

GEI Consultants



Functioning Servicing Study

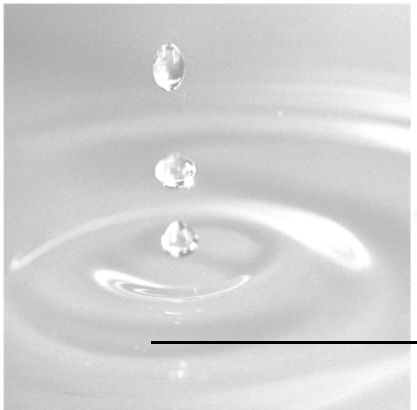
Northwest Secondary Plan Area

City of Niagara Falls, Ontario

Submitted to:
Chris Millar, MCIP, RPP, CNU-A
Senior Project Manager – Secondary Plans
Planning, Building & Development
City of Niagara Falls
4310 Niagara Street, Niagara Falls, ON L2E 6X5

Submitted by:
Matthew Fisher, P.Eng.
Senior Project Manager, Infrastructure Planning
1266 South Service Road, Unit C31, Hamilton, ON L8E 5R9

February 13th, 2026
Project No. 2402620



Matthew Fisher, P.Eng.
Senior Project Manager, Infrastructure Planning

Benjamin Peachman, P.Eng.
Project Manager, Infrastructure Planning

Table of Contents

1. Introduction 5
1.1. Study Area 5
1.2. Report Objectives 2
2. Physical Constraints to Study Area 3
2.1. Topography 3
2.2. Subwatershed Analysis 5
2.3. Stormwater Management Facilities 6
2.4. Easements and Linkages 6
2.5. Transportation (Road and Rail) Networks 6
2.6. Source Water Protection 7
2.7. Areas of Environmental Sensitivity 7
2.8. Regulated Areas 7
2.9. Geotechnical Considerations 8
2.10. Summary of Physical Constraints to Servicing 11
3. Servicing Policy and Design Criteria 13
3.1. Servicing Principles and Policies 13
3.2. Water Infrastructure 13
3.3. Wastewater Infrastructure 16
3.4. Stormwater Management and Drainage 19
4. Planning & Growth Projections 20
4.1. Growth Projections 20
4.2. Flow Projection Methodology 20
4.3. Projected Water Demand 21
4.4. Projected Wastewater Flows 22
5. Water Infrastructure 23
5.1. Existing Infrastructure 23
5.2. Planned Capital Projects 27
5.3. Proposed Infrastructure 29
5.4. Application Conditions 30
6. Wastewater Infrastructure 33
6.1. Existing Infrastructure 33
6.2. Planned Capital Projects 40
6.3. Proposed Infrastructure 43
6.4. Application Conditions 48
7. Stormwater Infrastructure 50
7.1. Existing Infrastructure 50
7.2. Proposed Infrastructure 51
7.3. Application Conditions 54

8. Cost Estimates 56
8.1. Costing Methodology 56
8.2. Water Infrastructure 57
8.3. Wastewater Infrastructure 58
8.4. Stormwater Infrastructure 58
8.5. Summary of Capital Costs 58
9. Implementation 59
9.1. Capital Program Implementation 59
9.2. Phasing Plan 59
10. Conclusions 62

Appendix A: Water Demand and Sanitary Flow Calculations

Appendix B: Cost Estimates

Record of Revisions

Version	Date	Author (s)	Reviewed by	Description
1	January 19th, 2026	Benjamin Peachman, P.Eng.	Matthew Fisher, P.Eng.	Issued in draft
2	February 13th, 2026	Benjamin Peachman, P.Eng.	Matthew Fisher, P.Eng.	Issued in final

List of Abbreviations

Acronym	Description
ADD	Average Day Demand
ADF	Average Daily Flow
BDSC	Beaver Dam Schiner's Creek
BPS	Booster Pumping Station
CNF	City of Niagara Falls
DC	Development Charge
ECA	Environmental Conservation Area
ET	Elevated Tank
FF	Fire Flow
FSS	Functional Servicing Study
GGH	Greater Golden Horseshoe
HGL	Hydraulic Grade Line
HVA	Highly Vulnerable Aquifers
I/I	Inflow and Infiltration
LID	Low Impact Development
masl	Metres above sea level
MCR	Municipal Comprehensive Review
MDD	Maximum Day Demand
MECP	Ministry of the Environment, Conservation, and Parks
MSP	Master Servicing Plan
MWs	Monitoring Wells
NHS	Natural Heritage System
NOTL	Niagara-on-the-Lake
NPCA	Niagara Peninsula Conservation Authority
NWSPA	Northwest Secondary Plan Area
ø	Diameter
OP	Official Plan
PDWF	Peak Dry Weather Flow
PHD	Peak Hour Demand
PHF	Peak Hour Flow
PSW	Provincially Significant Wetlands
PWWF	Peak Wet Weather Flow
SPS	Sewage Pumping Station
SWM	Stormwater Management
SGRA	Significant Groundwater Recharge Areas
W/WW/SW	Water, Wastewater, Stormwater
WHPA	Wellhead Protection Areas
WTP	Water Treatment Plant
WWTP	Wastewater Treatment Plant

1. Introduction

The City of Niagara Falls (CNF) is a lower-tier municipality located in southwestern Ontario within Niagara Region. The CNF is located on the Canadian border with the state of New York and is located north of Fort Erie, east of Welland and Thorold, southeast of St. Catherines, and south of Niagara-on-the-Lake (NOTL). The CNF is located in the Greater Golden Horseshoe (GGH) which is one of the fastest growing regions in North America. The CNF is anticipated to experience population growth over the next 30 years with the Northwest Secondary Plan Area (NWSPA) being identified as an urban expansion area through the completion of a Municipal Comprehensive Review (MCR) and new Official Plan (OP) by the CNF.

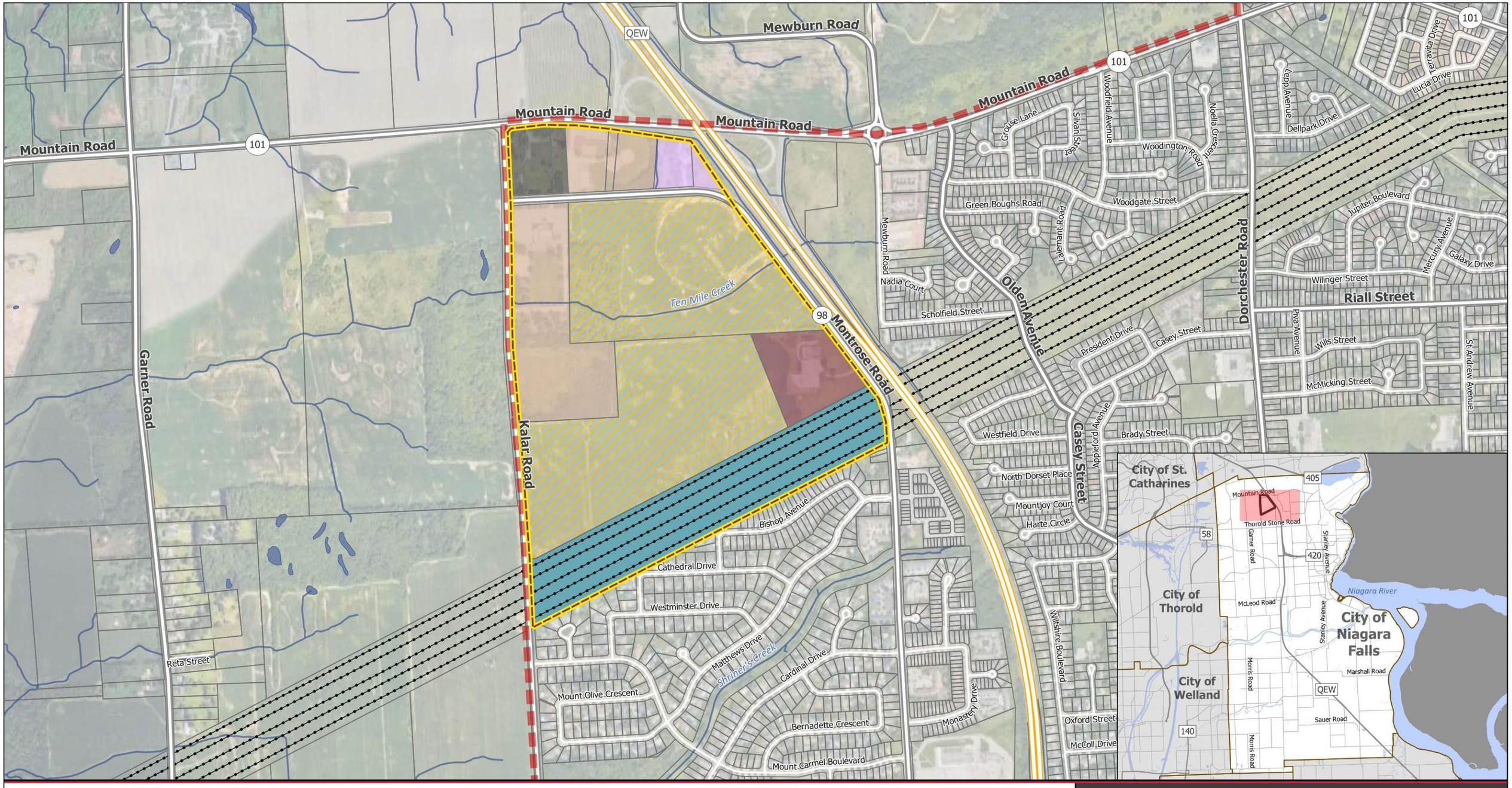
GEI Consultants Canada Ltd. (GEI) has been retained to complete the Functional Servicing Study (FSS) in support of the Northwest Secondary Plan. The FSS will include the following components:

- Phase 1: Existing Conditions Report
- Phase 2: Land Use Options Assessment
- Phase 3: Preferred Land Use Plan (Functional Servicing Study)

The Phase 3 Functional Servicing Study (FSS) will build upon the findings and recommendations from the previous phases to develop a comprehensive servicing strategy for the Study Area. This phase will focus on evaluating and confirming the preferred servicing alternatives for water, wastewater, and stormwater systems, assessing external infrastructure requirements, and identifying any necessary upgrades to support future development. Conceptual servicing layouts for water, wastewater, and stormwater infrastructure will be completed for the Study Area based on the preferred land use plan. Detailed design considerations, as well as preliminary cost estimates, will be prepared to guide implementation and coordination with municipal and regional infrastructure planning efforts. The goal of Phase 3 is to establish a feasible and coordinated servicing framework that supports the planned growth within the NWSPA.

1.1. Study Area

The NWSPA is approximately 101 hectares (ha) with an estimated 55 ha of net developable land identified in the Preferred Land Use Concept. These developable areas include the local roads envisioned for the NWSPA but exclude environmental protection areas, parks, open space designations, arterial roads, and collector roads. The NWSPA is generally bound by Mountain Road to the north, Montrose Road to the east, a Hydro One corridor to the south, and Kalar Road to the west. The QEW runs north to south, east of the Study Area. The Study Area is located entirely within the CNF's urban boundary and currently contains agricultural, commercial, and rural residential uses, along with several environmental features. The Study Area is shown in **Figure 1-1.**



Northwest Secondary Plan Area
Hydro Line
Parcel
Urban Area Boundary
Municipal Boundary
Waterbody, Watercourse

Major Land Use

Agriculture
Church
Hotel/Mobile Park
Private
Event/Recreation Complex
Hydro One Corridor

N

Reference(s)
1. Projection EPSG:26917
2. Base Data: City of Niagara Falls, 2024; Google Satellite, 2024

0 250 500 m

Figure 1-1
Map Title: Study Area

Project Name:
Northwest Secondary Plan Area Functional Servicing Study

Client Name:
City of Niagara Falls (Ontario, Canada)

GEI Consultants

Last Updated: July 2024
Document ID: 2402620-002

Document Path: \\geiconsultants.com\data\Data_Storage\Working\NIAGARA FALLS ON_CITY OF\2402620 - 621014 Niagara Falls Modelling Support\621014-xx Garner West & Northwest FSR\2402620-002-Northwest.qgz

1.2. Report Objectives

The following objectives have been defined to guide the completion of the Phase 3 FSS:

1. Assess alternative servicing strategies for water, wastewater, and stormwater infrastructure to support future development within the NWSPA.

2. Confirm external infrastructure requirements via hydraulic modelling and identify any upgrades needed to accommodate projected growth.

3. Identify preferred servicing strategies for water, wastewater, and stormwater infrastructure within the NWSPA.

4. Prepare preliminary cost estimates for the proposed servicing networks.

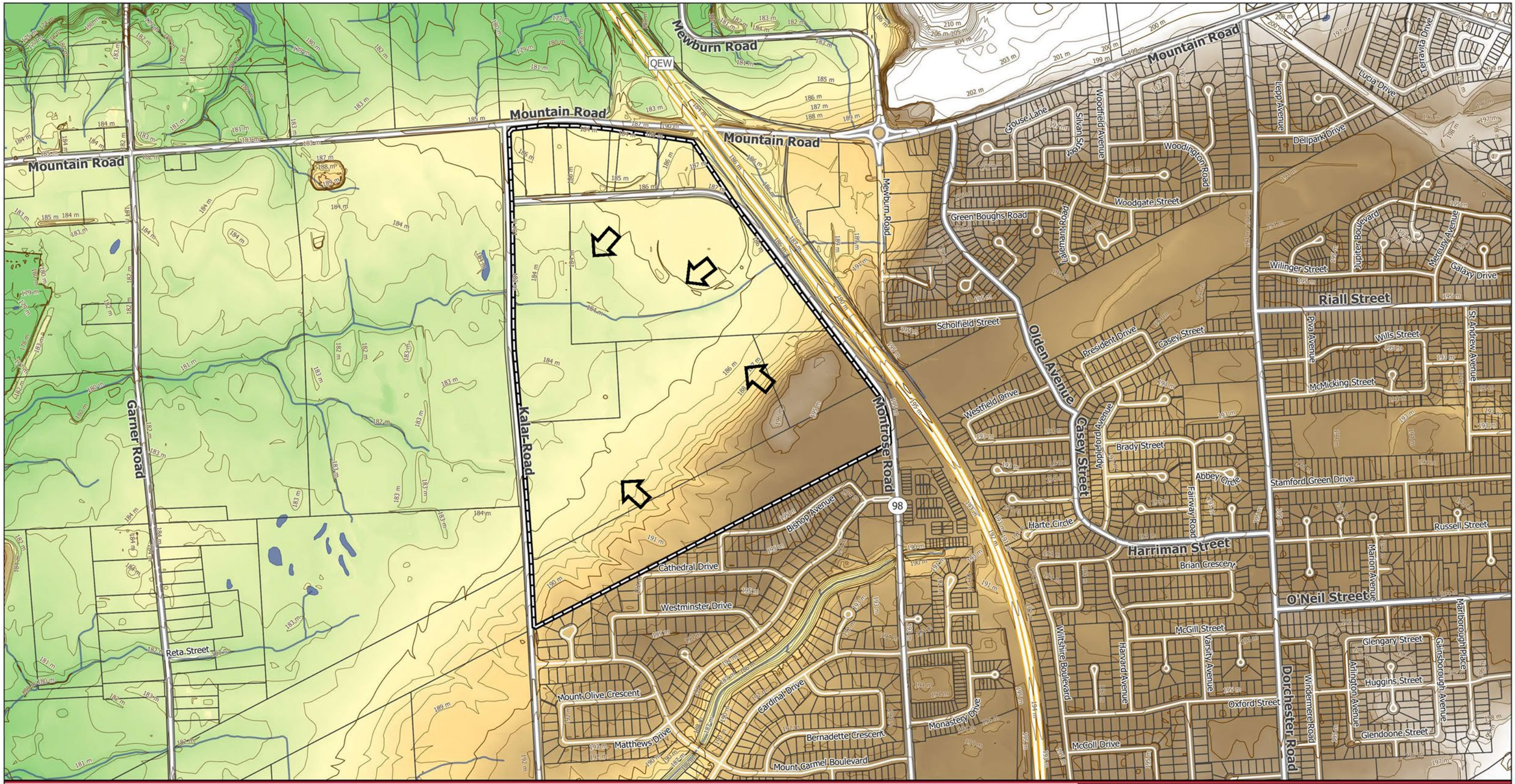
5. Identify implementation considerations, such as phasing, integration with existing systems, and coordination with other planned infrastructure projects.

2. Physical Constraints to Study Area

Identifying physical constraints to servicing within the Study Area was a key component of Phase 1. Phase 2 involved assessing alternative land use concepts with the physical constraints to servicing being a key consideration. Building on the findings from Phases 1 and 2, Phase 3 focuses on integrating identified constraints such as topography, environmental features, geotechnical conditions, and access limitations into the preferred servicing strategies for water, wastewater, and stormwater infrastructure. The following sub sections outline how each constraint has been considered and incorporated into the preferred servicing strategies for the NWSPA.

2.1. Topography

The topography of the Study Area has been reviewed and considered within the preferred servicing strategies for the NWSPA. Ground elevations within the NWSPA range from approximately 184 metres above sea level (masl) to 196 masl, creating a natural drainage pattern toward the tributary of Ten Mile Creek, which flows east to west through the Study Area. The surface elevation is approximately 196 masl where the Hydro One corridor meets Montrose Road in the southeast corner of the NWSPA and the surface grade falls quickly to level out in the range of 184 – 185 masl adjacent to the tributary of Ten Mile Creek that flows through the NWSPA. The topography of the Study Area was considered throughout the development of the preferred servicing strategies to ensure efficient, cost-effective infrastructure strategies. The existing topography of the NWSPA is detailed in **Figure 2-1**.



Study Area
Parcel
Waterbody, Watercourse
Major Overland Flow Route

5m Contour
1m Contour
5m Digital Elevation Model
200m
180m

Reference(s)
1. Projection EPSG:26917
2. Base Data: City of Niagara Falls, 2024; Google Satellite, 2024

0 250 500 m

Figure 2-1
Map Title: Local Topography

Project Name:
Northwest Secondary Plan Area Functional Servicing Study

Client Name:
City of Niagara Falls (Ontario, Canada)

GEI consultants

Last Updated: July 2024
Document ID: 2402620-002

Document Path: \\geiconsultants.com\data\Data_Storage\Working\NIAGARA FALLS ON, CITY OF\2402620 - 621014 Niagara Falls Modelling Support\621014-xx Garner West & Northwest FSRs\2402620-002-Northwest.mxd

2.2. Subwatershed Analysis

A watershed, also referred to as a catchment basin, is an area of land from which surface runoff (water, sediments, nutrients, and contaminants) drain into a common water body or watercourse. Watersheds include all of the water and water-dependent features such as wetlands, forests, urban areas, and agricultural areas.

The CNF lies within the South Niagara Falls watershed. It is an important watershed on the Niagara Peninsula because it is primarily agricultural and is not located within the Greenbelt Plan area. This watershed is also located in the Niagara River Area of Concern, meaning it has been determined that the aquatic environment has been severely affected.

A subwatershed refers to a smaller geographical area within a larger watershed, delineated by natural drainage patterns where runoff converges to a common outlet, such as a stream or river. By analyzing and incorporating the subwatershed data into the Secondary Plan process, the CNF can minimize environmental impacts and promote responsible land use practices within the NWSPA.

A subwatershed analysis is being completed in support of the Secondary Plan, in parallel with the Functional Servicing Study (FSS). The subwatershed analysis will complete investigations of the terrestrial habitat, fish habitat, water resources, and hydrogeology of the NWSPA and surrounding areas. Four seasons of monitoring and field surveys must be completed to support the recommendations of the subwatershed study. Relevant information from the subwatershed study was incorporated into the FSS as made available.

For the purposes of the FSS, the results of the subwatershed study refine the high-level desktop analysis completed within this report to identify constraints related to terrestrial habitat, fish habitat, water resources, and hydrogeology. For example, The Niagara Peninsula Conservation Authority (NPCA) has mapped the location of known Provincially Significant Wetlands (PSWs) within its jurisdiction which will be overlaid onto the NWSPA mapping. These areas will be identified as a constraint to development and/or servicing and therefore water, wastewater, and stormwater servicing will not be proposed within these areas. The subwatershed study will refine the limits of these constraining features through the monitoring and field surveys. These limits were reflected in the Preferred Land Use Concept developed during Phase 2 and will be considered throughout the assessment and development of the preferred servicing strategies in Phase 3 of the FSS.

The majority of the NWSPA is located in the Beaver Dam Schiner's Creek (BDSC) Ten Mile Creek subwatershed. A small portion of the properties fronting Mountain Road, near Kalar Road, are located in the BDSC Six Mile Creek subwatershed and a small portion of the Hydro One Corridor at the southeast corner of the Study Area is located in the BDSC Shriners Creek.

As shown in **Figure 2-4**, there are several key environmental features that must be considered for infrastructure planning purposes. The NWSPA includes an NPCA-regulated watercourse (tributary to Ten Mile Creek) that flows east to west through the Study Area along with a second NPCA-regulated watercourse that flows north to south and discharges into this tributary. A third NPCA-regulated stream has been identified along the west lot line of 2600 Montrose Road. Several wooded areas have been identified fronting Kalar Road, along with some areas of Significant Woodland. An Environmental

Conservation Area (ECA) has been identified, along with a Locally Significant Wetland, in line with the tributary to Ten Mile Creek. These environmental features have been further investigated as part of the subwatershed study but for the purposes of the FSS, they will be considered constraints to servicing.

2.3. Stormwater Management Facilities

A desktop review of storm water management (SWM) facilities was completed by reviewing maps and background reports pertaining to the Study Area. No existing stormwater management facilities were identified within the Study Area.

2.4. Easements and Linkages

The south end of the Study Area contains a Hydro One transmission corridor extending approximately 1.1 kilometres in length and 170 metres in width along the southern boundary. This corridor has been considered in the Phase 3 servicing layout to ensure all proposed infrastructure avoids conflicts with existing utility infrastructure and adheres to Hydro One's setback and crossing requirements. Based on the environmental review completed to date, no significant ecological linkages or natural heritage features have been identified within the Study Area that would constrain the proposed servicing design.

Based on the existing topography of the hydro corridor, it is anticipated that drainage will continue to be conveyed to the existing ditch on Kalar Road, and ultimately to Ten Mile Creek, via the construction of a piped or open swale stormwater conveyance system at the interface between the development areas and the hydro corridor.

2.5. Transportation (Road and Rail) Networks

The existing transportation network has been reviewed to confirm right-of-way ownership, jurisdiction, and constraints relevant to the detailed servicing design.

Kalar Road forms the western boundary of the NWSPA and is jointly owned by the CNF and Niagara Region, with approximately 1,200 metres under City jurisdiction and 230 metres under the Region. The road has a 26-metre right-of-way.

