

Smithville Master Community Plan

Water and Wastewater Master Servicing Plan

Township of West Lincoln

60619866

March 2023

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Executive Summary

The Smithville settlement area located in the Township of West Lincoln, in the Niagara Region is currently planning for the expansion of the existing urban boundary to accommodate the anticipated growth. A key feature of the planned growth will be the development of a water and wastewater servicing system that supports the uses and needs of existing populations whilst supplying the future capacity and options to support the growth of the area. This water and wastewater master servicing plan document sets out to provide an understanding of the existing water and wastewater infrastructure, the potential demand of proposed development, the potential permits needed for development, and the infrastructure and programs recommended to provide a sustainable service for Smithville.

Smithville is located on a key east west corridor in the Niagara peninsula (Highway 20), while also being home to about six thousand people and a number of industries and businesses. Current water and wastewater systems are serviced by a single water pumping station and two sanitary pumping stations. The Township has not previously had a Water and Wastewater Master Plan (W-WW MP), however as a lower tier municipality, major water and wastewater infrastructure has been previously identified in various iterations of the Niagara Region Water and Wastewater Master Plan. In addition to the Region's Master Plan, provincial and Township policies and guidance have been utilised to develop a vision and series of objectives that the W-WW MP should aim to follow:

1. Create a complete water and wastewater network;
2. Incorporate both local and regional economic growth;
3. Sustainably servicing to the community; and
4. Consistent implementation.

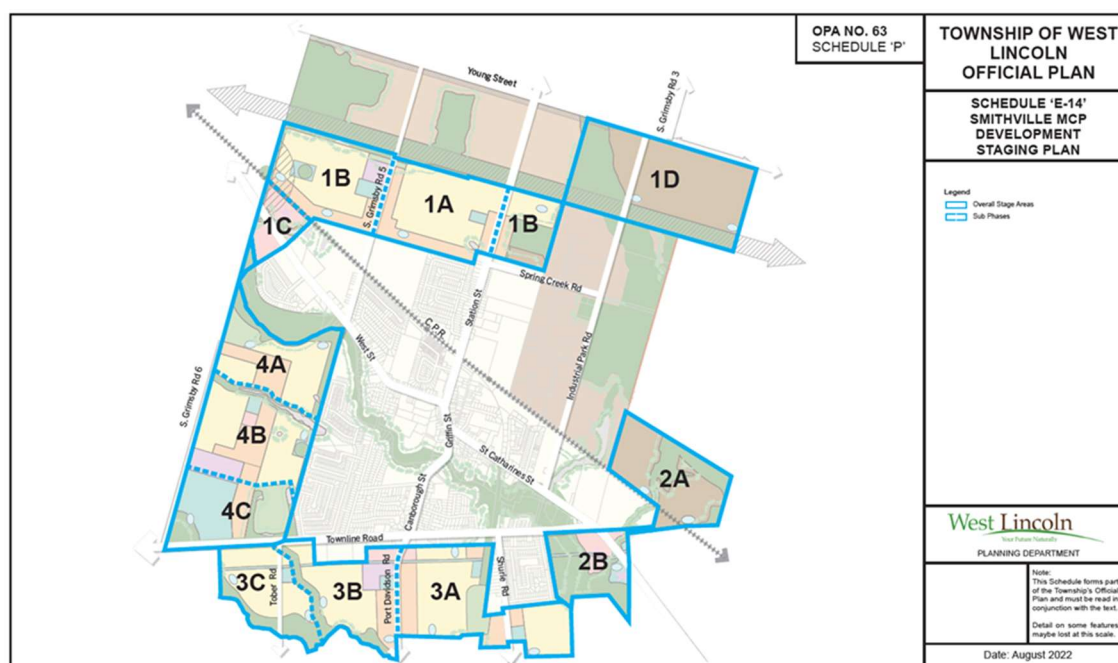
The Smithville settlement area currently has a water-wastewater network that is developed around one water pumping station and two sewer pumping stations. In addition, Smithville is dependent on an inground reservoir, an elevated storage facility and two sewer lift stations. The current overall water-wastewater system is comprised of roughly 33km of watermains and 34km of sewerlines and provides servicing to a population of 7140 and 1860 jobs. Whilst the infrastructure network within the existing urban boundary of Smithville is extensive, current imaging highlights the network as a limiting factor in population growth.

The urban boundary expansion and associated development will bring an additional 540 hectares adjacent to the current Smithville urban boundary, effectively doubling the size

of the community of Smithville, and leading to a forecasted population of about 29,000 by 2051. This level of growth requires an assessment of the existing water and wastewater network to understand what the possible impacts of the new development are, this exercise was conducted using a hydraulic model which replicates existing water and wastewater conditions and servicing capacity and then forecasts the growth system usage as a result of the new development.

The development Staging Plan was prepared as part of OPA No. 63 and is shown in Figure ES-1.

Figure ES-1: Development Staging Plan



The Master Community Plan (MCP) is a 30-year plan for accommodating growth in Smithville to 2051 through both intensification and greenfield development to achieve a complete community. To achieve the level of growth planned in a well designed, balanced and inclusive manner, while ensuring minimal disruption to the existing community it is necessary to develop an orderly and aligned staging program for the provision of the necessary infrastructure, transportation improvements and community facilities. The development rational and identification of infrastructure to support the development of Smithville are detailed in a series of supporting Master Plans.

Policy 6.11.7.6.3 h) of Official Plan Amendment 63 (OPA 63) provides that “The Township may, at its sole discretion, revise the Development Staging Plan without an amendment to this Plan where circumstances warrant, such as, but not limited to, unreasonable delay

by landowner(s), in order to facilitate the planned progression of growth and development in a manner that supports the implementation of the MCP.” The policies provide for an appropriate level of flexibility and provide a solid framework for implementation through more detailed Block Plans, MESP’s and EA addendums, while acknowledging that future updates and changes may be needed over the 30-year time period of the plan.

Although the various Master Plan documents set out anticipated timescales and staging program for the design and implementation of various infrastructure requirements within Smithville. The flexibility provisions of OPA 63 have been specifically designed to reflect the need to accommodate changes and adjustment that can occur over the 30-year planning horizon of the Master Community Plan. OPA 63 recommendations were presented to the public, Council, and the landowners on multiple occasions including: the Public Meeting, Council adoption of OPA 63, and TAC meetings as late as December 16, 2022.

As part of the Township’s Official Plan, additional flexibility is provided through periodic review and updating of the plan and policies over the 30-year planning horizon of the plan.

The water and wastewater system assessment forms the primary method for assessing possible mitigation measures which can include upgrades to existing servicing infrastructure as well as the development of new infrastructure including water and forcemains, gravity sewers, and pumps.

In assessing the existing water system, it was identified that the available pumping capacity at the existing London Road Pumping Station would be sufficient to meet the projected demands with the future Smithville Elevated Tank being implemented. An additional pump would be required at the station to meet the fire flow requirement. The future elevated tank has been identified in the Regional’s DC Study (Region’s DC Study project no.: W-S-010)

In assessing the existing wastewater system involving the Smithville SPS and Streamside SPS, it was identified that both stations require pumping capacity upgrades to meet the future peak wet weather flow. The Region is currently undergoing a capacity increase at Streamside SPS; the upgraded station is expected to provide adequate capacity to address the future peak wet weather flow. The Region also identified a future upgrade at the Smithville SPS in their DC study for addressing the future needs (Region’s DC Study project no.: WW-SPS-012).

Current urban boundary expansion plans were developed to improve existing infrastructure and center around four distinct development Stages (1-4) with each Stage

requiring an individualized water and wastewater servicing strategy to both fit the needs of Township and minimize impacts. The following section provides the list of preferred options for each stage’s servicing strategy.

Stage	Preferred Water Servicing Strategy	Preferred Wastewater Servicing Strategy
1	S1W1	S1WW1
2	S2W2	S2WW1
3	S3W1	S3WW1A, S3-FM1B, S3WW2A
4	S4W3	S4WW1, S4-FM2

Figures ES-2 and ES-3 present the preferred water and wastewater servicing strategy, respectively.

Figure ES-2: Preferred Water Servicing Strategy

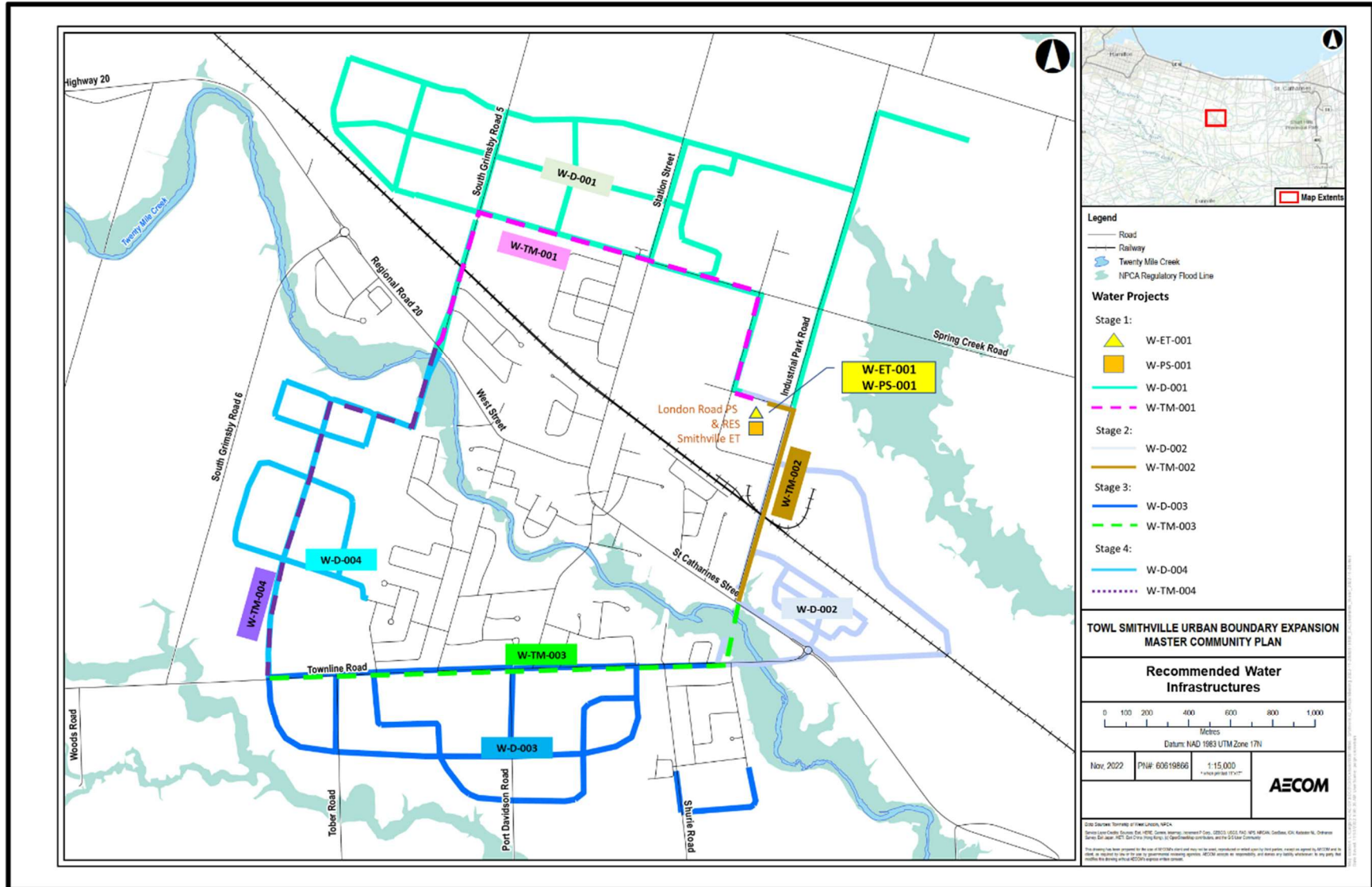


Figure ES-3: Preferred Wastewater Servicing Strategy

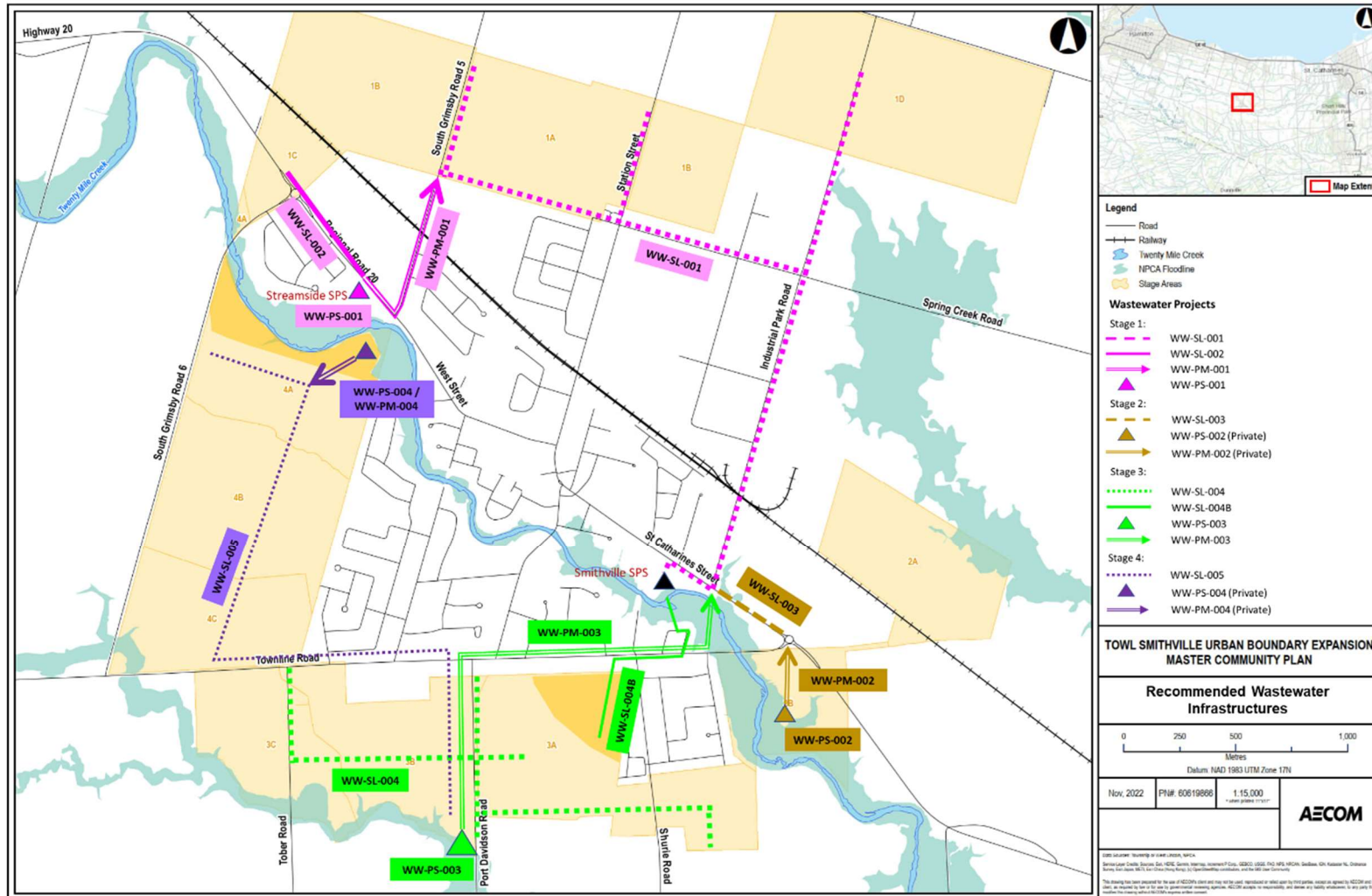


Table ES-1: Capital Costs Summary for the Recommended Water Infrastructures for the Township of West Lincoln

Capital Project ID	Stage	Descriptions	Size	Costs (2022\$)	Class EA Project Schedule	Anticipated Schedule
W-D-001	1	Local distribution mains for Stage 1	300mm	\$ 13,579,650	A	Next 10 years
W-D-002	2	Local distribution mains for Stage 2	300mm	\$ 5,308,538	A	Next 10 years
W-D-003	3	Local distribution mains for Stage 3	300mm	\$ 7,763,648	A	10 – 20 years
W-D-004	4	Local distribution mains for Stage 4	300mm	\$ 4,235,490	A	> 20 years

Table ES-2: Capital Costs Summary for the Recommended Water Infrastructures for the Region of Niagara

Capital Project ID	Stage	Descriptions	Size	Costs (2022\$)	Class EA Project Schedule	Anticipated Implementation Schedule
W-TM-001	1	<ul style="list-style-type: none"> • Watermain extends northerly on South Grimsby Road 5 from Regional Road 20 to Spring Creek Road • Easternly along Spring Creek Road to Thompson Road • Southernly on Thompson Road and easternly to London Road pumping station • No crossing of Twenty Mile Creek • Crossing of rail tracks on South Grimsby Road 5 	400mm	\$ 5,852,576	A	Next 10 years
W-TM-002	2	<ul style="list-style-type: none"> • Watermain extends southernly from London Road Pumping Station towards Industrial Park Road and Regional Road 20 (St Catharines Street) intersection • No crossing of Twenty Mile Creek 	400mm	\$ 3,787,184	A	Next 10 years

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Capital Project ID	Stage	Descriptions	Size	Costs (2022\$)	Class EA Project Schedule	Anticipated Implementation Schedule
		<ul style="list-style-type: none"> • Crossing of rail tracks on Industrial Park Road 				
W-TM-003	3	<ul style="list-style-type: none"> • New watermain extends easterly along Townline Road to existing North South easement east of Anderson Crescent • Northernly from easement to Industrial Park Road / Regional Road 20 and connection future Stage 2 watermain • Trenchless crossing of Twenty Mile Creek south of Industrial Park Road and Regional Road 20 	400mm	\$ 8,674,160	A	10 – 20 years
W-TM-004	4	<ul style="list-style-type: none"> • Watermain extends southernly from Regional Road 20 along future development lands to Townline Road • Trenchless crossing of Twenty Mile Creek on South Grimsby Road 5 • Within planned utility / active transportation corridor and planned Stage 4 local collector road • Southernly on local north south collector road to Townline Road 	400mm	\$ 8,311,280	A	> 20 years
W-ET-001	1	New elevated tank (8.8ML)	8.8ML	\$ 14,850,000	B	Next 10 years
W-PS-001	1	Dedicated fire pump (356L/s)	356L/s	\$ 675,000	A	Next 10 years

Table ES-3: Capital Costs Summary for Recommended Wastewater Infrastructures for the Township of West Lincoln

Capital Project ID	Stage	Descriptions	Size	Costs (2022\$)	Class EA Project Schedule ¹	Anticipated Implementation Schedule
WW-SL-001	1	<ul style="list-style-type: none"> • New sewer gravity main on Spring Creek Road from South Grimsby Road 5 and easterly to Industrial Park Road • Gravity sewer continues southernly down Industrial Park Road • Industrial Park to Regional Road 20 • Westerly on Regional Road 20 to Smithville Pumping Station • No crossing of Twenty Mile Creek required • Crossing of rail tracks on Industrial Park Road 	375 - 525mm	\$ 10,352,238	A	Next 10 years
WW-SL-002	1	<ul style="list-style-type: none"> • New gravity main on Regional Road 20 to Streamside Sanitary Pumping Station 	375mm	\$ 1,556,820	A	Next 10 years
WW-SL-003	2	<ul style="list-style-type: none"> • New sewer gravity main from Smithville sanitary pumping station on east side from Regional Road 20 (St Catharines Street) towards Townline Road • No crossing of Twenty Mile Creek required • No crossing of rail tracks 	375 - 525mm	\$ 1,826,904	A	Next 10 years

¹(as approved under the integrated MCEA process and subject to no OPA 63 appeal

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Capital Project ID	Stage	Descriptions	Size	Costs (2022\$)	Class EA Project Schedule ¹	Anticipated Implementation Schedule
WW-SL-004	3	<ul style="list-style-type: none"> • New Gravity Sewer follows Stage 3 North South and easterly local collector road starting at Townline Road • Connection to new SPS at Port Davidson Road / North Creek • Also includes flow from new gravity sewers within Stage 3 east of Port Davidson Road • Trenchless crossing of Twenty Mile Creek required • Does not service Stage 4 	375-525mm	\$ 8,132,061	A	10 – 20 years
WW-SL-004B	3	<ul style="list-style-type: none"> • New gravity sewer northerly from Stage 3A area to Townline Road • Easternly along Townline Road to Anderson Crescent • Northernly on Anderson Crescent via existing easement to southside of Twenty Mile Creek 	New gravity sewerline: 250mm Ex. Gravity sewerline replacement 250mm / 300mm	\$ 727,935	A	Nex 10 years
WW-SL-005	4	<ul style="list-style-type: none"> • Gravity sewer starting at north end of South Grimsby Road 6 • Easternly across the Stage 4 local collector road • Southernly on north south local collector road to Townline Road • Connects directly to future Port Davidson SPS 	300-525mm	\$ 5,939,325	A	> 20 years
WW-PS-002	2	<ul style="list-style-type: none"> • New SPS for Stage 2B • Assumed to be privately owned / operated pumping system 	4.8L/s	\$ 0	Subject to Town's / Region's approval	Next 10 years

Capital Project ID	Stage	Descriptions	Size	Costs (2022\$)	Class EA Project Schedule ¹	Anticipated Implementation Schedule
WW-PS-003 ²	3	<ul style="list-style-type: none"> Infrastructure Option S1; New SPS for Stages 3 & 4 	142L/s	\$ 4,374,000	A	10 – 20 years
WW-PS-004 / WW-PM-004	4A	<ul style="list-style-type: none"> New SPS on south side of Twenty Mile Creek within staging area 4A; this station is considered a private pumping system New forcemain on Regional Road 20 to future gravity sewer within Stage 4 	7.0 L/s / 200mm	\$ 0	Subject to Town's / Region's approval	> 20 years
WW-PM-002	2	<ul style="list-style-type: none"> New FM for future SPS to future gravity sewer on RR20 Assumed to be privately owned / operated pumping system 	150mm	\$ 0	Subject to Town's / Region's approval	Next 10 years
WW-PM-003	3	<ul style="list-style-type: none"> New forcemain extending Northernly on port Davidson Road from SPS towards Townline road Easternly along Townline Road to watermain easement. Northernly through easement towards Twenty Mile Creek Trenchless crossing of Twenty Mile Creek Connects to future gravity sewer at Regional Road 20 and Industrial Park Road 	500mm	\$ 8,363,342	A	10 – 20 years

² Based on the required capacity for the SPS, the implementation of WW-PS-003 & WW-PM-003 would be completed by the Township and the Region of Niagara will assume the ownership and O&M in accordance with the Region's SPS policy

Table ES-4: Capital Costs Summary for the Recommended Wastewater Infrastructures for the Region of Niagara

Capital Project ID	Stage	Descriptions	Size	Costs (2022\$)	Class EA Project Schedule	Anticipated Implementation Schedule
WW-PS-001	1	Streamside SPS Upgrade; Increase capacity to 42.6L/s	42.6L/s	\$ 3,611,250	A	Next 10 years
WW-PM-001	1	New FM on South Grimsby Road 5 for Streamside SPS connect to future gravity sewer on Spring Creek Road	250mm	\$ 3,368,421	A	Next 10 years

In support of the modeling exercise a series of public and stakeholder engagement exercises were conducted to gain feedback and understand some of the challenges and opportunities facing Smithville. The information gathered from these exercises was reviewed and a series of mitigation measures that aligned with the stated objectives were developed and tested. In assessing the impacts of the proposed development around the Smithville settlement area, it was determined that there were several key measures that were required to mitigate the impacts of the new development on the water and wastewater system.

- The assessment indicated that either a water storage capacity increase or a new water pumping station is required to address the future water peak hour demands. In addition, a new sewer pumping station and new forcemains are required to address the future wet weather demands.
- A significant amount of development is planned on either side of Twenty Mile Creek and North Creek. To address this, a number of trenchless crossings are required to service future developments.
- The reduction of construction complexity will be a key part of reducing the impact of maintenance works for the new system. By employing designs with shorter pipe distances, easier access and less potential disturbances it ensures that potential infrastructure repairs can be completed in a timely manner.

The W-WW MP has developed a capital program to support the phased implementation of the various water and wastewater infrastructure programs which is tied to the block plan process proposed under official plan amendment 63 (OPA 63). In developing the

options and measures for implementation the W-WW MP has addressed the phase 1 and 2 requirements of the Municipal Class Environmental Assessment process, and has also identified Class D cost estimates for each of the proposed measures. The recommended capital works will provide all necessary information to support the required Township's DC study update.

The Smithville W-WW MP represents a key document for the future development of the Smithville settlement area, providing an infrastructure network to support the growth and development within the settlement area, while maintaining the needs and expectations of existing residents and businesses to have adequate connection to water and wastewater services. The W-WW MP also supports the development of industrial and commercial facilities that increase employment opportunities in Smithville, promoting continued economic development and prosperity.

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1. Introduction

The urban settlement area of Smithville is located within the Township of West Lincoln (Township) in the Niagara Region (Region). Outside of its current boundaries, Smithville is surrounded by lands that are primarily classified as rural and agricultural. With a 2022 population and employment of approximately 7,415 and 1,865, respectively, this community is anticipated to grow substantially in the coming years. It is forecasted that Smithville will have an estimated population and employment of approximately 29,030 and 7,360, respectively, by 2051. In response, an urban boundary expansion study was determined to be needed to address this forecasted growth and would be carried out through a Master Community Plan (MCP)

The MCP for Smithville envisions a community that is complete, healthy, compact, and resilient. Overall, the MCP assesses potential land for the urban boundary expansion and considers how this area could be developed for a variety of land uses and to what density target. This plan is comprised of multiple studies, including the Subwatershed Study, Agricultural Impact Study, Financial Impact Study, Transportation Master Plan, Water and Wastewater Master Servicing Plan and the Integrated Municipal Class Environmental Assessment Master Servicing Plan

This document outlines the Water and Wastewater Master Servicing Plan for Smithville; its overview and vision is outlined in the following subsections.

1.1 Water and Wastewater Master Servicing Plan Overview

Smithville is the only Urban Settlement Area designated in the Township of West Lincoln Official Plan (additionally, there are 15 Hamlet Settlement Areas identified) and is intended as the primary focus of housing and employment growth in the Township and for the provision of related municipal infrastructure, community facilities and services. Smithville is considered as one of the fastest growing areas within the Region.

The Region of Niagara is responsible for providing the following key water and wastewater servicing infrastructure for Smithville:

- ◆ water treatment, transmission, storage facilities and pumping stations; and
- ◆ wastewater treatment, forcemains and sewage pumping stations.

With the continued growth in Smithville, there is increasing evidence of a need for strategies to manage current and future water demands and sanitary sewer flows within the Township; in addition there is a need to establish and plan for future improvements

integrated with local growth and development and coordinated with Region’s planned infrastructure.

The Water and Wastewater Master Plan for the Smithville MCP is a study intended to address the increasing demands on the Township’s and Region’s water and wastewater infrastructure. The study provides a review, evaluation, and development of water and wastewater servicing strategies for the preferred urban boundary expansion concept and associated MCP.

1.2 Vision

The overall vision for the Smithville Water and Wastewater Master Servicing Plan can be organized into three categories: the vision, the goals, and the objectives. To ensure they aligned with one another, the goals were based on the vision and the objectives were derived from the goals. Each category became increasingly specific the further away from the vision it moved.

The vision for the Smithville Water and Wastewater Master Servicing Plan is important to provide a focused, serviceability-related direction moving forward for the community. As the master servicing plan must align with the directions of the Township of West Lincoln and the Niagara Region, the following six documents were reviewed to develop this statement:

<u>Township of West Lincoln</u>	<u>Niagara Region</u>
Official Plan (Consolidated 2019)	Official Plan (2022)
Corporate Strategic Plan 2019-2029 (2019)	Water and Wastewater Master Plan (2016)
	Development Charge Study (2022)
	Baker Road WWTP PPCP Study (2022)

Through the review of the documents, key overlapping points in their visions and objectives were determined and then combined. While the directions from both the Township and Region were consistent with one another, that of the Township of West Lincoln had a heavier focus on the distinct elements of the Township, noting Smithville’s small-town, rural, and community qualities specifically. These distinct elements were

maintained when creating the vision, goals, and objectives for the water and wastewater master servicing plan.

The following is the vision for the Smithville water and wastewater servicing:

Smithville will consist of an infrastructure network that provides residents with safe and sustainable water and wastewater services, promotes economic growth, and will allow for the community to sustainably evolve with a small-town focus.

To support the vision, 4 goals were developed by identifying key categories that related to this statement. These goals were then derived into further objectives.

The goals for the Water and Wastewater Master Servicing Plan are as follows, and are further explained in the following subsections:

- 1. Create a complete water and wastewater network;**
- 2. Incorporate both local and regional economic growth;**
- 3. Sustainably servicing to the community; and**
- 4. Consistent implementation.**

In addition to the above noted vision, the recommendations resulting from this Water and Wastewater Master Servicing Plan will provide the required information to support the required Township's DC Study Update.

1.2.1 Create A Complete Water and Wastewater Network

A component of the MCP vision for Smithville is that it will be a complete community, and as such, the water and wastewater network should be complete as well. This is to promote its sustainability in response to the proposed urban boundary expansion. It is also noted that the A Place to Grow: Growth Plan encourages co-ordinated and integrated Infrastructure Planning with Land Use Planning which has been implemented as part of the MCP process. A complete water and wastewater network would provide the required resiliency to maintain adequate services throughout and would support the overall needs of customers.

The objectives are as follows:

- ◆ Identify key servicing points and continue to develop system network around them;

- ◆ Support a consistent level of service within and through the community; and,
- ◆ Develop the networks that are complete yet still provides flexibility for change beyond the course of the master servicing plan.

1.2.2 Incorporate Both Local and Regional Economic Growth

The water and wastewater systems within Smithville must be able to support the population projections to address the growth related to the urban boundary expansion as well as the expected growth within the existing urban boundary for Smithville. The Official Plan of the Township of West Lincoln acknowledges that growth for commercial and industrial industries will primarily occur within Smithville, meaning that a water and wastewater system that can support this growth is critical for not only Smithville but the rest of the lower-tier municipality. In addition, these systems must also balance the economic priorities of the Region.

The objectives of this goal are:

- ◆ Support the growth of the local economy through the water and wastewater systems in key locations within the community;
- ◆ Through capital projects, support the further development of Smithville as the commercial and industrial centre for the lower-tier municipality, along with considering the interaction with surrounding agricultural uses; and,
- ◆ Identify ways for the local and regional economy to benefit from recommended capital projects.

