Niagara Region

2021 Water and Wastewater Master Servicing Plan Update

Volume 1 – Executive Summary

Final Report

April, 2023

Niagara Region is committed to reviewing its practices, processes and the built environment for barriers to access for persons with disabilities. If you require additional or other formats for communicating the details of the appendices in this attached report, please contact the project team at niagaramspu@niagararegion.ca

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1 INTRODUCTION

1.1 Background

Niagara Region currently services the urban area of the municipalities of Grimsby, West Lincoln, Lincoln, St. Catharines, Thorold, Welland, Pelham, Port Colborne, Niagara-on-the-Lake, Niagara Falls, and Fort Erie. Water and wastewater servicing is operated under a two-tier system. Niagara Region is responsible for water treatment, transmission mains, feedermains, storage facilities and major booster pumping stations; as well as wastewater treatment, trunk sewers and sewage pumping stations. The area municipalities are responsible for local water distribution networks and local sewer collection systems.

Niagara Region is part of the Greater Golden Horseshoe (GGH) area situated around the western and southern end of Lake Ontario that continues to be one of the fastest growing regions in North America. The Government of Ontario's legislative growth plan, Places to Grow Act 2005 and recent amendments, identifies substantial population and employment growth for the GGH to year 2051.

Readily available and accessible public infrastructure is essential to the viability of existing and growing communities. Infrastructure planning, land use planning and infrastructure investment require close integration to ensure efficient, safe, and economically achievable solutions to provide the required water and wastewater infrastructure. To balance the needs of growth and sustainability with the protection and preservation of natural, environmental and heritage resources, Niagara Region initiated a Water and Wastewater Master Servicing Plan Update.

The 2021 Master Servicing Plan Update (MSPU) has completed a review, evaluation and development of growth-related water and wastewater servicing strategies, with consideration of sustainability requirements for the existing infrastructure, for all servicing within the urban areas of the Region. The 2021 MSPU uses updated population and employment growth forecasts based on a 2051 planning horizon, and accounts for changes in regulatory and legislative requirements. The 2021 MSPU addresses all Regional infrastructure within the urban areas for all Local Municipalities excluding the Township of Wainfleet.

Through this update of the Master Servicing Plan, the Region has highlighted the need to integrate the MSPU growth-related program with the Region's sustainability program intended to address the condition and performance of the existing infrastructure. The MSPU servicing strategies are based on the need to maintain appropriate levels of service throughout the systems and acknowledges that investment will be needed to support operations, maintenance, staff, and other resources related to maintaining the existing systems and facilities in a state of good repair and performance.

The 2021 MSPU builds on previous work undertaken as part of the 2016 Master Servicing Plan and previous long term infrastructure planning studies. The 2021 MSPU is a critical component in the Region's planning for growth and will provide the framework and vision for the water and wastewater servicing needs for the lake-based service areas of the Region to year 2051, along with consideration for post-2051 growth.

1.2 Master Servicing Plan Update Objectives

The 2021 MSPU comprehensively documents the development, evaluation and selection of the preferred water and wastewater servicing strategies to meet the servicing needs of existing users and future development to 2051.

The key objectives of the 2021 MSPU are as follows:

- Review planning forecasts to 2051 and determine the impacts on servicing needs for the Region's lake-based water and wastewater infrastructure
- Evaluate the ability of existing and planned water and wastewater infrastructure to efficiently and effectively service the Region's existing users and anticipated growth
- Undertake a comprehensive review and analysis for both water and wastewater servicing requirements
- Address key servicing considerations as part of the development and evaluation of water and wastewater servicing strategies including:
    - Level of service to existing users and approved growth;
    - Operational flexibility and system security and reliability;
    - Mitigation of impacts to natural, social, and economic environments;
    - Opportunity to meet policy, policy statements, regulations, and technical criteria;
    - Opportunity to optimize existing infrastructure and servicing strategies; and,
    - Ensuring the strategies are cost effective.
- Consider and develop sustainable servicing solutions with lifecycle considerations
- Update the capital program cost estimating methodology and utilize updated industry trends and more detailed information from relevant Region studies and projects to provide appropriate capital cost estimates
- Utilize the updated water and wastewater hydraulic models for the analysis of servicing alternatives
- Establish conceptual level water and wastewater servicing strategies, with corresponding capital programs, implementation plans based on the projected growth, and flexibility to be adjusted as growth is realized in the future
- Provide extensive consultation with the public and stakeholders; and
- Complete the Master Servicing Plan Update in accordance with the MEA Class EA process for Master Plans

1.3 Master Servicing Plan Update Report Outline

The 2021 Water and Wastewater Master Servicing Plan Update Report, including all supporting volumes, is the documentation placed on public record for the prescribed minimum 30-day review period. The documentation, in its entirety, describes all required phases of the planning process and incorporates the procedure considered essential for compliance with the Environmental Assessment Act.

The 2021 MSPU documentation is organized into five volumes as illustrated in **Figure 1.1** and as described below:

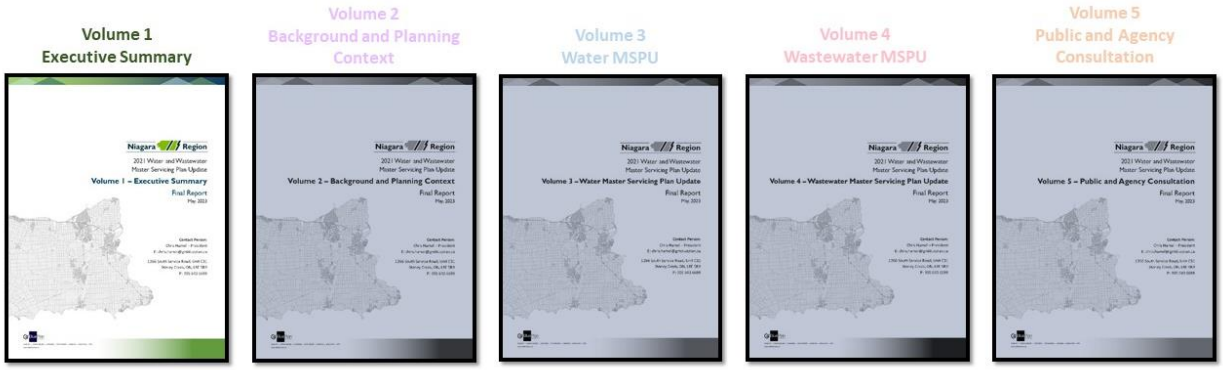


Figure 1.1 Master Servicing Plan Update Documentation

1.3.1 Volume 1 – Executive Summary

Volume 1 provides a brief overview of the 2021 MSPU. It summarizes the information contained in Volumes 2, 3, 4, and 5, including problem statement, purpose of the study, significant planning, policy and technical considerations, and description of the preferred water and wastewater servicing strategies including depiction of the projects and documentation of the capital programs.

1.3.2 Volume 2 – Background and Planning Context

Volume 2 details the master planning process including the Master Plan Class EA process, related studies, legislative and policy planning context, water and wastewater servicing principles and policies, population, and employment growth forecasts, existing environmental and servicing conditions, and future considerations.

1.3.3 Volume 3 – Water Master Servicing Plan Update and Project File

Volume 3 is the principal document summarizing the study objectives, approach, methodologies, technical analyses, evaluation, and selection of the preferred water servicing strategy for each of the water systems. This volume contains baseline water system data and performance information. This volume also documents the water servicing strategy development with detailed information on the projects and capital program associated with the preferred water servicing strategy.

1.3.4 Volume 4 – Wastewater Master Servicing Plan Update and Project File

Volume 4 is the principal document summarizing the study objectives, approach, methodologies, technical analyses, evaluation, and selection of the preferred wastewater servicing strategy for each of the wastewater systems. This volume contains baseline wastewater system data and performance information. This volume documents the wastewater servicing strategy development with detailed information on the projects and capital program associated with the preferred wastewater servicing strategy.

1.3.5 Volume 5 – Public and Agency Consultation

Volume 5 contains all relevant documentation of the public consultation process including notices, comments and responses, and distribution information. Presentation material from all Public Information Centres (PICs) held during the process is included. Other presentation material and discussion information from workshops held with relevant agencies, approval bodies and other stakeholders are also included.

2 BACKGROUND AND PLANNING CONTEXT

2.1 Integrated Planning Process

The Niagara Region is proactively planning to facilitate the anticipated growth for a total of 694,000 people and 272,000 jobs by 2051 in an integrated process that includes the Niagara Official Plan, 2022 Development Charges Background Study and By-Law Update, and the 2021 Water and Wastewater Master Servicing Plan Update (2021 MSPU). These strategic projects are aligned and interconnected to collectively form the foundation to support and foster Niagara's anticipated growth.

2.1.1 Region Official Plan Update (2022)

As part of the Niagara Official Plan, the Region completed extensive background review, consultation, and supporting studies which resulted in policies and mapping to managing growth and the economy, protecting the natural environment, resources, agricultural land, and providing infrastructure.

On November 4, 2022, the Minister of Municipal Affairs and Housing approved the Niagara Official Plan, with modifications. This approval helps the Niagara Region prepare for the anticipated population of 694,000 people and 272,000 jobs by 2051. Through the Niagara Official Plan and working with the local area municipalities, it helps provide more housing and jobs within the region.

The anticipated growth out to 2051 from the Niagara Official Plan process was utilized in the 2021 MSPU to determine the required water and wastewater growth capital projects.

2.1.2 Niagara Region's Development Charges Background Study and By-Law Update (2022)

The estimated capital costs of the recommended growth capital projects in the 2021 MSPU over the 30-year forecast period were included in the 2022 Development Charges Background Study and By-law. The 2022 Development Charges By-law was approved by Regional Council on August 25, 2022 and took effect on September 1, 2022.

2.1.3 Water and Wastewater Master Servicing Plan Update (2021 MSPU)

The 2021 MSPU is a critical component in the Region's planning for growth and provides the framework and vision for the water and wastewater servicing needs for the lake based service areas of the Region to 2051. The 2021 MSPU develops recommended strategies and evaluates the ability of the existing and planned water and wastewater infrastructure to continue to efficiently and effectively service the Region's existing users and service anticipated growth. This includes having consideration for Regional water and wastewater infrastructure to be aligned with the urban expansion and intensification areas identified in the Niagara Official Plan review. Additionally, the potential impacts of estimated growth beyond 2051 has been considered due to the longer useful life of water and wastewater infrastructure assets.

2.2 Problem and Opportunity Statement

Niagara Region has completed several updates to the Water and Wastewater Master Plan. The most recent 2016 MSPU, completed in 2017, looked at servicing planned growth to year 2041.

With an updated planning horizon to 2051, the current Master Servicing Plan Update needs to determine how the Region's water and wastewater infrastructure will establish a cost-effective infrastructure program that also meets the service needs of existing and future users, meets regulatory and legislative requirements, supports growth in a sustainable and responsible manner, and addresses the priority areas impacted by wet weather issues, climate change, energy management, infrastructure optimization, system security, and resiliency.

The problem and opportunity statement defines the principal starting point in the undertaking of the 2021 MSPU Class EA and assists in defining the scope of the project. The problem and opportunity statement for the 2021 Water and Wastewater Master Servicing Plan Update is defined as follows:

The 2021 MSPU will identify and develop a long-term water and wastewater servicing strategy and capital forecast to ensure level of service for existing and future residents and businesses. This will support projected future growth in the community to 2051 and consider potential impacts beyond 2051.

2.3 Study Area

The Study Area for the 2021 MSPU covers primarily the urban areas of the local municipalities in Niagara Region serviced by the lake-based systems. The Township of Wainfleet is not included in the scope of this Master Servicing Plan Update. The study area is presented in **Figure 1.2**.

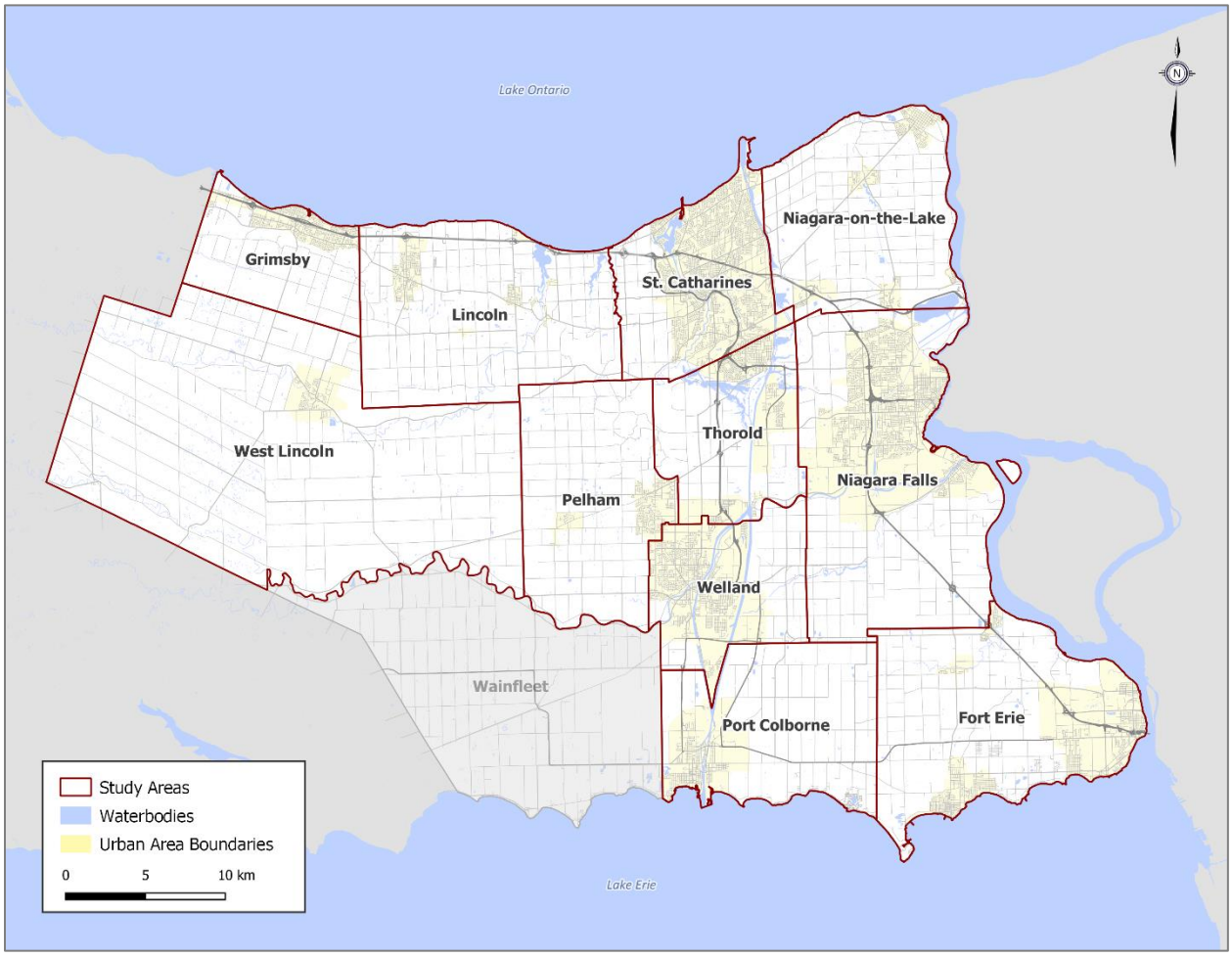
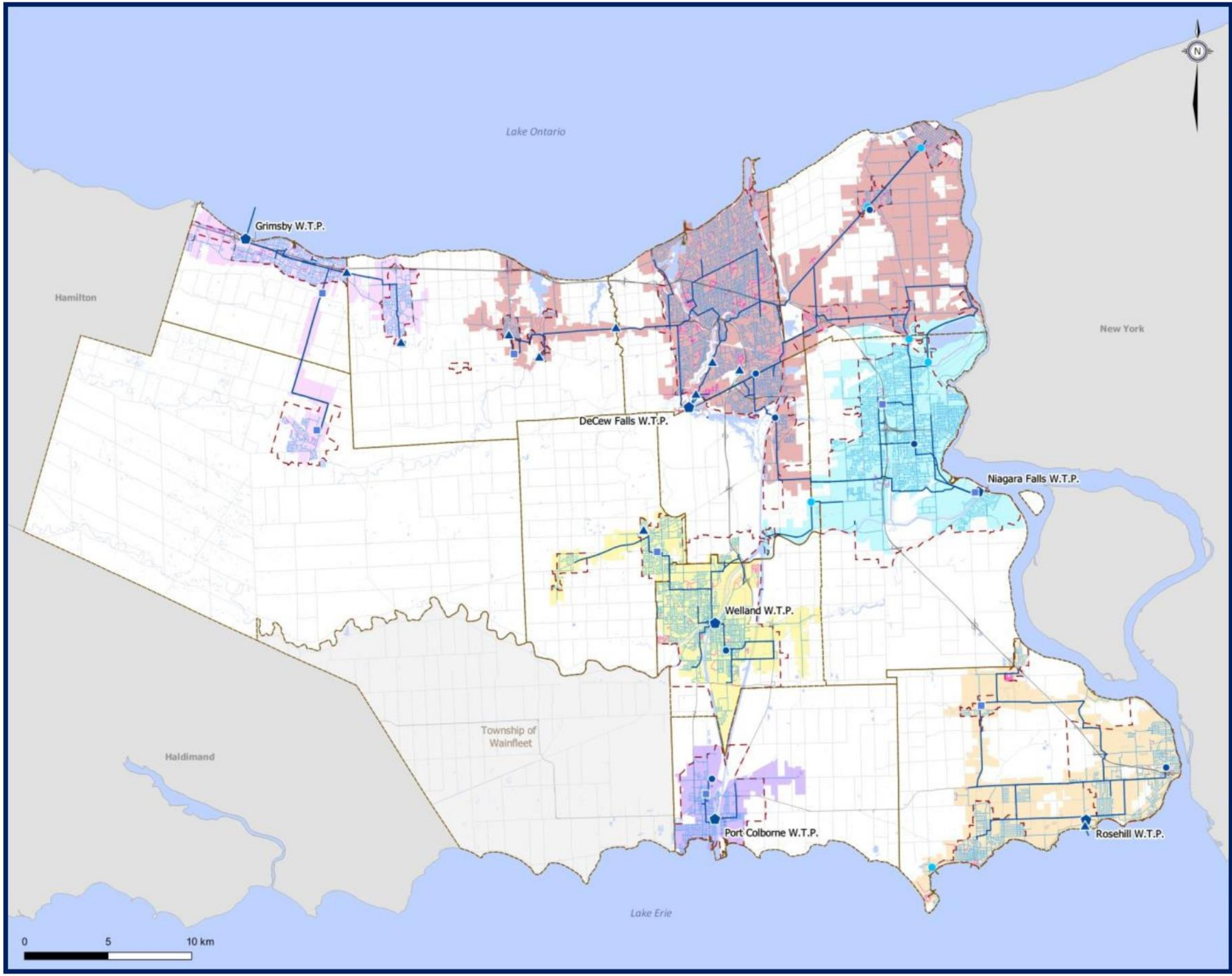


Figure 1.2 Study Area

The water and wastewater study areas are defined as the limits of existing infrastructure within each of the Local Municipalities excluding the Township of Wainfleet. The existing water and wastewater system and limits of infrastructure are depicted in **Figure 1.3** and **Figure 1.4.**

Niagara Region

2021 Water and Wastewater Master Servicing Plan Update



Existing Water Infrastructure

- Chlorine Facility
- Elevated Tank
- Fluoride Station
- Pumping Station
- Reservoir
- Standpipe
- Water Treatment Plant
- Region Mains
- Local Mains
- Private

Water Pressure Zones

- DeCew Falls
- Grimsby
- Niagara Falls
- Port Colborne
- Rosehill
- Welland

Other Features

- Township of Wainfleet
- Waterbodies
- Urban Area Boundary

Figure 1.3
System Overview
Existing Water Infrastructure

BluePlan Engineering

January 2023
621016-W-001
WKID: 26917

Niagara Region

2021 Water and Wastewater Master Servicing Plan Update

Lake Ontario

Niagara-on-the-Lake W.W.T.P.