Montrose Road forms the eastern boundary and extends east–west through the northern portion of the NWSPA. It is owned by Niagara Region with a 26-metre right-of-way.

Mountain Road forms the northern limit of the NWSPA and is also under Niagara Region ownership, with a right-of-way of approximately 28 metres. It provides access to the Queen Elizabeth Way (QEW) via an on-ramp located just north of the Study Area. The QEW, owned by the Province of Ontario, serves as the major regional transportation corridor for the area.

A CN railway is located approximately 1 (one) kilometre north of the NWSPA, though it is not anticipated to pose any constraints to the proposed servicing layout.

2.6. Source Water Protection

A desktop review of groundwater protection and vulnerability mapping was completed to confirm any potential constraints to the proposed servicing design. The analysis included Wellhead Protection Areas (WHPA), Highly Vulnerable Aquifers (HVA), and Significant Groundwater Recharge Areas (SGRA). Based on the Region of Niagara and CNF source protection data, the NWSPA is not located within any designated WHPA, HVA, or Surface Water Intake Protection Zone. As shown in Figure 3.6 of the CNF Master Drainage Plan Update Study, no groundwater-related constraints are anticipated to have a significant impact on the proposed servicing layout for the Study Area.

2.7. Areas of Environmental Sensitivity

A high-level desktop review was completed to identify Areas of Environmental Sensitivity within the NWSPA. It was found that a locally significant wetland, Significant Woodlands, Non-significant Woodlands, and an Environmental Conservation Area (ECA) are present.

A tributary to Ten Mile Creek extends through the NWSPA which has been deemed Important to fish habitat per Figure 3.4 from the CNF Master Drainage Plan Update Study. This tributary, along with another north-south tributary, the ECA, and Significant Woodlands are located within the regulation limits of the NPCA.

These Areas of Environmental Sensitivity were avoided during the design of the proposed servicing layout and were investigated by the subwatershed study.

2.8. Regulated Areas

A desktop review was completed to identify areas within the NWSPA that were regulated by the following:

- Niagara Peninsula Conservation Authority (NPCA)
- Provincial Natural Heritage System (NHS) or Greenbelt
- Niagara Escarpment
- Oak Ridges Moraine Conservation Plan

The NWSPA is not located within the Greenbelt, Niagara Escarpment, or the Oak Ridges Moraine Conservation Plan. Several areas of environmental sensitivity are located within the regulation limits of the NPCA as detailed in Section 2.7.

The NPCA-regulated areas were avoided during the design of the proposed servicing layout and were investigated in-depth and were investigated by the subwatershed study.

2.9. Geotechnical Considerations

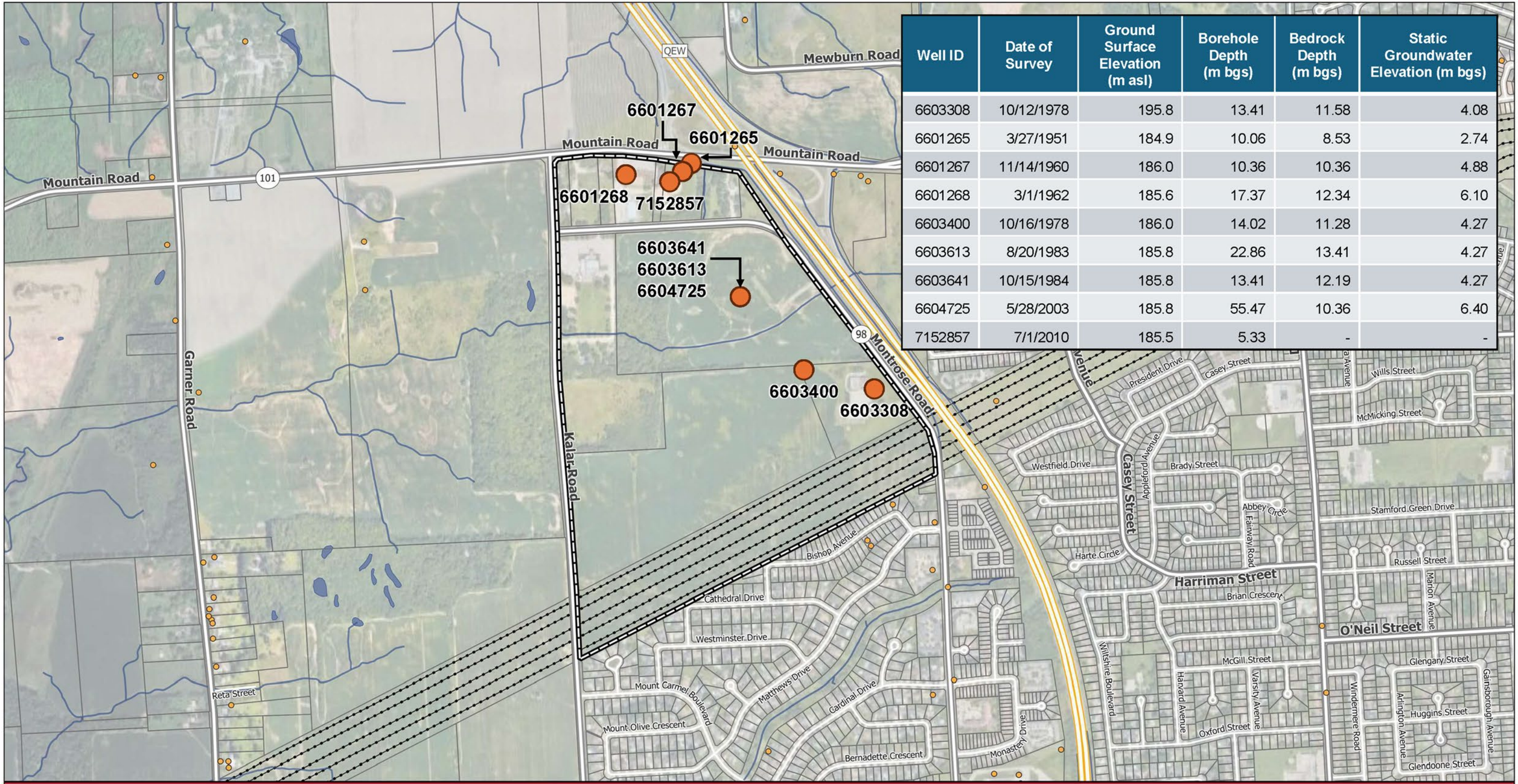
Borehole logs were reviewed from the Ontario Well Records, and nine (9) monitoring wells (MWs) were identified within the NWSPA. The locations of the MWs are shown in **Figure 2-2** with a summary of geotechnical information related to the nine MWs provided in a table included on the figure. Four (4) of the MWs (Well IDs 6601268, 6604725, 6603400, and 6603308) were chosen within the NWSPA to create a historic geotechnical profile as shown in **Figure 2-3** which illustrates the surface elevations, depth of overburden & bedrock, and groundwater levels. The geotechnical information from these MWs is summarized in **Table 2-1.**

Table 2-1: Borehole Log Summary

Well ID	Top of Grade (masl)	Groundwater Level (masl)	Soil Conditions by Depth (m)	Bedrock Level (masl)
6601268	185.6	179.5	Hard Brown Clay: 0 – 3.0 Soft Brown Clay: 3.0 – 10.5 Soft Brown Clay & Stone: 10.5 – 12.3 Limestone Rock: 12.3 – 17.4	173.3
6604725	185.8	179.4	Brown Sand Loam: 0 – 1.8 Grey Clay: 1.8 – 8.8 Grey Clay Boulders: 8.8 – 10.4 Grey Limestone: 10.4 – 55.5	175.4
6603400	186.0	181.7	Brown Clay: 0 – 2.1 Red Clay Loam: 2.1 – 6.4 Red Sand + Clay: 6.4 – 9.1 Grey Clay + Gravel: 9.1 – 11.3 Grey Rock: 11.3 – 14.0	174.7
6603308	195.8	191.7	Brown Clay: 0 – 1.8 Red Sand + Clay: 1.8 – 7.6 Red Clay + Gravel: 7.6 – 11.6 Red Rock: 11.6 – 13.4	184.2

The borehole information is fairly consistent throughout the Study Area and indicates that silty clay is the predominant native soil condition, with bedrock being typically encountered between 11 to 12 metres below grade. The groundwater levels within the boreholes generally ranged from 4 to 6 metres below grade. This geotechnical information was considered during the development of the preferred servicing strategies, specifically related to the technical and economic viability of deep infrastructure that could involve significant short-term construction and/or long-term groundwater dewatering needs. It was also considered from the context of certain infiltration practices being useful for stormwater management purposes.

Well ID	Date of Survey	Ground Surface Elevation (m asl)	Borehole Depth (m bgs)	Bedrock Depth (m bgs)	Static Groundwater Elevation (m bgs)
6603308	10/12/1978	195.8	13.41	11.58	4.08
6601265	3/27/1951	184.9	10.06	8.53	2.74
6601267	11/14/1960	186.0	10.36	10.36	4.88
6601268	3/1/1962	185.6	17.37	12.34	6.10
6603400	10/16/1978	186.0	14.02	11.28	4.27
6603613	8/20/1983	185.8	22.86	13.41	4.27
6603641	10/15/1984	185.8	13.41	12.19	4.27
6604725	5/28/2003	185.8	55.47	10.36	6.40
7152857	7/1/2010	185.5	5.33	-	-



Study Area
Historic Water Wells in Study Area
Other Historic Water Well
Hydro Line
Parcel
Municipal Boundary
Waterbody, Watercourse

Reference(s)
1. Projection EPSG:26917
2. Base Data: City of Niagara Falls, 2024; Google Satellite, 2024

0 250 500 m

Figure 2-2
Historic Borehole Logs in Study Area

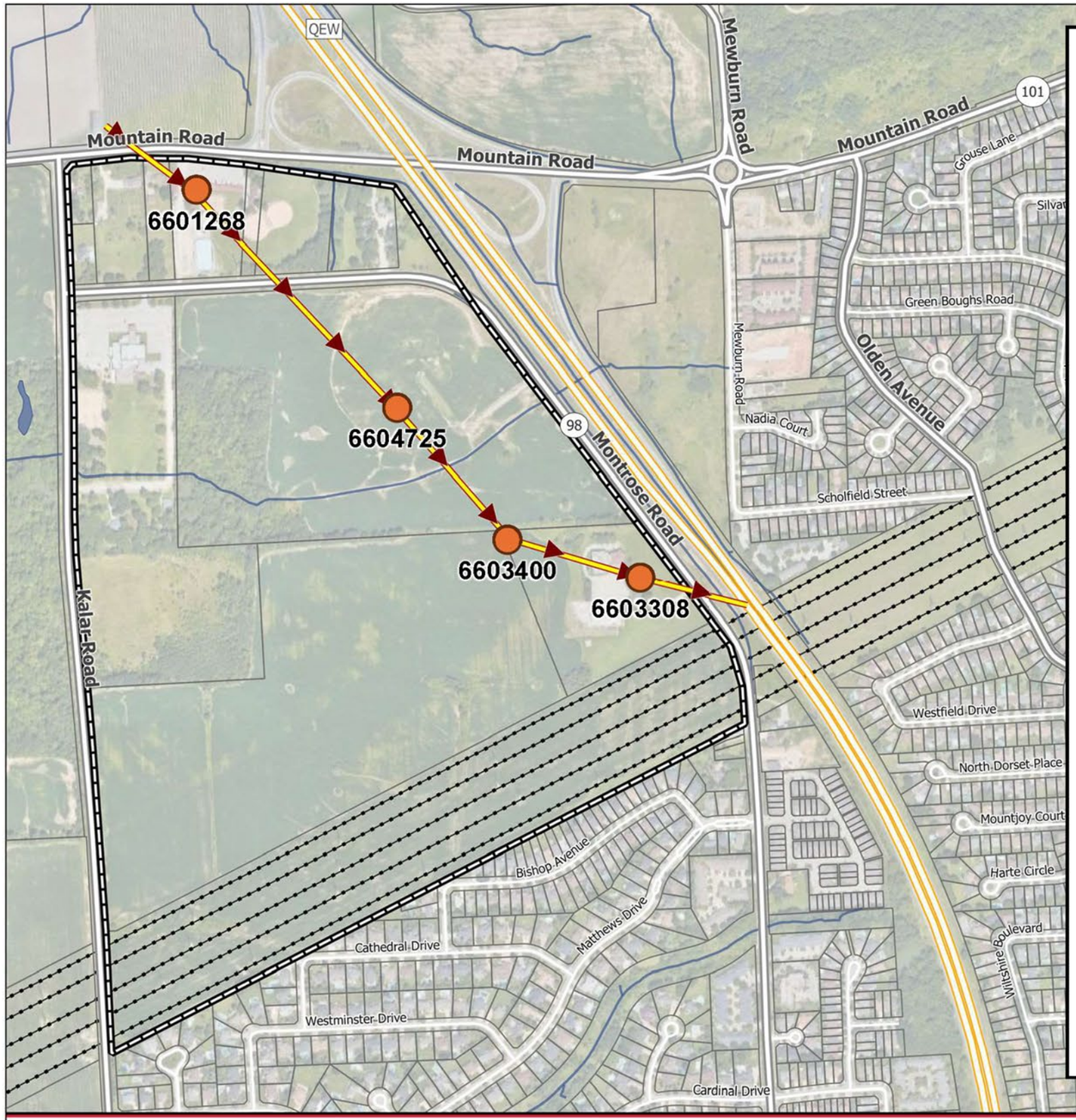
Project Name:
Northwest Secondary Plan Area Functional Servicing Study

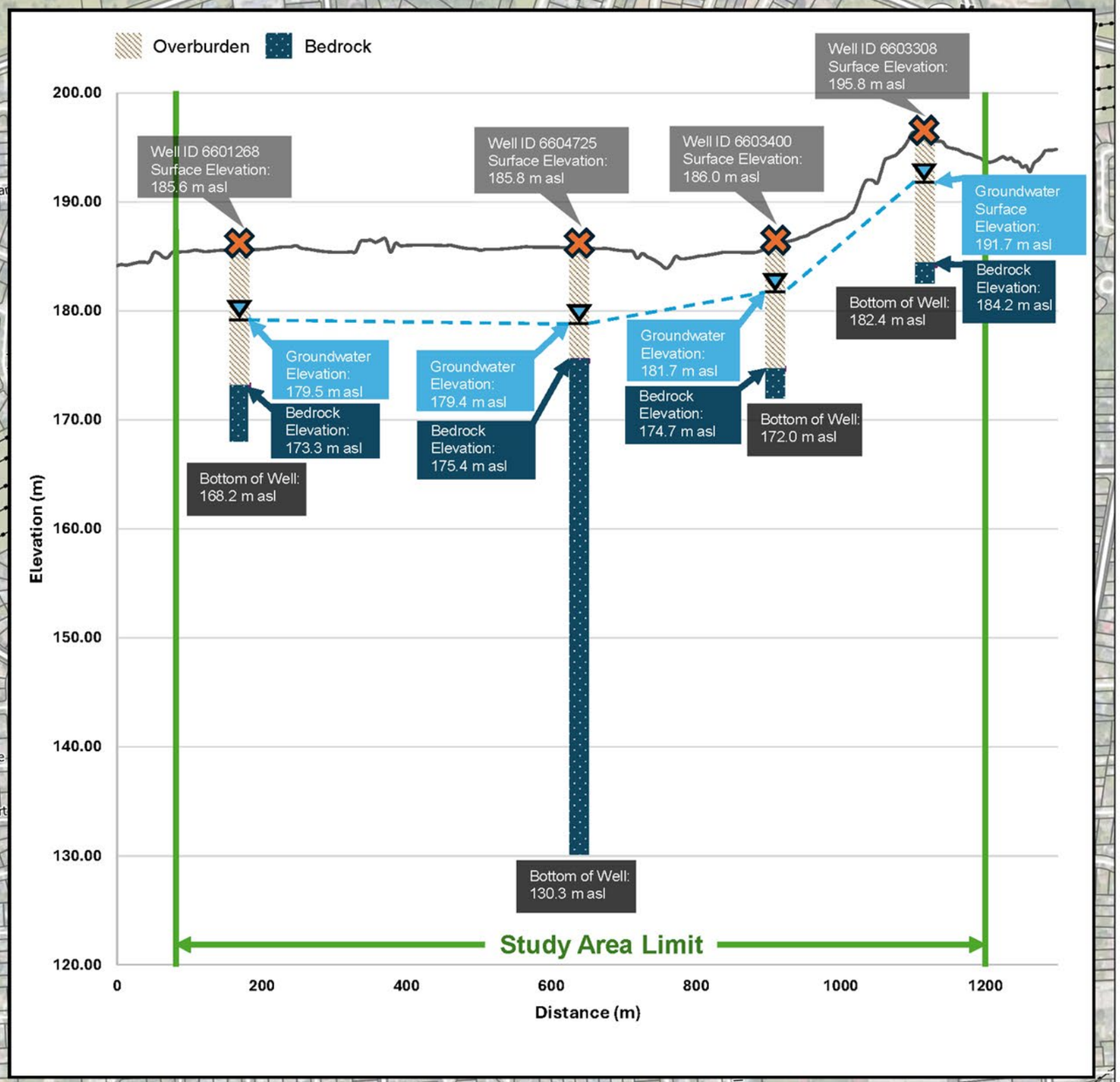
Client Name:
City of Niagara Falls (Ontario, Canada)

GEI Consultants

Last Updated: July 2024
Document ID: 2402620-002

Document Path: \\geiconsultants.com\data\Data_Storage\Working\NIAGARA FALLS ON, CITY OF\2402620 - 621014 Niagara Falls Modeling Support\621014-xx Garner West & Northwest\





Study Area
Historic Water Well
Hydro Line
Parcel
Municipal Boundary
Waterbody, Watercourse

Well ID	Date of Survey	Borehole Depth (m bgs)	Bedrock Depth (m bgs)	Static Groundwater Elevation (m bgs)
6601268	3/1/1962	168.2	173.3	179.5
6604725	5/28/2003	130.3	175.4	179.4
6603400	10/16/1978	172.0	174.7	181.7
6603308	10/12/1978	182.4	184.2	191.7

Reference(s)
1. Projection EPSG:26917
2. Base Data: City of Niagara Falls, 2024; Google Satellite, 2024

0 250 500 m

GEI consultants

Figure 2-3
Historic Borehole Log Profile in Study Area

Project Name:
Northwest Secondary Plan Area Functional Servicing Study

Client Name:
City of Niagara Falls (Ontario, Canada)

Last Updated: July 2024
Document ID: 2402620-002

Document Path: \\gei\consultants.com\data\Data_Storage\Working\NIAGARA FALLS ON, CITY OF\2402620 - 621014 Niagara Falls Modelling Support\621014-xx Garner West & Northwest FSRs\2402620-002-Northwest.ngz

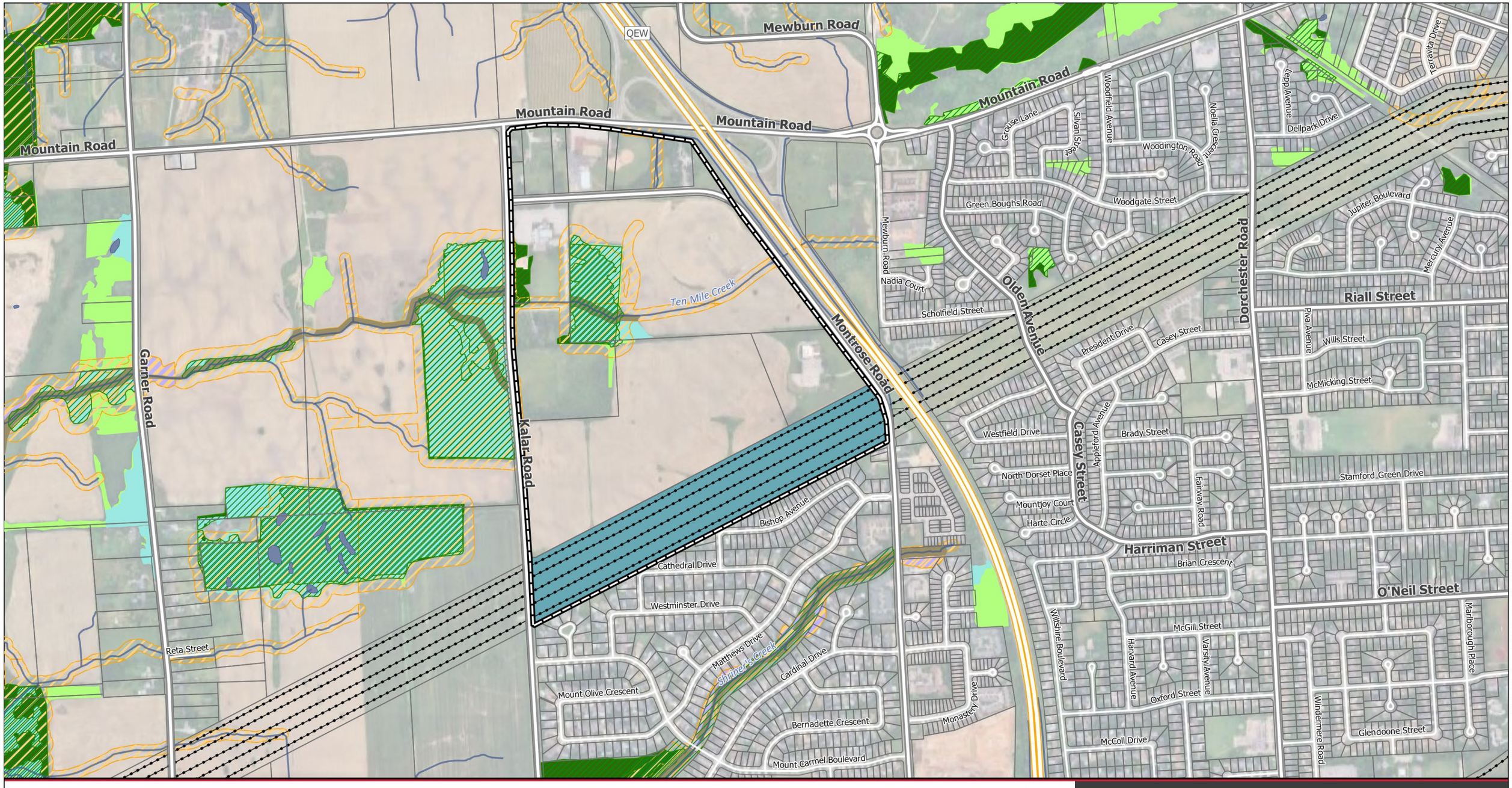
2.10. Summary of Physical Constraints to Servicing

Through the desktop review completed of the potential physical constraints to servicing, several constraints were identified and are as follows:

- A NPCA-regulated watercourse (tributary to Ten Mile Creek) that flows east to west through the Study Area along with a second NPCA-regulated watercourse that flows north to south and discharges into this tributary. A third NPCA-regulated stream has been identified along the west lot line of 2600 Montrose Road;
- Several wooded areas have been identified fronting Kalar Road, along with some areas of Significant Woodland;
- An Environmental Conservation Area (ECA) has been identified;
- A Locally Significant Wetland, in line with the tributary to Ten Mile Creek;
- A Hydro one easement spanning 170 metres in width and 1,100 metres in length that runs along the south limits of the NWSPA; and,
- Historic geotechnical records identify typical bedrock at 11 to 12 metres in depth, groundwater at 4 to 6 metres below grade, and silty clay as the predominant native soil condition.