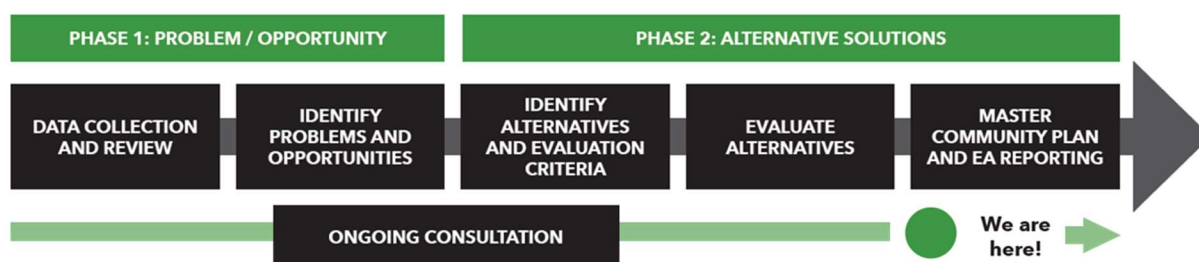
Articulate and support the achievement of the Vision for the future growth and expansion of Smithville to accommodate growth over a period of approximately 30 years (to 2051) as a complete, resilient and sustainable community with enhanced small-town character, a robust natural heritage system, efficient and optimized infrastructure systems, well-defined community edges, transportation choice and convenience, and supportive of the agricultural sector;

The following section will examine the existing system conditions within Smithville through a policy, inventory, and data review.

1.3 Integrated Planning Act and Municipal Class Environment Assessment

In addition to guiding the MCP land use concept/policy planning and OPA process, the Water and Wastewater Master Plan also supported the Integrated Municipal Class Environmental Assessment (MCEA) planning process that followed specific steps outlined in the Municipal Engineers Association MCEA document (as recently amended in 2015) and outlined in section A.2.9.3. The Water and Wastewater Master Plan study including their early succession phased reports or analysis findings provided inputs to the MCEA Phase 1 Problem/Opportunity Statement, and Phase 2 Alternatives evaluation. In addition, they identified recommended water and wastewater capital works projects as identified in Section 6, Table 6-1, and Table 6-3 in this report. The Phase 1 and 2 MCEA planning and consultation process is summarized below in Figure 1-1 and is described in more detail in the Integrated MCEA Master Servicing Plan report that describes the full MCEA identification and evaluation of alternatives. With respect to wastewater pumping stations, siting options were integrated with identified MCP stormwater management and park – open space blocks with low enough elevation that can receive gravity flows and provide adequate service for the area. Watermain and wastewater sanitary forcemain, and sewer alignments follow the preferred MCP road network and in some cases existing roads and easements that were evaluated and primarily focussed on crossing Twenty Mile Creek. Refer to the Integrated MCEA Master Servicing Plan report for more details.

Figure 1-1: MCEA Planning Process Diagram



Once OPA 63 is approved (subject to no appeals) select Schedule B projects are automatically approved as Schedule A projects. As per the MCEA document Appendix 1 Project Schedules, the establishment, extension or enlargement of a sewage collection system and water distribution system (Schedule A Wastewater Project # 10 and Schedule A Water Project # 6, respectively) which are a required as a condition of site plan, consent plan, plan of subdivision or condominium which come into affect under the Planning Act prior to construction of the works are automatically approved. It is also important to note that any change in infrastructure location (example sanitary pumping station) would be

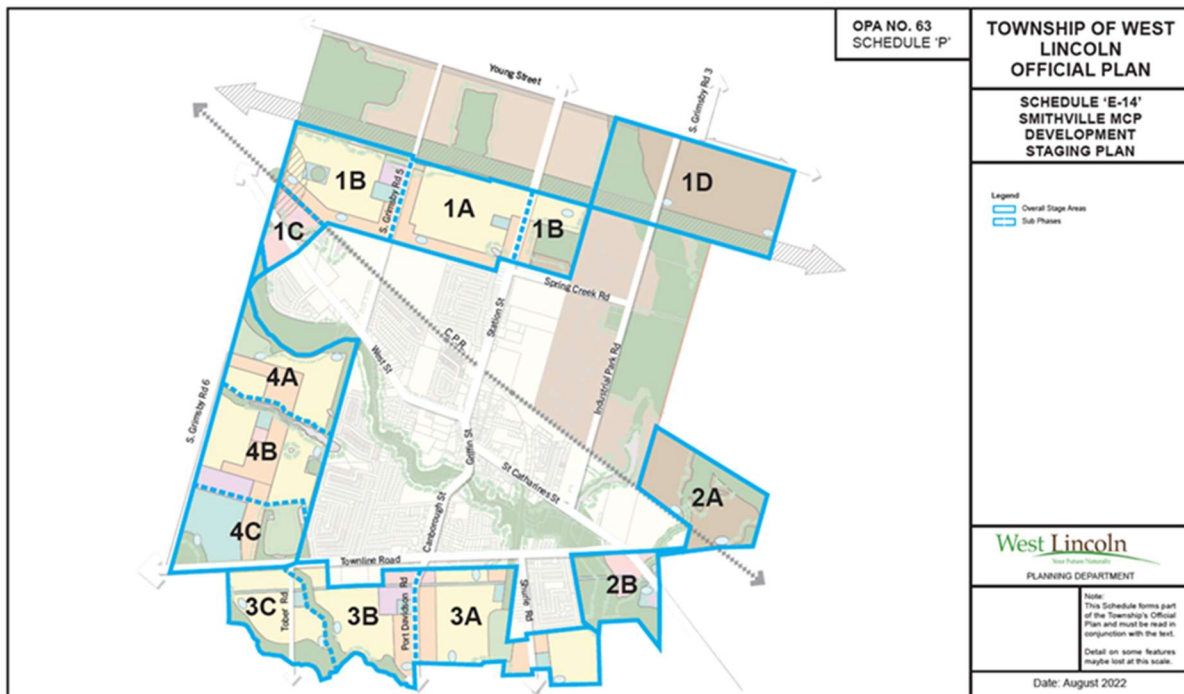
documented in a Master Environmental Servicing Plan and MCEA Addendum process in conjunction with block plan process.

1.4 Urban Boundary Expansion Concept Plan

MCP is a 30-year plan for accommodating growth in Smithville through both intensification and greenfield development to achieve a complete community in a logical and orderly manner aligned with the necessary infrastructure and transportation improvements and community facilities in alignment with Regional Master Plans.

The preferred Smithville urban boundary expansion including development staging is presented below in Figure 1-2.

Figure 1-2: Smithville Urban Boundary Expansion and Development Staging



The projected population for the Smithville urban boundary expansion is summarized below in Table 1-1.

Table 1-1: Projected Population for Smithville Urban Boundary Expansion

Population Type	Residential Population	Employment Population
Existing Condition (2021)³	7,140	1,850
Northwest Quadrant⁴	2,100	235
Spring Creek Heights Secondary Plan	95	280
Growth within Existing Urban Boundary	2,205	520
East Smithville Secondary Plan	2,380	695
Stage 1 Urban Boundary Expansion	5,565	1,740
Stage 2 Urban Boundary Expansion	0	630
Stage 3 Urban Boundary Expansion	5,550	725
Stage 4 Urban Boundary Expansion	3,995	675
Total	29,030	7,360

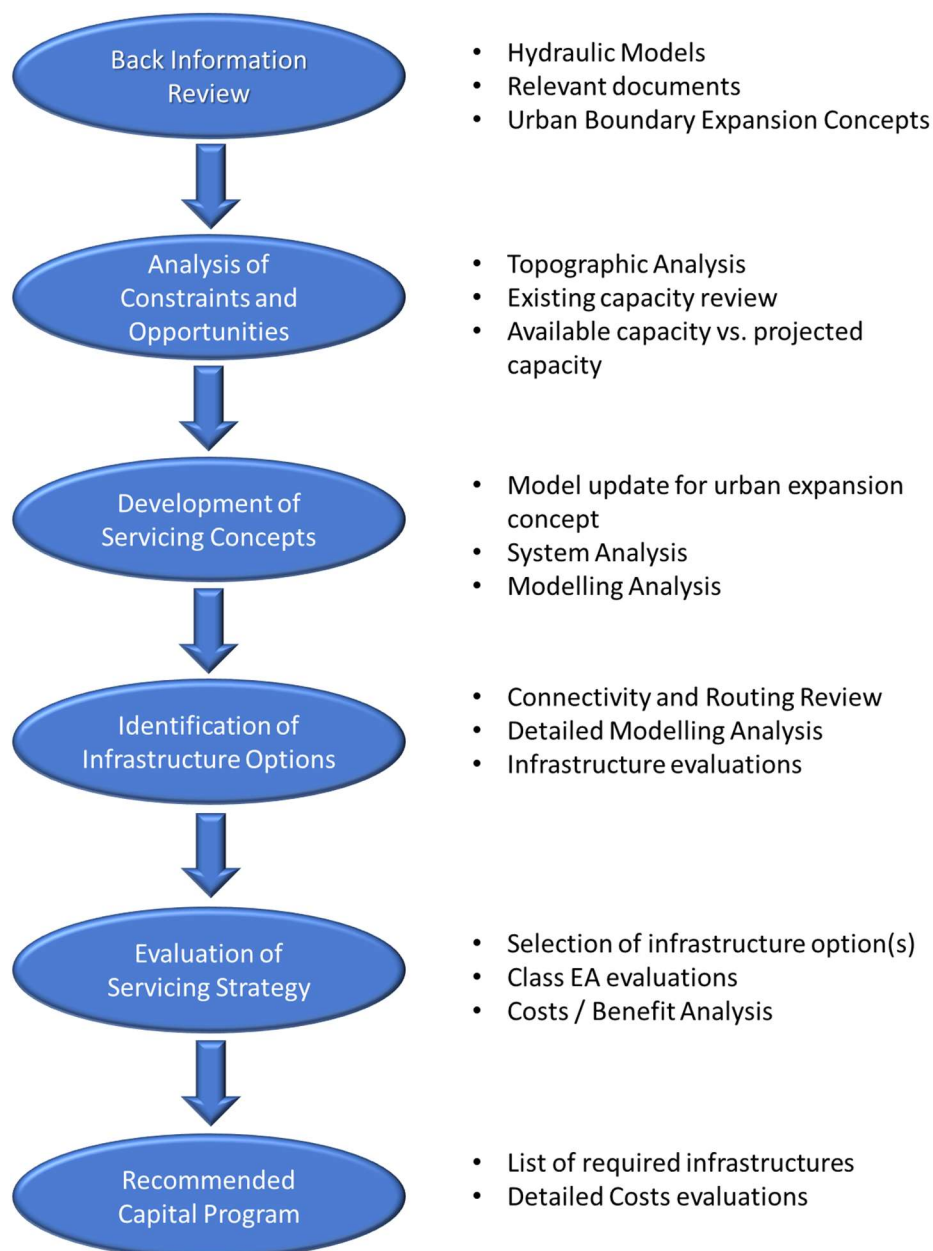
³ Based on Region of Niagara 2016 Water and Wastewater Master Plan Study

⁴ Dunloe, Marz and Station Meadows Developments

1.5 Approach for Water and Wastewater Strategy

To determine the recommended strategy for water and wastewater systems for the urban boundary expansion, the following approach in Figure 1-3 was applied.

Figure 1-3: Approach in Determining Recommended Strategy for Water and Wastewater Systems



2. Existing Water and Wastewater System

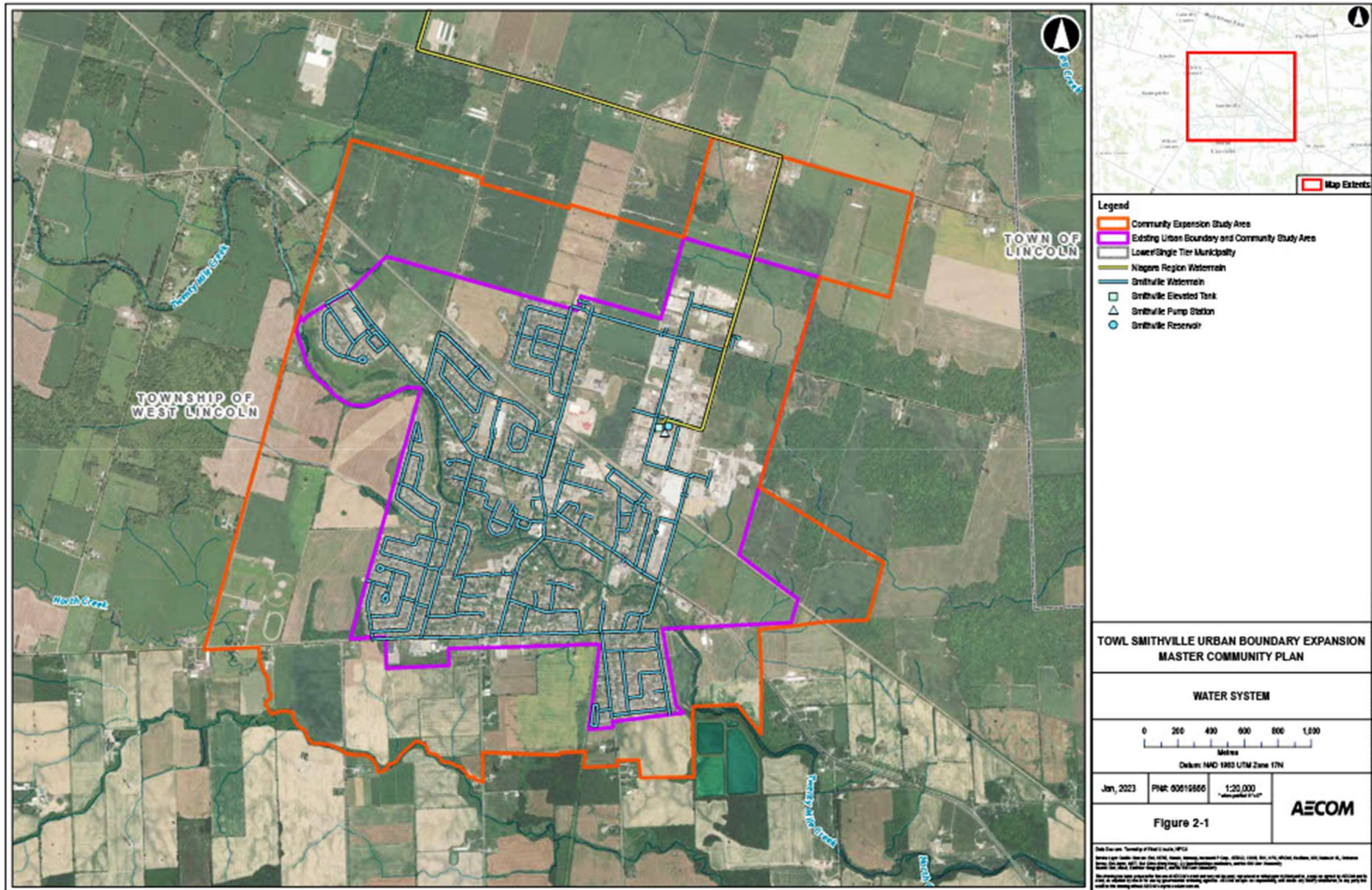
2.1 Existing Water System

The Smithville water system is an integral part of the overall Grimsby water system within the Region of Niagara. Treated water in the Grimsby water system is supplied to Smithville by the Grimsby Water Treatment Plant and the Region's transmission and pumping systems. The details of the overall Grimsby water system are well documented in the Region of Niagara Water and Wastewater Master Servicing Plan (2016) which is currently being updated.

Potable water for the Smithville water system is provided by the London Road Inground Reservoir via pumping at the London Road Pumping Station. The pressure moderations, fire flow and emergency water supply are provided by the existing Smithville Elevated Tank. The overall water distribution system comprises roughly 33km of watermains with sizes ranging from 150mm to 300mm. The following summarizes the key technical details of the water facilities responsible for providing potable water to Smithville and Figure 2-1 presents the existing Smithville Water System.

- ◆ Rated capacity of Grimsby Water Treatment Plant: 44.0 ML/d;
- ◆ London Road Inground Reservoir Capacity: 7.7 ML;
- ◆ Smithville Elevated Tank Capacity: 2.3 ML; and
- ◆ London Road Pumping Station Firm / Total Capacity: 19.4 ML/d / 25.9 ML/d.

Figure 2-1: Existing Smithville Water System



2.2 Water System Constraints and Opportunity

The constraints and opportunities for the existing Smithville water system were evaluated based on existing water facilities’ capacity, topography and existing water distribution system serviceability as indicated in the existing water hydraulic model provided by the Region. For reviewing the constraints and opportunities, the population information and water demands as per the Region’s 2016 Water and Wastewater Master Plan as shown in Table 2-1 was used as a basis for the evaluation.

Table 2-1: Region’s 2016 Water and Wastewater Master Plan Information for Water System

Region 2016 Water and Wastewater Master Plan Information	Existing	Future
Maximum Day Demand (MDD)	4.8 ML/d	11.7 ML/d
Peak Hour Demand⁵	9.6 ML/d	23.4 ML/d

The following sections provided the details of the evaluation results.

2.2.1 Pumping Capacity Review

Based on the existing firm pumping capacity of 19.4 ML/d at the London Road Pumping Station, the following Table 2-2 summarizes the constraints and opportunities from the available pumping capacity.

⁵ Peak hour demand factor of 2.0 times the average Maximum Day Demand was obtained from the Region’s MP Hydraulic Model

Table 2-2: London Road Pumping Capacity Constraints and Opportunity

Pump Capacity Evaluation Parameters	Flow	Capacity Surplus (+) or Deficit (-)
Existing Firm Capacity at London Road Pumping Station	19.4 ML/d	-
Existing Maximum Day Demands	4.8 ML/d	+14.6 ML/d
Existing Peak Hour Demands	9.6 ML/d	+9.8 ML/d
Future Maximum Day Demands	11.7 ML/d	+7.7 ML/d
Future Peak Hour Demands	23.4 ML/d	-4.0 ML/d

As noted above, the available pumping capacity at the existing London Road Pumping Station would be able to accommodate additional growth in the study area only if the storage capacity at the existing Smithville Elevated Tank could meet the required equalization storage. If the Smithville Elevated Tank could not meet the required equalization storage, a capacity increase at the London Road Pumping Station would be required to provide peak hour demand for future growth in the system. The next section covers the discussions on the storage capacity requirements, constraints and opportunities.

2.2.2 Storage Capacity Review

The storage requirement evaluation method was based on the MOECC's recommendation, which is consistent with those applied in the Region's Water and Wastewater Master Servicing Plan Study. The following summarizes the storage evaluation results.

Table 2-3: Storage Requirement Evaluations

Storage Components	Method	Existing Requirement	Future Requirement
A. Equalization	25% of MDD	1.2 ML	2.9 ML
B. Fire	MOECC Table 8-1	1.7 ML (159L/s for 3hr)	3.6 ML (250L/s for 4hr)
C. Emergency	25% of A+B	0.7 ML	1.6 ML
Total Storage	Sum of A, B and C	3.65 ML	8.16 ML

The storage evaluation results presented in Table 2-3 were compared with the available storage capacity in the existing Smithville system to determine the constraints and opportunities for water storage facilities. Table 2-4 summarizes the comparison results.

Table 2-4: Smithville Storage Capacity Constraints and Opportunity

Storage Capacity Evaluation Parameters	Storage Capacity	Capacity Surplus (+) / Deficit (-)
Existing Smithville Elevated Tank (floating storage)	2.3 ML/d	-
Existing London Road Reservoir (require pumping to deliver required storage)	7.7 ML/d	-
Required Storage for Existing conditions	3.65 ML/d	-1.35 ML / +6.35ML
Required Storage for Future conditions	8.16 ML/d	-5.86 ML / +1.84ML

According to Table 2-4, the existing storages for the Smithville water system were sufficient to meet the existing and future conditions with storage to be delivered via pumping from the London Road Inground Reservoir (surplus of 6.35 ML and 1.84 ML for existing and future conditions, respectively). With pumping applied to deliver the storage, the existing Smithville Elevated Tank would not be able to meet the required storage (deficit of 1.35 ML and 5.86 ML for existing and future, respectively).

According to the information that was shared by the Region, the Smithville Elevated Tank is reaching its service life expectancy and it could be replaced by a new elevated tank with larger capacity to provide full floating storage to Smithville water system.

2.2.3 Storage Vs. Pumping

When considering the pump capacity review results and storage capacity review results as presented in Section 2.2.1 and Section 2.2.2, respectively, the following opportunities were identified for supporting the urban boundary expansion:

Option 1: Maintain existing storage facilities / capacity. This option will require the following potential infrastructure upgrades:

- ◆ Sufficient standby power to provide emergency storage;
- ◆ Increase pump capacity to provide fire storage (fire flow); and
- ◆ Increase pump capacity with variable frequency drive capability to provide equalization storage for future condition only; existing floating storage in Smithville Elevated Tank was sufficient to meet the existing equalization requirement.

Option 2: Replace existing Smithville Elevated Tank to provide full floating storage to Smithville water system (≥ 8.16 ML). This option could avoid London Road Pumping Station upgrades as noted in Option 1 since the available pumping capacity had a surplus capacity of 7.7 ML/d to accommodate future growth.

Option 3: Replace existing Smithville Elevated Tank to provide partial floating storage to minimize the potential infrastructure upgrades at London Road Pumping Station as noted in Option 1. This option could minimize the potential water quality concerns that could happen in Option 2 due to lack of demands when a larger elevated tank is commissioned. The following sub-options could be considered for the future Smithville Elevated Tank:

Option 3A: To meet equalization storage only. The following upgrades in London Road Pumping Station would be required:

- ◆ Sufficient standby power to provide emergency storage; and

- ◆ Increase pump capacity to provide fire storage (fire flow).

Option 3B: To meet equalization and fire storage. The following upgrades to the London Road Pumping Station would be required:

- ◆ Sufficient standby power to provide emergency storage; potable standby power unit could be considered if station building expandability was not feasible.

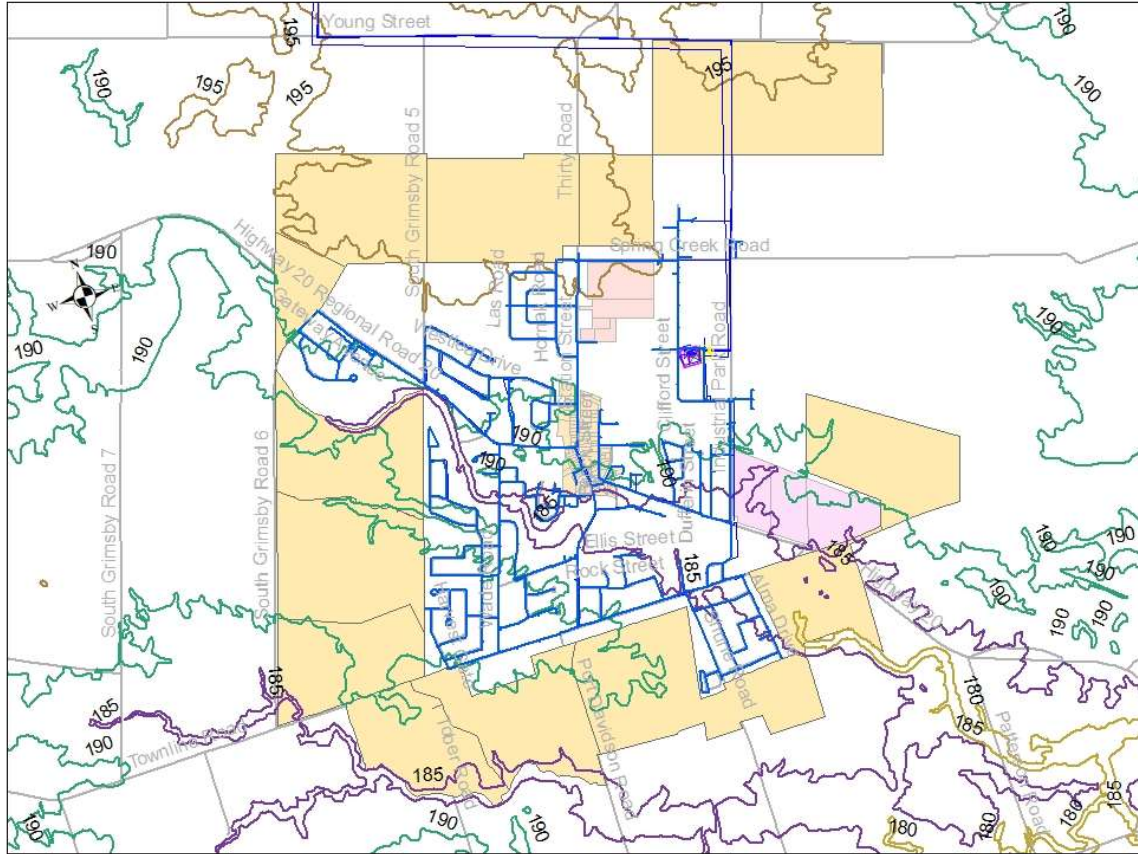
2.2.4 Topography Review

A high level review of the existing topography in the Smithville Water System was conducted to confirm the need for new pressure zone(s) to support the proposed urban boundary expansion. The review was completed based on the Region's design criteria for maximum and minimum pressures as well as the design hydraulic gradelines (HGL) for the system. The following summarizes the parameters applied for reviewing the topography in the system.

- ◆ Design HGL = 239m;
- ◆ Maximum Static Pressure = 100 psi (70.3m);
- ◆ Minimum Static Pressure = 40 psi (28.1m);
- ◆ Minimum elevation to maintain maximum static pressure = $239\text{m} - 70.3\text{m} = 168.7\text{m}$;
and
- ◆ Maximum elevation to maintain minimum static pressure = $239\text{m} - 28.1\text{m} = 210.9\text{m}$.

Based on the above noted parameters, the elevation contours for the Smithville water system were reviewed and Figure 2-2 presents the elevations within the vicinity of existing Smithville water system and the urban boundary expansion concept. As noted in Figure 2-2, the urban boundary expansion could be serviced by the system without the development of new pressure zone(s). The need of new pressure zone(s) was also governed by the water infrastructure(s) as friction (headloss) in the water system could reduce the available pressures and was further evaluated in the hydraulic modelling analysis.

Figure 2-2: Topographic Review Results



2.3 Existing Wastewater System

The Smithville wastewater system is an integral part of the overall Baker Road wastewater system within the Region of Niagara. The sewerage generated in the Smithville wastewater system is treated by the Baker Road Wastewater Treatment Plant. The details of the overall Baker Road wastewater system are documented in the Region of Niagara Water and Wastewater Master Servicing Plan (2016); which is currently being updated.

The Smithville wastewater system is comprised with two sewer lift stations, Streamside sanitary pumping station (SPS) and Smithville SPS. The SPSs and their associated forcemains are owned and operated by the Region of Niagara; the local collection system is owned and operated by the Township of West Lincoln. The overall wastewater collection system comprises with roughly 33.5km of sewerlines with sizes ranging from 150mm to 450mm. The following summarizes the key technical details of the wastewater facilities responsible for providing service to Smithville and Figure 2-3 presents the existing Smithville Wastewater System.

- ◆ Rated capacity of Baker Road Wastewater Treatment Plant: 31.3 ML/d,
- ◆ Streamside SPS rated capacity: 23.6 L/s,
- ◆ Smithville SPS rated capacity: 120.0 L/s, and
- ◆ 600 cubic meters of CSO tank at Smithville SPS

2.4 Wastewater System Constraints and Opportunity

For reviewing the constraints and opportunities in the Smithville Wastewater System, the population information and sanitary sewer flows as per the Region’s 2016 Water and Wastewater Master Servicing Plan as shown in Table 2-5 was used as a basis for the evaluation.

Please note that the design peak wet weather flow presented in Table 2-5 was estimated based on the design criteria in Region 2016 MP study. The Region commenced the MP Update in 2021 and the design criteria was changed / adjusted, this altered the design flows, and these changes will be reflected in a later section which will discuss the design of wet weather flows based on the latest criteria.

Since 2016, the servicing strategy for the NW quadrant was updated and the required capacity for Streamside SPS was higher than those presented in Table 2-5

Table 2-5: Region’s 2016 Water and Wastewater Master Plan Information for Wastewater System

Region 2016 Water and Wastewater Master Plan Information	Smithville SPS Service Area	Streamside SPS Service Area
Existing Design Peak Wet Weather Flow	114.3 L/s	7.9L/s
Future Design Peak Wet Weather Flow	222.9 L/s	12.1 L/s

The following sections provide the details of the evaluation results.

2.4.1 Pumping Capacity Review

Based on the existing firm pumping capacity at the pumping stations, the following summarizes the constraints and opportunities from the available pumping capacity.

Table 2-6: Smithville and Streamside SPS Capacity Constraints and Opportunity

Pump Capacity Evaluation Parameters	Smithville SPS / Service Area	Streamside SPS / Service Area
Existing Firm Capacity	120.0 L/s	23.6 L/s
Capacity Surplus (+) / Deficit (-) to meet Existing Design Peak Wet Weather Flow	+5.7 L/s	+15.4 L/s
Capacity Surplus (+) / Deficit (-) to meet Future Design Peak Wet Weather Flow	-102.9 L/s	+11.5 L/s

As noted in Table 2-6, the available pumping capacity at the existing sanitary pumping stations would be able to accommodate existing design peak wet weather flow but not the future design peak wet weather flow for Smithville SPS. The Region’s Master Servicing Plan and Development Charges (DC) Background Study have identified an upgrade requirement for Smithville SPS to accommodate future growth. The wastewater analysis conducted as part of this MCP would provide the additional growth / sanitary sewer flow projections information for the urban boundary expansion within the context of the future upgrade considerations for the Region.

2.4.2 Topography Review

A high-level review of the existing topography in the Smithville Wastewater System was conducted to confirm the wastewater servicing method for urban boundary expansion. The review was completed based on the elevation contour information provided to AECOM. Figure 2-4 presents the elevation and contour slope (red arrows) within each urban boundary expansion stage concept. The topography review establishes the basis for identifying the future sanitary sewer servicing strategy and the associated infrastructure for facilitating the strategy.

