Notice of Comments Received

Following Completion of the Public Review Period

The Regional Municipality of Niagara filed the 2021 Water and Wastewater Master Servicing Plan Update report for the 45-day public review period From Thursday June 22, 2023 to Monday August 7, 2023.

All comments received were tracked in the attached summary table and responses were issued where required. A copy of all comments and responses are attached in Volume 5. Revisions to the 2021 Water and Wastewater Master Servicing Plan Update include the following:

Volume 3

Modifications to table headings for the Comparison of Alternatives including Table 3.A.12, Table 3.B12, Table 3.E.12, and Table 3.F.12 to identify the Preferred Alternative within the table heading.

Figure captions were updated to address numbering and naming inconsistencies.

Volume 4

Text updated in Section 4.1.6 to address formatting error.

Text updated in Part A: Figure 4.A.2, Table 4.A.3, Table 4.A.8, Table 4.A.9, Section A.6.2, Table 4.A.10, to update the operational firm capacity for Biggar Lagoon.

Text updated in Part A: Table 4.A.3 and Table 4.A.9 to revise the Smithville SPS forcemain diameter.

Text updated in Part B: Table 4.B.8 to revise the PDWF for Cole Farm SPS.

Figure captions were updated to address numbering and naming inconsistencies.

Volume 5

Record of consultation dates updated.

Contact list updated in Appendix B.

Date Received (MM/DD/YYYY)	Contact Name / Organization	Comment	Response / Action	Response Date (MM/DD/YYYY)	Status	Related ESR Updates
6/1/2023	Newspaper Ads	Notice of Study Completion and Public Review ads appearing in newspapers.	- No action required	N/A	Complete	- Record of consultation provded in Volume 5
6/20/2023	Project Study Contact List	Notice of Study Completion sent by GM BluePlan on behalf of Niagara Region to project stakeholders (see Appendix V4.2 Contact List) using mass email newsletter.	- No action required	N/A	Complete	- Record of consultation provded in Volume 5
6/20/2023	Niagara Peninsula Energy	Niagara Peninsula Energy acknowledged receipt of Notice of Study Completion.	- No action required	N/A	Complete	- Record of consultation provded in Volume 5
6/22/2023	Indigenous Groups	Reminder email sent from GMBP to the following indigenous groups separate from mass email to notify them that the document is available for review from June 22 to August 7. - Haudenosaunee Development Institute (HDI) - Mississaugas of the Credit First Nations (MCFN) - Six Nations of the Grand River (SNGR)	- No action required	6/22/2023	Complete	- Record of consultation provded in Volume 5
6/27/2023	[redacted] (Resident)	**Resident brought up the following concerns:** - Potential underestimation of future sewage flow from Stevensville-Douglastown Lagoons, the new Spring Creek Estates development, and major commercial development in the Netherby and Townline Rd area of Fort Erie. - Sewage redirection from Stevensville-Douglastown lagoons being reconsidered after being identified as not practical or cost effective in the 2016 MSPU. **Resident inquired about the following:** - Is directing sewage from the Stevensville-Douglastown lagoons to the new SNF WWTP practical and cost effective or not? Resident provided estimate for amount of sewage projected to flow from the proposed commercial development in the Towline and Netherby roads area into the Stevensville-Douglastown sewage lagoons to assist in available capacity projections for the sewage lagoons.	- Region responded with information on growth projections, analysis and evaluation process for the Stevensville and Douglastown lagoons and the recommended projects to be undertaken as a result of the Master Servicing Plan	11/10/2023	Complete	- No further action required.
6/29/2023	[redacted] (Resident)	**Resident brought up the following concerns:** - Trouble accessing documents from project website for review.	- Project Manager (Ilija S.) was able to direct [redacted] (Resident) to download the appropriate document.	6/29/2023	Complete	- Record of consultation provded in Volume 5
7/7/2023	Mr. Moir (Urbantech)	Mr. Moir reached out via contact form on the project website and inquired about the northern reach property in the Town of Welland and wanted to speak about existing sewer capacity at area pump stations.	- Project Manager (Ilija S.) directed Mr. Moir to download and review the project web page and documents	7/10/2023	Complete	- No further action required.
7/31/2023	MECP Project Review Unit	The project team received detailed MECP Project Review Unit comments (see below)	- Documents were revised after the review period based on comments received. See notes below.	N/A	Complete	- See notes below
7/31/2023	MECP Project Review Unit Comment 1	**Volume 4 (Wastewater Master Servicing Plan Update) - Introduction, Section 4.1.6** -Grammatical errors where a space should be added in between the words in bold and the rest of the bullet point. For example, there should be a space between "Strategy and "Without" on the second bullet point of this section.	- Section 4.1.6 updated to address formatting concerns.	N/A	Complete	- Text updated in Section 4.1.6 to address formatting errors
7/31/2023	MECP Project Review Unit Comment 2	**Appendix V5-B (Public and Agency Consultion)** Shareholder Contact List in Volume 5 of the MSP should be revised to have the correct titles for stakeholders. In this case Joan Del Villar Cuicas of the MECP is mislabeled as 'Project Information Form - Online Submission" and should be revised to Regional Environmental Planner. The table should be reviewed to ensure there are no other errors.	- Contact list list updated in Volume 5, Appendix B.	N/A	Complete	- Contact list updated in Volume 5, Appendix B
7/31/2023	MECP Project Review Unit Comment 3	**Volume 3 (Comparison of Alternatives)** It is recommended that the identified preferred alternative is labeled on Tables 3.A.12, 3.B.12, 3.C.12, 3.D.12, 3.E.12, and 3.F.12 Comparison of Alternatives in Volume 3 of the MSP.	- Tables 3.A.12, 3.B.12, 3.E.12, and 3.F.12 updated to identify the preferred alternative.	N/A	Complete	- Tables 3.A.12, 3.B.12, 3.E.12, and 3.F.12 updated (Parts C and D do not have a Comparison of Alternatives table - text only)
7/31/2023	MECP Project Review Unit Comment 4	**Volume 5 (Indigenous Engagement)** The proponent should continue to document communication with all communities that have been engaged with as the Class EA proceeds.	- No further action required.	N/A	Complete	- Record of consultation provded in Volume 5
7/31/2023	MECP Project Review Unit Comment 5	Please note that it is the responsibility of the proponent to ensure that Species at Risk (SAR) are not killed, harmed, or harassed, and that their habitat is not damaged or destroyed through the proposed activities to be carried out on the site. If the proposed activities cannot avoid impacting protected species and their habitats, then the proponent will need to apply for an authorization under the Endangered Species Act (ESA). As is noted in the Report, if the proponent believes that their proposed activities are going to have an impact or are uncertain about the impacts, they should contact SAROntario@ontario.ca to undergo a formal review under the ESA.	- No further action required.	N/A	Complete	- Record of consultation provded in Volume 5
8/4/2023	Robert Babic (Crozier Consulting Engineers)	Crozier Consulting Engineers provided comments related to the Stevensville Secondary Plan area and the Douglas Town-Black Creek Secondary area plans servicing strategy and concerns and indicated this is a continued and ongoing effort to further discussion regarding development and servicing of these lands. The letter included a request to be included in updates and discussions related to recommendations and preferred strategies to be undertaken by the Region.	- Region responded noting reccomendation in the MSP Update were based on the best available planning information and that capacity needs will be reevaluated as new development application are projected. The Region noted Crozier requested to be included in updates and discussions related to recommendation and preferred strategies undertaken within the Stevensville Secondary Plan and Douglastown Black Creek Secondary Plan areas.	11/10/2023	Complete	- No further action required.

Date Received (MM/DD/YYYY)	Contact Name / Organization	Comment	Response / Action	Response Date (MM/DD/YYYY)	Status	Related ESR Updates
8/10/2023	Livia McEachern (City of Welland)	City of Welland provided comments from City staff requesting responses and supplemental information. 1) There are Regional projects identified in Welland's 2020 PPCP & MSP Update that were not identified in the Regional MSP Update. Those projects include: Dain City SPS Storage Optimization Woodlawn Trunk Sewer Upgrade Can staff provide some clarification as to why these projects were not identified in the Regional study? 2) The Ontario Rd Sewer upgrade identified in the City 2020 PPCP & MSP meets the requirements of a Regional Wastewater Trunk Main as identified in the Niagara Region's Development Charges Background Study Appendix E: Local Service Policy. Regional trunk mains are defined by having 170 l/s or more DWF. This upgrade was not identified in the Regional MSP. When investigated more closely though the City's Commercial Street MSP the following DWF were calculated for the Ontario Rd Sewer upgrade: - Ontario Rd – Southworth to Empress – 172 l/s - Ontario Rd – Empress to Ontario Rd SPS – 205 l/s Can staff provide some clarification as to why this project was not identified in the Regional study? 3) There were low pressures identified in the Hunter's Point Area. Can staff confirm if the water analysis incorporated the Hunter's Point Booster Station?	- Comprehensive response provided to address comments and will form part of the communication record. - Input was incorporated in final document preparation.	10/17/2023 and 11/10/2023	Complete	- Provided collaborative response that will form part of the communication document included in the final MSP.
8/16/2023	Mr. Moir (Urbantech)	Mr. Moir reached out to request a meeting to get clarification on items from the MSP as it relates to the towpath pump station (WW-SPS-037).	- Region provided clarification on question related to the towpath pump station site. - Region formally met with Urbantech to discuss the related questions.	9/18/2023	Complete	- No further action required.
9/6/2023	Project Team	Received comments regarding clarification around average and peak flows for the Cole Farm SPS.	- GMBP response provided to Region on 9/8/2023 indicating pump start/stop levels are causing an artificial increase in peak flows but the station wasn't flagged for any capacity issues.	N/A	Complete	- See below for adjustments made within the MSPU documentation
9/18/2023	Project Team	Received comments regarding Cole Farm SPS flows and Biggar Lagoon operational firm capacity Email from Ilija: Here, I have two corrections to incorporate: Cole Farm SPS – PDWF 14 L/s based on the upstream pipe segment. This is very similar to the flow numbers from Glenn; Biggar Lagoon – Operational firm capacity is 74 L/s instead of 54 L/s; If you know of any other correction that would prevent additional questions and confusion, please feel free to make it and let us know.	- Text updated in Part A: Figure 4.A.2, Table 4.A.3, Table 4.A.8, Table 4.A.9, Section A.6.2, Table 4.A.10, to update the operational firm capacity for Biggar Lagoon. - Text updated in Part A: Table 4.A.3 and Table 4.A.9 to revise the Smithville SPS forcemain diameter. - Text updated in Part B: Table 4.B.8 to revise the PDWF for Cole Farm SPS.	N/A	Complete	- Text updated in Part A: Figure 4.A.2, Table 4.A.3, Table 4.A.8, Table 4.A.9, Section A.6.2, Table 4.A.10, to update the operational firm capacity for Biggar Lagoon. - Text updated in Part A: Table 4.A.3 and Table 4.A.9 to revise the Smithville SPS forcemain diameter. - Text updated in Part B: Table 4.B.8 to revise the PDWF for Cole Farm SPS.

Niagara Region

2021 Water and Wastewater Master Servicing Plan Update

Volume 2 – Background and Planning Context

Final Report

December 5, 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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LIST OF ABBREVIATIONS

Acronym	Definition
2016 MSPU	2016 Water and Wastewater Master Servicing Plan Update
ANSI	Areas of Natural and Scientific Interest
BOD	Biochemical Oxygen Demand
BPS	Booster Pumping Station
CSO	Combined Sewer Overflow
CT	Contact Time
DFO	Department of Fisheries and Oceans Canada
EA(A)	Environmental Assessment (Act)
ECA	Environmental Compliance Assessment
ESR	Environmental Study Report
ET	Elevated Tank
FF	Fire Flow
GGH	Greater Golden Horseshoe
HADD	Harmful Alterations, Disruption, or Destruction of Fish Habitat
HCA	Hamilton Conservation Authority
HDI	Haudenosaunee Development Institute
HGL	Hydraulic Grade Line
I/I	Inflow and Infiltration
L/c/d	Litres per capita per day
L/e/d	Litres per employment per day
L/s/ha	Litres per second per hectare
LAM	Local Area Municipality
MCP	Master Community Plan
MCFN	Mississaugas of the Credit First Nation
MDD	Max Day Demand
MEA	Municipal Engineers Association
MECP	Ministry of the Environment, Conservation and Parks
MLD	Million Litres per Day
MMAH	Ministry of Municipal Affairs and Housing
MNRF	Ministry of Natural Resources and Forestry
MOE	Ministry of the Environment
MOECC	Ministry of the Environment and Climate Change
MSPU	Master Servicing Plan Update
NEP	Niagara Escarpment Plan
NOTL	Niagara-On-The-Lake

Acronym	Definition
NPCA	Niagara Peninsula Conservation Authority
NRW	Non-Revenue Water
OP	Official Plan
ORMCP	Oak Ridges Moraine Conservation Plan
PHD	Peak Hour Demand
PIC	Public Information Centre
PPCP	Pollution Prevention Control Plan
PPS	Provincial Policy Statement
PRV	Pressure Reducing Valves
PWC	Public Works Committee
PWWF	Peak Wet Weather Flow
QEW	Queen Elizabeth Way
SARA	Species at Risk Act
SCADA	Supervisory Control and Data Acquisition
SD	Stevensville-Douglastown
SNGR	Six Nations of the Grand River
SOGR	State of Good Repair
SPS	Sanitary Pumping Station
TAZ	Traffic Analysis Zones
TRC	Total Residual Chlorine
WTP	Water Treatment Plant
WWTP	Wastewater Treatment Plant

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.

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 1.1.**

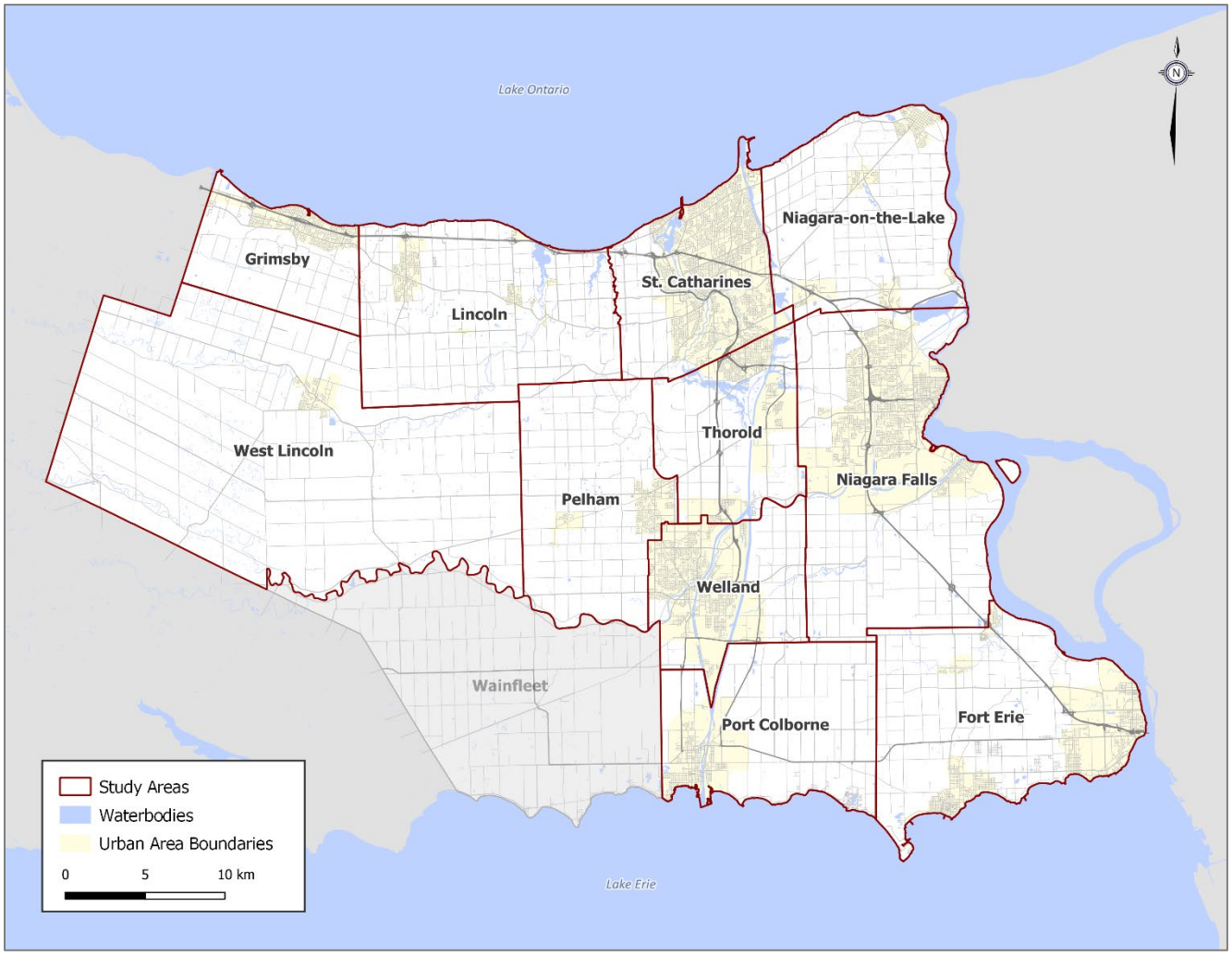

Figure 1.1 Study Area

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 growth planning and will provide the framework and vision for the water and wastewater servicing needs of 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 the following figure and as described below:

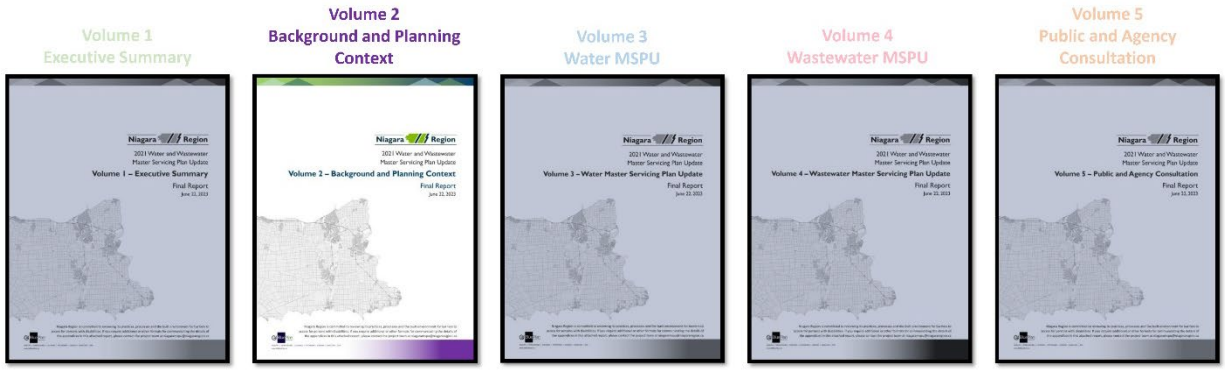

Figure 1.2 Master Servicing Plan Update Documentation

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.

