expected accuracy
Project Complexity	Med	Complexity adjusts Construction Contingency, and expected accuracy
Accuracy Range:	40%	
Area Condition:	Suburban	Area Condition uplifts unit cost and restoration

PROJECT NO.: WW-T-SS-07

PROPOSED DIAMETER:	200 mm	
TOTAL LENGTH:	806 m	
Tunnelled		0%
Open Cut	806 m	100%

CLASS EA REQUIREMENTS:	A+
CONSTRUCTION ASSUMPTION:	Sewer 5m

COST ESTIMATION SPREADSHEET

COMPONENT	RATE (%)	RATE ($)	UNIT	ESTIMATED QUANTITY	COST PER UNIT	SUB-TOTAL	COMMENTS
Construction Cost							
Pipe Construction - Open Cut			m	806 m	$651	$524,613	Existing road ROW
Pipe Construction - Tunneling			m	0 m	$1,300	$0	
Pipe Construction Uplift (Based on Area Conditions)	20%					$104,923	
Minor Creek Crossings			ea.	0	$66,000	$0	
Major Creek Crossings			ea.	0	$235,000	$0	
Road Crossings			ea.	0	$118,000	$0	
Major Road / Rail Crossings			ea.	0	$235,000	$0	
Utility Crossings			ea.	0	$118,000	$0	
Additional Construction Costs	15%		ea.			$94,430	Includes Mod/Demob,connections, inspection, hydrants, signage, traffic management, bonding, insurance
Provisional & Allowance	10%		ea.			$72,397	Provisional Labour and Materials in addition to base construction cost
Sub-Total Construction Base Costs						**$796,000**	
Geotechnical / Hydrogeological / Materials	1.0%					$8,000	
Geotechnical Sub-Total Cost						**$8,000**	
Property Requirements	1.5%					$ 11,900	
Property Requirements Sub-Total						**$11,900**	
Consultant Engineering/Design	15%					$ 119,400	includes planning, pre-design, detailed design, training, CA, commissioning
Engineering/Design Sub-Total						**$119,400**	
In House Labour/Engineering/Wages/CA	3%					$ 50,000	
In-house Labour/Wages Sub-Total						**$50,000**	
Project Contingency	15%					$148,000	Construction Contingency is dependent on Cost Estimate Class and Project Complexity
Project Contingency Sub-Total						**$148,000**	
Non-Refundable HST	1.76%					$19,100	
Non-Refundable HST Sub-Total						**$19,100**	
Total (2019 Dollars)						**$1,152,000**	Rounded to nearest $1,000
Other Estimate							
Chosen Estimate						**$1,152,000**	**2019 Estimate**

COST ESTIMATE SUMMARY - FOR PHASING ESTIMATING ONLY

PROJECT COMPONENT	PROJECT COMPONENT DESCRIPTION	PERCENTAGE	TOTAL	YEAR	COMMENTS
Study	Feasibility study, EA	2%	$23,040		
Design	Design fees, Town fees for design, contract admin	13%	$149,760		
Construction	Town fees, base costs and project contingency	85%	$979,200		
TOTAL			$1,152,000		

E

MUNICIPALITY OF THAMES CENTRE

APPENDIX E

PUBLIC CONSULTATION

Table of Contents

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. It is anticipated that the Municipality of Thames Centre will experience modest population and employment growth in the 20-year planning horizon. This growth must ensure efficient, safe, and economically achievable solutions when providing the required water and wastewater infrastructure.

The purpose of the Thames Centre 2018 Water and Wastewater Master Plan Update was to develop and evaluate water and wastewater servicing strategies to meet this potential population and employment growth within the Towns of Dorchester and Thorndale.

The study followed Approach 1, which satisfies Phases 1 and 2, of the Municipal Engineers Association Class EA process (October 2000, as amended in 2007, 2011, and 2015). When prepared in accordance with Approach 1, the study may become the basis for, and be used in support of, future investigations for the specific Schedule B and C projects identified within it. Schedule B projects would require the filing of the Project file for public review while Schedule C projects would have to fulfil Phases 3 and 4 prior to filing an Environmental Study Report (ESR) for public review.

1.2 The Value of Public Engagement

GM BluePlan and Municipal staff were committed to inform and engage the public in the study, listen to and acknowledge their concerns and aspirations, and provide feedback on how their input was considered in the recommendations.

The 2018 Water and Wastewater Master Plan Update encouraged all interested parties to participate in the planning process.

This document outlines the Communication and Public Engagement Plan that guided how the project team informed residents and stakeholders of the study, while identifying strategies to collect input. This Plan was used as a living document updated throughout all phases and is an integral part of the final report, supporting the study's documentation.

1.3 Purpose and Approach

The purpose of the Communication and Engagement Plan was to provide a framework for informing and obtaining input from individuals and groups interested in this study. This Plan provides guidance for the communication and engagement process for the study, including areas where internal or external coordination was required. The intent was to ensure that as the technical work moved forward, the public engagement activities progressed as an integral part of the project.

The Communication and Public Engagement Plan was developed with an overall approach to:

- Meet the public and agency notification and consultation requirements for Phases 1 and 2 of the Class EA process (October 2000, as amended 2007, 2011 and 2015);
- Build on past communication protocols and consultation plans from previous municipal planning initiatives and Class EA studies that Thames Centre has undertaken to ensure consistency and continuity; and,
- Consider new strategies to further engage residents and receive meaningful public input throughout the project.

1.4 Stakeholder and Issues Analysis

Appendix A identifies the Project Team, with key personnel from GM BluePlan and Municipality of Thames Centre. This team further extended to include stakeholders with key interest in the project such as Ministry or Conservation Authority staff. **Appendix B** identifies the list of key stakeholders who received notification and/or participated in the 2018 Water and Wastewater Master Plan Update, their potential issues or views relevant to the study, and the public engagement strategies specifically tailored to engage them in the planning process. This initial stakeholder list was developed based on an inventory of organizations, agencies and individuals operating within the study area, as well as a review of those individuals and groups who participated in other relevant local initiatives.

The stakeholder list was based on a similar practice developed by the International Association of Public Participation (IAP2) that embraces the need to understand different perspectives about key planning issues.

2 Communication Strategies

The following section outlines the communication techniques designed to share information with the public. Each section indicates strategies to satisfy Phases 1 and 2 of the Class EA process.

2.1 Study Notifications

All public notices were written in clear language to ensure compliance with relevant legislation. Public notices for this study were distributed by mail-out or electronically to all respective stakeholders and interested parties. The contact list was kept up-to-date by GM BluePlan to document agencies, stakeholders, and resident consultation. In addition, the notices were placed in all local newspapers running two consecutive weeks for the Public Meeting.

2.1.1 Notice of Study Commencement

GM BluePlan distributed the Notice of Commencement to an initial list of agencies and stakeholders, including known Indigenous Communities. The Notice indicated what the purpose of the project is, identified the general study area, and provided key contact information.

The Notice of Commencement is located in **Appendix C**.

2.1.2 Notice of Public Meeting

The Municipality of Thames Centre hosted a Public Information Centre as part of this study. The Notice of Public Information Centre was issued for two consecutive weeks in the local newspaper. The first Notice was issued two weeks in advance of the public meeting, and the second the week following thereafter. In addition to the newspaper Notices, GM BluePlan prepared a Notice in letter format to provide the information to the established list of agencies, stakeholders, residents and local businesses – similar to the Notice of Commencement.

The Notice of Public Information Centre is located in **Appendix D**.

2.1.3 Notice of Study Completion

The final step in the public engagement process to satisfy Phase 1 and 2 of the Class EA process was to prepare a Notice of Study Completion. The Notice advised the public and stakeholders that the study is complete and the final report is available for public review. The publishing of the Notice of Study Completion also signifies the beginning of the 30-day public review period. The notice includes advice to the public of their rights to request a Part II Order (or appeal). If no request is received during the review period, municipal staff may finalize documentation.

This notice was published in local newspapers and mailed out to those on the contact list, similar to the approach for the Notices of Commencement and Public Information Centre.

The Notice of Completion is located in **Appendix G**.

2.2 Municipal Webpage

Municipal staff maintained its standard water services webpage. Information on the website included:

- All project notices
- Study updates, including PIC materials posted one week prior to the events

The webpage was updated as necessary to ensure it stayed current with the existing study process.

3 Public Consultation

3.1 Public Meeting

The Municipality of Thames Centre hosted a Public Information Centre to solicit public and stakeholder comments and suggestions for the 2018 Water & Wastewater Master Plan Update. This included a mandatory point of contact when following Approach 1 of the Municipal Class EA process.

Specific elements of this Public Meeting involved:

- The background and purpose of the study;
- Profile of the study area;
- Issues and concerns within the study area;
- Alternatives and combinations of alternatives;
- Criteria by which alternatives have been evaluated;
- The preferred servicing alternative; and,
- Next steps in the process.

In support of the Public Meeting, GM BluePlan Team:

- Prepared the Notice of the public meeting for Thames Centre to advertise in local newspapers, and completed mail out of the notices;
- Provided public meeting display boards in PDF format to Thames Centre
- Prepared all coloured displays, sign-in sheets and comment forms;
- Provided professional staff to attend the public meeting;
- Prepared draft responses to written comments/concerns raised by attending public members and stakeholders for Thames Centre review;
- Issued approved response letters; and,
- Updated the project contact list to include additional public members and stakeholders who wish to be directly notified of future project related events.

In addition to reviewing all of the key products (i.e., display panels, materials, notices and response letters), Thames Centre staff attended the public meeting to support GM BluePlan staff in engaging residents and addressing questions posed by attendees

4 Overview of Key Study Interests

4.1 Municipal Staff Input

4.1.1 Project Team Meetings

GM BluePlan hosted meetings with Municipal staff and contact the technical agencies to solicit comments and suggestions on the servicing alternatives and combinations of alternatives, as well as the criteria by which alternatives were evaluated.

4.2 External Agency Input

4.2.1 Project Team Meetings

GM BluePlan hosted project meetings with key staff members to provide guidance to the Project Team at key points of the study.

For each meeting, GM BluePlan prepared a presentation and handouts to attendees for discussion and feedback. The Project Team included interested parties, such as Ministry and Conservation Authority contacts, as identified during the study.

4.2.2 Conservation Authorities

Upper Thames River Conservation Authority (UTRCA) was the local conservation authority within the study area. UTRCA was considered a key stakeholder and were invited to meet with Municipal and GM BluePlan staff during key study milestones.

4.2.3 Ministries

A number of provincial and federal ministries received notifications related to this study throughout the process. Some of the key ministries include:

- Ontario Ministry of the Environment, Conservation and Parks;
- Ontario Ministry of Aboriginal Affairs;
- Aboriginal Affairs and Northern Development Canada;
- Ontario Ministry of Transportation;
- Ontario Ministry of Natural Resources and Forestry; and,
- Ontario Ministry of Culture, Tourism and Sport.

4.2.4 Special Interest Groups

GM BluePlan and Municipal staff created a list of special interest groups and community / business / environmental groups who may have shown interest in the 2018 Water and Wastewater Master Plan Update. These groups were contacted during all points of contact (Notice of Commencement, Notice of Public Meeting, and Notice of Completion) and will be given instructions on how they can provide comments and/or meet with the project team. The interest groups evolved as municipal staff secures interest from additional individuals and organizations.

4.2.5 Indigenous Communities

A list of Indigenous Communities pertinent to the study area were identified through the Ministry of Environment, Conservation and Parks.

In addition, recent local studies were reviewed, and additional Indigenous Communities were added to the list to provide awareness, understanding and opportunities to participate in the planning process.

Following a review of the preliminary results, the following Indigenous Communities were identified as being pertinent to the study area:

- Chippewas of the Thames;
- Oneida Nation of the Thames;
- Munsee-Delaware Nation;
- Delaware Nation (Moravian of the Thames);
- Bkejwanong Territory (Walpole Island);
- Caldwell First Nation;
- Chippewas of Kettle and Stony Point First Nation; and
- Aamijiwnaang First Nation.

The full list of stakeholders, including contact information, can be found in **Appendix B**.

4.3 Public Documentation

4.3.1 Comments Management Tracking

Contact information was contained in a database such that all comments received were linked directly and stored easily and efficiently. All comments were initially directed to Project Managers Carlos Reyes (Thames Centre) and Julien Bell (GM BluePlan) via the newspaper notices, or letter correspondence.

The complete list of stakeholder correspondence, including emails/phone/meetings, can be found in **Appendix E**, Furthermore, the comments provided during the 30-day review period can be found in **Appendix H**.

Appendix A: Project Team

Municipality of Thames Centre
2018 Water and Wastewater Master Plan Update
Project Team

Company/Organization	Job Title	Title	First Name	Last Name	Street	City	Province	Postal Code	Email
Project Team									
Municipality of Thames Centre	Director of Environmental Services	Mr.	Carlos	Reyes	4305 Hamilton Road	Dorchester	ON	N0L 1G3	creyes@thamescentre.on.ca
Municipality of Thames Centre	Environmental Services Superintendent	Mr.	Jarrod	Craven	4305 Hamilton Road	Dorchester	ON	N0L 1G3	jcraven@thamescentre.on.ca
Municipality of Thames Centre	Director of Financial Services/Treasurer	Ms.	Denice	Williamson	4305 Hamilton Road	Dorchester	ON	N0L 1G3	dwilliamson@thamescentre.on.ca
Municipality of Thames Centre	Chief Administrative Officer	Mr.	Stewart	Findlater	4305 Hamilton Road	Dorchester	ON	N0L 1G3	SFindlater@thamescentre.on.ca
GM BluePlan	Project Manager	Mr.	Julien	Bell	330 Trillium Drive - Unit D	Kitchener	ON	N2E 3J2	julien.bell@gmblueplan.ca
GM BluePlan	Technical Lead	Mr.	Matthew	Fisher	3300 Highway 7 - Unit 402	Vaughan	ON	L4K 4M3	matthew.fisher@gmblueplan.ca

Appendix B: Study Contact List

Thames Centre

Municipality of Thames Centre
[illegible]
[illegible]

Group	Company/Organization	Department	Position	Title	First Name	Last Name	Street	City	Province	Postal Code	Telephone	Email
	FEDERAL AGENCIES											
Federal Agency	Indigenous and Northern Affairs Canada	Consultation and Accommodation Unit					[illegible]	Toronto	ON	[illegible]		
Federal Agency	Infrastructure [illegible]		Policy Advisor	Mr.	[illegible]	[illegible]	[illegible]	Ottawa	ON	[illegible]		
Federal Agency	Environment Canada	Environmental Protection Operations Division - Ontario	Manager, Environmental Assessment Section	Mr.	Rob	Dobos	P.O. Box 5050, 867 Lakeshore Road	Burlington	ON	L7R 4A6		
Federal Agency	Fisheries and Oceans Canada	Southwest Ontario District - London Office	Fish Protection Biologist	Mr.	[illegible]	[illegible]	867 Lakeshore Drive	Burlington	ON	L7R 4A6		
Federal Agency	Fisheries and Oceans Canada	Communications					520 Exmouth Street	Sarnia	ON	[illegible]		[illegible]
	PROVINCIAL AGENCIES											
Provincial Agency	Ministry of Aboriginal Affairs	Ministry Partnerships Unit	Manager	Mr.	[illegible]	[illegible]	160 Bloor Street East, 4th Floor	Toronto	ON	[illegible]		
Provincial Agency	Ministry of Municipal Affairs & Housing	Western Municipal Services Office - Community Planning & Development	Manager	Mr.	Scott	Oliver	659 Exeter Road, 2nd Floor	London	ON	[illegible]		scott.oliver@ontario.ca
Provincial Agency	Ministry of Natural Resources	Aylmer District	District Planner	Ms.	[illegible]	[illegible]	615 John Street North	Aylmer	ON	[illegible]		
Provincial Agency	Ministry of Environment, Conservation, and Parks	Environmental Assessment and Approvals Branch	Program Analyst				733 Exeter Road	London	ON	[illegible]		
Provincial Agency	Ministry of Environment, Conservation, and Parks	Southwestern Regional Office	Environmental Assessment & Planning Coordinator	Mr.	Craig	Newton	733 Exeter Road	London	ON	[illegible]		
Provincial Agency	Ministry of Environment, Conservation, and Parks	Southwestern Region	Director		[illegible]	[illegible]	733 Exeter Road, Floor 2	London	ON	[illegible]		[illegible]
Provincial Agency	Ministry of Environment, Conservation, and Parks	Southwestern Region - London District Office	District Manager	Mr.	[illegible]	[illegible]	733 Exeter Road	London	ON	[illegible]		
Provincial Agency	Ministry of Environment, Conservation, and Parks	Project Review Unit					135 St. Clair Avenue West, 1st Floor	Toronto	ON	[illegible]		
Provincial Agency	Ministry of Municipal Affairs and Housing	Community Planning and Development	Manager	Mr.	[illegible]	[illegible]	659 Exeter Road, 2nd Floor	London	ON	[illegible]		
Provincial Agency	Ministry of Agriculture, Food and Rural Affairs	Southwestern Ontario	Rural Planner	Mr.	[illegible]	[illegible]	667 Exeter Road	London	ON	[illegible]		
Provincial Agency	Ministry of Transportation	Environmental Division	Manager	Ms.	[illegible]	[illegible]	659 Exeter Road, 2nd Floor	London	ON	[illegible]		
Provincial Agency	Ministry of Economic Development, Employment and Infrastructure	Infrastructure Policy Division	Assistant Deputy Minister	Ms.	[illegible]	[illegible]	900 Bay Street, 5th Floor	Toronto	ON	[illegible]		
Provincial Agency	Ministry of Tourism, Culture and Sport	Culture Services Unit	Heritage Planner	Mr.	[illegible]	[illegible]	401 Bay Street, Suite 1700	Toronto	ON	[illegible]		
	INDIGENOUS COMMUNITIES											
Indigenous Communities	Aamjiwnaang First Nation		Chief	Chief	[illegible]	[illegible]	978 Tashmoo Avenue	Sarnia	ON	[illegible]		[illegible]
Indigenous Communities	Aamjiwnaang First Nation		Environment Coordinator	Ms.	[illegible]	[illegible]	978 Tashmoo Avenue	Sarnia	ON	[illegible]		[illegible]
Indigenous Communities	Aamjiwnaang First Nation		Environment Worker	Ms.	[illegible]	[illegible]	978 Tashmoo Avenue	Sarnia	ON	[illegible]		[illegible]
Indigenous Communities	Bkejwanong Territory (Walpole Island First Nation)		Chief	Chief	[illegible]	[illegible]	117 Tahgahoning Road, R.R. #3	Wallaceburg	ON	[illegible]		[illegible]
Indigenous Communities	Bkejwanong Territory (Walpole Island First Nation)	Walpole Island Heritage Centre	Consultation Manager	Mr.	[illegible]	[illegible]	2185 River Road R.R. #3	Wallaceburg	ON	[illegible]		[illegible]
Indigenous Communities	Bkejwanong Territory (Walpole Island First Nation)		Project Review Coordinator	Ms.	[illegible]	[illegible]	2185 River Road R.R. #3	Wallaceburg	ON	[illegible]		[illegible]
Indigenous Communities	Chippewas of Kettle and Stony Point First Nation		Chief	Chief	[illegible]	[illegible]	6247 Indian Lane, R.R. #2	Forest	ON	[illegible]		[illegible]
Indigenous Communities	Chippewas of Kettle and Stony Point First Nation		Consultation Officer	Ms.	[illegible]	[illegible]	6247 Indian Lane, R.R. #2	Forest	ON	[illegible]		[illegible]
Indigenous Communities	Chippewas of the Thames First Nation				[illegible]	[illegible]	320 Chippewa Road	Muncey	ON	[illegible]		[illegible]
Indigenous Communities	Chippewas of the Thames First Nation		Chief	Chief	[illegible]	[illegible]	320 Chippewa Road	Muncey	ON	[illegible]		[illegible]
Indigenous Communities	Chippewas of the Thames First Nation		Acting Director - Lands & Environment		[illegible]	[illegible]	320 Chippewa Road	Muncey	ON	[illegible]		[illegible]
Indigenous Communities	Caldwell First Nation		Chief	Chief	[illegible]	[illegible]	14 Orange Street	Leamington	ON	[illegible]		[illegible]
Indigenous Communities	Caldwell First Nation		Executive Administrator		[illegible]	[illegible]	14 Orange Street	Leamington	ON	[illegible]		[illegible]
Indigenous Communities	Munsee-Delaware Nation		Chief	Chief	[illegible]	[illegible]	289 Jubilee Road, R.R. #1	Muncey	ON	[illegible]		[illegible]
Indigenous Communities	Munsee-Delaware Nation		Band Manager	Mr.	[illegible]	[illegible]	289 Jubilee Road, R.R. #1	Muncey	ON	[illegible]		[illegible]
Indigenous Communities	Munsee-Delaware Nation		Consultation Contact		[illegible]	[illegible]	289 Jubilee Road, R.R. #1	Muncey	ON	[illegible]		[illegible]
Indigenous Communities	Oneida Nation of the Thames		Chief	Chief	[illegible]	[illegible]	2212 Elm Avenue	Southwold	ON	[illegible]		[illegible]
Indigenous Communities	Oneida Nation of the Thames		Political Office Manager		[illegible]	[illegible]	2212 Elm Avenue	Southwold	ON	[illegible]		[illegible]
Indigenous Communities	Oneida Nation of the Thames		Environment Coordinator	Mr.	[illegible]	[illegible]	2212 Elm Avenue	Southwold	ON	[illegible]		[illegible]
Indigenous Communities	Delaware Nation		Chief	Chief	[illegible]	[illegible]	14760 School House Line, R.R. #3	Thamesville	ON	[illegible]		[illegible]
	CONSERVATION AUTHORITIES											
Conservation Authority	Upper Thames River Conservation Authority	Watershed Planning, Research & Monitoring	Manager, Watershed Planning	Mr.	[illegible]	[illegible]	1424 Clarke Road	London	ON	[illegible]		
Conservation Authority	Upper Thames River Conservation Authority	Land Use Regulations Officer	Hydrology & Regulatory Services Unit	Ms.	Karen	Winfield	1424 Clarke Road	London	ON	[illegible]		
Conservation Authority	Upper Thames River Conservation Authority			Mr.	[illegible]	[illegible]	1424 Clarke Road	London	ON	[illegible]		[illegible]
	EMERGENCY SERVICES											
Emergency Services	Ontario Provincial Police		Detachment Commander				[illegible]	[illegible]	ON	[illegible]		