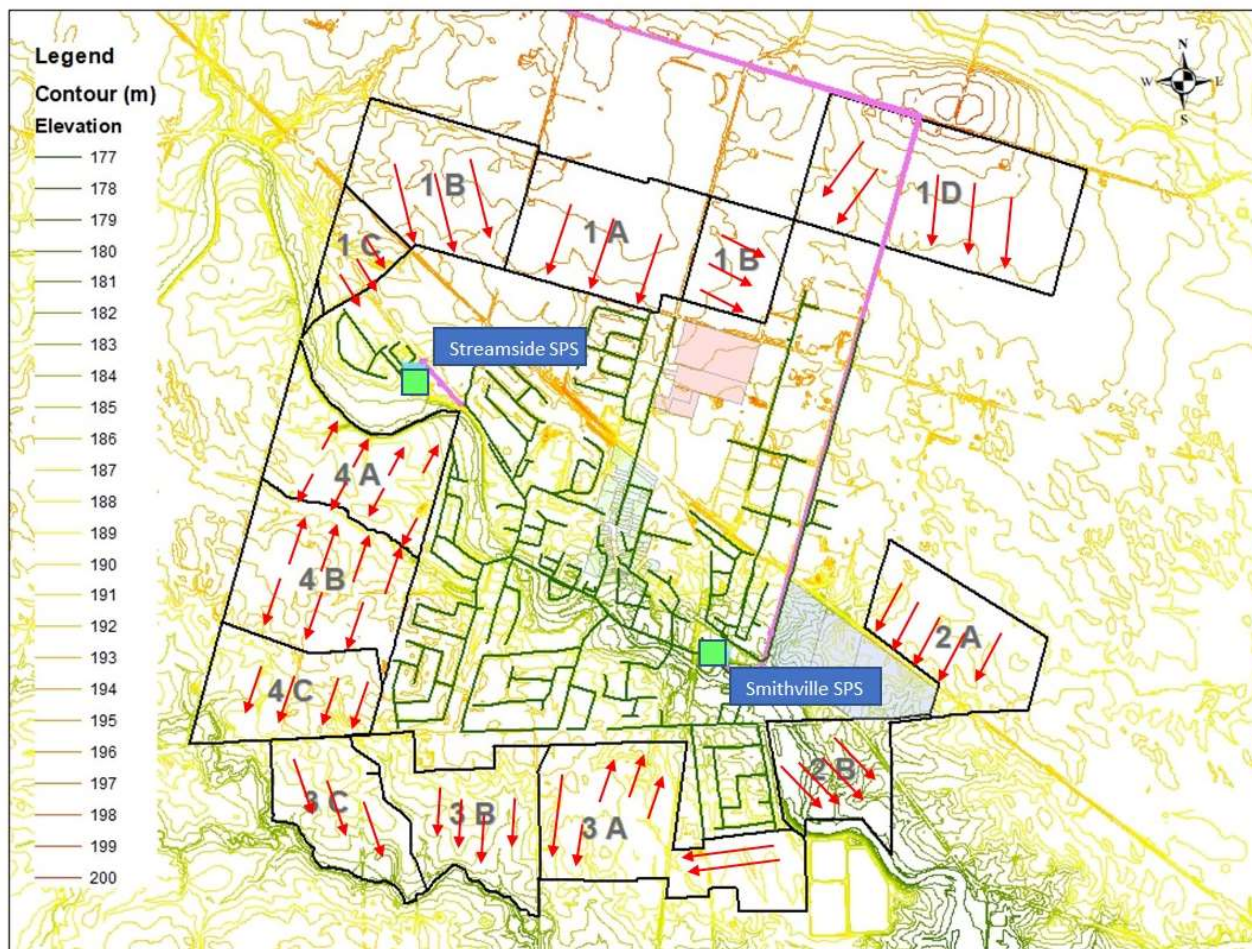


Figure 2-4: Topographic Review for Smithville Wastewater System

The review of the contour information related to each urban boundary expansion stage resulted in the following key understandings of the future sanitary sewer system;

- ◆ All stage areas could convey the sanitary sewer flows to Smithville SPS; which could trigger the pump capacity upgrades at Smithville SPS;
- ◆ Serviced by gravity sewerlines are available for the stage areas 1A, 1B, 1D and 2A for conveying flow to Smithville SPS;
- ◆ Stage area 1C could convey the sanitary sewer flows to Streamside SPS; which could trigger the pump capacity upgrades at Streamside SPS;
- ◆ New sanitary pumping station together with gravity sewerlines and forcemain are required for servicing stage areas 3A, 3B, 3C, 4A, 4B and 4C. The sanitary sewer flows would then be conveyed to Smithville SPS with crossing(s) of Twenty Mile Creek;

- ◆ Potentially 2 new sanitary pumping stations are required for servicing stages area 2B and NE corner of 3A. Due to the minor required pumping capacity, these potential pumping stations would be considered as private sanitary sewer system;
- ◆ Stage areas 4A could convey their sanitary sewer flows from South to North or North to South due to the change in elevations;
 - Conveying the sanitary sewer flows from South to North would require a future private sewage pumping station and forcemain to cross the Twenty Mile Creek. In addition to the creek crossing, the sanitary sewer flows could either convey to the Streamside SPS or convey the flows to the future gravity sewerline on Spring Creek Road via pumping; which would require a third new pumping station: and
 - Conveying the sanitary sewer flows from North to South would be serviced by future gravity sewerlines that also service stage areas 4C, 3B and 3C. The depth of the gravity sewerlines would be relatively deeper; the slope and depth of the future gravity sewer will be reviewed in the hydraulic analysis section.

3. Design and System Evaluation Criteria

3.1 Water System Design and Evaluation Criteria

The water system design and evaluation criteria applied in the Smithville MCP follows those used in the Region of Niagara 2021 Water and Wastewater Master Plan Study Update. The following presents the water design and evaluation criteria applied in the Smithville MCP.

Water System Design Criteria:

- ◆ Residential Average Day Demand: 240 L/ca/d
- ◆ Employment Average Day Demand: 270 L/ca/d
- ◆ Maximum Day Demand Factor: Average from last 5 years of data
- ◆ Peak Hour Demand Factor: 1.5 x Maximum Day Demand
- ◆ Employment Peak Hour Demand Factor: 2.0 x Average Day Demand

Water System Evaluation Criteria:

- ◆ Pump Station Capacity:
 - Firm pumping capacity to meet peak hour demand when there is insufficient equalization storage
 - Firm pumping capacity to meet maximum day demand when there is sufficient equalization storage
 - Dedicated fire pump when there is insufficient fire storage
 - Standby power unit(s) when there is insufficient emergency storage
- ◆ Storage Capacity:
 - Equalization Storage: 25% of Maximum Day Demand
 - Fire Storage: MOECC recommended fire flow and duration (Table 8-1)
 - Emergency Storage: 25% of Equalization Storage + 25% of Fire Storage

- ◆ Watermain Capacity:
 - Sufficient capacity to maintain 40 psi to 100 psi
 - Flag areas with velocity less than 0.6 m/s and exceed 1.5 m/s
 - Identify upgrade if velocity exceed 2.0 m/s

3.2 Wastewater System Design Criteria

The wastewater system design and evaluation criteria applied in the Smithville MCP also follows those used in the Region of Niagara 2021 Water and Wastewater Master Plan Study Update. The following presents the wastewater design and evaluation criteria applied in the Smithville MCP.

Wastewater System Design Criteria:

- ◆ Residential Average Dry Weather Flow: 255 L/ca/d
- ◆ Employment Average Dry Weather Flow: 310 L/ca/d
- ◆ Dry Weather Flow Peak Factor: Harmon Formula with values between 2 – 4
- ◆ Inflow and Infiltration allowance: 0.286 L/ha/s for new development and
0.4 L/ha/s for existing development
- ◆ Peak Wet Weather Design Flow (Region 2021MSPU): Peak Dry Weather Flow plus I&I allowance

Wastewater System Evaluation Criteria:

- ◆ Pump Station:
 - Firm pumping capacity to meet peak wet weather flow
- ◆ Forcemain Capacity:
 - Maximum velocity for new forcemain: 1.0 m/s – 2.0 m/s
- ◆ Gravity Sewerline Capacity:
 - Peak hydraulic gradeline (HGL) for existing sewerline does not exceed sewerline obvert under Peak Wet Weather Flow

4. Hydraulic Model Analysis

For evaluating the water and wastewater infrastructure requirements to support the projected growth for urban boundary expansion, the Region of Niagara's latest hydraulic models were utilized. The following sections detail the hydraulic modelling analysis results for water and wastewater systems.

4.1 Water Hydraulic Model Analysis

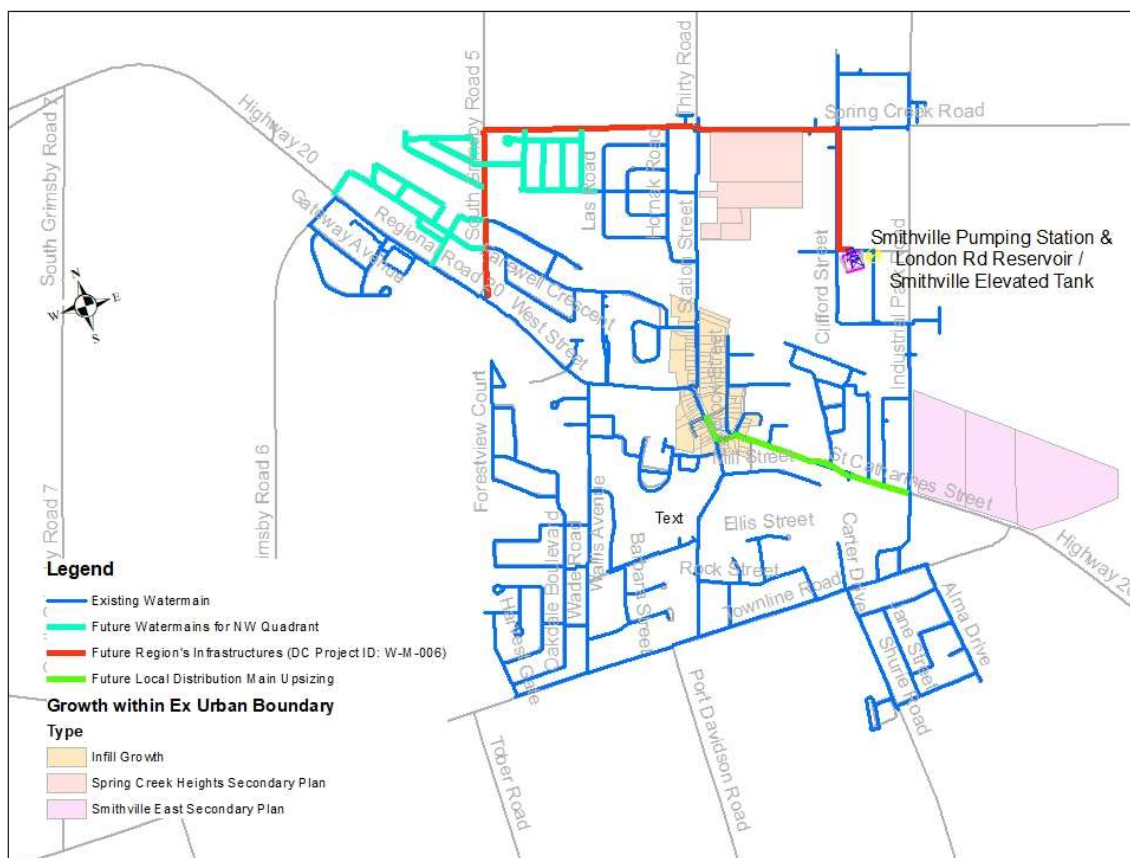
The water hydraulic modelling analysis was completed by utilizing the InfoWater Hydraulic Model used in the Region of Niagara's Water and Wastewater Master Servicing Plan Study (2016). The model was reviewed and compared with the Geographical Information System (GIS) to confirm the network accuracy and executability of the simulation. The modelling inputs such as water demands, water demand patterns (diurnal patterns), watermain c-factors and water facilities' parameters were reviewed to confirm their applicability for the Smithville MCP. The review of the water hydraulic model concluded that the Region's water hydraulic model was suitable for completing the infrastructure evaluation for the Smithville MCP.

To perform the infrastructure evaluation, several updates were applied to the hydraulic model and the next section provided the details of those updates.

4.1.1 Water Model Update

The Smithville water model was updated to include the future infrastructure and associated water demands for the proposed developments for Northwest Quadrant (Station Meadows West, Dunloe and Marz). The model was also updated to include the future infrastructure as per the latest Region's Development Charge (DC) study and future Smithville local distribution system upgrades and upsizing. Figure 4-1 presents the additional infrastructure included for the Smithville water system.

Figure 4-1: Smithville Water Model Update



4.1.2 Water Demand Update

For this study, the projected Average Day Demand (ADD) and Maximum Day Demand (MDD) were inputted to the model to reflect the population projection and design criteria used for the urban boundary expansions. The location of the future water demands was described by the urban boundary expansion concept; which was discussed in Section 1.4. For specific areas such as Northwest Quadrant developments, the water demands and their locations were reflected in the model based on following documents.

- ◆ Functional Servicing Report (FSR) for Station Meadows West (December 2019);
- ◆ Functional Servicing Report for Dunloe Development (August 2018); and
- ◆ Population projections for the new development areas;

Table 4-1 summarizes the ADD and MDD included in the hydraulic model, respectively.

Table 4-1: Water Demands for Smithville MCP

Development	Average Day Demand (ML/d)	Maximum Day Demand (ML/d)
Existing System⁶	2.2	3.8
Growth within Existing Urban Boundary	0.7	1.6
NW Quadrant⁷	0.1	0.2
Spring Creek Heights Secondary Plan	0.7	1.1
Smithville East Secondary Plan	0.8	1.3
Urban Boundary Expansion Stage 1	1.8	3.1
Urban Boundary Expansion Stage 2	0.2	0.3
Urban Boundary Expansion Stage 3	1.5	2.6
Urban Boundary Expansion Stage 4	1.1	2.0
Total Buildout Condition	9.1	16.0

⁶ 2021 water demands for Zone 239 as per Region's 2016 Water and Wastewater Master Plan Study

⁷ Projected water demands obtained from Water Hydraulic Modelling Analysis for Smithville NW Quadrant Development (AECOM, 2020)

4.1.3 Water System Analysis Results

System storage capacity and firm pumping capacity were evaluated prior to system infrastructure assessment. Upon confirmation of system capacity, the InfoWater hydraulic model was then run under the buildout condition system demand combined with future infrastructure to confirm the serviceability in the system.

4.1.3.1 Storage Capacity Evaluation

Based on the projected total equivalent population of 41,112 (Table 1-1) and projected maximum day demands of 19.0 ML/d (Table 4-1), the required storage capacity was evaluated as follows:

Table 4-2: Storage Capacity Requirement

Storage Components	Method	Storage Capacity Requirement
A. Equalization	25% of MDD	4.0 ML
B. Fire	MOECC Table 8-1	8.2 ML (378 L/s for 6hr)
C. Emergency	25% of A+B	3.0 ML
Total Storage	Sum of A, B and C	15.2 ML

According to the Region’s DC study and the discussions with the Region, the existing Smithville Elevated Tank will be replaced to accommodate the future growth (DC Project No. W-D-010 and W-S-010). Based on the required storage capacity of 15.2 ML and the existing available storage capacity of 7.7 ML, the following recommendations for future Smithville Elevated Tank were determined.

- ◆ Required equalization storage of 4.0 ML to be provided by the future elevated tank;
- ◆ Required fire storage of 8.2 ML to be partially provided by the existing London Road Reservoir via pumping and the difference of 0.9 ML to be provided by the future elevated tank. Since fire requirement for future Smithville water system was provided by London Road Reservoir (7.7 ML) via pumping, the existing pumping station

capacity should include sufficient pumping capacity to deliver the required fire flow of 356 L/s (30.8 ML/d);

- ◆ Required emergency storage of 3.0 ML to be provided by the future elevated tank; and
- ◆ The minimum required storage for the future elevation tank was 7.0 ML and should be considered by the Region in the DC project (W-S-010)

4.1.3.2 Pumping Capacity Evaluation

According to the storage capacity evaluation results, the recommended future Smithville Elevated Tank capacity should provide sufficient storage to meet the required equalization storage. Therefore, the pumping capacity evaluation for the London Road Pumping Station was based on Maximum Day Demand conditions. The following summarizes the pump capacity evaluation results.

- ◆ Existing Firm Capacity: 19.4 ML/d
- ◆ Projected MDD: 16.0 ML/d
- ◆ Pump Capacity Surplus: 3.4 ML/d (39.4 L/s)

As noted above, the existing firm capacity at London Road Pumping Station was sufficient to meet the projected maximum day demands with a surplus capacity of 3.4 ML/d. However, the storage evaluation results indicated that the pumping station should secure sufficient capacity for providing fire flow, which was estimated to be 30.8 ML/d (356 L/s). As a result, the existing London Road Pumping Station would require upgrades / expansion to include dedicated fire pump(s) to deliver the required fire flow, which should be considered in the Region's DC project for London Road Pumping Station Upgrade (W-P-004)

4.1.3.3 Water Servicing Concept Evaluation

The hydraulic model was analyzed under the ultimate demand conditions for evaluating the water servicing concept to support the urban boundary expansion in Smithville. In evaluating the water servicing concept, the following considerations and assumptions were applied in the analysis.

- ◆ Future Smithville Elevated Tank (7.0 ML) was located at the existing elevated tank location;
- ◆ London Road Pumping Station included a dedicated fire pump (356 L/s);

- ◆ Initial water servicing strategy was based on Region's DC projects; W-M-006 and W-M-018;
- ◆ The Region's DC projects that related to the Smithville water service should consider the required water demands to accommodate the growth in Smithville; and
- ◆ Development of the preferred water servicing strategy that considered the following factors:
 - Timing for the Northwest Quadrant developments
 - Location of the road improvement works
 - Interruptions to the existing residents due to construction
 - Construction methodology and complexity

The initial modelling analysis results indicated that the Region's DC Projects W-M-006 and W-M-018 together with the water distribution network extensions for each urban boundary expansion stage would provide sufficient water service to the future growth. Figure 4-2 shows the future infrastructure included in the initial modelling scenario and Figure 4-3 shows the overall system pressures in the system and the maximum velocity in the watermains within the Smithville water system. In addition, the modelling analysis results indicated that the future Smithville Elevated Tank levels were balanced properly within the 5 days extended period simulation. Figure 4-4 shows the future Smithville Elevated Tank level cycling for the simulation.

Figure 4-2: Future Smithville Water System

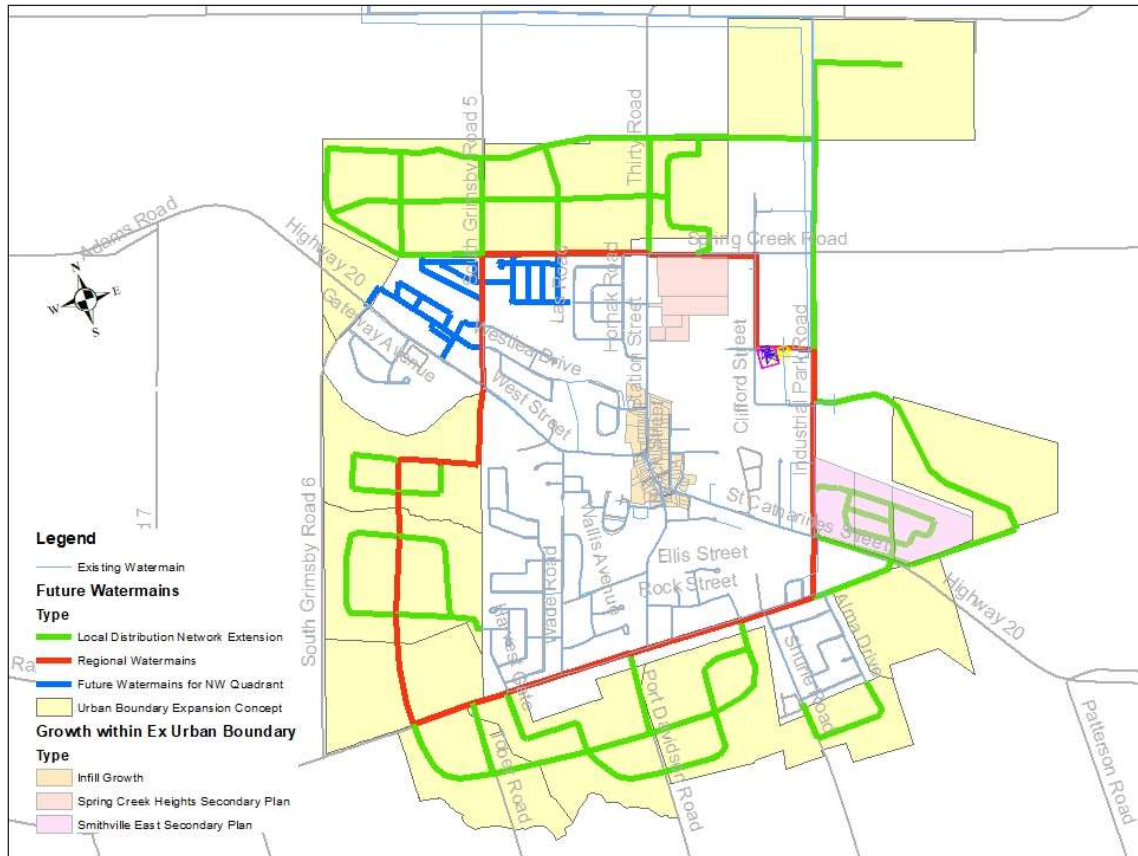


Figure 4-3: Preliminary Modelling Results for Initial Servicing Strategy

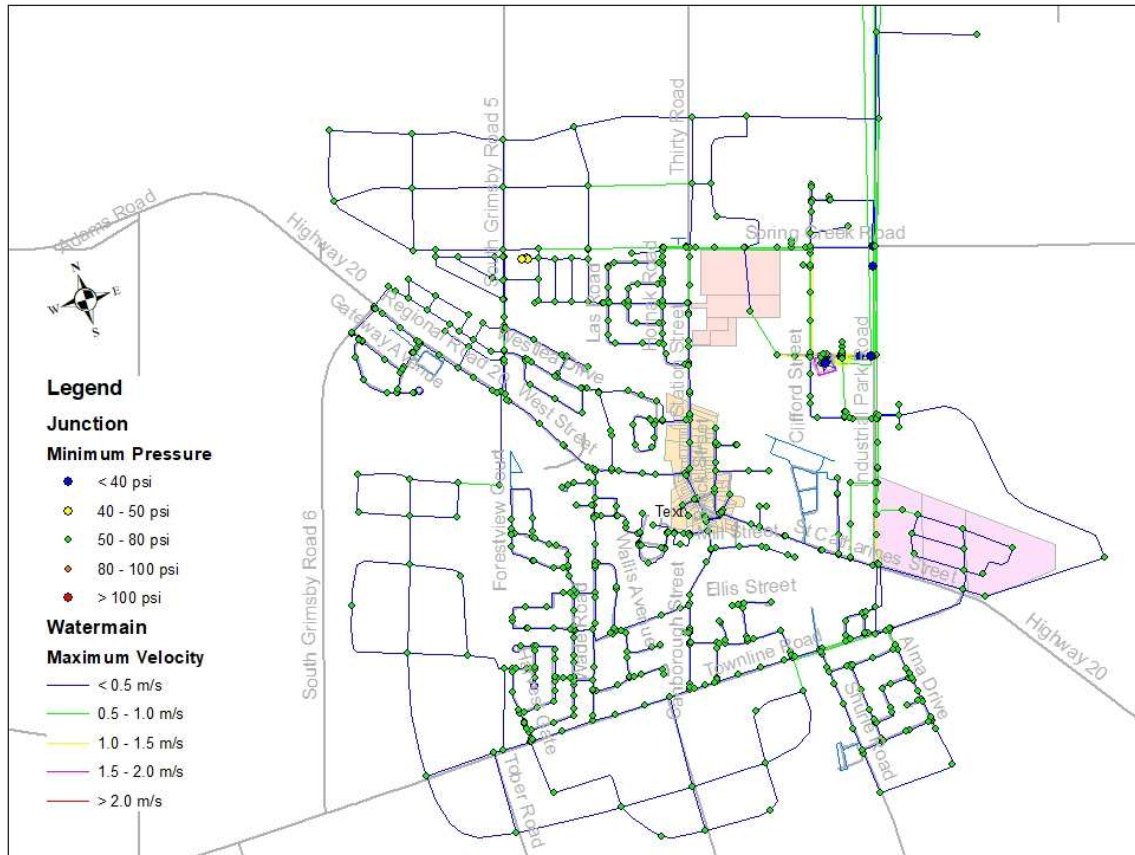
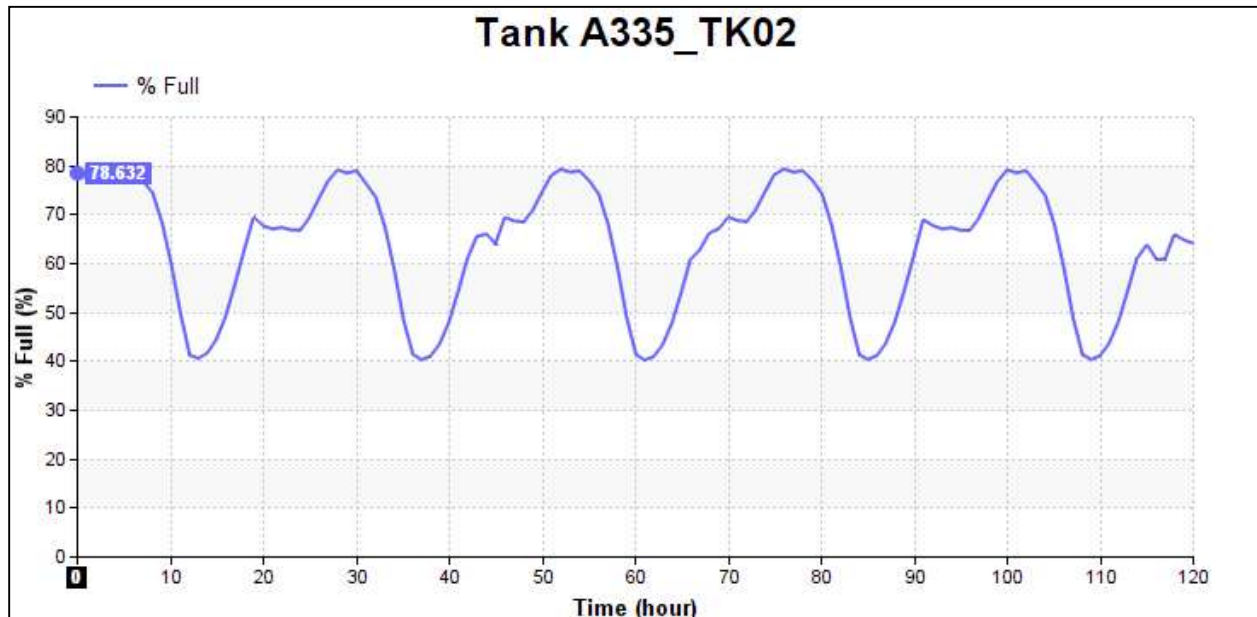


Figure 4-4: Simulation Results for Future Smithville Elevated Tank Levels



The completion of the preliminary modelling analysis indicated that the Region’s DC projects together with the water distribution network extension as shown in Figure 4-3 would provide adequate water service to meet the future growth in the Smithville Water System. This preliminary modelling results formed the basis for the identifying the infrastructure implementation strategy including alignment alternatives. These options were evaluated as part of the overall Municipal Class Environmental Assessment (MCEA) process and the details of the MCEA evaluation results are described in the Integrated MCEA Master servicing Plan report.

4.2 Wastewater Hydraulic Model Analysis

The wastewater hydraulic modelling analysis was completed by utilizing the InfoSWMM Hydraulic Model used in the Region of Niagara's Baker Road Wastewater Treatment Plant Pollution Prevention Control Plan & Master Servicing Plan Update (2022). The model was calibrated with the flow monitoring study results completed in 2021⁸. The calibrated model was reviewed with the Smithville MCP project team and Niagara Region to confirm the network accuracy and executability of the simulation. The model included the scenario that utilized 5-year design storm for simulating the wastewater collection system for Smithville. The modelling inputs such as sanitary sewer loadings and design storm were reviewed to confirm the applicability for the Smithville MCP. The review of the wastewater hydraulic model concluded that the Region's sanitary sewer hydraulic model was suitable for completing the infrastructure evaluation for the Smithville MCP.

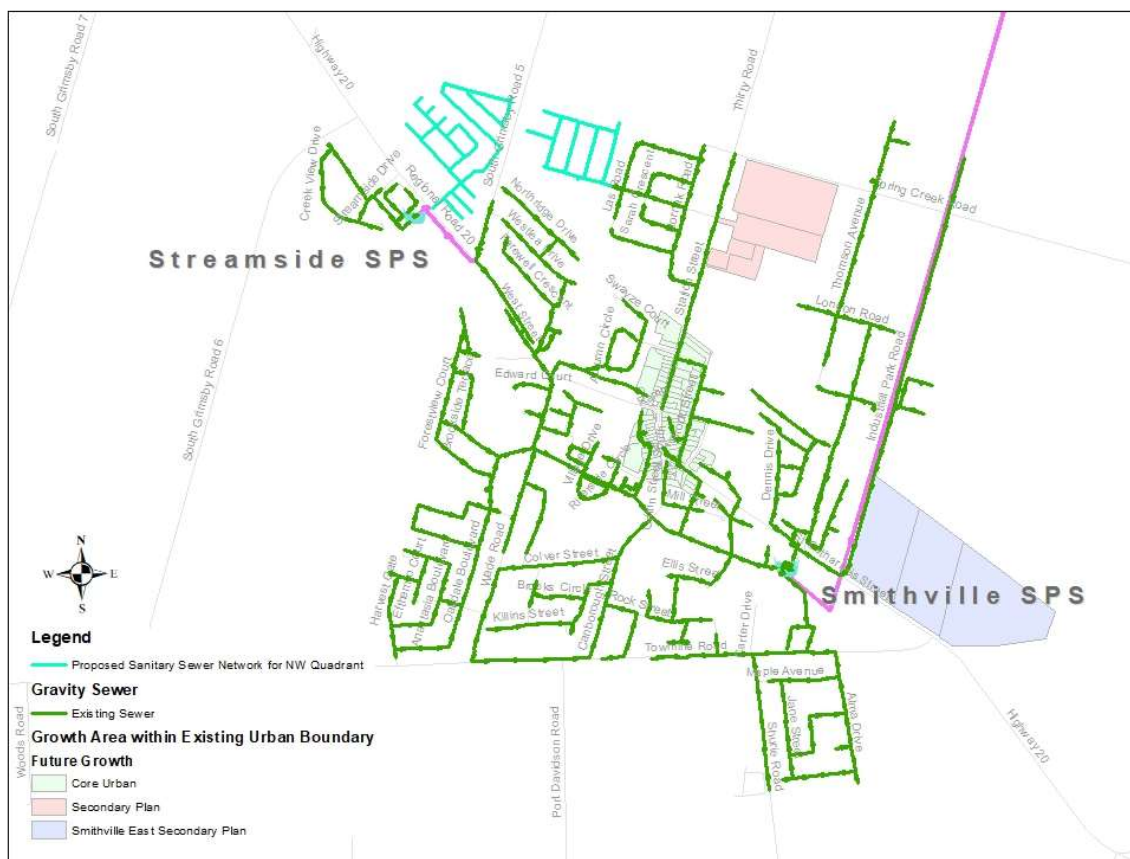
To evaluate the feasibility of the wastewater servicing concept, several updates were applied to the hydraulic model and the next section provides the details of those updates.