1.4 Master Servicing Plan Report Volume 2

The current Volume provides the overall background, process, and planning context that is the foundation on which the study has been undertaken. This volume clearly outlines the study objectives, master planning process, relevant legislative and policy documentation, servicing principles, existing conditions, and future considerations.

This volume has been organized in 10 sections as described below:

1. Introduction
2. Master Planning Process
3. Related Studies and Background Information
4. Problem and Opportunity Statement
5. Study Area
6. Planning Context
7. Planning and Growth Projections
8. Niagara Region Water and Wastewater Servicing Principles and Design Guidelines
9. Natural Environment/Existing Conditions
10. Existing Water and Wastewater Systems

Volume 2 is one of five volumes that make up the complete Master Servicing Plan Class EA Study Report and should be read in conjunction with the other volumes.

2 MASTER PLANNING PROCESS

The Municipal Class EA process clearly defines approaches for completion of Master Plans within the Class EA context. This 2021 MSPU is based on Approach 1 of the Class EA process, which involves preparing a master plan document at the conclusion of Phases 1 and 2 of the Class EA Process. This Master Plan provides an overall framework and supporting information.

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

2.1 Class Environmental Assessment Process

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

The EAA's comprehensive definition of the environment is:

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

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

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

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

The EA document must also include a description of:

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

2.1.1 Principles of Environmental Planning

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

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

2.1.2 Class Environmental Assessment

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

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

The Municipal Class Environmental Assessment, prepared by the Municipal Engineers Association (October 2000, as amended in 2007, 2011, and 2015), outlines the procedures to be followed to satisfy Class EA requirements for water, wastewater, stormwater management, and road projects. The process includes five phases:

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

Public and agency consultation are integral to the Class EA planning process.

Projects subject to the Class EA process are classified into following four "schedules" depending on the degree of the expected impacts. **Figure 2.3** illustrates the Municipal Class EA planning and design process with the phases required for each schedule.

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

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

Schedule B projects require a screening of alternatives for their environmental impacts and Phases 1 and 2 of the planning process must be completed. The proponent is required to consult with the affected public and relevant review agencies, to ensure that they area aware of the project and that their concerns are identified and considered. A Project File must be prepared and made available for review by any interested person or party. IF there are no outstanding concerns, then the project may proceed to implementation once the regulatory process has been completed.

Schedule C projects must satisfy all five phases of the Class EA process. These projects have the potential for greater environmental impacts. Phase 3 involves the assessment of alternative methods of carrying out the project, as well as public consultation on the preferred conceptual design. Phase 4 normally includes the preparation of an Environmental Study Report (ESR) that is filed for public review. Provided no significant impacts are identified and no outstanding concerns are identified, Schedule C projects are then approved and may proceed to implementation once the regulatory process has been completed.

MUNICIPAL CLASS EA PLANNING AND DESIGN PROCESS

NOTE: This flow chart is to be read in conjunction with Part A of the Municipal Class EA

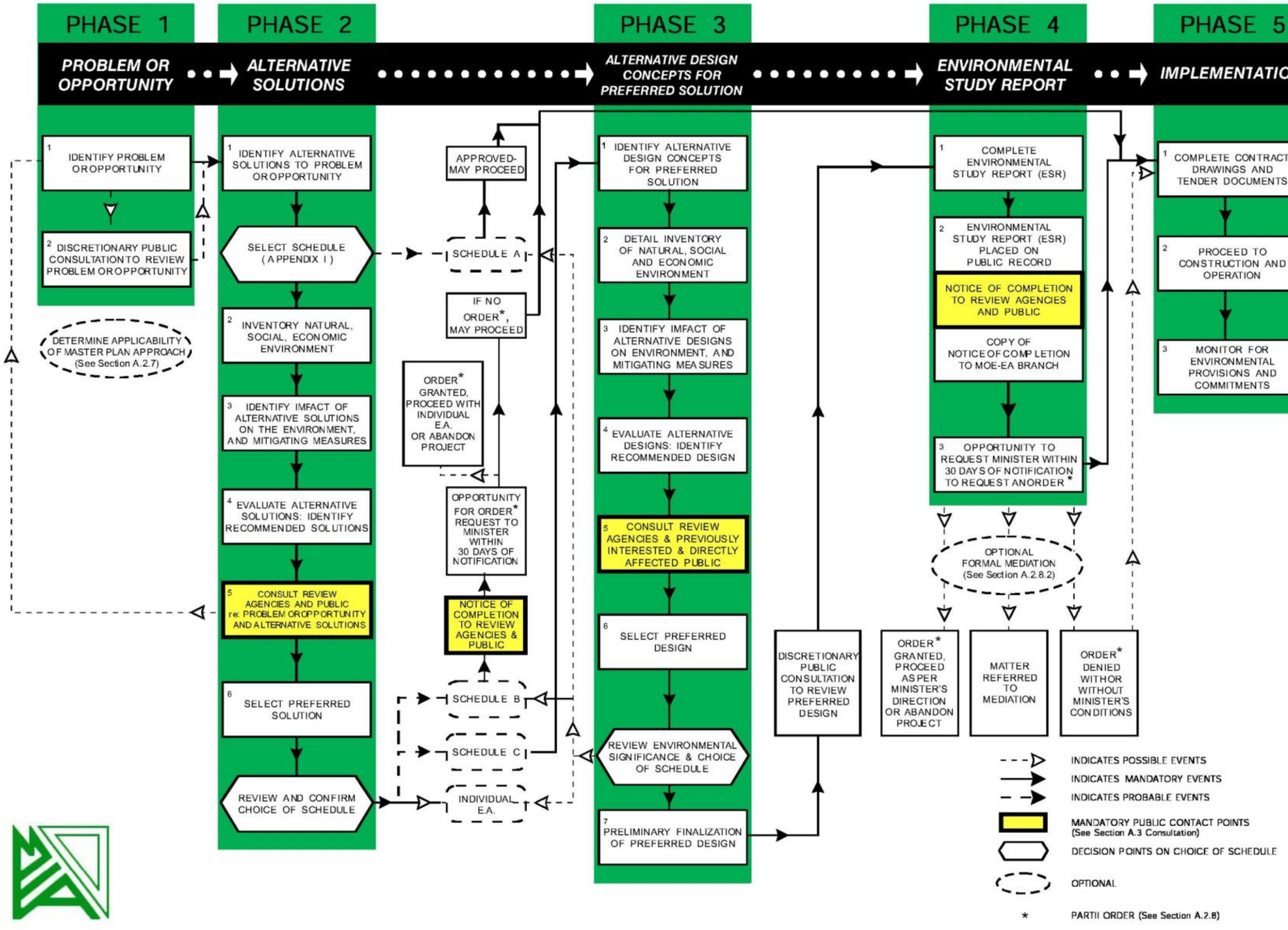

Figure 2.3 Municipal Class EA Planning and Design Process

2.1.3 Master Planning Process

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

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

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

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

According to the Class EA document, a master plan must at least satisfy the requirements of Phases 1 and 2 of the Class EA process and incorporate the five key principles of environmental planning, as identified in **Section 2.1.1**. The 2021 MSPU must document public and agency consultation at each phase of the process and a reasonable range of alternative solutions must be identified and systematically evaluated.

The 2021 MSPU is designed to build on the part of the decision-making completed in the PCP reports and present a refined overall strategy for all the communities in the study area. The approach for the MSPU is to confirm the existing projects and where applicable, evaluate and develop any new components. This approach would also be scrutinized through a public and agency consultation process and be fully documented.

This study follows Approach 1 of the approved master planning Class EA process. This approach allows for Schedule A and A+ projects identified in the MSPU to move forward to implementation. The MSPU provides evaluation and documentation to support identified Schedule B Class EA requirements with applicable review agency commitments prior to the respective implementation. Additionally, the MSPU identifies Schedule B or C projects that will proceed with separate studies to fully meet the Class EA requirements and allow for greater detail in the evaluation of alternatives and design concepts. Schedule C projects will continue to Phase 3 and 4 of the Class EA process with an Environmental Study Report (ESR) filed for public review.

2.2 Public Consultation

The public consultation process is essential for informing and obtaining input from potentially interested and affected parties during the study process.

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

- Present clear and concise information to stakeholders at key stages of the study process;
- Solicit community, regulatory and LAM staff input;
- Meet Municipal Class EA consultation requirements; and
- To fulfill the consultation requirements of the MEA Municipal Class EA document:
    - Build on past communication protocols and consultation plans from previous Class EA and municipal planning initiatives to ensure consistency and continuity;
    - Meet public and agency notification and consultation requirements for Phases 1 and 2 of the MEA Municipal Class EA (October 2000, as amended in 2015; and
    - Complete additional tasks to enhance the proposed consultation program and overall Class EA process.

As part of the current project, a communication and consultation plan has been developed. The main objective of the plan is to proactively engage the community, regulatory agencies, and regional staff. More specifically, the plan is designed to:

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

The complete Public Consultation process is documented in Volume V – Public Consultation.

2.2.1 Phase 1 Public Consultation

Public Information Centre #1

Several consultation methods have been used to address the requirements of the Municipal Class EA. The first round of Public Information Centres (PICs) was held during Phase 1 of the Class EA study process to:

- Inform public and stakeholders about Niagara Region's water/wastewater systems and provide future growth insights;
- Describe the Class EA process;
- Identify the problems, opportunity statements, and project schedules;

- Outline the overall study and decisions making process;
- Provide baseline information such as existing systems, land use, catchment areas, and environmental features; and,
- Elicit public input and answer any questions.

The Region compiled a mailing list that documented contact information for relevant and interested stakeholders. A combined Notice of Commencement and PIC No. 1 was formally initiated on April 8, 2021. The contacts on the stakeholder list were sent the combined Notice of Commencement and PIC No. 1 on April 13, 2023. Two notifications were sent out via e-mail, newspaper, and online media. The first newspaper notice was posted during the week of April 5-9, 2021, and the second notification on the week of April 12-16, 2021.

Notifications were distributed through digital and print media in the following papers:

- Niagara This Week (Niagara-on-the-Lake, Fort Erie, Grimsby, Port Colborne, Welland, Niagara Falls)
- The Standard (St. Catharines)
- Fort Erie Observer
- Welland Tribune
- Thorold News
- Niagara Falls Review
- Voice of Pelham

A virtual Public Information Centre (PIC) No. 1 was held from April 21 to May 5, 2021 virtually due to restrictions to public gatherings in the event of the COVID-19 pandemic. This PIC included an introductory video presentation, project materials for review, and opportunity for interested individuals to provide comments via the project email. During the 2-week engagement period, the video received 98 views, two emails from interested stakeholders were received, and one comment was submitted through the project website. Further detail including public comments and the materials presented at the first PIC is provided in Volume V – Public Consultation. All public information received during the study was collected in accordance with the Municipal Freedom of Information and Protection of Privacy Act. With the exception of personal information, all comments received from the public were included as part of the public record as well as study documentation prepared for public review.

2.2.2 Phase 2 Public Consultation

Public Information Centre #2

The Region hosted a second PIC during the second phase of study. The goals of PIC #2 were to:

- Review the progress on the study to date;
- Present recommended strategies for water and wastewater;
- Provide clarity around update, process, and next steps; and,
- Receive public input and answer any questions.

The initial mailing list was maintained and updated with feedback from comments received after PIC #1. The contacts on the updated stakeholder list were sent a Notice of PIC #2 on January 6, 2023. The Notice was also published in the following local newspapers between January 5 and 14, 2023:

- Niagara This Week
- St. Catharines Standard
- Welland Tribune
- Niagara Falls Review

- Niagara This Week
- St. Catharines Standard
- Welland Tribune
- Niagara Falls Review

PIC #2 was held as a live virtual presentation on January 18, 2023. The event was recorded and made available to the public for review. The feedback period for materials regarding PIC #2 remained open from January 18 to February 6, 2023. A total of 31 participants attended the virtual PIC #2 session. Further detail is provided in Volume V – Public Consultation which includes the comments received as well as the materials presented to the public.

2.2.3 Public Access to Information

All project publications, presentation materials, and other documentation has been made available to the general public through the Region's website (https://niagararegion.ca/projects/www-master-servicing-plan/). Notices of upcoming PICs were also posted on this website.

For those without Internet access, the Region also maintained a contact list and mailed relevant project materials to all who had expressed interest in the process.

2.2.4 Stakeholder and Agency Meetings

Regional staff held several meetings with local municipal staff to discuss the development and evaluation of the servicing strategies, and exchange dialogue on a number of relevant issues related to Niagara Region's water and wastewater systems.

An introductory meeting with the local area municipalities was held on Thursday April 8, 2021, to discuss the MSPU process, highlight key policies, servicing needs, and criteria.

As the study evolved, the Region hosted the following additional meetings with all local municipalities to discuss the proposed strategies:

- **Monday, May 31 to Wednesday, June 9, 2021 – Individual Local Municipality Review**
  - Presented MSPU objectives, baseline system demand and flow context, and solicited local municipality feedback on individual systems.
- **Thursday, September 16, 2021 – Pre-PIC #2 Consultation**
  - Presented updated project schedule, planning scenarios, water and wastewater design criteria and standards, and master planning guidelines; and solicited local municipality feedback on individual systems.
- **Wednesday, February 16 to Wednesday, February 23, 2022 – Draft Capital Program**
  - Presented draft water and wastewater capital programs and solicited local municipality feedback on individual systems.
- **Thursday, December 8, 2022 – Final Capital Program**
  - Presented final water and wastewater capital programs and solicited local municipality feedback on individual systems.

3 RELATED STUDIES AND BACKGROUND INFORMATION

The Region has undertaken several strategic servicing studies which were used as a starting point for the 2021 MSPU. The reports that are relevant to this study are:

- Regional Official Plan Update;
- 2003 Water and Wastewater Master Servicing Plan;
- 2011 Water and Wastewater Master Servicing Plan;
- 2016 Water and Wastewater Master Servicing Plan;
- Pollution Control Plans across each local Municipality; and
- Regional and Local Water and Wastewater Environmental Assessment.

3.1 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.

3.1.1 Region Official Plan Update

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.

3.1.2 Niagara Region's Development Charges Background Study and By-Law Update

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.

3.1.3 Water and Wastewater Master Servicing Plan Update

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.

3.2 2003 Water and Wastewater Master Servicing Plan

The 2003 Master Servicing Plan identified a 10-year capital works program for the wastewater and water systems. Many projects were recommended in both the regional and local systems.

Key recommendations for the regional wastewater and water systems included treatment plant expansions, new gravity sewers, sewage pumping station expansions, and decommissioning of facilities, such as lagoons and sewage pumping stations. It also recommended interconnections, plant upgrades, storage increase, and pumping station upgrades for the water systems.

3.3 2011 Water and Wastewater Master Servicing Plan

The 2011 Master Servicing Plan was built on several strategic servicing studies that the Region had previously undertaken, including the 2003 Master Servicing Plan, the recommendation of multiple Pollution Control Plans, and Risk Assessment Studies. The previous Master Servicing Plan completed Phases 1 and 2 of the MEA Municipal Class EA process and identified Schedule B and C projects.

3.4 2016 Water and Wastewater Master Servicing Plan

The Region completed its most recent Master Servicing Plan in 2016. The 2016 Master Servicing Plan had a focus on supporting growth out to 2041, built off the previous master serving studies and local municipal planning studies. The 2016 Master Servicing Plan incorporated an increased focus on wet weather flow management within the wastewater system with a focus on joint region and local area municipality management. The 2016 Master Servicing Plan recommendations included an enhancement to the wastewater system level of service and the introduction of a Region-wide inflow and infiltration reduction fund and strategy. The 2016 Master Servicing Plan also included an increased focus on improved water system operation, efficiency, and security of supply, resulting in the recommendation to consolidate smaller existing and pumped storages into new elevated tanks.

3.5 Pollution Prevention Control Plans

The following historic Pollution Prevention Control Plans (PPCP) were completed after the 2016 Master Servicing Plan which incorporated the Region's enhanced wastewater system level of service criteria:

- Town of Fort Erie (Anger Ave, Crystal Beach and Stevensville/Douglastown plants),
- Baker Road Wastewater Treatment Plant (Coordinated between the Town of Grimsby, Town of Lincoln, Township of West Lincoln, and the Region),
- City of Welland, and
- City of Niagara Falls.

Further, there are historic PPCPs completed prior to the 2016 Master Servicing Plan whose recommendations were considered; however, the recommendations were largely completed and/or superseded by the Region's enhanced wastewater system level of service criteria:

- St. Catharines and Thorold (Port Dalhousie and Port Weller plants),
- Niagara-On-The-Lake (Queenston plant and NOTL Lagoons), and
- Port Colborne.

These studies aim to develop pollution control plans that will meet the requirements of the Ministry of the Environment (MOE) Procedures F-5-5 and F-5-1 (further described in **Section 6.1** of this report).

Table 2.1 details the key recommendations from the PPCPs included in the Region's 2021 Master Servicing Plan.

Table 2.1 Niagara Pollution Prevention Control Plans Recommendations

Wastewater System	Recommendations

Anger Avenue	• I/I program and State of Good Repair works to reduce extraneous flows in the Lakeshore Road, Dominion Road, Rose Ave, Bardol, and Catherine SPS sewershed areas
	• Local sewer upgrades to: Grandview Road, Garrison Road, Bertie Street, Central Ave, Lavinia Street, Wintermute Street, and Edgemere Road
	• Sewer optimization study near Anger Ave WWTP
	• Upgrade the following SPS:
	  ○ Lakeshore Road SPS
	  ○ Catherine Street SPS
	  ○ Alliston Ave SPS

Baker Road	• Expand plant to 47.3 MLD rated capacity by adding 16 MLD • I/I reduction programs in Lincoln (Beamsville and Vineland), Grimsby (West Grimsby), and West Lincoln

Wastewater System	Recommendations

	• Upgrade the following SPS and forcemains:
	  ○ Biggar Lagoon SPS
	  ○ Lake Street SPS and forcemain
	  ○ Old Orchard SPS
	  ○ Woodsview SPS
	  ○ Ontario Street SPS and forcemain
	  ○ Victoria Ave SPS
	  ○ Laurie Ave and forcemain
	  ○ Campden SPS
	  ○ Jordan Valley SPS
	  ○ Bridgeport SPS
	  ○ Smithville SPS and forcemain
	  ○ Streamside SPS
	• Sewer upgrades consisting of:
	  ○ Region sewer upgrades:
	  ▪ Park Street sewer upgrades in Grimsby, downstream of Smithville forcemain to WWTP
	  ▪ South Service Road/Lister Road sewer upgrades in Lincoln, downstream of Victoria Ave forcemain to Ontario Street SPS
	  ○ Local sewer upgrades:
	  ▪ Grimsby: South Service Road
	  ▪ Lincoln: Beamsville trunk (local), Queen Street, Hixon Street, West Ave, Friesen Blvd, Dustan Street/Laurie Ave
	  ▪ West Lincoln: Smithville trunk upstream of Smithville SPS, Van Woudenberg Way, West Street, Wade Road, and London Road.