Municipality of Thames Centre
[illegible] Wastewater Master Plan Update
Draft Stakeholder List

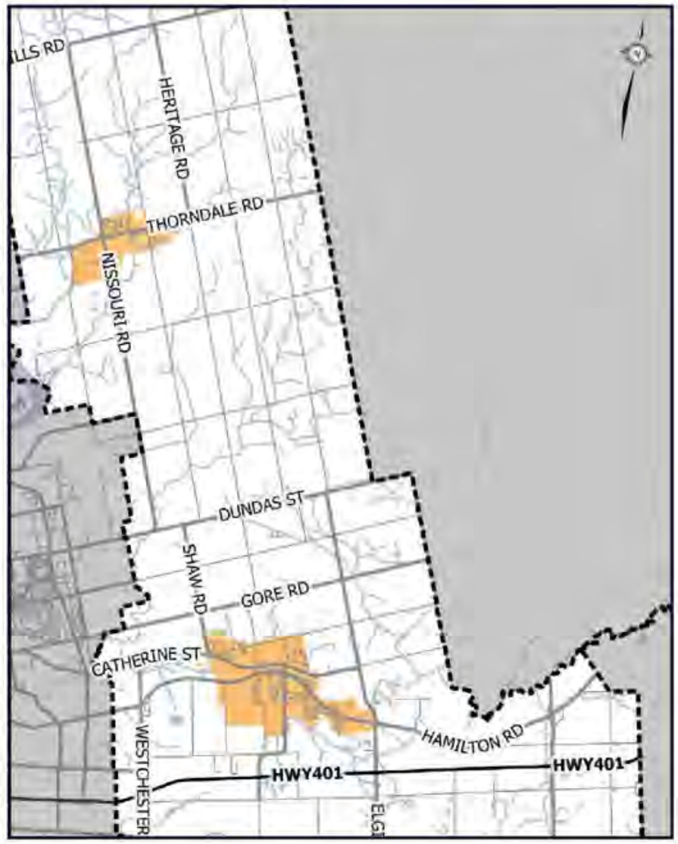
Group	Company/Organization	Department	Position	Title	First Name	Last Name	Street	City	Province	Postal Code	Telephone	Email
	INSTITUTIONS											
Institution	Thames Valley District School Board	Facility Services Department	Executive Officer	Mr.	[illegible]	[illegible]	951 Leathorne Street	London	ON	N5Z 3M7		
	TOWN CONTACTS											
Thames Centre	Municipality of Thames Centre	Environmental Services	Director of Environmental Services	Mr.	Carlos	Reyes	4305 Hamilton Road	Dorchester	ON	N0L 1G3		[illegible]@thamescentre.on.ca
Thames Centre	Municipality of Thames Centre	Environmental Services	Environmental Services Superintendent	Mr.	Jarrod	Dewar	4305 Hamilton Road	Dorchester	ON	N0L 1G2		[illegible]@thamescentre.on.ca
Thames Centre	Municipality of Thames Centre	Financial Services	Director of Financial Services/Treasurer	Ms.	Danica	Williamson	4305 Hamilton Road	Dorchester	ON	N0L 1G3		[illegible]@thamescentre.on.ca
Thames Centre	Municipality of Thames Centre	Chief Administrative Officer	Chief Administrative Officer	Mr.	[illegible]	[illegible]	4305 Hamilton Road	Dorchester	ON	N0L 1G3		[illegible]@thamescentre.on.ca
	CITY CONTACT											
	Middlesex-London Health Unit	Environmental Health Team	Manager	Mr.	Fatih	Sekercioglu	50 King Street	London	ON	N6A 5L7		
	Middlesex-London Health Unit	Environmental Health & Chronic Disease Prevention Services	Manager - Environmental Health	Mr.	Wally	Adams	50 King Street	London	ON	N6A 5L7		
	COUNCILLORS											
Mayor	Thames Centre		Mayor	Mayor	Alison	Warwick						awarwick@thamescentre.on.ca
Mayor	Thames Centre		Deputy Mayor	Deputy Mayor	Kelly	Elliott						kelliott@thamescentre.on.ca
Councillor	Thames Centre		Councillor-Ward 1	Councillor	Tom	Heeman						theeman@thamescentre.on.ca
Councillor	Thames Centre		Councillor-Ward 3	Councillor	Chris	Patterson						cpatterson@thamescentre.on.ca
Councillor	Thames Centre		Councillor-Ward 2	Councillor	Paul	Hunter						phunter@thamescentre.on.ca
	UTILITIES											
Utility	Hydro One			Mr.	Paul	[illegible]	[illegible] Pond Mills Road	London	ON	N5Z 4A1		
Utility	Rogers Cable Systems Utilities Coordinating Committee			Mr.	Ted	Reeves	[illegible] York Street	London	ON	N6W 2E9		
Utility	Bell Canada	Access Network Facilities		Mr.	Jeff	Holmes	100 Dundas Street, 4th Floor	London	ON	N6A 4L6		
Utility	Union Gas Limited		Construction Project Manager				109 Commissioners Road West	London	ON	N6A 4P1		
Utility	Imperial Oil	Procurement Department					237 4th Avenue Southwest	Calgary	AB	T2P 3M9		
Utility	Cogeco	Office of the President					950 Syscon Road	Burlington	ON	L7R 4E4		
Utility	Enbridge	[illegible] Services	Supervisor	Ms.	Ann	Newman	[illegible] Upper Canada Drive	Sarnia	ON	N7T 7H8		
	SPECIAL INTEREST GROUPS											
Special Interest Groups	Thames Region Ecological Association	C/O Grosvenor Lodge					1017 Western Road	London	ON	N6G 1G5		
Special Interest Groups	Thames Centre Business Association			Ms.	Kathryn	Suffolk						[illegible]
Special Interest Groups	Thames River Clear Water Revival						3434 Clarke Road	London	ON	N5V 3E5		
Special Interest Groups	Thames Valley Trail Association			Mr.	Tom Friesen		1017 Western Road	London	ON	N6G 1G5		info@tvta.ca
Special Interest Groups	Urban League of London						1017 Western Road	London	ON	N6G 1G5		
Special Interest Groups	Friends of Dingman Creek						1530 Thornley Street	London	ON	N6K 1A8		
Special Interest Groups	Advisory Committee on the Environment, Agricultural Advisory Committee						300 Dufferin Avenue, P.O. Box 5035	London	ON	N6A 4L9		
Special Interest Groups	Thames Talbot Land Trust											[illegible]@ttlt.ca
Special Interest Groups	Lambeth Community Association						4197 Decker Drive	London	ON	N6P 1J6		
Special Interest Groups	London Development Institute						203-630 Colborne Street	London	ON	N6B 2V2		
Special Interest Groups	London Home Builders Association						571 Wharncliffe Road South	London	ON	N6J 2N6		
Special Interest Groups	Nature London						[illegible] Road	London	ON	[illegible]		
Special Interest Groups	EnviroWestern											[illegible]@uwo.ca
Special Interest Groups	Great Lakes United											glu@glu.org
Special Interest Groups	CJDL Consulting Engineers				[illegible]	Lyle	263 Broadway, P.O. Box 460	Tillsonburg	ON	N4G 4H8		[illegible]
Special Interest Groups	CJDL Consulting Engineers				Nicole	Stone	263 Broadway, P.O. Box 460	Tillsonburg	ON	N4G 4H8		[illegible]@dougtarryhomes.com
Special Interest Groups	CJDL Consulting Engineers				Doug	Tarry	263 Broadway, P.O. Box 460	Tillsonburg	ON	N4G 4H8		[illegible]@dougtarryhomes.com
Special Interest Groups	CJDL Consulting Engineers				Greg	Tarry	263 Broadway, P.O. Box 460	Tillsonburg	ON	N4G 4H8		[illegible]@dougtarryhomes.com
	PUBLIC INFORMATION CONTACTS											
PIC Contact	Resident/interested party			Mr.	[redacted]		[redacted]				[redacted]	
PIC Contact	Resident/interested party			Mr.								
PIC Contact	Resident/interested party			Mr.								
PIC Contact	Resident/interested party			Mr. and Mrs.								
PIC Contact	Resident/interested party			Mr.								
PIC Contact	Resident/interested party			Mr. and Mrs.								
PIC Contact	Resident/interested party			Ms.								
PIC Contact	Resident/interested party			Mr. and Mrs.								
PIC Contact	Resident/interested party			Mr. and Mrs.								
PIC Contact	Resident/interested party			Mr.								
PIC Contact	Resident/interested party			Mr.	Chris	Patterson					[illegible]	cpatterson@thamescentre.on.ca
PIC Contact	Resident/interested party			Ms.	[redacted]						[redacted]	
PIC Contact	Resident/interested party			Mr.	Paul	Hunter					[illegible]	phunter@thamescentre.on.ca

Appendix C: Notice of Study Commencement

Notice of Study Commencement
Municipality of Thames Centre
2018 Water and Wastewater Master Plan Update

What is this study all about?

The Municipality of Thames Centre has initiated the 2018 Water and Wastewater Master Plan Update. This Update will aim to develop and evaluate water and wastewater servicing strategies to meet potential population and employment growth within the Dorchester and Thorndale communities. This is a critical component in the integrated planning process and will provide the framework and vision for the water and wastewater servicing needs for Thames Centre.



How is this study being done?

The 2018 Water and Wastewater Master Plan Update is intended to satisfy Phases 1 and 2 of the Municipal Class Environmental Assessment (MCEA) Process (October 2000, as amended in 2007, 2011 and 2015) approved under the Ontario Environmental Assessment Act.

How can I participate in this study?

Participation from the community and stakeholders is vital to the success of this study. The Municipality of Thames Centre invites residents to participate in this planning process and learn more about the 2018 Water and Wastewater Master Plan Update by attending a Public Information Centre later in the study to discuss the strategic approach.

If you would like more information about the 2018 Water and Wastewater Master Plan Update, please contact the undersigned:

Carlos Reyes, CISEC, P.Eng.
Director of Environmental Services
Municipality of Thames Centre
4305 Hamilton Road
Dorchester ON N0G 1G3
Phone: 519-268-7334, ext. 245
Email: creyes@thamescentre.on.ca

Julien Bell, P.Eng.
Consultant Project Manager
GM BluePlan Engineering Limited
330 Trillium Drive, Unit D
Kitchener, ON N2E 3J2
Phone: 519-748-1440
Email: julien.bell@gmblueplan.ca

Information will be collected in accordance with the Freedom of Information and Protection of Privacy Act. With the exception of personal information, all comments will become part of the public record.

Appendix D: Public Meeting

NOTICE OF PUBLIC INFORMATION CENTRE NO. 1
MUNICIPALITY OF THAMES CENTRE
WATER AND WASTEWATER MASTER PLAN UPDATE

The Study

The Municipality of Thames Centre is undertaking a Water and Wastewater Master Plan Update. This Update will aim to develop and evaluate water and wastewater servicing strategies to meet potential population and employment growth within the Dorchester and Thorndale communities.

The Process

The Water and Wastewater Master Plan Update is intended to satisfy Phases 1 and 2 of the Municipal Class Environmental Assessment (MCEA) Process (October 2000, as amended in 2007, 2011 and 2015) approved under the Ontario Environmental Assessment Act.

Get Engaged

Participation from the community and stakeholders is vital to the success of this study. The Municipality of Thames Centre invites residents to participate in this planning process and learn more about the Water and Wastewater Master Plan Update by attending Public Information Centre No.1

Public Information Centre No. 1 will be held:	
Date: Thursday, May 30, 2019 **Time:** 4 to 6 p.m. Thorndale Community Centre 265 Upper Queen Street Thorndale, Ontario N0M 2P0	**Date:** Thursday, May 30, 2019 **Time:** 7 to 9 p.m. The Flight Exec Centre - Blueline Room 2066 Dorchester Road Dorchester, Ontario N0L 1G2

If you would like more information about the Water and Wastewater Master Plan Update, please contact the undersigned:

Carlos Reyes, CISEC, P.Eng.
Director of Environmental Services
Municipality of Thames Centre
4305 Hamilton Road
Dorchester ON N0G 1G3
Phone: 519-268-7334, ext. 245
Email: creyes@thamescentre.on.ca

Julien Bell, P.Eng.
Consultant Project Manager
GM BluePlan Engineering Limited
330 Trillium Drive, Unit D
Kitchener, ON N2E 3J2
Phone: 519-748-1440
Email: julien.bell@gmblueplan.ca

Information will be collected in accordance with the Freedom of Information and Protection of Privacy Act. With the exception of personal information, all comments will become part of the public record.

Municipality of Thames Centre Water and Wastewater Master Plan Update
Public Information Centre No. 1 – May 30, 2019

SIGN-IN SHEET

Name (Organization if applicable)	Address	Phone Number	Email (you will receive key project updates)
[redacted]	[redacted]	519-[redacted]	[redacted]
[redacted]	[redacted]	519-[redacted]	[redacted]
[redacted]	[redacted]	519-[redacted]	[redacted]
[redacted]	[redacted]	519-[redacted]	[redacted]
[redacted]	[redacted]	519[redacted]	[redacted]
[redacted]	[redacted]	519-[redacted]	[redacted]
[redacted]	[redacted]	519-[redacted]	[redacted]
[redacted]	[redacted]	519-[redacted]	[redacted]
[redacted]	[redacted]	519-[redacted]	[redacted]
[redacted]	[redacted]	519-[redacted]	[redacted]
[redacted]	[redacted]	519-[redacted]	[redacted]
CHRIS PATTERSON	[redacted]	519-719-6530	cpatterson@thamescentre.on.ca
[redacted]	[redacted]	647-[redacted]	[redacted]
PAUL HUNTER	[redacted]	519 719 3104	phunter@thamescentre.on.ca

All comments and information received from individuals, stakeholder groups and agencies regarding this project are being collected under the authority of the "Municipal Act" to assist the Municipality of Thames Centre in making a decision. With the exception of personal information, all comments will become part of the public record.

Municipality of Thames Centre

Municipality of Thames Centre
Water and Wastewater Master Plan Update

Public Information Centre No. 1 – May 30, 2019

Comment Sheet

Contact Information:

Name: [redacted] Organization: TAX PAYER

Email: ____ Phone : [redacted]

Comments:

Do you have any questions or comments about the study or any information presented at today's event?

Water billing system as it is now structured does not encourage water conservation.
Changes are needed to the way water use is billed.
Look at your hydro and natural gas bills

Please place your comment sheet in the drop box provided, or return via mail by June 13, 2019 to:

Carlos Reyes, CISEC, P.Eng.	**Julien Bell, P.Eng.**
Director of Environmental Services	Consultant Project Manager
Municipality of Thames Centre	GM BluePlan Engineering Limited
4305 Hamilton Road	330 Trillium Drive, Unit D
Dorchester, ON N0G 1G3	Kitchener, ON N2E 3J2
Phone: 519-268-7334 ext. 245	Phone: 519-748-1440
Email: creyes@thamescentre.on.ca	Email: julien.bell@gmblueplan.ca

All comments and information received from individuals, stakeholder groups and agencies regarding this project are being collected under the authority of the "Municipal Act" to assist the Municipality of Thames Centre in making a decision. With the exception of personal information, all comments will become part of the public record.