Port Weller W.W.T.P.

Port Dalhousie W.W.T.P.

Baker Rd. W.W.T.P.

Queenston W.W.T.P.

Niagara Falls W.W.T.P.

Welland W.W.T.P.

Stevensville/Douglastown Lagoon W.W.T.P.

Anger Ave. W.W.T.P.

Seaway W.W.T.P.

Crystal Beach W.W.T.P.

Hamilton

New York

Haldimand

Township of Wainfleet

Lake Erie

0 5 10 km

Existing Wastewater Infrastructure

- Wastewater Treatment Plant (WWTP)
- Biosolids Storage Facility
- Odour Control Facility
- Leachate Pumping Station

Sanitary Pumping Stations (SPS)

- Regional
- Municipal
- Private

Wastewater Network

- Force Mains
- Regional Mains
- Local Sewers
- Private Sewers

Wastewater Sewersheds

- Baker Road
- Port Dalhousie
- Port Weller
- Niagara-on-the-Lake
- Queenston
- Niagara Falls
- Stevensville Douglastown
- Anger Avenue
- Crystal Beach
- Welland
- Seaway

Other Features

- Municipal Boundary
- Waterbodies
- Urban Area Boundary

Figure 1.4

System Overview

Existing Wastewater Infrastructure

BluePlan Engineering

March 2023
620126-WW-001
WKID: 26917

2.4 Planning Context

The Province of Ontario's Places to Grow and Amendments is the official growth plan for the GGH. It is a long-term plan that provides a framework for implementing Ontario's vision for building stronger, more prosperous communities by better managing growth in the Region to year 2051.

Niagara Region, through the Official Plan Update, established Regional and Local Municipal planning projections that were used as the planning basis for the 2021 MSPU which are summarized in **Table 1.1**.

Table 1.1 Niagara Region 2021 Official Plan –2051 Population and Employment Forecast Allocations by Local Municipality

Municipality	2051 Residential Population	2051 Employment Population
Fort Erie	48,050	18,430
Grimsby	37,000	14,960
Lincoln	45,660	15,220
Niagara Falls	141,650	58,110
Niagara-on-the-Lake	28,900	17,610
Pelham	28,830	7,140
Port Colborne	23,230	7,550
St. Catharines	171,890	79,350
Thorold	39,690	12,510
Wainfleet	7,730	1,830
Welland	83,000	28,790
West Lincoln	38,370	10,480
Niagara Region	**694,000**	**272,000**

2.5 Water Demand Projections

Each Master Servicing Plan Update provides an opportunity to review previous design criteria and resulting projections to ensure current infrastructure planning approaches reflect current conditions and the vision for water use into the future.

The Region's 2016 Master Servicing Plan Update utilized 300 Lpcd for both residential and employment land uses to project growth average day demands. More granular data was analyzed through the 2021 MSPU to reassess the per capita demand criteria to reflect existing usage trends more closely. It is important to maintain a reasonable factor of safety within the consumption criteria while avoiding over-conservatism which ultimately impacts the sizing and timing of capital projects.

The 2021 MSPU has recommended that the design criteria should be lowered to reflect current and projected usage. The 2021 MSPU has recommended and utilized the following design criteria to project water demands, determine capacity requirements, and establish the water infrastructure program:

- Residential Average Day Demand: 240 Lpcd
- Employment Average Day Demand: 270 Lped
- Maximum Day Factors: based on rolling average for each system from last 5 years
- Peak Hour Factors: based on diurnal curves developed for each system using historic SCADA data

The design criteria and water use analysis also indicated that, in some systems, the non-revenue water (NRW) was found to be extremely high (i.e., greater than 25%). Generally, 10 to 20% NRW is expected due to unbilled accounted for water. It has been recommended that the local municipalities and the Region work to decrease NRW as much as possible in the long-term. A new policy has been proposed through this MSPU that for municipalities where existing NRW is greater than 25%, the future NRW should be decreased to at least 25% through local area municipality programs and initiatives.

Based on the 2021 MSPU criteria and water use review, a summary of computed water demand projections is found in **Table 1.2**.

Table 1.2 Water System Population and Demand Projections

Water System	2021 – 2051 Growth *			2021 – Post-2051 Growth *			2021 Demands		2051 Demands		Post-2051	
	Growth Population	Growth Employment	Total Equivalent Growth	Growth Population	Growth Employment	Total Equivalent Growth	Average Day Demand (MLD)	Maximum Day Demand (MLD)	Average Day Demand (MLD)	Maximum Day Demand (MLD)	Average Day Demand (MLD)	Maximum Day Demand (MLD)
Grimsby Water Treatment Plant (WTP)	37,731	13,381	51,112	56,287	22,033	78,320	16.2	24.8	28.8	45.7	35.6	57.0
DeCew WTP	62,873	27,796	90,670	92,719	45,158	137,877	66.6	95.3	88.3	130.2	100.1	148.9
Niagara Falls WTP	45,051	21,095	66,146	67,961	25,111	93,072	43.0	64.5	59.5	90.9	66.1	101.4
Fort Erie WTP	14,149	7,305	21,454	27,857	9,989	37,846	12.6	17.3	16.8	24.4	20.8	30.6
Port Colborne WTP	4,140	1,956	6,097	19,413	6,163	25,576	8.2	11.2	8.3	12.1	13.1	19.8
Welland WTP	41,668	13,496	55,164	71,897	21,881	93,778	26.1	34.7	36.8	52.1	46.3	66.3

* Note: The 2021 MSPU has an established baseline condition of year 2021. 2021 represents the best available system information and system calibration data for the water and wastewater models at the time of study initiation. The 2021 MSPU has projected water demands from year 2021 to establish the 2051 infrastructure needs. The potential impacts of estimated growth beyond 2051 was considered due to the longer useful life of water and wastewater infrastructure assets.

2.6 Wastewater Flow Projections

Similar to water, each Master Servicing Plan Update provides an opportunity to review previous design criteria and resulting projections to ensure current infrastructure planning approaches reflect current conditions and the vision for wastewater flows into the future.

The Region's 2016 Master Servicing Plan Update utilized 275 Lpcd for both residential and employment land uses to project growth average daily flows. More granular data was analyzed through the 2021 MSPU to reassess the per capita demand criteria to reflect existing usage trends more closely. It is important to maintain a reasonable factor of safety within the flow criteria while avoiding over-conservatism which ultimately impacts the sizing and timing of capital projects.

The Region's extraneous flow allowance criteria was also reviewed against historic flow monitoring and pump station performance records. The review of historic wet weather flows found that typically 2-year design storm peak flows within existing built systems exceeded the Region's existing extraneous flow design allowance of 0.286 L/s/ha; however, that a 2-year design storm peak flow below 0.286 L/s/ha was achievable as demonstrated in multiple catchment areas. The extraneous flow design allowance for existing areas was increased to 0.4 L/s/ha to better reflect the existing high wet weather flows. For new greenfield development areas, the extraneous flow design allowance was maintained at 0.286 L/s/ha. This approach minimizes the magnitude of system upgrades and emphasizes wet weather flow management as a critical priority.

The 2021 MSPU has recommended and utilized the following design criteria to project wastewater flows, determine capacity requirements and establish the wastewater infrastructure program:

- Residential Average Flow Generation: 255 Lpcd
- Employment Average Flow Generation: 310 Lped
- Peak Factor: Harmon formula with values between 2 and 4 with consideration to the catchment area performance
- Extraneous Flow Allowance for Regional wastewater infrastructure:
    - 0.286 L/s/ha for new developments across all catchments
    - 0.4 L/s/ha for existing developments (varying across catchments depending on performance)
    - Consideration of observed peak and total flows under 5-year design storm in contributing catchments to initiate extraneous flow reduction efforts

Based on the 2021 MSPU criteria and wastewater flow review, a summary of computed wastewater flow projections is found in **Table 1.3**.

Table 1.3 Wastewater Flow Projections

Wastewater System	2021 – 2051 Growth[1]			2021 – Post-2051 Growth[1]			Average Daily Flow (MLD)		
	Growth Population	Growth Employment	Total Equivalent Growth	Growth Population	Growth Employment	Total Equivalent Growth	2021	2051	Post-2051
Baker Road WWTP	47,154	14,173	61,327	70,251	24,136	94,387	19.4	35.8	44.8
Port Dalhousie WWTP	27,860	13,491	41,351	38,218	19,418	57,637	34.2	45.5	50.0
Port Weller WWTP	14,949	7,575	22,525	19,745	12,246	31,991	34.4	40.6	43.2
Niagara-on-the-Lake WWTP	1,621	1,487	3,108	2,451	1,696	4,147	4.7	5.6	5.9
Queenston WWTP	15	86	101	83	101	185	0.2	0.3	0.3
Niagara Falls WWTP[2]	18,568	10,415	28,983	24,186	11,017	35,203	39.9	59.7	69.2
Stevensville and Douglastown WWTP	1,329	1,653	2,983	2,006	1,726	3,732	1.6	2.5	2.6
Anger Avenue WWTP	9,691	4,500	14,191	20,393	6,086	26,479	14.2	18.1	21.3
Crystal Beach WWTP	2,697	547	3,244	4,067	628	4,695	5.7	6.6	6.9
Seaway WWTP	4,125	1,899	6,024	19,127	6,078	25,205	11.8	13.4	18.6
Welland WWTP	41,634	13,070	54,704	71,789	21,326	93,115	34.2	48.9	59.1

[1] Note: The 2021 MSPU has an established baseline condition of year 2021. 2021 represents the best available system information and system calibration data for the water and wastewater models at the time of study initiation. The 2021 MSPU has projected wastewater demands from year 2021 to establish the 2051 infrastructure needs. The potential impacts of estimated growth beyond 2051 was considered due to the longer useful life of water and wastewater infrastructure needs.

[2] The values shown for the Niagara Falls WWTP do not consider the implementation of the South Niagara Falls WWTP and strategy.

3 WATER AND WASTEWATER SERVICING PRINCIPLES AND CRITERIA

Development of water and wastewater principles are integral to provide guidelines and direction to the 2021 MSPU process, as well as to the identification and evaluation of servicing strategies.

Through the course of the 2021 MSPU, priority areas were reviewed from the previous 2016 MSPU and further refined for application under this 2021 MSPU including:

- Health and safety;
- System reliability and security;
- Reserve capacity for operational flexibility and level of service;
- Impacts of climate change;
- Considerations to energy use and efficiency;
- Recognition of impacts from water efficiency and conservation; and
- Addressing issues related to the full lifecycle of water and wastewater services.

A comprehensive list of general, water, and wastewater principles were established. As a result, from the priority policy areas, key servicing principles were developed as highlighted below:

- Niagara Region will endeavor to maintain sufficient reserve capacity in its water and wastewater infrastructure and facilities to provide operational flexibility and meet potential changes in servicing conditions;
- Niagara Region shall endeavor to provide reliability, redundancy, and security in its water and wastewater systems with attention to high risk and critical areas;
- Niagara Region shall be aware of and consider the potential impact of climate change on the planning and sizing of infrastructure;
- Niagara region shall design water and wastewater facilities with consideration to energy use;
- Niagara Region will consider levels of storage beyond MECP guidelines where appropriate in order to provide operational flexibility, energy management, and system security. Further, system storage requirements should be exclusive of the volume required to achieve sufficient disinfection requirements at the Region's water treatment plants;
- Niagara Region will review a combination of servicing strategies including infrastructure and non-infrastructure (e.g., I/I reduction) solutions to meet wet weather level of service and provide sufficient wastewater capacity;
- Niagara Region will approach Guidelines F-5-5 and F-5-1 such that new development will not put the Region out of compliance with regulations and the Region will consider opportunities to not increase wet weather overflows beyond current conditions; and,
- Niagara Region will work to ensure that new developments do not increase wet weather flows and consider the potential for new developments to work collaboratively with the

Region and local area municipalities to reduce I/I in upstream catchments in order to gain some capacity for new developments.

4 WATER SERVICING STRATEGY

The process for developing, evaluating, and selecting the preferred water servicing strategy followed these key steps:

- Review of baseline conditions across each water system;
- Identify opportunities and constraints for each system;
- Develop high level servicing concepts;
- Review each concept with respect to environmental, social, legal, technical, and financial factors. Develop advantages and disadvantages for each;
- Provide additional detail for the preferred concept ensuring preliminary alignment, siting, capacity, timing, system optimization, and other technical factors are identified; and,
- Develop a conceptual cost estimate for each project

4.1 Basis of Water System Analysis

Table 1.4 outlines the servicing criteria that were utilized to assess the system performance, upgrade needs, and effectiveness of system upgrades.

Table 1.4 Servicing Criteria Water System

Description			Criteria
Flow Criteria	Water Demand	Residential	240 L/c/d
		Employment	270 L/e/d
	Peaking Factor	Maximum Day	Based on historic average of maximum day peaking factors from 2016 – 2020
		Peak Hour Factor	Based on system mass balance using hourly SCADA data from 2018 – 2020
	Existing System Demands		Starting Point Methodology • Based on local billing meter records and production records to establish existing system demands • Growth demands are added to the existing system baseline using design criteria
System Performance Criteria	System Pressures		Acceptable pressure range of 40 – 100 psi • Regional objective of maximizing areas within the preferred range of 50 – 80 psi on Regional watermains
	Fire Flow		250 L/s on Regional watermains at residual pressure of 30 psi

Description			Criteria
	Velocity	Average Day	Flag areas less than 0.6 m/s minimum velocity
		MDD+FF or PHD	Flag areas greater than 1.5 m/s Trigger upgrades greater than 2 m/s
Sizing and Triggers	Plant and Facility Upgrade Triggers		• 80% trigger for plant and facility planning process (time-based trigger on a case-by-base basis) • Complete plant and facility expansions before 90% capacity is reached
	Treatment Plant Sizing		Maximum day demand
	Pumping Station Sizing		Various potential demand scenarios: • Maximum day demand (MDD) • MDD + fire flow (250 L/s or MECP) • Peak Hour Demand (PHD) Appropriate design sizing scenario depends on the configuration of the service area for the pumping station. Refer to **Volume 3 - Introduction** for further discussion.
	Watermain Sizing		Regional transmission main system for PHD and MDD + fire flow demands
	Storage Sizing		MECP methodology (A + B + C) • Refer to **Section 4.1.1** and **Volume 3** for discussion regarding contact time (CT) volume requirement at WTP reservoirs

4.1.1 Water Treatment Plant Contact Time Volume Requirement

Due to the contact time requirements from the MECP, the actual usable volume at the WTP reservoirs is calculated to be less than the total volume, since contact time volume cannot be used as system storage based on the MECP's CT requirement.

The methodology for determining required CT is outlined in the MECP's Procedure for Disinfection of Drinking Water in Ontario. This procedure states that the disinfection portion of the overall water treatment process must achieve at least 0.5-log removal or inactivation of Giardia cysts and 2-log removal or inactivation of viruses. The required CT for 0.5 log inactivation of Giardia cysts is the limiting factor compared to the 2-log inactivation of viruses.

Table 1.5 presents the available system storage for all WTP reservoirs under 2051 MDD and buildout MDD conditions.