Crystal Beach	• I/I program and State of Good Repair works to reduce extraneous flow in the Crystal Beach Wastewater Treatment Plant sewershed (high priority) and Nigh Road SPS (low priority)
	• Upgrade the following SPS:
	  ○ Shirley SPS
	  ○ Nigh Road SPS
	• Local sewer upgrades to Erie Road, Ridgeway Road, Graeber Ave, and Ridge Road

Stevensville/ Douglastown	• I/I program and State of Good Repair works to reduce extraneous flow in both catchments • Local sewer upgrade to Hill Street and E Main Street if I/I reduction targets not achieved
Welland	• Implement investigation and rehabilitation programs in priority areas to identify and locate sources of I/I targeting 25% reduction in priority areas to provide capacity for City-wide growth

Wastewater System	Recommendations

	• Ontario Road trunk sewer upgrade and extension to manage peak wet weather flows in the Ontario Road SPS catchment and to facilitate the decommissioning of 3 temporary overflows
	• Local sewer upgrades in Broadway neighbourhood
	• Local sewer upgrades in Plymouth Road, Woodlawn Road, Clare Ave, and Daimler Parkway if I/I reduction targets are not met
	• Upgrade the following SPS:
	  ○ Towpath SPS
	  ○ Dain City SPS
	• Storage upgrade to Feeder Road SPS if I/I targets not met
	• Decommission City owned Fitch Street SPS
	• Continue sewer separation of combined sewers

Queenston	• N/A – No Pollution Control Plan
Niagara Falls	• Public Side I/I Reduction combined with municipal sewer separation program of combined sewers • State of Good Repair program • Annual flow monitoring • Studies, including: Valleyway Drainage Study, Decommissioning of Mcleod Road HEPC, and Wastewater System Efficiency Plan

The following Pollution Control Plans are currently underway or about to start and will be completed after the 2021 MSPU:

- Town of Niagara-On-The-Lake, and
- City of Port Colborne.

3.6 Local Area Water Distribution Master Plans

The following historic Water Distribution Master Plans were completed after the 2016 Master Servicing Plan:

- Town of Fort Erie, and
- City of Thorold.

Table 2.2 details the key recommendations from the Water Distribution Master Plans included in the Region's 2021 Master Servicing Plan.

Table 2.2 Niagara Distribution Masterplan Recommendations

Municipality	Recommendations

Town of Fort Erie	• Local watermain upgrades to address high priority State of Good Repair (SOGR) needs, including:
	  ○ Watermains identified by the Town's capital replacement program
	  ○ Watermains with higher historic breaks
	• Local watermain upgrades to address low priority SOGR needs, including:
	  ○ Replacement of watermain <150 mm with 150 mm PVC watermains
	  ○ Replacement of cast iron watermains with similar diameter PVC watermains
	• Re-assess hydraulic level of service following implementation of SOGR upgrades, and address hydraulic level of service upgrade needs by upsizing existing watermains and/or additional new watermains
	• Operational recommendations, including:
	  ○ Regular updates to the water distribution master plan on a 5-year cycle
	  ○ Non-revenue water (NRW) audit and remediation plan
	  ○ Review of Town's existing flushing program to optimize flushing locations
	• Development and documentation of Level of Service triggers
	• Improvements to asset database and GIS information

City of Thorold	• Local watermain upgrades to address existing fire flow deficiencies and to support growth to 2041 (additional system looping)
	• Two new connections to the Regional watermain network to support growth and improve security of supply at Sir Isaac Brock Way/Merittville Highway and at Allanburg Road/Upper's Lane
	• New trunk watermains along existing roads recommended to extend the distribution system to areas of future development (to ultimate buildout)
	• A new watermain crossing Highway 406 at Port Robinson Road to accommodate growth to ultimate buildout
	• Watermain replacement prioritization as part of the City's State of Good Repair Program was reoptimized as follows:
	  ○ Cast iron watermains with fire flow deficiencies
	  ○ Cast iron watermains and localized system looping
	  ○ Ductile iron and asbestos cement watermains
	  ○ Replace remaining watermains as needed (according to SOGR criteria and weightings)
	• Operations and maintenance recommendations as follows:
	  ○ Water meter replacement program feasibility and implementation study
	  ○ Fire flow retrofit program
	  ○ Backflow prevention by-law and program
	  ▪ Bulk water station feasibility study

3.7 Water and Wastewater Environmental Assessments

There are several water and wastewater environmental assessments (EA) which have been recently completed or are currently ongoing. The recommendations from these studies were used to inform the recommended strategies for the 2021 MSPU. For those studies which are currently ongoing and have not yet been finalized, it is noted that the recommended 2021 MPSU projects will be superseded by the strategies within the individual project EAs. **Table 2.3** presents the recently completed and ongoing EAs.

Table 2.3 Niagara Region Wastewater Systems Recommendations from Recently Completed and Ongoing Regional Environmental Assessments

EA	EA Schedule	Description	Outcome
Fort Erie Elevated Tank (ET)	B	Identify, evaluate, and recommend preferred location and design concepts for a new elevated tank.	The preferred location is on Region-owned land at the northeast corner of Bridge Street and Pettit Road, next to the existing Waste Transfer Station
Pelham ET	B	Identify, evaluate, and recommend preferred location and design concepts for a new elevated tank.	The preferred location is west of Lookout Street, south of golf driving range.
Park Ridge Reservoir	B	Identify, evaluate, and recommend preferred location and design concepts for a new in-ground reservoir.	The preferred location is on the east side of Park Road South, between Ridge Road East and Elm Tree Road East.
Bemis ET	B	Identify, evaluate, and recommend preferred location and design concepts for a new elevated tank.	Ongoing
Lundy's Lane ET	B	Identify, evaluate, and recommend preferred location and design concepts for a new elevated tank.	Ongoing
Grimsby WTP to Park Ridge Reservoir Trunk Watermain	B	Identify, evaluate, and recommend preferred alignment and design concepts for a new trunk watermain to convey water from the water treatment plant to the new Park Ridge Reservoir.	Ongoing
South Niagara Falls Wastewater Solutions	C	Identify, evaluate, and recommend preferred location and design concepts for a new wastewater treatment plant (WWTP) in South Niagara Falls. Includes recommendations to the broader wastewater catchment and required upgrades to support the new WWTP.	The preferred WWTP site is 6811 Reixinger Road with outfall discharge to Chippawa Creek. Several preferred alignments for new trunk sewers were also identified to support conveyance of flows from Niagara Falls and Thorold, as well as pumping station and forcemain upgrades and decommissioning.
Queenston – St. David's Wastewater Treatment Strategy	B	Identify, evaluate, and recommend preferred alternatives and design concepts for wastewater servicing in Queenston.	The preferred solution is to upgrade the existing Queenston WWTP. It should be noted that this EA was completed after the development and acceptance of the MSPU capital program. As such, there are placeholder projects within the MSPU capital program which note that the Queenston EA recommendations will supersede the MSPU recommendations.
Bender Hill Sewage Pumping Station (SPS)	B	Identify, evaluate, and recommend preferred alternatives and design concepts for SPS upgrades (existing condition concerns, capacity upgrades due to operational and capacity constraints at the SPS).	The preferred solution is to rehabilitate the existing station, upgrade or replace the existing pumps to address capacity issues, and realign River Road.
Catherine Street SPS	B	Identify, evaluate, and recommend preferred alternatives and design concepts for SPS upgrades (existing condition concerns, capacity upgrades due to operational, capacity, and wet weather constraints at the SPS).	The preferred solution is to construct a new Catherine Street SPS within the site limits of the adjacent lot.
Lakeshore Road SPS	B	Identify, evaluate, and recommend preferred alternatives and design concepts for SPS upgrades (existing condition concerns, capacity upgrades due to operational, capacity, and wet weather constraints at the SPS).	The preferred solution is to upgrade the Lakeshore SPS within the existing footprint and construct a new forcemain to the existing gravity sewer network.
Beaverdams SPS	B	Identify, evaluate, and recommend preferred alternatives and design concepts for the Beaverdams SPS, evaluate forcemain capacity to meet anticipated growth within the area, and evaluated potential alternate routes for the replacement of the existing forcemain.	The preferred solution is to construct new valve chamber and wet well structure to address capacity needs and realign the forcemain along Confederation Avenue to provide additional capacity.

EA	EA Schedule	Description	Outcome
East Side SPS Forcemain Replacement	B	Identify, evaluate, and recommend preferred alignments and design concepts for the replacement of the East Side SPS forcemain due to concerns regarding the condition and hydraulic operation of the existing forcemain.	The preferred solution is to replace the existing forcemain with a like diameter forcemain from the East Side SPS to the Seaway WWTP by traveling north along Welland Street/Barber Road and crossing the Welland Canal at Barrick Road, connecting south back to the WWTP.
Mewburn Road SPS Upgrades	B	Identify, evaluate, and recommend preferred alternatives and design concepts for SPS upgrades (existing condition concerns and operational constraints at the SPS).	The preferred solution is to build a new SPS at the closed landfill entrance at the corner of Mewburn Road, approximately 320 metres north of the existing SPS, on Region-owned land. This solution also includes a new forcemain along Mewburn Road.
Renown SPS	B	Identify, evaluate, and recommend preferred alternatives and design concepts for SPS upgrades (existing condition concerns and operational constraints at the SPS).	Ongoing

3.8 Water Billing Records

Water billing records from all local area municipalities were reviewed and cross-referenced against available plant production records and flow monitoring records. These results were utilized to establish baseline flow and demand rates in the existing system.

3.9 Local Area Servicing Studies

Further to the above listed studies, there have been multiple Local Area Servicing Studies that were completed or being concurrently prepared during the preparation of the 2021 MSPU. These studies, plan development, and Regional and Local Planning discussions informed the preparation of projected growth and spatial allocation of population and employment projections used in the preparation of the MSPU as outlined in **Section 7** – Planning and Growth. These Local Area Servicing Studies were reviewed and considered through the process of establishing servicing strategy options, evaluation, and selection of preferred recommended servicing solutions. A sample of these studies/initiatives include:

- Bridgeburg – Fort Erie
- 5th Wheel Development – Grimsby
- Grimsby GO Secondary Plan – Grimsby
- Beamsville GO Secondary Plan – Lincoln
- Prudhommes Development – Lincoln
- Port Robinson – Thorold
- Smithville Master Community Plan (urban boundary expansion)
- North East Employment Lands – Port Colborne
- Smithville Master Community Plan – West Lincoln

3.10 Local Flow Monitoring Studies

Flow monitoring for several local municipalities (Welland, Niagara Falls, West Lincoln, Grimsby, Lincoln, Fort Erie, St. Catharines) was leveraged to enhance the model update and the calibration process.

3.11 Updated Local Water and Wastewater Models

Building on the Region's existing water models, several local municipalities (Grimsby, St. Catharines, Lincoln, Grimsby, West Lincoln, Niagara Falls, Welland, Thorold, and Fort Erie) have developed, enhanced, and updated models of their water system which were leveraged during the 2021 MSPU Update.

Similarly for wastewater, some local municipalities have updated wastewater models since the 2016 MSPU, including:

- Fort Erie
- Niagara Falls
- Welland
- Pelham
- St. Catharines
- Grimsby
- Lincoln
- West Lincoln

Municipalities which did not have updated all-pipes models for the 2021 MSPU were Port Colborne and Niagara-On-The-Lake. It is anticipated that all-pipes models will be developed for these municipalities through upcoming PPCP projects in 2023 and 2024.

3.12 Niagara Region Water and Wastewater Project Design and Technical Specifications Manual

The Design Manual provides the Region with details on the design of regional facilities that are used in the implementation of capital works projects, including both the water distribution and wastewater collection systems.

4 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.

5 STUDY AREA

The Niagara region is located in southern Ontario, Canada, between Lake Ontario and Lake Erie. Niagara has a total area of 1,854 km^2 with a population of 489,106 and 185,894 employees in 2021. The Region is comprised of 12 local municipalities as shown in **Figure 2.4**. The Study Area covers the municipalities of Grimsby, West Lincoln, Lincoln, St. Catharines, Thorold, Welland, Pelham, Port Colborne, Niagara-on-the-Lake, Niagara Falls, and Fort Erie. The Township of Wainfleet was not included in the study scope as it is not currently municipally serviced.

Niagara Region

2021 Water and Wastewater Master Servicing Plan Update

Municipal Boundary
Urban Area Boundary

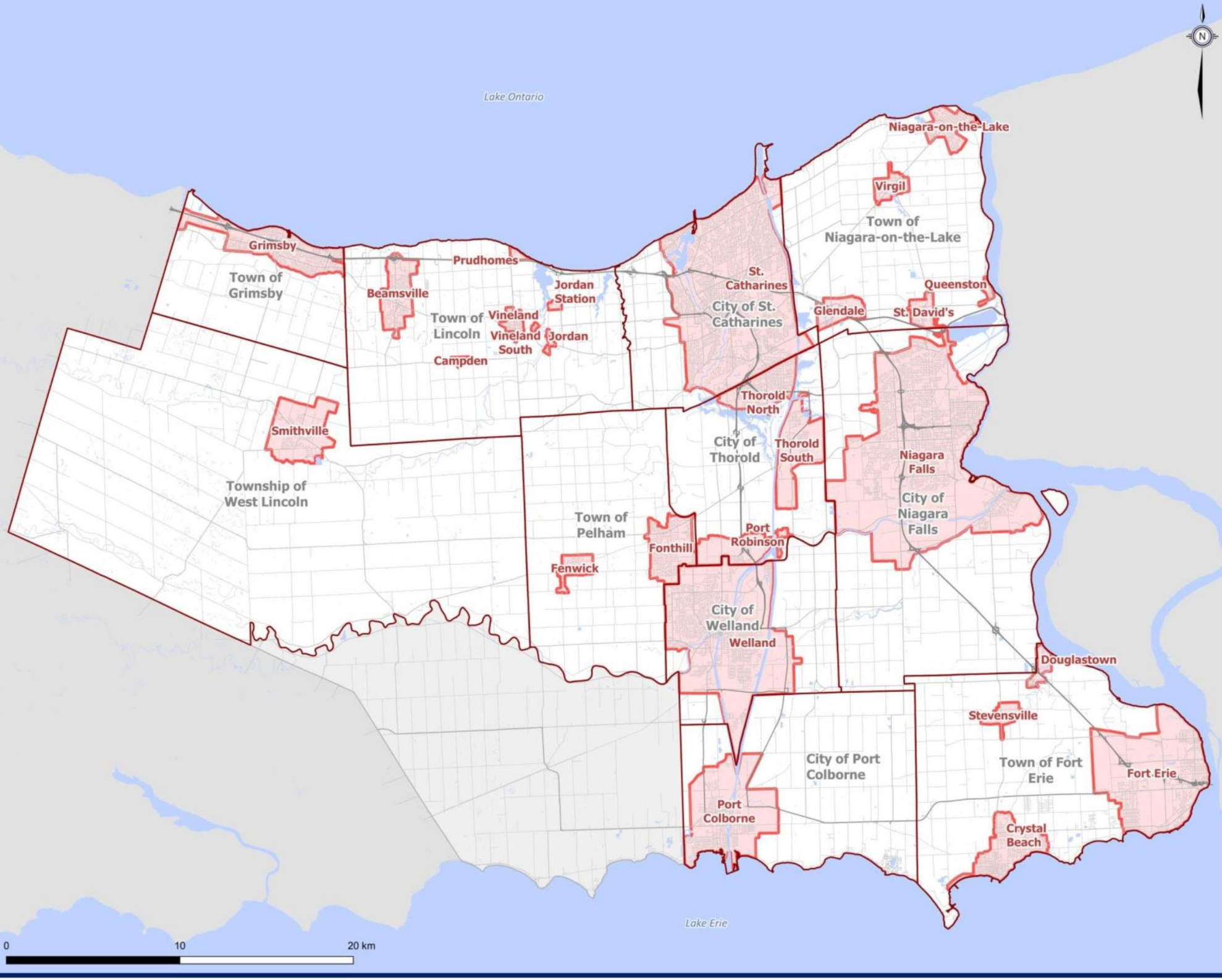

Figure 2.4
Study Area
Baseline System Understanding

BluePlan ENGINEERING

March 2023
620126-G-005
WKID: 26917

6 PLANNING CONTEXT

6.1 Provincial and Federal Legislation and Policy Context

Niagara Region, like all municipalities in Ontario, must operate within the administrative, legislative, and financial framework established by senior levels of government. The key provincial and national initiatives that provide directives, and are considered under the Master Servicing Plan process, are summarized below.

Provincial Policy Statement

The 2014 Provincial Policy Statement (PPS) provided updated policy direction on matters of provincial interest related to land use planning and development. As a key part of Ontario's policy-led planning system, the Provincial Policy Statement sets the policy foundation for regulating the development and use of land. It provides for appropriate development while protecting resources of provincial interest, public health and safety, and the quality of the natural environment.

In 2020, the PPS received a revision to better integrate economic, social, and environmental considerations; respond to rural and northern challenges; clarify policies to better support implementation; and provide direction for emerging issues.

Key infrastructure policies relevant to water and wastewater services include the following:

- Infrastructure, electricity generation facilities and transmission and distribution systems, and public service facilities shall be provided in a coordinated, efficient, and cost-effective manner that considers impacts from climate change while accommodating projected needs. Planning for infrastructure, electricity generation facilities and transmission and distribution systems, and public service facilities shall be coordinated and integrated with land use planning so that they are: (a) financially viable over their life cycle, which may be demonstrated through asset management planning; and (b) available to meet current and projected needs. (Policy 1.6.1)
- Planning authorities should promote green infrastructure to complement existing infrastructure. (Policy 1.6.2)
- Before consideration is given to developing new infrastructure and public service facilities: (a) the use of existing infrastructure and public service facilities should be optimized; and (b) opportunities for adaptive re-use should be considered, wherever feasible. (Policy 1.6.3)

More specifically, the 2020 Provincial Policy Statement recommended that sewage and water services should:

- Direct and accommodate expected growth in a manner that promotes the efficient use and optimization of existing:
    - municipal sewage services and municipal water services; and,
    - private communal sewage services and private communal water services, where municipal sewage services and municipal water services are not available.
- Ensure that these systems are provided in a manner that:
    - can be sustained by the water resources upon which such services rely
    - is feasible, financially viable and complies with all regulatory requirements; and,
    - protects human health and the natural environment.
- Promote water conservation and water use efficiency; and,
- Integrate servicing and land use considerations at all stages of the planning process (Policy 1.6.6.1).