Municipality of Thames Centre
Water and Wastewater Master Plan Update

Public Information Centre No. 1 – May 30, 2019

Comment Sheet

Contact Information:

Name: [redacted] Organization: Homeworker.

Email: [redacted]@sympatico.ca Phone: [redacted]

Comments:

Do you have any questions or comments about the study or any information presented at today's event?

Good Presentation

Please place your comment sheet in the drop box provided, or return via mail by June 13, 2019 to:

Carlos Reyes, CISEC, P.Eng. Director of Environmental Services Municipality of Thames Centre 4305 Hamilton Road Dorchester, ON N0G 1G3 Phone: 519-268-7334 ext. 245 Email: creyes@thamescentre.on.ca	**Julien Bell, P.Eng.** Consultant Project Manager GM BluePlan Engineering Limited 330 Trillium Drive, Unit D Kitchener, ON N2E 3J2 Phone: 519-748-1440 Email: julien.bell@gmblueplan.ca

All comments and information received from individuals, stakeholder groups and agencies regarding this project are being collected under the authority of the "Municipal Act" to assist the Municipality of Thames Centre in making a decision. With the exception of personal information, all comments will become part of the public record.

Welcome!

Municipality of Thames Centre
Water and Wastewater Master Plan Update

Public Information Centre

Thursday, May 30, 2019

4 to 6 p.m.
Thorndale Community Centre

7 to 9 p.m.
The Flight Exec Centre

Municipality of Thames Centre
4305 Hamilton Road
Dorchester ON N0L 1G3

What is Driving the Thames Centre Master Plan Update?

Growth
- Essential to Revisit Needs
- Supply and Treatment Capacities

New Approach
- Support Responsible Development
- Coordinated and Integrated Solutions with Growth Areas

Planning for Buildout
- Flexibility in Servicing Strategy
- Understanding of Servicing Impacts and Costs

Long-Term Financial Planning
- Capital Forecast to Service Existing and Support Future Growth
- Development Charges and Rate Updates

Thames Centre Master Plan Update Structure and Objectives

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

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Thames Centre Master Plan Update Vision

Establish a preferred servicing strategy for Water and Wastewater that:

- Meets current needs
- Supports growth
- Maintains or improves service levels
- Improve system resiliency and operation flexibility
- Considers the long-term financial viability of the systems

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Municipal Class EA Process

The Water and Wastewater Master Servicing Plan Update involves the completion of Phases 1 and 2 of the MEA Municipal Class EA process.

Environmental Assessment Process

Problem and Opportunity
- What makes up the water and wastewater systems?
- How does it work?
- How well is it working?
- What do we need?
- Project problem and opportunity statement

Identify Alternative Solutions
- How can we meet our needs?
- What are the different options?
- What does each option look like?

Evaluate Alternative Solutions
- How well does each option meet our needs?
- How much does each option cost?
- What impact does each option have on:
  - System performance?
  - Environment?
  - Social/ Cultural?

Select Preferred Solutions
- What is the best option and why?
- How do we move forward with the best option?

The study follows the Master Plan process as outlined in Section A.2.7 of the Municipal Engineers Association (MEA) Municipal Class Environmental Assessment (Oct 2000, as amended in 2007, 2011 and 2015).

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Planning for Growth

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Growth Uncertainty

- Location of growth – What infrastructure is needed?
- Rate of growth – When is infrastructure needed?
- Servicing outside existing Settlement Boundaries

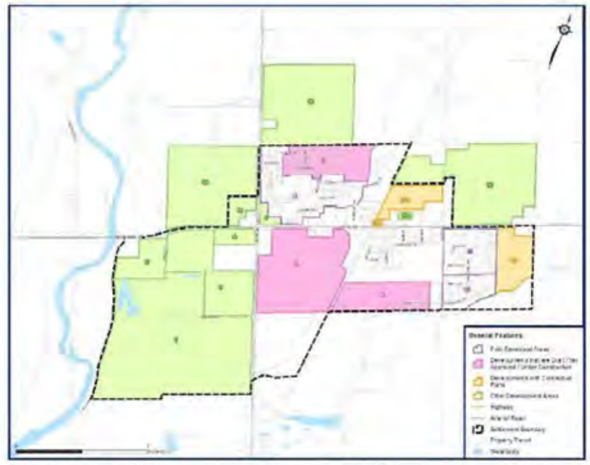
Draft Plans and Concepts

- Where available approved draft plans or Developer's concept plans were used to project growth

Remaining Development Lands

For Potential Development Lands, growth has been projected based on:

- Recent Development Charges Study Projections
- Land Use Density of 50 persons + jobs (PPJ) / hectare



		Dorchester	401 Corridor Lands	Thorndale
Method 1	Development Charges Study Projections	Additional 7,580 PPJ	Additional 132 PPJ	Additional 2,857 PPJ
Method 2	Increased Density 50 PPJ/ha Inside Settlement Boundary	Additional 13,411 PPJ	Additional 132 PPJ	Additional 5,844 PPJ
Method 3	Increased Density 50 PPJ/ha Inside and Outside Settlement Boundary	Additional 18,012 PPJ	Additional 6,968 PPJ	Additional 11,577 PPJ

Servicing Growth

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What is the trigger for new infrastructure requirements?

- Growth based on Method 2 – Increased Density of 50 PPJ/ha Inside Settlement Boundary
  - This ensures that required infrastructure is in place ahead of growth at expected densities based on best available information

How is future infrastructure to be sized?

Linear

- Watermain, sanitary sewers and forcemains based on Method 3 – Increased Density 50 PPJ/ha Inside and Outside Settlement Boundary
  - 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
  - Marginal cost increases to install upgraded pipes
  - Protects against costly upgrades if underground infrastructure is required to be upsized or twinned to accommodate more growth than originally expected

Vertical

- Treatment plants, pumping stations and storage facilities based on Method 2 – Increased Density 50 PPJ/ha Inside Settlement Boundary
  - 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
  - Increases in costs to size storage facilities for Method 3 can be prohibitive

Example Sewer Sizing

Sanitary sewer project crossing Rath-Harris Municipal Drain is required to service growth under Method 2

Sewer project crossing Rath-Harris Municipal Drain is deep and expensive to construct – sizing it to accommodate Method 3 growth means that the sewer will be able to accommodate all growth scenarios and will not have to be upgraded before the end of its service life

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Evaluation Methodology

Criteria Scoring and Selection

Will complete individual evaluation of each Criteria using the following ranking approach:

- "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

Selection will be guided by the **Reasoned Argument Approach**

- Clear and thorough rationale of the tradeoffs among the various criteria
- Highlights the reasons why one alternative is the best alternative

Environmental Factors

- Protects environmental features
- Protects wildlife and species-at-risk
- Minimizes climate change impacts

Financial Viability

- Be cost effective
- Operation and maintenance cost

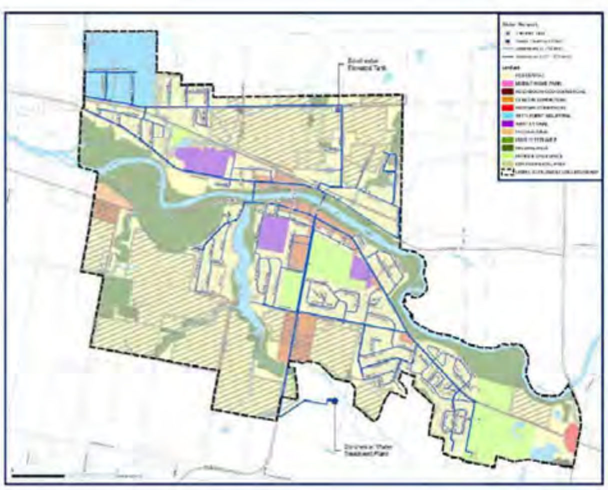
Technical Factors

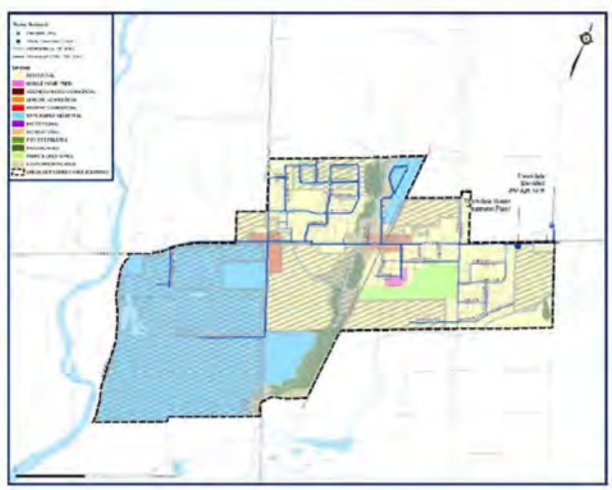
- Meets existing and future servicing needs
- Supports phased expansion of the system
- Provides a reliable service
- Minimizes and manages construction risk
- Aligns with approval and permitting process
- Ability to adapt to climate change

Social and Cultural Factors

- Protects resident quality of life
- Manages and minimizes construction impacts
- Protects cultural heritage features
- Protects archaeological features

Existing Water System





Dorchester						Thorndale					
Residential		Non-Residential		Total		Residential		Non-Residential		Total	
Population	Average Day Demand	Employment	Average Day Demand	Equivalent Population	Average Day Demand	Population	Average Day Demand	Employment	Average Day Demand	Equivalent Population	Average Day Demand
5,346 Persons	12.7 L/s	1,765 Jobs	2.4 L/s	7,111 PPJ	15.1 L/s	1,216 Persons	2.6 L/s	402 Jobs	0.3 L/s	1,618 PPJ	2.9 L/s

Dorchester Water System Opportunities and Constraints

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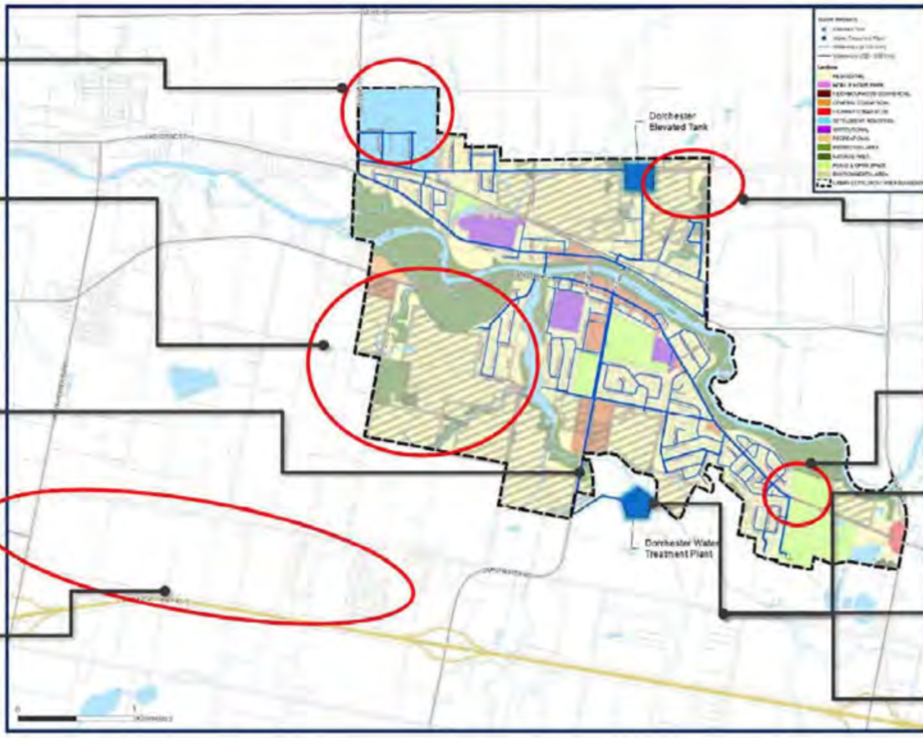
Industrial lands require fire flow of 150 L/s, looping constraints due to proximity of facility and higher elevation (265-270 m)

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



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

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

Thames Centre

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Dorchester Water Supply Needs

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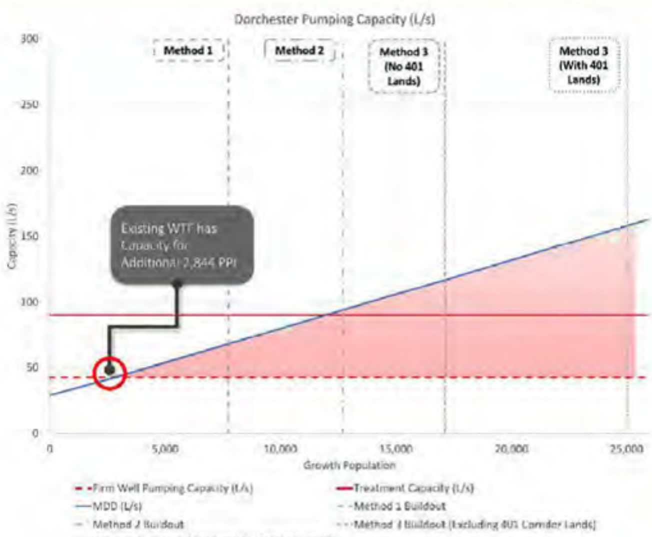

Existing Dorchester Supply = 42.6 L/s

Existing Population	22 L/s Supply Available
Method 1 Buildout	18 L/s Supply Deficit
Method 2 Buildout	44 L/s Supply Deficit
Method 3 Buildout (Excluding 401 Corridor Lands)	67 L/s Deficit
Method 3 Buildout (Including 401 Corridor Lands)	108 L/s Deficit

Supply Concept 1 – Maximize Well Capacity at Existing WTF to Service as Much Growth as Possible
- Availability of some additional capacity to supply growth within short term
- Not enough capacity within existing wellfield to service growth to Buildout

Supply Concept 2 – New Groundwater Source within Dorchester
- 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

Supply Concept 3 – Commission Lake Huron-Elgin Water Supply Connection
- Can provide certainty of supply for growth to Buildout
- There is allocation of supply available for Thames Centre
- Requires servicing and cost sharing agreement
- Requires extensive watermain construction and maintenance

Supply Concept 4 – Maximize Existing Facilities + Supply New Groundwater Source within Dorchester
- Availability of some additional capacity to supply growth within short-term while well exploration is commenced
- Long-term supply option is new groundwater supply (if available)
- Huron / Elgin Area connection remains available option if no new groundwater found.

Options 3 and 4 Carried forward for further analysis

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Dorchester Water Supply Options

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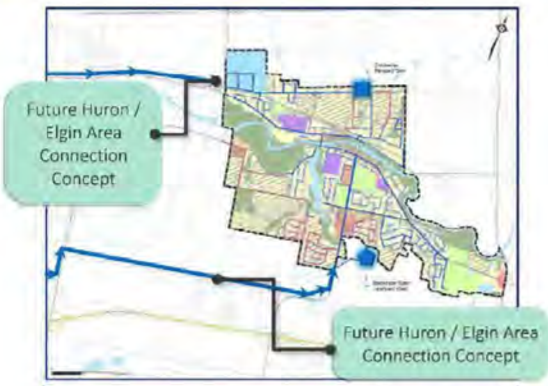

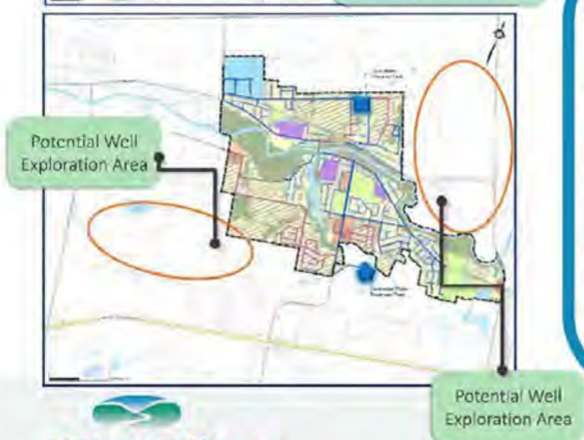

Commission Lake Huron-Elgin Water Supply Connection Option

- Watermain connection along Hamilton Road or Donnybrook Drive from London or south from Lake Huron / Elgin Water Supply

Advantages

- Provides supply for growth to buildout under all growth projection methods
- Similar infrastructure and construction costs for all buildout scenarios

Disadvantages

- Does not provide Municipality with full control over water supply
- Servicing agreement must be implemented and renewed

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

Maximize Existing Facilities + Supply New Groundwater Source within Dorchester

- Maximize Existing WTF through well rehabilitation and upgrades and water conservation programs
- Investigate new source of groundwater supply within Dorchester

Advantages

- Identification of new sufficient groundwater supply will provide Municipality with full control over water supply
- Maximizing capacity of existing WTF provides interim solution to service growth while groundwater supply investigation is undertaken
- If a sufficient groundwater supply is not found then Huron / Elgin Area connection supply option can be initiated at that time

Disadvantages

- 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 GW supply require extensive infrastructure

Upgrades, Costs and Timing

- 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

Preferred Option

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Dorchester Water Storage Needs and Options

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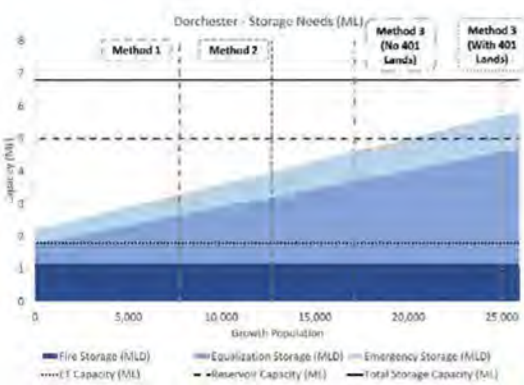

Category	Additional Storage Facility	Utilize Dorchester WTF Reservoirs
Technical Feasibility	●	●
Environmental Impacts	●	●
Social / Cultural Impacts	●	●
Financial Viability	●	●

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

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 connection if available well supply is not found

Disadvantages

- More extensive infrastructure upgrade requirements than to utilize existing 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

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

- Minimizes infrastructure upgrades in Dorchester (can utilize storage within the existing inground reservoirs at Dorchester WTF)

Disadvantages

- Increases standby power requirements at WTF

Upgrades, Costs and Timing

- Pump Upgrades at Dorchester WTF - $
- New infrastructure from new supply location to Dorchester WTF - $$
- Estimated timing:
  - 1 – 3 years