Table 1.5 WTP Reservoirs Available System Storage

	Total Volume (ML)	2051 Required CT Volume (ML)	2051 Available Volume (ML)	Post-2051 Required CT Volume (ML)	Post-2051 Available Volume (ML)
Grimsby Water Treatment Plant (WTP)	10.0	6.6	**3.4**	8.2	**1.8**
DeCew WTP	56.6	7.4	**49.2**	8.6	**48.0**
Niagara Falls WTP	14.0	8.3	**5.7**	9.1	**4.9**
Fort Erie WTP	11.7	2.3	**9.4**	2.8	**8.9**
Port Colborne WTP	3.8	0.9	**2.9**	1.4	**2.4**
Welland WTP	5.6	3.4	**2.3**	4.2	**1.4**

4.2 Water System Servicing Strategy Recommendations

4.2.1 Grimsby Water Treatment Plant Service Area

The Grimsby water system services the areas of Grimsby, Beamsville in the Town of Lincoln, and the Smithville area in the Township of West Lincoln. The Grimsby water system is anticipated to see a large amount of growth. The preferred water servicing strategy for the Grimsby WTP system is presented in **Figure 1.5**.

Key aspects of the water servicing strategy include:

- Based on the forecasted level of growth on the system, the Grimsby Water Treatment Plant will require additional water treatment capacity prior to 2051.
- The location of water storage to optimize pumping costs and provide equalization and emergency storage to the system has been addressed. A new storage facility to support the Grimsby and Smithville service areas has been established (Park Ridge Reservoir). The new location results in decommissioning the existing reservoir and pumping station.
- To support the new storage location and to provide additional water transmission capacity through the Grimsby system, a new feedermain across Grimsby and a new feedermain from the Grimsby Water Treatment Plant to the Park Ridge Reservoir are required, as well as a new separate set of high lift pumps to support the higher head required within the dedicated reservoir feed to the new Park Ridge Reservoir.
- The level of growth anticipated in the Smithville area will require additional storage, pumping, and feedermain capacity through the network.
- A new transmission main between the new Park Ridge Reservoir in Grimsby and the Hixon Reservoir in Lincoln is recommended to improve security of supply to Lincoln and maximize the use of existing storage capacity.

- Baffle improvements at the Grimsby WTP Reservoir are recommended to maximize the use of existing infrastructure by increasing usable volume for system storage.
- Additional storage capacity at the Hixon Reservoir is needed post-2051 to support growth beyond 2051.

4.2.2 DeCew and Niagara Falls Water Treatment Plant Service Area

The DeCew water system services the City of St. Catharines, the northern half of Thorold, the Vineland area in Lincoln, and Niagara-on-the-Lake. The system is interconnected with the Niagara Falls water system, which services the City of Niagara Falls and Port Robison East in Thorold. An integrated water system strategy was developed for the areas serviced by the DeCew Water Treatment Plant and the Niagara Falls Water Treatment Plant. The DeCew Water Treatment Plant and the Niagara Falls Water Treatment Plant systems are projected to see significant intensification and greenfield growth. The preferred water servicing strategy for the DeCew and Niagara Falls WTP system is presented in **Figure 1.6**.

Key aspects of the water servicing strategy include:

- Both the DeCew Water Treatment Plant and the Niagara Falls Water Treatment Plant have sufficient capacity to support growth to year 2051 and beyond.
- Additional feedermain capacity is required in Niagara-on-the-Lake to support water supply to the growth areas.
- A new feedermain from DeCew WTP to Townline Road East in Thorold is recommended to address security of supply concerns.
- Twinning of the Fourth Avenue transmission main from St. Catharines to Vineland is recommended to address security of supply to Lincoln.
- Additional storage capacity in the following areas to support growth to 2051:
    - **Fifth Avenue Reservoir** – one additional cell at the existing site
    - **South Thorold Elevated Tank (ET)** – new tank with additional storage capacity, location to be determined through a separate study, existing tank would be decommissioned
    - **Virgil ET** – new tank (either replacement or twinned tank) to provide additional storage capacity, location to be determined through a separate study
    - **Lundy's Lane ET –** New tank location to be determined through a separate study, existing Lundy's Lane tank will be decommissioned; and
    - DeCew and Niagara Falls WTP Reservoir expansions recommended post-2051 to support post-2051 storage needs
- Due to the amount of growth in South Niagara Falls, a new feedermain will be required to support the growth demands.
- Additional feedermain capacity is required in the Port Robinson East area due to growth and for system connectivity.

4.2.3 Fort Erie Water Treatment Plant Service Area

The Fort Erie (Rosehill) system services the Town of Fort Erie. The Fort Erie water system will experience additional demands from intensification and greenfield growth as well as a large amount of employment growth in central Fort Erie. There are storage and pumping optimization opportunities for this system. The preferred water servicing strategy for the Fort Erie WTP system is presented in **Figure 1.7**.

Key aspects of the water servicing strategy include:

- The Rosehill Water Treatment Plant has sufficient capacity to support growth beyond 2051.
- The components of the Fort Erie water strategy are focused on providing additional storage for the growth in the area while optimizing the storage/pumping relationship to reduce long term lifecycle costs.
- A new elevated tank will be provided in central Fort Erie to support the system growth and directly support the employment centre.
- The new tank will allow for the decommissioning of the existing Stevensville reservoir and pumping station as well as Central Avenue Fort Erie Elevated Tank.
- Additional feedermain capacity is required to support security of supply to central Fort Erie.

4.2.4 Port Colborne Water Treatment Plant Service Area

The Port Colborne system services the City of Port Colborne. The Port Colborne water system is projected to have moderate greenfield growth. However, infrastructure upgrades are required to support the projected growth in the northern and eastern portions of the system and to support security of supply related to crossings of the Welland Canal. The preferred water servicing strategy for the Port Colborne WTP system is presented in **Figure 1.8**.

Key aspects of the water servicing strategy include:

- The Port Colborne Water Treatment Plant has sufficient capacity to support growth beyond 2051.
- The components of the Port Colborne water strategy are focused on providing additional storage for the growth in the area while optimizing the storage/pumping relationship to reduce long term lifecycle costs.
- The Fielden Reservoir and Pumping Station will be decommissioned to address existing operational issues, reduce long-term life cycle costs, and maximize the use of surplus pumping and treatment capacity at the WTP.
- Additional water feedermain will be provided, with a new crossing of the Canal to support growth on the East and West side of Port Colborne.

- New elevated storage post-2051 is recommended to support long-term growth needs – preferred location to be determined in a separate study.

4.2.5 Welland Water Treatment Plant Service Area

The Welland water system services the City of Welland, the Town of Pelham (Fonthill and Fenwick), and the southern part of the City of Thorold (Port Robinson West Area). The Welland Treatment Plant service area is projected to see significant intensification (brownfield redevelopment) and greenfield growth. There are storage and pumping optimization opportunities aligned with asset renewal needs for this system. The preferred water servicing strategy for the Welland WTP system is presented in **Figure 1.9**.

Key aspects of the water servicing strategy include:

- The Welland Water Treatment Plant has sufficient capacity to support growth beyond 2051, however, a sustainability upgrade for treatment is required.
- The components of the Welland water strategy are focused on providing additional storage for the growth in the area while optimizing the storage/pumping relationship to reduce long term lifecycle costs.
- A new larger ET is recommended in Welland to replace the existing Bemis ET. The operating strategy within the Welland zone will likely be adjusted, with the final preferred strategy being determined in the separate Bemis ET Schedule B EA. As part of the 2021 MSPU, placeholder projects have been assumed, with understanding that the Bemis ET EA will refine and recommend the preferred strategy. These projects include:
    - A new dedicated feedermain from the WTP to the new ET
    - Placing one 10 ML cell at the Shoalt's Drive Reservoir into standby for future re-commissioning when required
    - Both sets of pumps in the Shoalt's Drive pumping station for the higher and lower pressure zones will be upgraded to support growth; and
    - New pumps at the Welland WTP to support an increased HGL within the Welland system
- A new Pelham ET will replace the existing Pelham ET in a different location (as determined through the separate Pelham ET Schedule B EA). The new ET will have a larger volume and increased height to support growth and optimize system pressures and performance in the area
    - The Pelham ET EA also identified feedermain upgrades required to support the operations of the new ET
- Additional feedermain capacity is required to support growth and address security of supply in the following areas:
    - Port Robinson West;
    - From the Welland WTP to northeast Welland;

- Connecting the east and west sides of the Recreational Canal along Humberstone Road, Thorold Townline Road, and Prince Charles Drive South;
- Across the canal from the Welland WTP to Aqueduct Street; and
- On Niagara Street from Mill Street to Riverbank Street

4.3 Water Servicing Strategy Growth Related Capital Program Summary

The above noted growth-related recommendations for each service area and system are consolidated for the overall Niagara Region Water Servicing Strategy Growth Related Capital Program.

The Water Capital Program addresses the infrastructure requirements to meet growth out to year 2051. The 2051 planning horizon presented increased storage requirements, additional Regional transmission main and feedermain requirements, and additional new projects to service the new growth areas compared to the previous 2016 MSPU program. In addition, the 2021 MSPU process has provided an opportunity to update the costing methodology resulting in updated and increased cost estimates for some projects previously identified in the 2016 MSPU.

A summary of the Water Servicing Strategy Capital Program is provided in **Table 1.6**.

A detailed breakdown of each project along with servicing strategy mapping is provided in **Section 8**.

Table 1.6 Water Growth-Related Capital Program Summary

Development Charges Program

	2022 - 2031	2032 - 2041	2042 - 2051	Total
Water Treatment Plants	$73,904,000	-	-	$73,904,000
Water Pumping Stations	$40,339,000	-	$1,716,000	$42,055,000
Water Storage Facilities	$141,903,000	-	$44,226,000	$186,129,000
Water Linear	$196,522,000	$118,346,000	$26,169,000	$341,037,000
Water Other	$8,592,000	$1,802,000	$1,290,000	$11,684,000
Additional Studies	$1,750,000	$1,750,000	$1,750,000	$5,250,000
Total	**$463,010,000**	**$121,898,000**	**$75,151,000**	**$660,059,000**

100% Sustainability / Benefit to Existing Program

	2022 - 2031	2032 - 2041	2042 - 2051	Total
Water Treatment Plants	$160,000,000	-	-	$160,000,000
Water Storage Facilities	$100,000	-	-	$100,000
Total	**$160,100,000**	**$0**	**$0**	**$160,100,000**

100% Post 2051 Program

	2022 - 2031	2032 - 2041	2042 - 2051	Post 2051	Total
Water Storage Facilities	-	-	-	$69,960,000	$69,960,000
Total	**-**	**-**	**-**	**$69,960,000**	**$69,960,000**

Total Growth Related Program

	2022 - 2031	2032 - 2041	2042 - 2051	Post 2051	Total
Total	**$623,110,000**	**$121,898,000**	**$75,151,000**	**$69,960,000**	**$890,119,000**

5 WASTEWATER SERVICING STRATEGY

Similar to water, the process for developing, evaluating, and selecting the preferred wastewater servicing strategy followed these key steps:

- Review of baseline conditions across each wastewater system;
- Identify opportunities and constraints for each system;
- Develop high level servicing concepts;
- Review each concept with respect to environmental, social, legal, technical, and financial factors. Develop advantages and disadvantages for each;
- Provide additional detail for the preferred concept ensuring preliminary alignment, siting, capacity, timing, system optimization, and other technical factors are identified; and
- Develop a conceptual cost estimate for each project.

5.1 Basis of Wastewater System Analysis

Table 1.7 outlines the servicing criteria that were utilized to assess the system performance, upgrade needs, and effectiveness of system upgrades.

Table 1.7 Servicing Criteria Wastewater System

	Component	Criteria	
Flow Criteria	Existing System Flows	Starting Point Methodology • Based on local billing meter records and flow monitoring data to establish existing dry weather flows • Growth flows are added to the existing system baseline using design criteria	
	Flow Generation	Residential	255 L/c/d
		Employment	310 L/e/d
	Peaking Factor	Peak Dry Weather Flow	Harmon's Peaking Factor
	Extraneous Flow Design Allowance	• 0.4 L/s/ha for existing areas* • 0.286 L/s/ha for new developments	
WWTP	System Performance and Triggers	• MECP Procedure F-5-1 • Trigger upgrade study at 80% capacity • Trigger upgrade construction at 90% capacity	
	Upgrade Sizing	• Existing average daily flow plus increase in flows due to projected population and catchment growth	

	Component	Criteria

Pump Station	System Performance and Triggers Sizing	• Two flow scenarios considered on a case-by-case basis (Refer to **Section 5.1.1**)
		  • **Design Allowance**: Peak wet weather flow using the peaked dry weather flow plus the extraneous flow design allowance
		  • **5-Year Storm**: Modelled peak wet weather flow using the 5-year design storm
		• Peak flow capacity to meet design peak wet weather flow using the extraneous flow design allowance
		• Wet well and system storage considerations under 5-year storm to minimize basement flooding and overflow risks

Forcemain	System Performance and Triggers	• Flag velocities less than 0.6 m/s • Flag velocities greater than 2 m/s • Upgrade when velocities exceed 2.5 m/s and considering condition and age
	Upgrade Sizing	• Design velocity target between 1 m/s and 2 m/s • Forcemain replacement to increase capacity
Trunk	System Performance and Triggers	• Design allowance peak wet weather flows, using the extraneous flow design allowance, to be managed within pipe • Freeboard (depth between hydraulic grade line and surface) greater than 1.8 m below surface in 5-year design storm • Flag pipe velocities less than 0.6 m/s • Flag pipe velocities greater than 3.0 m/s
	Upgrade Sizing	• Sized for full flow under post-2051 design peak wet weather flow • Assess 5-year design storm performance to minimize basement flooding risks and overflows

*Note that actual system performance of existing catchments varies. 0.4 L/s/ha was selected for use on existing areas in collaboration with the Region, based on historic data analysis and industry review of extraneous flow allowances

5.1.1 SPS Performance Evaluation and Upgrade Framework

It is the Region's design philosophy to size SPS inline with the Region's extraneous flow design allowance. However, the 2021 MSPU undertook a hybrid evaluation approach in an effort to acknowledge that SPS are a major contributors to local wastewater system performance and that many legacy systems' existing wet weather flows exceed the extraneous flow design allowance in local upstream catchments. The SPS hybrid performance evaluation and upgrade framework are summarized in **Table 1.8** and strive to balance the magnitude of capacity upgrades, potential cascading downstream upgrades, and managing the potential risk of local sewer surcharging and system overflows.

Under the hybrid performance evaluation and upgrade framework, the SPS capacity was sized to meet the lesser of peak wet weather flow (PWWF) using the extraneous flow design allowance, referred to as "Design Allowance PWWF" or the estimated 5-year storm PWWF. Further, consideration for the SPS actual performance under the estimated 5-year design storm peak wet weather flow was evaluated to determine if the available system storage including the wet well, storage tanks, and in system capacity was sufficient to manage excess flows while maintaining the system hydraulic grade line (HGL) below the basement flooding level of 1.8 m below grade and/or below the local overflow level.

In instances where the 5-year storm PWWF flow exceeded the available system storage, additional system solutions such as wet weather management, system storage, and/or additional SPS capacity upgrades were incorporated into the servicing solution. The most efficient solution to manage capacity and flow reduction was determined through the assessment of calculated flows from the 2051 design allowance PWWF and modelled 5-year storm PWWF against the operational firm capacity of the station and system storage.

Table 1.8 SPS Hybrid Performance Evaluation and Upgrade Framework

Case	2051 Design PWWF	2051 5 Year Storm PWWF	2051 5-Year Storm Storage Need	Preferred Solution	Upgrade Priority	Flow Monitoring Priority
Case 1	> Firm Capacity	> Firm Capacity	> Available Storage	Upgrade pumps to future design allowance flow with potential storage upgrades or wet weather management	High	Medium
Case 2	< Firm Capacity	> Firm Capacity	> Available Storage	Upgrade storage and/or wet weather management	High	High
Case 3	> Firm Capacity	> Firm Capacity	< Available Storage	Potential upgrade to design allowance flow and/or wet weather management	Medium	High
Case 4	< Firm Capacity	> Firm Capacity	< Available Storage	Potential wet weather management	Low	Medium
Case 5	> Firm Capacity	< Firm Capacity	< Available Storage	No upgrade, use actual peak flows	N/A	Low
Case 6	< Firm Capacity	< Firm Capacity	< Available Storage	No upgrade	N/A	Low

5.2 Wastewater System Recommendations Overview

The wastewater systems across the Region are impacted not only by growth but through wet weather responses in the systems compromising infrastructure capacity.

When reviewing wastewater system servicing alternatives, 4 typical strategies were considered for all systems:

- Capacity Upgrades: Wastewater Treatment Plant (WWTP), Sewage Pumping Station (SPS), Trunk Sewer
- Upstream Management: Storage, Peak Shaving, Diversion
- Peak Flow Management: Flow Reduction, RDII Removal
- Hybrid Solution

5.2.1 Baker Road Wastewater Treatment Plant Service Area

The Baker Road wastewater system services the areas of Grimsby, Lincoln, and the urban area of Smithville in West Lincoln. This service area is anticipated to see a large amount of growth. The preferred wastewater servicing strategy for the Baker Road WWTP system is presented in **Figure 1.10**.

- Based on the anticipated growth in the service area, the Baker Wastewater Treatment Plant will require additional treatment capacity prior to 2051.
- The projected growth and wet weather flow needs across much of the service area has triggered many sewage pumping station upgrades.
- Significant growth is expected from the Smithville Master Community Plan (MCP) through an urban boundary expansion. The population is expected to more than triple by 2051.
    - Infrastructure supporting the lands within the urban boundary expansion area are anticipated to be built by developers and have not been included in the capital program. Refer to the Water and Wastewater Servicing Plan for the Smithville MCP for further details.
    - The level of growth in the Smithville area will require upgrades to the sewage pumping stations and forcemains. The Smithville SPS forcemain and downstream gravity sewers will require upgrades, and due to corridor capacity constraints downstream in Grimsby, an EA is proposed to determine the appropriate alignment to accommodate the forcemain upgrades.
- A key strategy for the Baker Road WWTP system is to provide wet weather management across the system to manage growth capacity interim to infrastructure upgrades and for long-term system sustainability as identified in the latest PPCP. This will require Regional solutions as well as local municipality solutions.