Other recommended policies include the following:

- Municipal sewage services and municipal water services are the preferred form of servicing for settlement areas. Intensification and redevelopment within settlement areas on existing municipal sewage services and municipal water services should be promoted, wherever feasible. (Policy 1.6.6.2);
- Where municipal sewage services and municipal water services are not provided, municipalities may allow the use of private communal sewage services and private communal water services. (Policy 1.6.6.3);
- Where municipal sewage services and municipal water services or private communal sewage services and private communal water services are not provided, individual on-site sewage services and individual on-site water services may be used provided that site conditions are suitable for the long-term provision of such services with no negative impacts. In settlement areas, these services may only be used for infilling and minor rounding out of existing development. (Policy 1.6.6.4); and,
- Partial services shall only be permitted in the following circumstances: (a) where they are necessary to address failed individual on-site sewage services and individual on-site water services in existing development; or (b) within settlement areas, to allow for infilling and minor rounding out of existing development on partial services provided that site conditions are suitable for the long-term provision of such services with no negative impacts.

The 2020 Provincial Policy Statement was used as input to Niagara Region's Official plan (2022), which updated the Region's Policy Plan to be aligned with the A Place to Grow Plan.

Greenbelt Plan

The Greenbelt is a broad band of permanently protected land which supports agriculture as the predominant land use, gives permanent protection to the natural heritage and water resource systems, and provides for a diverse range of economic and social activities. It includes lands within, and builds upon the ecological protections provided by, the Niagara Escarpment Plan (NEP) and the Oak Ridges Moraine Conservation Plan (ORMCP). The 2005 Greenbelt Plan identifies where urbanization should not occur in order to provide permanent protection to the agricultural land base and the ecological features and functions occurring on this landscape. A review of the Greenbelt Plan was initiated in 2015 and culminated in the completion of the Proposed Greenbelt Plan in 2016.

Bill 23, the More Homes Built Faster Act, 2022 was passed by the Legislature and received Royal Assent on November 28, 2022. The MSPU planning works were completed prior to the Bill 23 announcement and adoption.

Niagara Escarpment Plan

The 2017 Niagara Escarpment Plan provides for the maintenance of the Niagara Escarpment and land in its vicinity substantially as a continuous natural environment, and to ensure only such development occurs as is compatible with that natural environment. The objectives of the Plan are as follows:

1. To protect unique ecologic and historic areas;
2. To maintain and enhance the quality and character of natural streams and water supplies;
3. To provide adequate opportunities for outdoor recreation;
4. To maintain and enhance the open landscape character of the Niagara Escarpment in so far as possible, by such means as compatible farming or forestry and by preserving the natural scenery;
5. To ensure that all new development is compatible with the purpose of this Act as expressed in **Section 2**;
6. To provide for adequate public access to the Niagara Escarpment; and,
7. To support municipalities within the Niagara Escarpment Planning Area in their exercise of the planning functions conferred upon them by the Planning Act.

A Place to Grow

A Place to Grow is a growth plan for the Greater Golden Horseshoe. It is long term plan, released in 2019 that builds upon the success of the initial Growth Plan in 2006. A Place to grow has the following aims:

- Create complete communities that offer support for living, working, learning, shopping, and playing;
- Provide affordable housing options to meet the needs of people at any age;
- Prioritize intensification and high-density communities in strategic growth areas to efficiently use land and infrastructure while supporting transit viability;
- Conserve and promote cultural heritage resources to support the social, economic, and cultural well-being of all communities, including First Nations and Métis communities; and,
- Integrate climate change considerations into planning and managing growth to create more resilient and sustainable communities and infrastructure.

The Growth Plan received Amendment 1 (2020), which came into effect August 28, 2020, and includes changes to the population and employment forecasts, the horizon year for planning, and other policies to increase housing supply, create jobs, attract business investment, and better align with infrastructure. This Plan was used as input to Niagara Region's Regional Official Plan in 2022.

Planning Act

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

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

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

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

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

Fisheries Act

The Fisheries Act provides provisions on the conservation and protection of freshwater and marine fish habitat in order to sustain fish species. In 2013, the Fisheries Policy statement was released to support the changes made to the Fisheries Act in 2012. The changes made to the Fisheries Act focuses on the protection of the productivity of commercial, recreational, and Aboriginal fisheries, improved implements for both compliance and protection, enhanced stakeholder partnerships (e.g., government agencies, local groups), and ensuring regulatory requirements are clear and consistent. In 2018, amendments for restoration of lost protections and incorporation of modern safeguards were proposed. The Fisheries Act received royal assent and became law as of June 21, 2019.

Water Opportunities and Conservation Act

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

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

To further the purpose of the *Act*, the MOECC may establish aspirational targets with respect to the conservation of water and other matters.

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

Safe Drinking Water Act

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

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

Clean Water Act

The *Clean Water Act* was adopted in 2006. The purpose of the *Act* is to protect existing and future sources of drinking water. The *Act* requires the following:

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

Ministry of the Environment and Climate Change Procedures F-5-1 and F-5-5

Procedure F-5-1 outlines the treatment requirements for municipal and private sewage treatment works discharging to surface waters. Effluent requirements are established on a case-by-case basis considering the characteristics of the receiving water body. Guideline F-5 takes the approach that all sewage treatment works should provide secondary treatment or equivalent as the "normal" level of treatment unless individual receiving water assessment studies indicate the need for higher levels of treatment. Existing works not complying with this Guideline are required to upgrade as soon as possible.

This procedure gives Effluent Design Objectives for biochemical oxygen demand (BOD), suspended solids, total phosphorus, and Effluent Guidelines for the former two. An Effluent Design Objective for ammonia is given for conventional activated sludge treatment with nitrification. Sewage treatment works designed according to the Ministry "Guidelines for the Design of Sewage Treatment Works" should be able to produce annual average effluent quality approximately equal to the Effluent Design Objectives, but not to exceed the Effluent Guidelines criteria.

Procedure F-5-5 outlines the requirements for municipal and private combined and partially separated sewer systems. The goals of the Procedure are as follows:

- Eliminate dry weather overflows;
- Minimize the potential for impacts on human health and aquatic life resulting from Combined Sewer Overflows (CSOs);
- Achieve as a minimum, compliance with body contact recreational water quality objectives for E.coli at beaches impacted by CSOs for at least 95% of the period June 1 – September 30 for an average year; and,
- Each operating authority of a combined sewer system is expected to:
    - Develop a Pollution Prevention and Control Plan,
    - Meet minimum CSO controls, and
    - Provide additional controls for beaches impaired by CSOs where water quality is not meeting E.coli objectives or where required by receiving water quality conditions.

Pollution Control Plans have been completed for most of the sewersheds in the Niagara Region outlining how the requirements of F-5-1 and F-5-5 will be met. The recommendations from these studies are summarized in **Section 3.4** of this report.

Canada-wide Strategy for the Management of Municipal Wastewater Effluent

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

CCME Strategic Vision for Water

In 2009, the Canadian Council of Ministers of the Environment (CCME) provided a framework for future actions and activities related to water through the development of a vision and action plan, such that Canadians have access to clean, safe, and sufficient water to meet their needs in ways that also maintain the integrity of ecosystems. The goals and rationale developed as part of the vision includes the following:

- Goal 1: Aquatic ecosystems are protected on a sustainable watershed basis.
  Rationale: Enhance understanding and application of Integrated Water Resource Management to improve ecosystem health.
- Goal 2: The conservation and wise use of water is promoted.
  Rationale: Improve understanding of the full value of water to achieve behavioral change.
- Goal 3: Water quality and water quantity management is improved, benefitting human and ecosystem health.
  Rationale: Promote nationally consistent approaches to water quality and quantity monitoring, guidelines, and multi-jurisdictional public reporting. Encourage research and networks to enhance knowledge and understanding of ground and surface waters.
- Goal 4: Climate change impacts are reduced through adaptive strategies.
  Rationale: Enhance water quality and quantity monitoring networks to support water and adaptation needs.
- Goal 5: Knowledge about Canada's water is developed and shared.
  Rationale: Help to spearhead value added information on water quality and quantity by supporting jurisdictional reporting efforts to Canadians in a systematic and consistent fashion.

Canadian Environmental Protection Act - Inorganic Chloramines and Chlorinated Wastewater Effluents in Municipal Wastewater Effluent

The Canadian Environmental Protection Act (CEPA) required the elimination of toxic chlorine residuals from municipal wastewater effluent. All owners and operators of wastewater systems with daily volumes greater than 5,000 cubic metres of effluent were required to lower their total residual chlorine (TRC) levels to less than 0.02mg/L or lower by December 15, 2009. Owners of wastewater systems (i.e., Niagara Region) were required to submit information to the federal Minister of Environment once their Pollution Prevention Plan (P2 plan) was prepared and had fully implemented the activities outlined in their P2 plan.

6.2 Conservation Authority Regulation and Policy

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

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

The study area falls predominantly within the boundaries of Niagara Peninsula Conservation Authority (NPCA) watersheds, which cover approximately 1,666 km^2 of the study area (**Figure 2.4**). Approximately 1.3 km^2 of lands in the north-western portion of the study area fall within the jurisdiction of the Hamilton Conservation Authority (HCA).

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

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

NPCA and HCA also administer Regulation 155/06 and Regulation 161/06, respectively, under Section 28 of the Conservation Authorities Act. In general, these regulations prohibit altering a watercourse, wetland, or shoreline and prohibit development in areas adjacent to river and stream valleys, hazardous lands, and wetlands, without the prior written approval from the Conservation Authority (i.e., issuance of a permit).

Finally, both NPCA and HCA have Level 2 agreements with Fisheries and Oceans Canada (DFO) to review projects under Section 35 of the Fisheries Act, which deals with management and protection of fish habitat. Under these agreements, the responsibilities of NPCA and HCA are:

- Determination of the presence of fish habitat, as well as potential impacts to fish and fish habitat resulting from a proposed project;
- Working with the proponent to mitigate potential impacts to fish and fish habitat resulting from the proposal;
- Issuing a letter of advice for projects that will likely not constitute a harmful alteration, disruption, or destruction of fish habitat (often referred to as a HADD); and,
- If necessary, referring the proposal to Fisheries and Oceans Canada for authorization under the Fisheries Act, if the impacts cannot be mitigated.

6.3 Regional Municipality of Niagara

The key regional initiatives that provide directives and are considered under the Master Servicing Plan process, are summarized below, in addition to the integrated planning process described in **Section 3.1**.

2019 – 2022 Regional Council Strategic Priorities

In 2019, Regional Council established five broad strategic priorities to enable a more prosperous and sustainable Niagara, while fostering an environment for economic prosperity, as follows:

- Supporting businesses and economic growth,
- Healthy and vibrant community,
- Responsible growth and infrastructure planning, and
- Sustainable and engaging government.

The Regional Council Strategic Priorities demonstrated the Region's continued efforts to advance key growth management objectives for all facets of infrastructure, including water and wastewater programs and initiatives.

Regional Climate Change Strategy

In 2013, Niagara Region created a climate change program to guide the reduction of greenhouse gas emissions and the risk from anticipated climate change as well as maximizing its benefit. This program sets out five milestones to reduce greenhouse gas emissions:

- Create a greenhouse gas emissions inventory and forecast,
- Set an emissions reductions target,
- Develop an action plan,
- Carry out the action plan, and
- Monitor progress and report results.

These milestones, adopted by Niagara Region, follow the Milestone Framework provided by the Federation of Canadian Municipalities.

In 2018, Niagara region created a New Niagara Official Plan – Climate Change Work Program. The climate change work program consists of six phases, listed below, with the objective to develop policies on climate change.

- Project initiation
- Discussion paper
- Consultation #1
- Develop OP Policies
- Consultation #2
- Other Implementation Tools

7 PLANNING AND GROWTH PROJECTIONS

7.1 Planning Projections

Amendment 1 to the Province's Growth Plan came into effect on August 28, 2020. This amendment updated A Place to Grow Plan which included updates to population and employment forecasts to a 2051 horizon.

Based on the need to conform to Amendment 1 and to Niagara Official Plan, the Region completed a 2051 Land Needs Assessment exercise that resulted in updated residential population and employment forecasts for the use in concurrently running studies, including the Water and Wastewater Master Plan and the Transportation Master Plan. The distribution of population and employment growth among the lower tier municipalities within the study area are presented in **Table 2.4**. For the purpose of the Master Plan, 2021 has been used as the base year.

Table 2.4 Projected Population Statistics – 2021 and 2051 Traffic Area Zones

Municipality	2021 Population and Employment		2051 Population and Employment		2021 to 2051 Growth Population and Employment		Post-2051	
	Population	Employment	Population	Employment	Population	Employment	Population Equivalent	2021 to Post 2051 Growth
City of Niagara Falls	96,616	38,079	141,574	59,318	44,957	21,238	200,892	0
City of Port Colborne	19,145	5,571	23,222	7,550	4,077	1,979	40,030	9,258
City of St. Catharines	138,624	62,501	171,733	80,175	33,110	17,674	269,069	14,589
City of Thorold	23,252	8,099	39,560	12,512	16,309	4,412	68,360	17,892
City of Welland	57,071	17,949	82,900	28,684	25,829	10,735	135,363	24,439
Town of Fort Erie	33,865	10,241	48,013	17,432	14,149	7,191	77,813	12,368
Town of Lincoln	26,499	11,038	45,803	15,641	19,304	4,603	71,707	10,263
Town of Niagara-on-the-Lake	20,269	12,277	29,574	17,175	9,305	4,898	54,127	7,380
Town of Pelham	19,180	4,559	28,763	7,140	9,583	2,581	37,341	1,438
Township of Grimsby	30,753	10,037	38,073	14,670	7,320	4,633	68,698	14,251
Township of West Lincoln	16,707	4,224	38,401	10,527	21,694	6,304	50,848	1,920
Township of Wainfleet	7,126	1,319	7,732	1,831	606	512	9,949	387
TOTAL	**489,106**	**185,894**	**695,348**	**272,655**	**206,242**	**86,761**	**1,084,198**	**114,185**

7.1.1 Land Use Analysis

The growth management strategy exercise was completed at a high level with population and employment projected on a five-year interval and allocated to Traffic Analysis Zones (TAZs). TAZs are the basic geographic unit for inventorying demographic data and land use within a study area most commonly used in conventional transportation planning models. TAZs often cover larger geographical blocks which are appropriate for traffic analysis but less refined for the use in water and wastewater infrastructure analysis which requires a more granular level of detail to refine accuracy of results.

To help direct the 2021 MSPU, the Region and its consultant partner, GM BluePlan, completed a land use analysis exercise to further refine the large, spatially allocated TAZ's population and employment projections to smaller geographic areas. The analysis included a review of vacant residential and employment land, strategic areas for planned intensification nodes and corridors, and land associated with the Region's current development planning process, such as Draft Plans of Subdivision and building permits. This process converted the residential and employment projections from the growth management study into more detailed allocations which enabled a spatial analysis to existing water and wastewater service areas.

The resulting growth area maps are provided in **Appendix 2B**.

7.1.2 Service Area

Completion of the land use analysis exercise enabled the projected growth to be spatially assigned to the existing water and wastewater service areas. The distribution of the population and employment within the separate water and wastewater service areas is presented in **Table 2.5** and **Table 2.6**.

Table 2.5 Existing and Projected Water Serviced Residential and Employment Population

Municipality	2021		2051		Post-2051	
	Residential	Employment	Residential	Employment	Residential	Employment
Grimsby	29,806	9,889	37,139	14,522	48,672	19,338
Lincoln	25,168	10,181	44,195	14,527	51,883	19,258
St. Catharines	138,624	62,501	171,733	80,175	184,155	85,453
NOTL	20,272	12,278	29,577	17,177	33,841	21,566
Niagara Falls	94,437	37,781	139,340	58,790	160,477	62,768
Fort Erie	33,865	10,241	48,013	17,432	61,721	20,116
Port Colborne	17,356	5,083	21,496	7,040	36,769	11,246
Thorold	22,898	8,041	39,230	12,441	53,363	19,284
Welland	57,076	17,950	82,909	28,685	106,932	35,497
Pelham	18,377	4,329	27,965	6,824	29,999	7,073
West Lincoln	8,386	2,400	30,279	8,091	34,585	9,409
Total	**466,264**	**180,673**	**671,877**	**265,703**	**802,398**	**311,008**

Table 2.6 Existing and Projected Wastewater Serviced Residential and Employment Population

Municipality	2021		2051		Post-2051	
	Residential	Employment	Residential	Employment	Residential	Employment
Fort Erie	30,287	9,583	44,004	16,284	56,752	18,023
Grimsby	29,612	9,859	36,932	14,486	48,464	19,284
Lincoln	23,348	8,792	41,288	12,646	48,548	16,494
Niagara Falls	93,941	37,253	138,442	57,885	159,576	61,864
NOTL	15,982	9,622	23,523	13,521	26,689	17,769
Pelham	15,462	3,360	24,957	5,557	26,914	5,764
Port Colborne	15,969	4,693	20,094	6,592	35,096	10,771
St. Catharines	136,974	59,764	169,735	76,844	182,111	82,081
Thorold	22,552	7,143	38,506	11,160	52,502	15,813
Welland	55,229	17,337	81,120	27,782	105,024	34,524
West Lincoln	8,386	2,400	30,279	8,091	34,585	9,409
Total	**447,741**	**169,807**	**648,880**	**250,850**	**776,260**	**291,796**

8 NIAGARA REGION WATER AND WASTEWATER PRINCIPLES AND DESIGN 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 principle and policy statements 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 of supply 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 of supply. Further, system storage requirements must 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 additional capacity for new developments.

8.1 Principles and Guidelines

Building on the Problem and Opportunity Statement for the 2021 MSPU, specific servicing principles have been developed to guide and provide direction for the development and evaluation of servicing strategies.

In general, Niagara Region is looking to build and maintain efficient, effective, and well managed water and wastewater systems that provide consistent and appropriate level of service to the end users.

In order to capture these goals, the servicing principles have been structured as outline below. Detailed servicing principles are provided in **Appendix 2C**.

General Servicing Principles

G.01	Municipal Servicing
G.02	Environmental Protection
G.03	Planning Horizon
G.04	Reserve Capacity
G.05	System Reliability and Security
G.06	Location of Municipal Services and Facilities
G.07	Climate Change
G.08	Energy Efficiency
G.09	Integrated Infrastructure Program
G.10	Level of Service
G.11	Region and Local Municipality Consistency
G.12	Sustainability

Water Servicing Principles

W.01	Health & Safety
W.02	Raw Water Sources
W.03	Treatment & Distribution Water Quality
W.04	Water Demand Projections
W.05	Distribution Requirements
W.06	Fire Flow Requirements
W.07	Storage Requirements
W.08	Operational Flexibility
W.09	Water Efficiency and Consumption Trends
W.10	Water Supply and Distribution Security

Wastewater Servicing Principles

WW.01	Health & Safety
WW.02	Receiving Water Bodies
WW.03	Wastewater Treatment and Collection Requirements
WW.04	Wastewater Flow Projections
WW.05	Sewer Use Criteria
WW.06	Separated Wastewater and Stormwater Systems
WW.07	Wastewater Collection and Pumping Systems
WW.08	Wet Weather Criteria
WW.09	Wet Weather Strategies
WW.10	Capacity Allocation
WW.11	Wet Weather Guidelines

The above noted principles address a wide range of servicing needs.