4.2.1 Wastewater Model Update

The Smithville wastewater model was updated to include the future infrastructure and associated sanitary sewer loadings for the proposed developments for Northwest Quadrant (Station Meadows West, Dunloe and Marz). Figure 4-5 presents the additional infrastructure included for the Smithville wastewater system.

⁸ West Lincoln Flow Monitoring Final Report (CIVICA, February 2021)

Figure 4-5: Smithville Wastewater Model Update



4.2.2 Wastewater Loading Update

The projected Peak Wet Weather Flows (PWWF) was calculated based on the projected population and design criteria applied in this study. The projected PWWF was inputted to model for evaluating the wastewater servicing concept. The location of the future sanitary sewer loadings was described by the urban boundary expansion concept; which was discussed in Section 1.4. For specific areas such as Northwest Quadrant developments, the sanitary sewer loadings and their locations were reflected in the model based on following documents.

- ◆ Functional Servicing Report (FSR) for Station Meadows West (December 2019);
- ◆ Functional Servicing Report for Dunloe Development (August 2018); and
- ◆ Population projections for the Marz development areas;

Table 4-3 summarizes the Average Dry Weather Flow (DWF) and Peak Wet Weather Flow (PWWF) included in the hydraulic model.

Table 4-3: Sanitary Sewer Loadings for Smithville MCP

Development Description	Streamside SPS Service Area			Smithville SPS Service Area ⁹		
	Avg DWF (L/s)	PWWF (5-yr design storm) (L/s)	PWWF (Design I/I) (L/s) ¹⁰	Avg DWF (L/s)	PWWF (5yr design storm) (L/s)	PWWF (Design I/I) (L/s) ⁹
Existing System¹¹	1.6	20.7	4.9	20.7	308.1	145.7
Growth within Existing Urban Boundary	-	-		8.4	0.0 ¹²	
NW Quadrant¹³	5.1	25.2		8.7	42.4	
Spring Creek Heights Secondary Plan	-	-		1.3	8.8	
Smithville East Secondary Plan				9.5	39.4	

⁹ Included sanitary sewer loadings for Streamside SPS Service Area

¹⁰ I/I for all future developments was estimated based on service areas (ha) and Region's design I/I rate of 0.286L/ha/s for new developments

¹¹ Existing peak wet weather flows for 5 Year design storm were obtained from calibrated InfoSWMM Hydraulic Model used in Baker Road PPCP Study (2022). Existing design peak wet weather flows were based on the service areas (ha) and Region's design I/I rate of 0.4 L/ha/s for existing development

¹² The growth type was assumed to be due to intensifications and no additional I/I was included in the analysis; the I/I was assumed to be identical to the existing condition.

¹³ Streamside SPS Service area included Marz and Dunloe developments; Smithville SPS Service area included Marz, Dunloe and Station Meadows developments

Development Description	Streamside SPS Service Area			Smithville SPS Service Area ⁹		
	Avg DWF (L/s)	PWWF (5-yr design storm) (L/s)	PWWF (Design I/I) (L/s) ¹⁰	Avg DWF (L/s)	PWWF (5yr design storm) (L/s)	PWWF (Design I/I) (L/s) ⁹
Urban Boundary Expansion Stage 1	2.3	11.1		20.4	111.6	
Urban Boundary Expansion Stage 2	-	-		2.3	15.6	
Urban Boundary Expansion Stage 3	-	-		19.0	83.2	
Urban Boundary Expansion Stage 4	-	-		14.2	66.1	
Total Buildout Condition	9.0	57.0	41.2	104.5	675.2	512.8

4.2.3 Wastewater System Analysis Results

System pumping capacity was evaluated prior to the hydraulic modelling analysis. Upon confirmation of system capacity, the InfoSWMM hydraulic model was then run under the buildout condition system loadings combined with future infrastructure to confirm the wastewater servicing concept.

4.2.3.1 Sanitary Sewer Pumping Capacity Evaluation

The sanitary sewer pumping capacity evaluation was completed for the Streamside and Smithville Sanitary Sewer Pumping Stations based on projected peak wet weather flows under ultimate buildout conditions. Table 4-4 summarizes the pump capacity evaluation results.

Table 4-4: Smithville Sanitary Sewer Pumping Capacity Evaluation Results

Smithville Sanitary Sewer Pumping Capacity Evaluation	Streamside SPS		Smithville SPS	
	PWWF (5-yr design storm) (L/s)	PWWF (Design I/I) (L/s)	PWWF (5-yr design storm) (L/s)	PWWF (Design I/I) (L/s)
Existing Firm Capacity	23.6 L/s		120.0 L/s	
Projected PWWF	57.0 L/s	41.2 L/s	675.2 L/s	512.8 L/s
Capacity Surplus (+) / Deficit (-)	-33.4 L/s	-17.6 L/s	-555.2 L/s	-392.8 L/s

As noted above, the available firm capacity at existing sanitary sewer pumping stations was insufficient to meet the projected flows. According to the Region’s DC Study (2022), the following pump capacity expansions at the two stations were identified.

- ◆ WW-SPS-012: Increase Smithville SPS capacity to 705 L/s by Year 2022-2031;
- ◆ WW-SPS-041: Increase Streamside SPS capacity to 41 L/s by Year 2022-2031;
- ◆ WW-FM-017: New forcemain for Streamside SPS; and
- ◆ WW-FM-011: New forcemain for Smithville SPS.

The estimated increase in pumping capacities as per the DC Study were sufficient to meet the projected flows based the design inflow & infiltration. However, the increase in pumping capacity as per DC Study for Streamside SPS was insufficient to meet the projected flows based on 5-year design storm for estimating the existing I/I. Baker Road WWTP PPCP Study (2022) recognized I/I reduction initiative for reducing the peak wet weather flows in the existing system and the initiative should consider the peak wet weather flows presented in Table 4-3.

4.2.3.2 Wastewater Servicing Concept Evaluation

The hydraulic model was analyzed under the peak wet weather flows (PWWF) in the Ultimate Buildout scenario for evaluating the wastewater servicing concept. The required

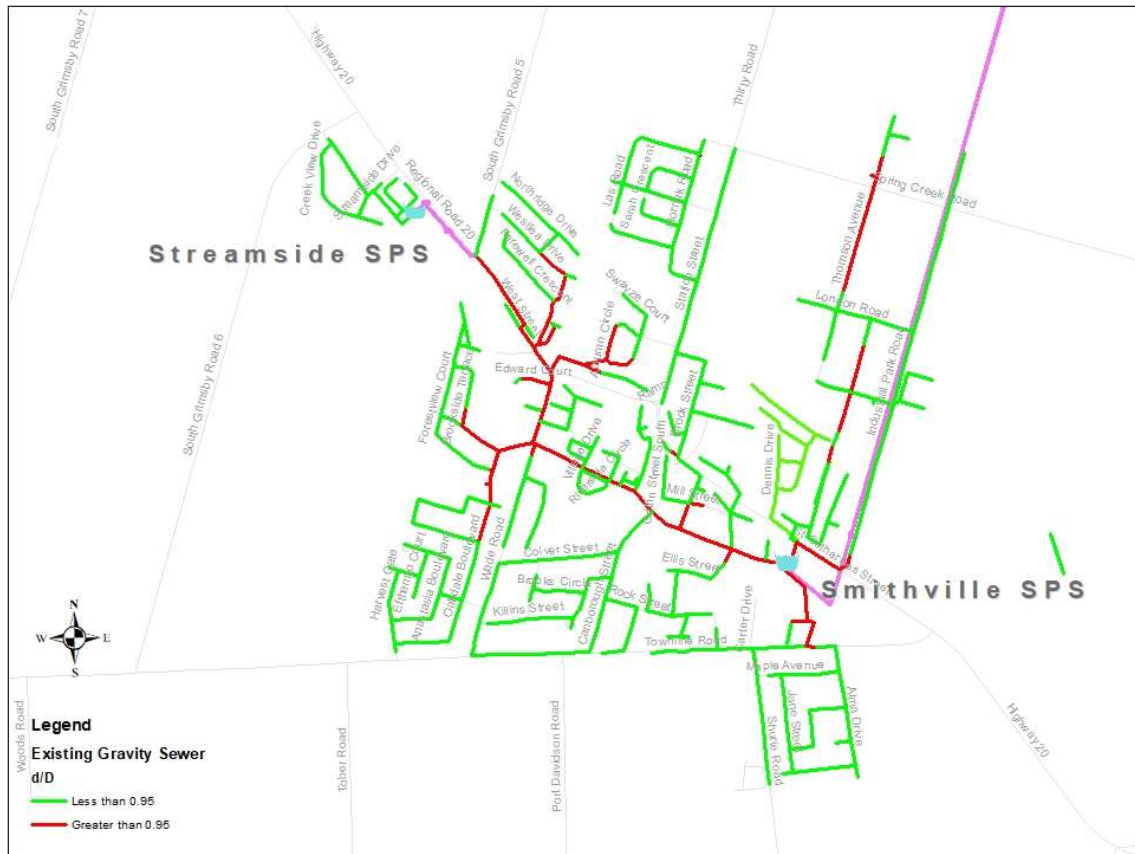
infrastructures to support the projected flows were identified. In the evaluation of the future Smithville wastewater system, the following considerations and assumptions were applied in analyzing the sewer network.

- ◆ The Region's DC projects that related to the Smithville wastewater service would provide adequate capacity to accommodate the projected wet weather flows in Smithville;
- ◆ Current servicing strategy for Northwest Quadrant Developments; and
- ◆ Development of the preferred water servicing strategy considered the following factors:
 - ◆ Timing for the Northwest Quadrant Developments
 - ◆ Location of the road improvement works
 - ◆ Interruptions to the existing residents due to construction
 - ◆ Construction methodology and complexity
- ◆ Existing elevation contour information and elevation survey results that were provided by LandSmith Engineering & Consulting Ltd.

The initial modelling analysis results indicated that the existing Smithville wastewater collection system did not provide adequate capacity to support the future growth. According to the modelling results obtained from the calibrated InfoSWMM model, several key existing sewerlines such as the 375mm and 450mm sewerlines along Twenty Mile Creek and West Street was reaching the maximum available capacity in the existing peak wet weather flow scenario¹⁴. Introducing additional flows to the existing sewerline would not be a feasible solution for accommodating the future developments unless the existing sanitary sewer collection network were replaced with a larger size. Figure 4-6 shows the hydraulic modelling results for the existing conditions; modelling pipes with colour coding in red indicated the sanitary sewer pipes were or are reaching maximum capacity (d/D over 95%).

¹⁴ Based on design 5 year storm scenario

Figure 4-6: Existing Wastewater Modelling Results



To evaluate the servicing concept for the future Smithville wastewater system, the projected flows related to the future growth would be accommodated by new sanitary sewer sub-trunk in the Smithville system rather than conveying the flows via the existing sanitary sewer collection system. Figure 4-7 shows the wastewater servicing concept for the future Smithville wastewater system and Figure 4-8 presents the hydraulic modelling analysis results.

Figure 4-7: Future Smithville Wastewater System

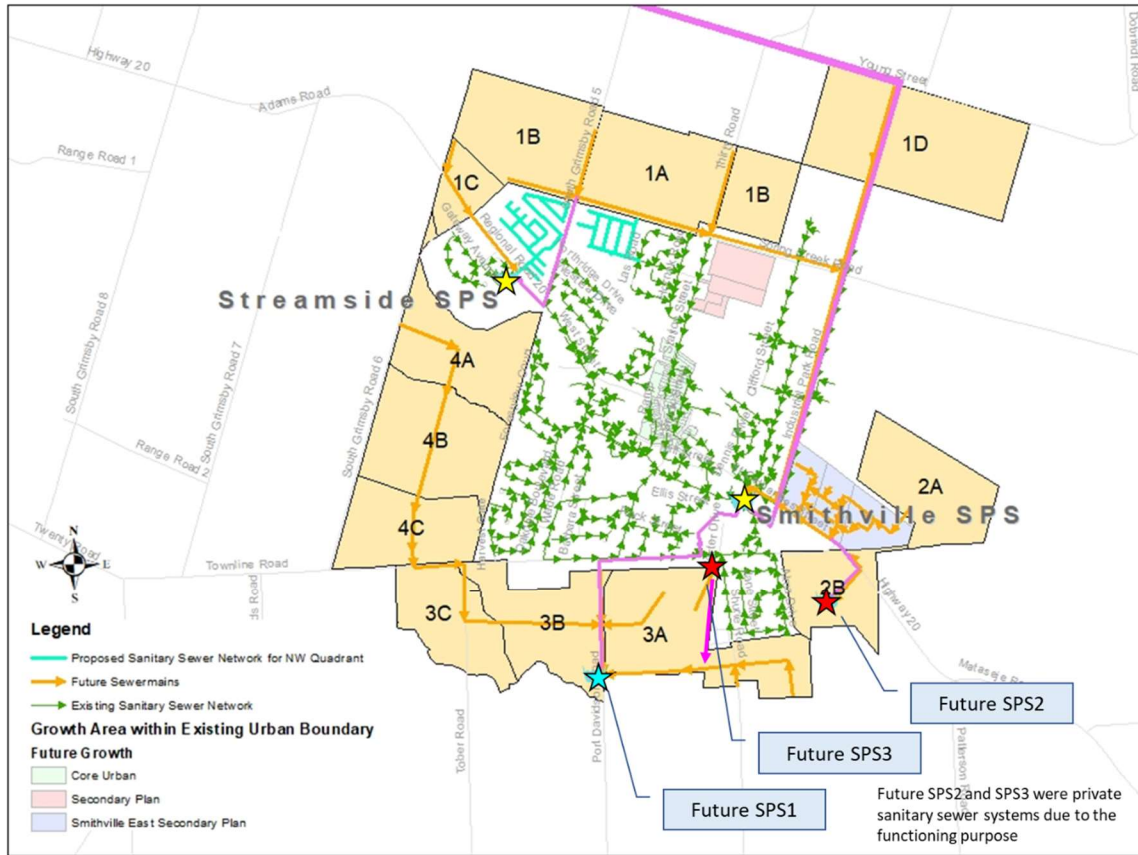
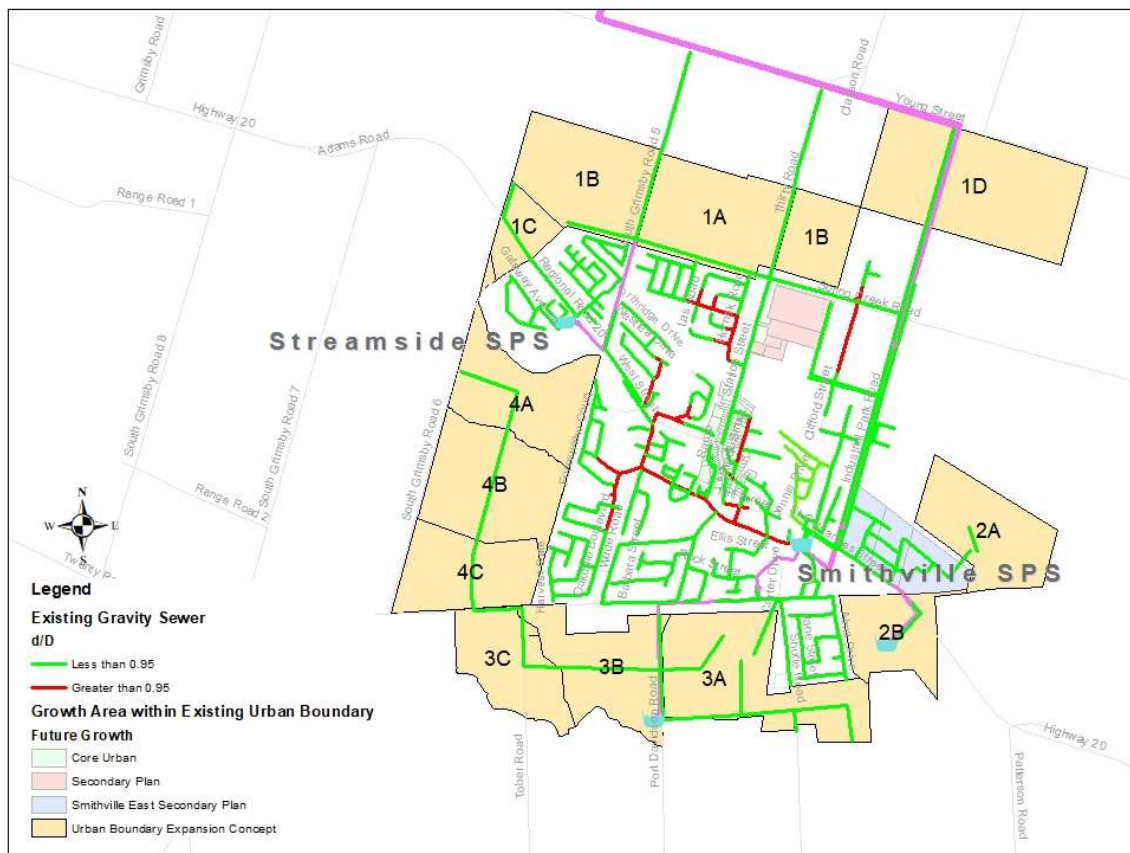


Figure 4-8: Preliminary Modelling Results for Wastewater Servicing Concept



The completion of the preliminary modelling analysis indicated that the servicing concept as shown in Figure 4-8 was a technically feasible option to provide adequate wastewater service to meet the urban boundary expansion in the Smithville. This preliminary modelling results formed the basis for the identifying the infrastructure strategy including alignment alternatives. These options were evaluated as part of the overall Municipal Class Environmental Assessment (MCEA) process and the details of the MCEA evaluation results are described in the Integrated MCEA Master servicing Plan report.

5. System Infrastructure Assessment and Evaluation

In Section 4, the water and wastewater servicing concepts were evaluated and confirmed to be feasible to provide sufficient services to meet the urban boundary expansion. For each stage (e.g. Stages 1 to 4), the proof of concepts completed in Section 4 led to the water and wastewater infrastructure assessment for identifying the implementation strategy.

5.1 Water and Wastewater Infrastructure Assessment Basis

Basis for Overall Recommended MCP Water and Wastewater Servicing Strategy

- Strategy for urban boundary expansion must not impact the growth within existing urban boundary developments.
- Assumes Smithville SPS upgrades in place by 2030 (as per Region's DC study).
- Also, in sync with Region's Water and Wastewater Servicing Master Plan strategy
- Requires Region's Smithville forcemain twinning between Smithville and
- Grimsby systems and Grimsby WTP and WWTP capacity upgrades. Assume these works would be implemented between 2030 and 2040.
- Requires Smithville elevated tank replacement and London Road water pump station capacity upgrade.

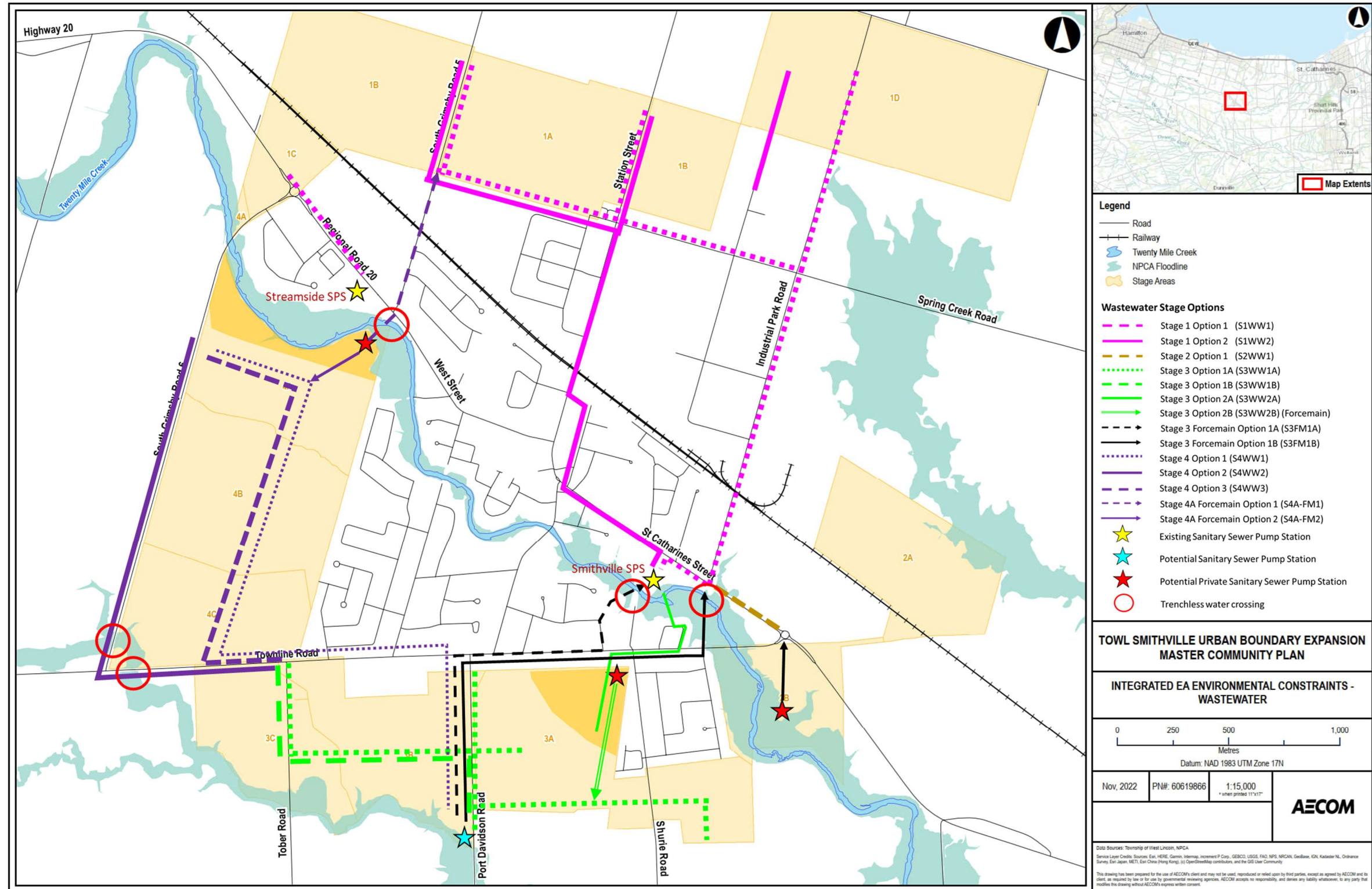
Utilizing the preliminary water servicing concept presented in Section 4.1.3.3, various infrastructure strategies / alignment options were reviewed. The strategies were developed based on the following considerations.

- ◆ Region's DC Projects (W-M-006 & W-M-018);
- ◆ Future road improvement works;
- ◆ Creek and railway crossing;
- ◆ Urban boundary expansion location;
- ◆ Opportunity to improve existing infrastructures; and

◆ Construction complexity.

Figure 5-1 and Figure 5-2 present the water and wastewater infrastructure options, respectively. The following sub-sections provided detailed water and wastewater infrastructure options assessment for each staging of the urban boundary expansion concept.

Figure 5-2: Wastewater Servicing Strategy Options



5.2 Water and Wastewater Infrastructure Assessment for Stage 1

The assessment results indicated that S1W1 and S1WW1 would be considered a most preferable strategies to meet the water and wastewater service, respectively, for the urban boundary expansion for Stage 1 as well as the expected growth for the Spring Creek Heights Secondary Plan area. The following summarizes the rationale for selecting these preferred solutions and Table 5-1 presents the detailed assessment results.

5.2.1 Preferred Solutions and Rationale for Stage 1 Water Service

As only one option was evaluated for the watermain expansion for Stage 1, S1W1 is the preferred solution.

5.2.2 Preferred Solutions and Rationale for Stage 1 Wastewater Service

Two alternatives were evaluated to address wastewater servicing for the Stage 1 urban boundary expansion area.

S1WW1

- ◆ New sewer gravity main on Spring Creek Road from South Grimsby Road 5 and easterly to Industrial Park Road
- ◆ Gravity sewer continues southernly down Industrial Park Road
- ◆ Industrial Park to Regional Road 20
- ◆ Westerly on Regional Road 20 to Smithville Pumping Station

S1WW2

- ◆ New sewer gravity main on Spring Creek Road from South Grimsby Road 5 and easternly towards Station Street
- ◆ Station Street south to Regional Road 20
- ◆ Westerly on Regional Road 20 to Smithville Pumping Station

Rationale for preferred solution for Stage 1 Wastewater Service

S1WW1 is the preferred solution, and the rationale is summarized as follows:

1. Can be easily coordinated with near term development
2. Alignment can be coordinated with preferred watermain length (S1W1)
3. Reduced construction complexity and avoids significant utility conflicts and community disruption within the existing Smithville urban area
4. Alignment can also provide service to the Spring Creek Heights Secondary Plan development area

In addition to the above noted rationale for selecting S1WW1 as the preferred solution, Industrial Park Road has a number of existing services within its ROW as well as the future Regional Forcemain. The detailed design for the S1WW1 must consider these services prior to the implementation of the infrastructure.

Table 5-1: Stage 1 Water and Wastewater Strategy Assessment Results

Category & Criteria		Stage 1 Water: S1W1	Stage 1 Wastewater: S1WW1	Stage 1 Wastewater: S1WW2
Details		<ul style="list-style-type: none"> Watermain extends northerly on South Grimsby Road 5 from Regional Road 20 to Spring Creek Road Easternly along Spring Creek Road to Thompson Road Southernly on Thompson Road and easternly to London Road pumping station No crossing of Twenty Mile Creek Crossing of rail tracks on South Grimsby Road 5 <p style="text-align: center;">Preferred Solution</p>	<ul style="list-style-type: none"> New sewer gravity main on Spring Creek Road from South Grimsby Road 5 and easterly to Industrial Park Road Gravity sewer continues southernly down Industrial Park Road Industrial Park to Regional Road 20 Westerly on Regional Road 20 to Smithville Pumping Station No crossing of Twenty Mile Creek required Crossing of rail tracks on Industrial Park Road <p style="text-align: center;">Preferred Solution</p>	<ul style="list-style-type: none"> New sewer gravity main on Spring Creek Road from South Grimsby Road 5 and easternly towards Station Street Station Street south to Regional Road 20 Westerly on Regional Road 20 to Smithville Pumping Station No crossing of Twenty Mile Creek required Crossing of rail tracks on Station Street
Technical Environment	a. Potential degree of construction complexities, including number and type of water crossings, anticipated rock removal, access, working area and duration to build.	<ul style="list-style-type: none"> One crossing of rail tracks No crossings of Twenty Mile Creek Anticipate in rock Access from South Grimsby Road 5 and Spring Creek Road Relative construction duration has not been determined due to single option for water 	<ul style="list-style-type: none"> One crossing of rail tracks No crossings of Twenty Mile Creek Anticipate in rock Access from Industrial Park Road, South Grimsby Road 5, and Spring Creek Road Shorter construction duration 	<ul style="list-style-type: none"> One crossing of rail tracks No crossings of Twenty Mile Creek Anticipate in rock Access from South Grimsby Road 5 and Spring Creek Road Longer construction duration due to work in urbanized area along Station Street / Brock Street
	b. Potential effects on roadway and utility infrastructure.	<ul style="list-style-type: none"> Lower impacts to paved surfaces Potential for railway conflicts on South Grimsby Road 5 Potential for utility conflicts on Thompson Road and London Road 	<ul style="list-style-type: none"> Lower impacts to paved surfaces Potential for railway conflicts on South Grimsby Road 5 	<ul style="list-style-type: none"> Greater impacts to paved surfaces on Station Street Potential for railway conflicts on Station Street
	c. Provides good site access for maintenance vehicles, future operation and maintenance and servicing.	<ul style="list-style-type: none"> Access from existing road allowances and existing utility corridor / easement / multi use path 	<ul style="list-style-type: none"> Access from existing road allowances and existing utility corridor/easement/multi use path Provides better access from existing and future road ROW 	<ul style="list-style-type: none"> Access from existing road allowances and existing utility corridor/easement / multi-use path Provides more difficult access from existing ROW (Station Street)
	d. Operation efficiency.	<ul style="list-style-type: none"> Not applicable 	<ul style="list-style-type: none"> Not applicable 	<ul style="list-style-type: none"> Not applicable
	e. Potential opportunity for current infrastructure to be decommissioned in favour of gravity solutions	<ul style="list-style-type: none"> Not applicable 	<ul style="list-style-type: none"> Not applicable 	<ul style="list-style-type: none"> Not applicable
	f. Potential effects on traffic.	<ul style="list-style-type: none"> Lower impacts to the travelling public 	<ul style="list-style-type: none"> Lower impacts to the travelling public 	<ul style="list-style-type: none"> Greater impacts to the travelling public
	g. Dependency on the completion of other Stages	<ul style="list-style-type: none"> Independent of all other Staging Strategies 	<ul style="list-style-type: none"> Independent of all other Staging Strategies 	<ul style="list-style-type: none"> Independent of all other Staging Strategies
	h. Degree of permitting and approvals complexity	<ul style="list-style-type: none"> CNR permitting anticipated due to railway crossing SAR permitting anticipated due to SAR habitat in area (Spring Creek Road extension) 	<ul style="list-style-type: none"> CNR permitting anticipated due to railway crossing SAR permitting anticipated due to SAR habitat in area (Spring Creek Road extension) 	<ul style="list-style-type: none"> CNR permitting anticipated due to railway crossing SAR permitting anticipated due to SAR habitat in area (Spring Creek Road extension)
	Land Use	i. Potential to conform to approved local (e.g., OP and MCP), provincial (e.g., PPS) plans and policies.	<ul style="list-style-type: none"> Conforms Utilities permitted in future ROW Pipe does not cross natural heritage system 	<ul style="list-style-type: none"> Conforms Pipe does not cross natural heritage system
j. Identify existing official plans and schedule B1, B3 and B4 Natural Heritage		<ul style="list-style-type: none"> Conforms Utilities permitted in future ROW Pipe does not cross natural heritage system 	<ul style="list-style-type: none"> Conforms Pipe does not cross natural heritage system 	<ul style="list-style-type: none"> Conforms Pipe does not cross natural heritage system

Category & Criteria		Stage 1 Water: S1W1	Stage 1 Wastewater: S1WW1	Stage 1 Wastewater: S1WW2
	k. Potential effects on current land uses, including development plans.	<ul style="list-style-type: none"> None anticipated 	<ul style="list-style-type: none"> None anticipated 	<ul style="list-style-type: none"> None anticipated
Natural Environment	l. Potential effects on terrestrial/aquatic habitat and species.	<ul style="list-style-type: none"> No anticipated effects on terrestrial / aquatic habitat and species 	<ul style="list-style-type: none"> No anticipated effects on terrestrial / aquatic habitat and species 	<ul style="list-style-type: none"> No anticipated effects on terrestrial / aquatic habitat and species
	m. Potential effects on species at risk (SAR) and SAR habitat.	<ul style="list-style-type: none"> Potential to encounter Species at Risk within Spring Creek Road extension area. Species may include Bobolink and Eastern Meadowlark. 	<ul style="list-style-type: none"> Potential to encounter Species at Risk within Spring Creek Road extension area. Species may include Bobolink and Eastern Meadowlark. 	<ul style="list-style-type: none"> Potential to encounter Species at Risk within Spring Creek Road extension area. Species may include Bobolink and Eastern Meadowlark.
	n. Potential to encounter soil and water contamination and waste disposal.	<ul style="list-style-type: none"> None identified 	<ul style="list-style-type: none"> None identified 	<ul style="list-style-type: none"> None identified
	o. Anticipated environmental permitting and approval considerations.	<ul style="list-style-type: none"> SAR permitting anticipated due to SAR habitat in area (Spring Creek Road extension) 	<ul style="list-style-type: none"> SAR permitting anticipated due to SAR habitat in area (Spring Creek Road extension) 	<ul style="list-style-type: none"> SAR permitting anticipated due to SAR habitat in area (Spring Creek Road extension)
	p. Potential effects on surface water and groundwater due to construction (i.e., dewatering of trenches during installation of watermain and/or sanitary forcemain/sewer, control of erosion and sedimentation).	<ul style="list-style-type: none"> The installation of watermain can lead to the interception of the shallow water table altering shallow groundwater flow paths Installation of infrastructure below the water table leads to the potential need for dewatering during construction and post construction and a decrease in groundwater levels 	<ul style="list-style-type: none"> The installation of sewer infrastructure can lead to the interception of the shallow water table altering shallow groundwater flow paths Installation of infrastructure below the water table leads to the potential need for dewatering during construction and post construction and a decrease in groundwater levels 	<ul style="list-style-type: none"> The installation of sewer infrastructure can lead to the interception of the shallow water table altering shallow groundwater flow paths Installation of infrastructure below the water table leads to the potential need for dewatering during construction and post construction and a decrease in groundwater levels
	q. Source water protection considerations.	<ul style="list-style-type: none"> Drainage features within the study area are primarily headwater drainage (HDF) features, with some defined and regulated watercourses 	<ul style="list-style-type: none"> Drainage features within the study area are primarily headwater drainage (HDF) features, with some defined and regulated watercourses 	<ul style="list-style-type: none"> Drainage features within the study area are primarily headwater drainage (HDF) features, with some defined and regulated watercourses
Socio-Economic Environment	r. Potential nuisance impacts (e.g., disruption to access, air, dust, noise, and vibration) from construction and operations.	<ul style="list-style-type: none"> Potential disruption to fronting properties 	<ul style="list-style-type: none"> Lower potential disruption to fronting properties 	<ul style="list-style-type: none"> Greater potential disruption to fronting properties
	s. Potential property requirements (temporary and permanent).	<ul style="list-style-type: none"> None anticipated 	<ul style="list-style-type: none"> None anticipated 	<ul style="list-style-type: none"> None anticipated
Climate Change	t. Potential carbon footprint (e.g., energy usage, use of construction materials, construction methods and operations).	<ul style="list-style-type: none"> Relative carbon footprint not determined due to single option for water 	<ul style="list-style-type: none"> Lower carbon footprint based on shorter construction duration 	<ul style="list-style-type: none"> Higher carbon footprint based on longer construction duration
Cultural Environment	u. Potential effects on archaeological resources.	<ul style="list-style-type: none"> Works outside road right of way contains areas of moderate to high archaeological potential. 	<ul style="list-style-type: none"> Works outside road right of way contains areas of moderate to high archaeological potential. 	<ul style="list-style-type: none"> Works outside road right of way contains areas of moderate to high archaeological potential
	v. Potential for disruption of built heritage resources and cultural heritage landscapes.	<ul style="list-style-type: none"> No potential or designated heritage resources within area. 	<ul style="list-style-type: none"> No potential or designated heritage resources within area. 	<ul style="list-style-type: none"> No potential or designated heritage resources within area.