5.2.2 Port Dalhousie Wastewater Treatment Plant Service Area

The Port Dalhousie wastewater system services the western part of both the City of St. Catharines and the City of Thorold. The preferred wastewater servicing strategy for the Port Dalhousie WWTP system is presented in **Figure 1.11**.

- While infrastructure capacity upgrades were considered, the recommended solution for the Port Dalhousie WWTP system is to provide wet weather management across the system at a rate that manages growth related impacts. This will require Regional solutions as well as local municipal solutions.
- An upgrade at the Beaverdams SPS and forcemain was identified to support growth in the area.
- With the implementation of the wet weather management program, the Port Dalhousie Wastewater Treatment Plant will have sufficient capacity to meet growth to year 2051.

5.2.3 Port Weller Wastewater Treatment Plant Service Area

The Port Weller wastewater system currently services the eastern part of St. Catharines, the eastern part of Thorold North, Thorold South, Glendale, and the Niagara District Airport. The preferred wastewater servicing strategy for the Port Weller WWTP system is presented in **Figure 1.12**.

- The Port Weller Wastewater Treatment Plant has sufficient capacity to support growth to year 2051 and beyond.
- The projected growth will require pumping station expansions to the Spring Gardens SPS and forcemain and the Haulage Road SPS and forcemain.
- A key strategy for the Port Weller system is to provide wet weather management across the system. This will require Regional solutions as well as local municipality solutions.
- The preferred servicing for the Thorold South projects including the Peel SPS, Black Horse SPS and Centre Street SPS are governed by the South Niagara Falls Wastewater Solutions Schedule 'C' Class Environmental Assessment
    - The strategy consists of the redirection of the Thorold South pump stations to pump to a trunk sewer connecting Thorold South to the South Niagara Falls system instead of to the Port Weller WWTP, which will provide the Port Weller trunk sewer and WWTP additional capacity to address existing capacity restrictions and to support growth.
    - The reconfiguration of Thorold South to the new Niagara Falls trunk sewer consists of
        - A new forcemain from Peel Street SPS to a new Black Horse SPS, and some upgrades at the Peel Street SPS to facilitate the new forcemain
        - A new, upgraded Black Horse SPS and forcemain to the new trunk sewer; and
        - Centre Street SPS will maintain the current configuration pumping into the Black Horse SPS catchment

5.2.4 Niagara-On-The-Lake Wastewater Treatment Plant Service Area

The Niagara-on-the-Lake wastewater system services the Old Town and Virgil areas of the Town of Niagara-on-the-Lake. The preferred wastewater servicing strategy for the Niagara-on-the-Lake WWTP system is presented in **Figure 1.13**.

- The Niagara-on-the-Lake Wastewater Treatment Plant has sufficient capacity to support growth to year 2051 and beyond.
- The projected growth will require pumping station expansions to Lakeshore Road SPS, Line 2 SPS, Front Street SPS.
- A key strategy for the Niagara-on-the-Lake system is to provide wet weather management across the system. This will require Regional solutions as well as local

municipality solutions. Further, it is expected that the Town's planned PPCP update will further identify catchments and strategies for inflow and infiltration reduction and other wet weather management solutions.

5.2.5 Queenston Wastewater Treatment Plant Service Area

The Queenston wastewater system services the Community of Queenston in Niagara-on-the-Lake. The preferred wastewater servicing strategy for the Queenston WWTP system is presented in **Figure 1.14**.

- The Queenston wastewater system is a small system in Niagara-on-the-Lake. There is not much growth projected and the system has capacity to support its needs. However, from a lifecycle perspective, it can be inefficient to operate small independent systems.
- The South Niagara Falls wastewater strategy presents opportunities for adjacent systems. On this basis, it is recommended to include the redirection of the Queenston flows to Niagara Falls via a new SPS and forcemain to the St. David's #1 SPS catchment, upgrades to the St David's #1 and #2 SPS and forcemains and decommissioning the Queenston WWTP.
- The proposed works or a more suitable recommended option from the ongoing Queenston – St. David's Wastewater Servicing Strategy EA are to prevail over the 2021 MSPU recommendations for the Queenston wastewater system, when the Queenston EA study results are approved and filed in 2023.

5.2.6 Niagara Falls Wastewater Treatment Plant Service Area

The Niagara Falls wastewater system services the City of Niagara Falls, and the St. David's area of the Town of Niagara-on-the-Lake. The preferred wastewater servicing strategy for the Niagara Falls WWTP system is presented in **Figure 1.15**.

- Several of the strategies for the Niagara Falls WWTP service area are governed by the following environmental assessments:
    - South Niagara Falls Wastewater Solutions Schedule 'C' Class EA was completed in 2022
    - Queenston – St. David's Wastewater Servicing Strategy EA, which is ongoing

Niagara Falls Strategy

- Without the implementation of the South Niagara Falls strategy, the current rated average daily flow capacity of the Niagara Falls WWTP is 68.3 MLD, with an existing flow of 39.9 MLD and a projected 2051 average daily flow of 61.6 MLD, which exceeds 90% of the wastewater treatment plant rated capacity. The projected post-2051 flow is 71.2 MLD, which would exceed the wastewater treatment plant rated capacity. The South Niagara Falls Wastewater Treatment Plant will reduce the 2051 flows to the existing

Niagara Falls WWTP to 33.0 MLD and the post-2051 flow to 34.6 MLD. As such, the existing plant has surplus capacity and will not reach 80% capacity within the 2051 time horizon.

- The projected growth will require pumping station expansions to Bender Hill SPS, Central SPS, Lundy's Lane SPS, Royal Manor SPS, and Dorchester Road SPS and forcemain.

South Niagara Falls

- The evaluation of alternatives for the South Niagara Falls plant location, trunk and forcemain alignment, and new SPS locations were all completed as a part of the South Niagara Falls Wastewater Solutions Schedule 'C' Class EA, which includes the following projects:
    - New South Niagara Falls WWTP
    - New WWTP Outfall
    - New tunneled trunk sewer from South Side Low Lift SPS to new WWTP
    - New shallow trunk sewer to Thorold South
    - New trunk sewer to eliminate CSO overflow upstream of the South Side Low Lift SPS
    - New Black Horse SPS and new upgraded forcemain and alignment
    - New Peel Street SPS forcemain and alignment
    - Decommission South Side High Lift SPS, Grass Brook SPS and Garner Road SPS, all to be replace by gravity connections to the new trunk system
    - Inflow and infiltration reduction in South Niagara Falls and Thorold South
- The Chippawa trunk sewer (new strategy identified in this 2021 MSPU) is recommended as the preferred alternative compared to the future upgrade/rehabilitation of the South Side Low Lift SPS and forcemain. In addition to servicing the South Side Low Lift SPS catchment, a tunneled trunk will also provide servicing flexibility for lands to the southeast of the new WWTP.
    - The trunk sewer is proposed in two phases:
        - Phase 1 is a tunneled trunk sewer from west of Lyons Creek (waterbody) to the new South Niagara Falls WWTP
        - Phase 2 is a tunneled trunk sewer from the South side Low Lift SPS to west of Lyons Creek (waterbody)
    - A Schedule B EA will be required to confirm the alignment of the trunk sewer with various water body crossings

St. David's and Queenston

- The South Niagara Falls wastewater strategy presents opportunities for the Niagara Falls WWTP system as a result of reduced flows to the Niagara Falls WWTP. On this basis, it is recommended to include the redirection of the Queenston flows to Niagara Falls WWTP

via a new SPS and forcemain to the St. David's #1 SPS catchment, upgrades to the St David's #1 and #2 SPS and forcemains and decommissioning the Queenston WWTP.

- The proposed works or a more suitable recommended option from the ongoing Queenston – St. David's Wastewater Servicing Strategy EA are to prevail over the 2021 MSPU recommendations for the Queenston wastewater system, when the Queenston EA study results are approved and filed in 2023.
- In the event that the Queenston WWTP is not re-directed to the Niagara Falls WWTP catchment, the upgrades to the St. David's #1 SPS and St. David's #2 SPS and supporting forcemains are still required to service growth.

System-wide

- A key strategy for the Niagara Falls system is to provide wet weather management across the system. This will require Regional solutions as well as local municipality solutions. Further, it is expected that the City of Niagara Falls' planned Master Plan and Wet Weather Management Study and the Town of Niagara-on-the-Lake's planned PPCP will further identify catchments and strategies for inflow and infiltration reduction and other wet weather management solutions.

5.2.7 Stevensville Douglastown Lagoons Service Area

The Stevensville Douglastown wastewater system services the areas of Stevensville and Douglastown in northern part of the Town of Fort Erie. The preferred wastewater servicing strategy for the Stevensville Douglastown WWTP system is presented in **Figure 1.16**.

- Based on the level of growth expected in the service area, the Stevensville Douglastown Lagoons will require additional treatment capacity. A Long-Term Servicing Strategy Study is recommended to assess wastewater treatment options for the Fort Erie area, which would include reviewing potential options, such as:
    - Maintain or expand the existing treatment lagoons
    - Decommission the Stevensville Douglastown Lagoons by replacing the Lagoons with a new SPS and forcemain to convey flows to either the Anger Avenue WWTP or new South Niagara Falls WWTP
- The projected growth will require pumping station expansions at both Stevensville SPS and Douglastown SPS.
- A key strategy for the Stevensville Douglastown system is to provide wet weather management through both catchments as identified in the Town's latest PPCP. This will require Regional solutions as well as local municipality solutions.

5.2.8 Anger Avenue Wastewater Treatment Plant Service Area

The Anger Avenue wastewater system services the eastern part of the Town of Fort Erie. The preferred wastewater servicing strategy for the Anger Avenue WWTP system is presented in **Figure 1.17**.

- The Anger Avenue Wastewater Treatment Plant has sufficient capacity to support growth to year 2051. The post-2051 flows are expected to exceed the 80% capacity. However, a Long-Term Servicing Strategy Study is recommended to assess wastewater treatment options for the Fort Erie area, which would include reviewing potential options, such as:
    - Assessing the viability of decommissioning the Crystal Beach WWTP and conveying Crystal Beach system flows to the Anger Ave WWTP service area via a new SPS and forcemain.
    - Assessing options to decommission the Stevensville Douglastown Lagoons by replacing the Lagoons with a new SPS and forcemain to convey flows to either the Anger Avenue WWTP or new South Niagara Falls WWTP.
    - Perform a capacity assessment of the Anger Avenue WWTP based on the preferred servicing strategy for Crystal Beach and Stevensville Douglastown areas.
- Several large residential and employment growth areas have been identified outside the existing serviced area. A local servicing strategy was identified in the Bridgeburg Wastewater Servicing Strategy; however, it will be implemented by developers and the to be determined solutions were not carried forward into the Region's capital program.
- The projected growth will require pumping station expansions at Alliston SPS and forcemain, Lakeshore SPS and forcemain, Catherine Street SPS and Thompson SPS.
- A key strategy for the Anger Avenue system is to provide aggressive wet weather management throughout the whole system as identified in the Town's latest PPCP. This will require Regional solutions as well as local municipality solutions.

5.2.9 Crystal Beach Wastewater Treatment Plant Service Area

The Crystal Beach wastewater system services the southwestern part of the Town of Fort Erie. The preferred strategy for the Crystal Beach WWTP system is presented in **Figure 1.18**.

- The Crystal Beach Wastewater Treatment Plant has sufficient capacity to support growth to year 2051; however, due to the age and condition of the plant, a Long-Term Servicing Strategy Study is recommended to assess wastewater treatment options for the Fort Erie area, which would include reviewing potential options, such as:
    - Maintain and rehabilitate the existing Crystal Beach WWTP
    - Replace the Crystal Beach WWTP at a new location
    - Convey Crystal Beach system flows to the Anger Ave WWTP service area via a new SPS and forcemain

- The existing system deficiencies and projected growth will require pumping station upgrades to Nigh Road SPS and Shirley SPS.
- A key strategy for the Crystal Beach system is to provide wet weather management in the Nigh Road SPS and Crystal Beach WWTP catchments, which were also identified as moderate priority areas in the Town's latest PPCP. This will require Regional solutions as well as local municipality solutions.

5.2.10 Seaway Wastewater Treatment Plant Service Area

The Seaway wastewater system services the City of Port Colborne. The preferred wastewater servicing strategy for the Seaway WWTP system is presented in **Figure 1.19**.

- The Seaway Wastewater Treatment Plant has sufficient capacity to support growth to year 2051. The post-2051 flows are expected to exceed the 80% capacity, at which time a potential upgrade study may be triggered.
- The projected growth will require pumping station expansions to Oxford SPS, Steele SPS, Union SPS and Omer SPS.
- A key strategy for the Seaway system is to provide wet weather management across the system. This will require Regional solutions as well as local municipality solutions including improving the system understanding through flow monitoring data collection. It is expected that the City of Port Colborne's planned PPCP update will further identify catchments and strategies for inflow and infiltration reduction and other wet weather management solutions.

5.2.11 Welland Wastewater Treatment Plant Service Area

The Welland wastewater system services the City of Welland, Town of Pelham, and the Port Robinson area of City of Thorold. The preferred wastewater servicing strategy for the Welland WWTP system is presented in **Figure 1.20**.

- The Welland Wastewater Treatment Plant has sufficient capacity to support growth to year 2051, however the projected 2051 flows will pass the 80% capacity around 2041, at which time a study may be triggered. Although the plant rated capacity is sufficient, it has been identified that significant sustainability upgrades are required to maintain the capacity and support future growth.
- A key strategy for the Welland system is to provide wet weather management across the system to support growth as identified in the latest PPCP. This will require Regional solutions as well as local municipality solutions, especially in the City of Welland.
- The existing system deficiencies and projected growth will require pumping station expansions to Foss Road SPS and forcemain, Towpath Road SPS and forcemain, Dain City SPS, Hurricane Road SPS.
- The Quaker Road trunk sewer will provide servicing flexibility for Pelham growth flows.

5.3 Wet Weather Management Strategy

As in the 2016 MSPU, a significant and critical element of this 2021 MSPU servicing strategy is implementation of a wet weather management program across the Local Municipalities.

The Niagara wastewater systems are a mix of separated and combined sewer systems. Each system is experiencing varying levels of impact during wet weather conditions. Climate change continues to create changing weather conditions and the wastewater systems are experiencing in most cases high peak flows under rainfall events. Providing infrastructure capacity for the peak flow events would require significant upgrades not only for local sewers, but also trunk sewers, pumping stations and ultimately the treatment plants. It is not economically feasible to continue building larger infrastructure to accommodate these peak flows consisting mostly of rain water, known as inflow and infiltration (I/I). There is opportunity to consider a balance of infrastructure upgrades with other strategies to remove the I/I to save costs, optimize treatment capacity, optimize operation and maintenance practices, and manage staff resources.

The wet weather management program in the 2021 MSPU has been updated to reflect the Regional and Local Area Municipalities efforts to better identify and quantify existing wet weather flows and to address high priority areas. The updated program identifies targeted areas and amounts of inflow and infiltration reduction intended to deal with existing capacity constraints as well as provide for growth related capacity without or minimizing expanding/upgrading existing infrastructure.

The wet weather program in the 2021 MSPU currently identifies overall preliminary priority, staging of location and target amount of inflow and infiltration reduction across all systems. This program provides for a proactive and targeted approach to addressing wet weather impacts.

5.4 Wastewater Servicing Strategy Growth-Related Capital Program Summary

The above noted growth-related recommendations for each Service Area and System are consolidated for the overall Niagara Region Wastewater Servicing Strategy Growth-Related Capital Program.

The wastewater capital program addresses the infrastructure requirements to meet growth out to year 2051, based on the best available planning information at the time of analysis for the 2021 MSPU. The analysis of infrastructure impacts under the forecasted 2051 planning horizon presented the need for an enhanced wet weather management program, additional Region-wide project components (such as odour control, ECA requirements, flow monitoring and data gathering), and additional new projects to service the new growth areas compared to the previous 2016 MSPU program. This 2021 MSPU also incorporated the detailed project components and costing developed for the South Niagara Falls Wastewater Solutions program. In addition, the 2021 MSPU process has provided an opportunity to update the costing methodology resulting in updated and increased cost estimates for some projects identified in the previous 2016 MSPU.

A summary of the Wastewater Servicing Strategy Capital Program is provided in the following **Table 1.9**. A detailed breakdown of each project along with strategy mapping is provided in **Section 8**.

Table 1.9 Wastewater Growth-Related Capital Program Summary

Development Charges Program

	2022 - 2031	2032 - 2041	2042 - 2051	Total
WW Treatment Plants	$208,275,000	$123,895,000	$0	$332,170,000
WW Pumping Stations	$158,574,000	$38,674,000	$0	$197,248,000
WW Linear	$292,800,000	$95,105,000	$0	$387,905,000
Wet Weather Program	$75,000,000	$75,000,000	$75,000,000	$225,000,000
WW Other	$34,500,000	$37,656,000	$34,000,000	$106,156,000
Additional Studies	$17,250,000	$1,750,000	$1,750,000	$20,750,000
Total	**$786,399,000**	**$372,080,000**	**$110,750,000**	**$1,269,229,000**

100% Sustainability / Benefit to Existing Program

	2022 - 2031	2032 - 2041	2042 - 2051	Total
WW Treatment Plants	-	$200,000,000	-	$200,000,000
WW Pumping Stations	$4,189,000	-	-	$4,189,000
Total	**$4,189,000**	**$200,000,000**	**$0**	**$204,189,000**

100% Post 2051 Program

			Post 2051	Total
Total	**-**	**-**	**$0**	**$0**

Total Growth Related Program

	2022 - 2031	2032 - 2041	2042 - 2051	Post 2051	Total
Total	**$790,588,000**	**$572,080,000**	**$110,750,000**	**$0**	**$1,473,418,000**

6 Integration with the Sustainability Capital Plan

It is important to recognize that the 2021 MSPU servicing strategies identify new infrastructure to service the additional growth out to year 2051 but these strategies are built by extending infrastructure from the existing systems and leveraging the existing Region infrastructure in place. It is essential that the existing infrastructure is maintained in good condition and performance to support servicing growth.