Under the 2021 MSPU, the principles were developed and enhanced to address the vision statement priorities of climate change, energy management, infrastructure optimization, system security, and resiliency. Of particular note, the area of wet weather management was also enhanced in the principles.

8.2 Design Criteria and Level of Service Objectives

In addition to the above noted principles, this document provides summary detail on the water and wastewater design criteria used under the Master Servicing Plan. The design criteria outline the methodology and values used to estimate growth related flows as well as the decision-making rationale related to infrastructure capacity and the trigger for upgrades. Detailed design criteria are provided in **Appendix 2C**.

8.2.1 Water Demand Design Criteria for Planning Purposes

The 2021 MSPU has used 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; and,
- Peak Hour Factors: Based on diurnal curves developed for each system using historic SCADA data.

8.2.2 Wastewater Flows Design Criteria for Planning Purposes

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

- Residential Flow Generation: 255 Lpcd;
- Employment Flow Generation: 310 Lped;
- Peaking Factor based on Harmon formula with values between 2 and 4 with consideration to the catchment area performance; and,
- Extraneous Flow Design Allowance for regional wastewater infrastructure:
    - 0.4 L/s/ha for existing areas
        - 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
    - 0.286 L/s/ha for new developments
    - Consideration of observed peak and total flows under 5-year design storm in contributing catchments to initiate extraneous flow reduction efforts.

9 NATURAL ENVIRONMENT / EXISTING CONDITION

9.1 Policy Context

9.1.1 Provincial Policy Statement (PPS)

The PPS was issued under Section 3 of the Planning Act, and came into effect on May 1, 2020, and replaces the PPS issued April 30, 2014. (Note Niagara Regions falls within Ecoregion 7E)

The natural heritage policies of the PPS (MMAH 2020) indicate that:

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

9.1.2 Species at Risk Act (SARA)

At a federal level, species at risk designations for species occurring in Canada are initially determined by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC). If approved by the federal Minister of the Environment, species are added to the federal List of Wildlife Species at Risk (Government of Canada 2002). Species that are included on Schedule 1 as endangered or threatened are afforded protection of critical habitat on federal lands under the Species at Risk Act (SARA). On private or provincially owned lands, only aquatic species listed as endangered, threatened, or extirpated and migratory birds are protected under SARA, unless ordered by the Governor in Council.

9.1.3 Endangered Species Act (ESA)

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

9.1.4 Fisheries Act

The purpose of the Fisheries Act is to maintain healthy, sustainable, and productive Canadian fisheries through the prevention of pollution, and the protection of fish and their habitat. In 2012, changes were made to the Fisheries Act to enhance Fisheries and Oceans Canada (DFO) ability to manage threats to Canada's commercial, recreational, and Aboriginal (CRA) fisheries. The Fisheries Act received royal assent and became law as of June 21, 2019.

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

9.1.5 Niagara Region Official Plan

Niagara Region's Official Plan (Office Consolidation, July2007) is the overarching policy document guiding land use within the Region. This document contains the Region's strategic objectives for development and conservation, as well as policies that implement provincial legislation and provide planning context to lower tier municipalities.

Section 7 of the Region's Official Plan (incorporated through Amendment 187 on April 16, 2008) defines the Region's Core Natural Heritage System and contains the Region's environmental policies. Section 7.A contains policies that apply throughout the Region (i.e., lands falling either within or outside of the Core Natural Heritage System). These include:

7.A.4.1 Development and site alteration may be permitted within an Earth Science Area of Natural and Scientific Interest (ANSI) shown on the Core Natural Heritage Map if it has been demonstrated that there will be no significant negative impacts on the earth science features for which the area was identified or on ecological functions related to the ANSI.

7.A.4.3 Linear public utilities and infrastructure may be permitted within an Earth Science ANSI if there is no reasonable alternative location, and they are designed to avoid or minimize negative impacts.

Section 7.B of the Region's Official Plan contains additional policies that apply to lands falling within the Core Natural Heritage System, which is defined in Policy 7.B.1.1 to consist of:

a) Core Natural Areas, classified as either Environmental Protection Areas or Environmental Conservation Areas;
b) Potential Natural Heritage Corridors connecting the Core Natural Areas;
c) Greenbelt Natural Heritage and Water Resources Systems; and,
d) Fish Habitat.

Policy 7.B.1.3 of the Region's Official Plan defines Environmental Protection Areas to include:

"…provincially significant wetlands; provincially significant Life Science Areas of Natural and Scientific Interest (ANSIs); and significant habitat of threatened and endangered species. In addition, within the Greenbelt Natural Heritage System, Environmental Protection Areas also include wetlands; significant valleylands; significant woodlands; significant wildlife habitat; habitat of species of concern; publicly owned conservation lands; savannahs and tallgrass prairies; and alvars."

Policy 7.B.1.4 of the Region's Official Plan defines Environmental Conservation Areas to include:

"…significant woodlands; significant wildlife habitat; significant habitat of species of concern; regionally significant Life Science ANSIs; other evaluated wetlands; significant valleylands; savannahs and tallgrass prairies; and alvars; and publicly owned conservation lands."

Although included within the Core Natural Heritage System, significant habitat of threatened and endangered species is not included in the Core Natural Heritage Map

Policy 7.B.1.3 of the Region's Official Plan states that:

"…these habitats will be identified through the Planning and Development review process. Where such habitat is identified development and site alteration shall be subject to the policies for Environmental Protection Areas."

Finally, Policy 7.B.1.14 of the Region's Official Plan states:

"…Notwithstanding other policies in this Plan essential public uses of a linear nature including utilities, communication facilities and transportation routes may be permitted within the Core Natural Heritage System or adjacent lands where an Environmental Assessment for the proposed use has been approved under Provincial or Federal legislation."

9.2 Ecological Features and Functions

This section describes the existing environmental conditions within the study area at a more detailed level, by ecological feature or function.

9.2.1 Niagara Escarpment Plan

Approximately 13,591 ha of lands designated within the Niagara Escarpment Plan Area occur within the study area. These lands occur through the northern portion of the study area within the Town of Grimsby, Town of Lincoln, City of Thorold, City of St. Catharines, Town of Pelham, Town of Niagara-on-the-Lake, and City of Niagara Falls (**Figure 2.5**). This portion of the study area contains a high concentration of provincially and regionally significant Areas of Natural and Scientific Interest (ANSIs), woodlots and Conservation Areas, as well as Short Hills Provincial Park.

Niagara Region

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Municipal Boundary

Urban Area Boundary

Environmental Features

Areas of Natural / Scientific Interest (ANSI)

Provincial Parks

Greenbelt Designation

Niagara Escarpment Plan

Protected Countryside

Lake Ontario

Hamilton

New York

Town of Grimsby

Town of Lincoln

Township of West Lincoln

City of St. Catharines

Town of Niagara-on-the-Lake

City of Thorold

City of Niagara Falls

Niagara River

Town of Pelham

City of Welland

Township of Wainfleet

Haldimand

City of Port Colborne

Town of Fort Erie

Lake Erie

0 10 20 km

Figure 2.5
Provincial Policy Areas
Baseline System Understanding

BluePlan

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620126-W-006
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9.2.2 Greenbelt Protected Countryside

Approximately 34,113 ha of lands designated as Greenbelt-Protected Countryside occur within the study area. These lands extend in a southerly direction from the Lake Ontario shoreline to the Niagara Escarpment in the eastern portion of the study area, generally to the southern boundary of Grimsby in the west, and as far south as Pelham Corners (Town of Pelham) in the central portion of the study area. The Protected Countryside is made up of an Agricultural System and a Natural System. Both of these system designations occur within the study area.

As noted in **Section 6.1**, the *More Homes Built Faster Act*, 2022 was passed by the Legislature and received Royal Assent on November 28, 2022. As part of this *Act*, specific pieces of land which were previously Greenbelt Protected Countryside were redesignated to allow residential development. The MSPU planning works were completed prior to the Bill 23 announcement and adoption.

9.2.3 Wetlands

The designation of wetlands as either regionally or provincially significant is completed through a standardized assessment process developed by the Ontario Ministry of Natural Resources and Forestry (OMNRF), the Ontario Wetland Evaluation System (OWES). Provincially significant wetlands are protected under Section 2.1 of the Provincial Policy Statement (2020), which prohibits development and site alteration in provincially significant wetlands and coastal wetlands. In addition, development and site alteration on adjacent lands is permitted only if the ecological function of the adjacent lands has been evaluated and it has been demonstrated that there will be no negative impacts on the natural features or ecological functions. Wetlands are also included in the Natural Areas System of the Niagara Escarpment Plan (2017) and in the Core Natural Heritage System of Niagara Region's Official Plan.

9.2.4 Niagara Region Core Natural Heritage System

The Niagara Region's Core Natural Heritage System consists of:

- Core Natural Areas, classified as either Environmental Protection Areas or Environmental Conservation Areas;
- Potential Natural Heritage Corridors connecting the Core Natural Areas;
- The Greenbelt Natural Heritage and Water Resources Systems; and,
- Fish Habitat.

These elements of the Core Natural Heritage System within the study area are depicted in the Niagara Region Official Plan (Schedule C) and provided in **Figure 2.6**.

As defined in the Region's Official Plan, Environmental Protection Areas include provincially significant wetlands, provincially significant Life Science Areas of Natural and Scientific Interest (ANSIs), and significant habitat of threatened and endangered species. In addition, within the Greenbelt Natural Heritage System, Environmental Protection Areas also include wetlands, significant valley lands, significant woodlands, significant wildlife habitat, significant habitat of species of concern, publicly owned conservation lands, savannahs, tallgrass prairies, and alvars. Environmental Conservation Areas include significant woodlands, significant wildlife habitat, significant habitat of species of concern, regionally significant Life Science ANSIs, other evaluated (e.g., regionally significant) wetlands, significant valley lands, savannahs, tallgrass prairies, alvars, and publicly owned conservation lands.

Although included within the Core Natural Heritage System, significant habitats of threatened and endangered species are not included in the Core Natural Heritage Areas. Rather, the Region's Official Plan states that these habitats are identified through the Planning and Development review process.

making our mark
NIAGARA
OFFICIAL PLAN

Figure 2.6

Schedule C1 - Natural Environment System Overlay and Provincial Natural Heritage Systems

June 2022

LAKE ONTARIO

CITY OF HAMILTON

NIAGARA RIVER

UNITED STATES OF AMERICA

HALDIMAND COUNTY

LAKE ERIE

Natural Environment System Overlay
Growth Plan Natural Heritage System
Greenbelt Plan Natural Heritage System
Urban Areas
Rural Settlements

LEGEND
Settlement Areas
Provincial Road
Regional Road
Railway
Major Watercourses
Welland Canal
Airport
Aerodrome
International Crossing
Municipal Boundaries
Niagara Escarpment Plan Area

0 2.5 5 10
Kilometers

N
W E
S

*Under Appeal with Ontario Land Tribunal

9.2.5 Life Sciences ANSIs

Areas of Natural and Scientific Interest (ANSIs) are defined in the Provincial Policy Statement (2020) as:

"areas of land and water containing natural landscapes or features that have been identified as having life science or earth science values related to protection, scientific study, or education."

OMNRF evaluates ANSIs to determine whether they are provincially or regionally (locally) significant. This evaluation takes into consideration the value of the area for conservation, scientific study, and education. Both provincially and regionally significant ANSIs are included in the Escarpment Natural Areas under the Niagara Escarpment Plan. ANSIs are designated as Earth Science or Life Science depending on whether they contain significant geological features (e.g., rock, fossil, and landform features) or biological feature (e.g., natural landscapes, ecological communities, plant, and animal species), respectively. Provincially and regionally significant Life Science ANSIs are included in Niagara Region's Core Natural Heritage System.

9.2.6 Provincial Parks

Short Hills Provincial Park (660 ha) is in the centre of the Niagara Peninsula bordering the City of St. Catharines, City of Thorold, and the Town of Pelham (**Figure 2.5**). Located at the southern edge of the Niagara Escarpment, the park contains small, but steep hills ("short hills"). Located in the Carolinian Zone, the park is home to many rare plant species including Sassafras and Black gum trees. Wildlife recorded in the park include mammals such as Brush wolves and White-tailed deer, as well as bird species which include Great horned owl, Indigo bunting, Bobolink, and Scarlet Tanager. Amphibians and Reptiles found in the park include Eastern milksnake, Butler snake, Leopard frog, American toad, Red-backed salamander, and the Brown snake (Friends of Short Hills Park, 2010).

9.2.7 Conservation Areas

The Niagara Peninsula Conservation Authority (NPCA) owns conservation lands across the study area. These 25 Conservation Areas, which cover a total area of approximately 1,130.4 ha, are mapped in **Figure 2.7**. The Study Area falls predominately within the boundaries of the NPCA watershed which covers approximately 1,666 km^2 of the study area with a further 1.3 km^2 of lands in the north-west within the jurisdiction of the Hamilton Conservation Authority (HCA).

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Urban Area Boundary
Municipal Boundary
Railways

Ecological Features

Environmental Protection Areas
Environmental Conservation Areas
Provincially Significant Wetlands
Waterbodies

Lake Ontario
Lake Erie
Niagara River
New York
Hamilton
Haldimand
Town of Grimsby
Town of Lincoln
Township of West Lincoln
Town of Pelham
City of St. Catharines
Town of Niagara-on-the-Lake
City of Thorold
City of Niagara Falls
City of Welland
Township of Wainfleet
City of Port Colborne
Town of Fort Erie
QEW
406
405
420
58
58A
140
3
0
10
20 km

Figure 2.7
Ecological Features
Baseline System Understanding

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9.2.8 Carolinian Canada Signature Sites

Although the Carolinian Life Zone makes up less than 1% of Canada's total land area, it contains a greater number of species than any other ecosystem in Canada, including approximately one third of Canada's rare and endangered species and many other species which are not found anywhere else in the country (Carolinian Canada, 2010). In 1984, 38 sites were identified as critical natural areas for the conservation of the Carolinian Life Zone in Canada. Six of these Carolinian Canada Signature Sites are located within the study area, where they cover a total area of approximately 5,200 ha.

9.2.9 Fish and Fish Habitat

Fish communities are generally classified according to the thermal preference of the dominant species of the fish community found within the waterbody or watercourse. Watercourses classified as cold water have a mean summer surface water temperature of less than 19°C or contain characteristic cold-water fish (e.g., salmon, trout, or sculpin species) or invertebrate species. Watercourses classified as cool water have a mean summer surface water temperature between 19°C and 25°C or contain characteristic fish (e.g., Walleye or Northern Pike) or invertebrate species. Warmwater watercourses have a mean summer surface water temperature greater than 25°C, contain a fish community often characterized by Largemouth bass, Bluegill, carp, bullheads, or Bowfin, or characteristic invertebrate species. A watercourse is classified as "unknown" if there is no temperature information or data are not sufficient to classify as either cold, cool, or warm.

Within Niagara Region, watercourses have also been classified into three fish habitat categories (critical, important, marginal), based on the sensitivity and significance of the existing and potential fish habitats, for the purpose of assisting with resource management decisions (OMNRF, 2000). The OMNRF's database contains records of 97 fish species occurring within Niagara Region. The study area encompasses portions of the Lake Ontario Watershed, Niagara River Watershed, and Lake Erie Watershed.

9.3 Natural Environment

9.3.1 Physiography

The study area falls within three physiographic regions, including the Iroquois Plain, Niagara Escarpment, and Haldimand Clay Plain (Chapman and Putnam, 1984).

9.3.2 Iroquois Plain

Below the Niagara Escarpment, the lowlands bordering Lake Ontario were inundated by a body of water known as Lake Iroquois during last glacial period. Today, the Lake Iroquois Plain is characterized by lacustrine sand and clay deposits along the former lake bottom. The old Lake Iroquois shoreline is marked by distinct features including cliffs, bars, gravel beaches and boulder pavements. The region is characterized by generally level topography, with a slight slope towards the Lake Ontario shore. It extends west from the Niagara River to the Trent River in the east and can reach thicknesses of up to 20 m (Sharpe et al.1999).

9.3.3 Niagara Escarpment

Stretching over 700 km from the Bruce Peninsula to the Niagara River, the Niagara Escarpment is Ontario's most distinct landform. This region, which was designated a UNESCO World Biosphere Reserve in 1990, bisects the study area in an east-westerly direction and separates the northern lowland area adjacent to Lake Ontario from the elevated areas above the Niagara Escarpment. Along much of its length, the region is covered by a thin layer of stony loam, while the brow of the Escarpment is characterized by a ridge of vertical cliffs of dolostone bedrock.

9.3.4 Haldimand Clay Plain

The Haldimand Clay Plain extends south from the Niagara Escarpment to Lake Erie. The region is made up of a series of parallel belts or terraces with the highest elevation adjacent to the Escarpment. The overburden material increases in depth towards the south and consists of lacustrine clays, which were deposited during the period of inundation by pro-glacial Lakes Warren and Lundy. Higher relief and ridges in the west generally direct drainage to the east, including Twenty Mile Creek and the Welland River. Some watercourses, such as Twenty Mile Creek, have carved deep valleys through the Escarpment and drain into Lake Ontario.

9.3.5 Carolinian Forest Ecoregion

The study area occurs within Ecoregion 7E (Lake Erie – Lake Ontario Ecoregion, also called the Carolinian Forest Ecoregion). An ecoregion is a provincial Ministry of Natural Resources and Forestry (OMNRF) term which is defined as "an area of land within which the response of vegetation to the features of landform follows a consistent pattern" and is "defined by a characteristic range and pattern of climatic variables" (OMNRF, 2007). Ecoregion 7E is generally characterized by very flat relief created by the deep, fined grained sediments from glacial and post glacial lakes that blanket the sedimentary bedrock. Wetlands and water are found on less than 2% of the ecoregion (OMNRF, 2007). Ecoregion 7E has the greatest diversity of species in Canada and is home to approximately 2,200 species of herbaceous plants, 70 species of trees, and 400 species of birds (OMNRF, 2007).

The Niagara Escarpment, which is recognized provincially and internationally as a significant landform, traverses the northern portion of the study area in an east-westerly direction. Although the Niagara Escarpment occupies a relatively small portion of the study area, it contains a variety of habitats including wooded slopes, crevices, exposed bedrock, cliff faces, waterfalls, and large tracts of forest which account for its high biological diversity. The Niagara Escarpment supports over 1,500 species of vascular plants, 325 bird species, 55 mammal species and 34 species of reptiles and amphibians (Niagara Escarpment Commission, 2010b). The portion of the study area that falls within the Niagara Escarpment contains a high concentration of provincially and regionally significant Areas of Natural and Scientific Interest (ANSIs), woodlots, Conservation Areas, and Short Hills Provincial Park.

The study area is within the Deciduous Forest Region based on Rowe's (1972) description of the Forest Regions of Canada. The Niagara section of the deciduous forest region contains many trees, shrubs, and herbs from the deciduous forest to the south, as a result of the favourable climatic and soil conditions.