The servicing strategies were developed considering these constraints by minimizing crossings, maintaining appropriate setbacks per regulating bodies, and minimizing excessive depth of cover. This will ensure compliance with regulatory standards and preserve ecological integrity. **Figure 2-4** illustrates the identified physical constraints to servicing within the NWSPA.

Figure 2-4: Constraints Map



Study Area
Hydro Line
Parcel
Hydro One Corridor

Natural Heritage Protections

- Potential Natural Heritage Corridor
- NPCA Approximate Regulation Lands
- Environmental Conservation Area
- Significant Woodland

Natural Heritage Feature

- Shoreline Area
- Other Woodlands
- Other Evaluated Wetlands
- Non-Provincially Significant Wetland
- Waterbody, Watercourse

N

Reference(s)
1. Projection EPSG:26917
2. Base Data: City of Niagara Falls, 2024; LIO 2024; Niagara Region 2024; Google Satellite, 2024

0 250 500 m

Figure 2-4
Constraints Map

Project Name:
Northwest Secondary Plan Area Functional Servicing Study

Client Name:
City of Niagara Falls (Ontario, Canada)

GEI consultants

Last Updated: February 2026
Document ID: 2402620-002

Document Path: B:\Working\NIAGARA FALLS ON, CITY OF\2402620 - 621014 Niagara Falls Modelling Support\621014-xx Garner West & Northwest FSRs\2402620-002-Northwest.qgz

3. Servicing Policy and Design Criteria

3.1. Servicing Principles and Policies

Niagara Region provides water and wastewater services under a two-tier system in which the Region owns and operates treatment plants, transmission mains, major storage, trunk sewers and pumping stations, while the CNF manages local distribution and collection systems. Regional servicing policies, established through the Official Plan and Water/Wastewater Master Servicing Plan (MSP), require that all new developments be serviced in an efficient, sustainable, and financially responsible manner, coordinated with planned growth and municipal infrastructure. Similar to other higher-tier Regions and Cities, Niagara Region emphasizes system reliability, redundancy, lifecycle considerations, and climate resilience when planning new facilities.

For water and wastewater systems, the MSP sets out principles that guide capacity planning in Secondary Plan areas. Water and wastewater systems must meet the design criteria detailed in Sections 3.2 and 3.3 and the City's engineering standards. Stormwater systems must follow the City's OP, Site Plan Guidelines, and engineering standards, as well as the Region's Stormwater Management Guidelines and NPCA policies.

Within this framework, the CNF applies its subdivision and site servicing standards to local road, water, wastewater and stormwater infrastructure. For Secondary Plans such as the NWSPA, servicing concepts must therefore align with Regional capacity and phasing, satisfy NPCA and MECP stormwater requirements, and conform to CNF design guidelines while supporting the growth management objectives of the Niagara Official Plan. Application requirements will be detailed further in Sections 5.4, 6.4, and 7.3.

3.2. Water Infrastructure

3.2.1. Treatment Plant

Treatment plants are designed to treat the maximum day demand. The following criteria were confirmed through the Region's MSP to assess when water treatment plants require expansion, as agreed upon with the Region:

- When flows reach 80% of plant capacity, the planning process for plant expansion will be flagged; and,
- When 90% of plant capacity has been reached, expansion should be completed.

3.2.2. Pumping Station

Per the Region MSP, water pumping stations are sized to provide maximum day demands, assuming there is sufficient storage in the pressure zone. When sufficient storage in the pressure zone is not provided, the pumping requirement is:

- Peak hour demands when there is insufficient balancing storage; or,
- Maximum day demand plus equivalent fire storage deficit flow transfer.

The following criteria is used to assess when a pumping station requires expansion:

- When flows reach 80% of the facility's firm capacity, the planning process for station expansion should be flagged; and,
- When 90% of facility firm capacity has been reached, expansion should be completed.

3.2.3. Storage

The required water storage capacity for a pressure zone was estimated in the Region MSP using the standard MECP criteria (A + B + C):

- Fire storage volume (A) is calculated based on equivalent population in accordance with the MECP Guideline for the Design of Water Distribution System;
- Equalization storage volume (B) is 25% of the maximum day demand; and,
- Emergency storage volume (C) is 25% of the equalization volume plus fire storage (C = 25% of A+B).

3.2.4. Watermains

Per the Region's MSP, watermains are sized based on flow demands and pressure requirements, which include the following:

- Maintain local system pressure between 40 and 100 psi;
    - Preferred pressure range of 50 to 80 psi for Regional transmission mains.
- Pipe velocity and headloss in the system, including:
    - Target headloss of 2.5 m/km or less to reduce pumping costs; and,
    - Target velocity less than 2.0 m/s under normal operating conditions.
- Minimum fire flow target of 250 L/s at a residual pressure of 30 psi within Regional transmission mains which service local distribution watermains.

3.2.5. Flow Criteria, Performance, and Sizing Methodology (Region MSP)

Per the Region's MSP, **Table 3-1** presents a summary of the flow criteria, performance, and sizing methodology that was utilized.

Table 3-1: Flow Criteria, Performance, and Sizing Methodology (Region MSP)

Description			Criteria
Flow Criteria	Water Demand	Residential	240 L/capita/day
		Employment	270 L/employee/day
	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 when 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-case 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)
	Watermain Sizing		Regional transmission main system for PHD and MDD + fire flow demands
	Storage Sizing		MECP methodology (A+B+C)

3.3. Wastewater Infrastructure

3.3.1. Wastewater Treatment Plant

Treatment plants are designed to treat the average daily flows. The following criteria were confirmed through the Region MSP to assess when wastewater treatment facilities require expansion.

- When flows reach 80% of plant capacity, the planning process for plant expansion will be flagged and,
- When 90% of plant capacity has been reached, expansion should be completed.

3.3.2. Pumping Station

The Region's design philosophy is to size sanitary pumping stations (SPS) in line with the Region's extraneous flow design criteria, but as per the Region MSP a hybrid evaluation approach is to be undertaken in an effort to acknowledge that SPSs are a major contributor to local wastewater system performance and that many legacy systems' existing wet weather flows exceed the extraneous flow design allowance. Two flow scenarios and evaluation criterions were agreed upon in the Region MSP to measure performance and/or flag triggers for a SPS:

- System Performance - Two flow scenarios considered
    - **Design Allowance**: Peak wet weather flow (PWWF) using the peaked dry weather flow (PDWF) plus the extraneous flow design allowance
    - **5-Year Storm**: Modelled PWWF using the 5-year design storm
- Trigger Sizing - Two criterions considered
    - Peak flow capacity to meet the design PWWF using the extraneous flow design allowance
    - Wet well and system storage considerations under 5-year storm to minimize basement flooding and overflow risks.

3.3.2.1. Sewage Pumping Station and Forcemain Policy Amendments

Niagara Region council has adopted a Sewage Pumping Stations and Forcemains Policy regarding upper-tier and lower-tier ownership and responsibilities. The proposed Policy Amendments require the following key considerations for the recommendation of pumping station and forcemain infrastructure as part of a Functional Servicing Plan for a Secondary Plan:

- Need for any new pumping station recommendations to be documented for approval by Niagara Region;
- Funding of new pumping stations to be identified for inclusion as part of the respective Region and/or Town Development Charges (DC) Background Studies, if Regional DC criteria are met; and,
- Documentation of evaluation of pumping station recommendations compared against the option of servicing by gravity sewer (including life-cycle cost analysis for both options).

Region policy maintains that:

- Gravity sewers are the most reliable method of transferring sewage from the sanitary collection system to wastewater treatment facilities;
- There are limitations to the practical depth of gravity sewers such that new pumping stations will only be allowed where it can be shown that pumping is a more cost effective and feasible option than gravity sewers;
- The need for a new pumping station, as well as an assessment of capacity of the downstream infrastructure, must be documented in engineering and/or planning studies (including Functional Servicing Plans); and,
- The cost for a new pumping station required to accommodate growth is to be included in the applicable Region/Town Development Charges (DC) by-law if Regional DC criteria are met.

3.3.3. Forcemain

As per the Region MSP, forcemain capacity is sized based on the firm capacity of the pumping station. The following criterion is used to assess when a forcemain for a pumping station requires expansion:

- Flag velocities less than 0.6 m/s for operational issues
- Flag velocities greater than 2 m/s
- Capacity expansion will be triggered once the forcemain design velocity exceeds 2.5 m/s and considering condition and age

Sizing of new forcemain will target the following criteria:

- Design velocity between 1.0 m/s and 2.0 m/s
- Where presently feasible, capacity requirements will be achieved by twinning of an existing forcemain with the same size as existing.

3.3.4. Trunk Sewers

As per the Region MSP, trunk sewers are sized to manage peak wet weather flows, using the extraneous flow design allowance (hybrid: 0.4 L/s/ha for existing areas and 0.286 L/s/ha for new areas), within the sewer obvert. The following criterion is used to assess when a sewer requires expansion:

- Capacity expansion will be triggered once the sewer peak hydraulic grade line exceeds the pipe obvert from the design allowance peak wet weather flows.
- Freeboard (depth between hydraulic grade line and ground surface) greater than 1.8m below ground surface during a 5-year design storm.
- Flag velocities less than 0.6 m/s for operational uses.
- Flag velocities greater than 3.0 m/s.

Sizing of new sewer will have the following criterion:

- Sized for full flow under post-2051 design allowance peak wet weather flow.
- Assess 5-year design storm performance to minimize basement flooding risk and overflows.

3.3.5. Flow Criteria, Scenarios, System Performance, and Sizing Methodology (Region MSP)

Per the Region MSP, **Table 3-2** presents a summary of the flow criteria, scenarios, performance, and sizing methodology that was utilized.

Table 3-2: Flow Criteria, Scenarios, System Performance, and Sizing Methodology

Description			Criteria
Flow Criteria	Existing System Flows		Starting Point Methodology • Based on local billing meter records and flow monitoring data to establish existing dry and wet 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 Criteria		• 0.4 L/s/ha for existing areas • 0.286 L/s/ha for new developments
Wastewater Treatment Plant	System Performance and Triggers		• MECP Procedure F-5-1 • Trigger upgrade planning at 80% capacity • Trigger upgrade construction at 90% capacity
	Upgrade Sizing		Average daily flow plus growth based on population design flows

Pump Station	System Performance Triggers and Sizing		• Two flow scenarios considered
			  ○ **Design Allowance:** Peak wet weather flow using the peak 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 2.0 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

Description		Criteria
Trunk	System Performance and Triggers	• Design allowance peak wet weather flows, using the extraneous flow design allowance, to be managed within pipe • Freeboard (depth between hydraulic grade line and ground surface) greater than 1.8 m below ground 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

3.4. Stormwater Management and Drainage

3.4.1. Quantity Controls

The Subwatershed Study includes hydrologic analysis of the Study Area to establish stormwater management criteria for quantity controls required of future development within the Study Area. Sizing of the conceptual stormwater management (SWM) facilities has been completed as part of the Phase 3 FSS with recommendations provided on the required level of quantity control for the entire Study Area, the potential for on-site quantity controls, and a conceptual layout of conveyance (storm sewer) systems.

3.4.2. Quality Controls

The Subwatershed Study includes hydrologic analysis of the Study Area to establish SWM criteria for quality controls required of future development within the Study Area. Sizing of the conceptual stormwater management (SWM) facilities has been completed as a part of the Phase 3 FSS with recommendations provided on the required level of quality control for the entire Study Area, as well as the potential for on-site quality controls that can be further defined at the development application stage.

4. Planning & Growth Projections

4.1. Growth Projections

As part of Phase 3, the population and employment projections for the NWSPA have been updated to reflect the most recent data provided by the CNF. As of the date of completion of the Phase 1 report (November 2024), the projected residential population growth in the NWSPA was estimated to be 4,200 persons with no projected employment growth. Updated projections, provided by the City in October 2025, now include residential and employment growth. The revised projections estimate a residential population of 6,740 persons and an employment population of 1,762, resulting in a total combined population of 8,502 people and jobs. The updated growth projections were used to inform the servicing capacity analysis and infrastructure sizing for the FSS. Table 4-1 provides a summary of the forecasted population and employment for the NWSPA.

Table 4-1: Growth Projections for Study Area

	Gross Expansion Area (ha)	Net Developable (ha)	Residential Growth (persons)	Employment Growth (employees)	Total Growth Estimate
Northwest SPA	101	55	6,740	1,762	8,502

4.2. Flow Projection Methodology

4.2.1. Water Demand Projection Methodology

Per the Region's MSP, the future water system's average daily demand (ADD) was developed using a starting point methodology (5-year rolling average of average daily demands and maximum day demands) incorporating a 25% reduction for non-revenue water for systems that are currently over 25% non-revenue water. Expected flows due to growth were added to the starting point flows to establish future flows.

Residential demands were calculated using a unit rate of 240 L/cap/day, while employment demands were calculated using 270 L/employee/day. No 25% reduction was accounted for non-revenue water.

4.2.2. Wastewater Flow Projection Methodology

Per the Region's MSP, the future wastewater system's average daily flow (ADF) was developed using a starting point methodology (5-year rolling average of average daily flows) incorporating a 25% reduction for non-revenue water. Expected flows due to growth were added to the starting point flows to establish future flows.

Residential flows were calculated using a unit rate of 255 L/cap/day, while employment demands were calculated using 310 L/employee/day. No 25% reduction was accounted for non-revenue water.

4.3. Projected Water Demand

Domestic water demands were calculated using the Region's per-capita consumption rates of 240 L/cap/day for residential growth and 270 L/employee/day for employment growth. For the projected residential population of 6,740 persons, this results in an Average Daily Flow (ADF) of 18.7 L/s, a Maximum Day Demand (MDD) of 30.0 L/s using an MDD factor of 1.60, and a Peak Hour Flow (PHF) of 39.3 L/s using a 2.10 peaking factor. For the employment population of 1,762 employees, the ADF is 5.5 L/s, the MDD is 8.8 L/s, and the PHF is 11.6 L/s using the same peaking factors. The total water demand for the NWSPA are an ADF of 24.2 L/s, an MDD of 38.8 L/s, and a PHF of 50.9 L/s.

Fire flow requirements were established using the MECP Table 8-1 methodology, based on an equivalent population of 8,502 persons. Interpolation between the 6,000 and 10,000 person categories yields a required fire flow of 178 L/s for a 3-hour duration. For design flow considerations, the fire flow was added to the maximum day demand, resulting in a required total water demand of 217 L/s.

A summary of the projected water demand for NWSPA is provided in **Table 4-2**, with the supporting calculations provided in **Appendix A.**

Table 4-2: Water Demand for NWSPA

	Population / Employees	ADF (L/s)	MDD (L/s)	PHF (L/s)
Residential	6,740	18.7	30.0	33.3
Employment	1,762	5.5	8.8	11.6
Total System Demand	8,502	24.2	38.8	50.9
	MECP Method	**ADF (L/s)**	**Design Flow (Fire Flow + MDD)**	
Fire Flow Requirements	Interpolated between 6,000 and 10,000 persons	178 L/s (3-hr duration)	217	

4.4. Projected Wastewater Flows

Wastewater generation for the NWSPA was calculated using the Region's per-capita wastewater rates of 255 L/cap/day for residential growth and 310 L/employee/day for employment growth. Based on a projected residential population of 6,740 persons and 1,762 employees, the resulting average sanitary flows are 19.9 L/s and 6.3 L/s, respectively. A Harmon peaking factor of 3.02 was applied to both land use categories in accordance with Regional design criteria. This results in peak dry weather flows (PDWF) of 60.2 L/s for residential uses and 19.1 L/s for employment uses.

An inflow & infiltration (I/I) allowance of 0.286 L/s/ha was applied across the developable area of 55 ha, generating an additional 15.7 L/s of wet-weather flow. When combined with the peak dry weather flows, the total Peak Wet Weather Flow (PWWF) for the NWSPA is 95.0 L/s.

A summary of the projected wastewater flows for NWSPA is provided in **Table 4-3**, with the supporting calculations provided in **Appendix A.**

Table 4-3: Wastewater Flows for NWSPA

	Growth Estimates	ADF (L/s)	Peaking Factor (Harmon)	PDWF (L/s)
Residential	6,740	19.9	3.02	60.2
Employment	1,762	6.3	3.02	19.1
	Developable Area (ha)		I/I Rate (L/s/ha)	Total I/I (L/s)
Inflow and Infiltration (I/I)	55		0.286	15.7
	ADF (L/s)	PDWF (L/s)	I/I Allowance (L/s)	PWWF (L/s)
Total Wastewater Flows	26.2	79.3	15.7	95.0

5. Water Infrastructure

5.1. Existing Infrastructure

The Niagara Falls water system servicing the CNF is interconnected with the DeCew water system to provide additional supply and storage capacity to the City of Thorold and the Town of Niagara-on-the-Lake (NOTL). The following sections describe the existing water infrastructure associated with treatment, pumping, storage, and transmission.

5.1.1. Water Treatment

The Niagara Falls water system is supplied by the Niagara Falls Water Treatment Plant (WTP), which is located on 3599 Macklem Street in the CNF. The plant is a conventional surface water treatment plant with zebra mussel control, travelling screens, coagulation, flocculation, sedimentation, filtration, and disinfection. The plant's intake is 5.5 metres deep and located on the west bank of the Welland River, just south of the Niagara River. Although located in the Welland River, the intake actually receives raw water from the Niagara River as the Chippawa/Queenston power canal draws water from the Welland River to fill its reservoirs thereby reversing flow in the Welland River.

The plant has a rated capacity of 145.5 MLD (1,684 L/s). As outlined in the Region's 2023 Summary Report, the average treated water ranged from 37.4 MLD (26% of rated capacity) to 50.9 MLD (35% of rated capacity) in 2023. The maximum treated water ranged from 42.0 MLD (29% of rated capacity) to 60.6 MLD (42% of rated capacity) in 2023. The Region's 2021 MP identified that the Niagara Falls WTP had sufficient existing capacity to provided treated water to support population growth to 2051, based on the population growth estimates carried within that study. The location of the Niagara Falls WTP is shown in **Figure 5-1**.

5.1.2. Booster Stations

The CNF operates within a single pressure zone with a hydraulic grade line (HGL) of 250 metres above sea level (masl). As previously stated, there is interconnectivity with the Thorold system (HGL = 227 masl) and the St. Davids and Queenston systems (HGL = 168 masl). Water pressure is maintained throughout the Niagara Falls system via a series of booster pumping stations (BPS) and storage reservoirs. Details related to the BPSs within the Niagara Falls water system are provided in **Table 5-1**.

Table 5-1: Summary of Booster Pumping Stations

Pump Station	**Niagara Falls WTP High Lift Station**	**Kent Avenue BPS**
Address	3599 Macklem Street, Niagara Falls	4281 Kent Avenue, Niagara Falls
Inlet Source (Pressure Zone & Facility)	Water Treatment Plant (WTP)	250 (via Kent Avenue Reservoir)
Discharge (Pressure Zone)	250	250
Pressure Zones Supplied	168, 189 (NOTL), 227 (Thorold), 250	168, 189 (NOTL), 227 (Thorold), 250
Number of Pumps (Total/Firm)	5/4	3/2
Installed Capacity (MLD)	200.5	91.0
Firm Capacity (MLD)	146.0	46.0
Total Dynamic Head (m)	83.2	57.9

5.1.3. Storage

Details related to the water storage facilities within the Niagara Falls WTP service area are provided in **Table 5-2**. The Region's 2021 MP identified that the Lundy's Lane Elevated Tank (ET) will be decommissioned with a new tank location to be determined through a separate study.

Table 5-2: Summary of Storage Facilities

Storage Facility	**Niagara Falls WTP Reservoir**	**Kent Avenue Reservoir**	**Lundy's Lane Elevated Tank**
Address	3599 Macklem Street, Niagara Falls	4281 Kent Avenue, Niagara Falls	6280 Lundy's Lane, Niagara Falls
Storage Type	Pumped Reservoir	Pumped Reservoir	Elevated Tank
Volume (ML)	14[1]	20.9	2.5
Top Water Level (m)	174.3	196.9	249.6
Fire Supply Zones	250 Pumped	250 Pumped	250 Floating
Maximum Day Demand Supply Zones	All	168 Pumped 227 Pumped 250 Pumped	168 Pumped 227 Pumped 250 Pumped

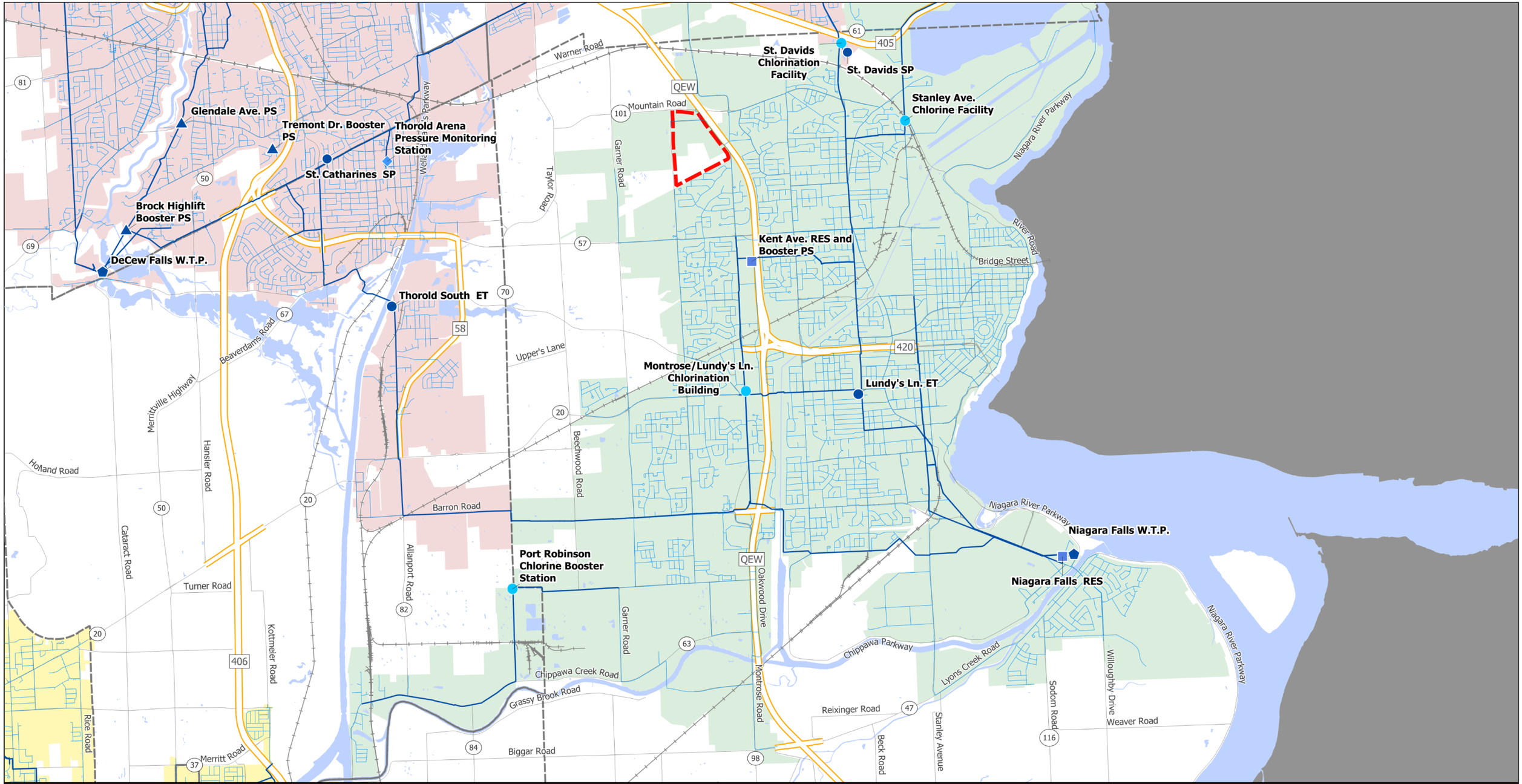
Note 1: Total WTP storage volume is 14 ML however due to MECP contact time requirements, the actual useable volume at the Niagara Falls WTP is 5.7 ML under 2051 MDD.