The Region continually establishes and implements a sustainability program that addresses priority projects to ensure the existing infrastructure is in a state-of-good-repair and continues to perform and meet the intended level of services.

Independent of the 2021 MSPU, the Region has completed a sustainability program analysis to identify the projects on a yearly basis, with focus on a 10 year program, to address the sustainability needs. This Sustainability Capital Plan is first developed to demonstrate the total investment needs and may identify a level of investment and implementation exceeding Region resources. The next steps for the Sustainability Capital Plan will be the development of the Financial Plan for existing Water and Wastewater assets which is anticipated to be completed in 2024. It should be noted that the Sustainability Capital Plan represents investment required over and above the growth-related 2021 MSPU program.

The 2021 MSPU undertook a process to review the Sustainability Program in conjunction with the growth-related program to eliminate duplicate projects and to align the timing of both growth and sustainability needs where appropriate in order to create efficiencies. This review was focused on the Sustainability Program for the next 10 years with the best information available at the time of this study.

The review process for integration of the MSPU program and the sustainability program was essential to demonstrate several key findings:

- There is opportunity to align growth and sustainability projects to bring efficiencies in costs and delivery;
- When planning and costing new infrastructure, lifecycle principles and costs must be considered. Existing and future infrastructure will have future service life replacements (i.e., pumps, electrical, roof, security upgrades at varying intervals from 5 – 40 years);
- Without maintenance of the existing infrastructure in a state of good repair and performance, there is risk that the growth-related program may not achieve desired capacities, timing, or level of service;
- There is also risk that implementing the growth-related program could have a negative impact on the level of service within the existing systems for the existing users; and,

- There are some major projects already considered under the sustainability program that are essential to the growth-related program such as the Welland WTP and WWTP.

Review of the needs based Sustainability Capital Plan for the next ten (10) years developed by the Region demonstrates a potential investment on average of $150M per year. When the Sustainability Capital Plan is integrated with the growth-related Water and Wastewater Capital Plans, the total investment approaches nearly $3B. The integrated potential 10-year program is shown in **Table 1.10**.

Table 1.10 Potential Growth-Related and Sustainability Program Summary

	DC Program Growth-Related Projects (2022 – 2031)	2021 MSPU 100% Sustainability/BTE Projects (2022 – 2031)	Additional Sustainability Projects (2022-2031)	Potential Integrated 10-Year Program (2022 – 2031)
Water	$463,010,000	$160,100,000	$487,237,000	**$1,110,347,000**
Wastewater	$786,399,000	$4,189,000	$1,048,099,500	**$1,838,687,500**
Total	**$1,249,409,000**	**$164,289,000**	**$1,535,336,500**	**$2,949,034,500**

This level of potential investment will require significant resourcing, implementation, and financial planning to establish a viable capital program to meet growth-related and sustainability requirements.

7 Key Considerations for Implementation

The next steps post filing of the Niagara Region 2021 MSPU will require a wide range of tasks. Some projects will require further study, some are ready to move to detailed design and construction. A capital program of this magnitude will require significant effort and resources of the Region team, Local Municipal teams, consultant, and contractor teams. The new infrastructure will need to perform at anticipated levels of service as well as not negatively impact existing levels of service across the existing systems. With this in mind, there are a number of key considerations for Implementation of the 2021 MSPU as listed, and not limited to, below:

- Servicing strategies are based on maintaining appropriate levels of service throughout the systems.
- Investment is needed to support operations, maintenance, staff, and other resources.
- With new growth-related and sustainability projects will come an increase in resourcing requirements to deliver the programs.
- The development community must similarly commit to appropriate levels of service and construction practices to support the capacity goals for growth and ensure that additional extraneous flows are not added to the system within new developments.
- Many projects in the 2021 MSPU will require future studies to refine the recommendations and address Class EA requirements. For some projects, Class EA studies are already underway and will update the strategies shown in this document (i.e., Queenston WWTP).
- Expanded urban areas will require development of servicing strategies, extension of local servicing, and new local infrastructure (in some cases including local wastewater pumping stations).
- 2021 MSPU cost estimates represent conceptual level estimating which is typically represented as +/- 50% accuracy. We continue to see significant fluctuations in project costs related to volatile market conditions, supply chain issues, and other variables. It is difficult to predict future costs, however, best available information has been used under the 2021 MSPU to develop the conceptual level, Estimate Class 3/4, cost estimates.

8 Water and Wastewater Servicing Strategy Capital Program Detailed Information

Detailed information for each project is provided for the water capital program in **Table 1.11** and for the wastewater capital program in **Table 1.12**. The water capital program figures are presented in **Figure 1.5** to **Figure 1.9**, and the wastewater capital program figures are presented in **Figure 1.10** to **Figure 1.20**.

Table 1.11 Water Capital Program

Master Plan ID	Name	Description	Size / Capacity	Year in Service	Municipality	Class EA Schedule	Class EA Status	Project Type	Total Component Estimated Cost
W-D-001	Decommissioning of Central Ave (Fort Erie South) ET	New Fort Erie ET to replace the Central Ave ET and Stevensville Reservoir; Central Ave ET to be decommissioned	N/A	2027-2031	Fort Erie	A+	N/A	Storage	$823,000
W-D-002	Decommissioning of Stevensville Res + PS	New Fort Erie ET to replace the Central Ave ET and Stevensville Reservoir; Stevensville Reservoir and Pumping Station to be decommissioned	N/A	2027-2031	Fort Erie	A+	N/A	Storage	$1,611,000
W-D-003	Decommissioning of Park Road Res + PS	Decommissioning of Park Road Reservoir and Pumping Station, to be replaced by new Grimsby Reservoir and additional pumping capacity at the WTP. To be completed after completion of W-M-005.	N/A	2027-2031	Grimsby	A+	N/A	Storage	$1,611,000
W-D-004	Decommissioning of Lundy's Lane ET	Lundy's Lane ET to be decommissioned and replaced by new South Niagara Falls ET	N/A	2027-2031	Niagara Falls	A+	N/A	Storage	$823,000
W-D-005	Decommissioning of Pelham ET	Decommissioning of existing Pelham ET, to be replaced by a new ET	N/A	2027-2031	Pelham	A+	N/A	Storage	$1,290,000
W-D-007	Decommissioning of Fielden Ave Res + PS	Decommissioning of Fielden Avenue Reservoir and Pumping Station	N/A	2027-2031	Port Colborne	A+	N/A	Storage	$1,611,000
W-D-008	Decommissioning of Bemis Elevated Tank	Decommissioning of Bemis Elevated Tank to be replaced with a new elevated tank	N/A	2027-2031	Welland	A+	N/A	Storage	$823,000
W-D-009	Decommissioning of one Shoalt's Reservoir Cell	Decommissioning of one Shoalt's Reservoir Cell. Placeholder project - to be confirmed through Bemis Elevated Tank Environmental Assessment	N/A	2032-2041	Welland	A+	N/A	Storage	$512,000
W-D-010	Decommissioning of Smithville ET	Decommissioning of existing Smithville ET, to be replaced by a new ET	N/A	2042-2051	West Lincoln	A+	N/A	Storage	$1,290,000
W-D-012	Decommissioning of Thorold South ET	Decommissioning of existing Thorold South ET, to be replaced by a new ET	N/A	2032-2041	Thorold	A+	N/A	Storage	$1,290,000
W-F-001	Grimsby WTP Expansion	Provide an additional 22 MLD treatment	22 MLD	2022-2026	Grimsby	C	Ongoing	Treatment	$73,904,000
W-F-003	Welland WTP Replacement	Replacement of existing Welland WTP with 73 MLD in approximately same location.	73 MLD	2027-2031	Welland	B	Satisfied	Treatment	$160,000,000
W-M-001	New trunk main in Central Fort Erie	New trunk main in Central Fort Erie	450 mm	2022-2026	Fort Erie	A+	N/A	Watermain	$12,299,000
W-M-002	New trunk main to Port Colborne East side	New trunk main to East side of Port Colborne across canal	450 mm	2027-2031	Port Colborne	A+	N/A	Watermain	$12,251,000

Master Plan ID	Name	Description	Size / Capacity	Year in Service	Municipality	Class EA Schedule	Class EA Status	Project Type	Total Component Estimated Cost
W-M-004	Upgrade trunk main from Grimsby WTP to Park Road (Partially Completed)	Upgrade trunk main from Grimsby WTP to Park Road. Partially completed. Alignment to be completed is the section from Baker Road to Park Road.	750 mm	2022-2026	Grimsby	A+	N/A	Watermain	$6,157,000
W-M-005	New dedicated feedermain from Grimsby WTP to New Grimsby Reservoir	New trunk main from Grimsby WTP to New Grimsby Reservoir	750 mm	2022-2026	Grimsby	B	Ongoing	Watermain	$54,668,000
W-M-006	New trunk main in Smithville (Phase 1)	New trunk main in Smithville (Phase 1 currently in design)	400 mm	2022-2026	West Lincoln	A+	Satisfied (Smithville Community Master Plan)	Watermain	$6,563,000
W-M-007	New trunk main from PRV to Port Robinson Chlorine BPS in Niagara Falls	New trunk main from PRV to Port Robinson Chlorine BPS in Niagara Falls	450 mm	2022-2026	Niagara Falls	A+	N/A	Watermain	$4,040,000
W-M-008	Secondary feed to Virgil ET (NOTL)	Trunk main from South NOTL to Virgil ET with PRV in NOTL to supply DeCew system from Niagara Falls system. Preliminary proposed alignment along Four Mile Creek.	600 mm	2032-2041	Niagara-on-the-Lake	A+	N/A	Watermain	$15,020,000
W-M-009	New Niagara Falls South trunk main to New Elevated Tank	New Niagara Falls South trunk main to provide additional supply to new growth areas. Placeholder project - subject to change based on preferred elevated tank location which is to be confirmed through the corresponding elevated tank EA	750 mm	2022-2026	Niagara Falls	A+	N/A	Watermain	$5,466,000
W-M-013	New trunk watermain from Grimsby to Lincoln	New trunk watermain from new Grimsby Reservoir to Hixon Reservoir in Lincoln. Preliminary alignment along Park Road, Elm Tree Road, Walker Road, Philp Road, Mountain Road, Edelheim Road. Alignment subject to change through Schedule B EA.	600 mm	2032-2041	Lincoln	B	Separate EA Required	Watermain	$32,080,000
W-M-014	New trunk main in southwest Welland	New trunk main on Humberstone Road and Prince Charles Drive. Allows for secondary connection for Dain City (significant projected growth) and closes the Region's trunk main loop across the canal. Include for coordination on potential Regional interconnection with City's planned new watermain on Canal Bank Street.	600 mm	2027-2031	Welland	A+	N/A	Watermain	$8,867,000
W-M-015	New trunk main in northwest Welland	New trunk main in northwest Welland to service growth areas. Watermain on Merritt Road and Merrittville Highway	450 mm	2032-2041	Welland	A+	N/A	Watermain	$6,520,000

Master Plan ID	Name	Description	Size / Capacity	Year in Service	Municipality	Class EA Schedule	Class EA Status	Project Type	Total Component Estimated Cost
W-M-016	Fourth Ave Watermain Twinning	Fourth Avenue watermain twinning from St. Catharines to Vineland to address security of supply to Vineland. Preliminary alignment along Fourth Avenue, Nineteenth Street, and along King Street. Alignment subject to change through Schedule B EA.	450 mm	2042-2051	Lincoln	B	Separate EA Required	Watermain	$19,187,000
W-M-017	New trunk main from Welland WTP to North	New trunk main from Welland WTP to North service area. Preliminary alignment along Ross Street, McMaster Avenue, Major Street, Atlas Avenue, Brown Road, Woodlawn Road	450 mm	2032-2041	Welland	A+	N/A	Watermain	$9,346,000
W-M-018	New trunk main in Smithville (Phase 2)	New trunk main in Smithville (Phase 2, further details to be provided through the Smithville Community Master Plan, alignment subject to change)	400 mm	2032-2041	West Lincoln	B	Satisfied (Smithville Community Master Plan)	Watermain	$14,382,000
W-M-019	New Niagara Falls South trunk main from Dorchester Road to Lyon's Creek Road	New Niagara Falls South trunk main to provide additional supply to new growth areas (W-M-009, W-M-019, W-M-020, W-M-021 form the loop). Preliminary alignment along Dorchester Road, across the Welland River, through South NF WWTP property, and Dell Road. Preferred alignment to be determined through EA process and depends on ET location.	600 mm	2032-2041	Niagara Falls	B	Separate EA Required	Watermain	$24,950,000
W-M-020	New Niagara Falls South trunk main along Lyon's Creek Road	New Niagara Falls South trunk main to provide additional supply to new growth areas (W-M-009, W-M-019, W-M-020, W-M-021 form the loop). Preliminary alignment along Lyon's Creek Road from Dell Road to Stanley Avenue. Preferred alignment to be determined through EA process and depends on ET location.	600 mm	2042-2051	Niagara Falls	B	Separate EA Required	Watermain	$6,982,000
W-M-021	New Niagara Falls South trunk main along Stanley Avenue	New Niagara Falls South trunk main to provide additional supply to new growth areas (W-M-009, W-M-019, W-M-020, W-M-021 form the loop). Preliminary alignment along Stanley Avenue from Lyon's Creek Road to existing Region 1050 mm watermain approximately 700 m south of Marineland Parkway. Preferred alignment to be determined through EA process and depends on ET location.	600 mm	2032-2041	Niagara Falls	B	Separate EA Required	Watermain	$16,048,000
W-M-022	New trunk main from DeCew WTP to Townline Road East in Thorold	New trunk main from DeCew WTP to Townline Road East in Thorold. Provides security of supply for City of Thorold through a secondary watermain feed. Routing and need for the project to be determined through ongoing EA.	750 mm	2022-2026	Thorold	B	Ongoing	Watermain	$62,270,000

Master Plan ID	Name	Description	Size / Capacity	Year in Service	Municipality	Class EA Schedule	Class EA Status	Project Type	Total Component Estimated Cost
W-M-023	Twinning of transmission main across the Welland Canal at the Welland WTP	Construction of new 900mm HDPE watermain across Welland Canal to Merritt Street and Aqueduct Street.	900 mm	2022-2026	Welland	A+	N/A	Watermain	$6,848,000
W-M-024	New trunk main on Merritt Street from Aqueduct Street to Niagara Street	New trunk main on Merritt Street from Aqueduct Street to Niagara Street. Part of the Welland canal transmission main twinning project (W-M-023)	600 mm	2022-2026	Welland	A+	N/A	Watermain	$932,000
W-M-025	New trunk main on Niagara Street from Mill Street to Riverbank Street	New trunk main on Niagara Street from Mill Street to Riverbank Street. EA is undergoing with Transportation project to replace Niagara Street bridge over Welland River	600 mm	2022-2026	Welland	A+	N/A	Watermain	$832,000
W-M-026	New dedicated trunk main from Shoalt's HLPS to Pelham ET	New dedicated trunk main from Shoalt's HLPS to the new Pelham elevated tank. Alignment provided by the Region through the Pelham ET EA.	400 mm	2027-2031	Welland	A+	N/A	Watermain	$6,655,000
W-M-027	New trunk main from Pelham ET to Highway 20 and Haist Avenue	New trunk main from Pelham ET to Highway 20 and Haist Avenue. Alignment provided by the Region through the Pelham ET EA.	400 mm	2027-2031	Welland	A+	N/A	Watermain	$4,208,000
W-M-028	New dedicated feedermain from Welland WTP to existing Bemis ET	New dedicated feedermain from Welland WTP to existing Bemis ET. Placeholder project - preferred size and alignment to be determined through the Bemis ET EA.	400 mm	2027-2031	Welland	A+	N/A	Watermain	$4,466,000
W-P-001	Upgrade Shoalt's Drive LLPS	Replace existing 3 MLD low lift pumps with three 20.5 MLD pumps (41 MLD/474 L/s firm capacity to support 2051 required capacity in Welland, total station capacity of 61.5 MLD/712 L/s). Placeholder project - to be confirmed through Bemis Elevated Tank Environmental Assessment	475 L/s	2027-2031	Welland	A	N/A	Pumping	$6,868,000
W-P-002	Upgrade Shoalt's Drive HLPS	Replace all four 5.4 MLD high lift pumps with four 8 MLD pumps (24 MLD/278 L/s firm capacity to support MDD plus MECP fire flow for 2051 and post-2051, total station capacity of 32 MLD/370 L/s)	278 L/s	2027-2031	Welland	A	N/A	Pumping	$6,868,000
W-P-004	Upgrade Smithville Pumping Station	Replace one 4.32 MLD pump with 10.8 MLD pump (firm capacity of 32.4 MLD/375 L/s to support 2051 and post-2051 growth, total station capacity of 36.7 MLD/425 L/s)	300 L/s	2042-2051	West Lincoln	A	N/A	Pumping	$1,716,000