Preferred Option

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Dorchester Road Trunk Watermain Upgrade Servicing Options

Upgrade existing watermain along Dorchester Road

- Existing Dorchester Road trunk watermain conveys water from water treatment facility to elevated tank and Dorchester distribution system
- Upgrades will improves system resiliency and services buildout scenarios in North and South Dorchester, and utilize existing Thames River crossing
- Construction along Dorchester Road through built-up area will be more disruptive to residents and expensive

Category	Clara St.	Development Roads Alignment
Technical Feasibility	Green	Green
Environmental Impacts	Green	Green
Social / Cultural Impacts	Yellow	Green
Financial Viability	Yellow	Green
		Preferred Option

New watermain alignment along Clara St. to Dorchester Elevated Tank in North Dorchester

- Clara Street alignment option within existing right-of-way, does not require that timing of watermain construction aligns with development construction

New watermain alignment through new development roads in North Dorchester

Construction of new watermain alignment along proposed roads through greenfield development is more cost efficient and less disruptive to residents

Expected that required watermain upgrades triggered by growth will align with timing of development

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Southwest Dorchester Water Servicing Options

New Trunk Watermain to Service Growth in Southwest Dorchester

- New trunk watermain required to service growth in Southwest Dorchester
- Mill Road and Christie Drive developments are in Approval Process with preliminary road and servicing layouts
- New trunk watermain can follow development road alignments, keep construction out of existing roadways, lessen disruption to residents and costs

Category	Hamilton Rd. Alignment	Development Roads Alignment
Technical Feasibility	Green	Green
Environmental Impacts	Red	Yellow
Social / Cultural Impacts	Yellow	Green
Financial Viability	Yellow	Green
		Preferred Option

New watermain alignment along Hamilton Rd. to service southwest Dorchester development

- Long section of new watermain through environmentally sensitive area, existing roadway and not servicing any properties
- Increased costs and environmental approvals
- Construction on municipal road increases disruption to residents

New watermain alignment through new development in Southwest Dorchester

- 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
- Construction timing will be coordinated with development

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Northwest Dorchester Water Servicing Options

Trunk Watermain Upgrades to Improve Fire Flow to Northwest Dorchester

- 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

Category	Catherine St.	Marion St.
Technical Feasibility		
Environmental Impacts		
Social / Cultural Impacts		
Financial Viability		
	Preferred Option	

Watermain Upgrades along Catherine Street

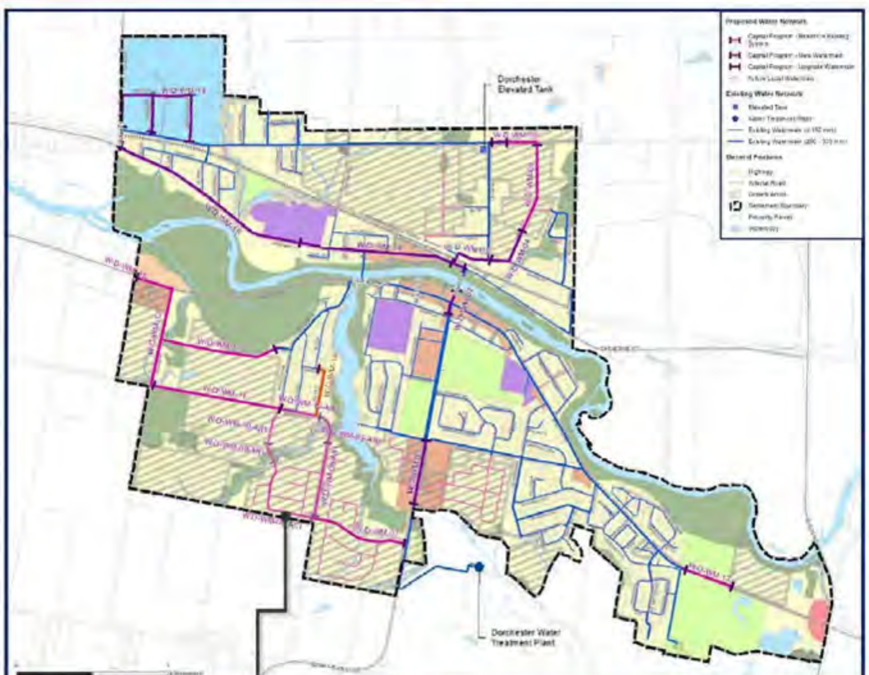
- Longer watermain section through built up municipal road
- Existing newly-installed watermain crossing of railway can be utilized
- Project can be coordinated with watermain replacement program – upgrade when existing watermain has reached the end of its service life
- Cost efficient if combined with watermain replacement program with no additional disruption to residents

Watermain Upgrades along Marion Street

- Shorter section along less built-up road
- Newer watermain – will not need to be replaced before Catherine Street watermain

Dorchester Water Capital Program

Capital Program Master Plan ID	Name	Class EA Schedule	Size/Capacity	Capital Program Total Component Estimated Cost	
W-D-SUP-01	Maximize Dorchester WTF Supply	A	20 L/s	$	1,067,000
W-D-SUP-02	New Dorchester Groundwater Supply	C	44 L/s - 108 L/s	$	10,000,000
W-D-BPS-01	Dorchester HLP Upgrades	A	90 L/s	$	1,067,000
W-D-WM-01	Dorchester Watermain - Spine Trunk Upgrade on Dorchester Rd. (South of Byron Ave.)	A+	300 mm	$	1,033,000
W-D-WM-02	Dorchester Watermain - Spine Trunk Upgrade on Dorchester Rd. (River Bank)	A+	300 mm	$	444,000
W-D-WM-03	Dorchester Watermain - Spine Trunk Upgrade on Catherine St. and Minnie Rd. (North Section)	A+	300 mm	$	1,406,000
W-D-WM-04	Dorchester Watermain - North St. Upgrade	A	200 mm	$	703,000
W-D-WM-05	Dorchester Watermain - Northeast Loop	A+	200 mm	$	1,147,000
W-D-WM-06	Dorchester Watermain - Marion St. Upgrade	A+	200 mm	$	622,000
W-D-WM-07	Dorchester Watermain - West Trunk at the Development 25	A	300 mm	$	1,171,000
W-D-WM-08-Alt1	Dorchester Watermain - West Trunk at the Development 22	A	300 mm	$	1,108,000
W-D-WM-09-Alt1	Dorchester Watermain - West Trunk river crossing at Development 22.	B	300 mm	$	367,000
W-D-WM-10-Alt1	Dorchester Watermain - West Trunk at Development 22.	A	300 mm	$	443,000
W-D-WM-11	Dorchester Watermain - West Trunk on Christie Dr.	A	300 mm	$	1,913,000
W-D-WM-12	Dorchester Watermain - West Trunk on Harris Rd. and Hamilton Rd.	A	300 mm	$	1,806,000
W-D-WM-13	Dorchester Watermain - West Trunk at Mill Ct. Loop	A	200 mm	$	1,555,000
W-D-WM-14	Dorchester Watermain - Catherine St. East Section Upgrade (part of WM Replacement Program)	A+	300 mm	$	2,319,000
W-D-WM-15	Dorchester Watermain - Catherine St. West Section Upgrade (part of WM Replacement Program)	A+	300 mm	$	3,243,000
W-D-WM-16	Dorchester Watermain - Northwest Industrial Lands Upgrade (part of WM Replacement Program)	A+	300 mm	$	2,531,000
W-D-WM-17	Dorchester Watermain - Hamilton Rd. Extension	A+	200 mm	$	684,000
W-D-WM-18	Dorchester Watermain - Benefit to Existing System	A+	200 mm	$	684,000
W-D-401-ST-01	Cost Benefit Study to Service 401 Corridor Lands	-		$	50,000
Sub-Total Projects with Growth Components				**$**	**27,270,000**
Sub-Total Projects that are 100% Benefit to Existing Residents				**$**	**8,095,000**
Total Capital Program				**$**	**35,365,000**



Alternative alignment through development lands may be available (to be reviewed further during application process)

401 Corridor Lands Water Servicing Concepts

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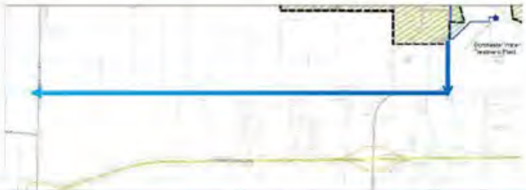
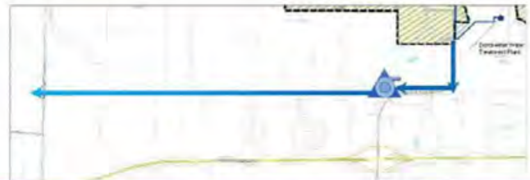


Servicing Concept 1 – Supply 401 Corridor Lands from Dorchester WTP

- Provides Low pressures (<40 psi) with no fire flow provided
- Improved service pressures and fire flow if future Huron / Elgin Area supply is required to be commissioned



Servicing Concept 2 – Supply 401 Corridor Lands with Low Lift BPS

- Provides service pressures (>40 psi) with no fire flow provided
- Potential for low Lift BPS could be decommissioned if London supply is commissioned

Servicing Concept 3 – Supply 401 Corridor Lands with BPS + Fire Pump

- Provides industry with service pressures >50 psi + fire flow
- Significant increase to costs to service 401 Corridor

Servicing Concept 4 – Supply 401 Corridor Lands with BPS + Storage Facility

- Provision of sufficient service pressures and fire flows to area
- Can provide additional storage to South Dorchester and mitigate WTP pump upgrade requirements

It is recommended that Municipality undertake further analysis to review cost-benefits of providing sufficient operating pressures and fire flows to the 401 Corridor Lands
- The study will clarify the long term servicing needs of the 401 Corridor Lands and servicing concepts can be evaluated compared to the Study recommendations

Thorndale Water System Opportunities and Constraints

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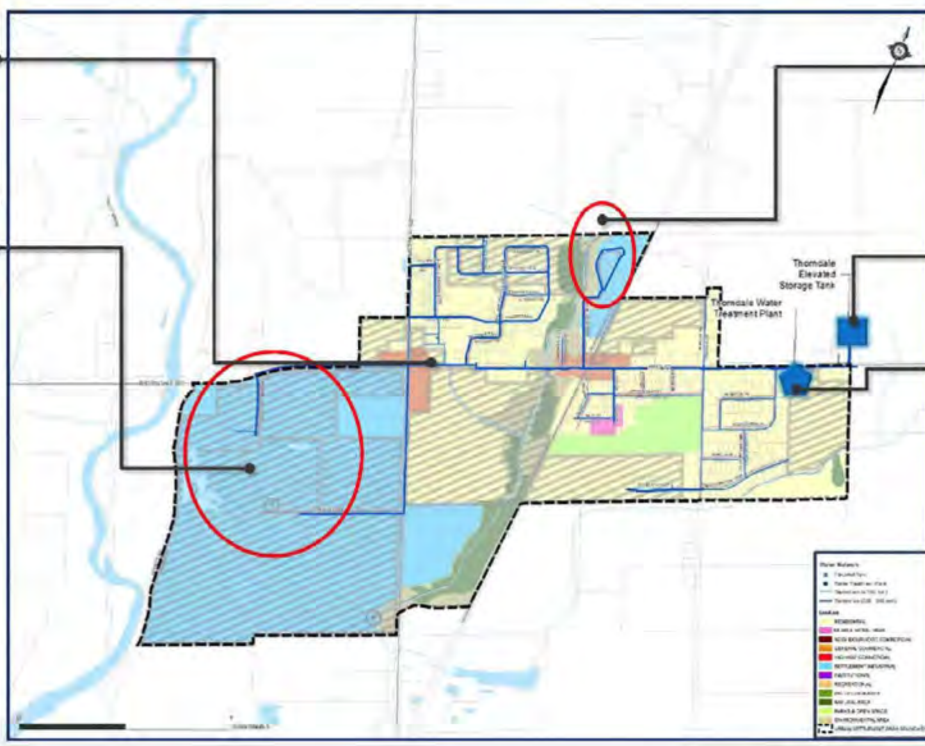
Trunk watermains have insufficient capacity to provide sufficient fire flow under Buildout

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



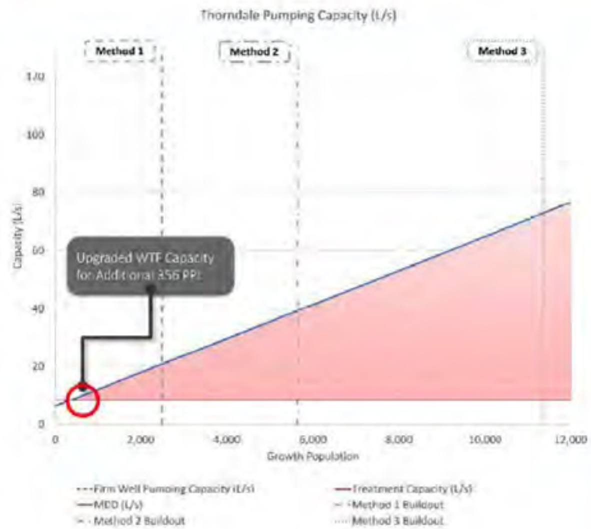
Existing Industrial Area has insufficient available fire flow

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 Water Supply Needs



Approved Thorndale Supply = 20.0 L/s

Existing Population	2 L/s Supply Available
Method 1 Buildout	13 L/s Supply Deficit
Method 2 Buildout	31 L/s Supply Deficit
Method 3 Buildout	65 L/s Deficit

Supply Concept 1 – Maximize Well Capacity at Existing WTF to Service as Much Growth as Possible
- Availability of some additional capacity to supply growth within short term
- Not enough capacity within existing wellfield to service growth to Buildout

Supply Concept 2 – New Groundwater Source within Dorchester
- 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

Supply Concept 3 – Commission Lake Huron-Elgin Water Supply Connection
- Can provide certainty of supply for growth to Buildout
- There is allocation of supply available for Thames Centre
- Requires servicing and cost sharing agreement
- Requires extensive watermain construction and maintenance

Supply Concept 4 – Maximize Existing Facilities + Supply New Groundwater Source within Dorchester
- Availability of additional capacity to supply all residential growth within Thorndale Settlement Boundary while well exploration is commenced
- Long-term supply option is new groundwater supply (if available)
- Huron / Elgin Area connection remains available option if no new groundwater found.

Options 3 and 4 Carried forward for further analysis

Thames Centre

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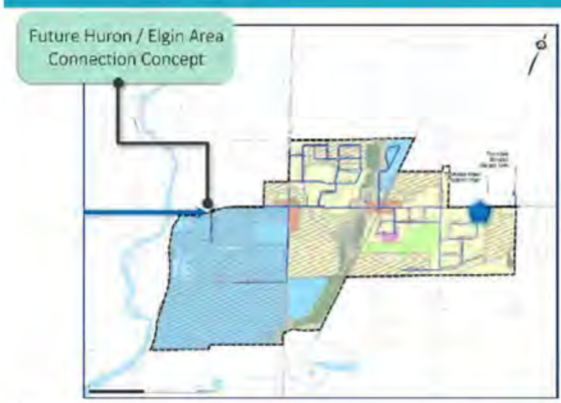
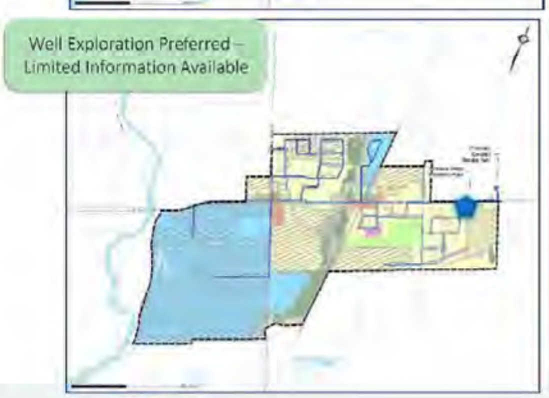
Thorndale Water Supply Options





Commission Lake Huron-Elgin Water Supply Connection Option

- Watermain connection along Thorndale Road from North London or south from Lake Huron / Elgin Water Supply

Advantages	Disadvantages	Required Upgrades and Timing

• Provides supply for growth to buildout under all growth projection methods
• Similar infrastructure and construction costs for all buildout scenarios
	• Does not provide Municipality with full control over water supply
	• Servicing agreement must be implemented and renewed
		• Servicing Agreement
		• Trunk watermain construction with metering
		• Booster Pumping Station may be required
		• Estimated timing:
		  • Agreement – 2years
		  • 6-7 years to commissioning

Maximize Existing Facilities + Supply New Groundwater Source within Dorchester

- Maximize Existing WTF (expected supply will be limited to 20 L/s)
- Investigate new source of groundwater supply within Thorndale

Advantages	Disadvantages	Required Upgrades and Timing

• Identification of new sufficient groundwater supply will provide Municipality with full control over water supply
• Maximizing capacity of existing WTF can service growth to Buildout under Method 1
• If a sufficient groundwater supply is not found then Huron / Elgin Area connection supply option can be initiated at that time
	• 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 GW supply require extensive infrastructure
		• Upgrades 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

Preferred Option

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Thorndale Water Storage Needs and Options

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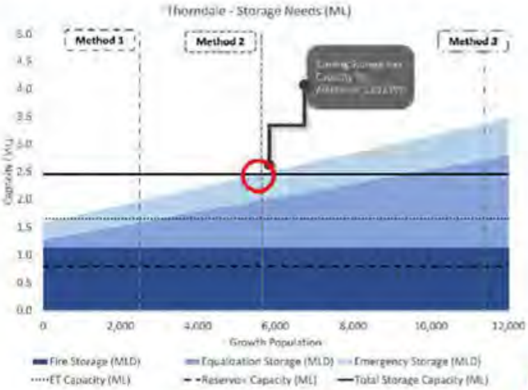


Category	Additional Storage Facility	Upgrade Thorndale WTF Reservoirs
Technical Feasibility	●	●
Environmental Impacts	●	●
Social / Cultural Impacts	●	●
Financial Viability	●	●

Construct Additional Storage Facility

- Second elevated tank or reservoir with booster pumping station to be constructed to meet storage needs at buildout

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 connection if available well supply is not found

Disadvantages

- More extensive infrastructure upgrade requirements than to utilize existing WTF site

Upgrades, Costs and Timing

- New reservoir or elevated tank
- Environmental Assessment - $ - 2 years
- Design and construction - $$ - 2 to 4 years

Upgrade Pumps and Reservoirs at Thorndale WTF

- Twin existing reservoir cell at Thorndale WTF and upgrade pumps to supplement storage to meet buildout needs; requires WTF pump capacity upgrades to access full storage capacity