5.1.4. Trunk Distribution Network

The Regional trunk water distribution system, along with the local watermain networks, are shown in **Figure 5-1**. The transmission mains consist of 400mmø – 1050mmø watermains which distribute treated water throughout the Niagara Falls water system. The local watermain networks consist of 150mmø – 350mmø watermains which conveys treated water from the transmission mains to local residents and businesses. The boundary road network around the NWSPA contains the following water distribution network:

- 250mmø – 300mmø watermain on Montrose Road (Kalar Road to limit of Study Area)
- 300mmø watermain on Kalar Road at southwest limits of Study Area

Refer to **Figure 5-2** for the location of the water distribution network adjacent to the Study Area.



Study Area
Railway
Waterbody, Watercourse
Municipal Boundary

Existing Water Infrastructure
- Water Treatment Plant (WTP)
- Pumping Station (PS)
- Elevated Tank (ET), Stand Pipe (SP)
- Reservoir (RES)
- Fluoride Station
- Chlorine Facility
- Transmission Mains
- Distribution Mains

WTP Administrative Area
- DeCew Falls WTP
- Niagara Falls WTP
- Welland WTP

Reference(s)
1. Projection EPSG:26917
2. Base Data: City of Niagara Falls, 2024

0 1 2 km

Figure 5-1
Map Title: Existing Water Infrastructure in Niagara Falls

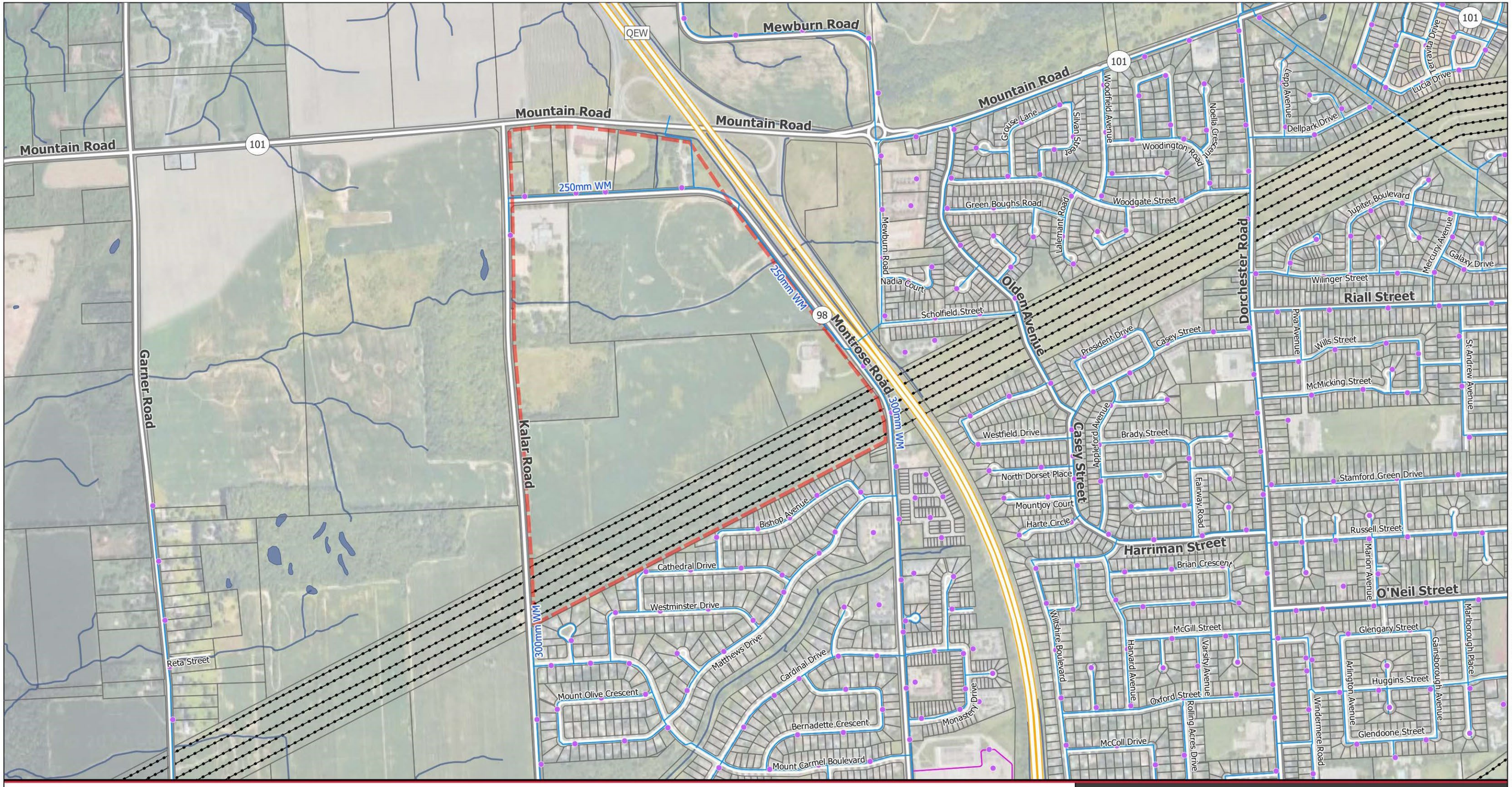
Project Name:
Northwest Secondary Plan Area Functional Servicing Study

Client Name:
City of Niagara Falls (Ontario, Canada)

GEI Consultants

Last Updated: July 2024
Document ID: 2402620-002

Document Path: \\geiconsultants.com\data\Data_Storage\Working\NIAGARA FALLS ON, CITY OF\2402620 - 621014 Niagara Falls Modelling Support\621014-xx Garner West & Northwest FSRs\2402620-002-Northwest.ngz



Study Area
Hydro Line
Parcel
Waterbody, Watercourse

Existing Water Infrastructure

Hydrant
Distribution Mains
Private

Reference(s)
1. Projection EPSG:26917
2. Base Data: City of Niagara Falls, 2024; Google Satellite, 2024

0 250 500 m

Figure 5-2
Map Title: Existing Water Infrastructure in Study Area

Project Name:
Northwest Secondary Plan Area Functional Servicing Study

Client Name:
City of Niagara Falls (Ontario, Canada)

GEI Consultants

Last Updated: July 2024
Document ID: 2402620-002

Document Path: \\geiconsultants.com\data\Data_Storage\Working\NIAGARA FALLS ON, CITY OF\2402620 - 621014 Niagara Falls Modelling Support\62\014-xx Garner West & Northwest FSR\s2402620-002-Northwest.qgz

5.2. Planned Capital Projects

The Region's 2021 MSP identified several capital projects to support the planned growth within the DeCew WTP & Niagara Falls WTP system service areas to 2051, which includes the NWSPA. **Table 5-3** and **Figure 5-3** identify and describe the planned water capital projects potentially impacting growth in the NWSPA.

Table 5-3: Planned Water Capital Projects

Master Plan ID	Name	Description	Size / Capacity	Estimated Year in Service	Project Type
W-S-004	New South Niagara Falls ET	New South Niagara Falls ET to replace the Lundy's Lane ET and provide additional storage	12.0 ML	2022 – 2026	Storage
W-S-014	In-ground reservoir expansion at Niagara Falls WTP	In-ground reservoir expansion at Niagara Falls WTP to support buildout growth and CT volume requirements	10.0 ML	Post 2051	Storage
W-D-004	Decommissioning of Lundy's Lane Elevated Tank (ET)	Lundy's Lane ET to be decommissioned and replaced by New South Niagara Falls ET.	N/A	2027-2031	Decom
W-M-007	New transmission main in South Niagara Falls	New transmission main from Pressure Reducing Valve (PRV) to Port Robinson Chlorine BPS in Niagara Falls	450 mm	2022 – 2026	Watermain
W-M-009	New Niagara Falls South transmission main to New ET	New Niagara Falls South transmission main to provide additional supply to new growth areas.	750 mm	2022 - 2026	Watermain
W-M-019	New Niagara Falls South feedermain from Dorchester Road to Lyon's Creek Road	New Niagara Falls South feedermain to provide additional supply to new growth areas.	600 mm	2032 - 2051	Watermain
W-M-020	New Niagara Falls South feedermain along Lyon's Creek Road	New Niagara Falls South feedermain to provide additional supply to new growth areas.	600 mm	2042 – 2051	Watermain
W-M-021	New Niagara Falls South Feedermain along Stanely Avenue	New Niagara Falls South feedermain to provide additional supply to new growth areas	N/A	2032 - 2051	Watermain

W-S-016
W-M-022
DeCew Falls W.T.P.
W-D-012
W-S-009
Thorold South ET
W-M-007
Port Robinson Chlorine Booster Station
W-S-004
W-M-009
W-M-019
W-M-020
W-M-021
Lundy's Ln. ET
W-D-004
Niagara Falls RES
W-S-014
Glendale Avenue
Warner Road
Welland Canals Parkway
Mountain Road
QEW
Garner Road
Taylor Road
Bridge Street
River Road
Niagara River Parkway
Beaverdams Road
Merrittville Highway
Upper's Lane
Beechwood Road
Barron Road
Holland Road
Hansler Road
Hollow Road
Cataract Road
Turner Road
Kottmeier Road
Rice Road
Merritt Road
Allanport Road
Oakwood Drive
Montrose Road
Chippawa Parkway
Chippawa Creek Road
Grassy Brook Road
Biggar Road
Reixinger Road
Lyons Creek Road
Stanley Avenue
Beck Road
Sodom Road
Willoughby Drive
Weaver Road
Portage Road
405
420
406
QEW

Study Area
Railway
Waterbody, Watercourse
Municipal Boundary

Capital Program
Elevated Tank
Reservoir
Transmission
Distribution

Existing Water Infrastructure
Transmission Mains
Distribution Mains

WTP Administrative Area
DeCew Falls WTP
Niagara Falls WTP
Welland WTP

N

Reference(s)
1. Projection EPSG:26917
2. Base Data: City of Niagara Falls, 2024

0 1 2 km

Figure 5-3
Planned Water Capital Projects in Niagara Falls

Project Name:
Northwest Secondary Plan Area Functional Servicing Study

Client Name:
City of Niagara Falls (Ontario, Canada)

GEI

Last Updated: July 2024
Document ID: 2402620-002

Document Path: \\geiconsultants.com\data\Data_Storage\Working\NIAGARA FALLS ON_CITY OF\2402620 - 621014 Niagara Falls Modelling Support\621014-xx Garner West & Northwest FSRs\2402620-001-Garner West.aprx

5.3. Proposed Infrastructure

The strategy development for water servicing infrastructure in the NWSPA involved a review of multiple alternatives for servicing the lands, along with hydraulic modelling to identify potential constraints with each servicing alternative. The following sub-sections detail the various servicing components included in the preferred water strategy.

5.3.1. Water Treatment

Given that the population and employment growth projections for the NWSPA increased from Phase 1 to Phase 3, a review of the increased Average Daily Demand (ADD) was completed. Based on the Phase 1 growth projection of 4,200 people, an ADD of 1.0 MLD was calculated. Based on the updated Phase 3 growth projection of 8,502 people and jobs, an ADD of 2.1 MLD was calculated. Therefore, an additional 1.1 MLD of ADD will be required of the Niagara Falls WTP in 2051. As previously stated, the average treated water ranged from 37.4 MLD (26% of its 145.5 MLD rated capacity) to 50.9 MLD (35% of rated capacity) in 2023. The Region's 2021 MP identified that the Niagara Falls WTP had sufficient existing capacity to provide treated water to support population growth to 2051 and given the marginal increase in ADD, no additional upgrades are anticipated to be required at the water treatment facilities. However, the Region should incorporate these updated growth projections into the next Master Plan update to confirm system-wide treatment needs.

5.3.2. Booster Stations

As detailed in Section 5.1.2, the CNF operates within a single pressure zone with a HGL of 250 masl. The ground elevation of the NWSPA generally ranges from 184 to 196 masl. Therefore, water pressure across the NWSPA, including higher elevation areas, remain within the required 40–100 psi threshold under 2051 MDD and fire flow conditions. Therefore, the existing regional pressure zone provides sufficient service without the need for increased pressure and a local booster station is not required to support the planned community. It is recommended that final grading be reviewed during detailed design to confirm no isolated high points fall below acceptable pressure levels, but based on current modelling, no booster station improvements are needed.

5.3.3. Storage

As detailed in Section 5.1.3, the CNF's potable water system is supported by multiple pumped and floating storage facilities. Based on the updated growth projections for the NWSPA, it is not anticipated that additional storage facilities are required in the Regional system to 2051 (beyond already planned upgrades). It is recommended that the Region incorporate the updated growth projection into the next Master Plan update to confirm system-wide storage needs.

5.3.4. Distribution Network Improvements

As previously identified, the NWSPA does currently have access to the municipal water distribution network along Montrose Road and a portion of Kalar Road. The existing water servicing network was constructed to service the existing land use and given the substantial land use updates envisioned for the NWSPA, hydraulic modelling was conducted to determine the extent and sizing of distribution system

upgrades. As shown on **Figure 5-4**, a 300mmø watermain is proposed to extend on Kalar Road from the existing 300mmø watermain south of the hydro corridor to the existing 250mmø watermain on Kalar Road, near Montrose Road. A section of the 250mmø watermain on Montrose Road is proposed to be replaced with a 300mmø watermain and extended as a 300mmø watermain along the internal collector roads of the NWSPA to provide servicing throughout the Secondary Plan area. Hydraulic modelling confirms that the sizing and looping identified on **Figure 5-4** will provide adequate pressure and fire flow that exceeds 250 L/s.

5.4. Application Conditions

Water servicing for the development must comply with the Region of Niagara Water and Wastewater Project Design Manual, City of Niagara Falls Engineering Design Requirements, local municipal standards, and applicable MECP guidelines. A Functional Servicing Report (FSR) is required to demonstrate that adequate supply, pressure, and fire flow capacity are available to support the development under both average and peak design conditions, along with conformance with the Official Plan and Secondary Plan.

The submission must include domestic demand calculations based on Region-standard per-capita and employment rates, identifying average day, maximum day, and peak hour demands. Fire flow requirements must be assessed using accepted methodologies and confirmed against available system pressures. For the CNF, the design must also ensure that local distribution system pressures remain within acceptable limits under maximum day plus fire flow conditions and that looping, hydrant spacing, and valve arrangements meet City standards.

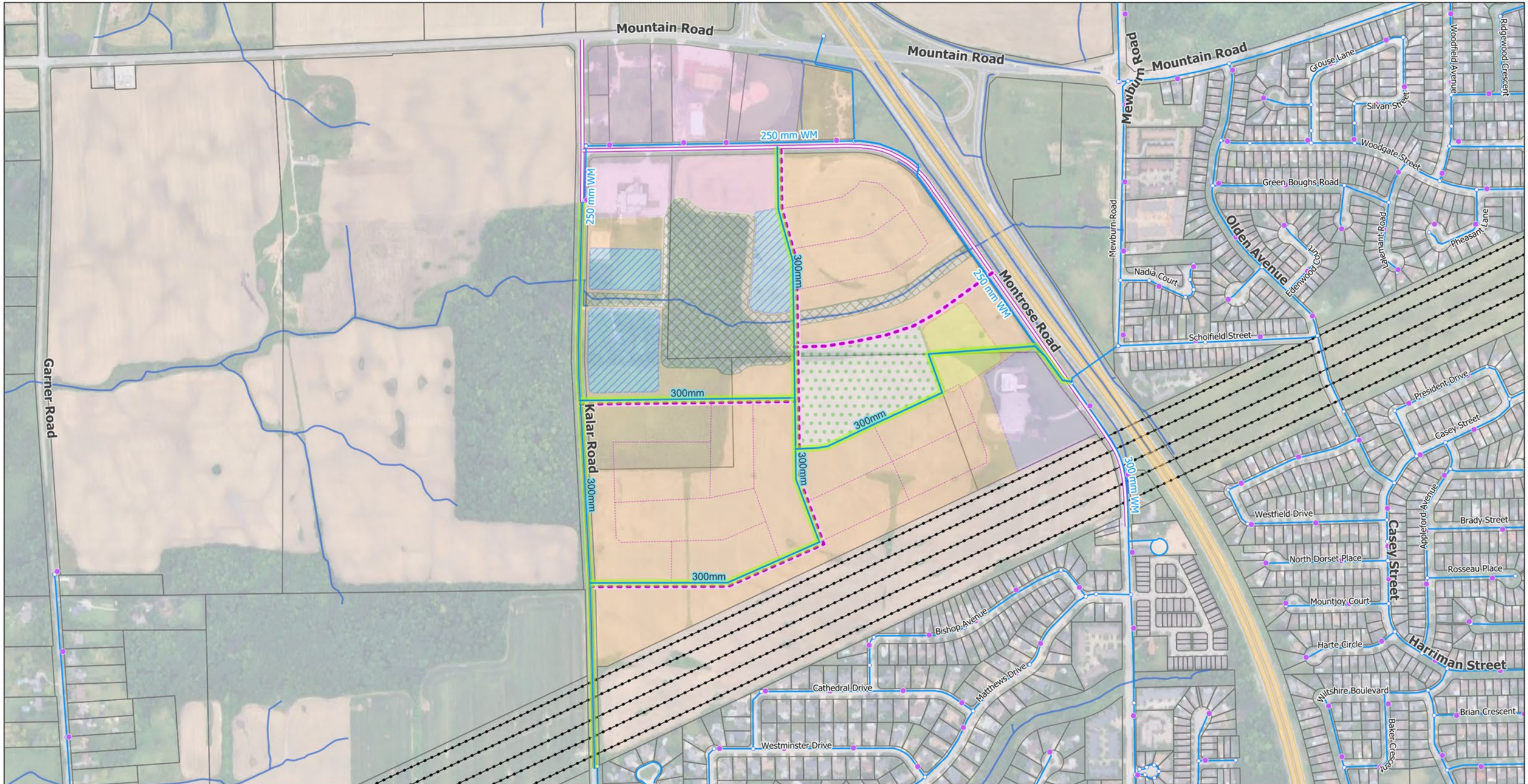
Hydraulic modelling must confirm that both the CNF distribution system and any connected Regional transmission system can accommodate projected flows without causing unacceptable pressure drops or service disruptions. Where the development relies on a Regional pressure district, the proponent must verify that adequate capacity exists in the associated trunk mains, pressure zones, and storage facilities. Any identified constraints must be addressed through system upgrades, phasing strategies, or alternative servicing approaches.

Engineering drawings must accompany the submission and include all proposed watermain alignments, pipe sizes, materials, depth of cover, hydrant locations, connections to existing infrastructure, and any required system looping or pressure-reducing measures. Local requirements for utility separation, frost protection, and backflow prevention must also be addressed.

A summary of the regulating bodies associated with the proposed water infrastructure is provided below (not an exhaustive list as revisions to the layout of the subdivision may impact the need for certain approvals):

- City of Niagara Falls (design must comply with engineering & construction standards)
    - Subdivision and/or site plan approval
    - Consolidated Linear Infrastructure Environmental Compliance Approval (CLI-ECA)
- Niagara Region (design must comply with engineering & construction standards)
- Ministry of the Environment, Conservation, and Parks (MECP)
    - Form 1 application

- Niagara Peninsula Conservation Authority (NPCA) (if final location of watermains are located in a NPCA-regulated area)
- Fisheries and Oceans Canada (DFO) (if final location of watermains impact fish habitat or species at risk)



Preferred Land Use Concept

- Environmental Protection Area
- Community Park
- Mixed Use
- Residential
- Place of Worship
- Elementary School
- Storm Water Management

Proposed Road

- Arterial
- Collector
- Local

Proposed Infrastructure

- Proposed New Watermain

Existing Water Infrastructure

- Hydrant
- Junction
- Local Water Main

Reference(s)

1. Projection EPSG:26917
2. Base Data: City of Niagara Falls, 2024; Google Satellite, 2024

0 150 300 m

Figure 5-4
Proposed Water System

Project Name:
Northwest Secondary Plan Area Functional Servicing Study

Client Name:
City of Niagara Falls (Ontario, Canada)

GEI

Last Updated: January 2026
Document ID: 2402620-004

Document Path: B:\Working\NIAGARA FALLS ON, CITY OF\2402620 - 621014 Niagara Falls Modelling Support\6\2014-xx Garner West & Northwest FSRs\Northwest\5. Work in Progress\3. GIS and Databases\2402620-004-Northwest Secondary Plan.qgz

6. Wastewater Infrastructure

6.1. Existing Infrastructure

The Niagara Falls wastewater system services the CNF and portions of the Town of Niagara-on-the-Lake (NOTL). A map of the existing wastewater system in the CNF is provided in **Figure 6-2**. The following sections describe the existing wastewater infrastructure associated with treatment, pumping, and collection.