Master Plan ID	Name	Description	Size / Capacity	Year in Service	Municipality	Class EA Schedule	Class EA Status	Project Type	Total Component Estimated Cost
W-P-005	New HLP at Welland to support increased HGL	New separate set of high lift pumps at Welland WTP to support potential increase in hydraulic grade line (same capacity as existing pumps, but increased head). Placeholder project - to be confirmed through Bemis Elevated Tank Environmental Assessment	880 L/s	2027-2031	Welland	A+	N/A	Pumping	$13,620,000
W-P-006	New HLP at Grimsby for dedicated reservoir feed	New separate set of high lift pumps at Grimsby WTP to support dedicated feed to the new Grimsby Reservoir (48 MLD/556 L/s firm capacity to support 2051 MDD for the Grimsby system, total station capacity of 64 MLD/741 L/s).	556 L/s	2022-2026	Grimsby	A+	N/A	Pumping	$12,983,000
W-S-001	New Fort Erie ET	New Fort Erie ET to replace the Central Ave ET and Stevensville Reservoir	9.0 ML	2022-2026	Fort Erie	B	Satisfied	Storage	$20,084,000
W-S-003	New Pelham ET	New Pelham ET to replace existing ET. Assuming property acquisition is required (5% for new site).	6.0 ML	2027-2031	Pelham	B	Satisfied	Storage	$14,313,000
W-S-004	New South Niagara Falls ET	New South Niagara Falls ET to replace the Lundy's Lane ET and provide additional storage. Final preferred location to be determined through the EA process. Preliminary location shown on map. Assuming property acquisition is required (5% for new site).	12.0 ML	2022-2026	Niagara Falls	B	Ongoing	Storage	$27,933,000
W-S-005	New Grimsby Reservoir	New Grimsby Reservoir to provide additional storage – in construction Includes associated connection to existing Park Road facility and associated upgrades to Park Road pump station to support interim operational configuration	15.0 ML	2022-2026	Grimsby	B	Satisfied	Storage	$24,921,000
W-S-006	Hixon Reservoir Expansion	Additional cell at Hixon to support post-2051 growth	5.0 ML	Post-2051	Lincoln	A+	N/A	Storage	$14,380,000
W-S-007	Fifth Avenue Reservoir Expansion	One additional cell to support 2051 and post-2051 growth	4.3 ML	2042-2051	Lincoln	A+	N/A	Storage	$12,542,000
W-S-008	New elevated tank in NOTL	New ET in Virgil to support 2051 growth. Assuming property acquisition is required (5% for new site).	4.5 ML	2042-2051	Niagara-on-the-Lake	B	Separate EA Required	Storage	$10,734,000
W-S-009	Replace Thorold South ET	New larger Thorold South ET to replace existing ET Assuming property acquisition is required (5% for new site).	11.0 ML	2027-2031	Thorold	B	Separate EA Required	Storage	$25,605,000
W-S-010	Replace Smithville Elevated Tank	Replace Smithville Elevated Tank with a larger tank to support 2051 and post-2051 growth. Assuming property acquisition is required (5% for new site).	9.0 ML	2042-2051	West Lincoln	B	Separate EA Required	Storage	$20,950,000

Master Plan ID	Name	Description	Size / Capacity	Year in Service	Municipality	Class EA Schedule	Class EA Status	Project Type	Total Component Estimated Cost
W-S-011	Replace Bemis Elevated Tank	Replace Bemis Elevated Tank - Sizing to be confirmed through Bemis Elevated Tank Environmental Assessment	12.0 ML	2027-2031	Welland	B	Ongoing	Storage	$26,547,000
W-S-012	New Port Colborne Elevated tank	Twin existing Barrick Road ET to support post-2051 growth. Assuming property acquisition is required (5% for new site).	9.0 ML	Post-2051	Port Colborne	B	Separate EA Required	Storage	$20,950,000
W-S-014	In-ground Reservoir Expansion at Niagara Falls WTP	In-ground Reservoir Expansion at Niagara Falls WTP to support post-2051 growth and CT volume requirements. Also provides flexibility to support potential employment development in the QEW corridor. Assuming property acquisition is required (5% for new site).	10.0 ML	Post-2051	Niagara Falls	B	Separate EA Required	Storage	$23,278,000
W-S-015	Grimsby WTP Reservoir Baffle Improvements	Grimsby WTP Reservoir baffle improvements to increase baffle factor, allowing for more usable volume at the WTP. Current baffle factor is 0.3, target to increase to at least 0.5.	-	2022-2026	Grimsby	A	N/A	Storage	$2,500,000
W-S-016	In-ground Reservoir Expansion at DeCew WTP	In-ground Reservoir Expansion at DeCew WTP to support post-2051 growth and CT volume requirements.	5.0 ML	Post-2051	St. Catharines	A+	N/A	Storage	$11,352,000
W-ST-001	Region Wide WTP Reservoir Volume Study	Study to review WTP reservoir CT volume and overall system storage	N/A	2022-2026	Region-Wide	A+	N/A	Storage	$100,000
W-ST-002	Additional Studies	Water Master Servicing Plan and Water Servicing Study	N/A	2022 – 2051	Region-Wide	A+	N/A	N/A	$5,250,000
								Total	**$890,119,000**

Niagara Region

2021 Water and Wastewater Master Servicing Plan Update

Capital Program

- Treatment Plant
- Pumping Station
- Elevated Tank
- Reservoir
- Watermains

Existing Water Infrastructure

- Water Treatment Plant (W.T.P.)
- Pumping Station (P.S.)
- Elevated Tank (E.T.) / Standpipe (S.P.)
- Reservoir (Res)
- Region Mains
- Local Mains
- Private

Other Features

- Municipal Boundary
- Waterbodies
- Urban Area Boundary

Development Locations

- Pre-2051
- Post-2051

***Note that additional growth in existing built areas is anticipated**

***Project alignments are preliminary and will be refined through subsequent projects (EA and/or detailed design)**

Figure 1.5

Grimsby System

Preferred Water Servicing Strategy

BluePlan Engineering

December 2022
620126-W-013
WKID: 26917

Niagara Region

2021 Water and Wastewater Master Servicing Plan Update

Capital Program

- Treatment Plant
- Pumping Station
- Elevated Tank
- Reservoir
- Watermains

Existing Water Infrastructure

- Water Treatment Plant (W.T.P.)
- Pumping Station (P.S.)
- Elevated Tank (E.T.) / Standpipe (S.P.)
- Reservoir (Res)
- Region Mains
- Local Mains
- Private

Other Features

- Municipal Boundary
- Waterbodies
- Urban Area Boundary

Development Locations

- Pre-2051
- Post-2051

***Note that additional growth in existing built areas is anticipated**

***Project alignments are preliminary and will be refined through subsequent projects (EA and/or detailed design)**

Figure 1.6

DeCew Falls System

Preferred Water Servicing Strategy

BluePlan Engineering

December 2022
620126-W-013
WKID: 26917

Niagara Region

2021 Water and Wastewater Master Servicing Plan Update

Capital Program

- Treatment Plant
- Elevated Tank
- Pumping Station
- Reservoir
- Watermains

Existing Water Infrastructure

- Water Treatment Plant (W.T.P.)
- Pumping Station (P.S.)
- Elevated Tank (E.T.) / Standpipe (S.P.)
- Reservoir (Res)
- Region Mains
- Local Mains
- Private

Other Features

- Municipal Boundary
- Waterbodies
- Urban Area Boundary

Development Locations

- Pre-2051
- Post-2051

***Note that additional growth in existing built areas is anticipated**

***Project alignments are preliminary and will be refined through subsequent projects (EA and/or detailed design)**

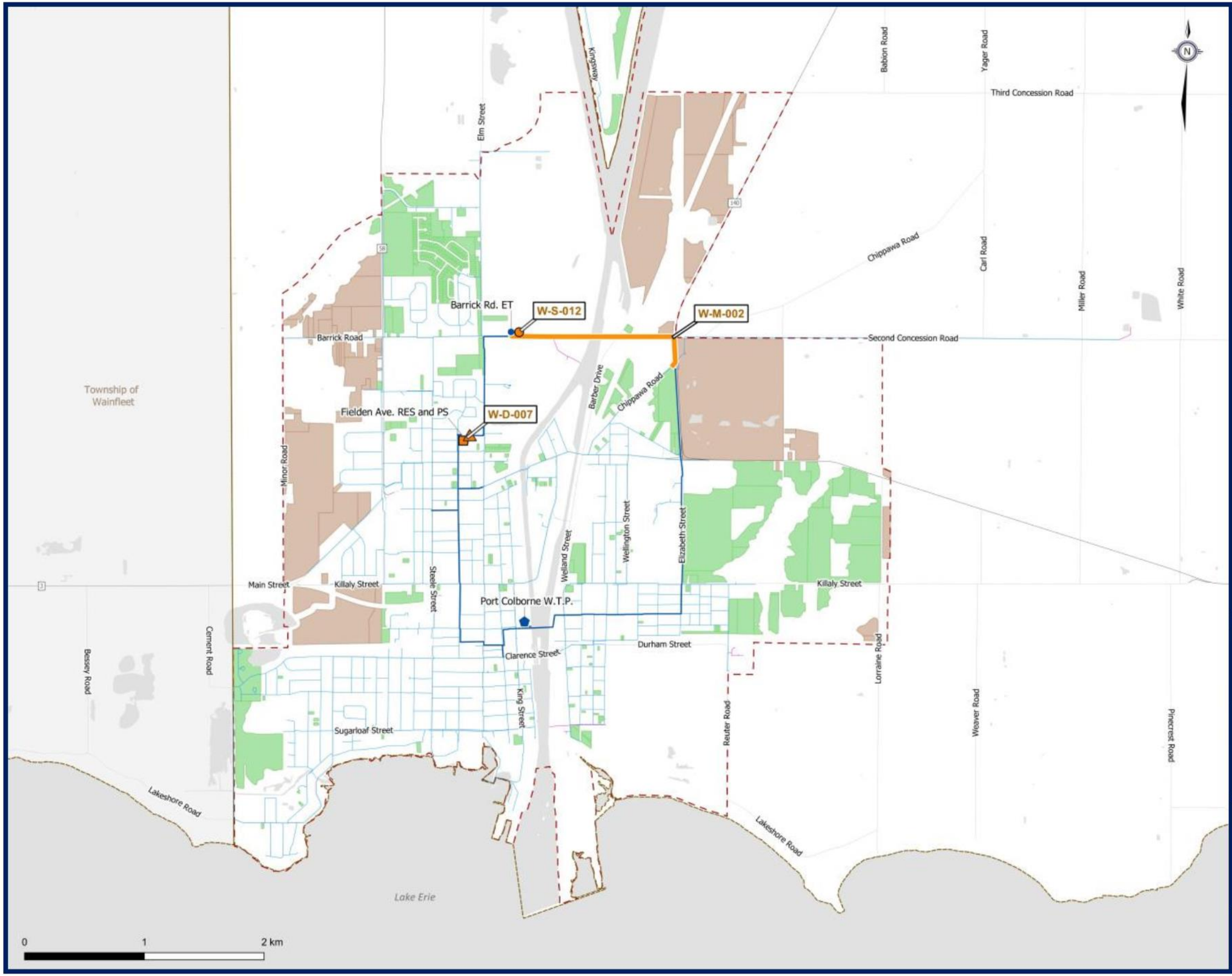
Figure 1.7
Fort Erie
Preferred Water Servicing Strategy

BluePlan Engineering

December 2022
620126-W-013
WKID: 26917

Niagara Region

2021 Water and Wastewater Master Servicing Plan Update



Capital Program

- Treatment Plant
- Elevated Tank
- Pumping Station
- Reservoir
- Watermains

Existing Water Infrastructure

- Water Treatment Plant (W.T.P.)
- Pumping Station (P.S.)
- Elevated Tank (E.T.) / Standpipe (S.P.)
- Reservoir (Res)
- Region Mains
- Local Mains
- Private

Other Features

- Municipal Boundary
- Waterbodies
- Urban Area Boundary

Development Locations

- Pre-2051
- Post-2051

***Note that additional growth in existing built areas is anticipated**

***Project alignments are preliminary and will be refined through subsequent projects (EA and/or detailed design)**

Figure 1.8

Port Colborne

Preferred Water Servicing Strategy

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Capital Program

- Treatment Plant
- Pumping Station
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- Watermains

Existing Water Infrastructure

- Water Treatment Plant (W.T.P.)
- Pumping Station (P.S.)
- Elevated Tank (E.T.) / Standpipe (S.P.)
- Reservoir (Res)
- Region Mains
- Local Mains
- Private

Other Features

- Municipal Boundary
- Waterbodies
- Urban Area Boundary

Development Locations

- Pre-2051
- Post-2051

***Note that additional growth in existing built areas is anticipated**

***Project alignments are preliminary and will be refined through subsequent projects (EA and/or detailed design)**

Figure 1.9
Welland
Preferred Water Servicing Strategy

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Table 1.12 Wastewater Capital Program

Master Plan ID	Name	Description	Size / Capacity	Year in Service	Municipality	Class EA Schedule	Class EA Status	Project Type	Total Component Estimated Cost
WW-D-001	Decommissioning of Queenston WWTP	Decommissioning of Queenston WWTP, to be replaced by new SPS and forcemain to St. David's #1	N/A	2027-2031	Niagara-on-the-Lake	B	To be Satisfied Under Consolidated Queenston Schedule B EA - Separate Study	Treatment	$2,256,000
WW-D-003	Decommissioning of South Side High Lift SPS	Decommissioning of SSHL SPS, to be replaced by gravity trunk sewer to SNF WWTP	N/A	2037-2041	Niagara Falls	A+	To be Satisfied Under Consolidated South NF Schedule C EA - Separate Study	Forcemain	$500,000
WW-D-004	Decommissioning of Garner SPS	Decommissioning of Garner SPS to be replaced by gravity connection to SNF WWTP	N/A	2032-2036	Niagara Falls	A+	To be Satisfied Under Consolidated South NF Schedule C EA - Separate Study	Forcemain	$450,000
WW-D-006	Decommissioning of Grassy Brook SPS	Decommissioning of Grassy Brook SPS to be replaced by gravity connection to SNF WWTP	N/A	2032-2036	Niagara Falls	A+	To be Satisfied Under Consolidated South NF Schedule C EA - Separate Study	Sewer	$450,000
WW-FM-003	Upgrade Foss Road SPS Forcemain	Replace existing 200 mm Foss Road SPS Forcemain with new single 250 mm forcemain in Welland.	250 mm	2027-2031	Pelham	A+	Satisfied	Forcemain	$9,883,000
WW-FM-004	Laurie Avenue SPS Forcemain Upgrade	New 250 mm Laurie Avenue SPS Forcemain Upgrade in Lincoln	250 mm	2022-2026	Lincoln	A+	Satisfied	Forcemain	$2,605,000
WW-FM-005	New Peel Street SPS Forcemain	New 400 mm Peel Street SPS Forcemain in Thorold from station to Black Horse SPS	400 mm	2027-2031	Thorold	B	To be Satisfied Under Consolidated South NF Schedule C EA - Separate Study	Forcemain	$5,062,000
WW-FM-006	New Black Horse Forcemain to Niagara Falls	New Black Horse Forcemain to New South Niagara Falls Trunk on Barron Road to the Montrose Trunk Sewer	400 mm	2027-2031	Thorold	B	To be Satisfied Under Consolidated South NF Schedule C EA - Separate Study	Forcemain	$2,839,000
WW-FM-009	Dorchester Forcemain Upgrade	Replace Existing 350 mm Dorchester SPS Forcemain with new single 500 mm forcemain in Niagara Falls.	500 mm	2027-2031	Niagara Falls	A+	Satisfied	Forcemain	$659,000
WW-FM-010	St. Davids #1 Forcemain Upgrade	Replace existing 200 mm St. Davids #1 Forcemain with new single 400 mm in Niagara-on-the-Lake	400 mm	2027-2031	Niagara-on-the-Lake	A+	To be Satisfied Under Consolidated Queenstown Schedule B EA - Separate Study	Forcemain	$5,803,000
WW-FM-011	Smithville Forcemain Upgrade	Replace existing 400 mm Smithville SPS Forcemain with new single 750 mm forcemain in Smithville.	750 mm	2027-2031	West Lincoln	B	Satisfied	Forcemain	$41,785,000