Category & Criteria		Stage 1 Water: S1W1	Stage 1 Wastewater: S1WW1	Stage 1 Wastewater: S1WW2
Cost	w. Cost of construction (including property acquisition).	<ul style="list-style-type: none"> Relative cost of construction not determined due to single option for water 	<ul style="list-style-type: none"> Lower cost of construction than S1WW2 due to shorter construction duration 	<ul style="list-style-type: none"> Higher cost of construction than S1WW1 due to shorter construction duration
	x. Cost of operation / maintenance.	<ul style="list-style-type: none"> Relative cost of operation not determined due to single option for water 	<ul style="list-style-type: none"> Lower than S1WW2 	<ul style="list-style-type: none"> Higher than S1WW1

5.3 Water and Wastewater Infrastructure Assessment for Stage 2

The assessment results indicated that S2W2 and S2WW1 would be considered a most preferable strategies to meet the water and wastewater service, respectively, for the Stage 2 urban boundary expansion as well as the expected growth for the East Smithville Secondary Plan area. The following summarizes the rationale for selecting these preferred solutions and Table 5-1 presents the detailed assessment results.

5.3.1 Preferred Solutions and Rationale for Stage 2 Water Service

Two alternatives were evaluated to address water servicing for the Stage 2 urban boundary expansion area.

S2W1

- ◆ Watermain extends southernly from London Road Pumping Station down Industrial Park Road
- ◆ Industrial Park Road easternly towards Regional Road 20 and Townline Road roundabout

S2W2

- ◆ Watermain extends southernly from London Road Pumping Station towards Industrial Park Road and Regional Road 20 (St Catharines Street) intersection

Rationale for preferred solution for Stage 2 Water Service

S2W2 is the preferred solution, and the rationale is summarized as follows:

1. Reduced construction complexity and avoids significant community disruption within the existing Smithville urban area
2. No potential of cultural heritage sites in area

5.3.2 Preferred Solutions and Rationale for Stage 2 Wastewater Service

As only one option was evaluated for the wastewater servicing for Stage 2, S2WW1 is the preferred solution. To service Stage area 2B a private pumping system will be required. Alternatively, the area can be serviced by utilising a low pressure system whereby individual buildings pump their wastewater to a pressurized sewer main which

will be owned and maintained by the Township; individual building pumps will be considered a private system with individual building owner responsibility.

Table 5-2: Stage 2 Water and Wastewater Strategy Assessment Results

Category & Criteria		Stage 2 Water: S2W1	Stage 2 Water: S2W2	Stage 2 Wastewater: S2WW1
Details		<ul style="list-style-type: none"> Watermain extends southernly from London Road Pumping Station down Industrial Park Road Industrial Park Road easternly towards Regional Road 20 and Townline Road roundabout No crossing of Twenty Mile Creek Crossing of rail tracks on Industrial Park Road 	<ul style="list-style-type: none"> Watermain extends southernly from London Road Pumping Station towards Industrial Park Road and Regional Road 20 (St Catharines Street) intersection No crossing of Twenty Mile Creek Crossing of rail tracks on Industrial Park Road <p style="text-align: center;">Preferred Solution</p>	<ul style="list-style-type: none"> New sewer gravity main from Smithville sanitary pumping station on east side from Regional Road 20 (St Catharines Street) towards Townline Road No crossing of Twenty Mile Creek required No crossing of rail tracks <p style="text-align: center;">Preferred Solution</p>
Technical Environment	a. Potential degree of construction complexities, including number and type of water crossings, anticipated rock removal, access, working area and duration to build.	<ul style="list-style-type: none"> One crossing of rail tracks No crossings of Twenty Mile Creek Anticipate in rock Access from Industrial Park Road Longer construction duration related to longer watermain length Potential temporary easement required which could delay construction commencement 	<ul style="list-style-type: none"> One crossing of rail tracks No crossings of Twenty Mile Creek Anticipate in rock Access from Industrial Park Road Shorter construction duration related to shorter watermain length Potential temporary easement required which could delay construction commencement 	<ul style="list-style-type: none"> No crossings of rail tracks No crossings of Twenty Mile Creek Anticipate in rock Access from Regional Road 20 (St Catharines Street) Relative construction duration has not been determined due to single option for wastewater
	b. Potential effects on roadway and utility infrastructure.	<ul style="list-style-type: none"> Greater impacts to recently paved surfaces on Regional Road 20 (St Catharines Street) and Townline Road roundabout Potential for utility conflicts on Townline Road and Regional Road 20 (St Catharines Street) Potential for railway conflicts on Industrial Park Road 	<ul style="list-style-type: none"> Lower impacts to paved surfaces Potential for railway conflicts on Industrial Park Road Potential for utility conflicts on London Road 	<ul style="list-style-type: none"> Greater impacts to recently paved surfaces on Regional Road 20 (St Catharines Street) and Townline Road roundabout Potential for utility conflicts on Townline Road and Regional Road 20 (St Catharines Street)
	c. Provides good site access for maintenance vehicles, future operation and maintenance and servicing.	<ul style="list-style-type: none"> Access from existing road allowances 	<ul style="list-style-type: none"> Access from existing road allowances 	<ul style="list-style-type: none"> Access from existing road allowances
	d. Operation efficiency.	<ul style="list-style-type: none"> Higher energy use related to long watermain and number of bends 	<ul style="list-style-type: none"> Lower energy use related to short watermain and no bends 	<ul style="list-style-type: none"> Relative operation efficiency not determined due to single option for wastewater
	e. Potential opportunity for current infrastructure to be decommissioned in favour of gravity solutions	<ul style="list-style-type: none"> Not applicable 	<ul style="list-style-type: none"> Not applicable 	<ul style="list-style-type: none"> Not applicable
	f. Potential effects on traffic.	<ul style="list-style-type: none"> Greater impacts to traveling public 	<ul style="list-style-type: none"> Lower impacts to traveling public 	<ul style="list-style-type: none"> Relative traffic effects not determined due to single option for wastewater
	g. Dependency on the completion of other Stages	<ul style="list-style-type: none"> Independent of all other Staging Strategies 	<ul style="list-style-type: none"> Independent of all other Staging Strategies 	<ul style="list-style-type: none"> Independent of all other Staging Strategies
	h. Degree of permitting and approvals complexity	<ul style="list-style-type: none"> CNR permitting anticipated due to railway crossing SAR permitting anticipated due to SAR habitat in area (Industrial Park Road agricultural fields) 	<ul style="list-style-type: none"> CNR permitting anticipated due to railway crossing SAR permitting anticipated due to SAR habitat in area (Industrial Park Road agricultural fields) 	<ul style="list-style-type: none"> SAR permitting anticipated due to SAR habitat in area (Regional Road 20 agricultural fields)
Land Use	i. Potential to conform to approved local (e.g., OP and MCP), provincial (e.g., PPS) plans and policies.	<ul style="list-style-type: none"> Conforms Utilities permitted in future ROW Pipe does not cross natural heritage system Work in regulated area to comply with NPCA policy document – November 2022 	<ul style="list-style-type: none"> Conforms Utilities permitted in future ROW Pipe does not cross natural heritage system Work in regulated area to comply with NPCA policy document – November 2022 	<ul style="list-style-type: none"> Conforms Pipe does not cross natural heritage system Work in regulated area to comply with NPCA policy document – November 2022
	k. Potential effects on current land uses, including development plans.	<ul style="list-style-type: none"> Potential to impact industrial area along Industrial Park Road Potential to impact Tim Hortons landscaping and parking 	<ul style="list-style-type: none"> Potential to impact industrial area along Industrial Park Road Potential to impact Tim Hortons landscaping and parking 	<ul style="list-style-type: none"> Potential to impact residential and industrial area along Regional Road 20 (St Catharines Street)

Category & Criteria		Stage 2 Water: S2W1	Stage 2 Water: S2W2	Stage 2 Wastewater: S2WW1
Natural Environment	l. Potential effects on terrestrial/aquatic habitat and species.	<ul style="list-style-type: none"> Provincially Significant wetland consisting of swamp community south of Regional Road 20. Twenty Mile Creek includes wetland amphibian breeding habitat and turtle wintering. Habitat for several species of Conservation concern and deer wintering. 	<ul style="list-style-type: none"> Provincially Significant wetland consisting of swamp community south of Regional Road 20 (St Catharines Street). Twenty Mile Creek includes wetland amphibian breeding habitat and turtle wintering. Habitat for several species of Conservation concern and deer wintering. 	<ul style="list-style-type: none"> Provincially Significant wetland consisting of swamp community south of Regional Road 20. Twenty Mile Creek includes wetland amphibian breeding habitat and turtle wintering. Habitat for several species of Conservation concern and deer wintering.
	m. Potential effects on species at risk (SAR) and SAR habitat.	<ul style="list-style-type: none"> Potential to encounter Species at Risk in agricultural fields east of Industrial Park Road. Species may include Bobolink and Eastern Meadowlark. 	<ul style="list-style-type: none"> Potential to encounter Species at Risk in agricultural fields east of Industrial Park Road. Species may include Bobolink and Eastern Meadowlark. 	<ul style="list-style-type: none"> Potential to encounter Species at Risk in agricultural fields north of Regional Road 20 (St Catharines Street). Species may include Bobolink and Eastern Meadowlark.
	n. Potential to encounter soil and water contamination and waste disposal.	<ul style="list-style-type: none"> None identified 	<ul style="list-style-type: none"> None identified 	<ul style="list-style-type: none"> None identified
	o. Anticipated environmental permitting and approval considerations.	<ul style="list-style-type: none"> Requires Niagara Peninsula Conservation Authority work permit Potential Species at Risk related to sending and receiving pits outside travel portion of ROW 	<ul style="list-style-type: none"> Requires Niagara Peninsula Conservation Authority work permit Potential Species at Risk related to sending and receiving pits outside travel portion of ROW 	<ul style="list-style-type: none"> Requires Niagara Peninsula Conservation Authority work permit Potential Species at Risk related to sending and receiving pits outside travel portion of ROW
	p. Potential effects on surface water and groundwater due to construction (i.e., dewatering of trenches during installation of watermain and/or sanitary forcemain/sewer, control of erosion and sedimentation).	<ul style="list-style-type: none"> The installation of water infrastructure can lead to the interception of the shallow water table altering shallow groundwater flow paths Installation of infrastructure below the water table leads to the potential need for dewatering during construction and post construction and a decrease in groundwater levels 	<ul style="list-style-type: none"> The installation of water infrastructure can lead to the interception of the shallow water table altering shallow groundwater flow paths Installation of infrastructure below the water table leads to the potential need for dewatering during construction and post construction and a decrease in groundwater levels 	<ul style="list-style-type: none"> The installation of sewer infrastructure can lead to the interception of the shallow water table altering shallow groundwater flow paths Installation of infrastructure below the water table leads to the potential need for dewatering during construction and post construction and a decrease in groundwater levels
	q. Source water protection considerations.	<ul style="list-style-type: none"> Drainage features within the study area are primarily headwater drainage (HDF) features, with some defined and regulated watercourses Twenty Mile Creek is the most significant watercourse and valley system within Smithville, with confined corridors and floodplains 	<ul style="list-style-type: none"> Drainage features within the study area are primarily headwater drainage (HDF) features, with some defined and regulated watercourses Twenty Mile Creek is the most significant watercourse and valley system within Smithville, with confined corridors and floodplains 	<ul style="list-style-type: none"> Drainage features within the study area are primarily headwater drainage (HDF) features, with some defined and regulated watercourses Twenty Mile Creek is the most significant watercourse and valley system within Smithville, with confined corridors and floodplains
Socio-Economic Environment	r. Potential nuisance impacts (e.g., disruption to access, air, dust, noise, and vibration) from construction and operations.	<ul style="list-style-type: none"> Greater potential disruption to fronting properties 	<ul style="list-style-type: none"> Lower potential disruption to fronting properties 	<ul style="list-style-type: none"> Potential disruption to fronting properties
	s. Potential property requirements (temporary and permanent).	<ul style="list-style-type: none"> Potential temporary easements on northern section Industrial Park Road for railway crossing Potential temporary easements on northwest corner of Industrial Park Road and Regional Road 20 (St Catharines Street) 	<ul style="list-style-type: none"> Potential temporary easements on northern section Industrial Park Road for railway crossing Potential temporary easements on northwest corner of Industrial Park Road and Regional Road 20 (St Catharines Street) 	<ul style="list-style-type: none"> Potential temporary easements on northwest corner of Industrial Park Road and Regional Road 20 (St Catharines Street) Twenty Mile Creek for sewer crossing
Climate Change	t. Potential carbon footprint (e.g., energy usage, use of construction materials, construction methods and operations).	<ul style="list-style-type: none"> Higher carbon footprint related to longer length of watermain and construction duration. 	<ul style="list-style-type: none"> Lower carbon footprint related to shorter length of watermain and construction duration. 	<ul style="list-style-type: none"> Relative carbon footprint not determined due to single option for wastewater
Cultural Environment	u. Potential effects on archaeological resources.	<ul style="list-style-type: none"> Works outside road right of way contains areas of moderate to high archaeological potential. 	<ul style="list-style-type: none"> Works outside road right of way contains areas of moderate to high archaeological potential. 	<ul style="list-style-type: none"> Works outside road right of way contains areas of moderate to high archaeological potential.

Category & Criteria		Stage 2 Water: S2W1	Stage 2 Water: S2W2	Stage 2 Wastewater: S2WW1
Cost	v. Potential for disruption of built heritage resources and cultural heritage landscapes.	<ul style="list-style-type: none"> Potential heritage resources within area. 	<ul style="list-style-type: none"> No potential or designated heritage resources within area. 	<ul style="list-style-type: none"> Potential heritage resources within area.
	w. Cost of construction (including property acquisition).	<ul style="list-style-type: none"> Higher cost relative to longer construction duration 	<ul style="list-style-type: none"> Lower cost relative to shorter construction duration 	<ul style="list-style-type: none"> Relative cost of construction not determined due to single option for wastewater
	x. Cost of operation / maintenance.	<ul style="list-style-type: none"> Higher than S2W2 	<ul style="list-style-type: none"> Lower than S2W1 	<ul style="list-style-type: none"> Relative cost of operation not determined due to single option for wastewater

5.4 Water and Wastewater Infrastructure Assessment for Stage 3

The assessment results indicated that S3W1 would be considered a most preferable strategies to meet the required water service for the Stage 2 urban boundary expansion. For meeting the required wastewater service, a combination of three (3) wastewater infrastructure strategies were identified as the most preferable solutions; S3WW1A, S3WW2A and S3FM1B. The following summarizes the rationale for selecting these preferred solutions and Table 5-3 and Table 5-4 present the detailed assessment results for water and wastewater servicing strategy, respectively.

5.4.1 Preferred Solutions and Rationale for Stage 3 Water Service

Two alternatives were evaluated to address water servicing for the Stage 3 urban boundary expansion area.

S3W1

- ◆ New watermain extends easterly along Townline Road to existing North South easement east of Anderson Crescent
- ◆ Northernly from easement to Industrial Park Road / Regional Road 20 and connection future Stage 2 watermain

S3W2

- ◆ New watermain extends southernly from Townline Road and Stage 4 North South local collector road
- ◆ Southernly / easterly / northernly following internal stage 3 local collector road to Townline Road
- ◆ Easternly along Townline Road to Townline Road and Regional Road 20 roundabout and connection to future Stage 2 watermain

Rationale for preferred solution for Stage 3 Water Service

S3W1 is the preferred solution, and the rationale is summarized as follows:

1. Reduced construction complexity and avoids significant community disruption specifically for the roundabout located at Townline Road and Regional Road 20
2. Lower capital and operation maintenance costs

3. Alignment follows road allowances and does not need to be coordinated with Stage 3 developments
4. Allows for decommissioning of existing watermain within current easement between Townline Road and Regional Road 20
5. Can be coordinated with future upgrades to Townline Road
6. Stage 3A could connect to the existing watermain on Townline Road until the Region's Ring System is implemented. Therefore Stage 3A can be implemented in the near term.

The preferred solution for Stage 3 water service includes a crossing of Twenty Mile Creek and Figure 5-3 presents the location of the crossing for this solution as well as the property access requirements.

5.4.2 Preferred Solutions and Rationale for Stage 3 Wastewater Service

A total of six (6) alternatives were evaluated to address wastewater servicing for the Stage 3 urban boundary expansion area.

5.4.2.1 Gravity Sewer System Options for Stage 3

S3WW1A

- ◆ New Gravity Sewer follows Stage 3 North South and easterly local collector road starting at Townline Road
- ◆ Connection to new SPS at Port Davidson Road / Creek
- ◆ Also includes flow from new gravity sewers within Stage 3 east of Port Davidson Road
- ◆ Does not service Stage 4

S3WW1B

- ◆ New Gravity Sewer follows Stage 3 North South and easterly local collector road starting at Townline Road
- ◆ Connection to new SPS at Port Davidson Road / Creek
- ◆ Also includes flow from new gravity sewers within Stage 3 east of Port Davidson Road

- ◆ Deeper gravity sewer at the westside of the new SPS to allow for Stage 4 Wastewater to be completed

Rationale for preferred solution for Stage 3 gravity sewer system

S3WW1A is the preferred solution, and the rationale is summarized as follows:

1. Reduced construction complexity as gravity sewer exists closer to surface
2. Lower capital and operation maintenance costs

5.4.2.2 Wastewater Servicing Options for Stage 3A

S3WW2A

- ◆ New gravity sewer northerly from Stage 3A area to Townline Road
- ◆ Replace existing gravity sewer with larger size along Townline Road to Anderson Crescent and northerly on Anderson Crescent via existing easement to southside of Twenty Mile Creek

S3WW2B

- ◆ New SPS for Stage 3A service area and forcemain southerly to Stage 3 development area connecting to east west gravity sewer that sends flow to new SPS at Port Davidson Road and Creek

Rationale for preferred solution for Stage 3A wastewater service

S3WW2A is the preferred solution, and the rationale is summarized as follows:

1. Reduced construction complexity and avoids significant community disruption within the existing urban area
2. Lower capital and operation maintenance costs relating to new gravity sewer and no pumping system is required
3. Alignment follows road allowances and does not need to be coordinated with Stage 3 developments
4. Can be coordinated with future upgrades to Townline Road

5.4.2.3 Forcemain Options for Stage 3

S3FM1A

- ◆ New forcemain extending Northernly on port Davidson Road from SPS towards Townline road
- ◆ Easternly along Townline Road to Rock Street. Northernly up Rock Street towards Twenty Mile Creek crossing Rock Street Park
- ◆ Trenchless crossing of Twenty Mile Creek
- ◆ Connects to pumping station at Regional Road 20 and Industrial Park Road

S3FM1B

- ◆ New forcemain extending Northernly on port Davidson Road from SPS towards Townline road
- ◆ Easternly along Townline Road to watermain easement. Northernly through easement towards Twenty Mile Creek
- ◆ Trenchless crossing of Twenty Mile Creek
- ◆ Connects to future gravity sewer at Regional Road 20 and Industrial Park Road
- ◆ New SPS is a private pumping station

Rationale for preferred solution for Stage 3 Forcemain System

S3FM1B is the preferred solution, and the rationale is summarized as follows:

1. Reduced construction complexity and avoids significant community disruption within the existing urban area as it avoids Rock Park
2. Avoids potential soil and groundwater contamination associated with former landfill
3. Can be coordinated with the preferred Stage 3 water projects and Twenty Mile Creek crossing
4. Utilises existing north south easement between Townline Road and Regional Road 20

The preferred solution for Stage 3 forcemain system includes a crossing of Twenty Mile Creek and Figure 5-3 presents the location of the crossing for this solution as well as the property access requirements.

Table 5-3: Stage 3 Water Servicing Strategy Assessment Results

Category & Criteria		Stage 3 Water: S3W1	Stage 3 Water: S3W2
Details		<ul style="list-style-type: none"> New watermain extends easterly along Townline Road to existing North South easement east of Anderson Crescent Northerly from easement to Industrial Park Road / Regional Road 20 and connection future Stage 2 watermain Trenchless crossing of Twenty Mile Creek south of Industrial Park Road and Regional Road 20 <p style="text-align: center;">Preferred Solution</p>	<ul style="list-style-type: none"> New watermain extends southerly from Townline Road and Stage 4 North South local collector road Southerly / easterly / northerly following internal stage 3 local collector road to Townline Road Easterly along Townline Road to Townline Road and Regional Road 20 roundabout and connection to future Stage 2 watermain Trenchless crossing of Twenty Mile Creek along Townline Road
Technical Environment	a. Potential degree of construction complexities, including number and type of water crossings, anticipated rock removal, access, working area and duration to build.	<ul style="list-style-type: none"> One crossing of Twenty Mile Creek Anticipate in rock Access from Townline Road and from existing watermain easement (South side of Twenty Mile Creek) Shorter construction duration due to shorter watermain length and without requirement to coordinate construction with Stage 3 development Potential easement required for Twenty Mile Creek crossing 	<ul style="list-style-type: none"> One crossing of Twenty Mile Creek Anticipate in rock Access from Townline Road and from existing watermain easement (South side of Twenty Mile Creek) Longer construction duration due to longer watermain length and requirement to coordinate construction with Stage 3 development Potential easement required for Twenty Mile Creek crossing
	b. Potential effects on roadway and utility infrastructure.	<ul style="list-style-type: none"> Lower impacts to paved surfaces and utilities (i.e. shorter length) 	<ul style="list-style-type: none"> Greater impacts to paved surfaces and utilities (i.e. roundabout located at Regional Road 20 and Townline Road)
	c. Provides good site access for maintenance vehicles, future operation and maintenance and servicing.	<ul style="list-style-type: none"> Access from existing utility corridor/easement / roads 	<ul style="list-style-type: none"> Access from existing roads
	d. Operation efficiency.	<ul style="list-style-type: none"> Lower operation and maintenance effort required related to shorter watermain distance 	<ul style="list-style-type: none"> Higher operation and maintenance effort related to longer watermain distance
	e. Potential opportunity for current infrastructure to be decommissioned in favour of gravity solutions	<ul style="list-style-type: none"> Allows for decommissioning of existing 150 mm watermain in current easement between Townline Road and Regional Road 20 	<ul style="list-style-type: none"> Does not allow for decommissioning
	f. Potential effects on traffic.	<ul style="list-style-type: none"> Lower impacts to traveling public (avoids roundabout at Townline Road and Regional Road 20) 	<ul style="list-style-type: none"> Greater impacts to traveling public on Townline Road and Regional Road 20 (roundabout)
	g. Dependency on the completion of other Stages	<ul style="list-style-type: none"> Water strategy requires Stage 2 water infrastructure to be in place prior to developing Stage 3 	<ul style="list-style-type: none"> Water strategy requires Stage 2 water infrastructure to be in place prior to developing Stage 3
	h. Degree of permitting and approvals complexity	<ul style="list-style-type: none"> Species at risk habitat in area of water crossings NCPA permits for trenchless crossing Avoids coordination with block plan development process 	<ul style="list-style-type: none"> Species at risk habitat in area of water crossings NCPA permits for trenchless crossing Watermain to be captured with block plan development process
Land Use	<ul style="list-style-type: none"> i. Potential to conform to approved local (e.g., OP and MCP), provincial (e.g., PPS) plans and policies. j. Identify existing official plans and schedule B1, B3 and B4 Natural Heritage 	<ul style="list-style-type: none"> Conforms Utilities permitted in future ROW Pipe crosses natural heritage system (current official plan Schedule E-12 and proposed OPA schedule 63) between Regional Road 20 (St Catharines Street) and Townline Road Work in regulated area to comply with NPCA policy document – November 2022 	<ul style="list-style-type: none"> Conforms Utilities permitted in future ROW Pipe crosses natural heritage system (current official plan Schedule E-12 and proposed OPA schedule 63) between Regional Road 20 (St Catharines Street) and Townline Road Work in regulated area to comply with NPCA policy document – November 2022

Category & Criteria		Stage 3 Water: S3W1	Stage 3 Water: S3W2
Natural Environment	k. Potential effects on current land uses, including development plans.	<ul style="list-style-type: none"> Potential to disrupt parking lot at northwest corner of Industrial Park Road and Regional Road 20 (Temporary easement for watercrossing) 	<ul style="list-style-type: none"> Potential to disrupt agricultural land use (Southside Twenty Mile Creek) (Temporary easement for watercrossing)
	l. Potential effects on terrestrial/aquatic habitat and species.	<ul style="list-style-type: none"> Trenchless crossing minimizes impacts Minor vegetation removal in existing easement between Townline Road and Regional Road 20 Provincially Significant wetland consisting of swamp community south of Industrial Park Road. Twenty Mile Creek includes wetland amphibian breeding habitat and turtle wintering. Habitat for several species of Conservation concern and deer wintering. 	<ul style="list-style-type: none"> Trenchless crossing minimizes impacts Potential vegetation removal on Townline Road for Twenty Mile Creek crossing Provincially Significant wetland consisting of swamp community between Regional Road 20 (St Catharines) and Townline Road. Twenty Mile Creek includes wetland amphibian breeding habitat and turtle wintering. Habitat for several species of Conservation concern and deer wintering.
	m. Potential effects on species at risk (SAR) and SAR habitat.	<ul style="list-style-type: none"> Potential to encounter Species at Risk in existing easement between Townline Road and R 20 Grass Pickerel and Snapping Turtle habitat in creek. 	<ul style="list-style-type: none"> Potential to encounter Species at Risk in agricultural fields south of Townline Road. Species may include Bobolink and Eastern Meadowlark.
	n. Potential to encounter soil and water contamination and waste disposal.	<ul style="list-style-type: none"> None identified 	<ul style="list-style-type: none"> None identified
	o. Anticipated environmental permitting and approval considerations.	<ul style="list-style-type: none"> Requires Niagara Peninsula Conservation Authority work permit Anticipated Permit to Take Water Potential Species at Risk related to sending and receiving pits outside travel portion of ROW 	<ul style="list-style-type: none"> Requires Niagara Peninsula Conservation Authority work permit Anticipated Permit to Take Water Potential Species at Risk related to sending and receiving pits outside travel portion of ROW
	p. Potential effects on surface water and groundwater due to construction (i.e., dewatering of trenches during installation of watermain and/or sanitary forcemain/sewer, control of erosion and sedimentation).	<ul style="list-style-type: none"> The installation of water infrastructure can lead to the interception of the shallow water table altering shallow groundwater flow paths Installation of infrastructure below the water table leads to the potential need for dewatering during construction and post construction and a decrease in groundwater levels 	<ul style="list-style-type: none"> The installation of water infrastructure can lead to the interception of the shallow water table altering shallow groundwater flow paths Installation of infrastructure below the water table leads to the potential need for dewatering during construction and post construction and a decrease in groundwater levels
	q. Source water protection considerations.	<ul style="list-style-type: none"> Drainage features within the study area are primarily headwater drainage (HDF) features, with some defined and regulated watercourses Twenty Mile Creek is the most significant watercourse and valley system within Smithville, with confined corridors and floodplains 	<ul style="list-style-type: none"> Drainage features within the study area are primarily headwater drainage (HDF) features, with some defined and regulated watercourses Twenty Mile Creek is the most significant watercourse and valley system within Smithville, with confined corridors and floodplains
Socio-Economic Environment	r. Potential nuisance impacts (e.g., disruption to access, air, dust, noise, and vibration) from construction and operations.	<ul style="list-style-type: none"> Greater potential to impact fronting properties and access to businesses (Regional Road 20 and Industrial Park Road area) 	<ul style="list-style-type: none"> Lower potential to impact fronting properties and businesses
	s. Potential property requirements (temporary and permanent).	<ul style="list-style-type: none"> Potential temporary easements on northwest corner of Industrial Park Road and Regional Road 20 (St Catharines Street) Potential permanent easement between St Catharines Street and Townline Road for watermain crossing 	<ul style="list-style-type: none"> Potential permanent easements on Townline Road at Twenty Mile Creek for watermain crossing