Advantages

- 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

- 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 and pump upgrades - $$ - 1 – 2 years
- New infrastructure from new supply location to Thorndale WTF - $$

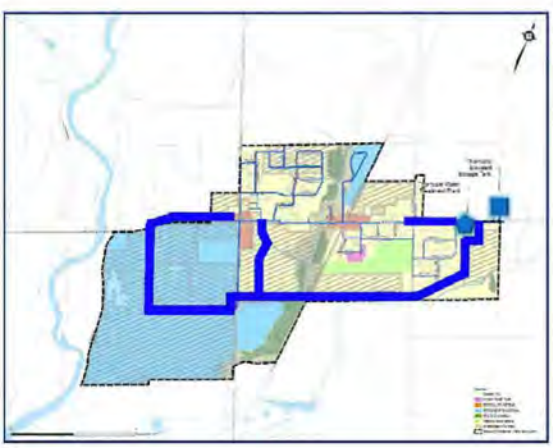
Preferred Option

Thorndale Water Servicing Options

CM BluePlan ENGINEERING

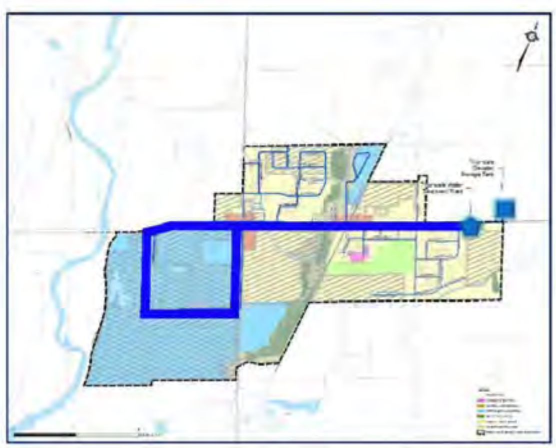
Trunk Watermain to Service Growth in Thorndale

- Development in South Thorndale and Thorndale Industrial Park requires security of supply and sufficient fire flow



New Watermain Through South Thorndale

- Oversizing of watermains to be installed for area developments
- Improves system resiliency with additional feed to west Thorndale
- Construction through greenfield areas will lessen costs and disruption to residents



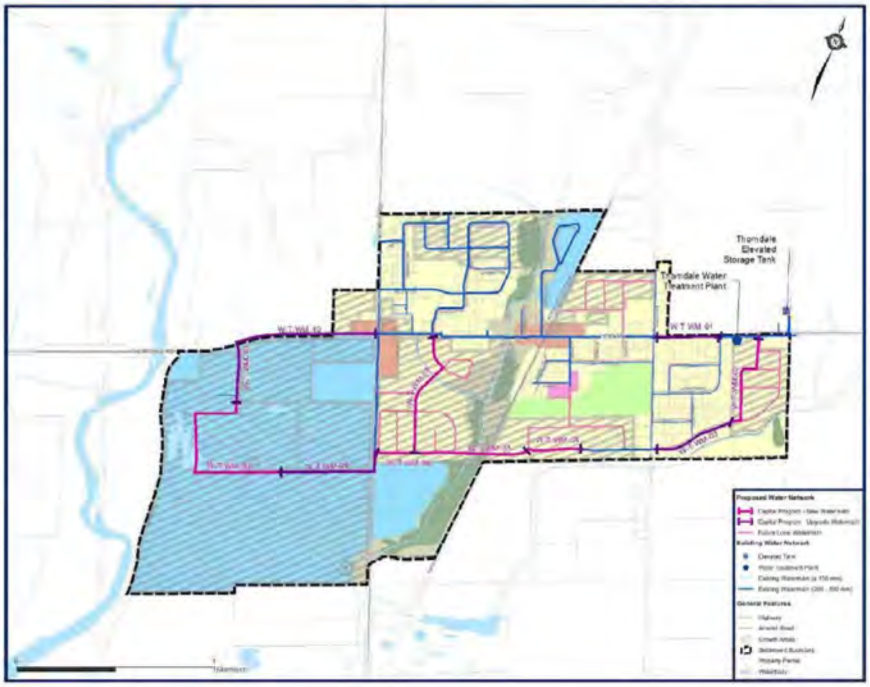
Watermain Upgrades along King Street and Thorndale Road

- Shorter section along built-up road, temporary water bypasses may be required
- Construction of WM crossing railway will be more expensive through built-up area of King Street
- Does not provide system resilient; single railway and creek crossing

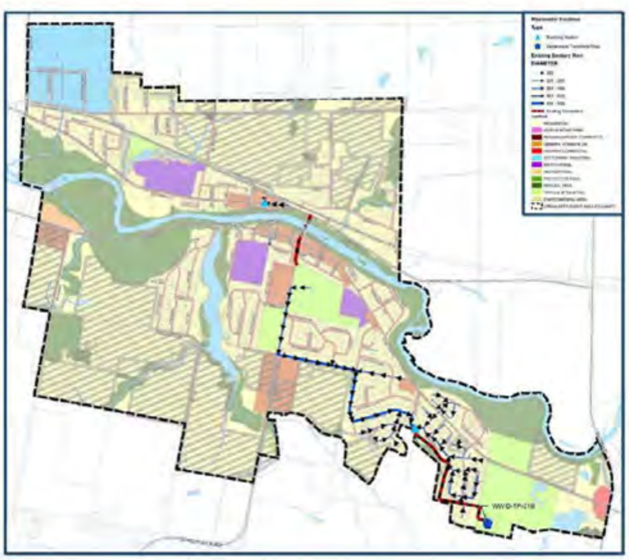
Category	South Thorndale	King St.
Technical Feasibility	●	●
Environmental Impacts	●	●
Social / Cultural Impacts	●	●
Financial Viability	●	●
	Preferred Option	

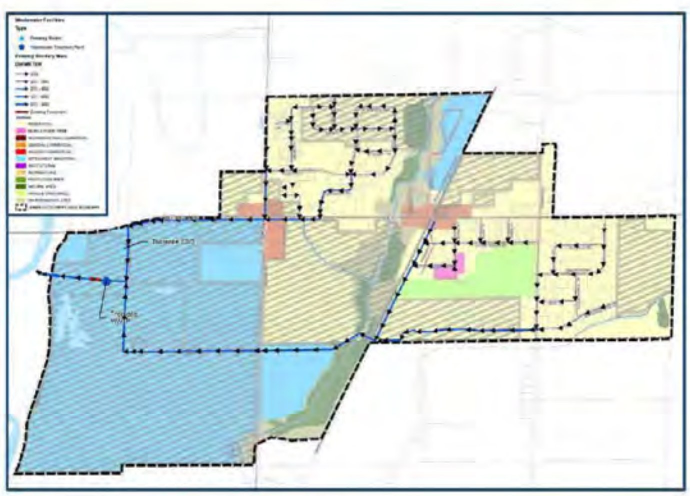
Thorndale Water Capital Program

Capital Program Master Plan ID	Name	Class EA Schedule	Size/Capacity		Capital Program Total Component Estimated Cost
W-T-SUP-01	Maximize Thorndale WTF Supply	A	20 L/s	$	753,000
W-T-SUP-02	New Thorndale Groundwater Supply	C	31 L/s - 65 L/s	$	1,020,000
W-T-RES-01	Thorndale Reservoir Upgrade	A	0 ML	$	882,000
W-T-BPS-01	Thorndale HLP Upgrades	A	20 L/s	$	976,000
W-T-WM-01	Thorndale Watermain - Thorndale Rd. Upgrade	A+	300 mm	$	880,000
W-T-WM-02	Thorndale Watermain - South Trunk at Monteith Lands	A	300 mm	$	427,000
W-T-WM-03	Thorndale Watermain - South Trunk Meadowbrook Ln. Upgrade	A	300 mm	$	1,844,000
W-T-WM-04	Thorndale Watermain - South Trunk at Foxborough Subdivision	A	300 mm	$	597,000
W-T-WM-05	Thorndale Watermain - South Trunk at Railway Crossing	A	300 mm	$	1,083,000
W-T-WM-06	Thorndale Watermain - South Trunk at Rosewood Subdivision	A	300 mm	$	1,160,000
W-T-WM-07	Thorndale Watermain - Subrunk at Rosewood	A	300 mm	$	1,941,000
W-T-WM-08	Thorndale Watermain Upgrade - Gerald Pkwy. Upgrade	A+	300 mm	$	2,000,000
W-T-WM-09	Thorndale Watermain Upgrade - Industrial Lands Loop	A+	300 mm	$	753,000
W-T-WM-10	Thorndale Watermain Upgrade - Industrial Lands Upgrade	A+	300 mm	$	1,020,000
Sub-Total Projects with Growth Components				**$**	**24,583,000**
Sub-Total Projects that are 100% Benefit to Existing Residents				**$**	**-**
Total Capital Program				**$**	**24,583,000**



Existing Wastewater System





Dorchester			Thorndale		
Flows to Dorchester PS and WWTP			Flows to Thorndale SPS and WWTP		
Equivalent Serviced Population	Average Day Flow	Peak Flow	Equivalent Serviced Population	Average Day Flows	Peak Flow
1,325	3.0 L/s	25.1 L/s	1,915	2.1 L/s	31.2 L/s

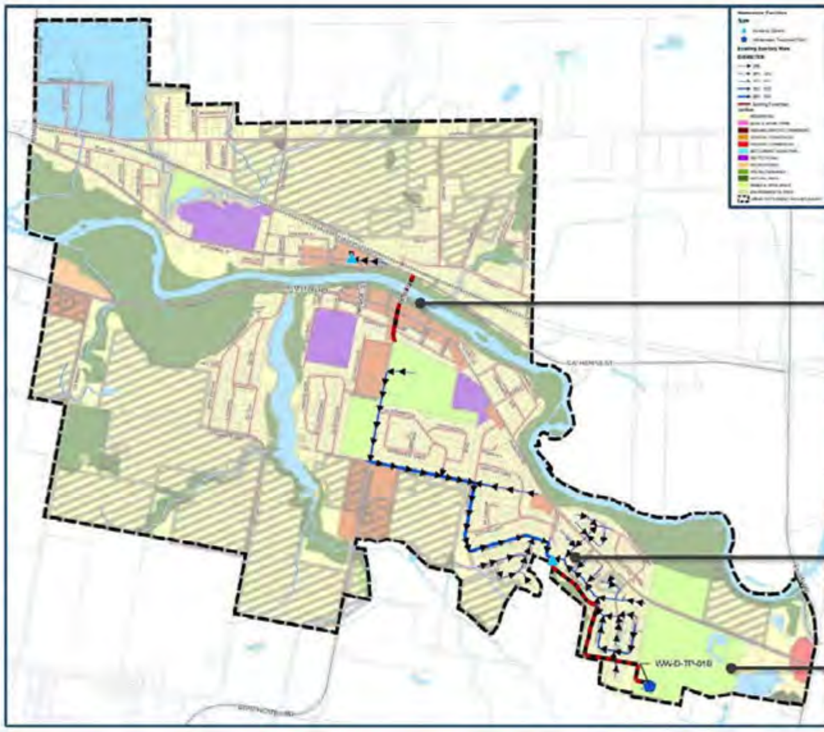
Dorchester Wastewater System Opportunities and Constraints

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



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

Opportunity to service all existing un-serviced lands

Long-term capacity issue at the Dorchester SPS

Long-term treatment capacity issue at the Dorchester WWTP

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4305 Hamilton Road
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North Dorchester Wastewater Servicing

Servicing Growth and Unserviced Properties in North Dorchester

- Treatment, pumping and conveyance needs for Dorchester are driven by servicing needs and options for lands in North Dorchester
- There is opportunity to balance growth needs with needs of all serviced and unserviced areas in North Dorchester
- There are many combinations of viable options and detailed evaluation is required
- The "Do Nothing" option (Option 1) was also considered

Option 2 – NW SPS

Option 3 – NE SPS + NW SPS

Option 4 – NE SPS + NW SPS

Option 5 – Growth SPS + NE + NW SPS

Option 6 – New WWTP

Gravity Sewer — Forcemain — Pumping Station — Treatment Plant

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Dorchester ON N0L 1G3

North Dorchester Wastewater Servicing

Evaluation Criteria	Option 1 - Do Nothing Do Nothing	Option 2 Northwest SPS - all growth areas and all existing areas gravity to one SPS	Option 3 Northwest and Northeast SPS - all growth and existing areas	Option 4 Northeast SPS - all growth East of Development 6 can gravity to NESPS, remaining areas gravity to NWSPS	Option 5 New Development SPS - all growth North of CN rail can gravity to New Development SPS, remaining areas gravity to NW SPS and NESPS	Option 6 Northwest WWTP 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 WWTP 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 WWTP 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
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
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: $$$$	$$$$
Lifecycle cost	No change	$$	$$$	$$$	$$$$	$$$$
Legal / Jurisdictional						
Land use requirements	None	Parcel in existing developed area required for SPS site	Two parcels in existing developed area required for SPS sites	Two parcels in existing developed area required for SPS sites	Parcel in new development and two parcels in existing developed area required for SPS sites	Two parcels in existing developed area required for SPS sites
Integration with other local / municipal plans	Not relevant to this area	Development lands plus existing unserviced lands	Development lands plus existing unserviced lands	Development lands ahead of existing unserviced lands	Development lands ahead of existing unserviced lands	Development lands plus existing unserviced lands
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 WWTP**

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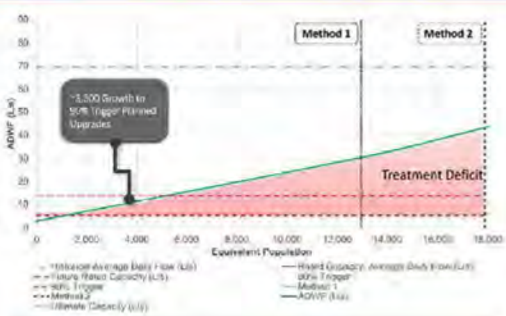
Dorchester Wastewater Treatment Needs and Options



	Planned Future Capacity	Average Day Demand (L/s)		Supply Deficit (L/s)	
		Including North Dorchester	Excluding North Dorchester	Including North Dorchester	Excluding North Dorchester
Current	13.89	3	3	10.9	10.9
Method 1		30.37	23.3	-16.47	-9.4
Method 2		43.23	30.3	-29.33	-16.4
Method 3		75.37	67.44	-61.47	-48.54

Category	North Dorchester WWTP	Upgrade Existing WWTP
Technical Feasibility	🔴	🟢
Environmental Impacts	🟡	🟢
Social / Cultural Impacts	🟢	🟢
Financial Viability	🟡	🟢

Construct and Commission North Dorchester WWTP

- Construct second wastewater treatment plant in North Dorchester

Advantages

- Can reduce upgrade requirements at Dorchester PS and Dorchester WWTP (flows from North are routed to new WWTP)

Disadvantages

- Underutilizes planned upgrades at existing Dorchester WWTP
- Extensive additional study and permitting required for new WWTP
- Adds significant infrastructure upgrade and operation costs to Dorchester WW system

Upgrades, Costs and Timing

- New North Dorchester WWTP
  - Environmental Assessment - $ - 2 to 3 years
  - Design and construction - $$ - 3 to 5 years
  - Total - $$$ - 5 - 7 years
- Dorchester PS and WWTP will still require upgrades - $$$$

Utilize Approved Future Upgrades at Dorchester WWTP

- Upgrade Dorchester WWTP as planned based on growth triggers

Advantages

- Sufficient treatment capacity upgrades have already been planned for and approved to service growth to Buildout under most projection methods
- Minimizes infrastructure upgrade and operation costs

Disadvantages

- Requires additional pumping to service growth within North Dorchester (and lands directly south of Thames River)
- Planned future upgrades cannot fully accommodate Buildout under Method 3

Upgrades, Costs and Timing

- Upgrades at Dorchester WWTP are approved and planned for - $$$$ - upgrades triggered by flows
- Dorchester PS and FM Upgrades - $$$$ - upgrades triggered by flows

Preferred Option

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4305 Hamilton Road
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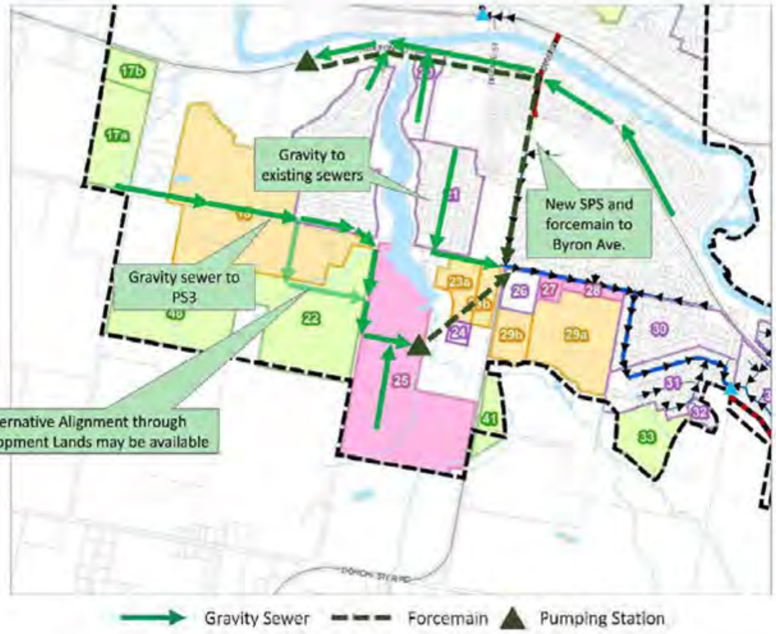
South Dorchester Wastewater Servicing

CM BluePlan ENGINEERING

Servicing Growth and Unserviced Properties in South Dorchester

- There is one preferred servicing concept in South Dorchester
- Dorchester PS existing and Dorchester PS3 under construction
  - Dictates servicing concept for new development
  - Upgrades at PS planned for to accommodate future growth
- New PS required for existing unserviced lands located near Thames River
- New PS required for development lands in southeast Dorchester
- Alternative alignment of proposed gravity sewer may be available through Development Area 22
  - Alignments will be reviewed further as part of development application process



Category	South Servicing
Technical Feasibility	
Environmental Impacts	
Social / Cultural Impacts	
Financial Viability	