Master Plan ID	Name	Description	Size / Capacity	Year in Service	Municipality	Class EA Schedule	Class EA Status	Project Type	Total Component Estimated Cost
WW-FM-012	New Queenston Forcemain	New 250 mm Queenston Forcemain into Niagara Falls system	250 mm	2027-2031	Niagara-on-the-Lake	B	To be Satisfied Under Consolidated Queenston Schedule B EA - Separate Study	Forcemain	$12,427,000
WW-FM-013	Lake Street Forcemain Upgrade	Replace existing 445 mm Lake Street SPS Forcemain with new single 600 mm forcemain in Grimsby.	750 mm	2022-2026	Grimsby	A+	Satisfied	Forcemain	$3,454,000
WW-FM-014	Ontario Street Forcemain Upgrade	Replace Existing 534 mm Ontario Street SPS Forcemain with new single 750 mm forcemain in Grimsby.	750 mm	2022-2026	Lincoln	B	Satisfied	Forcemain	$11,408,000
WW-FM-017	New Streamside Forcemain and Outlet	New 200 mm forcemain and alignment	200 mm	2032-2036	West Lincoln	A+	Satisfied	Forcemain	$2,350,000
WW-FM-018	Beaverdams Forcemain Replacement	Replace existing 150 mm Beaverdams SPS forcemain with new single 200 mm in Thorold	200 mm	2022-2026	Thorold	B	Satisfied	Forcemain	$3,660,000
WW-FM-019	Haulage Road Forcemain Upgrade	Upgrade existing 150 mm Haulage Road SPS forcemain with new single 250 mm	250 mm	2037-2041	St. Catharines	A+	Dependent on outcome of wet weather flow study	Forcemain	$4,500,000
WW-FM-022	Commission 600 mm Towpath Road Forcemain	Bring constructed 600 mm Towpath SPS forcemain into service	600 mm	2032-2036	Welland	A+	Satisfied	Forcemain	$250,000
WW-FM-024	St. David's #2 Forcemain Upgrade	Replace existing 250 mm St David's #2 SPS forcemain with new single 400 mm in Niagara Falls	400 mm	2027-2031	Niagara-on-the-Lake	A+	To be Satisfied Under Consolidated Queenstown Schedule B EA - Separate Study	Forcemain	$5,689,000
WW-FM-025	Alliston Road Forcemain Upgrade	Replace existing 250 mm Alliston Road SPS forcemain with new single 300 mm in Fort Erie	350 mm	2027-2031	Fort Erie	A+	Satisfied	Forcemain	$4,233,000
WW-FM-026	Lakeshore Forcemain Replacement	Upgrade existing 200 mm Lakeshore SPS forcemain with new single 250 mm in Fort Erie	250 mm	2022-2026	Fort Erie	A+	Satisfied	Forcemain	$1,155,000
WW-FM-027	Spring Gardens Forcemain Replacement	Upgrade existing 400 mm Spring Gardens SPS forcemain with new single 500 mm in St Catharines	500 mm	2022-2026	St. Catharines	B	Separate EA Required	Forcemain	$3,058,000
WW-FM-028	Jordan Valley Forcemain Replacement	Replace existing 200 mm Jordan Valley SPS forcemain with new single 300 mm in Lincoln	300 mm	2022-2026	Lincoln	A+	Satisfied	Forcemain	$2,915,000
WW-II-017	Region Wide Wet weather Reduction	Wet weather reduction program in all systems to be executed from 2022-2051	N/A	Post-2051	Region-Wide		Dependent on outcome of wet weather flow study	Wet Weather Reduction	$225,000,000
WW-SPS-001	Alliston SPS Upgrade	Upgrade from 67 L/s to ultimate ECA of 130 L/s by adding final pump.	130 L/s	2027-2031	Fort Erie	A+	Satisfied	Pumping	$1,107,000
WW-SPS-002	Catherine Street SPS Replacement	Increase station capacity from 150.8 L/s to 190 L/s by replacing station at new location.	190 L/s	2022-2026	Fort Erie	B	Separate EA Ongoing	Pumping	$9,372,000
WW-SPS-003	Lakeshore SPS Upgrade (Fort Erie - Anger Ave WWTP)	Increase station capacity from 63 L/s to 79 L/s by replacing the station at a new location.	79 L/s	2022-2026	Fort Erie	B	Separate EA Ongoing	Pumping	$7,748,000

Master Plan ID	Name	Description	Size / Capacity	Year in Service	Municipality	Class EA Schedule	Class EA Status	Project Type	Total Component Estimated Cost
WW-SPS-004	Shirley SPS Upgrade	Increase station capacity from 29 L/s to 57 L/s; Also includes sustainability upgrades to the station	57 L/s	2021 (Already Complete)	Fort Erie	A+	Satisfied	Pumping	$4,845,000
WW-SPS-005	Nigh Road SPS Pump Replacement	Increase station capacity from 22 L/s to 54 L/s by replacing the existing two pumps.	54 L/s	2027-2031	Fort Erie	A+	Dependent on outcome of wet weather flow study	Pumping	$2,053,000
WW-SPS-006	Stevensville SPS Upgrade	Increase station capacity from 41 L/s to 87 L/s. Scope includes wet well expansion and replacing the two existing pumps.	87 L/s	2022-2026	Fort Erie	A+	Satisfied	Pumping	$2,797,000
WW-SPS-008	Oxford SPS Pump Replacement	Increase station capacity from 6 L/s to re-establish 8L/s ECA capacity by replacing the existing two pumps.	8 L/s	2022-2026	Port Colborne	A+	Satisfied	Pumping	$1,213,000
WW-SPS-009	Steele SPS Relocation	Increase station capacity from 25 L/s to re-establish 35 L/s ECA capacity by replacing the station at a new location	35 L/s	2032-2036	Port Colborne	B	Separate EA Required	Pumping	$3,485,000
WW-SPS-011	Foss Road SPS Upgrade	Increase station capacity from 25 L/s to 50 L/s ECA capacity by replacing the existing two pumps.	50 L/s	2027-2031	Pelham	A+	Satisfied	Pumping	$2,778,000
WW-SPS-012	Smithville SPS Upgrade	Increase station capacity from 104 L/s to 705 L/s. Scope includes wet well expansion, pump upgrade and adding two pumps.	705 L/s	2027-2031	West Lincoln	B	Separate EA Required	Pumping	$17,623,000
WW-SPS-013	Campden SPS Pump Replacement	Increase station capacity from 11 L/s to 21 L/s by replacing the existing two pumps. (Construction 2022)	21 L/s	2022-2026	Lincoln	A+	Satisfied	Pumping	$1,430,000
WW-SPS-014	Laurie Avenue SPS Upgrade	Increase station capacity from 28 L/s to 90 L/s. Scope includes new wet well and pump upgrades.	90 L/s	2022-2026	Lincoln	A+	Satisfied	Pumping	$3,354,000
WW-SPS-015	Victoria Avenue SPS Pump Replacement	Increase station capacity from 120 L/s to 380 L/s by replacing the existing three pumps	380 L/s	2027-2031	Lincoln	A+	Satisfied	Pumping	$5,070,000
WW-SPS-016	Bridgeport SPS Pump Replacement	Increase station capacity from 11 L/s to 25 L/s, as planned in 2022 design, by replacing the existing two pumps	25 L/s	2022-2026	Lincoln	A+	Satisfied	Pumping	$3,475,000
WW-SPS-017	Jordan Valley SPS Pump Replacement	Increase station capacity from 40 L/s to 74 L/s, as planned in 2022 design, by replacing the existing two pumps.	74 L/s	2022-2026	Lincoln	A+	Satisfied	Pumping	$3,593,000
WW-SPS-018	Ontario Street SPS Upgrade	Increase station capacity from 420 L/s to 840 L/s. Upgrades include dry and wet well expansions and two additional pumps.	840 L/s	2027-2031	Lincoln	B	Satisfied	Pumping	$14,316,000
WW-SPS-019	Biggar Lagoon Pump Replacement	Increase station capacity from 54 L/s to re-establish 95 L/s ECA capacity by replacing the existing two pumps.	95 L/s	2022-2026	Grimsby	A+	Satisfied	Pumping	$2,898,000
WW-SPS-020	Lake Street SPS Pump Replacement	Increase station capacity from 375 L/s to 600 L/s by replacing existing four pumps.	600 L/s	2022-2026	Grimsby	A+	Satisfied	Pumping	$6,762,000
WW-SPS-021	Beaverdams SPS Pump Replacement	Increase station capacity from 10 L/s to 40 L/s as planned in 2022 design	40 L/s	2022-2026	Thorold	B	Satisfied	Pumping	$4,161,000

Master Plan ID	Name	Description	Size / Capacity	Year in Service	Municipality	Class EA Schedule	Class EA Status	Project Type	Total Component Estimated Cost
WW-SPS-026	Dorchester SPS Pump Replacement	Increase station capacity from 185 L/s to 345 L/s by replacing the existing three pumps. Use implementation plan prior to upgrade: Flow monitoring, validate wet weather flows, re-evaluate required upgrades	345 L/s	2027-2031	Niagara Falls	A+	Satisfied	Pumping	$5,070,000
WW-SPS-028	Black Horse SPS Upgrade	New SPS location with increased capacity from 67 L/s to 180 L/s.	180 L/s	2027-2031	Thorold	B	To be Satisfied Under Consolidated South NF Schedule C EA - Separate Study	Pumping	$5,054,000
WW-SPS-031	St. David's #2 SPS Upgrade	Increase station capacity from 42 L/s to 202 L/s with a full station Reconstruction	202 L/s	2027-2031	Niagara-on-the-Lake	B	To be Satisfied Under Consolidated Queenstown Schedule B EA - Separate Study	Pumping	$6,571,000
WW-SPS-032	St. David's #1 SPS Upgrade	Increase station capacity from 29 L/s to 174 L/s. with a full station reconstruction.	174 L/s	2027-2031	Niagara-on-the-Lake	B	To be Satisfied Under Consolidated Queenstown Schedule B EA - Separate Study	Pumping	$5,740,000
WW-SPS-035	Line 2 SPS Pump Replacement	Increase station capacity from 7 L/s to re-establish 8 L/s ECA capacity by replacing the existing two pumps, as per 2022 design.	8 L/s	2022-2026	Niagara-on-the-Lake	A+	Satisfied	Pumping	$1,213,000
WW-SPS-037	Towpath SPS Upgrade	Increase station capacity from 118 L/s to 600 L/s. Scope includes pump upgrades and one additional pump.	600 L/s	2022-2026	Thorold	A+	Satisfied	Pumping	$6,519,000
WW-SPS-038	Hurricane Road SPS Pump Replacement	Increase station capacity from 39 L/s to 67 L/s by replacing existing two pumps.	67 L/s	2022-2026	Pelham	A+	Satisfied	Pumping	$2,415,000
WW-SPS-039	New Queenston SPS	New Queenston SPS with firm capacity of 62 L/s	62 L/s	2027-2031	Niagara-on-the-Lake	B	To be Satisfied Under Consolidated Queenston Schedule B EA - Separate Study	Pumping	$2,996,000
WW-SPS-040	Woodsview SPS Upgrade	Increase station capacity from 35.5 L/s to 53 L/s by replacing the station at location.	53 L/s	2022-2026	Grimsby	A+	Satisfied	Pumping	$4,189,000
WW-SPS-041	Streamside SPS Upgrade	Increase station capacity from 16 L/s to 41 L/s. Scope includes wet well expansion and pump upgrades.	41 L/s	2022-2026	West Lincoln	A+	Satisfied	Pumping	$1,314,000
WW-SPS-042	Haulage Road SPS Pump Replacement	Increase station capacity from 45 L/s to 80 L/s by replacing both pumps.	80 L/s	2037-2041	St. Catharines	A+	Dependent on outcome of wet weather flow study	Pumping	$2,415,000
WW-SPS-043	Spring Gardens SPS Pump Replacement	Increase station capacity from 291 L/s to 349 L/s by replacing existing three pumps.	349 L/s	2022-2026	St. Catharines	A+	Satisfied	Pumping	$6,519,000
WW-SPS-045	Front Street SPS Pump Replacement	Increase station capacity from 25 L/s to 56 L/s by replacing existing two pumps. Use implementation plan prior to upgrade: Flow monitoring, validate wet weather flows, re-evaluate required upgrades	56 L/s	2032-2036	Niagara-on-the-Lake	A+	Satisfied	Pumping	$2,778,000

Master Plan ID	Name	Description	Size / Capacity	Year in Service	Municipality	Class EA Schedule	Class EA Status	Project Type	Total Component Estimated Cost
WW-SPS-046	Omer SPS Pump Replacement	Increase station capacity from 108 L/s to 131 L/s by replacing existing three pumps	131 L/s	2032-2036	Port Colborne	A+	Satisfied	Pumping	$3,621,000
WW-SPS-047	Union SPS Pump Replacement	Increase station capacity from 100.9 L/s to re-establish 126 L/s ECA capacity by replacing the existing three pumps. Use implementation plan prior to upgrade: Flow monitoring, validate wet weather flows, re-evaluate required upgrades	126 L/s	2027-2031	Port Colborne	A+	Satisfied	Pumping	$3,621,000
WW-SPS-049	Dain City SPS Pump Replacement	Increase station capacity from 90 L/s to 164 L/s by replacing existing three pumps.	164 L/s	2037-2041	Welland	A+	Satisfied	Pumping	$4,346,000
WW-SPS-050	Bender Hill SPS Pump Replacement	Full station replacement at new location from 237 L/s to re-establish 330 L/s ECA capacity.	330 L/s	2022-2026	Niagara Falls	B	Separate EA Required	Pumping	$15,234,000
WW-SPS-051	Central SPS Pump Replacement	Increase station capacity from 800 L/s to re-establish 1000 L/s ECA capacity by replacing the existing five pumps.	1000 L/s	2037-2041	Niagara Falls	A+	Satisfied	Pumping	$10,777,000
WW-SPS-052	Lundy's Lane SPS Pump Replacement	Increase station capacity from 56 L/s to re-establish 98 L/s ECA capacity by replacing the existing three pumps.	98 L/s	2037-2041	Niagara Falls	A+	Satisfied	Pumping	$3,079,000
WW-SPS-053	Royal Manor SPS Pump Replacement	Increase station capacity from 9 L/s to 16 L/s by replacing existing two pumps	16 L/s	2022-2026	Niagara Falls	A+	Satisfied	Pumping	$1,213,000
WW-SPS-054	Thompson SPS Upgrade	Increase station capacity from 362 L/s to 510 L/s by installing one additional planned pump: consistent with phased approach under ultimate ECA capacity of 680 L/s	510 L/s	2032-2036	Fort Erie	A+	Satisfied	Pumping	$1,690,000
WW-SPS-055	Douglastown SPS Upgrade	Increase station capacity from 33 L/s to 79 L/s. Scope includes wet well expansion and pump upgrades.	79 L/s	2037-2041	Fort Erie	A+	Satisfied	Pumping	$2,428,000
WW-SPS-058	Peel Street SPS Upgrade	Station upgrades which may be required to accommodate new forcemain	N/A	2027-2031	Thorold	A+	To be Satisfied Under Consolidated South NF Schedule C EA - Separate Study	Pumping	$500,000
WW-SPS-059	Lakeshore Road SPS Pump Replacement	Increase station capacity from 90 L/s to 168 L/s by replacing existing two pumps, Includes wet well upgrades	168 L/s	2037-2041	Niagara-on-the-Lake	A+	Satisfied	Pumping	$4,055,000
WW-SS-002	Quaker Road Trunk Sewer	New 600 mm trunk sewer on Quaker Rd. between Pelham Street trunk and Rice Road trunk sewers.	600 mm	2022-2026	Welland	A+	Satisfied	Sewer	$3,106,000
WW-SS-006	New Montrose Trunk Sewer	New tunneled trunk sewer on Montrose conveying flows from South Side High Lift SPS to the new South Niagara Falls WWTP	1500 mm	2027-2031	Niagara Falls	B	Satisfied	Sewer	$88,622,000
WW-SS-007	New Brown Road Trunk Sewer	Shallow gravity trunk from South Thorold to Garner SPS-South Niagara Falls trunk connection	600 mm	2027-2031	Niagara Falls	B	Satisfied	Sewer	$16,765,000
WW-SS-008	Chippawa Trunk Sewer Phase 1	New tunneled 1200 mm trunk sewer from west of Lyon's Creek to South Niagara Falls WWTP	1200 mm	2032-2036	Niagara Falls	B	Separate EA Required (WW-SS-015)	Sewer	$60,923,000

Master Plan ID	Name	Description	Size / Capacity	Year in Service	Municipality	Class EA Schedule	Class EA Status	Project Type	Total Component Estimated Cost
WW-SS-009	Lister Road Trunk Upgrade 1	Replace existing 600 mm gravity sewer downstream of Victoria Ave forcemain with new 750 mm gravity sewer	750 mm	2027-2031	Lincoln	A+	Satisfied	Sewer	$1,758,000
WW-SS-010	Lister Road Trunk Upgrade 2	Replace existing 675 mm gravity sewer downstream of Victoria Ave forcemain with new 825 mm gravity sewer	825 mm	2027-2031	Lincoln	A+	Satisfied	Sewer	$5,747,000
WW-SS-011	Beamsville Trunk Upgrade 1	Replace existing 600 mm gravity sewer with new 825 mm gravity sewer	825 mm	2027-2031	Lincoln	A+	Satisfied	Sewer	$7,766,000
WW-SS-012	Beamsville Trunk Upgrade 2	Replace existing 750 mm gravity sewer with new 1050 mm gravity sewer	1050 mm	2027-2031	Lincoln	A+	Satisfied	Sewer	$1,575,000
WW-SS-013	Smithville Trunk Upgrade	Sewer upgrades along an alternate alignment to WWTP. Replaces old MSP SS-(003-004).	600 mm	2027-2031	Grimsby	B	Separate EA Required	Sewer	$49,272,000
WW-SS-014	South Niagara Falls SSO Trunk	New sewer to eliminate overflows upstream of South Side High Lift SPS	1050 mm	2022-2026	Niagara Falls	B	To be Satisfied Under Consolidated South NF Schedule C EA - Separate Study	Sewer	$1,554,000
WW-SS-015	Chippawa Trunk Sewer Phase 2	New tunneled 1200 mm trunk sewer from South Side Low Lift to west of Lyon's Creek	1200 mm	2037-2041	Niagara Falls	B	Separate EA Required	Sewer	$27,082,000
WW-TP-001	Baker Road WWTP Upgrade	Baker Road WWTP Upgrade to provide an additional 16 MLD	14 MLD	2032-2036	Grimsby	C	Separate EA Required	Treatment	$123,895,000
WW-TP-002	South Niagara Falls Wastewater Treatment Plant - Phase 1	New South Niagara Falls WWTP Phase 1 with 30 MLD capacity	30 MLD	2022-2026	Niagara Falls	C	Separate EA Required	Treatment	$203,557,000
WW-TP-003	South Niagara Falls Wastewater Treatment Plant Phase 2	New South Niagara Falls WWTP Upgrade from 30 MLD to 60 MLD	30 MLD	2037-2041	Niagara Falls	C	To be Satisfied Under Consolidated South NF Schedule C EA - Separate Study	Treatment	$200,000,000
WW-TP-004	South Niagara Falls Wastewater Treatment Plant Outfall	New South Niagara Falls WWTP Outfall Structure	1800 mm	2022-2026	Niagara Falls	C	To be Satisfied Under Consolidated South NF Schedule C EA - Separate Study	Treatment	$4,718,000
WW-TP-005	Region-wide WWTP Process Upgrades	Process upgrades to re-establish ECA capacity	N/A	2022-2051	Region-Wide			Treatment	$50,000,000
WW-TP-006	Region-wide WWTP Process Upgrades	Upgrades for odour control across the Region at forcemains, pump stations, and other locations.	N/A	2022-2051	Region-Wide			Treatment	$40,000,000
WW-ST-001	Region Wide Flow Monitoring and Data Collection	Funding to support flow monitoring and data collection initiatives	N/A	2022-2051	Region-Wide			Wet Weather Reduction	$12,000,000
WW-ST-002	Fort Erie QEW Corridor Long-Term Study	Crystal Beach WWTP, SD WWTP long term strategy	N/A	2022-2026	Fort Erie		Separate EA Required	Treatment	$500,000
WW-ST-003	Additional Studies	Wastewater Master Servicing Plan, Wastewater Servicing Study, CSO Program	N/A	2022 – 2051	Region-Wide	A+	N/A	N/A	$20,750,000
								Total	**$1,473,418,000**