6.1.1. Wastewater Treatment

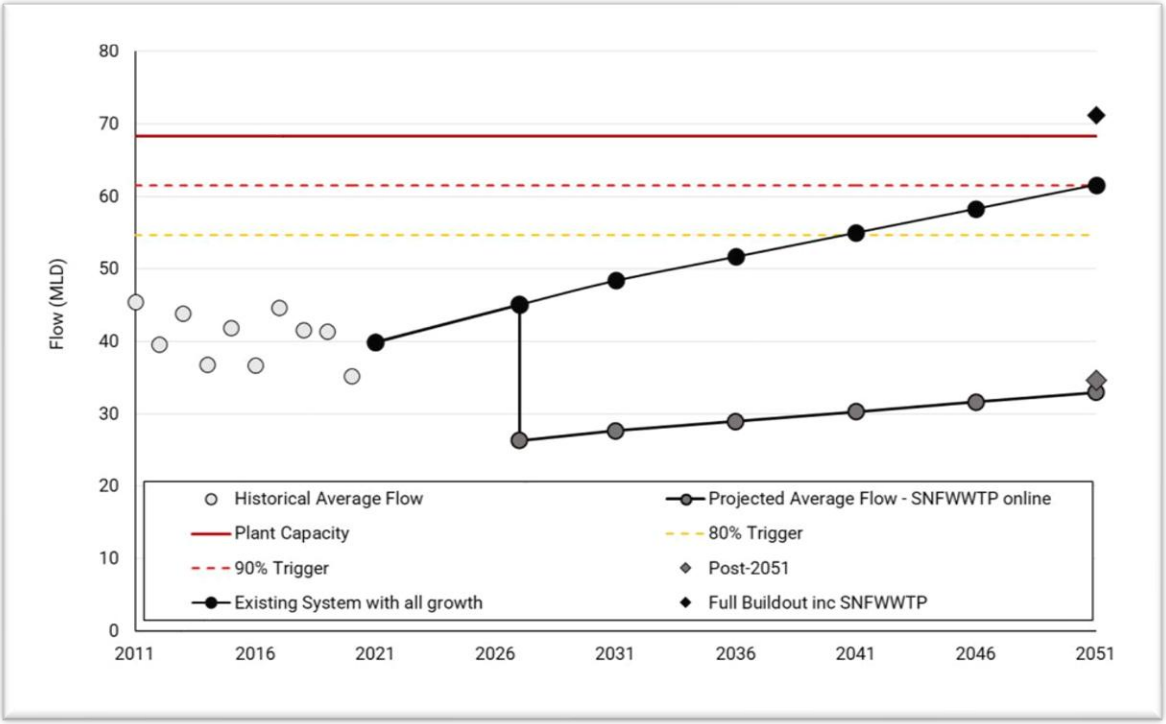
Wastewater treatment within the system is provided by the Niagara Falls Wastewater Treatment Plant (WWTP), which is located at 3450 Stanley Avenue in the City of Niagara Falls. The plant is a rotating biological contacting plant with a current rated capacity of 68.3 Megalitres per day (MLD), a peak dry weather flow capacity of 136.3 MLD, and a peak wet weather flow capacity of 205.0 MLD. The plant uses ferric chloride addition for phosphorus removal.

Five (5) years of recent flow data was used by the 2021 Niagara Region Water and Wastewater Master Servicing Plan Update (MSPU) to calculate an average daily flow at the plant of 39.9 MLD. It was projected that by 2051 the average daily flow will be 61.6 MLD which exceeds 90% of the existing wastewater treatment plant capacity (which is a trigger for expansion). The projected post-2051 average daily flow is 71.2 MLD, which exceeds the plant's rated capacity. Based on these anticipated capacity limitations at the Niagara Falls WWTP, Niagara Falls completed the South Niagara Falls Wastewater Solutions Schedule 'C' Class EA; the recommendations of which are detailed below in Section 6.1.1.1.

6.1.1.1. South Niagara Falls Wastewater Solutions Class EA

Niagara Region undertook the South Niagara Falls Wastewater Solutions (SNFWWS) study to identify, develop, and implement a wastewater servicing strategy and conceptual design of a new WWTP and associated collection and conveyance infrastructure in South Niagara Falls. The study identified a preferred location for the future WWTP at 6811 & 7047 Reixinger Road with an outfall into Chippawa Creek. The collection and conveyance system identified within the preferred strategy included a trunk sewer along Reixinger Road & Montrose Road; potentially involving the decommissioning of several existing sewage pumping stations (Grassy Brook SPS, Oakwood Drive SPS, Garner Road South West SPS, and South Side High Lift SPS). In addition, it included a trunk sewer along Brown Road, Beechwood Road, McLeod Road, and Barron Road to provide wastewater servicing to Thorold via a New Black Horse SPS with a forcemain along Allanport Road to discharge flows to the new trunk sewer terminating at the intersection of Barron Road & Allanport Road.

Figure 6-1: Projected Future ADF at Niagara Falls WWTP (2021 Region MSP)



6.1.2. Sewage Pumping Stations

The Region operates 21 sewage pumping stations throughout the CNF; the locations of which, along with their respective sewersheds, are shown in **Figure 6-2**. The Kalar Road SPS and Mewburn SPS service areas are in close proximity to the NWSPA and their details are provided in **Table 6-1**.

Table 6-1: Summary of Relevant SPS Details

	Station Name	Kalar Road SPS	Mewburn SPS
	Location	4254 Kalar Road	2617 Mewburn Road
Pump Station Details	**ECA Firm Capacity (L/s)**	510	23.3
	Operational Firm Capacity (L/s)	463	17.1
	Number of Pumps	4	2
Forcemain Details	**No. of Forcemains**	Single[1]	Single
	Forcemain Diameter (mm)	600	200
	Forcemain Length (m)	2,448	685
Catchment Details	**Sewershed (ha)**	500.1	8.9
	Sewershed Inclusive of Upstream Catchments (ha)	500.1	8.9
Peak Dry Weather Flow (L/s)	**2021 Flows**	91.7	0.9
	2051 Flows	126.7	2.3
	Post-2051 Flows	138.3	5.1
	2021 Flows	291.7	4.5

	Station Name	Kalar Road SPS	Mewburn SPS
Design Allowance - Peak Wet Weather Flow (L/s)	**2051 Flows**	350.8	8.5
	Post-2051 Flows	362.5	11.3
5-Year Storm – Peak Wet Weather Flow (L/s)	**2021 Flows**	670.9	7.2
	2051 Flows	730.0	11.2
	Post-2051 Flows	741.6	14.0

Note 1: Kalar Road SPS has an additional 350mmø forcemain as emergency standby that is approximately 1,269 metres in length along the existing hydro ROW and south along Montrose Road, discharging to a 600mmø trunk sanitary sewer. The 600mmø forcemain noted in this table is operated as a single forcemain.

As shown in **Figure 6-2**, the Kalar Road SPS is located approximately 1.3 kilometres south of the southern limits of the NWSPA. Its' service area is approximately 500 hectares and abuts the south and east limits of the NWSPA. The Kalar Road SPS pumps flows via a 600mmø forcemain east to a 750mmø gravity trunk sewer located within a hydro corridor that eventually discharges directly to the Niagara Falls WWTP. There are networks of local & trunk sewers that drain to the Kalar Road SPS; several of which are in close proximity to the NWSPA and were considered as potential connection points during the strategy development.

The Mewburn SPS is located approximately 500 metres east of the eastern limits of the NWSPA. Its' service area is approximately 9 hectares and is localized around the station. This station pumps flow via a 200mmø forcemain east to a 300mmø gravity sewer on Woodfield Avenue that is located within the Niagara Falls WWTP catchment area. Flows are conveyed east via local & trunk sewers directly to the Niagara Falls WWTP. There are several local sewers that drain to the Mewburn SPS that could function as connection points for the NWSPA however the QEW is located between the NWSPA and the Mewburn SPS service area. Mewburn SPS is currently being considered for expansion pending the results of a separate ongoing study.

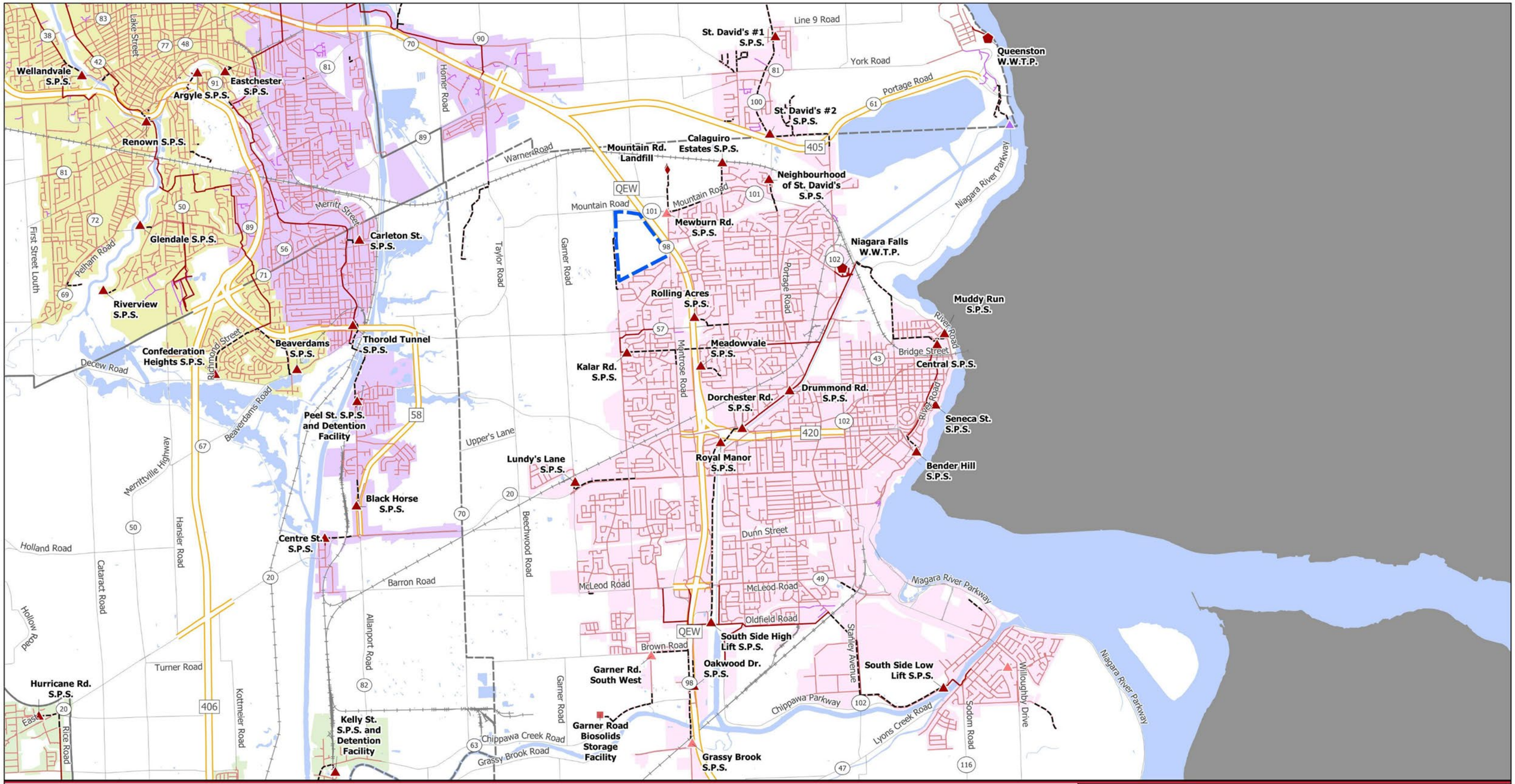
The anticipated flows experienced at the Kalar SPS and Mewburn SPS were extracted from the 2021 Region MSP and indicate that both stations operate within their firm capacity for peak dry weather flow (PDWF) events and design-based peak wet weather flow (PWWF) events. However, the Kalar SPS experiences an exceedance of its firm capacity during the 5-year PWWF event whereas the Mewburn SPS does not. As the NWSPA is anticipated to contribute approximately 95 L/s of PWWF, the Mewburn SPS is significantly undersized whereas the Kalar Road SPS has spare capacity.

6.1.2.1. Private Sewage Pumping Station

A privately owned sewage pumping station (SPS) is located on the existing Club Italia property in the NWSPA, conveying wastewater from the site to the municipal system. The facility receives a maximum peak flow of approximately 0.3 L/s, generated solely from the existing development. Wastewater is collected through a short gravity sewer network onsite and discharged via the highlighted forcemain, which routes west toward Kalar Road and south along Kalar Road before connecting into the municipal sanitary system at Mount Carmel Boulevard. The SPS, forcemain, and associated maintenance holes were constructed to CNF and OPSS standards, including 200 mm DR35 PVC gravity sewers. Upon redevelopment of the Club Italia lands, it is anticipated that this private SPS will be decommissioned in favour of a publicly-owned larger sewage pumping station.

6.1.3. Trunk Collection Network

As previously noted, sewage flows from the Niagara Falls WWTP service area are conveyed to the treatment plant via a network of local and Regionally owned sewers, and Regionally owned sewage pumping stations and forcemains. As shown in **Figure 6-4**, the majority of the sewers in close proximity to the NWSPA are local sewers which are typically designed to convey flows from the neighborhoods they were installed within. The closest trunk sewer is a 500mmø trunk sewer located approximately 1,050 metres south of the NWSPA which is tributary to the Kalar SPS. A local sewer extends from this trunk sewer to a distance of 550 metres from the NWSPA. Both of these sewer segments were investigated as potential connection points as part of the strategy development.



Study Area
Railway
Municipal Boundary
Waterbody, Watercourse

Existing Wastewater Infrastructure

- Wastewater Treatment Plant
- Sewage Pumping Station (Region)
- Sewage Pumping Station (Local)
- Leachate Pumping Station
- Force Main
- Regional
- Local

Wastewater Catchment

- Niagara Falls WWTP
- Port Dalhousie WWTP
- Port Weller WWTP
- Welland WWTP

Reference(s)
1. Projection EPSG:26917
2. Base Data: City of Niagara Falls, 2024

0 1 2 km

Figure 6-2
Map Title: Existing Wastewater Infrastructure in Niagara Falls

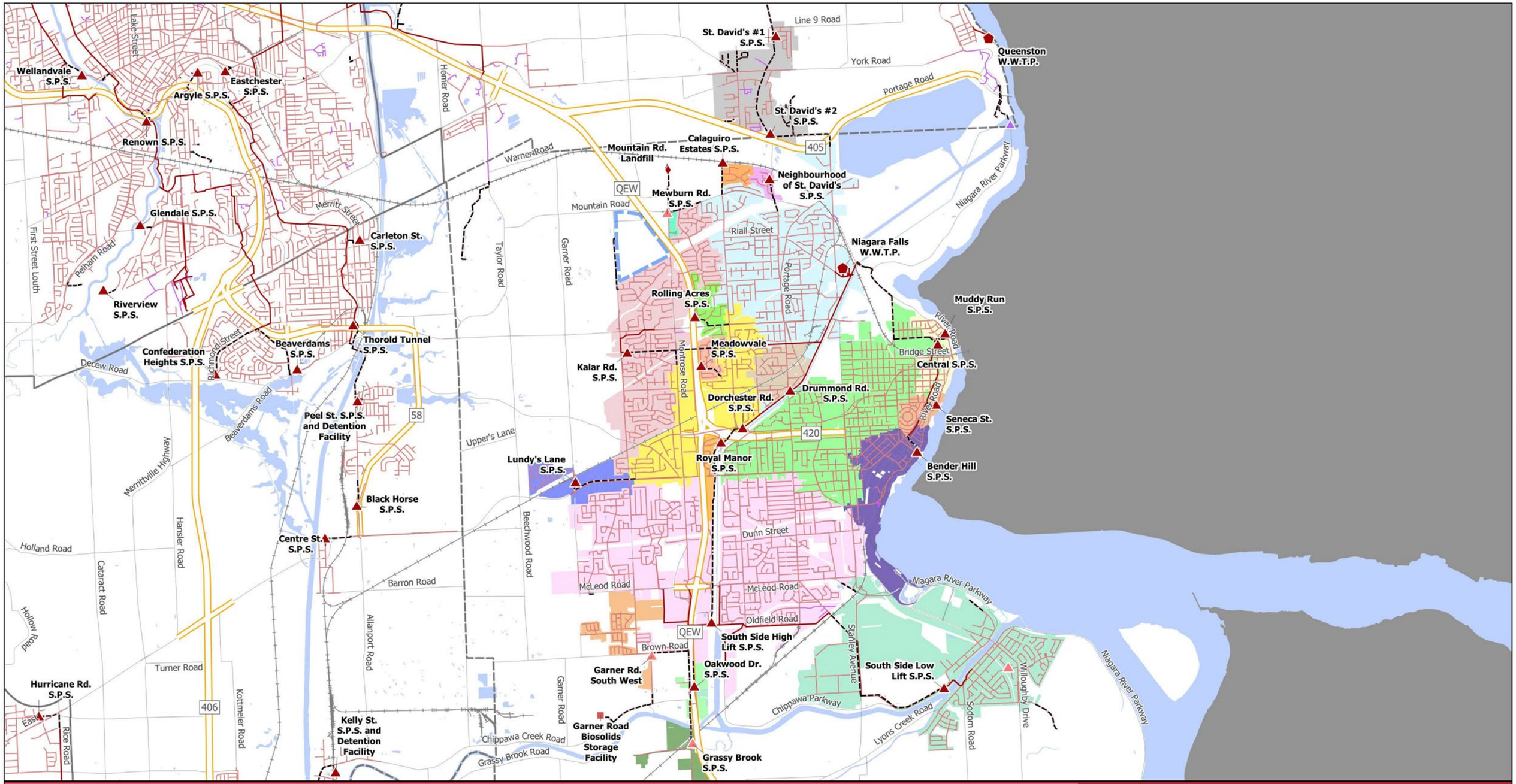
Project Name:
Northwest Secondary Plan Area Functional Servicing Study

Client Name:
City of Niagara Falls (Ontario, Canada)

GEI Consultants

Last Updated: July 2024
Document ID: 2402620-002

Document Path: \\geiconsultants.com\data\Data_Storage\Working\NIAGARA FALLS ON_CITY OF\2402620 - 621014 Niagara Falls Modelling Support\62\2014-xx Garner West & Northwest FSRs\2402620-002-Northwest.qgz



Study Area
Railway
Municipal Boundary
Waterbody, Watercourse

Existing Wastewater Infrastructure

- Wastewater Treatment Plant
- Sewage Pumping Station (Region)
- Sewage Pumping Station (Local)
- Leachate Pumping Station
- Force Main
- Regional
- Local

Wastewater Catchment by SPS

- Bender Hill
- Calaguiro
- Central
- Dorchester Road
- Drummond Road
- Garner
- Grassy Brook
- Kalar Road
- Lundy's Lane
- Meadowvale
- Mewburn
- Muddy Run
- Neighbourhood
- Niagara Falls WWTP
- Oakwood
- Rolling Acres
- Royal Manor
- Seneca Street
- South Side High Lift
- South Side Low Lift
- St. Davids #1
- St. Davids #2

Reference(s)
1. Projection EPSG:26917
2. Base Data: City of Niagara Falls, 2024

0 1 2 km

Figure 6-3
Existing Wastewater Catchments by Sewage Pumping Station

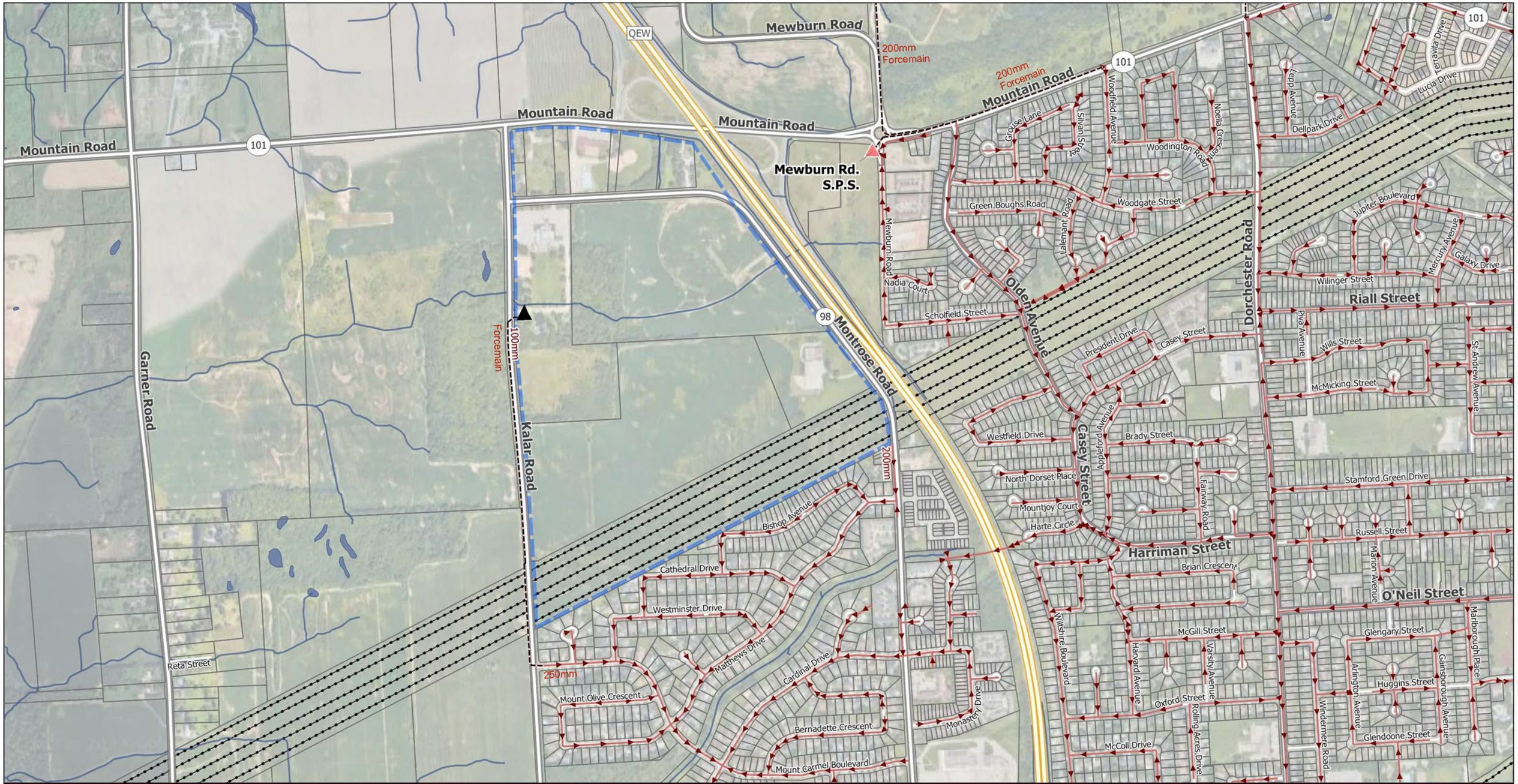
Project Name:
Northwest Secondary Plan Area Functional Servicing Study