401 Corridor Lands Wastewater Servicing

CM BluePlan ENGINEERING

Servicing Concept 1 – Gravity and Siphon under Thames River

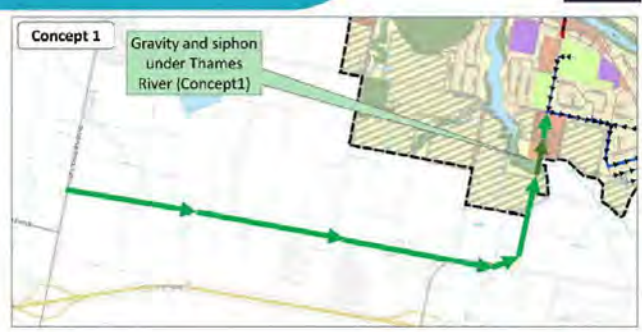
- Gravity along Dorchester Road and siphon under Thames River

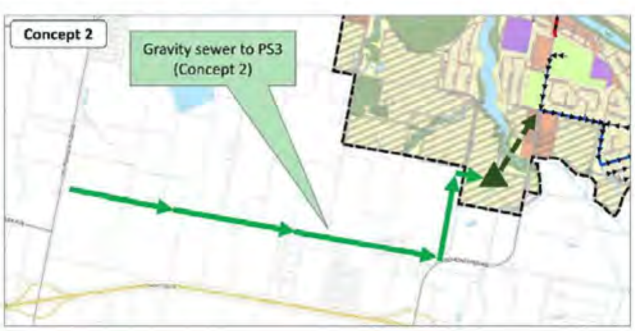
Servicing Concept 2 – Gravity to PS3

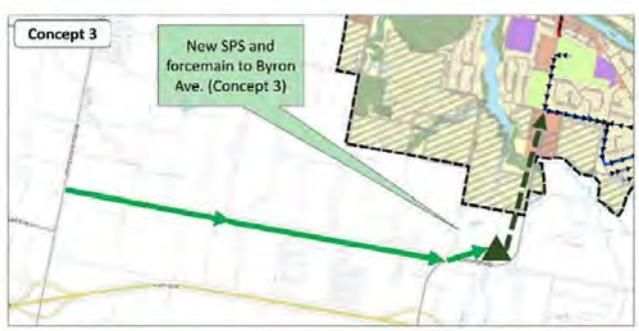
- Gravity along Mill Road to PS3
- Upgrades required at PS3

Servicing Concept 3 – New SPS

- New SPS to service 401 Corridor Lands
- New forcemain to trunk sewer on Byron Avenue





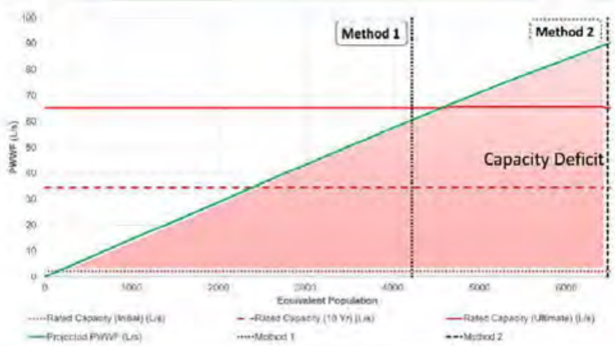


It is recommended that the Municipality undertake further analysis to review cost-benefits of providing sufficient operating pressures and fire flows to the 401 Corridor Lands

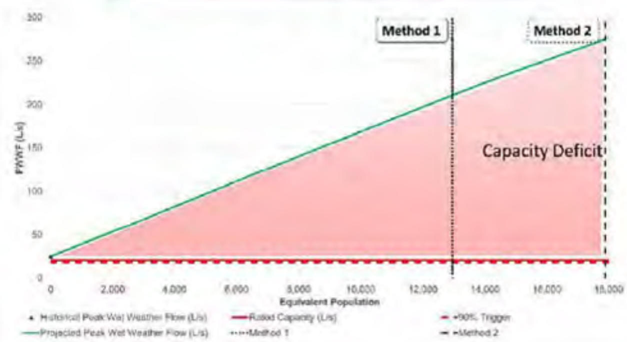
- The study will clarify the long term servicing needs of the 401 Corridor Lands and servicing concepts can be evaluated compared to the Study recommendations

Dorchester Wastewater Pumping Station Upgrades

Dorchester 3 SPS

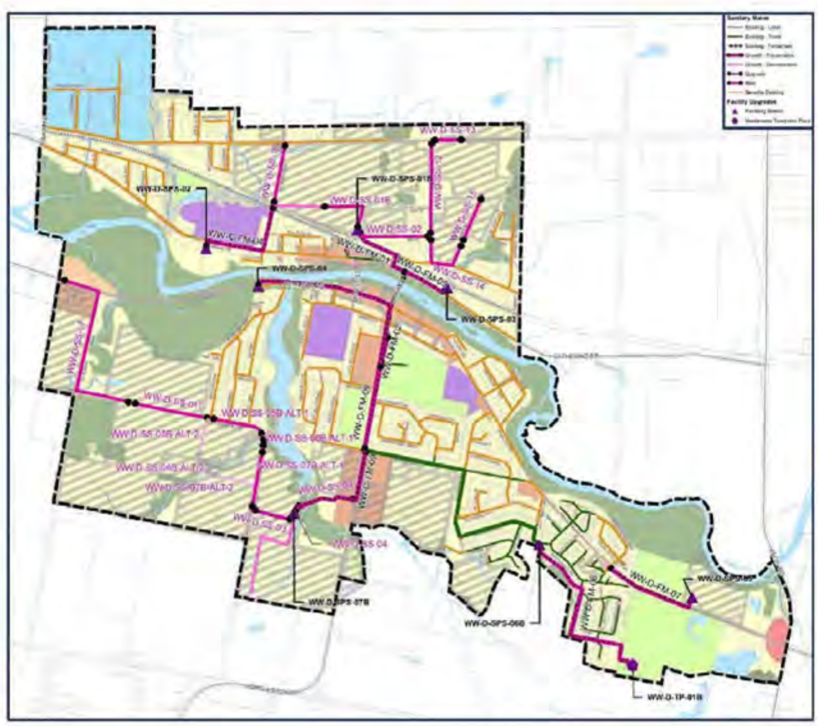


Dorchester SPS

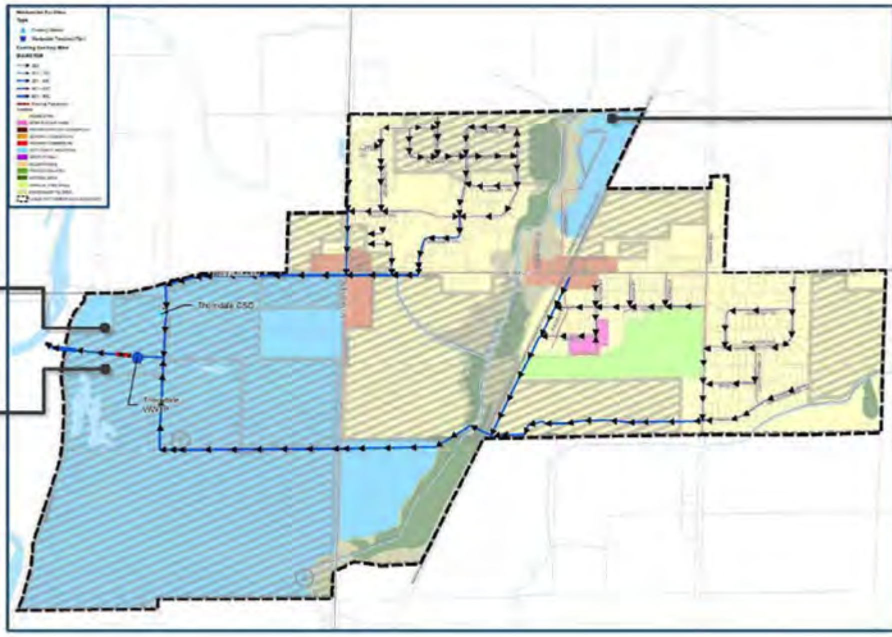


Dorchester Wastewater Capital Program

Capital Program Master Plan ID	Name	Class EA Schedule	Size/Capacity	Capital Program Total Component Estimated Cost
WW-D-TP-01B	Dorchester Treatment Plant Upgrades	C	3.2 ML	$ 14,001,000
WW-D-SPS-01B	North Dorchester New Development SPS	B	90 L/s	$ 4,732,000
WW-D-SPS-02	North Dorchester Northwest SPS	B	9 L/s	$ 568,000
WW-D-SPS-03	North Dorchester Northeast SPS	B	1 L/s	$ 171,000
WW-D-SPS-04	South Dorchester SPS	B	17 L/s	$ 995,000
WW-D-SPS-05B	Southeast Dorchester SPS	B	8 L/s	$ 538,000
WW-D-SPS-06B	Dorchester SPS Upgrades	B	254 L/s	$ 10,065,000
WW-D-SPS-07B	PS3	B	102 L/s	$ 5,359,000
WW-D-FM-01	North Dorchester New Development forcemain	A	300 mm	$ 1,263,000
WW-D-FM-02	Dorchester Road forcemain extension	A+	300 mm	$ 374,000
WW-D-FM-03	Dorchester Road forcemain extension	A+	300 mm	$ 916,000
WW-D-FM-04	North Dorchester Northwest forcemain	A+	100 mm	$ 1,464,000
WW-D-FM-05	North Dorchester Northeast forcemain	A+	100 mm	$ 1,168,000
WW-D-FM-06	South Dorchester forcemain	A+	100 mm	$ 2,441,000
WW-D-FM-07	Southeast Dorchester forcemain	A+	100 mm	$ 753,000
WW-D-FM-08	Dorchester SPS forcemain	A+	350 mm	$ 2,327,000
WW-D-FM-09	PS3 forcemain	B	250 mm	$ 1,798,000
WW-D-SS-01B	New Development SPS West Sewers	A+	300 mm	$ 455,000
WW-D-SS-02	New Development SPS East Sewers	A	250 mm	$ 660,000
WW-D-SS-03	PS3 West Sewers	A+	375 mm	$ 403,000
WW-D-SS-04	PS3 West Sewers	A+	450 mm	$ 126,000
WW-D-SS-05B-ALT-1	Christie Drive and new Development sewer	A+	300 mm	$ 522,000
WW-D-SS-06B-ALT-1	Rath Harris Municipal Drain Crossing	B	300 mm	$ 361,000
WW-D-SS-07B-ALT-1	New development sewer	A+	375 mm	$ 466,000
WW-D-SS-09	Sewer East of PS3	A	250 mm	$ 1,153,000
WW-D-SS-10	Sewer East of PS3	A	300 mm	$ 300,000
WW-D-SS-11B	Christie Drive and new Development sewer	A	300 mm	$ 586,000
WW-D-SS-12	Clara Street sewer	A+	200 mm	$ 789,000
WW-D-SS-13	Marion Street sewer	A+	200 mm	$ 312,000
WW-D-SS-14	North Street to Clara Street sewer	A	200 mm	$ 601,000
WW-D-SS-15	North Street Sewer	A	200 mm	$ 451,000
WW-D-SS-16	Richmond Street Sewer	A	200 mm	$ 466,000
WW-D-SS-17	Hamilton Road to Christie Drive sewer	A	200 mm	$ 1,316,000
WW-D-SS-18	Sewers for Existing Unserviced (SPS-01B)	A+	200 mm	$ 9,291,000
WW-D-SS-19	Sewers for Existing Unserviced (SPS-02)	A+	200 mm	$ 6,986,000
WW-D-SS-20	Sewers for Existing Unserviced (SPS-03)	A+	200 mm	$ 1,411,000
WW-D-SS-21	Sewers for Existing Unserviced (SPS-04)	A+	200 mm	$ 6,565,000
WW-D-SS-22	Sewers for Existing Unserviced (SPS-06B)	A+	200 mm	$ 10,157,000
WW-D-SS-23	Sewers for Existing Unserviced (SPS-07B)	A+	200 mm	$ 2,833,000
WW-D-401-ST-01	Cost Benefit Study to Service 401 Corridor Lands	-		$ 50,000
Sub-Total Projects with Growth Components				**$ 50,943,000**
Sub-Total Projects that are 100% Benefit to Existing Residents				**$ 43,999,000**
Total Capital Program				**$ 94,942,000**

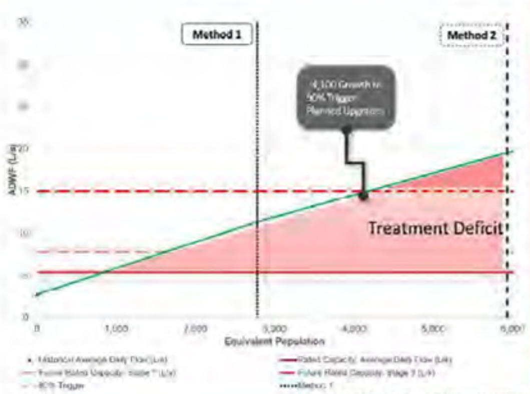


Thorndale Wastewater System Opportunities and Constraints



- Individual development vs. consolidated area servicing
- 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 Wastewater Treatment Needs and Options



Upgrades at Thorndale WWTP

- Upgrade Thorndale WWTP as planned
- Additional upgrades beyond planned will be required to service Method 3 growth outside of Settlement Boundary

Advantages

- Sufficient treatment capacity upgrades have already been planned for and approved to service growth to buildout within the Thorndale Settlement Boundary
- Minimizes infrastructure upgrade and operation costs
- There is available area at the Thorndale WWTP site for expansion to meet buildout needs under all growth projection methods

Disadvantages

- Planned future upgrades cannot fully accommodate Buildout under Method 3
- All flows to the WWTP are conveyed through the Thorndale SPS and the SPS will be required to be upgraded along with the WWTP

Upgrades, Costs and Timing

- Upgrades at Thorndale SPS and WWTP are approved and planned for - $$ - upgrades triggered by flows

Preferred Option

	Existing Facility Firm Capacity (L/s)	Planned Facility Capacity Upgrades (L/s)	Average Day Demand (L/s)	Supply Deficit (L/s)	+% Supply Capacity
Current	5.359	14.99	2.7	12.2	18%
Method 1			11.4	3.6	76%
Method 2			19.6	4.6	130%
Method 3			34.5	-19.5	230%

Category	South Servicing
Technical Feasibility	●
Environmental Impacts	●
Social / Cultural Impacts	●
Financial Viability	●

Thorndale Wastewater Servicing

Servicing Growth and Unserviced Properties in Thorndale

- There is one preferred servicing concept in Thorndale
- No sewer upgrades required for buildout under Method 1 growth projections
- Downstream sewers within Industrial Park are required to be upgraded to convey flows at buildout under Method 2 and Method 3 growth projections

Category	Thorndale Servicing
Technical Feasibility	●
Environmental Impacts	●
Social / Cultural Impacts	●
Financial Viability	●

Method 1

Method 2

Method 3

Municipality of Thames Centre
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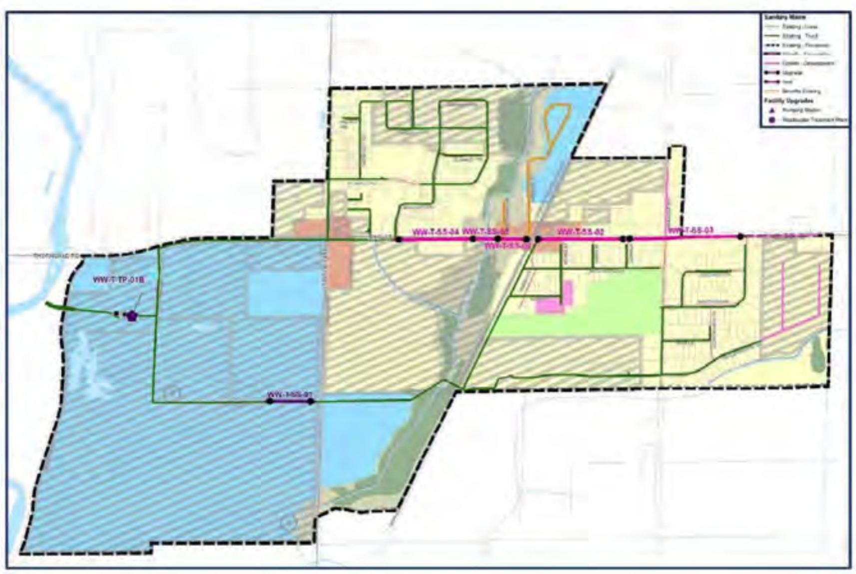
Dorchester ON N0L 1G3

Thorndale Wastewater Capital Program

Capital Program Master Plan ID	Name	Class EA Schedule	Project Type	Size/Capacity	Capital Program Total Component Estimated Cost	
WW-T-TP-01B	Thorndale Treatment Plant Upgrades (includes SPS)	C	Treatment	1.0 ML	$	7,192,000
WW-T-SS-01	Gerald Parkway sewer upgrades	A+	Sewer	375 mm	$	326,000
WW-T-SS-02	King Street sewer	A+	Sewer	250 mm	$	528,000
WW-T-SS-03	King Street sewer	A+	Sewer	250 mm	$	667,000
WW-T-SS-04	King Street sewer	A+	Sewer	200 mm	$	469,000
WW-T-SS-05	King Street sewer crossing Wye Creek	B	Sewer	200 mm	$	713,000
WW-T-SS-06	King Street sewer	A+	Sewer	200 mm	$	215,000
WW-T-SS-07	Sewers for Existing Unserviced within Thorndale	A+	Sewer	200 mm	$	1,031,000
Sub-Total Projects with Growth Components					**$**	**8,046,000**
Sub-Total Projects that are 100% Benefit to Existing Residents					**$**	**3,095,000**
Total Capital Program					**$**	**11,141,000**



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Thank you for your participation!

We want to hear from you!
Please let us know your thoughts by filling out a comment form.
If you have any questions or input, please speak with one of the project team members here, and/or you may contact the Municipality of Thames Centre Project Manager:

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Please note that information related to this study will be collected in accordance with the *Freedom of Information and Protection of Privacy Act*. All comments received will become part of the public record and may be included in the study documentation prepared for public review.