The Carolinian Zone is a component of the Deciduous Forest Region, occupying the southeastern portion of the Forest Region from Grand Bend on Lake Huron and Toronto on Lake Ontario, extending southward to Lake Erie. The Carolinian Zone is characterized by a warmer and moister lake effect climate, occurring on fertile soils. Dominant tree species include oaks and hickories with associates including Black walnut, Sycamore, and Sassafras. Although the Carolinian Zone makes up less than 1% of Canada's total land area, it contains a greater number of species than any other ecosystem in Canada, including approximately one third of Canada's rare and endangered species and many other species which are not found anywhere else in the country (Carolinian Canada, 2010).

The mammal species found in the study area include those common to southern Ontario, such as White-tailed Deer, Coyote, Red fox, Raccoon, Striped Skunk, Woodchuck, Eastern Gray Squirrel, Eastern Chipmunk, Meadow Vole, and Eastern Cottontail, as well as species characteristic of the Carolinian Zone, such as the Grey Fox and Woodland Vole (Carolinian Canada, 2010).

There are observational records of more than 44 species of reptiles and amphibians occurring within Niagara Region, which represent more than half of the reptile and amphibian species found in Ontario (Yagi et al.2009). A number of these species have been designated at risk, including Fowler's Toad, Blandings Turtle, Eastern Hognosed Snake, and Massasauga Rattlesnake (NHIC, 2010).

The study area contains a notably high species richness and abundance of birds. There are historical and recent records of over 360 bird species occurring within Niagara Region (Black & Roy, 2009). These include species common to southern Ontario such as the Canada goose, Turkey vulture and Mallard duck, as well as species characteristic of the Carolinian Zone, including the Red-bellied woodpecker and Yellow-breasted chat.

9.3.6 Aquatic Environment

The study area encompasses portions of three watersheds: the Lake Ontario Watershed, Niagara River Watershed, and Lake Erie Watershed.

Lands in the northern portion of the study area drain into Lake Ontario. The Lake Ontario Watershed generally starts above the Niagara Escarpment, where the watercourses in the western portion of the study area drain in an easterly direction before turning north to flow over the Escarpment and into Lake Ontario. The watershed falls within the municipal boundaries of the Town of Grimsby, Township of West Lincoln, Town of Lincoln, Town of Pelham, City of St. Catharines, City of Thorold, City of Welland, City of Niagara Falls, and Town of Niagara-on-the-Lake. This watershed contains five drainage basins.

Lands in the central portion of the study area drain into the Niagara River, a channel or isthmus approximately 58 km in length that flows from Lake Erie to Lake Ontario. Near the midpoint of the Niagara River, an abrupt elevation drop of 51 m at Niagara Falls separates the Lower and Upper segments of the River. In 1987, the Niagara River was designated as an Area of Concern by the International Joint Commission due to degraded water quality resulting from nutrients and rural runoff, sedimentation, contaminants from industry and municipal sources, and combined sewer overflows (Environment Canada, 2010). The Niagara River Watershed contains four drainage basins.

Lands in the southern portion of the watershed drain into Lake Erie. This drainage occurs primarily through small streams and tile drains that have been created to drain the Haldimand Clay Plain, generally flowing south from the Onondaga Escarpment to Lake Erie. The entire Lake Erie Watershed covers less than 20 km^2. Within the study area, this watershed contains two drainage basins.

10 EXISTING WATER AND WASTEWATER SYSTEMS

10.1 Existing Water System

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. The existing water distribution system managed by the Region consists of six water treatment plants, 316 km of watermains, eleven booster stations, six high lift pump stations at treatment plants, twenty-five storage facilities and reservoirs, fifteen re-chlorination stations, and 82 pressure reducing valves (PRV). **Figure 2.8** shows a map of the existing water distribution system. Detailed description of the water system is included in Volume 3 – Water MSPU Update.

10.2 Existing Wastewater System

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. Based on current GIS data, the existing wastewater system managed by the Region consists of ten wastewater treatment plants, one lagoon system, approximately 322 km of trunk wastewater linear infrastructure including sewers, forcemains and flow meter flumes, 10 leachate pumping stations, and 108 sewage pumping stations. **Figure 2.9** shows a map of the existing wastewater system. Detailed description of the wastewater system is included in Volume 4 – Wastewater MSPU Update.

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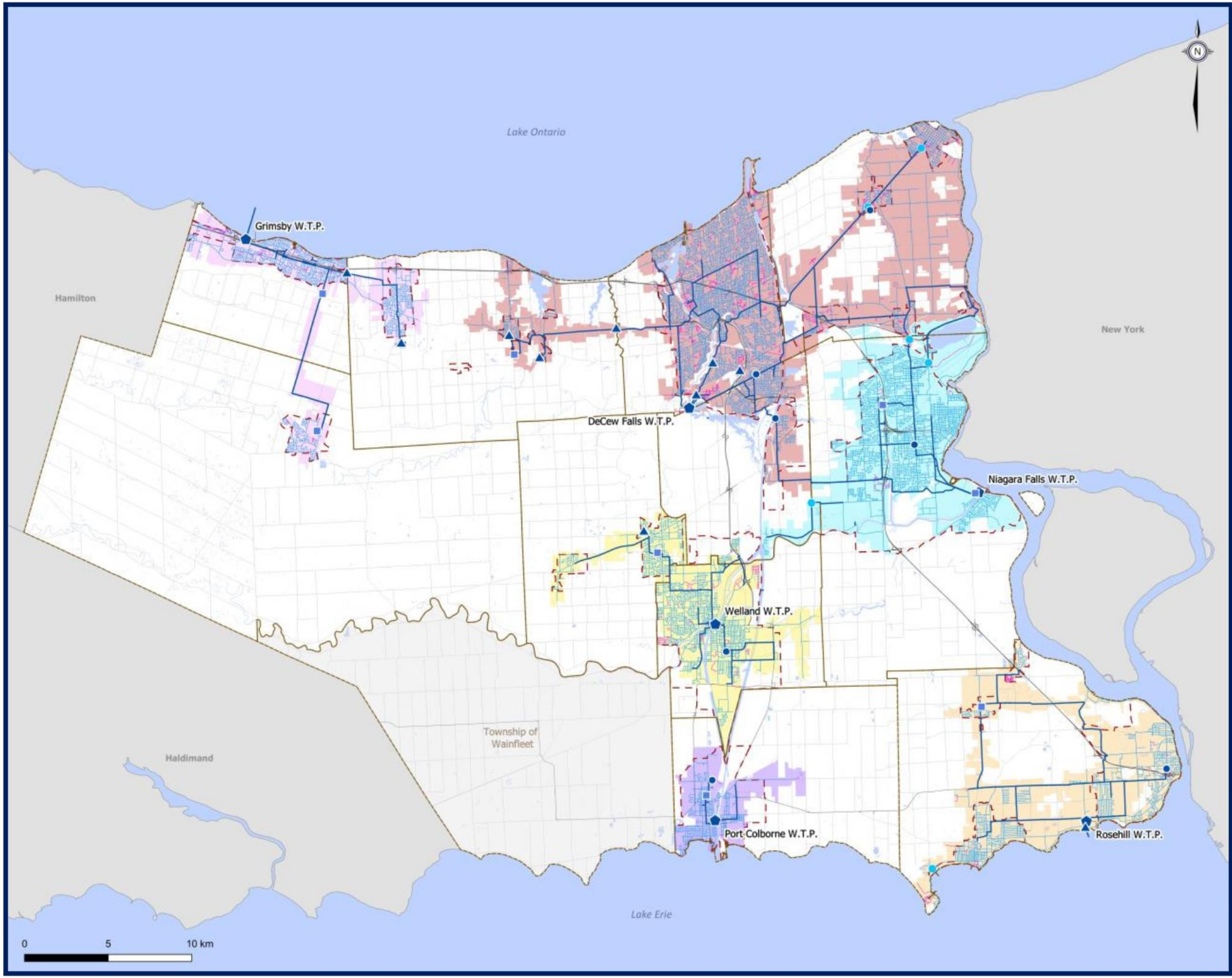

Existing Water Infrastructure

- 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 2.8
Water System Overview
Baseline System Understanding

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Niagara Region

2021 Water and Wastewater Master Servicing Plan Update

Lake Ontario

Hamilton

New York

Haldimand

Township of Wainfleet

Lake Erie

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.

0 5 10 km

Existing Wastewater Infrastructure

- Wastewater Treatment Plant (WWTP)
- Combined Sewage Detention Facility
- 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 2.9

Wastewater System Overview

Baseline System Understanding

BluePlan Engineering

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2A

Regional Municipality of Niagara

APPENDIX 2A

REGIONAL POLICY PLAN – INFRASTRUCTURE

5.2 Infrastructure

Well-planned and managed *infrastructure* is fundamental to attaining the Region's vision for thriving and resilient communities, and key to achieving the growth forecasts of this Plan.

The *infrastructure* policies that follow will ensure that the region's existing and future *development* is supported by *infrastructure* that is planned, constructed, and managed in an integrated, efficient, and environmentally *sustainable* manner.

The Region will continue to prepare, update, and rely upon on long-term *infrastructure* master plans to ensure optimization and strategic timing of sound investments.

The policies in this section address the region's existing and future *infrastructure* needs relating to drinking water, wastewater, stormwater management, waste, energy, *utility* services, and pipeline infrastructure.

The planning and development of *infrastructure* must be integrated with *climate change* resiliency. The Growth Plan directs that the Region develop policies to identify actions that will reduce greenhouse gas emissions, assess *infrastructure* risks and vulnerabilities, and identify actions to address these growing challenges.

The objectives of this section are as follows:

a) undertake *infrastructure* planning, development, and asset management;

b) ensure municipal services are provided in an efficient manner;

c) supply *municipal water and wastewater systems/servicing* within *urban areas*;

d) restrict *municipal water and wastewater systems/servicing* outside *urban areas*;

e) provide municipal *waste management* services;

f) ensure stormwater management and *green infrastructure* is integrated into the planning process;

g) ensure *utilities* are provided in an efficient and compatible manner; and

h) support the development of green energy infrastructure.

Roles in the Delivery of Services

The Region provides *water services* and *wastewater services* to its *urban areas*. The Region is responsible for water treatment, transmission mains, storage facilities, major booster pumping stations, wastewater treatment, trunk sewers and sewage pumping stations. The Local Area Municipalities are responsible for local water distribution networks and local sewer collection systems.

The Region and Local Area Municipalities share a role in stormwater management.

The Region is exclusively responsible for *waste management*.

5.2.1 Infrastructure Planning, Development, and Asset Management

5.2.1.1 *Infrastructure* planning, development, and asset management shall be undertaken in support of the growth management policies of this Plan to promote sustainability and the achievement of *complete communities*.

5.2.1.2 A coordinated, integrated, and comprehensive approach using the minimum *intensification* and density targets of this Plan, should be used for the planning, development, and management of *infrastructure* within municipalities, across lower-tier and upper-tier municipal boundaries, and with other orders of government, agencies, and boards.

5.2.1.3 *Infrastructure* planning shall be aligned with land use planning, *infrastructure* investment and *watershed planning*.

5.2.1.4 *Infrastructure* investment shall be leveraged to direct and support growth and *development* within *strategic growth areas* as well as to achieve the minimum *intensification* and density targets identified in this Plan.

5.2.1.5 Before consideration is given to developing new *infrastructure*, the Region and Local Area Municipalities shall optimize the use of existing *infrastructure*, and plan and direct growth in a manner that promotes efficient use of existing services.

5.2.1.6 The Region shall provide *infrastructure* and services within its jurisdiction to accommodate existing *development* and anticipated growth within the financial capability of the Region.

5.2.1.7 The Region will identify the full life-cycle costs of *infrastructure* and provide long-range, holistic, integrated and financially sustainable *infrastructure* planning based on the understanding of the co-relation between long-term *infrastructure* investment and long-term funding plans.

5.2.1.8 *Infrastructure* will be planned through the appropriate environmental assessment process, ensuring full regard for the *natural environment system*, *cultural heritage resources* and natural hazard areas of the region.

5.2.1.9 The location, design, construction, and operation of *infrastructure* will be sustainable, strategic, and cost-efficient, and minimize adverse impacts on the *natural environment system*, agricultural lands, and existing landscape.

5.2.1.10 The Region and Local Area Municipalities shall assess *infrastructure* risks and vulnerabilities, including those caused by the impacts of *climate change*, and identify actions and investments to address these challenges, which could be identified as part of municipal asset management planning.

5.2.1.11 The Region will promote the use of *green infrastructure* and *low impact development* by considering *green infrastructure* in public works projects and encouraging its use through review of development applications.

5.2.1.12 Local Area Municipalities should include policies in their official plans for the planning and construction of new *infrastructure* and related facilities that address the principles of environmental sustainability including but not limited to:

a) reducing energy demands;

b) promoting design and orientation to optimize passive solar energy gains;

c) providing for on-site, renewable energy generation and co-generation and district energy systems;

d) maximizing water conservation, including water efficient landscaping and collection and reuse of clean water;

e) providing appropriate stormwater infiltration at the source;

f) integrating green roofs into energy and water conservation strategies;

g) providing for collection and storage of recyclable and organic wastes on site;

h) integrating *active transportation* and transit into development plans; and

i) maintaining and enhancing hydrological and *natural heritage features* and functions.

5.2.1.13 Construction of new, or expansion of existing municipal water, wastewater and stormwater *infrastructure* should only be considered where the following conditions are met:

a) strategies for water conservation and other water demand management initiatives are being implemented in the existing service area;

b) plans for expansion or for new services shall serve growth that achieves the growth management targets and policies for *intensification* and density in this Plan; and

c) plans have been considered in the context of applicable inter-provincial, national, bi-national, or state-provincial Great Lakes Basin agreements and are in compliance with the Great Lakes-St. Lawrence River Basin Sustainable Water Resources Agreement.

5.2.1.14 Updates to the Regional Water and Wastewater Master Servicing Plan may be implemented through amendments to the Niagara Official Plan as required.

Updates to the Regional Water and Wastewater Master Servicing Plan

Updates to the Water and Wastewater Master Servicing Plan determine infrastructure needs for development over a 30-year or greater period. Updates include identifying full life cycle costs of the system and options to pay for these costs over the long-term. This informs the Region's Budget and Development Charges to sustainably finance growth.

5.2.1.15 New and expanding Regional *infrastructure* and facilities may be reviewed by the Region's Urban Design Section in consultation with relevant Regional divisions and Local Area Municipalities.

5.2.1.16 The Region shall give priority for the provision of new municipal water and sewage services within *urban areas* to:

a) areas where growth aligns with the Region's Water and Wastewater Master Servicing Plan;

b) existing *development* on *individual on-site sewage services* and/or *individual on-site water services* within the *urban areas*;

c) existing *development* having deficiencies in existing *municipal water and wastewater systems/services* to meet minimum water quality objectives and minimum pollution abatement objectives, as established by the Region in consultation with appropriate Provincial and Federal Ministries;

d) industrial *development* creating employment opportunities, which shall be assigned a higher priority than new residential *development*;

e) *development* and *redevelopment* within *strategic growth areas* which produce an intensive and compact form of development; and

f) support areas with district plans and secondary plans.

5.2.1.17 The Region shall develop Stormwater Management Guidelines giving guidance on best practices and innovation for development applications and *public works projects* and to assist in addressing *climate change* impacts.

5.2.1.18 Planning for stormwater management shall:

a) conform with Section 3.2;

b) be integrated with planning for sewage and water services and ensure that systems are optimized, feasible and financially viable over the long term;

c) minimize, or, where possible, prevent increases in contaminant loads;

d) minimize erosion and changes in water balance, and prepare for the impacts of *climate change* through the effective management of stormwater, including the use of *green infrastructure*;

e) mitigate risks to human health, safety, property, and the environment;

f) maximize the extent and function of vegetative and pervious surfaces;

g) promote stormwater management best practices, including stormwater attenuation and re-use, water conservation and efficiency, and *low impact development*; and

h) consider *green infrastructure* and other measures which address the impacts of *climate change*.

5.2.1.19 Local Area Municipalities will develop *stormwater master plans* or equivalent for serviced *settlement areas* that:

a) are informed by *watershed planning* or equivalent;

b) protect the *quality and quantity of water* by assessing existing stormwater facilities and systems;

c) characterize existing environmental conditions;

d) examine the cumulative environmental impacts of stormwater from existing and planned *development*, including an assessment of how extreme weather events will exacerbate these impacts and the identification of appropriate adaptation strategies;

e) incorporate appropriate *low impact development* and *green infrastructure*;

f) identify the need for stormwater retrofits, where appropriate;

g) identify the full life-cycle costs of the stormwater *infrastructure*, including maintenance costs, and develop options to pay for these costs over the long-term; and

h) include an implementation and maintenance plan.

5.2.1.20 The Region will develop a Long-Term Waste Management Strategic Plan in consultation with the Local Area Municipalities. Policy direction will be implemented through an amendment to this Plan.

Waste Management Strategic Plan

The Long-term Waste Management Strategic Plan will guide the operation of the Region's day-to-day *waste management* programs including reduction, reuse, recycling, composting, diversion, and disposal of residual waste. The Plan will reduce greenhouse gas emissions, address Provincial climate change adaptation goals, and identify opportunities for energy from waste and source reduction. A component of the Plan will be long-term financial sustainability.

5.2.1.21 The Region will design, operate, and monitor *waste management* facilities in such a manner as to promote sustainability and public health and, wherever feasible, provide for future adaptive re-use opportunities in accordance with applicable Local official plan policies and Provincial requirements.

5.2.1.22 *Waste management* systems shall be located and designed in accordance with Provincial legislation and standards.

5.2.2 Municipal Water and Wastewater Servicing within Urban Areas

5.2.2.1 Adequate water supply and sewage collection shall be provided to meet the existing and future *development* needs in alignment with the growth management policies of this Plan, the Water and Wastewater Master Servicing Plan and the Region's capital budget process.

5.2.2.2 *Municipal water and wastewater systems/services* are the required form of servicing for *development* in *urban areas*.

5.2.2.3 Local Area Municipalities, in coordination with the Region, will comprehensively approach and integrate growth allocated by the Region with required *infrastructure* and establish priority and phasing policies for water and wastewater services.

5.2.2.4 Prior to approval of *development*, the municipality shall ensure that required water and wastewater services and servicing capacity is available to support the *development*.

5.2.2.5 Private lateral connections to Regional water or wastewater mains are discouraged.

5.2.2.6 The Region will endeavour to:

a) maintain sufficient reserve capacity in its water and wastewater *infrastructure* and facilities to provide operational flexibility and meet potential changes in servicing conditions;

b) ensure new *development* will not put the Region out of compliance with regulations and the Region will consider opportunities to maintain or reduce wet weather overflow occurrence; and,

c) provide reliability, redundancy and security in its water and wastewater systems with attention to high risk and critical areas.