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Lake Ontario

WW-SPS-019
Biggar Lagoon S.P.S.
Lakewood Garden S.P.S.
WW-SPS-040
Roberts Rd. S.P.S
Old Orchard S.P.S.
WW-SPS-020
Lake St. S.P.S.
Bal Harbour S.P.S.
WW-FM-013
WW-TP-001
WW-SS-013
WW-SPS-018
WW-SS-012
WW-SS-010
Ontario St. S.P.S.
WW-SS-009
WW-FM-014
WW-SS-011
WW-SPS-014
Laurie Ave. S.P.S.
WW-FM-004
Victoria Ave. S.P.S.
WW-SPS-015
WW-SPS-016
Bridgeport S.P.S.
WW-SPS-017
Jordan Valley S.P.S.
WW-FM-028
WW-SPS-013
Campden S.P.S.
WW-FM-011
WW-FM-017
Streamside S.P.S.
WW-SPS-041
Smithville S.P.S.
WW-SPS-012

0 1 2 km

Capital Program

- Treatment Plant
- Pumping Station
- Wet Weather Reduction (WW-II-017)
- Forcemains
- Sewers

Wastewater Facilities

- Wastewater Treatment Plant
- Biosolids Storage Facility
- Leachate Pumping Station
- Odour Control Facility

Wastewater Network

- Force Mains
- Regional Mains
- Local Sewers
- Private Sewers

Pumping Stations

- Niagara Region
- Municipal
- Private

Other Features

- Municipal Boundary
- Waterbodies
- Urban Area Boundary

Development Locations

- Post-2051
- Pre-2051

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Figure 1.10
Baker Road WWTP System
Preferred Wastewater Servicing Strategy

BluePlan ENGINEERING

December 2022
620126-WW-006
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- Treatment Plant
- Pumping Station
- Wet Weather Reduction (WW-II-017)
- Forcemains
- Sewers

Wastewater Facilities

- Wastewater Treatment Plant
- Biosolids Storage Facility
- Leachate Pumping Station
- Odour Control Facility

Wastewater Network

- Force Mains
- Regional Mains
- Local Sewers
- Private Sewers

Pumping Stations

- Niagara Region
- Municipal
- Private

Other Features

- Municipal Boundary
- Waterbodies
- Urban Area Boundary

Development Locations

- Post-2051
- Pre-2051

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Figure 1.11

Port Dalhousie WWTP System

Preferred Wastewater Servicing Strategy

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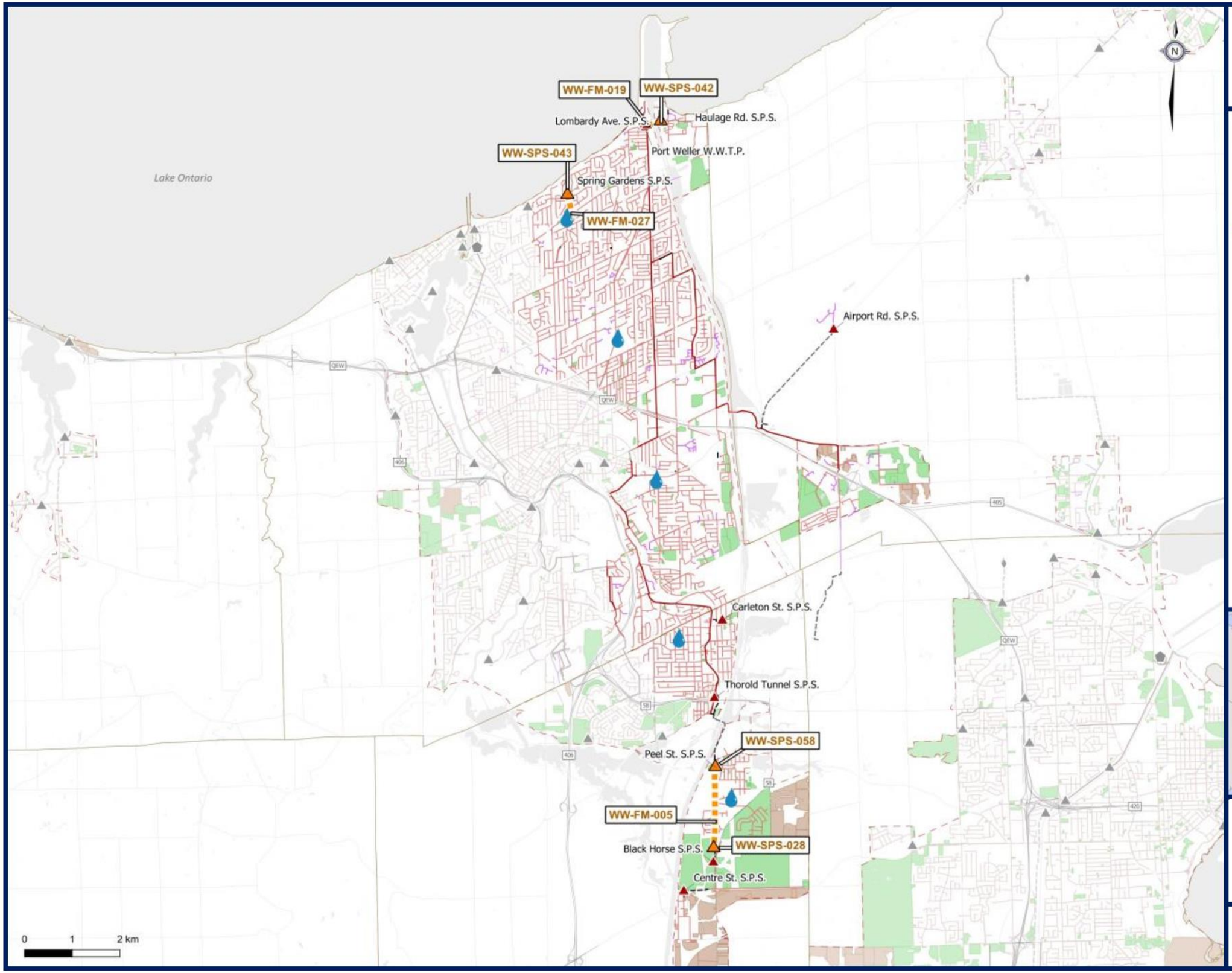
December 2022
620126-WW-006
WKID: 26917



Niagara Region

2021 Water and Wastewater Master Servicing Plan Update

Capital Program

- Treatment Plant
- Pumping Station
- Wet Weather Reduction (WW-II-017)
- Forcemains
- Sewers

Wastewater Facilities

- Wastewater Treatment Plant
- Biosolids Storage Facility
- Leachate Pumping Station
- Odour Control Facility

Wastewater Network

- Force Mains
- Regional Mains
- Local Sewers
- Private Sewers

Pumping Stations

- Niagara Region
- Municipal
- Private

Other Features

- Municipal Boundary
- Waterbodies
- Urban Area Boundary

Development Locations

- Post-2051
- Pre-2051

***Note that additional growth in existing built areas is anticipated**

***Project alignments are preliminary and will be refined through subsequent projects (EA and/or detailed design)**

Figure 1.12

Port Weller WWTP System

Preferred Wastewater Servicing Strategy

BluePlan Engineering

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Niagara Region

2021 Water and Wastewater Master Servicing Plan Update

Capital Program

- Treatment Plant
- Pumping Station
- Wet Weather Reduction (WW-II-017)
- Forcemains
- Sewers

Wastewater Facilities

- Wastewater Treatment Plant
- Biosolids Storage Facility
- Leachate Pumping Station
- Odour Control Facility

Wastewater Network

- Force Mains
- Regional Mains
- Local Sewers
- Private Sewers

Pumping Stations

- Niagara Region
- Municipal
- Private

Other Features

- Municipal Boundary
- Waterbodies
- Urban Area Boundary

Development Locations

- Post-2051
- Pre-2051

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Figure 1.13
NOTL WWTP System
Preferred Wastewater Servicing Strategy

BluePlan Engineering

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Niagara Region

2021 Water and Wastewater Master Servicing Plan Update

Capital Program

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- Wet Weather Reduction (WW-II-017)
- Forcemains
- Sewers

Wastewater Facilities

- Wastewater Treatment Plant
- Biosolids Storage Facility
- Leachate Pumping Station
- Odour Control Facility

Wastewater Network

- Force Mains
- Regional Mains
- Local Sewers
- Private Sewers

Pumping Stations

- Niagara Region
- Municipal
- Private

Other Features

- Municipal Boundary
- Waterbodies
- Urban Area Boundary

Development Locations

- Post-2051
- Pre-2051

***Note that additional growth in existing built areas is anticipated**

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Figure 1.14
Queenston WWTP System
Preferred Wastewater Servicing Strategy

BluePlan Engineering

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Niagara Region

2021 Water and Wastewater Master Servicing Plan Update

Capital Program

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- Pumping Station
- Wet Weather Reduction (WW-II-017)
- Forcemains
- Sewers

Wastewater Facilities

- Wastewater Treatment Plant
- Biosolids Storage Facility
- Leachate Pumping Station
- Odour Control Facility

Wastewater Network

- Force Mains
- Regional Mains
- Local Sewers
- Private Sewers

Pumping Stations

- Niagara Region
- Municipal
- Private

Other Features

- Municipal Boundary
- Waterbodies
- Urban Area Boundary

Development Locations

- Post-2051
- Pre-2051

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Figure 1.15

Niagara Falls WWTP System

Preferred Wastewater Servicing Strategy

BluePlan Engineering

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Niagara Region

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Wastewater Facilities

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- Odour Control Facility

Wastewater Network

- Force Mains
- Regional Mains
- Local Sewers
- Private Sewers

Pumping Stations

- Niagara Region
- Municipal
- Private

Other Features

- Municipal Boundary
- Waterbodies
- Urban Area Boundary

Development Locations

- Post-2051
- Pre-2051

***Note that additional growth in existing built areas is anticipated**

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Figure 1.16

Stevensville / Douglastown System

Preferred Wastewater Servicing Strategy

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Niagara Region

2021 Water and Wastewater Master Servicing Plan Update

Capital Program

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- Pumping Station
- Wet Weather Reduction (WW-II-017)
- Forcemains
- Sewers

Wastewater Facilities

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- Leachate Pumping Station
- Odour Control Facility

Wastewater Network

- Force Mains
- Regional Mains
- Local Sewers
- Private Sewers

Pumping Stations

- Niagara Region
- Municipal
- Private

Other Features

- Municipal Boundary
- Waterbodies
- Urban Area Boundary

Development Locations

- Post-2051
- Pre-2051

***Note that additional growth in existing built areas is anticipated**

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Figure 1.17

Anger Avenue WWTP System

Preferred Wastewater Servicing Strategy

BluePlan Engineering

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Niagara Region

2021 Water and Wastewater Master Servicing Plan Update

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- Wet Weather Reduction (WW-II-017)
- Forcemains
- Sewers

Wastewater Facilities

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- Biosolids Storage Facility
- Leachate Pumping Station
- Odour Control Facility

Wastewater Network

- Force Mains
- Regional Mains
- Local Sewers
- Private Sewers

Pumping Stations

- Niagara Region
- Municipal
- Private

Other Features

- Municipal Boundary
- Waterbodies
- Urban Area Boundary

Development Locations

- Post-2051
- Pre-2051

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Figure 1.18

Crystal Beach WWTP System

Preferred Wastewater Servicing Strategy

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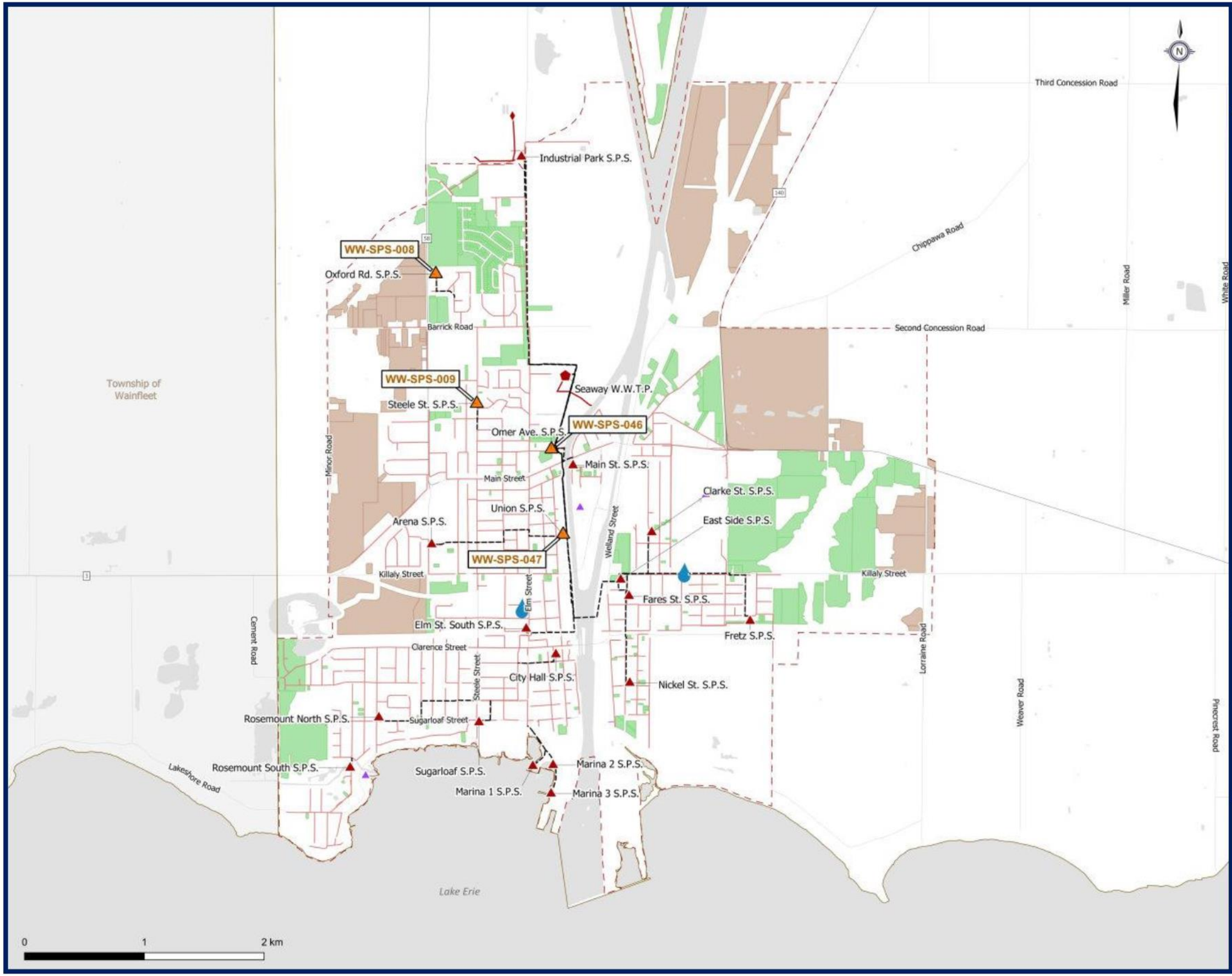
Niagara Region

2021 Water and Wastewater Master Servicing Plan Update



Capital Program

- Treatment Plant
- Pumping Station
- Wet Weather Reduction (WW-II-017)
- Forcemains
- Sewers

Wastewater Facilities

- Wastewater Treatment Plant
- Biosolids Storage Facility
- Leachate Pumping Station
- Odour Control Facility

Wastewater Network

- Force Mains
- Regional Mains
- Local Sewers
- Private Sewers

Pumping Stations

- Niagara Region
- Municipal
- Private

Other Features

- Municipal Boundary
- Waterbodies
- Urban Area Boundary

Development Locations

- Post-2051
- Pre-2051

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Figure 1.19

Seaway WWTP System

Preferred Wastewater Servicing Strategy

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Niagara Region

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Capital Program

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- Pumping Station
- Wet Weather Reduction (WW-II-017)
- Forcemains
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Wastewater Facilities

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- Biosolids Storage Facility
- Leachate Pumping Station
- Odour Control Facility

Wastewater Network

- Force Mains
- Regional Mains
- Local Sewers
- Private Sewers

Pumping Stations

- Niagara Region
- Municipal
- Private

Other Features

- Municipal Boundary
- Waterbodies
- Urban Area Boundary

Development Locations

- Post-2051
- Pre-2051

***Note that additional growth in existing built areas is anticipated**

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Figure 1.20
Welland WWTP System
Preferred Wastewater Servicing Strategy

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