Client Name:
City of Niagara Falls (Ontario, Canada)

GEI

Last Updated: August 2024
Document ID: 2402620-002

Document Path: \\geiconsultants.com\data\Data_Storage\Working\NIAGARA FALLS ON_CITY OF\2402620 - 621014 Niagara Falls Modelling Support\621014-xx Garner West & Northwest FSRs\2402620-002-Northwest.qgz



Study Area
Hydro Line
Parcel
Waterbody, Watercourse

Existing Wastewater Infrastructure

Sewage Pumping Station (Local)
Force Main
Local Gravity Main
Private Lift Station

N

Reference(s)
1. Projection EPSG:26917
2. Base Data: City of Niagara Falls, 2024; Google Satellite, 2024

0 250 500 m

Figure 6-4
Map Title: Existing Wastewater Infrastructure in Study Area

Project Name:
Northwest Secondary Plan Area Functional Servicing Study

Client Name:
City of Niagara Falls (Ontario, Canada)

GEI Consultants

Last Updated: July 2024
Document ID: 2402620-002

Document Path: \\geiconsultants.com\data\Data_Storage\Working\NIAGARA FALLS ON_CITY OF\2402620 - 621014 Niagara Falls Modelling Support\621014-xx Garner West & Northwest FSR\2402620-002-Northwest.qgz

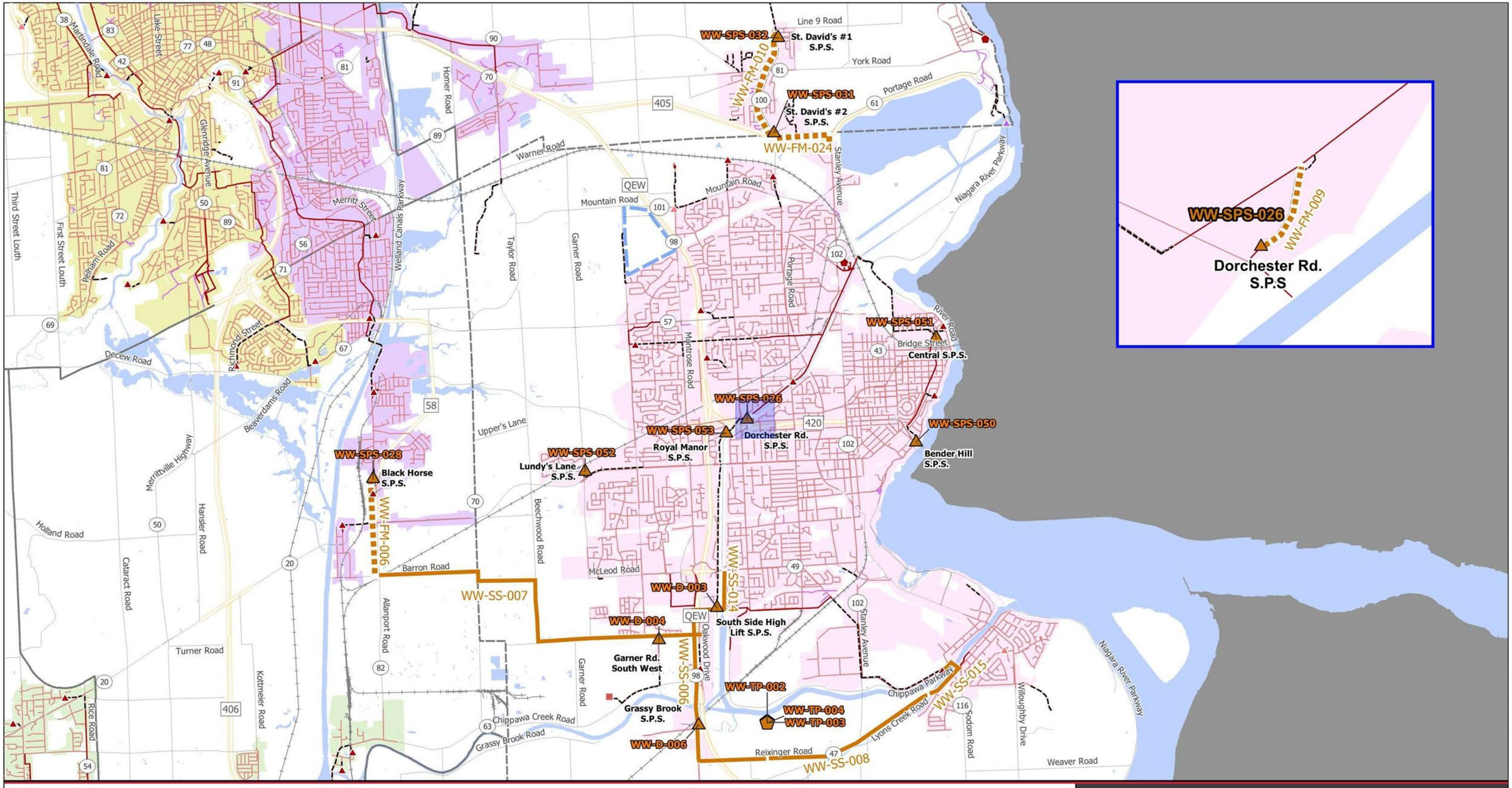
6.2. Planned Capital Projects

The Region's 2021 Master Plan identified several capital projects to support the planned growth within the DeCew WTP & Niagara Falls WTP system service areas to 2051, which includes the NWSPA. **Table 6-2** and **Figure 6-5** identify and describe the planned wastewater capital projects potentially impacting growth in the NWSPA.

Table 6-2: Planned Wastewater Capital Projects

Master Plan ID	Name	Description	Size / Capacity	Estimated Year in Service	Project Type
WW-TP-002	South Niagara Falls WWTP – Phase 1	New South Niagara Falls WWTP Phase 1 with 30 MLD capacity	30 MLD	2022-2026	Treatment
WW-TP-003	South Niagara Falls WWTP	New South Niagara Falls WWTP upgrade from 30 MLD to 60 MLD	30 MLD	2037-2041	Treatment
WW-TP-004	South Niagara Falls WWTP Outfall Structure	New South Niagara Falls WWTP Outfall Structure	1800 mm	2022-2026	Treatment
WW-SPS-026	Dorchester SPS Pump Replacement	Increase station capacity from 185 L/s to 345 L/s by replacing the existing three pumps	345 L/s	2027 - 2031	Pumping
WW-SPS-028	Black Horse SPS Upgrade	New SPS location with increased capacity from 67 L/s to 180 L/s	180 L/s	2027 - 2031	Pumping
WW-SPS-031	St. David's #2 SPS Upgrade	Increase station capacity from 42 L/s to 202 L/s with a full reconstruction	202 L/s	2027 - 2031	Pumping
WW-SPS-032	St. David's #1 SPS Upgrade	Increase station capacity from 29 L/s to 174 L/s with a full station reconstruction	174 L/s	2032 - 2051	Pumping
WW-SPS-050	Bender Hill SPS Pump Replacement	Full station replacement at new location from 237 L/s to re-establish 330 L/s ECA capacity	330 L/s	2022-2026	Pumping
WW-SPS-051	Central SPS Pump Replacement	Increase station capacity from 800 L/s to re-establish 1,000 L/s ECA capacity by replacing the existing five pumps	1,000 L/s	2037-2041	Pumping
WW-SPS-052	Lundy's Lane SPS Pump Replacement	Increase station capacity from 56 L/s to re-establish 98 L/s ECA capacity by replacing the existing three pumps	98 L/s	2037 - 2041	Pumping
WW-SPS-053	Royal Manor SPS Pump Replacement	Increase station capacity from 9 L/s to 16 L/s by replacing the existing two pumps	16 L/s	2022 – 2026	Pumping

Master Plan ID	Name	Description	Size / Capacity	Estimated Year in Service	Project Type
WW-FM-006	New Black Horse Forcemain to Niagara Falls	New Black Horse Forcemain to New South Niagara Falls Trunk on Barron Road to Montrose	400 mm	2027 – 2031	Forcemain
WW-FM-009	Dorchester Forcemain Upgrade	Replace ex. 350mm Dorchester SPS Forcemain with new single 500mm forcemain in Niagara Falls	500 mm	2027-2031	Forcemain
WW-FM-010	St David's #1 Forcemain Upgrade	Replace ex. 200mm St. Davids #1 Forcemain with new single 400 mm in Niagara-on-the-Lake (NOTL)	400 mm	2027-2031	Forcemain
WW-FM-024	St. David's #2 Forcemain Upgrade	Replace ex. 250mm St. David's #2 SPS forcemain with new single 400mm in Niagara Falls	400 mm	2027-2031	Forcemain
WW-D-003	Decommissioning of South Side High Lift (SSHL) SPS	Decommissioning of SSHL SPS, to be replaced by gravity trunk sewer to SNF WWTP	N/A	2037-2041	Decom
WW-D-004	Decommissioning of Garner SPS	Decommissioning of Garner SPS to be replaced by gravity trunk sewer to SNF WWTP	N/A	2032-2036	Decom
WW-D-006	Decommissioning of Grassy Brook SPS	Decommissioning of Grassy Brook SPS to be replaced by gravity trunk sewer to SNF WWTP	N/A	2032-2037	Decom
WW-SS-06	New Montrose Trunk Sewer	New tunnelled trunk sewer on Montrose conveying flows from SSHL SPS to new SNF WWTP	1500mm	2027-2031	Sewer
WW-SS-07	New Brown Road Trunk Sewer	Shallow trunk sewer from South Thorold to Garner SPS-South Niagara Falls trunk connection	600mm	2027-2031	Sewer
WW-SS-008	Chippawa Trunk Sewer Phase 1	New tunneled 1200mm trunk sewer from west of Lyon's Creek to South Niagara Falls WWTP	1200 mm	2032 – 2036	Sewer
WW-SS-014	South Niagara Falls SSO Trunk	New sewer to eliminate overflows upstream of South Side High Lift SPS	1050 mm	2022-2026	Sewer
WW-SS-015	Chippawa Trunk Sewer Phase 2	New tunneled 1200mm trunk sewer from South Side Low Lift to west of Lyon's creek	1200 mm	2037 - 2041	Sewer



Study Area
Railway
Municipal Boundary
Waterbody, Watercourse

Capital Program
- Wastewater Treatment Plant
- Sanitary Pumping Station
- Forcemain
- Trunk Sewer

Existing Wastewater Infrastructure
- Wastewater Treatment Plant
- Sewage Pumping Station (Region)
- Sewage Pumping Station (Local)
- Leachate Pumping Station
- Force Main
- Regional
- Local

Wastewater Catchment
- Niagara Falls WWTP
- Port Dalhousie WWTP
- Port Weller WWTP
- Welland WWTP

N

Reference(s)
1. Projection EPSG:26917
2. Base Data: City of Niagara Falls, 2024

0 1 2 km

Figure 6-5
Planned Wastewater Capital Projects in Niagara Falls

Project Name:
Northwest Secondary Plan Area Functional Servicing Study

Client Name:
City of Niagara Falls (Ontario, Canada)

GEI Consultants

Last Updated: July 2024
Document ID: 2402620-002

Document Path: \gisconsultants.com\data\Data_Storage\Working\NIAGARA FALLS ON, CITY OF\2402620 - 621014 Niagara Falls Modelling Support\621014-xx Garner West & Northwest FSRs\2402620-001-Garner West.qpz

6.3. Proposed Infrastructure

The strategy development for wastewater servicing infrastructure in the NWSPA involved a review of multiple alternatives for servicing the lands, along with hydraulic modelling to identify potential constraints with each servicing alternative. The following sub-sections detail the various servicing components included in the preferred wastewater strategy.

6.3.1. Wastewater Treatment

As detailed in Section 6.1.1, the Niagara Falls WWTP currently treats wastewater in the CNF. However, as the Niagara Falls WWTP is advancing in age and reaching its rated capacity, Niagara Region initiated an Environmental Assessment which recommended the construction of the South Niagara Falls WWTP. This second WWTP will alleviate capacity concerns at the Niagara Falls WWTP by diverting flow away from its service area and assist in servicing growth in the CNF.

Given the increase in population and employment growth projections for the NWSPA from Phase 1 to Phase 3 of this study, a review of the Average Daily Flow (ADF) was completed. Based on the Phase 1 growth projection of 4,200 people, an ADF of 1.1 MLD was calculated. Based on the updated Phase 3 growth projection of 8,502 people and jobs, an ADF of 2.3 MLD was calculated. Therefore, an additional 1.2 MLD will be required of the Niagara Falls WWTP in 2051. Assuming the construction of the South Niagara Falls WWTP and given the marginal increase in ADF, no additional upgrades are required at the wastewater treatment facilities. However, the Region should incorporate these updated growth projections into the next Master Plan update to confirm system-wide treatment needs.

6.3.2. Pumping Stations

Given the topography of the NWSPA, a new sewage pumping station (SPS) is required to service the entirety of the NWSPA as it cannot be drained by gravity. The preferred location of the SPS was reviewed within the context of technical, environmental, financial, social, and legal considerations. The preferred location is reflected on **Figure 6-10** and was chosen based on the following reasoning:

- Based on conceptual layout of the internal sewers, this location generally minimized the depth of the SPS and contributing sewers thereby reducing cost.
- Location is at Kalar Road and a future collector road allowing municipal access off either right-of-way, as well as a logical extension of sewers along the collector roads thereby assisting in phasing of development.
- Location avoids sensitive environmental features but allows for an emergency overflow to the environment (if required).

While the preferred location represents a logical choice based on the aforementioned reasons, there remains opportunities to locate the SPS along the future internal collector road or along Kalar Road based on the generally flat topography in the area. The specific location of the SPS will be refined through subsequent development applications and engagement amongst the stakeholders and the City. The SPS has been recommended for a firm capacity of 110 L/s which is approximately 15% above the identified PWWF of 95 L/s for the NWSPA. The SPS will pump flows via a 300mmø forcemain on Kalar Road to the existing Regional trunk sewer on Kalar Road, approximately 390 metres south of Thorold

Stone Road. The outlet location for the forcemain was determined based on hydraulic modelling analysis of the downstream network which is detailed further in Section 6.3.3.

6.3.3. Trunk Sewer Network

As detailed in the Phase 1 report, several connection points were considered for the forcemain conveying flows from the NWSPA to the existing wastewater network draining to the Kalar SPS. A preferred connection point was determined based on minimizing new construction challenges, as well as downstream upgrades, and is shown on **Figure 6-10**. The existing sewer infrastructure on Kalar Road includes the following segments which were considered as potential connection points:

- 200mmø sewer from Thorold Stone Road to 420 metres north
- 300mmø sewer from south limit of 200mmø sewer to 115 metres south of Thorold Stone Road
- 500mmø sewer from south limit of 300mmø sewer to 270 metres south
- 900-1050mmø trunk sewer from Kalar Road east for 155 metres to Kalar Road SPS.

The Kalar Road SPS pumps flows via a 2,500 metre length 600mmø forcemain to receiving trunk sewers that flow by gravity to the Niagara Falls WWTP. Hydraulic modelling indicated that surcharging was not anticipated from the Kalar Road SPS to the Niagara Falls WWTP. However, 2051 flow backups were identified during the 10-year storm event in the Regional trunk and local sewers upstream of Kalar Road SPS due to capacity constraints at Kalar Road SPS and high wet weather inflows, regardless of the inclusion of NWSPA flows. Due to capacity limitations associated with the 200mmø and 300mmø sewer segments, these sewers were removed as viable connection points. However, connecting upstream of the 500mmø and 900mmø sewer segments on Kalar Road were considered viable options with hydraulic analysis results presented below to support the preferred alternative.

Option A: Connect upstream of 500mmø sewer on Kalar Road

As shown in **Figure 6-6**, surcharging was identified in the sewers upstream of Kalar Road SPS with NWSPA flows included (red line) and without NWSPA flows (blue line). As shown, the HGL is minorly increased due to the inclusion of NWSPA flows. The manhole identified in red is the transition between the 300mmø and 500mmø sewer segments noted above.

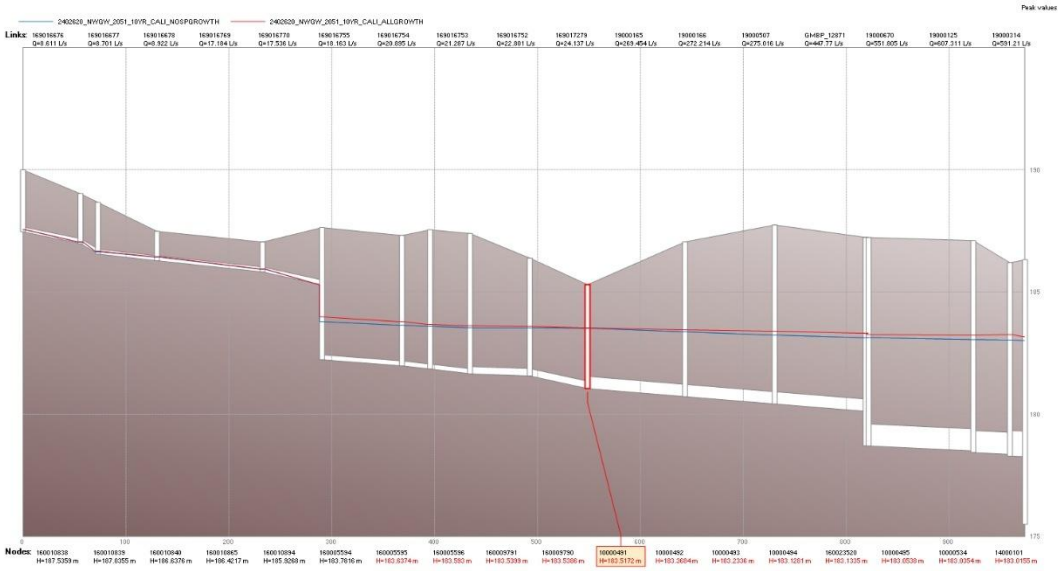


Figure 6-6: Existing Wastewater System – Option A

It is recommended for the Region to consider upgrades to the Kalar Road SPS in their next MSP update. Once the capacity constraint related to the SPS is removed, the upstream surcharging is reduced to reflect the orange line in **Figure 6-7**. Upsizing of the three segments of 500mmø trunk sewer (marked in yellow) to 600mmø eliminates the sewer surcharging (purple line) associated with 2051 growth (including the NWSPA flows).

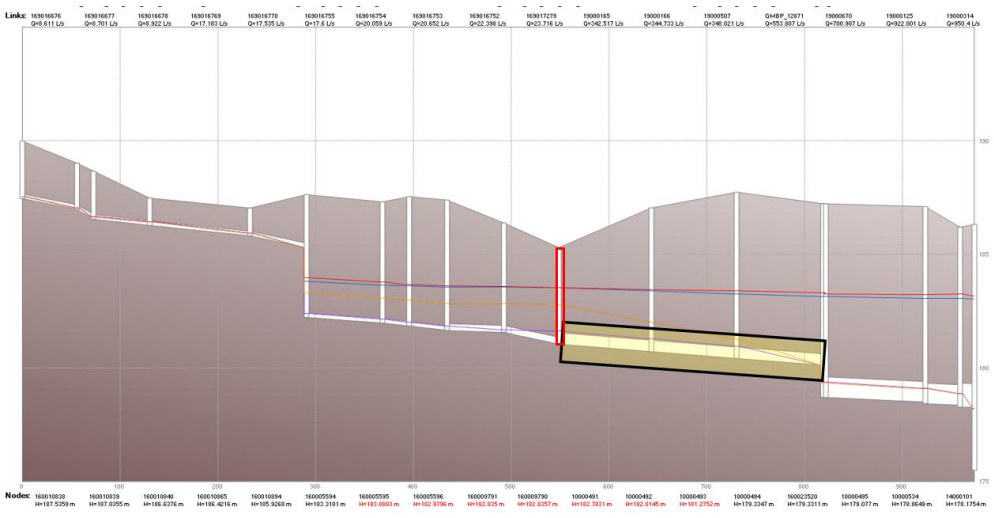


Figure 6-7: Wastewater System - Kalar SPS & trunk sewer upgrades – Option A

Option B: Connect upstream of 900mmø sewer on Kalar Road

As shown in **Figure 6-8**, surcharging was identified in the sewers upstream of Kalar Road SPS with NWSPA flows included (red line) and without NWSPA flows (blue line). As shown, the HGL is minorly increased due to the inclusion of NWSPA flows. The manhole identified in red is the transition between the 500mmø and 900mmø sewer segments noted above.

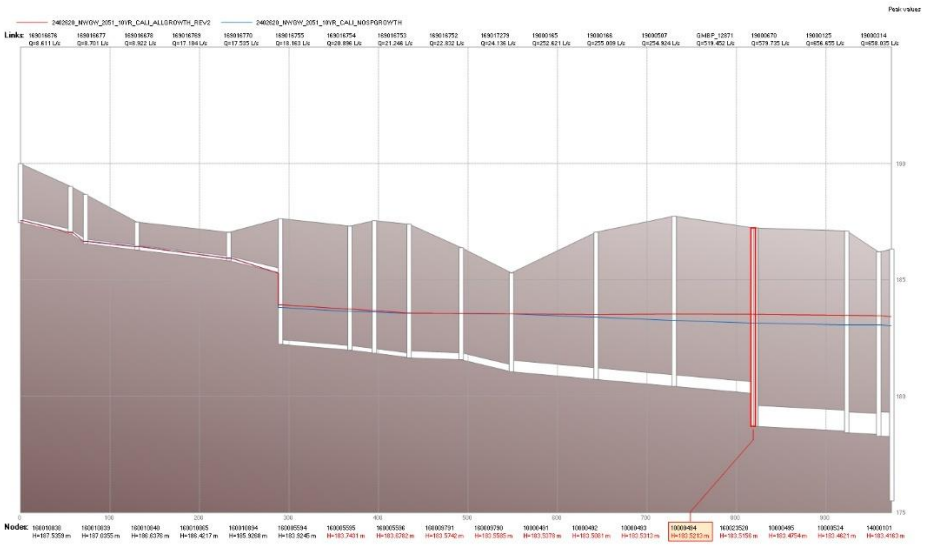


Figure 6-8: Existing Wastewater System - Option B

Similar to Option A, it is recommended for the Region to consider upgrades to the Kalar Road SPS in their next MSP update. Once the capacity constraint related to the SPS is removed, the upstream surcharging is reduced to reflect the orange line in **Figure 6-9**. Upsizing of the three segments of 500mmø trunk sewer (marked in yellow) to 600mmø eliminates the sewer surcharging (purple line) associated with 2051 growth (including the NWSPA flows).