5.2.2.7 Existing municipal *combined sewer* and storm drainage systems shall be separated, where technically and financially feasible

5.2.2.8 All new *development* which is proposed to be connected to existing *combined sewer* facilities shall be served with separated systems within the property limits of the *development*. The connection to the *combined sewer* will only be considered once a new separated storm outlet has been determined to be unachievable and the available capacity within the existing *combined sewer* services has been confirmed.

5.2.2.9 The potential impact of *climate change* on the planning and sizing of water and wastewater infrastructure shall be considered.

5.2.2.10 Water and wastewater facilities shall be designed with consideration to reducing energy use and greenhouse gas emissions.

5.2.2.11 The Region will review a combination of servicing strategies including *infrastructure* and non-infrastructure solutions to meet wet weather

level of service and provide sufficient wastewater capacity. The Region will work collaboratively with the Local Area Municipalities to reduce wet weather flows in the sanitary system.

5.2.2.12 Within urban *settlement areas* full municipal services are the preferred form of servicing. Partial services shall only be permitted in the following circumstances:

a) where they are necessary to address failed *individual on-site sewage services* and *individual on-site water services* in existing *development*; or,

b) to allow for infilling and minor rounding out of existing *development* on partial services provided site conditions are suitable for the long-term provision of such services with no negative impacts.

5.2.2.13 Any extensions of the existing water supply or sewage disposal systems must have approval through the current water licenses and sewage disposal system approvals from both the Local Area Municipality and Region.

5.2.2.14 Where *developmen*t is proposed on lands adjacent to an existing or proposed sewage treatment facility, the location of *development* shall be determined by appropriate noise and odour studies that identify suitable separation distances and mitigation measures.

5.2.3 Municipal Water and Wastewater Servicing Outside of Urban Areas

5.2.3.1 *Lateral connections* to Regional water or wastewater mains are not permitted outside the *urban areas* boundaries.

5.2.3.2 Municipal water supply mains or municipal sewers shall not be extended outside the *urban areas* except:

a) where necessary to correct an existing health problem as determined by the Medical Officer of Health or where there is a clean-up order from the Ministry of the Environment, Conservation and Parks, and provided all alternatives to municipal mains for resolving health concerns have been considered; and

b) where extensions of the water supply system are for necessary operating purposes, such as the looping of existing mains, the replacement of existing mains, and the interconnection of *urban areas*.

2B

Regional Municipality of Niagara

APPENDIX 2B

GROWTH AREA MAPS

Niagara Region

2021 Water and Wastewater Master Servicing Plan Update

Planning Information

- Traffic Area Zones

Development Locations

- Post-2051
- Pre-2051
- Municipal Boundary
- Urban Area Boundary
- Waterbodies

Town of Grimsby
Town of Lincoln
Township of West Lincoln
City of St. Catharines
Town of Niagara-on-the-Lake
City of Thorold
City of Niagara Falls
Town of Pelham
City of Welland
Township of Wainfleet
City of Port Colborne
Town of Fort Erie

0 5 10 km

Figure 2.10
Traffic Area Zones and Development Locations

BluePlan Engineering

March 2023
620126-G-002
WKID: 26917

Niagara Region

2021 Water and Wastewater Master Servicing Plan Update

Planning Information

- Traffic Area Zones

Development Locations

- Post-2051
- Pre-2051
- Municipal Boundary
- Urban Area Boundary
- Waterbodies

Figure 2.11
Traffic Area Zones and Development Locations
Grimsby

BluePlan Engineering

March 2022
620126-W-002
WKID: 26917

Niagara Region

2021 Water and Wastewater Master Servicing Plan Update

Planning Information

- Traffic Area Zones

Development Locations

- Post-2051
- Pre-2051
- Municipal Boundary
- Urban Area Boundary
- Waterbodies

Figure 2.12
Traffic Area Zones and Development Locations

Lincoln

BluePlan Engineering

March 2022
620126-W-002
WKID: 26917

Niagara Region

2021 Water and Wastewater Master Servicing Plan Update

Planning Information

- Traffic Area Zones

Development Locations

- Post-2051
- Pre-2051
- Municipal Boundary
- Urban Area Boundary
- Waterbodies

Figure 2.13
Traffic Area Zones and Development Locations

St. Catharines

BluePlan Engineering

March 2022
620126-W-002
WKID: 26917

Niagara Region

2021 Water and Wastewater Master Servicing Plan Update

Planning Information

- Traffic Area Zones

Development Locations

- Post-2051
- Pre-2051
- Municipal Boundary
- Urban Area Boundary
- Waterbodies

Niagara-on-the-Lake
Virgil
Town of Niagara-on-the-Lake
City of St. Catharines
Queenston
St. David's
City of Niagara Falls
City of Thorold
Hunter Road
East and Line
Line 1 Road
Line 2 Road
Line 3 Road
Line 4 Road
Line 5 Road
Line 6 Road
Line 7 Road
Line 8 Road
Line 9 Road
Niagara Stone Road
Niven Road
Lakeshore Road
Concession 4 Road
Concession 2 Road
Concession 6 Road
Concession 1 Road
Concession 7 Road
Concession 5 Road
Irvine Road
McNab Road
Church Road
Townline Road
Scott Street
Lakeshore Road
Parnell Road
Unwell Road
Reed Road
Carlton Street
Vine Street
Grantham Avenue
Bunting Road
Niagara Street
Stewart Road
Airport Road
Four Mile Creek Road
Niagara River Parkway
Custman Road
Dunkirk Road
Queenston Street
Queenston Road
York Road
Portage Road
Taylor Road
Warner Road
Mewburn Road
Stanley Avenue
Oakdale Avenue
Merritt Street
Glendale Avenue
Glenridge Avenue
Welland Canals Parkway
Mountain Road
QEW
405
0
4 km

Figure 2.14
Traffic Area Zones and Development Locations
Niagara-on-the-Lake

BluePlan Engineering

March 2022
620126-W-002
WKID: 26917

Niagara Region

2021 Water and Wastewater Master Servicing Plan Update

Planning Information

- Traffic Area Zones

Development Locations

- Post-2051
- Pre-2051
- Municipal Boundary
- Urban Area Boundary
- Waterbodies

Figure 2.15
Traffic Area Zones and Development Locations
Niagara Falls

BluePlan Engineering

March 2022
620126-W-002
WKID: 26917

Niagara Region

2021 Water and Wastewater Master Servicing Plan Update

Planning Information

- Traffic Area Zones

Development Locations

- Post-2051
- Pre-2051
- Municipal Boundary
- Urban Area Boundary
- Waterbodies

Figure 2.16
Traffic Area Zones and Development Locations

Thorold

BluePlan Engineering

March 2022
620126-W-002
WKID: 26917

Niagara Region

2021 Water and Wastewater Master Servicing Plan Update

Planning Information

- Traffic Area Zones

Development Locations

- Post-2051
- Pre-2051
- Municipal Boundary
- Urban Area Boundary
- Waterbodies

Figure 2.17
Traffic Area Zones and Development Locations

Welland

BluePlan Engineering

March 2022
620126-W-002
WKID: 26917

Niagara Region

2021 Water and Wastewater Master Servicing Plan Update

Planning Information

- Traffic Area Zones

Development Locations

- Post-2051
- Pre-2051
- Municipal Boundary
- Urban Area Boundary
- Waterbodies

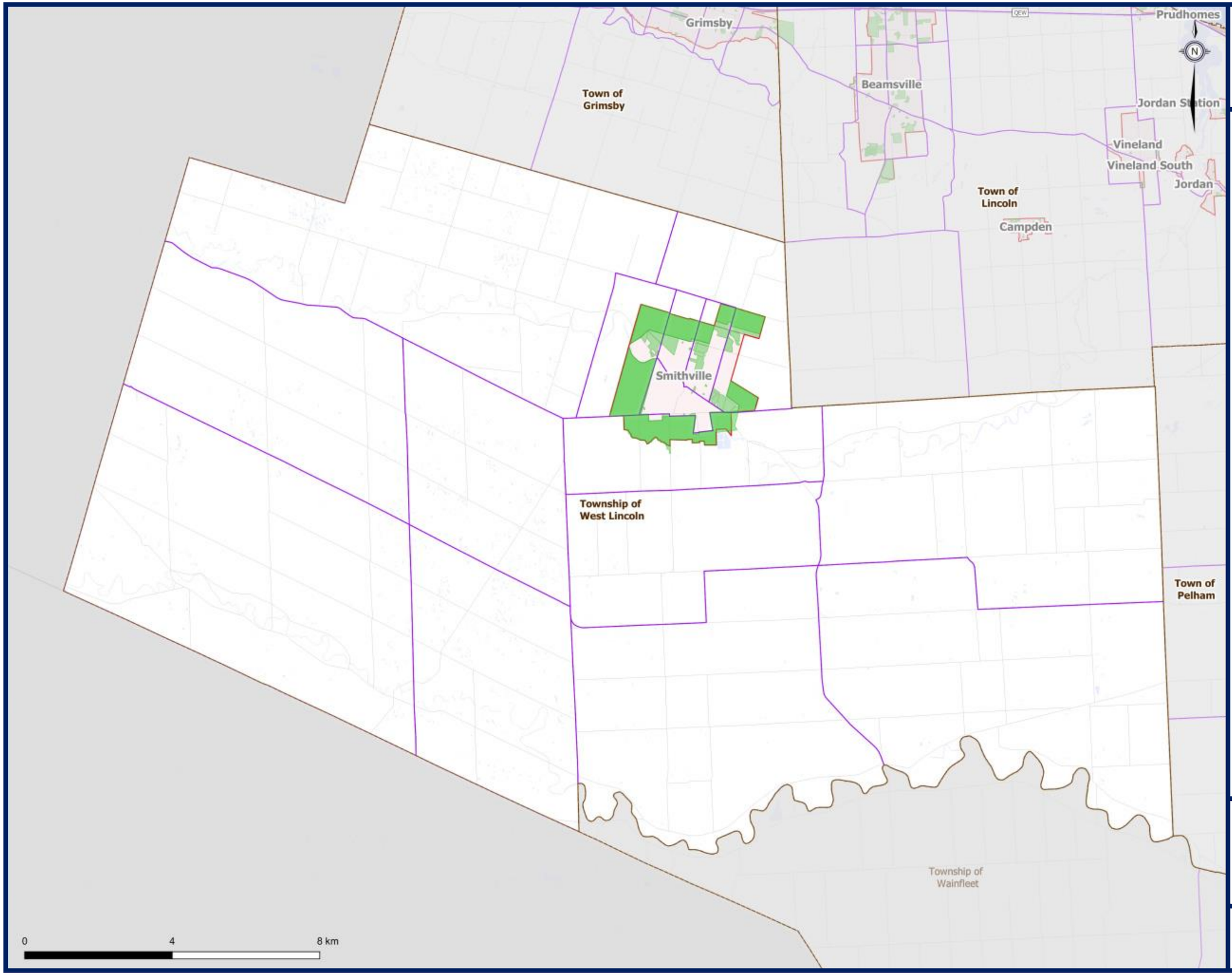
Figure 2.18
Traffic Area Zones and Development Locations
Pelham

BluePlan Engineering

March 2022
620126-W-002
WKID: 26917

Niagara Region

2021 Water and Wastewater Master Servicing Plan Update



Planning Information

- Traffic Area Zones

Development Locations

- Post-2051
- Pre-2051
- Municipal Boundary
- Urban Area Boundary
- Waterbodies

Figure 2.19
Traffic Area Zones and Development Locations
West Lincoln

BluePlan Engineering

March 2022
620126-W-002
WKID: 26917

Niagara Region

2021 Water and Wastewater Master Servicing Plan Update

Planning Information

- Traffic Area Zones

Development Locations

- Post-2051
- Pre-2051
- Municipal Boundary
- Urban Area Boundary
- Waterbodies

Figure 2.20
Traffic Area Zones and Development Locations
Port Colborne

BluePlan Engineering

March 2022
620126-W-002
WKID: 26917

Niagara Region

2021 Water and Wastewater Master Servicing Plan Update

Planning Information

- Traffic Area Zones

Development Locations

- Post-2051
- Pre-2051
- Municipal Boundary
- Urban Area Boundary
- Waterbodies

Figure 2.21
Traffic Area Zones and Development Locations
Fort Erie

BluePlan Engineering

March 2022
620126-W-002
WKID: 26917

2C

Regional Municipality of Niagara

APPENDIX 2C

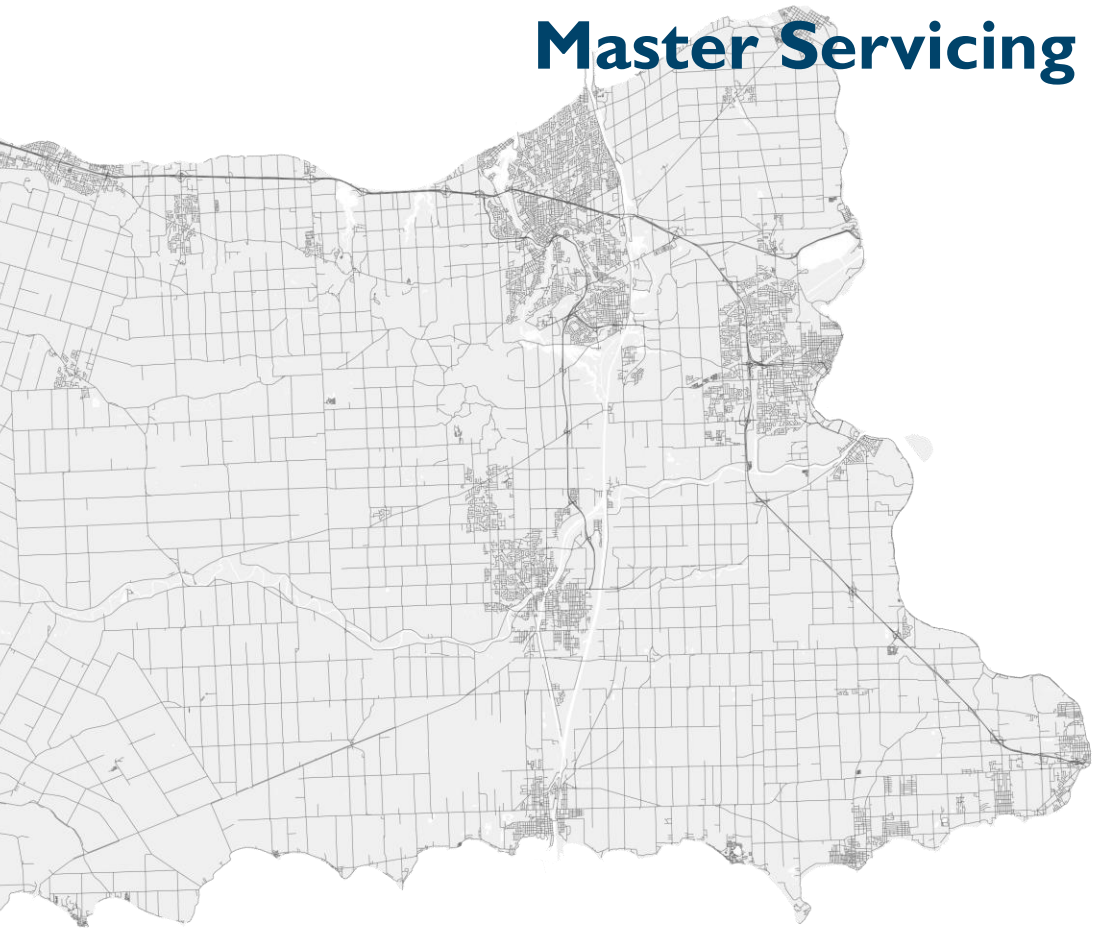
SERVICING PRINCIPLES AND DESIGN CRITERIA MEMO

Niagara Region

Technical Memorandum 2
Servicing Principles and Criteria

2021 Water and Wastewater Master Servicing Plan Update

May 10, 2023



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1.0 Introduction

GM BluePlan Engineering Limited has been retained by Niagara Region to complete a Master Servicing Plan Update for water and wastewater services across the Region. The objective of the Study is to develop a comprehensive plan that will incorporate all facets of the management, expansion and funding of the water and wastewater systems for the urban service areas of the Region through to the year 2051 with consideration for post-2051 buildout.

Development of water and wastewater principles are integral to provide guidelines and direction to the Master Servicing Plan Update process, as well as to the identification and evaluation of servicing strategies.

The Region's 2016 Master Servicing Plan Update established master planning policy, criteria, and principles which were used as the basis for this memo. Updates to water and wastewater criteria and principles were made using the best available data as of 2021, and through consultation with the Region.

1.1 Study Background and Objectives

The provision of safe and sustainable water and wastewater services is an important issue to the public and to the Municipalities planning, operating, and maintaining the systems. Execution of reasonable servicing principles is essential to ensure proper planning and design principles are followed in developing the servicing strategies, implementing the system capital program, as well as in the operation and maintenance practices.

Development of the water and wastewater servicing principles has been based on existing documentation and related sources, including:

- The Niagara Region Official Plan
- Federal and Provincial policies and legislation
- Design and development standards
- Municipal By-laws, and
- Existing municipal policies and procedures

The objectives of the Servicing Principles Document include, but are not limited to the following:

- Providing direction for planning and identifying water and wastewater servicing issues that may impact growth options
- Providing direction for normal operation and maintenance of the water and wastewater systems (the principles do not replace normal operation and maintenance procedures or best practices)

- Providing direction for development and evaluation of servicing strategies for the Water and Wastewater Master Servicing Plan Update
- Ensuring appropriate design and costing criteria are utilized for developing and evaluating servicing strategies for the Water and Wastewater Master Plan Update
- Setting servicing principles that are reasonably implemented
- Setting servicing principles that are robust and sustainable

Although best management practices and criteria are updated over time, the context, intent, and validity of the servicing principles should remain intact.

Servicing principles provide the overall guiding vision and approach. Criteria is the tactical implementation of servicing principles.

1.2 Approach

The approach in establishing and implementing the water and wastewater servicing principles is as follows:

1. Establish overall guiding vision for the Master Servicing Plan Update as the foundation for related servicing principles.
2. Develop general servicing principles as well as separate water and wastewater servicing principles.
3. Address issues related to the full cycle of water and wastewater services from the water source to the customer, from the customer to the treated wastewater discharge and final discharge to recipient water body.
4. Highlight key criteria and best practices related to each servicing principles.
5. Review and discuss principles with Region departments. Enhance the consultation of servicing principles through a Niagara Region and Local Municipality workshop environment.
6. Consolidate the general, water and wastewater servicing principles in the Document.
7. Utilize the servicing principles, and any developed criteria and/or best management practices, outlined in the Servicing Principles Document to guide the development and evaluation of servicing strategies for the Master Servicing Plan Update.
8. Implement and utilize the principles, guidelines, criteria, and best practices within the day-to-day decision making for planning and operation of the water and wastewater systems.