Category & Criteria		Stage 3 Water: S3W1	Stage 3 Water: S3W2
Climate Change	t. Potential carbon footprint (e.g., energy usage, use of construction materials, construction methods and operations).	<ul style="list-style-type: none"> Lower carbon footprint related to shorter length of watermain and construction duration. 	<ul style="list-style-type: none"> Higher carbon footprint related to longer length of watermain and construction duration.
Cultural Environment	u. Potential effects on archaeological resources.	<ul style="list-style-type: none"> Works outside road right of way contains areas of moderate to high archaeological potential. 	<ul style="list-style-type: none"> Works outside road right of way contains areas of moderate to high archaeological potential.
	v. Potential for disruption of built heritage resources and cultural heritage landscapes.	<ul style="list-style-type: none"> Potential heritage resources within area. 	<ul style="list-style-type: none"> Potential heritage resources within area.
Cost	w. Cost of construction (including property acquisition).	<ul style="list-style-type: none"> Lower than S3W2 due to shorter length and less road restoration required 	<ul style="list-style-type: none"> Higher than S3W1 due to longer length and greater road restoration required (roundabout at Regional Road 20 and Townline Road)
	x. Cost of operation / maintenance.	<ul style="list-style-type: none"> Lower than S3W2 due to shorter length Allows for decommissioning of existing watermain with a higher efficiency system 	<ul style="list-style-type: none"> Higher than S3W1 due to shorter length

Table 5-4: Stage 3 Wastewater Servicing Strategy Assessment Results

Category & Criteria		Stage 3: S3WW1A	Stage 3: S3WW1B	Stage 3 S3FM1A	Stage 3 S3FM1B	Stage 3: S3WW2A	Stage 3: S3WW2B
Details		<ul style="list-style-type: none"> New Gravity Sewer follows Stage 3 North South and easterly local collector road starting at Townline Road Connection to new SPS at Port Davidson Road / North Creek Also includes flow from new gravity sewers within Stage 3 east of Port Davidson Road Trenchless crossing of Twenty Mile Creek required Does not service Stage 4 <p style="text-align: center;">Preferred Solution</p>	<ul style="list-style-type: none"> New Gravity Sewer follows Stage 3 North South and easterly local collector road starting at Townline Road Connection to new SPS at Port Davidson Road / North Creek Also includes flow from new gravity sewers within Stage 3 east of Port Davidson Road Deeper gravity sewer to allow for Stage 4 Wastewater to be completed 	<ul style="list-style-type: none"> New forcemain extending Northernly on port Davidson Road from SPS towards Townline road Easternly along Townline Road to Rock Street. Northernly up Rock Street towards Twenty Mile Creek crossing Rock Street Park Trenchless crossing of Twenty Mile Creek Connects to pumping station at Regional Road 20 and Industrial Park Road 	<ul style="list-style-type: none"> New forcemain extending Northernly on port Davidson Road from SPS towards Townline road Easternly along Townline Road to watermain easement. Northernly through easement towards Twenty Mile Creek Trenchless crossing of Twenty Mile Creek Connects to future gravity sewer at Regional Road 20 and Industrial Park Road <p style="text-align: center;">Preferred Solution</p>	<ul style="list-style-type: none"> New gravity sewer northernly from Stage 3A area to Townline Road Easternly along Townline Road to Anderson Crescent Northernly on Anderson Crescent via existing easement to southside of Twenty Mile Creek <p style="text-align: center;">Preferred Solution</p>	<ul style="list-style-type: none"> New SPS for Stage 3A service area and forcemain southerly to Stage 3 development area connecting to east west gravity sewer that sends flow to new SPS at Port Davidson Road and North Creek New SPS is a private pumping station
Technical Environment	a. Potential degree of construction complexities, including number and type of water crossings, anticipated rock removal, access, working area and duration to build.	<ul style="list-style-type: none"> No crossings of Twenty Mile Creek Anticipate in rock Access from Townline Road Shorter construction duration relative to 1B due to sewer being closer to the surface 	<ul style="list-style-type: none"> No crossings of Twenty Mile Creek Greater amount of in rock due to deeper gravity sewer Access from Townline Road Longer construction duration relative to 1A due to deeper sewer 	<ul style="list-style-type: none"> One crossing of Twenty Mile Creek to connect with new SPS and forcemain Anticipate in rock Access from Townline Road Comparable construction duration relative to FM1B due to park restoration required Potential conflict with storm outlet (Northside of Twenty Mile Creek) Potential temporary easement required in area of Smithville SPS connection 	<ul style="list-style-type: none"> One crossing of Twenty Mile Creek to connect with new SPS and forcemain Anticipate in rock Access from Townline Road Comparable construction duration relative to FM1A due to longer forcemain length Potential conflict with storm outlet (Northside of Twenty Mile Creek) Potential temporary easement required at northwest intersection of Regional Road 20 and Industrial Park Road 	<ul style="list-style-type: none"> No crossings of Twenty Mile Creek Anticipate in rock Access from Townline Road Existing easement between houses on north side of Anderson Crescent has limited spacing Comparable construction duration relative to 2B due to same sewer main length 	<ul style="list-style-type: none"> No crossings of Twenty Mile Creek Anticipate in rock Access from Townline Road Comparable construction duration relative to 2A due to same sewer main length
	b. Potential effects on roadway and utility infrastructure.	<ul style="list-style-type: none"> H impacts to paved surfaces 	<ul style="list-style-type: none"> Lower impacts to paved surfaces 	<ul style="list-style-type: none"> Lower impacts to paved surfaces Potential conflict with storm outlet (Northside of Twenty Mile Creek) 	<ul style="list-style-type: none"> Lower impacts to paved surfaces Potential conflict with storm outlet (Northside of Twenty Mile Creek) 	<ul style="list-style-type: none"> Greater impacts to paved surfaces (Anderson Crescent) 	<ul style="list-style-type: none"> Low impacts to paved surfaces (Avoids Anderson Crescent)
	c. Provides good site access for maintenance vehicles, future operation and maintenance and servicing.	<ul style="list-style-type: none"> Access from existing roads 	<ul style="list-style-type: none"> Access from existing roads 	<ul style="list-style-type: none"> Access from existing roads and Rock Park 	<ul style="list-style-type: none"> Access from existing utility corridor / roads 	<ul style="list-style-type: none"> Access from existing roads 	<ul style="list-style-type: none"> Access from existing roads
	d. Operation efficiency.	<ul style="list-style-type: none"> Lower operation and maintenance effort use compared to 1B 	<ul style="list-style-type: none"> Higher operation and maintenance effort compared to 1A related to deeper sewer 	<ul style="list-style-type: none"> Comparable operation and maintenance effort relative to FM1B due to same length 	<ul style="list-style-type: none"> Comparable operation and maintenance effort relative to FM1A due to same length 	<ul style="list-style-type: none"> Higher operation and maintenance effort relative to W3WW2B due to SPS 	<ul style="list-style-type: none"> Lower operation and maintenance effort relative to W3WW2A due to avoidance of SPS Requires operations and maintenance by private entity

Category & Criteria		Stage 3: S3WW1A	Stage 3: S3WW1B	Stage 3 S3FM1A	Stage 3 S3FM1B	Stage 3: S3WW2A	Stage 3: S3WW2B
	e. Potential opportunity for current infrastructure to be decommissioned in favour of gravity solutions f. Potential effects on traffic	• Not Applicable	• Not Applicable	• Not Applicable	• Consolidates water and wastewater in existing utility corridor (existing easement between Townline Road and Regional Road 20)	• Not applicable	• Not Applicable
	g. Potential effects on traffic.	• Lower impacts to traveling public Townline Road	• Lower impacts to traveling public Townline Road	• Lower impacts to traveling public Townline Road	• Lower impacts to traveling public Townline Road	• Greater impacts to traveling public on Anderson Crescent and Townline Road	• Lower impacts to traveling public Townline Road
	h. Dependency on the completion of other Stages	• Wastewater strategy could be implemented independently to Stages 1 and 2 with a new sanitary pump station / forcemain in place.	• Wastewater strategy could be implemented independently to Stages 1 and 2 with a new sanitary pump station / forcemain in place.	• Implementation would allow S3WW1 or S3WW2 to be implemented independently of Stages 1 and 2	• Requires gravity sewer from Stage 1 (S1WW1) • Implementation would allow S3WW1 or S3WW2 to be implemented independently of Stages 1 and 2	• Stage 3 northeast area can be implemented in near term with replacement of existing sewer line (Anderson Crescent sanitary sewer easement deficiency and maintenance of capacity).	• Stage 3 northeast area can be implemented with a new Stage 3 gravity sewer, pump station and forcemain in place
	i. Degree of permitting and approvals complexity	• SAR permitting anticipated due to SAR habitat in area (Townline Road agricultural fields) • Sewer to be captured with block plan development process	• SAR permitting anticipated due to SAR habitat in area (Townline Road agricultural fields) • Sewer to be captured with block plan development process	• Species at risk habitat in area of water crossings • NCPA permits for trenchless crossing • Forcemain to be captured with block plan development process	• Species at risk habitat in area of water crossings • NCPA permits for trenchless crossing • Forcemain to be captured with block plan development process	• SAR permitting anticipated due to SAR habitat in area (Townline Road agricultural fields) • Sewer to be captured with block plan development process	• SAR permitting anticipated due to SAR habitat in area (Townline Road agricultural fields) • Forcemain to be captured block plan development process
Land Use	j. Potential to conform to approved local (e.g., OP and MCP), provincial (e.g., PPS) plans and policies. k. Identify existing official plans and schedule B1, B3 and B4 Natural Heritage	• Conforms • Pipe does not cross natural heritage system • Work in regulated area to comply with NPCA policy document – November 2022	• Conforms • Pipe does not cross natural heritage system • Work in regulated area to comply with NPCA policy document – November 2022	• Conforms • Pipe crosses natural heritage system (current official plan Schedule E-12 and proposed OPA schedule 63) between Regional Road 20 (St Catharines Street) and Townline Road • Work in regulated area to comply with NPCA policy document – November 2022	• Conforms • Pipe crosses natural heritage system (current official plan Schedule E-12 and proposed OPA schedule 63) between Regional Road 20 (St Catharines Street) and Townline Road • Work in regulated area to comply with NPCA policy document – November 2022	• Conforms • Pipe does not cross natural heritage system • Work in regulated area to comply with NPCA policy document – November 2022	• Conforms • Pipe does not cross natural heritage system • Work in regulated area to comply with NPCA policy document – November 2022
	l. Potential effects on current land uses, including development plans.	• Sewer line is located within future development lands	• Sewer line is located within future development lands	• Forcemain is located within future development lands	• Forcemain is located within future development lands	• Sewer line is located within future development lands	• Sewer line is located within future development lands

Category & Criteria		Stage 3: S3WW1A	Stage 3: S3WW1B	Stage 3 S3FM1A	Stage 3 S3FM1B	Stage 3: S3WW2A	Stage 3: S3WW2B
Natural Environment	m. Potential effects on terrestrial/aquatic habitat and species.	<ul style="list-style-type: none"> No anticipated effects on terrestrial / aquatic habitat and species 	<ul style="list-style-type: none"> No anticipated effects on terrestrial / aquatic habitat and species 	<ul style="list-style-type: none"> Trenchless crossing minimizes impacts Minor vegetation removal in existing easement between Townline Road and Regional Road 20 Provincially Significant wetland consisting of swamp community south of Industrial Park Road. Twenty Mile Creek includes wetland amphibian breeding habitat and turtle wintering. Habitat for several species of Conservation concern and deer wintering. 	<ul style="list-style-type: none"> Trenchless crossing minimizes impacts Minor vegetation removal in existing easement between Townline Road and Regional Road 20 Provincially Significant wetland consisting of swamp community south of Industrial Park Road. Twenty Mile Creek includes wetland amphibian breeding habitat and turtle wintering. Habitat for several species of Conservation concern and deer wintering. 	<ul style="list-style-type: none"> Minor vegetation removal between Townline Road and Regional Road 20 Provincially Significant wetland consisting of swamp community south of Industrial Park Road. Twenty Mile Creek includes wetland amphibian breeding habitat and turtle wintering. Habitat for several species of Conservation concern and deer wintering. 	<ul style="list-style-type: none"> Minor vegetation removal between Townline Road and Regional Road 20 Provincially Significant wetland consisting of swamp community south of Industrial Park Road. Twenty Mile Creek includes wetland amphibian breeding habitat and turtle wintering. Habitat for several species of Conservation concern and deer wintering.
	n. Potential effects on species at risk (SAR) and SAR habitat.	<ul style="list-style-type: none"> Potential to encounter Species at Risk in agricultural fields south of Townline Road. Species may include Bobolink and Eastern Meadowlark. 	<ul style="list-style-type: none"> Potential to encounter Species at Risk in agricultural fields south of Townline Road. Species may include Bobolink and Eastern Meadowlark. 	<ul style="list-style-type: none"> Potential to encounter Species at Risk in agricultural fields south of Townline Road. Species may include Bobolink and Eastern Meadowlark. 	<ul style="list-style-type: none"> Potential to encounter Species at Risk in agricultural fields south of Townline Road. Species may include Bobolink and Eastern Meadowlark. 	<ul style="list-style-type: none"> Potential to encounter Species at Risk in agricultural fields south of Townline Road. Species may include Bobolink and Eastern Meadowlark. 	<ul style="list-style-type: none"> Potential to encounter Species at Risk in agricultural fields south of Townline Road. Species may include Bobolink and Eastern Meadowlark.
	o. Potential to encounter soil and water contamination and waste disposal.	<ul style="list-style-type: none"> None identified 	<ul style="list-style-type: none"> None identified 	<ul style="list-style-type: none"> Potential to encounter soil and groundwater contamination due to work within / adjacent to former landfill in the area 	<ul style="list-style-type: none"> None identified 	<ul style="list-style-type: none"> None identified 	<ul style="list-style-type: none"> None identified
	p. Anticipated environmental permitting and approval considerations.	<ul style="list-style-type: none"> Requires Niagara Peninsula Conservation Authority work permit Potential Species at Risk related to sending and receiving pits outside travel portion of ROW 	<ul style="list-style-type: none"> Requires Niagara Peninsula Conservation Authority work permit Potential Species at Risk related to sending and receiving pits outside travel portion of ROW 	<ul style="list-style-type: none"> Requires Niagara Peninsula Conservation Authority work permit Anticipated Permit to Take Water Potential Species at Risk related to sending and receiving pits outside travel portion of ROW 	<ul style="list-style-type: none"> Requires Niagara Peninsula Conservation Authority work permit Anticipated Permit to Take Water Potential Species at Risk related to sending and receiving pits outside travel portion of ROW 	<ul style="list-style-type: none"> Requires Niagara Peninsula Conservation Authority work permit Potential Species at Risk related to sending and receiving pits outside travel portion of ROW 	<ul style="list-style-type: none"> Requires Niagara Peninsula Conservation Authority work permit Potential Species at Risk related to sending and receiving pits outside travel portion of ROW
	q. Potential effects on surface water and groundwater due to construction (i.e., dewatering of trenches during installation of watermain and/or sanitary forcemain/sewer, control of erosion and sedimentation).	<ul style="list-style-type: none"> The installation of sewer infrastructure can lead to the interception of the shallow water table altering shallow groundwater flow paths Installation of infrastructure below the water table leads to the potential need for dewatering during construction and post construction and a decrease in groundwater levels 	<ul style="list-style-type: none"> The installation of sewer infrastructure can lead to the interception of the shallow water table altering shallow groundwater flow paths Installation of infrastructure below the water table leads to the potential need for dewatering during construction and post construction and a decrease in groundwater levels 	<ul style="list-style-type: none"> The installation of sewer infrastructure can lead to the interception of the shallow water table altering shallow groundwater flow paths Installation of infrastructure below the water table leads to the potential need for dewatering during construction and post construction and a decrease in groundwater levels 	<ul style="list-style-type: none"> The installation of sewer infrastructure can lead to the interception of the shallow water table altering shallow groundwater flow paths Installation of infrastructure below the water table leads to the potential need for dewatering during construction and post construction and a decrease in groundwater levels 	<ul style="list-style-type: none"> The installation of sewer infrastructure can lead to the interception of the shallow water table altering shallow groundwater flow paths Installation of infrastructure below the water table leads to the potential need for dewatering during construction and post construction and a decrease in groundwater levels 	<ul style="list-style-type: none"> The installation of sewer infrastructure can lead to the interception of the shallow water table altering shallow groundwater flow paths Installation of infrastructure below the water table leads to the potential need for dewatering during construction and post construction and a decrease in groundwater levels

Category & Criteria		Stage 3: S3WW1A	Stage 3: S3WW1B	Stage 3 S3FM1A	Stage 3 S3FM1B	Stage 3: S3WW2A	Stage 3: S3WW2B
	r. Source water protection considerations.	<ul style="list-style-type: none"> Drainage features within the study area are primarily headwater drainage (HDF) features, with some defined and regulated watercourses Twenty Mile Creek is the most significant watercourse and valley system within Smithville, with confined corridors and floodplains 	<ul style="list-style-type: none"> Drainage features within the study area are primarily headwater drainage (HDF) features, with some defined and regulated watercourses Twenty Mile Creek is the most significant watercourse and valley system within Smithville, with confined corridors and floodplains 	<ul style="list-style-type: none"> Drainage features within the study area are primarily headwater drainage (HDF) features, with some defined and regulated watercourses Twenty Mile Creek is the most significant watercourse and valley system within Smithville, with confined corridors and floodplains 	<ul style="list-style-type: none"> Drainage features within the study area are primarily headwater drainage (HDF) features, with some defined and regulated watercourses Twenty Mile Creek is the most significant watercourse and valley system within Smithville, with confined corridors and floodplains 	<ul style="list-style-type: none"> Drainage features within the study area are primarily headwater drainage (HDF) features, with some defined and regulated watercourses Twenty Mile Creek is the most significant watercourse and valley system within Smithville, with confined corridors and floodplains 	<ul style="list-style-type: none"> Drainage features within the study area are primarily headwater drainage (HDF) features, with some defined and regulated watercourses Twenty Mile Creek is the most significant watercourse and valley system within Smithville, with confined corridors and floodplains
Socio-Economic Environment	s. Potential nuisance impacts (e.g., disruption to access, air, dust, noise, and vibration) from construction and operations.	<ul style="list-style-type: none"> Lower potential disruption to fronting properties due to avoidance of work within existing ROW 	<ul style="list-style-type: none"> Lower potential disruption to fronting properties due to avoidance of work within existing ROW 	<ul style="list-style-type: none"> Greater potential disruption to fronting properties than FM2 due to passage through Rock Park 	<ul style="list-style-type: none"> Lower potential disruption to fronting properties than FM1 	<ul style="list-style-type: none"> Greater potential disruption to fronting properties along Anderson Crescent and Townline Road 	<ul style="list-style-type: none"> Lesser potential disruption to fronting properties along Townline Road
	t. Potential property requirements (temporary and permanent).	<ul style="list-style-type: none"> None anticipated 	<ul style="list-style-type: none"> None anticipated 	<ul style="list-style-type: none"> Potential temporary easements on Townline Road at Twenty Mile Creek for forcemain crossing 	<ul style="list-style-type: none"> Potential temporary easements on Townline Road at Twenty Mile Creek for forcemain crossing 	<ul style="list-style-type: none"> Existing easement between houses is insufficient for new gravity sewer installation (May require new easement) 	<ul style="list-style-type: none"> None anticipated
Climate Change	u. Potential carbon footprint (e.g., energy usage, use of construction materials, construction methods and operations).	<ul style="list-style-type: none"> Lower carbon footprint relative to S3WW1B 	<ul style="list-style-type: none"> Higher carbon footprint relative to S3WW1A 	<ul style="list-style-type: none"> Comparable carbon footprint relative to S3FM2 	<ul style="list-style-type: none"> Comparable carbon footprint relative to S3FM1 	<ul style="list-style-type: none"> Higher carbon footprint relative to S3WW2B due to construction of gravity sewer 	<ul style="list-style-type: none"> Lower carbon footprint relative to S3WW2A
Cultural Environment	v. Potential effects on archaeological resources.	<ul style="list-style-type: none"> Works outside road right of way contains areas of moderate to high archaeological potential. 	<ul style="list-style-type: none"> Works outside road right of way contains areas of moderate to high archaeological potential. 	<ul style="list-style-type: none"> Works outside road right of way contains areas of moderate to high archaeological potential. 	<ul style="list-style-type: none"> Works outside road right of way contains areas of moderate to high archaeological potential. 	<ul style="list-style-type: none"> Works outside road right of way contains areas of moderate to high archaeological potential. 	<ul style="list-style-type: none"> Works outside road right of way contains areas of moderate to high archaeological potential.
	w. Potential for disruption of built heritage resources and cultural heritage landscapes.	<ul style="list-style-type: none"> Potential heritage resources within area. 	<ul style="list-style-type: none"> Potential heritage resources within area. 	<ul style="list-style-type: none"> Potential heritage resources within area. 	<ul style="list-style-type: none"> Potential heritage resources within area. 	<ul style="list-style-type: none"> No potential or designated heritage resources within the area 	<ul style="list-style-type: none"> No potential or designated heritage resources within the area
Cost	x. Cost of construction (including property acquisition).	<ul style="list-style-type: none"> Lower cost of construction relative to S3WW1B due to sewer depth 	<ul style="list-style-type: none"> Higher cost of construction relative to S3WW1B due to deeper sewer 	<ul style="list-style-type: none"> Relatively comparable cost relative to S3FM1B 	<ul style="list-style-type: none"> Relatively comparable cost relative to S3FM1A 	<ul style="list-style-type: none"> Higher cost of construction relative to S3WW2B due to new gravity sewer 	<ul style="list-style-type: none"> Lower cost of construction relative to S3WW2A due to reduce infrastructure requirements

Category & Criteria		Stage 3: S3WW1A	Stage 3: S3WW1B	Stage 3 S3FM1A	Stage 3 S3FM1B	Stage 3: S3WW2A	Stage 3: S3WW2B
	y. Cost of operation / maintenance.	<ul style="list-style-type: none"> Lower cost relative to 1B due to sewer depth 	<ul style="list-style-type: none"> Higher cost relative to 1A due to deeper sewer 	<ul style="list-style-type: none"> Comparable cost relative to S3FM2 due to similar length forcemains and construction requirements 	<ul style="list-style-type: none"> Comparable cost relative to S3FM1 due to similar length forcemains and construction requirements 	<ul style="list-style-type: none"> Lower maintenance cost relative to 2B as new gravity sewer will likely not have maintenance costs for a few years 	<ul style="list-style-type: none"> Higher maintenance cost relative to 2A due to routine maintenance needed on existing gravity sewer

5.5 Water and Wastewater Infrastructure Assessment for Stage 4

The assessment results indicated that S4W3 would be considered a most preferable strategies to meet the water for the Stage 4 urban boundary expansion. For meeting the required wastewater service for Stage 4, two infrastructure options were determined to be the most preferable strategy; S4WW1 and S4A-FM2. The following summarizes the rationale for selecting these preferred solutions. Table 5-5 and Table 5-6 present the detailed assessment results for Stage 4 water and wastewater strategy, respectively.

5.5.1 Preferred Solutions and Rationale for Stage 4 Water Service

Three (3) alternatives were evaluated to address the need to expand the watermain length to Stage 4 of the Township of Lincoln Urban Expansion Project.

S4W1

- ◆ Watermain follows Regional Road 20 from South Grimsby Road 5 to South Grimsby Road 6
- ◆ Southernly on South Grimsby Road 6
- ◆ Trenchless crossing of Twenty Mile Creek on South Grimsby Road 6
- ◆ Watermain continues on South Grimsby Road 6 to Townline Road
- ◆ Two trenchless crossings of North Creek

S4W2

- ◆ Watermain extends southernly from Regional Road 20 and South Grimsby Road 5 intersection along future development lands to South Grimsby Road 6
- ◆ Trenchless crossing of Twenty Mile Creek on South Grimsby Road 5
- ◆ Within planned utility / active transportation corridor and planned Stage 4 local collector road
- ◆ Westerly on collector road to connect on South Grimsby Road 6
- ◆ Southernly on South Grimsby Road 6 to Townline Road
- ◆ Two trenchless crossings of North Creek

S4W3

- ◆ Watermain extends southernly from Regional Road 20 along future development lands to Townline Road
- ◆ Trenchless crossing of Twenty Mile Creek on South Grimsby Road 5
- ◆ Within planned utility / active transportation corridor and planned Stage 4 local collector road
- ◆ Southernly on local north south collector road to Townline Road

Rationale for preferred solution for Stage 4 Water Servicing

S4W3 is the preferred solution, and the rationale is summarized as follows:

1. Reduced construction complexity including fewest trenchless water crossings, avoids significant utility conflicts and community disruption within the existing Smithville urban area
2. Lowest carbon footprint associated with the construction and maintenance of system
3. Lowest cost in construction, operation and maintenance

The preferred solution for Stage 4 water servicing includes a crossing of Twenty Mile Creek and presents the location of the crossing for this solution as well as the property access requirements (temporary easement at Northwest corner of South Grimsby Road 5 and Region Road 20).

5.5.2 Preferred Solutions and Rationale for Stage 4 Wastewater Service

A total of five (5) alternatives were evaluated to address the need to expand the sanitary sewer system to Stage 4 of the Township of Lincoln Urban Expansion Project; three alternatives for the gravity sewer system for the majority of Stage 4 and two alternatives for the northern part of Stage 4A.

5.5.2.1 Gravity Sewer System for Stage 4

S4WW1

- ◆ Gravity sewer starting at north end of South Grimsby Road 6
- ◆ Easternly across the Stage 4 local collector road
- ◆ Southernly on north south local collector road to Townline Road
- ◆ Connects directly to future Port Davidson SPS

S4WW2

- ◆ Gravity sewer south on South Grimsby Road 6 connecting to Townline Road
- ◆ Easternly on Townline Road to connect to future stage 3 gravity sewer S3WW1A
- ◆ Two crossings of a creek

S4WW3

- ◆ Gravity sewer starting at north end of South Grimsby Road 6
- ◆ Gravity sewer easternly through Stage 4 local collector road
- ◆ Southernly on north south local collector road to Townline Road
- ◆ Easternly on Townline Road to connect to future stage 3 gravity sewer S3WW1A

Rationale for preferred solution for Stage 4 Gravity Sewer System

S4WW1 is the preferred solution, and the rationale is summarized as follows:

1. Alignment can be directly connected to future Port Davidson SPS
2. Does not rely on Stage 3 gravity sewer to be in place
3. Avoids trenchless crossings

4. Minimizes impacts to paved surfaces and travelling public (Townline Road)
5. Can be coordinated with Townline Road expansion
6. Optimizes overall capital investment as deeper gravity sewer for Stage 3 will not be required

5.5.2.2 Wastewater Servicing for Stage 4A

S4FM1

- ◆ New SPS on south side of Twenty Mile Creek within staging area 4A; this station is considered a private pumping system
- ◆ Forcemain going north on South Grimsby Road 5 connecting northerly to Spring Creek Road
- ◆ Trenchless crossing of Twenty Mile Creek
- ◆ One crossing of railway

S4FM2

- ◆ New SPS on south side of Twenty Mile Creek within staging area 4A; this station is considered a private pumping system
- ◆ New forcemain connects to future gravity sewer system for Stage 4

Rationale for preferred solution for Stage 4A

S4-FM2 is the preferred solution, and the rationale is summarized as follows:

1. Reduced construction complexity associated with no crossings of Twenty Mile Creek and railway are required
2. Lower maintenance and operation cost
3. Lower carbon footprint for construction

Alternatively, the area can be serviced by utilising a low pressure system whereby individual buildings pump their wastewater to a pressurized sewer main which will be owned and maintained by the Township; individual building pumps will be considered a private system with individual building owner responsibility .