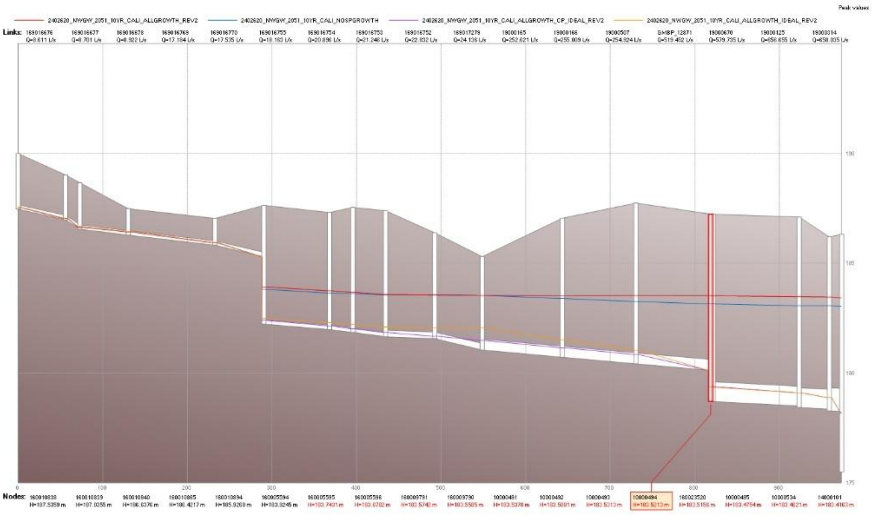


Figure 6-9: Wastewater System - Kalar SPS & trunk sewer upgrades – Option B

Based on the hydraulic analysis, the following observations were made:

- Prior to the capacity constraint being removed at the Kalar Road SPS, surcharging was identified for Options A & B in the sewers upstream of Kalar Road SPS with NWSPA flows included (red line) and without NWSPA flows (blue line). The HGL is minorly increased due to the inclusion of NWSPA flows.
    - When including NWSPA flows, Option B has a slightly elevated HGL in the 900mmø sewer segments compared to Option A given the lack of flow attenuation associated with Option B.
- Upon removal of the capacity constraint at the Kalar Road SPS, surcharging was identified in the 500mmø sewer segments for Options A & B (orange line) with surcharging eliminated in Options A & B when upsizing the 500mmø sewer segments to 600mmø (purple line).
    - Option B showed reduced surcharging compared to Option A in the 500mmø sewer segments given the proposed connection location.
- Within the 900mmø sewer segments, surcharging was identified for Options A & B prior to capacity constraints being removed at the Kalar Road SPS. Upon removal of these constraints, Options A & B do not show surcharging.
- It has been noted that a planned Inflow & Infiltration (I/I) program could potentially reduce the surcharging identified upstream of the Kalar Road SPS. The impact of this program should be monitored by the Region with upgrades considered to the noted sewers if required.

Based on the hydraulic analysis, Option B was considered the preferred connection point to the municipal wastewater system based on the following reasoning:

- Reduced impact on downstream infrastructure.
- Reduced reliance on Regional upgrade of existing 500mmø sewer to facilitate servicing of NWSPA.

6.3.4. Internal Collection System

The internal wastewater collection system is shown on **Figure 6-10** and consists of several gravity sewer segments sized at 300-375mmø with slopes ranging from 0.3% to 0.5%. The internal network was designed conceptually to provide allowable cleansing velocity, maintain adequate depth of cover, while also minimizing installation depth. The sewers are identified along Kalar Road and through internal collector roads however it is anticipated that additional smaller-diameter sewers will be extended along the remaining collector roads and local roads to service the various development blocks. The sewers will all drain to the proposed SPS which will convey the flows via forcemain to the existing wastewater system draining to the Kalar Road SPS.

6.4. Application Conditions

Wastewater servicing for the development must comply with the Region of Niagara Water and Wastewater Project Design Manual, City of Niagara Falls Engineering Design Requirements, municipal standards, and the MECP Design Guidelines for Sewage Works (2008). A Functional Servicing Report (FSR) is required to demonstrate that the proposed wastewater flows can be accommodated within both the City's local system and the downstream Regional trunk system without causing surcharging, capacity deficiencies, or increased basement flooding risk.

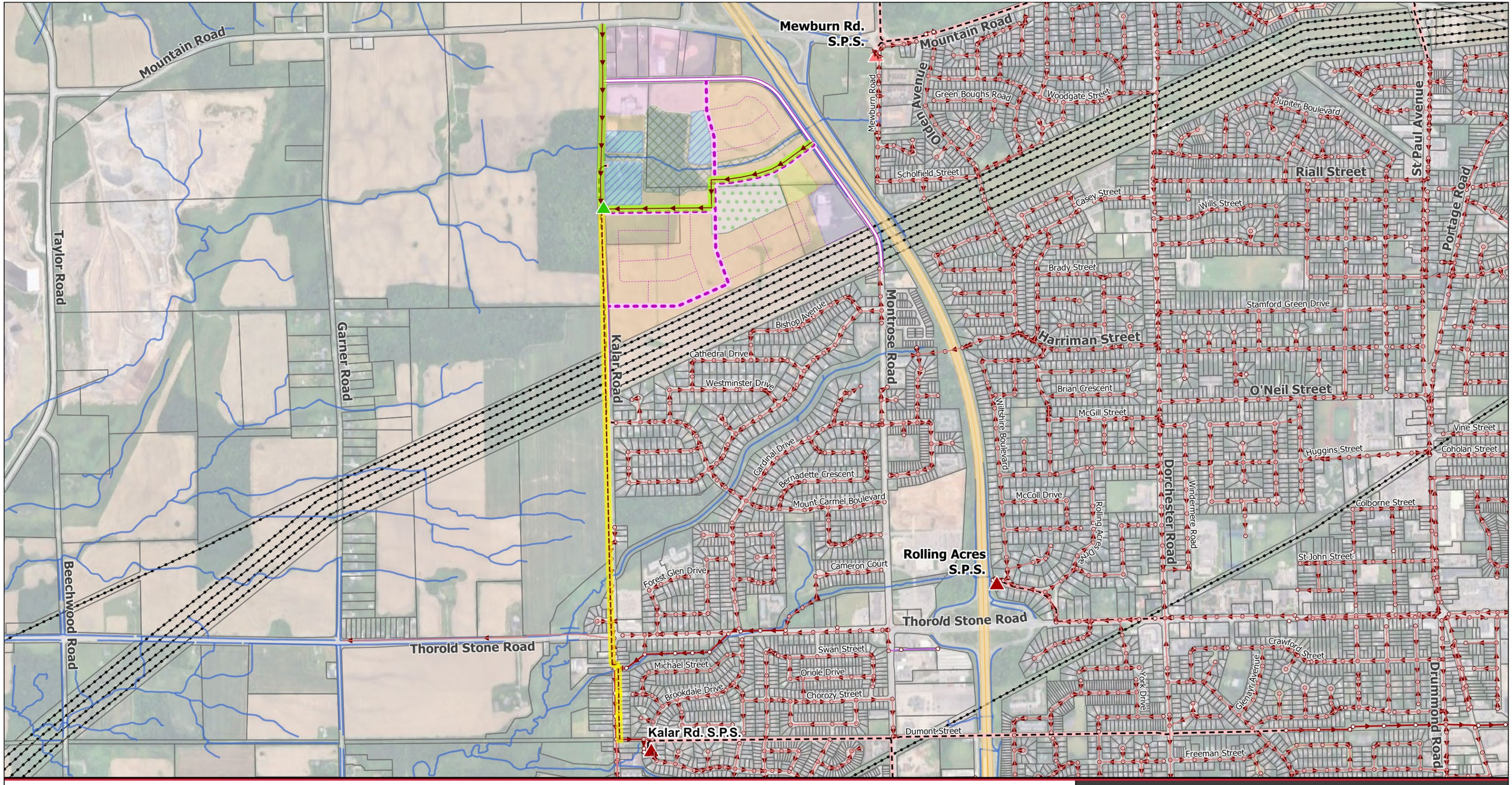
The FSR must include sanitary flow calculations that use Regional population and employment per capita criteria and identify average, peak dry weather, and peak wet weather flows. For the CNF, the design must also confirm that local sewers meet minimum slope requirements, remain within acceptable depth to diameter ratios, and do not exceed allowable surcharge limits during the 5-year and 100-year wet weather design events. Hydraulic modelling must assess downstream performance through both the City and Regional systems.

Where flows outlet to a Regional sewage pumping station or forcemain, the proponent must confirm that adequate capacity exists under current and future conditions or identify required upgrades or phasing constraints. Infiltration and inflow allowances must meet both Region and City expectations, and additional mitigation may be required where downstream constraints exist.

Engineering drawings must accompany the FSR and identify sewer alignments, slopes, depths, maintenance hole locations, and all connections to City and Regional infrastructure. Local requirements such as frost depth, utility separation, and odour or air release provisions must be addressed where applicable.

A summary of the regulating bodies associated with the proposed wastewater infrastructure is provided below (not an exhaustive list as the final location of the SPS will dictate certain approval requirements):

- City of Niagara Falls (design must comply with engineering & construction standards)
    - Building permit for any structures associated with the SPS
    - Consolidated Linear Infrastructure Environmental Compliance Approval (CLI-ECA)
- Niagara Region (design must comply with engineering & construction standards)
- Ministry of the Environment, Conservation, and Parks (MECP)
    - Environmental Compliance Approval (ECA)
    - Municipal Class Environmental Assessment (Schedule B) for SPS
    - Source Protection / Clean Water Act (if final location of SPS is located in a source water protection area)
- Niagara Peninsula Conservation Authority (NPCA) (if final location of SPS is located in a NPCA-regulated area)
- Fisheries and Oceans Canada (DFO) (if final location of SPS impacts fish habitat or species at risk)



Preferred Land Use Concept

- Environmental Protection Area
- Community Park
- Mixed Use
- Residential
- Place of Worship
- Elementary School
- Storm Water Management

Proposed Road

- Arterial
- Collector
- Local

Proposed Infrastructure

- New Sanitary Pumping Station
- New Force Main (300mm)
- Proposed Sanitary Pipe (450mm)

Existing Wastewater Infrastructure

- Sewage Pumping Station (Local)
- Sewage Pumping Station (Region)
- Existing Private Pumping Station
- Sanitary Gravity Main

Reference(s)

1. Projection EPSG:26917
2. Base Data: City of Niagara Falls, 2024; Google Satellite, 2024

0 150 300 m

Figure 6-10
Proposed Wastewater System

Project Name:
Northwest Secondary Plan Area Functional Servicing Study

Client Name:
City of Niagara Falls (Ontario, Canada)

GEI

Last Updated: February 2026
Document ID: 2402620-004

Document Path: B:\Working\NIAGARA FALLS ON, CITY OF\2402620 - 621014 Niagara Falls Modelling Support\621014-xx Garner West & Northwest FSRs\Northwest\5. Work in Progress\3. GIS and Databases\2402620-004-Northwest Secondary Plan.qgz

7. Stormwater Infrastructure

7.1. Existing Infrastructure

7.1.1. Existing Drainage Areas

A review of the topography within and adjacent to the NWSPA indicates that the entirety of the NWSPA drains to a tributary of Ten Mile Creek that flows east to west through the NWSPA. As shown on **Figure 7-1,** there are also external drainage areas for the east and south of the NWSPA that contribute stormwater flows to this tributary.

The topography of the NWSPA generally slopes from the higher elevations along Montrose Road, Mountain Road, and the Hydro One corridor, to the lower elevations along Kalar Road. Ground elevations range from approximately 182 to 196 meters above sea level, with the highest elevations located where Montrose Road meets the Hydro One corridor.

The external drainage area east of the QEW is conveyed to the Ten Mile Creek tributary via a box culvert under the QEW and a culvert under Montrose Road. Development within the NWSPA will need to consider, and maintain, the existing outlet for this external drainage area. Similarly, the external drainage area to the south includes several rear yards of the Mount Carmel neighbourhood that may contribute stormwater flows to the Hydro One corridor. Re-grading, or alteration of the Hydro One corridor, is not anticipated therefore the existing drainage pattern will be maintained. Ultimately, conveyance of flows from this external catchment will also need to be maintained in the post-development condition which will be reviewed further at the design stage.

7.1.2. Existing Stormwater Infrastructure

The majority of stormwater is conveyed through the NWSPA via overland flow and roadside ditches. The aforementioned culverts under the QEW and Montrose Road convey drainage from the east while the entirety of the drainage from the NWSPA (including the external drainage areas) is conveyed west in the Ten Mile Creek tributary via a culvert under Kalar Road, approximately 250 metres south of Montrose Road. The function of these culverts will need to be maintained in the post-development condition.

7.2. Proposed Infrastructure

7.2.1. Proposed Drainage Areas

Existing drainage patterns are recommended to be preserved as much as possible under the post-development condition. Impacts to the quantity and quality of runoff resulting from the implementation of the preferred concept plan will be mitigated by the preferred stormwater management (SWM) strategy, which was completed in coordination with the subwatershed consultant. The proposed drainage areas within the NWSPA have been delineated based on existing drainage patterns and in consideration of the preferred land use concept, and are summarized in **Table 7-1** and identified on **Figure 7-1.**

Table 7-1: Proposed Drainage Areas

Catchment ID	Approximate Area (ha)	Description	Outlet
1	12.4	Primarily mixed-use with some areas of medium density.	Ten Mile Creek via SWM Pond 1_2
2	14.1	Primarily low-density with some medium-density along Montrose Road and mixed use.	Ten Mile Creek via SWM Pond 1_13
3	7.8	Ten Mile Creek tributary corridor and sensitive natural areas to be retained.	Ten Mile Creek
4	42.5	Mixture of low-density and medium-density uses. Includes the community park, potential school site, and a significant portion of the internal collector roads.	Ten Mile Creek via SWM Pond 1_11
5	22.3	Hydro One corridor and external drainage area to the south.	Ten Mile Creek via ditches along Kalar Road
6	41.1	External drainage area to the east.	Ten Mile Creek via culverts under QEW & Montrose Road

7.2.2. Proposed Stormwater Conveyance System

The proposed minor system consists of 525mmø storm sewers extending along the internal collector roads and through the development blocks to convey storm flows to the stormwater ponds. The location and sizing of these storm sewers will be subject to further review at the design stage however they are typically required to convey the 5-year design storm at a minimum (pending confirmation by the approving agencies at the design stage).

All major flows in excess of the minor (storm sewer) system shall be safely routed to an appropriate municipal outlet, typically a natural watercourse or municipal sewer. Major systems will need to be confirmed at the design stage with the local and collector roads being assumed to convey the major (overland) system to the stormwater ponds at the planning stage. The major system is typically required to convey the 100-year design storm at a minimum (pending confirmation by the approving agencies at the design stage). The location of the proposed storm sewer conveyance system is identified on **Figure 7-1.**

7.2.3. Stormwater Management

7.2.3.1. Quantity Controls

Quantity controls in the CNF generally requires proponents to ensure that post-development peak flows do not exceed pre-development peak flows for the 2-year, 5-year, 25-year, and 100-year design storms. This requirement will need to be confirmed at the design stage with the approving agencies (CNF, Niagara Region, NPCA, etc.). Further information pertaining to quantity controls can be found in the subwatershed study.

7.2.3.2. Quality Controls

Quality controls in the CNF generally requires proponents to achieve a specified suspended solids removal rate; the level of which (Normal or Enhanced) will depend upon the ecological sensitivity of the receiving watercourse. The proponent will be required to confirm with the approving agency the level of required protection at the design stage. Further information pertaining to quality controls can be found in the subwatershed study.

7.2.3.3. SWM Facility Sizing and Locations

As shown in **Figure 7-1**, there are three (3) SWM facilities identified in the NWSPA which were assumed as wet ponds for this planning study. The ponds are located within blocks SWM Pond 1_13, SWM Pond 1_2, and SWM Pond 1_11. They have all been sized to provide the required water quantity and quality controls for their associated contributing drainage areas per the recommendations from the subwatershed study. A summary of the SWM facility details is provided in **Table 7-2**.

Table 7-2: Summary of SWM Facility Details

SWM Pond	Quality Storage (m^3)	Quantity Storage (m^3)	Total Storage (m^3)
1_13	2,337	6,760	9,097
1_2	2,495	7,130	9,625
1_11	6,606	18,420	25,026

The SWM facilities were located to optimize the potential layout of the stormwater minor and major systems by aligning with the existing drainage pattern in the NWSPA.

7.2.4. Low Impact Development (LID) Practices

Low Impact Development (LID) practices provide a comprehensive overview of Best Management Practices (BMPs) used to replicate natural hydrologic processes in urban environments. **Table 7-3** outlines the design intent, applicability, sizing criteria, performance expectations, construction considerations, and maintenance needs for a wide range of LID measures that could be applied in the NWSPA. Together, these practices form a flexible treatment train that supports infiltration, filtration, evapotranspiration, and distributed storage across development sites.

Table 7-3: Low Impact Development (LID) Practices

BMP Category	Design Intent & When to Use It	Applicability	Sizing Criteria	Performance Expectations
Bioretention / Rain Gardens	Provide infiltration, filtration, and temporary storage using engineered soil + vegetation. Use in boulevards and commercial sites where space is available and soils have medium infiltration.	Residential/mixed-use blocks, road boulevards, commercial sites.	0.5–1.0 m soil mix; 0.1–0.3 m ponding; footprint 5–20% of drainage area.	High suspended solids removal; moderate nutrient reduction; peak flow reduction; volume reduction where soils permit.
Enhanced Bioretention (Underdrain)	Provide consistent water quality treatment where infiltration is poor. Use where clay soils or high groundwater prevent true infiltration.	Clay soils, high groundwater, urban infill.	Underdrain required; media depth similar to bioretention; controlled outlet.	Strong pollutant removal; reliable flow control; limited volume reduction.
Infiltration Trenches / Chambers	Promote infiltration and recharge; reduce runoff volume. Use where soils infiltrate well and groundwater is sufficiently deep.	Permeable soils (sand, sandy loam); ≥1 m separation to groundwater.	Infiltration rate from field test; 30–40% void ratio; ≤72 hr drain time.	Significant volume reduction; good water balance outcomes; moderate water quality improvement with pretreatment.
Permeable Pavement	Provide infiltration and storage beneath traffic/parking surfaces. Use in parking lots, driveways, sidewalks with suitable subgrade.	Parking lots, low–medium traffic areas.	Stone reservoir depth per storage need; run-on ratio 1:1–3:1.	Good quality treatment; strong volume reduction; reduced icing.
Green Roofs	Retain rainfall, support evapotranspiration, and reduce roof runoff. Use where urban density limits ground-level SWM space.	Buildings with adequate structural capacity.	Growing medium 75–150+ mm; loading-dependent.	40–80% annual retention; reduced peak flows; improved thermal performance.
Cisterns (Rainwater Harvesting)	Capture rooftop runoff for reuse (irrigation, flushing). Use with large roof areas or where reuse demand exists.	Institutional, commercial, residential with reuse.	Volume based on roof area + water demand.	Volume reduction; reduces potable water use; controlled discharge.
Vegetated Swales / Bioswales	Convey runoff while slowing flow and providing shallow infiltration/filtration. Use along roads and open space corridors.	Road edges, pathways, green corridors.	Slopes <6%; Manning's n 0.15–0.25; check dams if needed.	Moderate quality treatment; velocity reduction; minor infiltration.
Wet Ponds / Constructed Wetlands	Provide long-term water quality treatment and quantity control. Use as end-of-pipe facilities in new subdivisions.	Larger development blocks with available land.	Permanent pool + extended detention volume; forebay required.	High pollutant removal; good peak attenuation; ecological benefits.
Underground Storage (Tanks, Pipes, Vaults)	Provide quantity control where land is constrained. Use in dense areas or commercial sites.	Infill, commercial, industrial sites.	Volume sized for design storm; depth limited by utilities.	Strong peak flow control; no infiltration or quality unless combined with pretreatment.
Lot-Level Controls (Soak-away pits, Downspouts, Enhanced Topsoil)	Reduce runoff at the source through infiltration and retention. Use in subdivisions and residential blocks.	Low- and medium-density residential.	Enhanced topsoil ≥300 mm; soak-away pits sized to rooftop area.	Very effective for reducing base runoff; supports water balance and reduces sewer demand.

For the NWSPA, wet ponds were chosen as the quantity and quality controls as they provide reliable long-term water quality treatment, effective peak flow attenuation, and strong resilience to varying site and soil conditions. Given the natural drainage patterns, and the need to manage flows toward the Ten Mile Creek tributary, wet ponds offer a practical solution that aligns with the Region of Niagara's stormwater requirements.

The LID measures identified in **Table 7-3** represent potential strategies that proponents can review for applicability at the design stage to improve water quality, reduce runoff, and encourage a strong water-balance based approach to stormwater management.