2.0 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 2016 Master Servicing Plan needs to be updated to determine how the Region's water and wastewater infrastructure will establish a cost effective infrastructure program that 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 Master Plan Update 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.

3.0 Servicing Principles

Building on the Problem and Opportunity Statement for the Master Servicing Plan Update, specific servicing principles have been developed to guide and provide direction for the development and evaluation of servicing strategies.

In general, Niagara Region is looking to build and maintain efficient, effective, well managed water and wastewater systems that provide high level of service to the end users.

In order to capture these goals, the servicing principles have been structured as outline below. Further details for each servicing principle are provided in the appendices.

Appendix A: General Servicing Principles

G.01	Municipal Servicing
G.02	Environmental Protection
G.03	Planning Horizon
G.04	Reserve Capacity
G.05	System Reliability and Security
G.06	Location of Municipal Services and Facilities
G.07	Climate Change
G.08	Energy Efficiency
G.09	Integrated Infrastructure Program
G.10	Level of Service
G.11	Region and Local Municipality Consistency
G.12	Sustainability

Appendix B: Water Servicing Principles

W.01	Health & Safety
W.02	Raw Water Sources
W.03	Treatment & Distribution Water Quality
W.04	Water Demand Projections
W.05	Distribution Requirements
W.06	Fire Flow Requirements
W.07	Storage Requirements
W.08	Operational Flexibility
W.09	Water Efficiency and Consumption Trends
W.10	Water Supply and Distribution Security

Appendix C: Wastewater Servicing Principles

WW.01	Health & Safety
WW.02	Receiving Water Bodies
WW.03	Wastewater Treatment and Collection Requirements
WW.04	Wastewater Flow Projections
WW.05	Sewer Use Criteria
WW.06	Separated Wastewater and Stormwater Systems
WW.07	Wastewater Collection and Pumping Systems
WW.08	Wet Weather Criteria
WW.09	Wet Weather Strategies
WW.10	Capacity Allocation
WW.11	Wet Weather Guidelines

The above noted servicing principles address a wide range of servicing needs.

Under the 2021 Master Servicing Plan Update, the principles were developed and enhanced to address the vision statement priorities of climate change, energy management, infrastructure optimization, system security and resiliency. Of particular note, the area of wet weather management was also enhanced in the servicing principles.

In addition to the above noted servicing principles, this document provides summary detail on the water and wastewater design criteria used under the Master Servicing Plan. The design criteria outlines the methodology and values used to estimate growth related flows as well as the decision-making rationale related to infrastructure capacity and the trigger for upgrades. This information is provided in **Appendix D**.

4.0 Implementation

This document has been structured such that additional servicing principles may be added as required. The servicing principle statements themselves have been worded such that they should remain relevant over time, though these can also be edited as required.

It is anticipated that through technological innovations, regulatory changes, and updated servicing principles, some of the criteria or best practices will require updating in the future. The structure should allow this to be done without necessarily having to edit the actual guiding principle statements.

5.0 Summary

The Servicing Principle Document has been developed as part of the Niagara Region 2021 Water and Wastewater Master Servicing Plan Update.

The general, water and wastewater principles developed in this document will provide guidance and direction to the Master Servicing Plan process.

The principles should also form part of the Region's day to day planning, design, construction, operations and maintenance practices for the water and wastewater systems.

A

Regional Municipality of Niagara

APPENDIX A

GENERAL SERVICING PRINCIPLES

No.	Area of Interest	Principle Statement	Servicing Implications
G.01	Municipal Servicing	*"Niagara Region shall provide adequate municipal servicing for water and wastewater in accordance with the population and employment projections in the time horizon of the Official Plan."*	• Planning and design of servicing strategies will optimize use of existing infrastructure where possible • Infrastructure will be planned and designed in accordance with growth projections in the Region's Official Plan • Timing of growth will be reviewed with consideration to a reasonable implementation schedule for infrastructure required to meet the projected growth • Municipal servicing will be implemented using typical standards (MECP Guidelines, Region Design Criteria and Standards)
G.02	Environmental Protection	*"Niagara Region shall consider, protect and endeavour to minimize impact to the natural, built and cultural environment and heritage of the community"*	• Servicing studies shall consider the Region and Local Municipality Official Plan Environmental and Heritage Policies • Services will be planned through the appropriate Environmental Assessment process to ensure full regard for the natural and cultural heritage
G.03	Planning Horizon	*"Niagara Region shall ensure that the design of water and wastewater infrastructure recognizes the potential for growth beyond the time horizon of the Official Plan."*	• Recognize that the service life of infrastructure may be 60 years or more • Consider, where appropriate, potential for growth beyond the time horizon of the Official Plan for the planning and sizing of infrastructure

No.	Area of Interest	Principle Statement	Servicing Implications
G.04	Reserve Capacity	*"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."*	• Recognize there is a time frame required to implement expansion of the infrastructure and facilities and initiate planning, the Environmental Assessment process, design, and construction for expansion with consideration of the in-service date • Day to day operation and maintenance of infrastructure and facilities requires flexibility for operating conditions, fluctuating flows, equipment shutdowns, maintenance, emergency operations and other unforeseen conditions • Inability to maintain adequate operating capacity will trigger future expansions or upgrades of the infrastructure • Additional capacity for infrastructure and facilities will consider full rated capacity and appropriate reserve capacity defined through design criteria
G.05	System Reliability and Security	*"Niagara Region shall endeavor to provide reliability, redundancy and security in its water and wastewater systems with attention to high risk and critical areas."*	• Recognize that all systems are susceptible to some level of failure or breakdown or need to be taken out of service for regular maintenance. It is reasonable to provide a level of reliability to ensure an acceptable level of service is maintained • System reliability will be further defined through design criteria

No.	Area of Interest	Principle Statement	Servicing Implications
G.06	Location of Municipal Services and Facilities	*"Niagara Region shall locate all of its services and facilities on public property or on municipally-owned easements."*	• The Region will ensure that any new and existing infrastructure be located within road right-of-ways, or on Region-owned property (including designated lots and easements) • Adequate property size will be maintained to facilitate all day-to-day activities and emergency response • Adequate property will be acquired to meet future infrastructure requirements
G.07	Climate Change	*"Niagara Region shall be aware of and consider the potential impact of climate change on planning and sizing of infrastructure."*	• Water and wastewater infrastructure and facilities will be designed with consideration to the potential impacts of climate change
G.08	Energy Efficiency	*"Niagara Region shall design water and wastewater facilities with consideration to energy use."*	• Facilities will be planned and designed with consideration to minimize overall lifecycle costs, including capital and operating/maintenance costs • Attention to energy use will provide significant opportunity to optimize lifecycle costs • Alternative infrastructure strategies should be considered to minimize energy (i.e.: water storage vs pumping)

No.	Area of Interest	Principle Statement	Servicing Implications
G.09	Integrated Infrastructure Program	*"Niagara Region shall coordinate and integrate the MSP program with Region planning, programs and policies where appropriate."*	• Coordination and integration will ensure servicing principles and strategies are aligned • Consideration for integration of sustainability upgrades necessary to maintain existing system performance • Key initiatives for integration include the Municipal Comprehensive Review, Transportation Master Plan, and Asset Management Plan
G.10	Level of Service	*"Niagara Region shall outline the Level of Service Objectives through the Master Servicing Plan and endeavor to meet/exceed the minimum requirements as outlined in the objectives."*	• The Region will review and evaluate strategies developed through the Master Servicing Plan based on their ability to meet requirements outlined in the Level of Service Objectives
G.11	Region and Local Municipality Consistency	*"Niagara Region and Local Municipalities will endeavour to maintain consistent criteria, standards and policy with respect to approach and level of service for planning and design the water and wastewater systems to meet growth"*	• Niagara Region has responsibility to plan, build, operate and maintain the trunk water and wastewater systems including major facilities while the Local Municipalities plan, build, operate and maintain the local distribution and collection systems • It is critical that consistent criteria be utilized when analyzing the long-term servicing needs for both trunk and local system capacity • The trunk and local systems are integrated and should be planned accordingly

No.	Area of Interest	Principle Statement	Servicing Implications
G.12	Sustainability	*"Niagara Region will endeavour to undertake sustainable planning, operation and maintenance of the Water and Wastewater Systems."*	• The Region will strive to plan, operate, and maintain Water and Wastewater Systems that are Environmentally, Financially, Operationally, Legislatively, and Socially Sustainable • Financial Sustainability shall consider and utilize appropriate funding mechanisms including but not limited to Development Charges, local cost to development, rates, and reserves to provide a long term balanced and equitable plan to fund the delivery of servicing • Review opportunities to optimize the joint Regional and Local Municipal infrastructure functions, with consideration for allowing local service connection to Regional trunk infrastructure where doing so does not negatively impact the operation and/or life span of the Regional infrastructure.

B

Regional Municipality of Niagara

APPENDIX B

WATER SERVICING PRINCIPLES

No.	Area of Interest	Principle Statement	Servicing Implications
W.01	Health & Safety	"Niagara Region will promote health, productivity and safety of the community through design, construction and maintenance of the Region's potable water infrastructure"	• The Region will prepare a comprehensive strategy to manage existing and future water servicing needs • Ensure that planning and implementation of the potable water systems are consistent with legislative policies and guidelines • Municipal servicing will be implemented under typical standards (MECP Guidelines, Region criteria and standards)
W.02	Raw Water Sources	"Niagara Region shall endeavor to enhance, protect and maintain quality, quantity and safety of its raw water sources"	• Monitoring of water sources is required to ensure safe yield limit of the water taking is occurring • The Region shall consider policies related to the International Joint Commission on the Great Lakes
W.03	Treatment & Distribution Water Quality	"Niagara Region shall meet or exceed legislated water quality criteria"	• Water quality will meet, at a minimum, all legislated criteria • Implement industry best practices to ensure water quality is maintained • Review the economics, reliability, and water quality impacts of implementing new technology
W.04	Water Demand Projections	"Niagara Region shall utilize a water demand projection methodology that recognizes recent water supply data and current consumption trends"	• Forward-looking water demand projections in the Master Servicing Plan must appropriately identify future water needs to ensure the best estimate for infrastructure capacity and timing • The Region will utilize a starting point methodology based on recent water supply conditions • The Region will establish current water design criteria and standards for new growth

No.	Area of Interest	Principle Statement	Servicing Implications
W.05	Distribution Requirements	"Niagara Region shall provide potable water at adequate pressure and flow to its customers"	• Provide pressures which meet current design criteria and standards • Review and optimize Pressure Zone Boundaries throughout the Region • Have an adequate combination of storage capacity, pumping capacity, and stand-by power to meet the desired level of service under emergency conditions
W.06	Fire Flow Requirements	"Niagara Region shall consider the Ministry of the Environment Guidelines and the Fire Underwriters Guidelines for establishing the acceptable level of fire flow."	• Provide pressures and flows which meet current design criteria and standards
W.07	Storage Requirements	"Niagara Region shall adopt the Ministry of the Environment Guidelines as the minimum acceptable level of water storage."	• Provide adequate level of storage which meets current design criteria and standards • Consider level of storage required under floating versus pumped conditions to meet equalization, fire, and emergency storage as well as to meet operational flexibility requirements

No.	Area of Interest	Principle Statement	Servicing Implications
W.08	Operational Flexibility	"Niagara Region shall consider levels of storage beyond MECP Guidelines where appropriate in order to provide operational flexibility, energy management and system security"	• Water storage can provide opportunities for optimization of pumping strategies • Water storage can provide additional level of service and security under emergency conditions, particularly for any areas across the Region with limited redundancy • Consideration should be given to optimizing lifecycle costs for the water system as storage can minimize pumping energy costs
W.09	Water Efficiency and Consumption Trends	"Niagara Region shall be aware of the impacts water efficiency and conservation has on the water network."	• Continue to assess water demand conditions and determine reasonableness of trends (potential lower water use and consumption) • Utilize water efficiency studies where available • Apply where appropriate demand trends (efficiency) into future design criteria and growth forecasts • Apply awareness to how it will impact strategies and scheduling of future infrastructure
W.10	Water Supply and Distribution Security	"Niagara Region shall plan, design, construct, operate and maintain the water system to balance level of service and security of supply to the customers"	• The Region shall continue to implement standards, criteria, and standard operating procedures for the water system • There is an awareness and integration between the Regional water system, local distribution system and water services on private property • The Region will maintain appropriate standards for the Regional water system to protect the public and private infrastructure

C

Regional Municipality of Niagara

APPENDIX C

WASTEWATER SERVICING PRINCIPLES

No.	Area of Interest	Principle Statement	Servicing Implications
WW.01	Health & Safety	"Niagara Region will promote health, productivity and safety of the community through design, construction and maintenance of the Region's wastewater infrastructure"	• The Region will prepare a comprehensive strategy to manage existing and future water servicing needs • Ensure that planning and implementation of the wastewater systems are consistent with legislative policies and guidelines • Municipal servicing will be implemented under typical standards (MECP Guidelines, Region criteria and standards)
WW.02	Receiving Water Bodies	"Niagara Region shall endeavor to enhance, protect and maintain quality, quantity and safety of its receiving water bodies"	• Wastewater effluent discharges will meet, at a minimum, all legislated criteria • The Region shall consider policies related to the International Joint Commission on the Great Lakes
WW.03	Wastewater Treatment and Collection Requirements	"Niagara Region shall meet as a minimum the requirements of the Environmental Compliance Approvals set out by governing bodies and the appropriate legislated treatment and collection criteria."	• Wastewater quality (air and effluent) will meet as a minimum all legislated criteria. • Manage wet weather conditions (inflow / infiltration) through asset management programs to minimize extraneous flows and maximize efficient use of available wastewater infrastructure • Implement industry best practices to ensure effluent quality is maintained • Review the economics, reliability, and effluent quality impacts of implementing new technology

No.	Area of Interest	Principle Statement	Servicing Implications
WW.04	Wastewater Flow Projections	"Niagara Region shall utilize a wastewater flow projection methodology that recognizes recent wastewater flow and treatment data and current consumption trends"	• Forward-looking wastewater flow projections in the Master Servicing Plan must appropriately identify future wastewater needs to ensure the best estimate for infrastructure capacity and timing • The Region will utilize a starting point methodology based on recent wastewater flow conditions • The Region will establish current wastewater design criteria and standards for new growth
WW.05	Sewer Use Criteria	"Niagara Region shall maintain a sewer use program that sets the appropriate limits and procedures to control discharge"	• Review and maintain a sewer use by-law, which is supported by Council • Maintain a monitoring program to ensure the discharges meet the limits set out in the by-law • The Region shall consider over-strength discharge and surcharge agreements to manage plant capacities
WW.06	Separated Wastewater and Stormwater Systems	"Niagara Region shall plan and maintain separate wastewater and stormwater systems"	• The Region will continue to build, maintain, and operate separated wastewater and stormwater systems • The Region will endeavor as part of I &I reduction measures to identify and remediate existing sanitary sewer cross connections and implement strategy to prevent future cross connections and stormwater impact on the wastewater system

No.	Area of Interest	Principle Statement	Servicing Implications
WW.07	Wastewater Collection and Pumping Systems	"Niagara Region shall provide adequate reliability and security in wastewater pumping systems"	• Force main twinning should be examined to provide adequate velocities during different phases of development and also to provide security in operation. • Adequate retention capacity should be provided in the sewer system • The Region shall consider adequate level of facility storage, system storage and standby power to manage emergency conditions
WW.08	Wet Weather Flow Criteria	"Niagara Region shall utilize current wet weather flow criteria to determine peak wet weather flows and size wastewater infrastructure"	• Existing systems across the Region have a range of existing performance and levels of flow under wet weather flow conditions • Notwithstanding existing conditions, Niagara Region shall consider planning for new growth consistently across all systems • The level of service under wet weather conditions will be established through the Master Servicing Plan design criteria • The most cost-effective and beneficial strategy may include not providing additional infrastructure but creating additional capacity through flow reduction methods such as inflow/infiltration control • Development of the servicing strategies to address high wet weather flows should consider the joint Region and Local Municipal capacity needs and implementation costs • Consideration to environmental, social, and financial factors as well as the feasibility for implementation should be given when determining the wet weather criteria

No.	Area of Interest	Principle Statement	Servicing Implications
WW.09	Wet Weather Strategies	"Niagara Region shall review a combination of servicing strategies including infrastructure and non-infrastructure (i.e., I/I reduction) solutions to meet wet weather level of service and provide sufficient wastewater capacity."	• Providing wastewater system capacity at both the Region level and local collection system level requires a wide review of potential servicing strategies • The Region Master Servicing Plan will develop and evaluate a comprehensive list of alternatives against multiple-bottom-line criteria including lifecycle costs • The most cost-effective and beneficial strategy may include not providing additional infrastructure but creating additional capacity through flow reduction methods such as inflow/infiltration control
WW.10	Capacity Allocation	"Niagara Region shall review opportunities to allocate capacity gained through implementation of wet weather strategies and system optimization for growth and non-growth benefit"	• Provision of additional capacity within the wastewater system will need to consider the desired benefit • Additional capacity may be required to meet regulatory requirements or to improve level of service in the system

No.	Area of Interest	Principle Statement	Servicing Implications
WW.11	Wet Weather Guidelines	"Niagara Region shall approach Guidelines F-5-5 and F-5-1 such that new development will not put the Region out of compliance with the regulations and the Region shall consider opportunities to not increase wet weather overflows beyond current conditions"	• The Region will continue to manage system performance under wet weather conditions • As required under F-5-5, baseline performance of the system has been established • New growth should not negatively impact the system and should not put the Region out of compliance with existing regulations • As additional flows from growth are added to the system, the Region should look for opportunities to not make overflow conditions worse than the current baseline conditions

D

Regional Municipality of Niagara

APPENDIX D

DESIGN CRITERIA AND STANDARDS

WATER DESIGN CRITERIA FOR PLANNING PURPOSES

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
	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 subsection below regarding WTP contact time volume requirement

(1) Note that the water consumption criteria were developed under the assumption that high non-revenue water rates would be decreased over the next 20 years through local area municipality programs and initiatives, with the target of reduction to 25% or lower across the Region.

(2) In the event that a LAM identifies more conservative criteria to suit area specific needs (i.e., tourist areas), the LAM should specify these criteria within local policy documentation and work collaboratively with the Region to achieve local objectives.

Water Treatment Plan Contact Time Volume Requirement

The Region has indicated that 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, as 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.

WASTEWATER DESIGN CRITERIA FOR PLANNING PURPOSES

	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	

Pump Station	System Performance and Triggers Sizing	• Two flow scenarios considered on a case-by-case basis (Refer to **Volume 4**)
		  • **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 twinning to increase capacity where feasible	
Trunk	System Performance and Triggers	• Design allowance peak wet weather flows, using the extraneous flow design allowance, to be managed within pipe	

	Component	Criteria
		• Freeboard (depth between hydraulic grade line and surface) greater than 1.8 m below surface in 5-year design storm • Flag pipes velocities less than 0.6 m/s • Flag pipes 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