Appendix E: Stakeholder Consultation

Municipality of Thames Centre
Water and Wastewater Master Plan Update
Summary of Comments Received

#	From	To	Date Received	Type	Comment	Action	Status
1	Craig Newton (Ministry of the Environment, Conservation and Parks)	Carlos Reyes (Municipality of Thames Centre)	12/12/2018	Email	MECP advised of new process to submit notices along with a Project Information Form to regional representative.	1. Comment filed. 2. GMBP submitted requested documents to MECP on 18-Dec-18	Complete
2	Sally Kuipers (Bell Canada)	Carlos Reyes, Julien Bell (Municipality of Thames Centre, GM BluePlan)	12/18/2018	Email	Requested contact name to be removed from stakeholder list and suggested addressing as "attention to" so any Bell office recipient can open.	1. Comment filed. 2. Updates made to stakeholder list.	Complete
3	Katherine Kirzati (Ministry of Tourism, Culture and Sports)	Carlos Reyes, Julien Bell (Municipality of Thames Centre, GM BluePlan)	1/7/2019	Email	MTCS 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. MTCS requested to remain on the stakeholder list.	1. Comment filed. 2. No technical heritage studies were completed under this study.	Complete
4	Karen Winfield (Upper Thames River Conservation Authority)	Carlos Reyes, Julien Bell (Municipality of Thames Centre, GM BluePlan)	2/1/2019	Email	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.	1. Comment filed. 2. 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.	Complete
5	Fallon Burch (Chippewas of the Thames First Nation)	Carlos Reyes (Municipality of Thames Centre)	4/3/2019	Email	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.	1. Comment filed. 2. Revised stakeholder list to include new email address.	Complete
6	Bronson Nicholas (Oneida Nation of the Thames)	Carlos Reyes, Julien Bell (Municipality of Thames Centre, GM BluePlan)	4/5/2019	Email	Confirmed receipt of Notice of Commencement. Encouraged team to come out to the community and present the project to the Oneida Environment Department.	1. Comment filed. 2. Team contacted Oneida to set up date for presentation.	Complete
7	Deren Lyle (CJDL Consulting Engineering)	Carlos Reyes, Julien Bell (Municipality of Thames Centre, GM BluePlan)	4/29/2019	Email	Confirmed receipt of Notice of Commencement. Requested to remain on the stakeholder list and suggested adding two additional contacts from CJDL.	1. Comment filed. 2. Stakeholder list updated.	Complete
8	[redacted] (Resident)	Carlos Reyes, Julien Bell (Municipality of Thames Centre, GM BluePlan)	5/16/2019	Email	Resident interested in more information about the study. Is currently a home owner in Dorchester on septic system.	1. Comment filed. 2. GMBP issued response with date and information for upcoming Public Information Centre.	Complete
9	Craig Newton (Ministry of the Environment, Conservation and Parks)	Carlos Reyes (Municipality of Thames Centre)	5/29/2019	Email	Acknowledged receipt of Notice of Commencement. Provided list of Indigenous Communities for consultation.	1. Comment filed. 2. GMBP provided list of indigenous communities with information presented at the Public Information as well as an opportunity to learn more about the study.	Complete
10	Bob Stratford (RW Stratford Consulting Inc.)	Carlos Reyes, Julien Bell (Municipality of Thames Centre, GM BluePlan)	6/5/2019	Email	Requested an electronic copy of materials presented at Public Information Centre.	1. Comment filed. 2. GMBP provided link for download which includes materials presented at Public Information Centre.	Complete
11	Fallon Burch (Chippewas of the Thames First Nation)	Carlos Reyes (Municipality of Thames Centre)	6/19/2019	Email	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.	1. Comment filed. 2. GMBP to provide copy of the final report during the 30-day public review period.	Complete
12	Fallon Burch (Chippewas of the Thames First Nation)	Carlos Reyes (Municipality of Thames Centre)	6/19/2019	Email	Provided invoice to Thames Centre for the review of materials.	1. Comment filed. 2. Thames Centre processed invoice.	Complete

RECEIVED
Southwest Regional Office
London

DEC 11 2018

Ministry of the Environment
and Climate Change

Thames Centre

December 7, 2018

To whom it may concern:

RE: Thames Centre 2018 Water and Wastewater Master Plan Update, Notice of Commencement

GM BluePlan has been retained by the Municipality of Thames Centre to complete the 2018 Water and Wastewater Master Plan Update.

The Master Plan Update will aim to develop and evaluate water and wastewater servicing strategies to meet potential population and employment growth within the Dorchester and Thorndale communities.

The 2018 Water and Wastewater Master Plan Update is intended to satisfy Phases 1 and 2 of the Municipal Class Environmental Assessment (MCEA) Process (October 2000, as amended in 2007, 2011, and 2015) approved under the Ontario Environmental Assessment Act.

As part of the study's consultation program, you are currently included in the Study Contact List. If you wish to be removed or would like to suggest an alternative representative, please contact the undersigned. Should we not hear from you, your details will remain on the Study Contact list and you will be notified of all future consultation opportunities during the undertaking of this Master Planning study.

Should you have any comments or questions, please contact the undersigned below.

Sincerely,

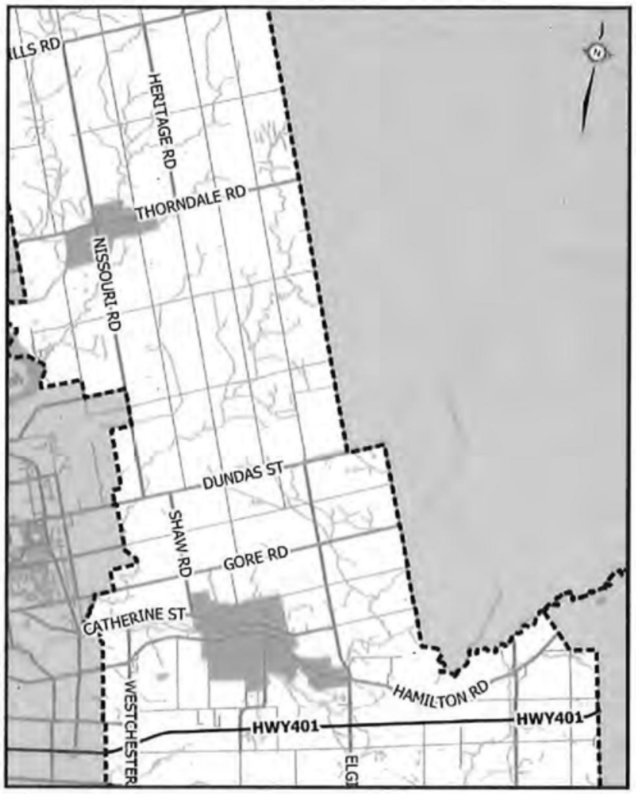
Carlos Reyes, CISEC, P.Eng.
Director of Environmental Services
Municipality of Thames Centre
Phone: 519-268-7334 ext. 245
Email: creyes@thamescentre.on.ca

Julien Bell, P.Eng.
Consultant Project Manager
GM BluePlan Engineering Limited
Phone: 519-748-1440
Email: Julien.Bell@gmblueplan.ca

Notice of Study Commencement
Municipality of Thames Centre
2018 Water and Wastewater Master Plan Update

What is this study all about?

The Municipality of Thames Centre has initiated the 2018 Water and Wastewater Master Plan Update. This Update will aim to develop and evaluate water and wastewater servicing strategies to meet potential population and employment growth within the Dorchester and Thorndale communities. This is a critical component in the integrated planning process and will provide the framework and vision for the water and wastewater servicing needs for Thames Centre.



How is this study being done?

The 2018 Water and Wastewater Master Plan Update is intended to satisfy Phases 1 and 2 of the Municipal Class Environmental Assessment (MCEA) Process (October 2000, as amended in 2007, 2011 and 2015) approved under the Ontario Environmental Assessment Act.

How can I participate in this study?

Participation from the community and stakeholders is vital to the success of this study. The Municipality of Thames Centre invites residents to participate in this planning process and learn more about the 2018 Water and Wastewater Master Plan Update by attending a Public Information Centre later in the study to discuss the strategic approach.

If you would like more information about the 2018 Water and Wastewater Master Plan Update, please contact the undersigned:

Carlos Reyes, CISEC, P.Eng.
Director of Environmental Services
Municipality of Thames Centre
4305 Hamilton Road
Dorchester ON N0G 1G3
Phone: 519-268-7334, ext. 245
Email: creyes@thamescentre.on.ca

Julien Bell, P.Eng.
Consultant Project Manager
GM BluePlan Engineering Limited
330 Trillium Drive, Unit D
Kitchener, ON N2E 3J2
Phone: 519-748-1440
Email: julien.bell@gmblueplan.ca

Information will be collected in accordance with the Freedom of Information and Protection of Privacy Act. With the exception of personal information, all comments will become part of the public record.

Danielle MacKinnon - GM BluePlan

From:	EA Notices to SWRegion (MECP) <eanotification.swregion@ontario.ca>
Sent:	Tuesday, December 18, 2018 10:45 AM
To:	Danielle MacKinnon - GM BluePlan
Cc:	creyes@thamescentre.on.ca; Julien Bell - GM BluePlan
Subject:	RE: Municipality of Thames Centre, Master Plan, 2018 Water and Wastewater Master Plan Update

Danielle:

Thank you

Yours truly,

Craig Newton
Regional Environmental Planner / Regional EA Coordinator
Ministry of the Environment, Conservation and Parks
Southwestern Region
733 Exeter Road
London, Ontario
N6E 1L3

Telephone: (519) 873-5014
E-mail: craig.newton@ontario.ca

From: Danielle MacKinnon - GM BluePlan [mailto:Danielle.MacKinnon@gmblueplan.ca]
Sent: December-18-18 10:32 AM
To: EA Notices to SWRegion (MECP)
Cc: creyes@thamescentre.on.ca; Julien Bell - GM BluePlan; Newton, Craig (MECP)
Subject: Municipality of Thames Centre, Master Plan, 2018 Water and Wastewater Master Plan Update

Good morning,

This email is in response to the Municipality of Thames Centre - 2018 Water and Wastewater Master Plan Update.

Please find attached the Notice of Commencement (sent via mail to Craig Newton on December 7, 2018) and the completed Project Information Form.

If you have any questions please contact Carlos Reyes (creyes@thamescentre.on.ca) as per the Project Information Form.

Best regards,

Danielle MacKinnon, B. Eng., E.I.T.
Infrastructure Planning

GM BluePlan Engineering Limited
Royal Centre | 3300 Highway No. 7, Suite 402 | Vaughan ON L4K 4M3
t: 416.703.0667 ext. 7214
danielle.mackinnon@gmblueplan.ca | www.gmblueplan.ca

N O T I C E - This message from GM BluePlan Engineering Limited is intended only for the use of the individual or entity to which it is addressed and may contain information which is privileged, confidential or proprietary. Internet communications cannot be guaranteed to be secure or error-free as information could be intercepted, corrupted, lost, arrive late or contain viruses. By communicating with us via e-mail, you accept such risks. When addressed to our clients, any information, drawings, opinions or advice (collectively, "information") contained in this e-mail is subject to the terms and conditions expressed in the governing agreements. Where no such agreement exists, the recipient shall neither rely upon nor disclose to others, such information without our written consent. Unless otherwise agreed, we do not assume any liability with respect to the accuracy or completeness of the information set out in this e-mail. If you have received this message in error, please notify us immediately by return e-mail and delete the message from your computer systems.

Ministry of Tourism, Culture and Sport

Programs and Services Branch
401 Bay Street, Suite 1700
Toronto ON M7A 0A7
Tel: 416.314.7643

Ministère du Tourisme, de la Culture et du Sport

Direction des programmes et des services
401, rue Bay, Bureau 1700
Toronto ON M7A 0A7
Tél: 416.314.7643

Ontario

07 January 2018

EMAIL ONLY

Julien Bell, P.Eng.
Consultant Project Manager
GM BluePlan Engineering Limited
330 Trillium Drive, Unit D
Kitchener, ON N2E 3J2
julien.bell@gmblueplan.ca

MTCS File #	:	**0010173**
Proponent	:	**Municipality of Thames Centre**
Subject	:	**Notice of Commencement**
Project	:	**Water and Wastewater Master Plan -2018 Update**
Location	:	**Municipality of Thames Centre, County of Middlesex**

Dear Mr. Bell:

Thank you for providing the Ministry of Tourism, Culture and Sport (MTCS) with the Notice of Commencement for the above-referenced project. MTCS's interest in this Master Plan project relates to its mandate of conserving Ontario's cultural heritage, which includes:

- Archaeological resources, including land and marine;
- Built heritage resources, including bridges and monuments; and,
- Cultural heritage landscapes.

Under the Municipal Class Environmental Assessment (EA) process, the proponent is required to determine a project's potential impact on cultural heritage resources. A Master Plan project at minimum will address Phases 1 and 2 of the Municipal Class EA process. Developing and reviewing inventories of known and potential cultural heritage resources within the study area can identify specific resources that may play a significant role in guiding the evaluation of alternatives for subsequent project-driven EAs.

Project Summary
The Municipality of Thames Centre has initiated an update to its Water and Wastewater Master Plan that will evaluate servicing strategies to meet potential population and employment growth in the communities of Dorchester and Thorndale. This project aims to satisfy Phases 1 and 2 of the Municipal Class EA process (October 2000, amended in 2007, 2011 and 2015).

Identifying Cultural Heritage Resources
While some cultural heritage resources may have already been formally identified, others may be identified through screening and evaluation. Indigenous communities may have knowledge that can contribute to the identification of cultural heritage resources, and we suggest that any engagement with Indigenous communities includes a discussion about known or potential cultural heritage resources that are of value to these communities. Municipal Heritage Committees, historical societies and other local heritage organizations may also have knowledge that contributes to the identification of cultural heritage resources.

Archaeological Resources
This Master Plan project may impact archaeological resources and you should screen the project with the MTCS *Criteria for Evaluating Archaeological Potential* and *Criteria for Evaluating Marine Archaeological Potential* to determine if archaeological assessments will be needed for subsequent project-driven Municipal Class EAs. MTCS archaeological sites data are available at

archaeology@ontario.ca, and if the Master Plan project area exhibits archaeological potential or encompasses archaeological sites of high cultural heritage value or interest, these data should be used in the evaluation of alternatives.

Built Heritage and Cultural Heritage Landscapes
The MTCS *Criteria for Evaluating Potential for Built Heritage Resources and Cultural Heritage Landscapes* should be completed to help determine whether this Master Plan project may impact cultural heritage resources. The clerk for the Municipality of Thames Centre can provide information on property registered or designated under the *Ontario Heritage Act* and municipal Heritage Planners can also provide information that will assist you in completing the checklist. A determination of whether the Master Plan project area impacts potential or known heritage resources of cultural heritage value or interest should be used in the evaluation of alternatives.

If subsequent project-driven Municipal Class EAs may impact potential or known heritage resources MTCS recommends that a Heritage Impact Assessment (HIA), prepared by a qualified consultant, should be completed to assess potential project impacts. Our Ministry's *Info Sheet #5: Heritage Impact Assessments and Conservation Plans* outlines the scope of HIAs. Please send the HIA to MTCS for review and make it available to local organizations or individuals who have expressed interest in review.

Please provide a copy of the completed checklists to MTCS.

Environmental Assessment Reporting
All technical cultural heritage studies and their recommendations are to be addressed and incorporated into Master Plan projects. Please advise MTCS whether any technical heritage studies will be completed for the Master Plan project and provide them to MTCS for review and comment prior to issuing a Notice of Completion. If screening has identified no known or potential cultural heritage resources, or no impacts to these resources, please include the completed checklists, along supporting documentation and rationale, in the Master Plan project file report.

Thank you for consulting MTCS on this project. Please continue to do so through the Master Plan process, and contact me for any questions or clarification.

Sincerely,

Katherine Kirzati
Heritage Planner
katherine.kirzati@ontario.ca

Copied: Carlos Reyes, Municipality of Thames Centre

It is the sole responsibility of proponents to ensure that any information and documentation submitted as part of their EA report or file is accurate. MTCS makes no representation or warranty as to the completeness, accuracy or quality of the any checklists, reports or supporting documentation submitted as part of the EA process, and in no way shall MTCS be liable for any harm, damages, costs, expenses, losses, claims or actions that may result if any checklists, reports or supporting documents are discovered to be inaccurate, incomplete, misleading or fraudulent.

Please notify MTCS if archaeological resources are impacted by EA project work. All activities impacting archaeological resources must cease immediately, and a licensed archaeologist is required to carry out an archaeological assessment in accordance with the Ontario Heritage Act and the Standards and Guidelines for Consultant Archaeologists.

If human remains are encountered, all activities must cease immediately and the local police as well as the Registrar, Burials of the Ministry of Government and Consumer Services (416-326-8800) must be contacted. In situations where human remains are associated with archaeological resources, MTCS should also be notified to ensure that the site is not subject to unlicensed alterations which would be a contravention of the *Ontario Heritage Act*.

UPPER THAMES RIVER
CONSERVATION AUTHORITY
"Inspiring a Healthy Environment"

The Thames
A Canadian
Heritage River

February 1, 2019

Municipality of Thames Centre
4305 Hamilton Road
Dorchester, Ontario
N0G 1G3

GM BluePlan Engineering Limited
330 Trillium Drive, Unit D
Kitchener, Ontario
N2E 3J2

Attention: **Carlos Reyes**, Director of Environmental Services – (via e-mail: creyes@thamescentre.on.ca)
Julien Bell, Consultant Project Engineer – (via e-mail - julien.bell@gmblueplan.ca)

Dear Mr. Reyes and Mr. Bell:

Re: **Notice of Study Commencement**
Municipality of Thames Centre
2018 Water and Wastewater Master Plan Update

Upper Thames River Conservation Authority (UTRCA) staff are in receipt of the *Notice of Study Commencement* for the *Municipality of Thames Centre 2018 Water and Wastewater Master Plan Update*. We offer the following comments under Ontario Regulation 157/06 and our responsibilities as a commenting agency providing technical review and advisement related to natural heritage, water resources and natural hazard management pursuant to relevant legislation and policies set out in the UTRCA Planning Policy Manual (June 28, 2006):

General Comments

1) We would appreciate the opportunity for our technical staff to review and provide comments on any upcoming draft documents and proposed alternatives including any draft Environmental Study Report and/or Assimilative Capacity Report. Please note that our scope of review is based on the policies set out in the Upper Thames River Conservation Authority Planning Policy Manual (June 28, 2006). EA and subsequent detail design project review for the Water and Wastewater Master Plan Update Study would generally be guided by, but not limited to, natural heritage, natural hazard and pollution prevention areas of concern for lands regulated within our jurisdiction.

2) According to the enclosed project location mapping, portions of the study area occur within natural hazard and natural heritage areas regulated by the Conservation Authority. The UTRCA regulates development within the Regulation Limit in accordance with Ontario Regulation 157/06 made

pursuant to Section 28 of the *Conservation Authorities Act*. This regulation requires proponents to obtain written approval from the UTRCA prior to undertaking any works in the regulated area including filling, grading, construction, alteration to a watercourse and/or interference with a wetland.

Digital Mapping

3) Our staff can provide digital mapping which outlines the boundaries of the natural heritage and natural hazard features as well as Drinking Water Source Protection Areas present within the study area. Our digital mapping may be obtained by contacting our GIS department (contact: Phil Simm, 519-451-2800 x 247). Generally the fee involved with obtaining digital mapping of our natural heritage and natural hazard features is $100 but this fee will be waived as the mapping is intended for use by one of our member municipalities for a Master Plan Study.