Table 5-5: Stage 4 Water Infrastructure Strategy Assessment Results

Category & Criteria	Stage 4: S4W1	Stage 4: S4W2	Stage 4: S4W3
Details	<ul style="list-style-type: none"> Watermain follows Regional Road 20 from South Grimsby Road 5 to South Grimsby Road 6 Southernly on South Grimsby Road 6 Trenchless crossing of Twenty Mile Creek on South Grimsby Road 6 Watermain continues on South Grimsby Road 6 to Townline Road Two trenchless crossings of North Creek 	<ul style="list-style-type: none"> Watermain extends southernly from Regional Road 20 and South Grimsby Road 5 intersection along future development lands to South Grimsby Road 6 Trenchless crossing of Twenty Mile Creek on South Grimsby Road 5 Within planned utility / active transportation corridor and planned Stage 4 local collector road Westerly on collector road to connect on South Grimsby Road 6 Southernly on South Grimsby Road 6 to Townline Road Two trenchless crossings of North Creek 	<ul style="list-style-type: none"> Watermain extends southernly from Regional Road 20 along future development lands to Townline Road Trenchless crossing of Twenty Mile Creek on South Grimsby Road 5 Within planned utility / active transportation corridor and planned Stage 4 local collector road Southernly on local north south collector road to Townline Road <p style="text-align: center;">Preferred Solution</p>
Technical Environment	<p>a. Potential degree of construction complexities, including number and type of water crossings, anticipated rock removal, access, working area and duration to build.</p> <ul style="list-style-type: none"> One crossing of Twenty Mile Creek Two crossings of North Creek at the northeast corner of Townline Road and South Grimsby Road 6 Anticipate in rock Access from South Grimsby Road 6 and Regional Road 20 (West Street) Longer construction duration associated with longer watermain length 	<ul style="list-style-type: none"> One crossing of Twenty Mile Creek Two crossings of North Creek at the northeast corner of Townline Road and South Grimsby Road 6 Anticipate in rock Access from South Grimsby Road 6 and Future Development lands (South side of Twenty Mile Creek) Shorter construction duration associated with shorter watermain length 	<ul style="list-style-type: none"> One crossing of Twenty Mile Creek Anticipate in rock Access from South GR5 (North side of Twenty Mile Creek) Access from Future Development Lands (South side of Twenty Mile Creek) Shortest construction duration associated with shortest watermain length
	<p>b. Potential effects on roadway and utility infrastructure.</p> <ul style="list-style-type: none"> Greater potential to impact recently paved surfaces on Regional Road 20 (West Street) and South Grimsby Road 6 roundabout 	<ul style="list-style-type: none"> Lower impacts to paved surfaces 	<ul style="list-style-type: none"> Lowest impacts to paved surfaces
	<p>c. Provides good site access for maintenance vehicles, future operation and maintenance and servicing.</p> <ul style="list-style-type: none"> Access from existing roads (South Grimsby Road 6 and West Street) 	<ul style="list-style-type: none"> Access from future development lands, local collector road, utility corridor (South of Twenty Mile Creek), and existing roads (South Grimsby Road 6) 	<ul style="list-style-type: none"> Access from future development lands, local collector road, and utility corridor (South of Twenty Mile Creek)
	<p>d. Operation efficiency.</p> <ul style="list-style-type: none"> Highest operation and maintenance effort related to longest watermain 	<ul style="list-style-type: none"> Higher operation and maintenance effort related to longer watermain 	<ul style="list-style-type: none"> Lower operation and maintenance effort related to shorter watermain
	<p>e. Potential opportunity for current infrastructure to be decommissioned in favour of gravity solutions f. Potential effects on traffic</p>	<ul style="list-style-type: none"> Not applicable 	<ul style="list-style-type: none"> Not applicable
	<p>g. Potential effects on traffic.</p> <ul style="list-style-type: none"> Greater impacts to traveling public due to road restoration required (Roundabout at Regional Road 20 and South Grimsby Road 6) 	<ul style="list-style-type: none"> Lower impacts to traveling public 	<ul style="list-style-type: none"> Lowest impacts to traveling public
	<p>h. Dependency on the completion of other Stages</p>	<ul style="list-style-type: none"> Water strategy for Stage 4 will require Stage 1 or Stage 3 water infrastructure to form the Region's Ring system concept. 	<ul style="list-style-type: none"> Water strategy for Stage 4 will require Stage 1 or Stage 3 water infrastructure to form the Region's Ring system concept.
	<p>i. Degree of permitting and approvals complexity</p>	<ul style="list-style-type: none"> Avoids coordination with block plan development process Species at risk habitat in area of water crossings NCPA permits for trenchless crossing 	<ul style="list-style-type: none"> Watermain to be captured with block plan development process Species at risk habitat in area of water crossings NCPA permits for trenchless crossing

Category & Criteria	Stage 4: S4W1	Stage 4: S4W2	Stage 4: S4W3
<p style="writing-mode: vertical-rl; transform: rotate(180deg);">Land Use</p> <p>j. Potential to conform to approved local (e.g., OP and MCP), provincial (e.g., PPS) plans and policies. k. Identify existing official plans and schedule B1, B3 and B4 Natural Heritage</p> <p>i. Potential effects on current land uses, including development plans.</p>	<ul style="list-style-type: none"> Conforms Utilities permitted in future ROW Pipe crosses natural heritage system (current official plan Schedule E-12 and proposed OPA schedule 63) along South Grimsby Road 6 Work in regulated area to comply with NPCA policy document – November 2022 	<ul style="list-style-type: none"> Conforms Utility corridor permitted within MCP Natural Heritage System or restoration area (south side of Twenty Mile Creek) Pipe crosses natural heritage system (current official plan Schedule E-12 and proposed OPA schedule 63) at the intersection of Regional Road 20 and South Grimsby Road 5 Work in regulated area to comply with NPCA policy document – November 2022 	<ul style="list-style-type: none"> Conforms Utility corridor permitted within MCP Natural Heritage System or restoration area (south side of Twenty Mile Creek) Pipe crosses natural heritage system (current official plan Schedule E-12 and proposed OPA schedule 63) at the intersection of Regional Road 20 and South Grimsby Road 5 Work in regulated area to comply with NPCA policy document – November 2022
	<ul style="list-style-type: none"> Greater impact to fronting properties on West Street and South Grimsby Road 6 (Roundabout) 	<ul style="list-style-type: none"> Potential impact to fronting properties Potential to impact future development plans related to sending and receiving pits at northwest corner of South Grimsby Road 5 and Regional Road 20 (West Street) 	<ul style="list-style-type: none"> Potential to impact future development plans related to sending and receiving pits at northwest corner of South Grimsby Road 5 and Regional Road 20 (West Street) development plans
<p style="writing-mode: vertical-rl; transform: rotate(180deg);">Natural Environment</p> <p>m. Potential effects on terrestrial/aquatic habitat and species.</p> <p>n. Potential effects on species at risk (SAR) and SAR habitat.</p> <p>o. Potential to encounter soil and water contamination and waste disposal.</p> <p>p. Anticipated environmental permitting and approval considerations.</p> <p>q. Potential effects on surface water and groundwater due to construction (i.e., dewatering of trenches during installation of watermain and/or sanitary forcemain/sewer, control of erosion and sedimentation).</p> <p>r. Source water protection considerations.</p>	<ul style="list-style-type: none"> Trenchless crossing minimizes impacts Minor vegetation removal Provincially Significant wetland consisting of swamp community along South Grimsby Road 6 Twenty Mile Creek includes wetland amphibian breeding habitat and turtle wintering. Habitat for several species of Conservation concern and deer wintering. 	<ul style="list-style-type: none"> Trenchless crossing minimizes impacts Minor vegetation removal within future utility corridor south of West Street and South Grimsby Road 5 intersection Provincially Significant wetland consisting of swamp community south of West Street and South Grimsby Road 5 intersection Twenty Mile Creek includes wetland amphibian breeding habitat and turtle wintering. Habitat for several species of Conservation concern and deer wintering. 	<ul style="list-style-type: none"> Trenchless crossing minimizes impacts Minor vegetation removal within future utility corridor south of West Street and South Grimsby Road 5 intersection Provincially Significant wetland consisting of swamp community south of West Street and South Grimsby Road 5 intersection Twenty Mile Creek includes wetland amphibian breeding habitat and turtle wintering. Habitat for several species of Conservation concern and deer wintering.
	<ul style="list-style-type: none"> Potential to encounter Species at Risk in meadow east related to water crossings. Species may include Barn Swallow, Monarchs and Eastern Wood-Pewee. Grass Pickerel and Snapping Turtle habitat in creek. 	<ul style="list-style-type: none"> Potential to encounter Species at Risk within the future utility corridor. Species may include Bobolink and Eastern Meadowlark. Grass Pickerel and Snapping Turtle habitat in creek. 	<ul style="list-style-type: none"> Potential to encounter Species at Risk within the future utility corridor. Species may include Bobolink and Eastern Meadowlark. Grass Pickerel and Snapping Turtle habitat in creek.
	<ul style="list-style-type: none"> None identified 	<ul style="list-style-type: none"> None identified 	<ul style="list-style-type: none"> None identified
	<ul style="list-style-type: none"> Requires Niagara Peninsula Conservation Authority work permit Anticipated Permit to Take Water Potential Species at Risk related to sending and receiving pits outside travel portion of ROW 	<ul style="list-style-type: none"> Requires Niagara Peninsula Conservation Authority work permit Anticipated Permit to Take Water Potential Species at Risk related to sending and receiving pits outside travel portion of ROW 	<ul style="list-style-type: none"> Requires Niagara Peninsula Conservation Authority work permit Anticipated Permit to Take Water Potential Species at Risk related to sending and receiving pits outside travel portion of ROW
	<ul style="list-style-type: none"> The installation of water infrastructure can lead to the interception of the shallow water table altering shallow groundwater flow paths Installation of infrastructure below the water table leads to the potential need for dewatering during construction and post construction and a decrease in groundwater levels 	<ul style="list-style-type: none"> The installation of water infrastructure can lead to the interception of the shallow water table altering shallow groundwater flow paths Installation of infrastructure below the water table leads to the potential need for dewatering during construction and post construction and a decrease in groundwater levels 	<ul style="list-style-type: none"> The installation of water infrastructure can lead to the interception of the shallow water table altering shallow groundwater flow paths Installation of infrastructure below the water table leads to the potential need for dewatering during construction and post construction and a decrease in groundwater levels
	<ul style="list-style-type: none"> Drainage features within the study area are primarily headwater drainage (HDF) features, with some defined and regulated watercourses Twenty Mile Creek is the most significant watercourse and valley system within Smithville, with confined corridors and floodplains 	<ul style="list-style-type: none"> Drainage features within the study area are primarily headwater drainage (HDF) features, with some defined and regulated watercourses Twenty Mile Creek is the most significant watercourse and valley system within Smithville, with confined corridors and floodplains 	<ul style="list-style-type: none"> Drainage features within the study area are primarily headwater drainage (HDF) features, with some defined and regulated watercourses Twenty Mile Creek is the most significant watercourse and valley system within Smithville, with confined corridors and floodplains

Category & Criteria	Stage 4: S4W1	Stage 4: S4W2	Stage 4: S4W3
Socio-Economic Environment	<ul style="list-style-type: none"> Greater potential disruption to fronting properties on West Street and South Grimsby Road 6 including businesses and St Martin Catholic Elementary School Potential to disrupt West Lincoln Leisureplex and Smithville Sports Complex 	<ul style="list-style-type: none"> Lower potential disruption to fronting properties Potential to disrupt West Lincoln Leisureplex and Smithville Sports Complex 	<ul style="list-style-type: none"> Lowest potential disruption to fronting properties Less potential to disrupt West Lincoln Leisureplex and Smithville Sports Complex
	<ul style="list-style-type: none"> Potential temporary easements on South Grimsby Road 6 and Townline Road at creeks for watermain crossings 	<ul style="list-style-type: none"> Requires temporary easement on south side of Regional Road 20 (West Street) at foot of South Grimsby Road 5 for Twenty Mile Creek watermain crossing and at Townline Road for watermain crossing Avoid permanent easement from property owner on southside of Regional Road 20 (West Street) directly south of South Grimsby Road 5 as trenchless crossing goes through residential property Requires permanent minor easement on southside of Twenty Mile Creek (land not developable). 	<ul style="list-style-type: none"> Requires temporary easement on north side of West Street and east side of South Grimsby Road 5 for Twenty Mile Creek watermain crossing Avoid permanent easement from property owner on southside of Regional Road 20 (West Street) directly south of South Grimsby Road 5 as trenchless crossing goes through residential property Requires permanent minor easement on southside of Twenty Mile Creek (land not developable).
Climate Change	<ul style="list-style-type: none"> Highest carbon footprint related to longest length of watermain and construction duration. 	<ul style="list-style-type: none"> Higher carbon footprint related to longer length of watermain and construction duration. 	<ul style="list-style-type: none"> Lower carbon footprint related to shorter length of watermain and construction duration.
Cultural Environment	<ul style="list-style-type: none"> Works outside road right of way contains areas of moderate to high archaeological potential. 	<ul style="list-style-type: none"> Works outside road right of way contains areas of moderate to high archaeological potential. 	<ul style="list-style-type: none"> Works outside road right of way contains areas of moderate to high archaeological potential.
	<ul style="list-style-type: none"> Potential heritage resource west of South Grimsby Road 6. 	<ul style="list-style-type: none"> Potential heritage resource south of West Street. 	<ul style="list-style-type: none"> Potential heritage resource south of West Street.
Cost	<ul style="list-style-type: none"> Highest cost relating to multiple water crossings, road restoration required, and longest watermain length 	<ul style="list-style-type: none"> Higher cost relating to multiple water crossings and length of watermain Minor cost associated with permanent easement southside of West Street at South Grimsby Road 5 	<ul style="list-style-type: none"> Lower cost relating to single water crossing and shorter length of watermain Minor cost associated with permanent easement southside of West Street at South Grimsby Road 5
	<ul style="list-style-type: none"> Highest related to length of watermain length 	<ul style="list-style-type: none"> Higher than option 3 related to intermediate length of watermain length 	<ul style="list-style-type: none"> Lower related to shorter length of watermain length

Table 5-6: Stage 4 Wastewater Infrastructure Strategy Assessment Results

Category & Criteria		Stage 4: S4A-FM1	Stage 4: S4A-FM2	Stage 4 S4WW1	Stage 4: S4WW2	Stage 4: S4WW3
Details		<ul style="list-style-type: none"> New SPS on south side of Twenty Mile Creek within staging area 4A; this station is considered a private pumping system New forcemain going north on South Grimsby Road 5 connecting northernly to Spring Creek Road Trenchless crossing of Twenty Mile Creek One crossing of railway 	<ul style="list-style-type: none"> New SPS on south side of Twenty Mile Creek within staging area 4A; this station is considered a private pumping system New forcemain connect to future gravity sewer within Stage 4 <p style="text-align: center;">Preferred Solution</p>	<ul style="list-style-type: none"> Gravity sewer starting at north end of South Grimsby Road 6 Easternly across the Stage 4 local collector road Southernly on north south local collector road to Townline Road Connects directly to future Port Davidson SPS <p style="text-align: center;">Preferred Solution</p>	<ul style="list-style-type: none"> Gravity sewer south on South Grimsby Road 6 connecting to Townline Road Easternly on Townline Road to connect to future stage 3 gravity sewer S3WW1A Two crossings of North Creek 	<ul style="list-style-type: none"> Gravity sewer starting at north end of South Grimsby Road 6 Gravity sewer easternly through Stage 4 local collector road Southernly on north south local collector road to Townline Road Easternly on Townline Road to connect to future stage 3 gravity sewer S3WW1A
Technical Environment	a. Potential degree of construction complexities, including number and type of water crossings, anticipated rock removal, access, working area and duration to build.	<ul style="list-style-type: none"> One crossing of Twenty Mile Creek One crossing of railway Anticipate in rock Access from Future Development Lands (South side of Twenty Mile Creek) and South Grimsby Road 5 Longer construction duration due to length of forcemain system. 	<ul style="list-style-type: none"> No crossing of Twenty Mile Creek Anticipate in rock Access from Future Development Lands (South side of Twenty Mile Creek) Shorter construction duration due to length of forcemain system. 	<ul style="list-style-type: none"> No crossing of Twenty Mile Creek Anticipate in rock Access from Future Development Lands (South side of Twenty Mile Creek) Longer construction duration associated with longer sewer main length 	<ul style="list-style-type: none"> Two crossings of North Creek Anticipate in rock Access from South Grimsby Road 6 Longer construction duration associated with multiple creek crossings 	<ul style="list-style-type: none"> No crossing of Twenty Mile Creek Anticipate greater in rock due to deeper sewer Access from Future Development Lands (South side of Twenty Mile Creek) Shorter construction duration associated with shorter sewer main length
	b. Potential effects on roadway and utility infrastructure.	<ul style="list-style-type: none"> Greater impacts to paved surfaces 	<ul style="list-style-type: none"> Lower impacts to paved surfaces 	<ul style="list-style-type: none"> Lower impacts to paved surfaces 	<ul style="list-style-type: none"> Greater impacts to paved surfaces Potential to impact utilities 	<ul style="list-style-type: none"> Lower impacts to paved surfaces
	c. Provides good site access for maintenance vehicles, future operation and maintenance and servicing.	<ul style="list-style-type: none"> Access from future utility corridor/easement/multi use path / road 	<ul style="list-style-type: none"> Access from future utility corridor /multi use path 	<ul style="list-style-type: none"> Access from future utility corridor /multi use path 	<ul style="list-style-type: none"> Access from existing road allowances 	<ul style="list-style-type: none"> Access from future utility corridor/ multi use path
	d. Operation efficiency.	<ul style="list-style-type: none"> Higher operation and maintenance effort relative to FM2 due to longer forcemain length Requires operations and maintenance by private entity 	<ul style="list-style-type: none"> Lower operation and maintenance effort relative to FM1 due to shorter forcemain length Requires operations and maintenance by private entity 	<ul style="list-style-type: none"> Highest operation and maintenance effort 	<ul style="list-style-type: none"> Higher operation and maintenance effort 	<ul style="list-style-type: none"> Lower operation and maintenance effort
	e. Potential opportunity for current infrastructure to be decommissioned in favour of gravity solutions	<ul style="list-style-type: none"> Not applicable 	<ul style="list-style-type: none"> Not applicable 	<ul style="list-style-type: none"> Not applicable 	<ul style="list-style-type: none"> Not applicable 	<ul style="list-style-type: none"> Not applicable
	f. Potential effects on traffic					
	g. Potential effects on traffic.	<ul style="list-style-type: none"> Greater impacts on travelling public 	<ul style="list-style-type: none"> Lower impacts on travelling public 	<ul style="list-style-type: none"> Lower impacts on travelling public 	<ul style="list-style-type: none"> Greater impacts on travelling public 	<ul style="list-style-type: none"> Lower impacts on travelling public
	h. Dependency on the completion of other Stages	<ul style="list-style-type: none"> Stage 4A could be implemented without relying on the rest of Stage 4 and Stage 3 but requires Stage 1 to be in place. 	<ul style="list-style-type: none"> Stage 4A could be implemented with Stage 4 local sewer in place. . 	<ul style="list-style-type: none"> Stage 4 could be implemented without relying on Stage 3 local collection being in place. Requires new Stage 3 SPS and forcemain across Twenty Mile Creek to upgraded Smithville SPS. 	<ul style="list-style-type: none"> Stage 4 can only be implemented with Stage 3 local collection in place. Requires new Stage 3 SPS and forcemain across Twenty Mile Creek to upgraded Smithville SPS. 	<ul style="list-style-type: none"> Stage 4 can only be implemented with Stage 3 local collection in place. Requires new Stage 3 SPS and forcemain across Twenty Mile Creek to upgraded Smithville SPS.

Category & Criteria		Stage 4: S4A-FM1	Stage 4: S4A-FM2	Stage 4 S4WW1	Stage 4: S4WW2	Stage 4: S4WW3
Land Use	i. Degree of permitting and approvals complexity	<ul style="list-style-type: none"> Species at risk habitat in area of water crossings Species at risk habitat in area of water crossings NCPA permits for trenchless crossing 	<ul style="list-style-type: none"> Forcemain to be captured with block plan development process Species at risk habitat in area of future development lands NCPA permits for trenchless crossing 	<ul style="list-style-type: none"> Sewer to be captured with block plan development process Species at risk habitat in area of future development lands NCPA permits for trenchless crossing 	<ul style="list-style-type: none"> Avoids coordination with block plan development process Species at risk habitat in area of water crossings NCPA permits for trenchless crossing 	<ul style="list-style-type: none"> Sewer to be captured with block plan development process Species at risk habitat in area of development lands NCPA permits for trenchless crossing
	j. Potential to conform to approved local (e.g., OP and MCP), provincial (e.g., PPS) plans and policies. k. Identify existing official plans and schedule B1, B3 and B4 Natural Heritage	<ul style="list-style-type: none"> Conforms Utility corridor permitted within MCP Natural Heritage System or restoration area (south side of Twenty Mile Creek) Pipe crosses natural heritage system (current official plan Schedule E-12 and proposed OPA schedule 63) at Regional Road 20 (St Catharines Street) Work in regulated area to comply with NPCA policy document – November 2022 Requires CNR approval 	<ul style="list-style-type: none"> Conforms Utility corridor permitted within MCP Natural Heritage System or restoration area (south side of Twenty Mile Creek) Pipe does not cross a natural heritage area Work in regulated area to comply with NPCA policy document – November 2022 	<ul style="list-style-type: none"> Conforms Utility corridor permitted within MCP Natural Heritage System or restoration area (south side of Twenty Mile Creek) Pipe does not cross a natural heritage area Work in regulated area to comply with NPCA policy document – November 2022 	<ul style="list-style-type: none"> Conforms Utilities permitted in future ROW Pipe does not cross a natural heritage area Work in regulated area to comply with NPCA policy document – November 2022 	<ul style="list-style-type: none"> Conforms Utility corridor permitted within MCP Natural Heritage System or restoration area (south side of Twenty Mile Creek) Pipe does not cross a natural heritage area Work in regulated area to comply with NPCA policy document – November 2022
	l. Potential effects on current land uses, including development plans.	<ul style="list-style-type: none"> Potential to impact future development plans at Northwest corner of West Street and South Grimsby Road 5 (related to watercrossing) 	<ul style="list-style-type: none"> Not applicable 	<ul style="list-style-type: none"> Not applicable 	<ul style="list-style-type: none"> Not applicable 	<ul style="list-style-type: none"> Not applicable
Natural Environment	m. Potential effects on terrestrial/aquatic habitat and species.	<ul style="list-style-type: none"> Trenchless crossing minimizes impacts Minor vegetation removal within future utility corridor south of West Street and South Grimsby Road 5 intersection Provincially Significant wetland consisting of swamp community between South Grimsby Road 6 and Townline Road. Creek includes wetland amphibian breeding habitat and turtle wintering. Habitat for several species of Conservation concern and deer wintering. 	<ul style="list-style-type: none"> Minor vegetation removal within future utility corridor south of West Street and South Grimsby Road 5 intersection Habitat for several species of Conservation concern and deer wintering. 	<ul style="list-style-type: none"> Minor vegetation removal within future utility corridor south of West Street and South Grimsby Road 5 intersection Habitat for several species of Conservation concern and deer wintering. 	<ul style="list-style-type: none"> Trenchless crossing minimizes impacts Minor vegetation removal on South Grimsby Road 6 and Townline Road for creek crossing Provincially Significant wetland consisting of swamp community between South Grimsby Road 6 and Townline Road. Creek includes wetland amphibian breeding habitat and turtle wintering. Habitat for several species of Conservation concern and deer wintering. 	<ul style="list-style-type: none"> Minor vegetation removal within future utility corridor south of West Street and South Grimsby Road 5 intersection Habitat for several species of Conservation concern and deer wintering.
	n. Potential effects on species at risk (SAR) and SAR habitat.	<ul style="list-style-type: none"> Potential to encounter Species at Risk within future utility corridor south of West Street and South Grimsby Road 5 intersection Grass Pickerel and Snapping Turtle habitat in creek. 	<ul style="list-style-type: none"> Potential to encounter Species at Risk within future utility corridor south of West Street and South Grimsby Road 5 intersection Grass Pickerel and Snapping Turtle habitat in creek. 	<ul style="list-style-type: none"> Potential to encounter Species at Risk within future utility corridor south of West Street and South Grimsby Road 5 intersection Grass Pickerel and Snapping Turtle habitat in creek. 	<ul style="list-style-type: none"> Potential to encounter Species at Risk in agricultural fields west of South Grimsby Road 6. Species may include Bobolink and Eastern Meadowlark. 	<ul style="list-style-type: none"> Potential to encounter Species at Risk within future utility corridor south of West Street and South Grimsby Road 5 intersection Grass Pickerel and Snapping Turtle habitat in creek.
	o. Potential to encounter soil and water contamination and waste disposal.	<ul style="list-style-type: none"> None identified 	<ul style="list-style-type: none"> None identified 	<ul style="list-style-type: none"> None identified 	<ul style="list-style-type: none"> None identified 	<ul style="list-style-type: none"> None identified

Category & Criteria		Stage 4: S4A-FM1	Stage 4: S4A-FM2	Stage 4 S4WW1	Stage 4: S4WW2	Stage 4: S4WW3
Climate Change	p. Anticipated environmental permitting and approval considerations.	<ul style="list-style-type: none"> Requires Niagara Peninsula Conservation Authority work permit Anticipated Permit to Take Water Potential Species at Risk related to sending and receiving pits outside travel portion of ROW 	<ul style="list-style-type: none"> Requires Niagara Peninsula Conservation Authority work permit Anticipated Permit to Take Water 	<ul style="list-style-type: none"> Requires Niagara Peninsula Conservation Authority work permit Anticipated Permit to Take Water 	<ul style="list-style-type: none"> Requires Niagara Peninsula Conservation Authority work permit More permitting required due to more water crossings Anticipated Permit to Take Water Potential Species at Risk related to sending and receiving pits outside travel portion of ROW 	<ul style="list-style-type: none"> Requires Niagara Peninsula Conservation Authority work permit Anticipated Permit to Take Water
	q. Potential effects on surface water and groundwater due to construction (i.e., dewatering of trenches during installation of watermain and/or sanitary forcemain/sewer, control of erosion and sedimentation).	<ul style="list-style-type: none"> The installation of infrastructure can lead to the interception of the shallow water table altering shallow groundwater flow paths Installation of infrastructure below the water table leads to the potential need for dewatering during construction and post construction and a decrease in groundwater levels study) 	<ul style="list-style-type: none"> The installation of infrastructure can lead to the interception of the shallow water table altering shallow groundwater flow paths Installation of infrastructure below the water table leads to the potential need for dewatering during construction and post construction and a decrease in groundwater levels 	<ul style="list-style-type: none"> The installation of infrastructure can lead to the interception of the shallow water table altering shallow groundwater flow paths Installation of infrastructure below the water table leads to the potential need for dewatering during construction and post construction and a decrease in groundwater levels) 	<ul style="list-style-type: none"> The installation of infrastructure can lead to the interception of the shallow water table altering shallow groundwater flow paths Installation of infrastructure below the water table leads to the potential need for dewatering during construction and post construction and a decrease in groundwater levels 	<ul style="list-style-type: none"> The installation of infrastructure can lead to the interception of the shallow water table altering shallow groundwater flow paths Installation of infrastructure below the water table leads to the potential need for dewatering during construction and post construction and a decrease in groundwater levels)
	r. Source water protection considerations.	<ul style="list-style-type: none"> Drainage features within the study area are primarily headwater drainage (HDF) features, with some defined and regulated watercourses Twenty Mile Creek is the most significant watercourse and valley system within Smithville, with confined corridors and floodplains 	<ul style="list-style-type: none"> Drainage features within the study area are primarily headwater drainage (HDF) features, with some defined and regulated watercourses Twenty Mile Creek is the most significant watercourse and valley system within Smithville, with confined corridors and floodplains 	<ul style="list-style-type: none"> Drainage features within the study area are primarily headwater drainage (HDF) features, with some defined and regulated watercourses Twenty Mile Creek is the most significant watercourse and valley system within Smithville, with confined corridors and floodplains 	<ul style="list-style-type: none"> Drainage features within the study area are primarily headwater drainage (HDF) features, with some defined and regulated watercourses Twenty Mile Creek is the most significant watercourse and valley system within Smithville, with confined corridors and floodplains 	<ul style="list-style-type: none"> Drainage features within the study area are primarily headwater drainage (HDF) features, with some defined and regulated watercourses Twenty Mile Creek is the most significant watercourse and valley system within Smithville, with confined corridors and floodplains
Socio-Economic Environment	s. Potential nuisance impacts (e.g., disruption to access, air, dust, noise, and vibration) from construction and operations.	<ul style="list-style-type: none"> Greater potential disruption to fronting properties 	<ul style="list-style-type: none"> Lower potential disruption to fronting properties 	<ul style="list-style-type: none"> Lower potential disruption to fronting properties 	<ul style="list-style-type: none"> Greater potential disruption to fronting properties 	<ul style="list-style-type: none"> Lower potential disruption to fronting properties
	t. Potential property requirements (temporary and permanent).	<ul style="list-style-type: none"> Temporary easement required for Twenty Mile Creek crossing Requires permanent easement from property owner on southside of Regional Road 20 (West Street) directly south of South Grimsby Road 5 as trenchless crossing goes through residential property Requires easement on south side of Twenty Mile Creek (to be captured in future development application) for forcemain crossing 	<ul style="list-style-type: none"> None anticipated 	<ul style="list-style-type: none"> None anticipated 	<ul style="list-style-type: none"> Temporary easement required for North Creek crossing Potential temporary easements on northwest corner of South Grimsby Road 6 and Townline Road for Creek for forcemain crossing 	<ul style="list-style-type: none"> None anticipated
Climate Change	u. Potential carbon footprint (e.g., energy usage, use of construction materials, construction methods and operations).	<ul style="list-style-type: none"> Higher carbon footprint relative to FM1A due to longer length of forcemain and construction duration 	<ul style="list-style-type: none"> Lower carbon footprint relative to FM1B due to shorter length of forcemain and construction duration 	<ul style="list-style-type: none"> Highest carbon footprint relative to S4WW2 and 3 due to the length of sewer and construction duration. 	<ul style="list-style-type: none"> Higher carbon footprint relative to S4WW1 due to the construction duration 	<ul style="list-style-type: none"> Lower carbon footprint relative to S4WW1 due to the length of the sewer and construction duration

Category & Criteria		Stage 4: S4A-FM1	Stage 4: S4A-FM2	Stage 4 S4WW1	Stage 4: S4WW2	Stage 4: S4WW3
Cultural Environment	v. Potential effects on archaeological resources.	<ul style="list-style-type: none"> Works outside road right of way contains areas of moderate to high archaeological potential. 	<ul style="list-style-type: none"> Works outside road right of way contains areas of moderate to high archaeological potential. 	<ul style="list-style-type: none"> Works outside road right of way contains areas of moderate to high archaeological potential. 	<ul style="list-style-type: none"> Works outside road right of way contains areas of moderate to high archaeological potential. 	<ul style="list-style-type: none"> Works outside road right of way contains areas of moderate to high archaeological potential.
	w. Potential for disruption of built heritage resources and cultural heritage landscapes.	<ul style="list-style-type: none"> Potential heritage resources within area south of West Street. 	<ul style="list-style-type: none"> Potential heritage resources within area south of West Street. 	<ul style="list-style-type: none"> Potential heritage resources within area south of West Street. 	<ul style="list-style-type: none"> No potential or designated heritage resources within area. 	<ul style="list-style-type: none"> Potential heritage resources within area south of West Street.
Cost	x. Cost of construction (including property acquisition).	<ul style="list-style-type: none"> High cost 	<ul style="list-style-type: none"> Low cost 	<ul style="list-style-type: none"> Highest 	<ul style="list-style-type: none"> High 	<ul style="list-style-type: none"> Lowest
	y. Cost of operation / maintenance.	<ul style="list-style-type: none"> Higher related to longer length of forcemain 	<ul style="list-style-type: none"> Lower related to shorter length of forcemain 	<ul style="list-style-type: none"> Highest related to longer sewer 	<ul style="list-style-type: none"> Higher related to creek crossings 	<ul style="list-style-type: none"> Lower related to shorter sewer

5.6 Recommended Water and Wastewater Servicing Strategy

The recommended strategy for water and wastewater system to accommodate the urban boundary expansion concept was identified based on the overall environment assessment results, technical feasibility and financial implications. According to the assessment results presented in the previous sections, the preferred strategy for water and wastewater system was as follow:

Preferred Water Strategy:

- ◆ Stage 1: S1W1
- ◆ Stage 2: S2W2
- ◆ Stage 3: S3W1
- ◆ Stage 4: S4W3

Preferred Wastewater Strategy:

- ◆ Stage 1: S1WW1
- ◆ Stage 2: S2WW1
- ◆ Stage 3: S3WW1A, S3WW2A and S3FM1B
- ◆ Stage 4: S4WW1 and S4A-FM2

Figure 5-5 and Figure 5-6 present the preferred water and wastewater strategy, respectively. The required infrastructures for each strategy were colour code based on the associated staging as per the urban boundary expansion concept.