7.3. Application Conditions

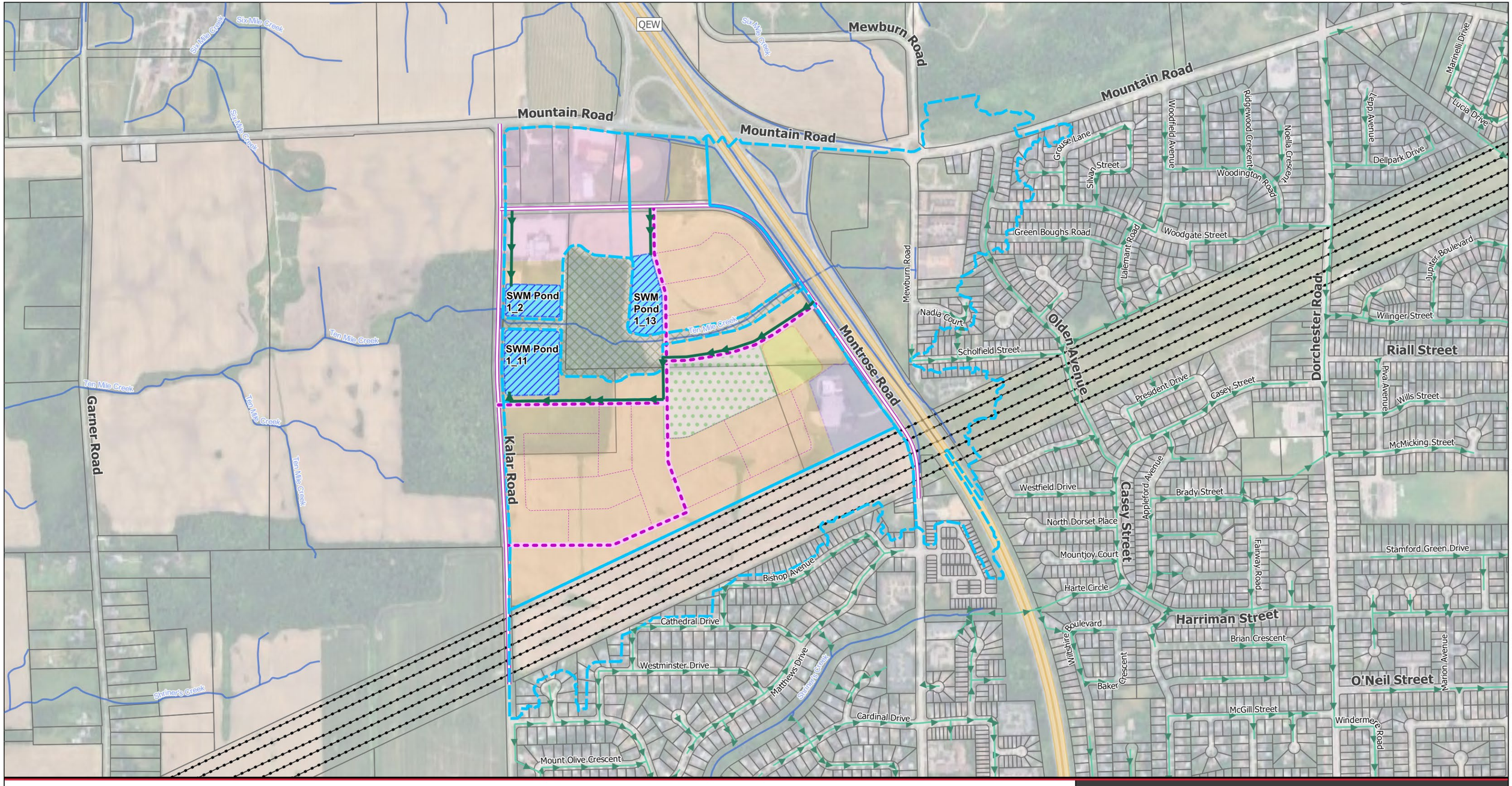
Stormwater management for the development must conform to the Region of Niagara Stormwater Management Guidelines, the MECP SWM Manual (2003)**,** NPCA policies**,** and applicable municipal standards. A comprehensive Stormwater Management Report is required to demonstrate that post-development drainage patterns, peak flows, water quality, erosion control, and water balance objectives meet Regional and NPCA criteria, and that both minor and major system flows are safely conveyed without adverse impacts to adjacent lands, municipal infrastructure, or downstream watercourses.

The submission must include hydrologic and hydraulic modelling, assessment of pre- and post-development peak flows (typically up to the 100-year or Regulatory storm), and water quality treatment meeting MECP requirements, including Enhanced (80% Total Suspended Solids) where required. Erosion control and water balance analyses must be provided, with justification for selected LID measures and rationale where site conditions limit their feasibility.

Major system overland flow routes must be identified and protected, and all stormwater facilities must meet the design requirements for freeboard, access, geotechnical stability, and erosion protection. Designs must include quantity, quality, erosion, and water balance calculations, as well as plans for staging, sediment forebays, maintenance access, landscaping, and long-term operation and maintenance.

A grading and drainage plan must accompany the report, demonstrating proper drainage boundaries, safe major system routing, and compatibility with existing topography. The report must identify any impacts to Ten Mile Creek or other downstream systems, appropriate mitigation measures, and confirm that controlled discharges do not increase flood or erosion risk.

Clearance of stormwater conditions will require acceptance of the final SWM design, engineering drawings, and any required supporting technical studies by the CNF, Niagara Region, NPCA, & the MECP.



Preferred Land Use Concept

- Environmental Protection Area
- Community Park
- Mixed Use
- Residential
- Place of Worship
- Elementary School

Proposed Road

- Arterial
- Collector
- Local

Proposed Infrastructure

- Proposed Drainage Boundary
- Storm Water Management
- Proposed Storm Sewers

Existing Storm Infrastructure

- Existing Storm Sewer

Reference(s)

1. Projection EPSG:26917
2. Base Data: City of Niagara Falls, 2024; Google Satellite, 2024

0 150 300 m

Figure 7-1
Proposed Stormwater System

Project Name:
Northwest Secondary Plan Area Functional Servicing Study

Client Name:
City of Niagara Falls (Ontario, Canada)

GEI consultants

Last Updated: February 2026
Document ID: 2402620-004

Document Path: B:\Working\NIAGARA FALLS ON, CITY OF\2402620 - 621014 Niagara Falls Modelling Support\621014-xx Garner West & Northwest FSRs\Northwest\5. Work in Progress\3. GIS and Databases\2402620-004-Northwest Secondary Plan.qgz

8. Cost Estimates

8.1. Costing Methodology

The cost estimating methodology for the NWSPA study is based on a unit-rate approach that reflects typical labour and material costs in Southwestern Ontario. All unit rates used in this assessment are expressed in 2025 dollars and were informed by unit rates carried in the previously completed Niagara Region Water and Wastewater Master Servicing Plan (MSP). These unit rates were carried forward with indexing (inflation) applied to reflect 2025 dollars per the Construction Price Index (CPI) put out by Statistics Canada for the construction sector. The key assumptions and factors supporting the preliminary costs for water, wastewater, and storm infrastructure within the NWSPA are summarized below:

• Project Classification: Cost estimates are prepared to a Class 4 (Infrastructure Planning) level, suitable for early planning and funding allocation based on limited design information. More detailed estimates will be completed during future design phases.

• Project Complexity: Project complexity is considered during estimate development and classified as Low, Medium, or High. Complexity influences allowances for construction contingency, geotechnical and hydrogeological investigations, and potential property or easement requirements.

• Area Condition: Defined as Rural, Suburban, or Urban, and used in conjunction with project complexity to determine appropriate cost allowances.

• Installation Cost: Calculated using unit rates for linear and facility works within the NWSPA. Linear unit rates vary by installation depth, including shallow installation (0 to 5 metres), deep installation (5 to 7 metres), and tunnelling (greater than 7 metres). Tunnelling unit rates are also applied to specialized crossings, categorized as Type 1 Crossing (Minor Creek, approximately 20 metres), Type 2 Crossing (Minor Road or Utility Corridor, approximately 60 metres), or Type 3 Crossing (Major Creek or Road, approximately 150 metres).

The Class 4 cost estimate for each capital project is composed of the Total Construction Cost, the Total Design Cost, and an applied Project Contingency. These components include the following:

• Total Construction (Hard) Costs:

- Installation Cost
- General Items: Allowance for items required on all projects (bonding, insurance, etc.), calculated as a percentage of the Installation Cost (9% to 20%).
- Provisional Costs: Allowance for provisional labour and materials above the Installation Cost (6% to 12%).
- Construction Contingency: Allowance for additional labour and construction works, applied as a percentage of the Installation Cost (10% to 20%).

• Total Design (Soft) Costs:

- Geotechnical / Hydrogeological: Allowance for required investigations, calculated as a function of Project Complexity (0.5% for Low Complexity, 1% for Medium Complexity, 2% for High Complexity).
- Property / Easements: Allowance for potential property requirements, calculated as a function of Project Complexity (1% for Low Complexity, 1.5% for Medium Complexity, 2% for High Complexity).
- Engineering / Design (Internal): Applied as a percentage of the Total Construction Cost (8% for projects under $10M, 6% for $10M to $50M, 4% for projects over $50M).
- Design / Contract Administration (External): Applied as a percentage of the Total Construction Cost (15% for projects under $10M, 12% for $10M to $50M, 10% for projects over $50M).
- Approvals: Allowance for permitting and regulatory submissions, calculated as a percentage of the Total Construction Cost (1.5% for projects under $10M, 1% for $10M to $50M, 0.5% for projects over $50M).

A Project Contingency allowance ranging from 10% to 25% is applied to both the Total Construction Cost and Total Design Cost to determine the Total Project Cost based on the Project Complexity and Class Estimate Type. As all of the cost estimates for the NWSPA are Class 4, the Project Contingencies are 10% for Low Complexity), 15% for Medium Complexity, and 25% for High Complexity.

It is noted that the conceptual costs identified in this report are considered suitable for the purposes of infrastructure planning and are therefore conservative to ensure adequate contingencies.

8.2. Water Infrastructure

The cost estimates for the water infrastructure in the NWSPA is broken into three projects:

- WM 1-1 (300mmø watermain along Kalar Road)
- WM 2-1 (Upsize of existing 250mmø watermain to 300mmø watermain on Montrose Road)
- WM 3-1 (300mmø watermain along internal collector roads)

A summary of the Class 4 cost estimates for water infrastructure is provided in **Table 8-1** with a total estimated capital cost of $9.7M.

Table 8-1: Watermain Costing Summary

Project ID	Pipe Size (mm)	Length (m)	Capital Cost ($2025)
WM 1-1	300	1,100	$3,313,000
WM 2-1	300	105	$340,000
WM 3-1	300	2,250	$6,066,000
TOTAL	**-**	**3,455**	**$9.7M**

Refer to **Appendix B** for detailed costing sheets for each of the noted water projects.

8.3. Wastewater Infrastructure

The cost estimates for the wastewater infrastructure in the NWSPA is broken into four projects:

- WW 1-1 (300mmø sewer along Kalar Road)
- WW 2-1 (Sewers on internal collector roads)
- WW 3-1 (Sewage Pumping Station – firm capacity of 110 L/s)
- WW 4-1 (300mmø forcemain on Kalar Road)

A summary of the Class 4 cost estimates for wastewater infrastructure is provided in **Table 8-2** with a total estimated capital cost of $25.1M.

Table 8-2: Wastewater Costing Summary

Project ID	Pipe Size (mm) or Capacity (L/s)	Length (m)	Capital Cost ($2025)
WW 1-1	300	685	$2,791,000
WW 2-1	Varying; costed as 375mmø	935	$6,017,000
WW 3-1	110	-	$10,442,000
WW 4-1	300	2,000	$5,891,000
TOTAL	**-**	**3,380**	**$25.1M**

Refer to **Appendix B** for detailed costing sheets for each of the noted wastewater projects.

8.4. Stormwater Infrastructure

The cost estimates for the stormwater infrastructure in the NWSPA is broken into two projects:

- SW 1-1 (Storm sewers on internal collector roads or through private lands)
- SW 2-1 (Stormwater management wet ponds)

A summary of the Class 4 cost estimates for stormwater infrastructure is provided in **Table 8-3** with a total estimated capital cost of $12.4M.

Table 8-3: Stormwater Costing Summary

Project ID	Pipe Size (mm) or Quantity	Length (m)	Capital Cost ($2025)
SW 1-1	Varying; costed as 525mmø	1,230	$3,185,000
SW 2-1	Three (3) ponds	-	$9,230,705
TOTAL	**-**	**1,230**	**$12.4M**

Refer to **Appendix B** for detailed costing sheets for each of the noted stormwater projects.

8.5. Summary of Capital Costs

The total capital cost to implement the NWSPA's preferred servicing strategy, as detailed in **Figure 5-4**, **Figure 6-10**, and **Figure 7-1**, is estimated at approximately $47.2 million in 2025 dollars, inclusive of construction, engineering, contingency, and HST. The portion of this infrastructure that is applicable to development charges will be reviewed as part of a financial assessment.

9. Implementation

9.1. Capital Program Implementation

The servicing strategy developed for the NWSPA provides a high-level framework for the water, wastewater, and stormwater infrastructure required to support planned development and growth to 2051. As a land-use planning document prepared under the Planning Act, the Secondary Plan does not fulfill the requirements of the Municipal Class Environmental Assessment (MEA Class EA) process. Instead, the infrastructure projects identified through this study will be advanced through the appropriate MEA Class EA schedules during future stages of planning and design.

As the capital program progresses, project-specific EA requirements will be confirmed, and the municipality will complete the necessary studies for any Schedule A, A+, or B works. The Secondary Plan recommendations therefore serve as the foundation for future EA processes, design refinements, and implementation planning.

During subsequent phases of implementation, the following activities will be undertaken:

- Refinement of infrastructure locations and alignments through detailed surveys, grading, and subdivision design.
- Identification and confirmation of property, easement, or access requirements.
- Selection of preferred construction methodologies based on updated geotechnical and hydrogeological information.
- Completion of supporting studies such as environmental impact assessments, hydraulic modelling, and climate resilience analyses.
- Identification and mitigation of construction-related impacts, including erosion and sediment control, noise, and traffic management.
- Fulfillment of municipal, provincial, and conservation authority permitting requirements.

For budgeting purposes, the servicing plan outlined in this report provides a preliminary foundation for future capital planning and development charge allocation. As more detailed information becomes available through EA and design phases, project costing, schedules, and implementation priorities will be refined to align with development phasing and infrastructure capacity needs.

9.2. Phasing Plan

The servicing strategy for the NWSPA was developed to identify the water, wastewater, and stormwater infrastructure needed to support development of the NWSPA. This study provides a broad-level assessment of servicing requirements, recognizing that several components of the preferred strategy will require further refinement through detailed design, future environmental assessments where applicable, and subdivision-level planning. These additional steps, along with the construction sequencing and capacity confirmation within adjacent municipal systems, form important considerations when establishing the implementation timing of the recommended infrastructure program.

A servicing phasing plan was developed to coordinate infrastructure delivery with anticipated development activity across the Secondary Plan Area. The phasing approach considers development readiness, proximity to existing services, the need to complete key stormwater management facilities early in the process, and dependencies between water, wastewater, and storm infrastructure. The phasing plan also reflects the logical progression of deep utility installation, external system upgrades, and the staged expansion of stormwater facilities and outlets to Ten Mile Creek.

Based on a review of the growth identified for the NWSPA with the CNF, development is expected to proceed in five main phases, as reflected in **Figure 9-1.**

- Phase 1 (2026–2031) encompasses the central-western portion of the NWSPA where servicing can be most readily extended from existing infrastructure along Kalar Road.
- Phase 2A (2031–2036) includes the southern portion of the NWSPA with a significant portion of the low-density and medium-density land uses in the plan area. This phase includes the extension of east-west internal collector roads with the associated water, wastewater, and stormwater (w/ww/sw) infrastructure.
- Phase 2B (2036-2041) includes the northeastern portion of the NWSPA which is largely low-density residential. It includes a section of north-south collector road that connects to Montrose Road, along with the associated w/ww/sw infrastructure.
- Phase 3A (2041-2046) includes the southwest corner of Kalar Road and Montrose Road which includes a portion of the mixed use land use.
- Phase 3B (2046-2051) includes the portion of the NWSPA north of Montrose Road which is the majority of the mixed use land use.

Table 9-1 provides a summary of the approximate timing of the various infrastructure projects identified for the development of the NWSPA with **Figure 9-1** providing the location of the various phases.

Table 9-1: Approximate Timing of Required Infrastructure Projects

Phase	Implementation Timing	Water Infrastructure	Wastewater Infrastructure	Stormwater Infrastructure
1	2026-2031	• WM 1-1 • WM 2-1 • Portion of WM 3-1	• Portion of WW 2-1 • WW 3-1 • WW 4-1	• Portion of SW 1-1 • SW 2-1 (Pond 1_11)
2A	2031-2036	• WM 1-1 • WM 2-1 • Portion of WM 3-1	• WW 2-1 • WW 3-1 • WW 4-1	• Portion of SW 1-1 • SW 2-1 (Pond 1_11)
2B	2036-2041	• WM 1-1 • WM 2-1 • WM 3-1	• WW 2-1 • WW 3-1 • WW 4-1	• Portion of SW 1-1 • SW 2-1 (Ponds 1_11 & 1_13)
3A	2041-2046		• Portion of WW 1-1 • WW 2-1 • WW 3-1 • WW 4-1	• Portion of SW 1-1 • SW 2-1 (Ponds 1_11, 1_13, & 1_2)
3B	2046-2051		• WW 1-1 • WW 2-1 • WW 3-1 • WW 4-1	• SW 1-1 • SW 2-1 (Ponds 1_11, 1_13, & 1_2)

To ensure that servicing is available in advance of development, the anticipated time required for design, approvals, environmental studies, and construction must be considered for each water, wastewater, and stormwater project within the preferred strategy. This includes the timing required for any upgrades to Regional infrastructure. **Table 9-1** provides a high-level implementation schedule that aligns infrastructure delivery with the anticipated phasing plan however the build-out of the NWSPA will be refined as detailed design and development applications advance.

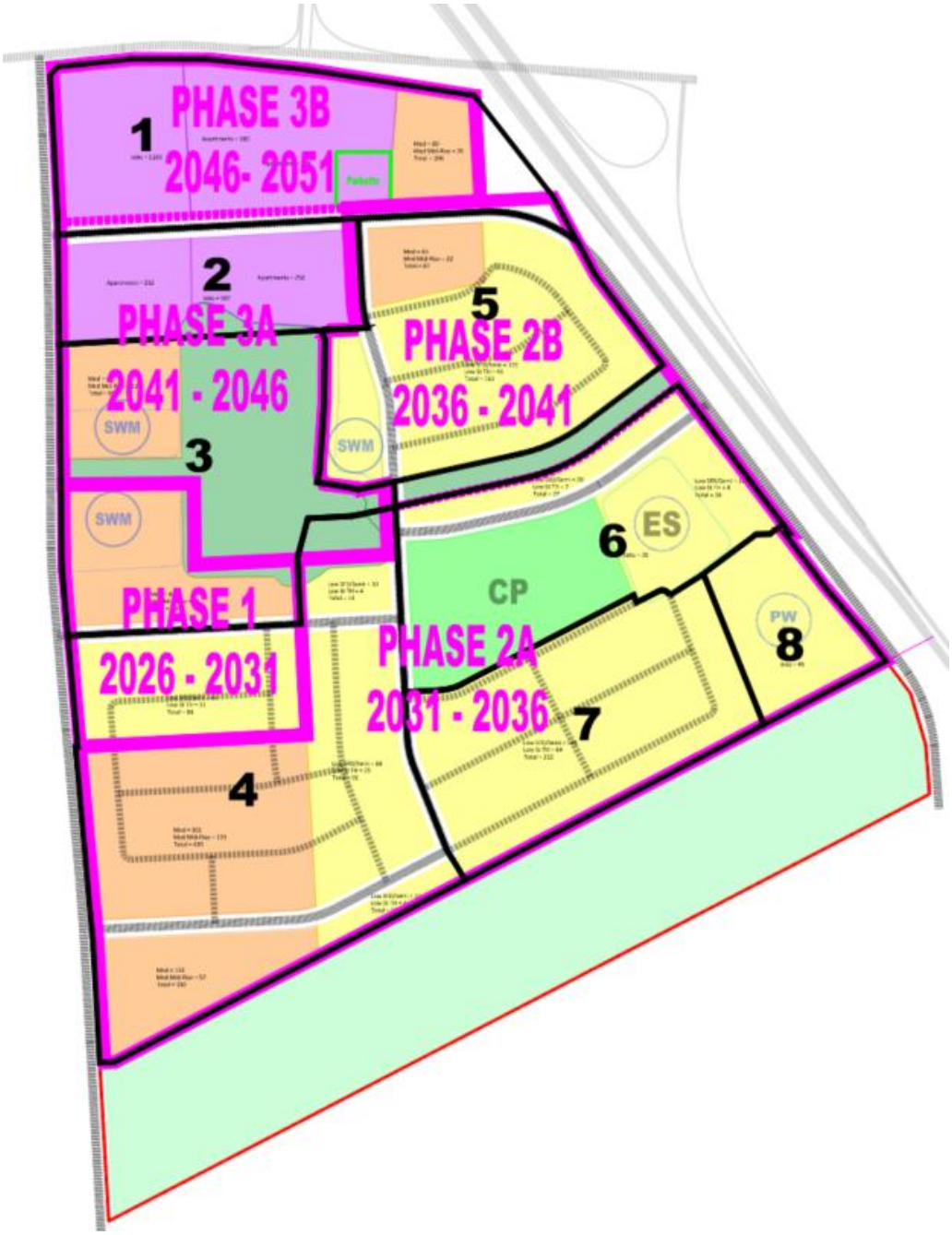


Figure 9-1: Phasing Plan

10. Conclusions

The Northwest Secondary Plan was completed as a requirement of municipal policy to demonstrate population and employment growth potential, while also serving as a guidance document for infrastructure and financial planning to service the NWSPA. The servicing strategies recommended in this study are intended to form the basis for supporting the anticipated growth, however as growth is actualized, strategies may require refinement based on evolving constraints, changing system demands, and development phasing.

Key components of the preferred water strategy include:

- Construction of a new 300mmø watermain on Kalar Road connecting the existing 300mmø watermain immediately south of the NWSPA to the existing 250mmø watermain near the intersection of Kalar Road and Montrose Road.
- Extend a network of new 300mmø watermains throughout the NWSPA from the new Kalar watermain and connect to the existing 250mmø watermain mid-block on Montrose Road and the existing watermain crossing the QEW. This will provide system looping, improve pressure distribution, and supply fire flow capacity throughout the development areas.
- Strategy to remain flexible to refine alignments and phasing strategies based on development sequencing.

Key components of the preferred wastewater strategy include:

- Construction of a new sewage pumping station (SPS) and forcemain that pumps sewage flows from the NWSPA to the existing 900mmø trunk sewer on Kalar Road, south of Thorold Stone Road.
- Extension of new gravity sewers throughout the NWSPA to drain to the new SPS.
- Recommendation for the Region to review the need for potential upgrades to the trunk sewer on Kalar Road and capacity limitations at Kalar SPS given the updated population projections for the NWSPA.
- Strategy to remain flexible to refine alignments and phasing strategies based on development sequencing, constructability, and downstream capacity assessments completed during detailed design.

Key components of the preferred stormwater strategy include:

- Construction of three (3) stormwater management (SWM) facilities (assumed as wet ponds for this study) that outlet to the Ten Mile Creek tributary (which is either retained in situ or rehabilitated (as required)). Quantity and quality controls must be designed to meet the requirements of the regulatory agencies.
- Extension of storm sewers through the development blocks that drain to the three SWM facilities. Storm sewers must be designed to meet the requirements of the regulatory agencies.
- Protection and enhancement of major overland flow routes to ensure safe conveyance of the 100-year or Regulatory event without increasing downstream flood risk.

- Strategy to remain flexible to refine SWM facility type and sizing, outlet configuration, and overall drainage boundaries as designs proceed and grading elevations become more defined.

As development progresses within the NWSPA, it is recommended that the Region and the City regularly review the recommended infrastructure program and update the servicing strategies as necessary to reflect actual growth patterns, emerging constraints, and updated design information.

Appendix A:

Water Demand and Sanitary Flow Calculations

Appendix B:

Cost Estimates