Water (Quantity/Quality) Management

4) In terms of water quality and stream health, we suggest the Water and Wastewater Master Plan Update address protection of local surface water and prevent further decline in water quality and ecosystem health. While the Ministry of Environment, Conservation, and Parks (MECP) is the lead agency responsible for requirements of water and wastewater discharge, the UTRCA supports the need for protection of local stream water quality based on current conditions. The recent 2017 Upper Thames River Watershed Report Cards give a D grade for overall surface water quality for both Wye Creek subwatershed (Thorndale area) and the Dorchester Corridor subwatershed (Dorchester area). Both these subwatersheds have elevated nutrient levels (phosphorus and nitrates), above the guideline for aquatic life. Benthic invertebrate samples in both subwatersheds indicate impaired stream health (D grade) with conditions staying steady over recent years. Bacteria (E.coli) levels have stayed steady in these subwatersheds and have a C grade.

Drinking Water Source Protection

5) In terms of Drinking Water Source Protection, we suggest the Water and Wastewater Master Plan Update is the best time to consider regulatory requirements of the Clean Water Act (CWA) and Source Protection Plan as well as designated vulnerable areas.

6) In the assessment of alternatives it will be important to consider the impacts on vulnerable areas. The comparison of alternatives should also consider whether there are any activities associated with the alternatives that would be threats to the drinking water sources. You may wish to engage your municipal Risk Management Official to identify activities, including those of private landowners who may be affected by the project.

7) The municipality is required by s. 27(3) of O. Reg. 287/07 to notify the CA of the creation of, or modification of any transport pathways.

8) If the Water and Wastewater Master Plan Update includes changes to the pumping rates of the existing municipal water supplies, there could be implications for the delineated vulnerable areas. It could also change what activities are drinking water threats and the areas where they are drinking water threats. The proponent should consider this in their assessment of alternatives.

9) The CWA has very specific requirements for notification related to those who are engaged in significant drinking water threats as a result of revisions to the Assessment Report and Source

Protection Plan. It is important that this be considered to ensure that those affected by the proposal are engaged through the Water and Wastewater Master Plan Update process while alternatives are being considered.

10) If the proponents have questions on how source protection and the local plan may affect the proposed alternatives they may contact UTRCA Drinking Water Source Protection (DWSP) staff or their municipal Risk Management Official (RMO).

Summary

Please be advised that we have not yet received enough information to provide detailed comments regarding the project. However, we appreciate being contacted early in the process and are always open to meeting with you to discuss and work through any concerns or complications along the way.

Our office would like to be included in future circulations regarding this project. We would appreciate receiving information and reports as they become available in order to ensure that we can meet the project deadlines with our comments.

If you have any questions regarding the above information, please contact the undersigned.

Yours truly,
UPPER THAMES RIVER CONSERVATION AUTHORITY

Karen M. Winfield

Karen M. Winfield
Land Use Regulations Officer

April 3, 2019

VIA EMAIL

Carlos Reyes, CISEC, P.Eng
Municipallity of Thames Centre
4305 Hamilton Road
Dorchester, ON N0G 1G3

RE: 2018 Water and Wastewater Master Plan Update, Municipality of Thames Centre

Dear Mr. Reyes,

We have received the *Notice of Study Commencement* regarding the aforementioned project. The proposed master plan 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.

Thank you for providing the update. Please send a digital copy of all future Notices and Final Reports to consultation@cottfn.com . We look forward to continuing this open line of communication. Please do not hesitate to contact me if you need further clarification of this letter.

Thank you for notifying Chippewas of the Thames First Nation.

Sincerely,

Fallon Burch
Consultation Coordinator
Chippewas of the Thames First Nation
(519) 289-5555 Ext. 251
consultation@cottfn.com

c: Julien Bell, P.Eng, Consultant Project Manager, GM BluePlan Engineering Limited

Friday, April 5, 2019

Brandon Doxtator

Environment and Consultation Coordinator

Oneida Public Works Department

2706 Nicholas Rd,

Southwold ON, N0L-2G0

519-652-6922

Carlos Reyes

Director of Environmental Services

Municipality of Thames Centre

4305 Hamilton Rd.

Dorchestor ON, N0G-1G3

519 268 7334 ext.245

Re: Thames Centre 2018 Water and Wastewater Master Plan Update, Notice of Commencement

Dear Mr. Reyes

Oneida Nation of the Thames would like to thank you for taking to the time and for considering our input on the proposed Master Plan study. Oneida Nation of the Thames is part of the Haundenosaunee Confederacy and asserts our inherent rights through multiple treaties, such as the Nan-Fan treaty of 1701. This treaty encompasses our Traditional Beaver Hunting territory (Ohio River to the South, Illinois River up to Chicago in the West, Lake Simcoe to the North and 60km East of Lake Erie) and guarantees our rights and title to the land forever.

In the spirit of the Truth and Reconciliation Commission and the 94 calls to action, and to the United Nations Declaration on the Rights of Indigenous Peoples (UNDRIP), it is important for the Oneida Nation of the Thames to build relationships with outside proponents and for those proponents that wish to build projects in our traditional territory to properly engage, and provide resources for our community to participate.

We take water and wastewater issues very seriously in our community, and since you are up river of Oneida Nation of the Thames, anything you do affects our standard of living through our water quality.

We encourage you to come out to our community and to present your project to our Environment Committee, Chief and Council or our community members depending on the impact of the project on our community. You can coordinate a meeting through the Oneida Environment Department, which can be reached at the Oneida Public Works office at 519-652-6922 or environment@oneida.on.ca.

We look forward to working with you during this process

In Friendship,

Brandon Doxtator

Ontario

Ministry of the Environment, Conservation and Parks
Southwest Region
733 Exeter Road
London ON N6E 1L3
Tel: 519 873-5000

Ministère de l'Environnement, de la Protection de la nature et des Parcs
Direction régionale du Sud-Ouest
733, rue Exeter
London ON N6E 1L3
Tél.: 519 873-5000

May 29th, 2019

Municipality of Thames Centre
4305 Hamilton Rd
Dorchester, Ontario
N0L 1G3

Attention: Mr. Carlos Reyes, P. Eng.
Director of Environmental Services

Re: Notice of Commencement Thames Centre 2018 Water and Wastewater Master Plan Update

Dear Mr. Reyes:

This letter acknowledges the Ministry of Environment, Conservation and Parks (MECP) receipt, with thanks, of the Notice of Commencement of the Thames Centre 2018 Water and Wastewater Master Plan Update.

Based on the information submitted to date, the MECP have identified the following key project details with respect to the proposed undertaking:

Aboriginal Consultation

The Crown has a legal duty to consult Aboriginal communities when it has knowledge, real or constructive, of the existence or potential existence of an Aboriginal or treaty right and contemplates conduct that may adversely impact that right. Before the Municipality of Thames Centre may proceed with this project, the Crown must ensure that its duty to consult has been fulfilled, where such a duty is triggered. Although the duty to consult with Aboriginal peoples is a duty of the Crown, the Crown may delegate procedural aspects of consultation to project proponents while retaining oversight of the process.

The Municipality of Thames Centre's proposed project may have the potential to affect Aboriginal or treaty rights protected under section 35 of Canada's *Constitution Act 1982*. Where the Crown's duty to consult is triggered in relation to the Municipality of Thames Centre's proposed project, the MECP is delegating the procedural aspects of rights-based consultation to the Municipality of Thames Centre through this letter. The Crown intends to rely on the delegated consultation process in discharging its duty to consult and maintains the right to participate in the consultation process as it sees fit. Based upon the information you have provided to date and the Crown's preliminary assessment the Municipality of Thames Centre is required to consult with the following communities who have been identified as potentially affected by your project.

Aamjiwnaang First Nation	Aamjiwnaang First Nation 978 Tashmoo Ave. Sarnia, ON N7T 7H5 519-336-8410 Chief Chris Plain chief@aamjiwnaang.ca Other Contacts: Sharilyn Johnston, Environment Coordinator sjohnston@aamjiwnaang.ca Christine James, Environment Worker cjames@aamjiwnaang.ca (same mailing address for all)	Sarnia, ON
Bkejwanong Territory (Walpole Island First Nation)	Bkejwanong Territory 117 Tahgahoning Road R.R.#3 Wallaceburg, ON N8K 4K9 519-627-1481 Chief Dan Miskokomon drskoke@wifn.org Other Contacts: Dean Jacobs, Consultation Manager Walpole Island Heritage Centre 2185 River Road R.R.#3 Wallaceburg, ON N8K 4K9 519-627-1475 dean.jacobs@wifn.org and Janet Macbeth, Project Review Coordinator janet.macbeth@wifn.org	Wallaceburg, ON
Chippewas of Kettle and Stony Point First Nation	Chippewas of Kettle and Stony Point First Nation 6247 Indian Lane, R.R.#2 Forest, ON N0N 1J1 519-786-2125 Chief Jason Henry jason.henry@kettlepoint.org Other Contact: Valerie George Consultation Officer valerie.george@kettlepoint.org	Forest, ON
Chippewas of the Thames First Nation	Chippewas of the Thames First Nation 320 Chippewa Rd., Muncey, ON N0L 1Y0 519-289-5555 Chief Myeengun Henry myeengun@cottfn.com Other Contacts: Kelly Riley, Acting Director - Lands & Environment kriley@cottfn.com Consultation Manager : Fallon Burch (Notices should be sent to Chief with an email copy to consultation@cottfn.com) Consultation email: consultation@cottfn.com	Muncey, ON
Caldwell First Nation	Caldwell First Nation 14 Orange St. Leamington, ON N8H 3W3 519-322-1766 or 1-800-206-7522 Chief Mary Duckworth chief.duckworth@caldwellfirstnation.ca Executive Administrator Nikki Orosz nikki.orosz@caldwellfirstnation.ca	Leamington, ON
Oneida Nation of the Thames ONYOTA'A:KA	Oneida Nation of the Thames 2212 Elm Ave. Southwold, ON N0L 2G0 519-652-3244 Chief Jessica Hill jessica.hill@oneida.on.ca Other Contact: Political Office Manager Email: cherilyn.hill@oneida.on.ca Tel: (519) 318-4593 Environment Contact: Brandon Doxtator, Environment Coordinator Email: environment@oneida.on.ca Phone (519) 652-6922	London, ON

Munsee-Delaware Nation	Munsee-Delaware Nation 289 Jubilee Rd R.R.#1 Muncey, ON N0L 1Y0 519-289-5396 Chief Roger Thomas chief@munsee.ca Other Contact: Glenn Forrest, Band Manager glenn@munsee.ca Other Consultation contact: Stacey Phillips Ph (519) 289-5396 X229 Email: consultation@munsee.ca	London, ON
Eelünaapéewi Lahkéewiit (Delaware Nation)	Delaware Nation 14760 School House Line R.R.#3 Thamesville, ON N0P 2K0 519-692-3936 Chief Denise Stonefish denise.stonefish@delawarenation.on.ca	Thamesville, ON

Steps that you may need to take in relation to Aboriginal consultation for your proposed project are outlined in the "Code of Practice for Consultation in Ontario's Environmental Assessment Process" which can be found at the following link:

https://www.ontario.ca/document/consultation-ontarios-environmental-assessment-process

Additional information related to Ontario's *Environmental Assessment Act* is available online at:

www.ontario.ca/environmentalassessments

You must contact the Director of Environmental Assessment and Permissions Branch (Director) under the following circumstances subsequent to initial discussions with the communities identified by MOECC:

- Aboriginal or treaty rights impacts are identified to you by the communities;
- You have reason to believe that your proposed project may adversely affect an Aboriginal or treaty right;
- Consultation has reached an impasse;
- A Part II Order request or elevation request is expected.

The Director can be notified either by email, mail or fax using the information provided below:

Email:	enviropermissions@ontario.ca Subject: Potential Duty to Consult
Fax:	416-314-8452
Address:	Environmental Assessment and Permissions Branch 135 St. Clair Avenue West, 1st Floor Toronto, ON, M4V 1P5

The MECP will then assess the extent of any Crown duty to consult for the circumstances and will consider whether additional steps should be taken, including what role the County of Elgin will be asked to play should additional steps and activities be required.

Source Water Protection

As per the recent amendments to the Municipal Engineers Association (MEA) Class Environmental Assessment parent document approved October 2015, proponents undertaking a Municipal Class EA project must identify early in the process whether a project is occurring within a source water protection vulnerable area. This must be clearly documented in an ESR. If the project is occurring in a vulnerable area, then there may be policies in the local Source Protection Plan (SPP) that need to be addressed (requirements under the Clean Water Act). The proponent should contact and consult with the appropriate Conservation Authority/Source Protection Authority (CA/SPA) to discuss potential considerations and policies in the SPP that apply to the project.

Please include a section in the report on Source Water Protection. Specifically, it should discuss whether or not the project is located in a vulnerable area or changes or creates new vulnerable areas and provide applicable details about the area. If located in a vulnerable area, proponents should document whether any project activities are a prescribed drinking water threat and thus pose a risk to drinking water (this should be consulted on with the appropriate CA/SPA). Where an activity poses a risk to drinking water, the proponent must document and discuss in the Project File Report/ESR how the project adheres to or has regard to applicable policies in the local SPP. If creating or changing a vulnerable area, proponents should document whether any existing uses or activities may potentially be affected by the implementation of source protection policies. This section should then be used to inform and should be reflected in other sections of the report, such as the identification of net positive/ negative effects of alternatives, mitigation measures, evaluation of alternatives etc. As a note, even if the project activities in a vulnerable area are deemed not to be a drinking water risk, there may be other policies that apply and so consultation with the local CA/SPA is important.

Climate Change

The Municipality of Thames Centre is strongly encouraged to include climate change in this EA. Climate change should be considered in the context of mitigation and the context of adaptation. The Ministry has recently released a guidance document to support proponents in including climate change in environmental assessments. The guide can be found online: https://www.ontario.ca/page/considering-climate-change-environmental-assessment-process. It should be noted that Climatic Features is identified in Appendix 2 of the Municipal Class EA page 2-7 (2015).

Part II Order Request Form

Please note that as of July 1, 2018, a Part II Order Request Form must be used to request a Part II Order as per O. Reg. 152/18. Accordingly, please include those details when conveying information regarding the Part II Order process such as on the Notice of Completion. The following sample text would cover this requirement in the Notice of Completion for this project:

"As of July 1, 2018, a Part II Order Request Form must be used to request a Part II Order in accordance with O. Reg. 152/18. The Part II Order Request Form is available online on the Forms Repository website (http://www.forms.ssb.gov.on.ca/) by searching "Part II Order" or "012-2206E" (the form ID number)."

Conclusion

Thank you for the opportunity to comment on this project. Please keep this office fully informed of the status of this project as it proceeds through the Class EA process. All future correspondence with respect to this project should be sent to my attention, as I am this ministry's one window contact for this project, Craig Newton, Regional Environmental Planner / Regional EA Coordinator at (519) 873-5014 or by email at craig.newton@ontario.ca

A draft copy of the Environmental Study Report (ESR) should be sent to the appropriate MOECC regional office before the Municipality of Thames Centre issues its notice of completion of the final report. Allow a minimum of 30 days for MECP's technical reviewers to provide comments on the draft ESR.

When the ESR is finalized, please send the Notice of Completion and final documentation to me.

Should you or any members of your project team have any questions regarding the material above, please contact me directly.

Yours truly,

Craig Newton
Regional Environmental Planner / Regional EA Coordinator
Ministry of Environment, Conservation and Parks
733 Exeter Road
London ON, N6E 1L3
519-873-5014

cc Mr. Rob Wrigley, District Manager, MECP London District
Ms. Julien Bell, P. Eng., GM BluePlan Engineering Limited

Danielle MacKinnon - GM BluePlan

From:	Julien Bell - GM BluePlan
Sent:	Wednesday, June 19, 2019 2:33 PM
To:	Danielle MacKinnon - GM BluePlan
Subject:	FW: Water and Wastewater Master Plan Update, Municipality of Thames Centre
Attachments:	418109-190531-PIC-PIC No. 1-e03.pdf

Julien Bell, P.Eng.
Infrastructure Planning, Partner

GM BluePlan Engineering Limited
330 Trillium Drive, Unit D | Kitchener ON N2E 3J2
t: 519.748.1440 ext. 4264 | c: 416.254.6247
julien.bell@gmblueplan.ca | www.gmblueplan.ca

From: Carlos Reyes <CReyes@thamescentre.on.ca>
Sent: Wednesday, June 19, 2019 2:28 PM
To: Fallon Burch <fburch@cottfn.com>
Cc: Julien Bell - GM BluePlan <julien.bell@gmblueplan.ca>
Subject: RE: Water and Wastewater Master Plan Update, Municipality of Thames Centre

Good afternoon Fallon,

As requested, please see the attached copy of the information shared at the Public Information Centre for the water and wastewater masterplan update. Let me know if you have any questions.

Thank you,

Carlos Reyes, CISEC, P.Eng.
Director of Environmental Services, **Municipality of Thames C**

Address 4305 Hamilton Road, Dorchester, Ontario. N0L 1G3
Phone (519) 268-7334 Ext. 245 **Fax** (519) 268-39
Email creyes@thamescentre.on.ca

*"**Confidentiality Notice:** The content of this communication, including the content of any accompanying attachments, is private and intended for the exclusive use of the intended recipient only. The content, including the content of any accompanying attachments may also contain information that is confidential, privileged and/or is exempt from disclosure pursuant to applicable law. If you are not the intended recipient, you are strictly prohibited from reading, using, disclosing, copying, or distributing this e-mail or any of its content. If you have received this e-mail in error, please notify the sender by reply e-mail immediately (**creyes@thamescentre.on.ca**) and permanently delete this e-mail and its attachments along with any copies thereof. Thank you for your cooperation."*

From: Fallon Burch [mailto:fburch@cottfn.com]
Sent: Wednesday, June 19, 2019 12:13 PM

To: Carlos Reyes <CReyes@thamescentre.on.ca>
Cc: julien.bell@gmblueplan.ca
Subject: Water and Wastewater Master Plan Update, Municipality of Thames Centre

Good afternoon Mr. Reyes,

Can you please send me the information shared at the Public Information Centre held on May 30th, 2019.

Thank you,

Fallon Burch
Consultation Coordinator, Chippewas of the Thames First Nation
320 Chippewa Rd Muncey, ON N0L 1Y0 | 519-289-5555 | www.cottfn.com/consultation

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Appendix F: Report to Council

Appendix G: Notice of Study Completion

Appendix H: 30 Day Review Period