Figure 5-5: Recommended Water Servicing Strategy

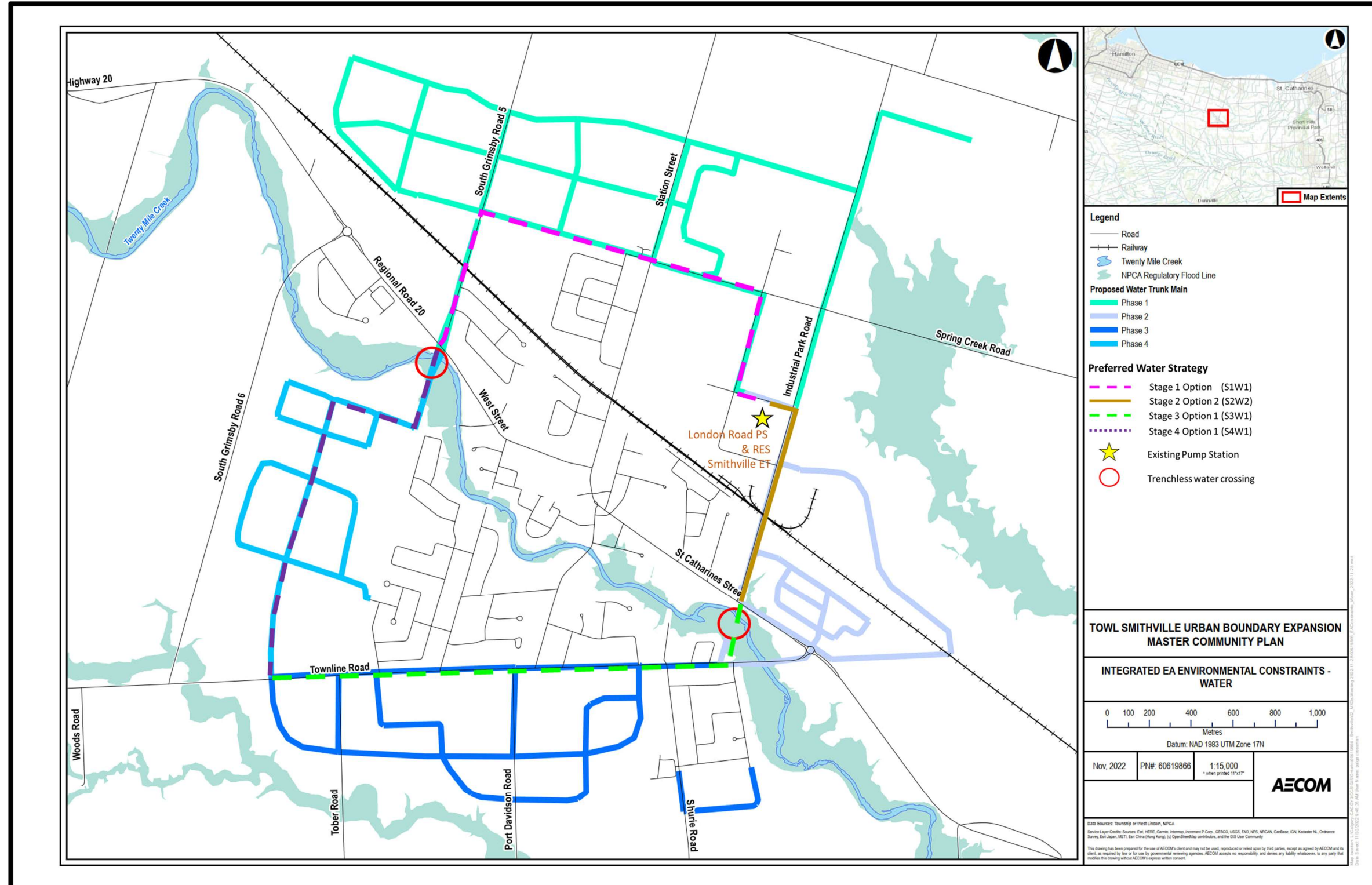
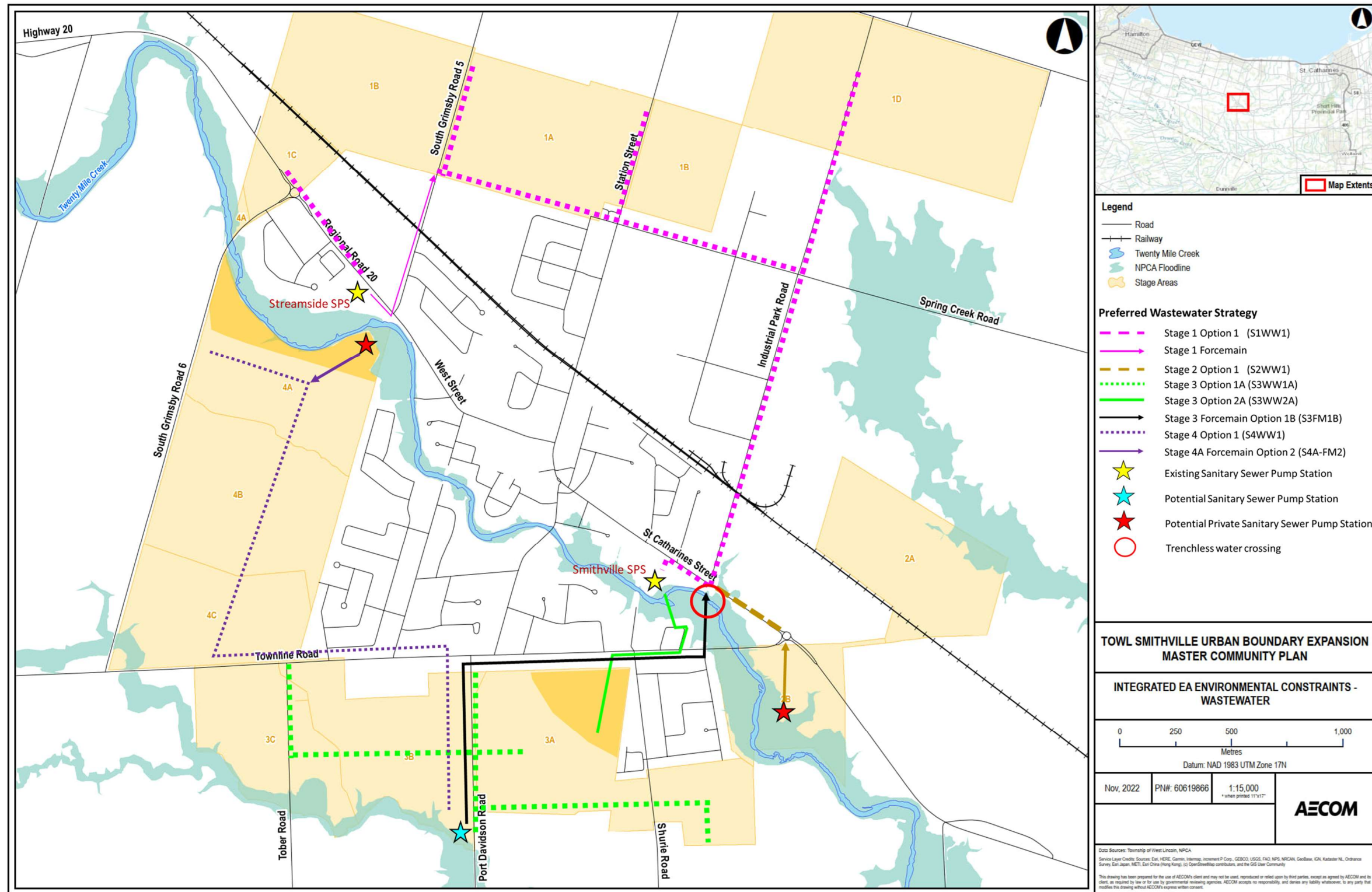


Figure 5-6: Recommended Wastewater Servicing Strategy



6. Future Work Requirements

Detailed costs were identified for each infrastructure option based on the recommended water and wastewater servicing strategy. The detailed costs for the future capital works were formulated based on the following:

- ◆ Engineering design costs: 15% of the construction costs;
- ◆ Contingency costs: 20% of the construction costs;
- ◆ Interconnection to existing local system: \$500,000 each;
- ◆ Railway Crossing: \$2,000,000 each;
- ◆ Creek Crossing: \$5,000,000 each;
- ◆ Pumping Station: \$2,500,000 per new building or building expansion + \$5,000 per L/s of pumping capacity; and
- ◆ Construction Costs for new watermains and sanitary sewer mains as listed below.

Watermain		Sanitary Sewerline	
Size	\$ per meter	Size	\$ per meter
200mm	\$950	300mm	\$1,060
300mm	\$1,050	375mm	\$1,200
400mm	\$1,120	450mm	\$1,230
500mm	\$1,320	525mm	\$1,300
600mm	\$1,650	600mm	\$1,350
		675mm	\$1,400
		750mm	\$1,450

6.1 Future Water Infrastructure

Table 6-1 and Table 6-2 present the recommended water infrastructure projects to be implemented over the 30 year planning horizon for the Township of West Lincoln and the Region of Niagara, respectively. Figure 6-1 presents the overall preferred water infrastructures.

Table 6-1: Recommended Water Infrastructure Projects for the Township of West Lincoln Over the 30-Year Planning Horizon

Capital Project ID	Stage	Preferred Servicing Strategy ID	Descriptions	Region's DC project ID	Size	Length	Railway / Creek Crossing	Construction Costs	Design Costs	Contingency Costs	Costs (2022\$)	Class EA Project Schedule ¹⁵	Anticipated Implementation Schedule
W-D-001	1	S1W1	Local distribution mains for Stage 1	-	300mm	9,580m	-	\$ 10,059,000	\$ 1,508,850	\$ 2,011,800	\$ 13,579,650	A	Next 10 years
W-D-002	2	S2W2	Local distribution mains for Stage 2	-	300mm	3,745m	-	\$ 3,932,250	\$ 589,838	\$ 786,450	\$ 5,308,538	A	Next 10 years
W-D-003	3	S3W1	Local distribution mains for Stage 3	-	300mm	5,477m	-	\$ 5,750,850	\$ 862,628	\$ 1,150,170	\$ 7,763,648	A	10 – 20 years
W-D-004	4	S4W3	Local distribution mains for Stage 4	-	300mm	2,988m	-	\$ 3,137,400	\$ 470,610	\$ 627,480	\$ 4,235,490	A	> 20 years
Total Estimated Costs for Water Capital Projects (2022\$)											\$ 30,887,326		

¹⁵(as approved under the integrated MCEA process and subject to no OPA 63 appeal)

Table 6-2: Recommended Water Infrastructure Projects for the Region of Niagara Over the 30-Year Planning Horizon

Capital Project ID	Stage	Preferred Servicing Strategy ID	Descriptions	Region's DC project ID	Size	Length	Railway / Creek Crossing	Construction Costs	Design Costs	Contingency Costs	Costs (2022\$)	Class EA Project Schedule ¹⁶	Anticipated Implementation Schedule
W-TM-001	1	S1W1	<ul style="list-style-type: none"> Watermain extends northerly on South Grimsby Road 5 from Regional Road 20 to Spring Creek Road Easternly along Spring Creek Road to Thompson Road Southerly on Thompson Road and easternly to London Road pumping station No crossing of Twenty Mile Creek Crossing of rail tracks on South Grimsby Road 5 	W-M-006	400mm	2,548m	\$ 2,000,000 (1 railway crossing)	\$ 2,853,760	\$ 428,064	\$ 570,752	\$ 5,852,576	A	Next 10 years
W-TM-002	2	S2W2	<ul style="list-style-type: none"> Watermain extends southerly from London Road Pumping Station towards Industrial Park Road and Regional Road 20 (St Catharines Street) intersection No crossing of Twenty Mile Creek Crossing of rail tracks on Industrial Park Road 	W-M-018	400mm	1,182m	\$ 2,000,000 (1 railway crossing)	\$ 1,323,840	\$ 198,576	\$ 264,768	\$ 3,787,184	A	Next 10 years
W-TM-003	3	S3W1	<ul style="list-style-type: none"> New watermain extends easternly along Townline Road to existing North South easement east of Anderson Crescent Northerly from easement to Industrial Park Road / Regional Road 20 and connection future Stage 2 watermain Trenchless crossing of Twenty Mile Creek south of Industrial Park Road and Regional Road 20 	W-M-018	400mm	1,633m	\$ 5,000,000 (1 creek crossing)	\$2,721,600	\$ 408,240	\$ 544,320	\$ 8,674,160	A	10 – 20 years
W-TM-004	4	S4W3	<ul style="list-style-type: none"> Watermain extends southerly from Regional Road 20 along future development lands to Townline Road Trenchless crossing of Twenty Mile Creek on South Grimsby Road 5 Within planned utility / active transportation corridor and planned Stage 4 local collector road Southerly on local north south collector road to Townline Road 	-	400mm	2,190m	\$ 5,000,000 (1 creek crossing)	\$ 2,452,800	\$ 367,920	\$ 490,560	\$ 8,311,280	A	> 20 years

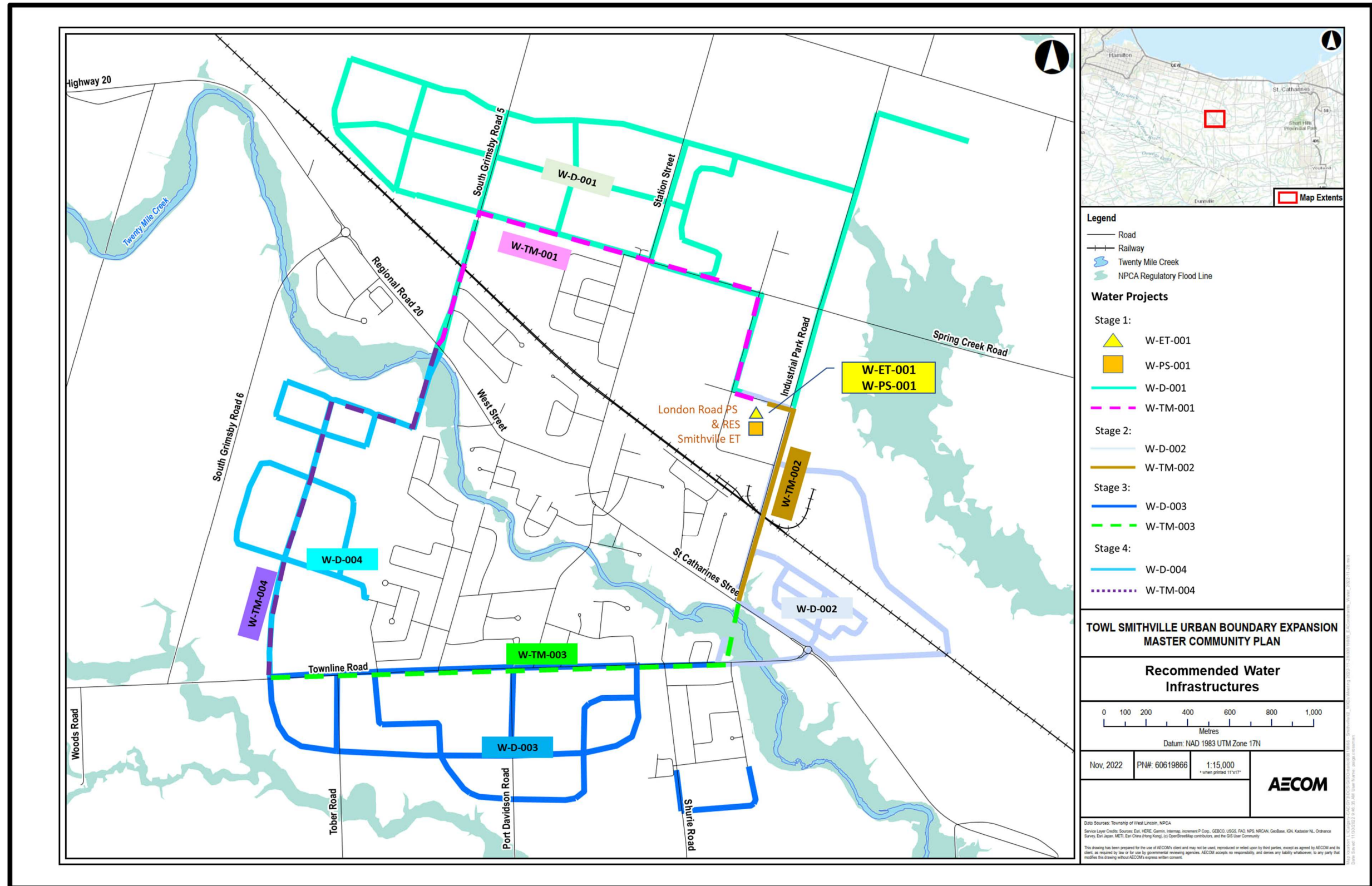
¹⁶(as approved under the integrated MCEA process and subject to no OPA 63 appeal)

Capital Project ID	Stage	Preferred Servicing Strategy ID	Descriptions	Region's DC project ID	Size	Length	Railway / Creek Crossing	Construction Costs	Design Costs	Contingency Costs	Costs (2022\$)	Class EA Project Schedule ¹⁶	Anticipated Implementation Schedule
W-ET-001	1	-	New elevated tank (8.8ML)	W-S-010 ¹⁷	8.8ML	-	-	\$ 11,000,000	\$ 1,650,000	\$ 2,200,000	\$ 14,850,000	B	Next 10 years
W-PS-001	1	-	Dedicated fire pump (356L/s)	W-P-004 ¹⁸	356L/s	-	-	\$ 500,000	\$ 75,000	\$ 100,000	\$ 675,000	A	Next 10 years
Total Estimated Costs for Water Capital Projects (2022\$)											\$ 42,150,200		

¹⁷ Region of Niagara DC Study 2022 indicated that the estimated budget for W-S-010 was \$12,570,000. The Schedule B Class EA study should be completed by the Region.

¹⁸ Region of Niagara DC Study 2022 indicated that the estimated budget for W-P-004 was \$1,544,400. Based on the descriptions for W-P-004 from the Region's DC study, the recommended dedicated fire pump was not part of the project and therefore the estimated costs presented herein would be considered an additional costs for W-P-004 (\$1,544,400 + \$675,000 = \$2,219,400)

Figure 6-1: Preferred Water Infrastructures



6.2 Future Wastewater Infrastructure

Table 6-3 and Table 6-4 present the recommended wastewater infrastructure projects to be implemented over the 30 year planning horizon for the Township of West Lincoln and the Region of Niagara, respectively. Figure 6-2 presents the overall preferred wastewater infrastructures.

Table 6-3: Recommended Wastewater Infrastructure Projects for the Township of West Lincoln Over the 30 Year Planning Horizon

Capital Project ID	Stage	Preferred Servicing Strategy ID	Descriptions	Size	Length	Railway / Creek Crossing	Construction Costs	Design Costs	Contingency Costs	Costs (2022\$)	Class EA Project Schedule ¹⁹	Anticipated Implementation Schedule
WW-SL-001	1	S1WW1	<ul style="list-style-type: none"> • New sewer gravity main on Spring Creek Road from South Grimsby Road 5 and easterly to Industrial Park Road • Gravity sewer continues southernly down Industrial Park Road • Industrial Park to Regional Road 20 • Westerly on Regional Road 20 to Smithville Pumping Station • No crossing of Twenty Mile Creek required • Crossing of rail tracks on Industrial Park Road 	375 - 525mm	2,548m	\$ 2,000,000 (railway crossing)	\$ 6,186,843	\$ 928,026	\$ 1,237,369	\$ 10,352,238	A	Next 10 years
WW-SL-002	1	S1WW1	<ul style="list-style-type: none"> • New gravity main on Regional Road 20 to Streamside Sanitary Pumping Station 	375mm	961m	\$ 0	\$ 1,153,200	\$ 172,980	\$ 230,640	\$ 1,556,820	A	Next 10 years
WW-SL-003	2	S2WW1	<ul style="list-style-type: none"> • New sewer gravity main from Smithville sanitary pumping station on east side from Regional Road 20 (St Catharines Street) towards Townline Road • No crossing of Twenty Mile Creek required • No crossing of rail tracks 	375 - 525mm	1,633m	\$ 0	\$ 1,353,262	\$ 202,989	\$ 270,652	\$ 1,826,904	A	Next 10 years
WW-SL-004	3	S3WW1A	<ul style="list-style-type: none"> • New Gravity Sewer follows Stage 3 North South and easterly local collector road starting at Townline Road • Connection to new SPS at Port Davidson Road / North Creek • Also includes flow from new gravity sewers within Stage 3 east of Port Davidson Road • Trenchless crossing of Twenty Mile Creek required • Does not service Stage 4 	375-525mm	4,543m	\$ 0	\$ 6,891,578	\$ 1,033,737	\$ 206,747	\$ 8,132,061	A	10 – 20 years

¹⁹(as approved under the integrated MCEA process and subject to no OPA 63 appeal)

Capital Project ID	Stage	Preferred Servicing Strategy ID	Descriptions	Size	Length	Railway / Creek Crossing	Construction Costs	Design Costs	Contingency Costs	Costs (2022\$)	Class EA Project Schedule ¹⁹	Anticipated Implementation Schedule
WW-SL-004B	3	S3WW2A	<ul style="list-style-type: none"> New gravity sewer northernly from Stage 3A area to Townline Road Easternly along Townline Road to Anderson Crescent Northernly on Anderson Crescent via existing easement to southside of Twenty Mile Creek 	New gravity sewerline: 250mm Ex. Gravity sewerline replacement 250mm / 300mm	New Gravity sewerline: 380m Ex. Gravity sewerline replacement 513m	\$ 0 ²⁰	\$ 539,211	\$ 80,882	\$ 107,843	\$ 727,935	A	Next 10 years
WW-SL-005	4	S4WW1	<ul style="list-style-type: none"> Gravity sewer starting at north end of South Grimsby Road 6 Easternly across the Stage 4 local collector road Southernly on north south local collector road to Townline Road Connects directly to future Port Davidson SPS 	300-525mm	3,531m	\$ 0	\$ 4,399,500	\$ 659,925	\$ 879,900	\$ 5,939,325	A	> 20 years
WW-PS-002	2	S2WW1	<ul style="list-style-type: none"> New SPS for Stage 2B Assumed to be privately owned / operated pumping system 	4.8L/s	-	\$ 0	\$ 0	\$ 0	\$ 0	\$ 0	Subject to Town's / Region's approval	Next 10 years
WW-PS-003²¹	3	S3WW1A	<ul style="list-style-type: none"> Infrastructure Option S1; New SPS for Stages 3 & 4 	148L/s	-	\$ 0	\$ 3,240,000	\$ 486,000	\$ 648,000	\$ 4,374,000	A	10 – 20 years
WW-PS-004 / WW-PM-004	4A	S4A-FM2	<ul style="list-style-type: none"> New SPS on south side of Twenty Mile Creek within staging area 4A; this station is considered a private pumping system New forcemain on Regional Road 20 to future gravity sewer within Stage 4 	7.0 L/s / 200mm	210m	\$ 0	\$ 0	\$ 0	\$ 0	\$ 0	Subject to Town's / Region's approval	> 20 years

²⁰ The existing gravity sewer that crosses the Twenty Mile Creek will be maintained as 250mm as higher flow / velocity would be beneficial in archiving higher scouring velocity and also it was a cost-effective method for accommodating Stage 3A

²¹ Based on the required capacity for the SPS, the implementation of WW-PS-003 would be completed by the Township and the Region of Niagara will assume the ownership, O&M of the station in accordance with the Region's SPS policy.

Capital Project ID	Stage	Preferred Servicing Strategy ID	Descriptions	Size	Length	Railway / Creek Crossing	Construction Costs	Design Costs	Contingency Costs	Costs (2022\$)	Class EA Project Schedule ¹⁹	Anticipated Implementation Schedule
WW-PM-002	2	S2WW1	<ul style="list-style-type: none"> New FM for future SPS to future gravity sewer on RR20 Assumed to be privately owned / operated pumping system 	150mm	516m	\$ 0	\$ 0	\$ 0	\$ 0	\$ 0	Subject to Town's / Region's approval	Next 10 years
WW-PM-003	3	S3FM1B	<ul style="list-style-type: none"> New forcemain extending Northernly on port Davidson Road from SPS towards Townline road Easternly along Townline Road to watermain easement. Northernly through easement towards Twenty Mile Creek Trenchless crossing of Twenty Mile Creek Connects to future gravity sewer at Regional Road 20 and Industrial Park Road 	500mm	2,030m	\$ 5,000,000 (1 creek crossing)	\$ 2,491,364	\$ 373,705	\$ 498,273	\$ 8,363,342	A	10 – 20 years
Total Estimated Costs for Wastewater Capital Projects (2022\$)										\$ 41,272,625		

Table 6-4: Recommended Wastewater Infrastructure Projects for the Region of Niagara Over the 30 Year Planning Horizon

Capital Project ID	Stage	Preferred Servicing Strategy ID	Descriptions	Region's DC project ID	Size	Length	Railway / Creek Crossing	Construction Costs	Design Costs	Contingency Costs	Costs (2022\$)	Class EA Project Schedule ²²	Anticipated Implementation Schedule
WW-PS-001	1	S1WW1	<ul style="list-style-type: none"> Streamside SPS Upgrade; Increase capacity to 42.6L/s 	WW-SPS-041	42.6L/s	-	\$ 0	\$ 2,675,000	\$ 401,250	\$ 535,000	\$ 3,611,250	A	Next 10 years
WW-PM-001	1	S1WW1	<ul style="list-style-type: none"> New FM on South Grimsby Road 5 for Streamside SPS connect to future gravity sewer on Spring Creek Road 	WW-FM-017	250mm	953m	\$ 2,000,000 (railway crossing)	\$ 1,013,645	\$ 152,047	\$ 202,729	\$ 3,368,421	A	Next 10 years
Total Estimated Costs for Wastewater Capital Projects (2022\$)											\$ 6,979,671		

²²(as approved under the integrated MCEA process and subject to no OPA 63 appeal)

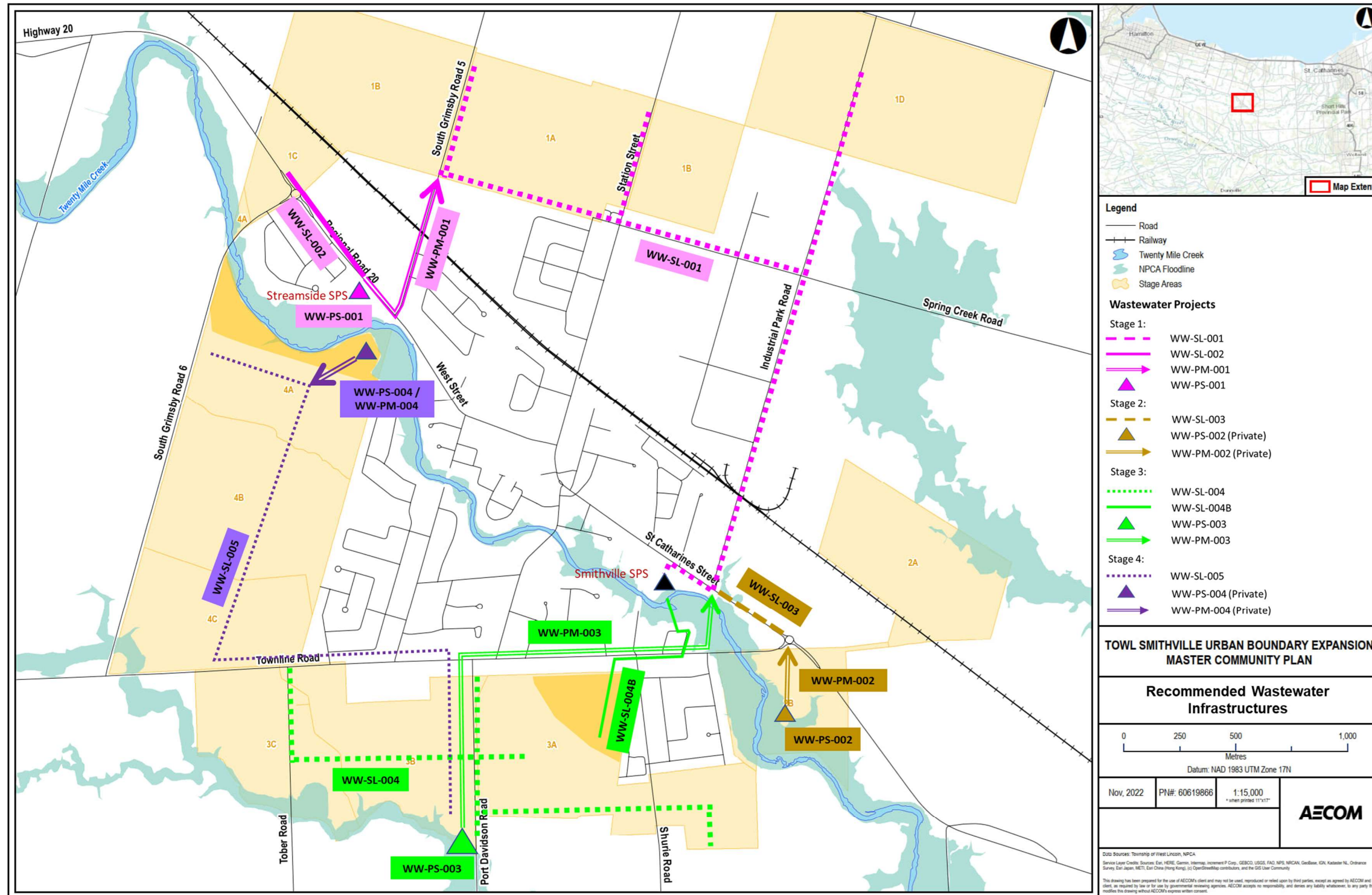


Figure 6-2: Preferred Wastewater Infrastructures

