

Existing Conditions Report

Garner West Secondary Plan Area

City of Niagara Falls, Ontario

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Record of Revisions

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3	November 25, 2024	Benjamin Peachman, P.Eng.	Matthew Fisher, P.Eng.	Revised per Region comments

Acronyms and Abbreviations

Acronym / Abbreviation	Definition
ADD	Average Daily Demand
ADF	Average Daily Flow
BDSC	Beaver Dam Schiner's Creek
CNF	City of Niagara Falls
DC	Development Charge
EA	Environmental Assessment
ECA	Environmental Conservation Area
ET	Elevated Tank
FF	Fire Flow
FSS	Functional Servicing Study
GGH	Greater Golden Horseshoe
ha	hectare
km	kilometre
l/c/d	Litres per Capita per Day
L/s	Litres per Second
m/s	Metre per Second
masl	meters above sea level
MCR	Municipal Comprehensive Review
MDD	Maximum Day Demand
MSP	Master Servicing Plan
MSPU	Master Servicing Plan Update
NPCA	Niagara Peninsula Conservation Authority
NOTL	Niagara-on-the-Lake
NWSPA	Northwest Secondary Plan Area
OP	Official Plan
PDWF	Peak Dry Weather Flow
PHD	Peak Hour Demand
PPH	Persons per Hectare
PSI	Pounds per Square Inch
PSW	Provincially Significant Wetland
PWWF	Peak Wet Weather Flow
SNFWWS	South Niagara Falls Wastewater Solutions
SPS	Sanitary Pumping Station
SWM	Stormwater Management
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 Stevensville, east of Welland and Thorold, southeast of St. Catharines, 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 and the Garner West Secondary Plan Area (GWSPA) was identified as an urban expansion area through the completion of a Municipal Comprehensive Review (MCR) and new Official Plan (OP) by the CNF.

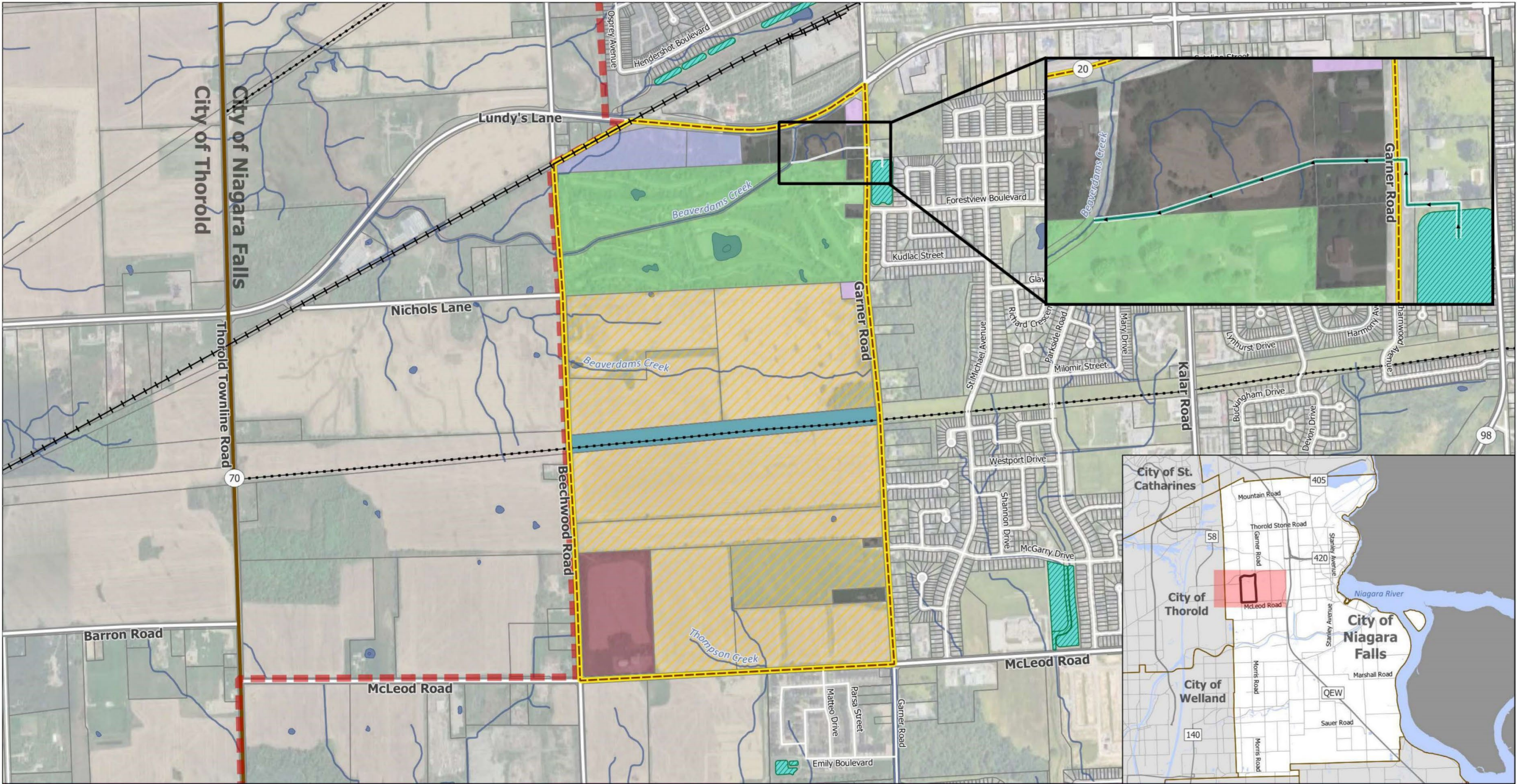
GEI Consultants Canada Ltd. has been retained to complete the Functional Servicing Study (FSS) in support of the Garner West Secondary Plan. The FSS will include the following components:

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

The Existing Conditions Report is being completed to summarize the existing conditions within and adjacent to the Study Area; specifically physical constraints to servicing, relevant design criteria, existing water, wastewater, and stormwater infrastructure, hydraulic modelling of the existing system, and recommendations for Phase 2. The goal of Phase 1 is to gain an understanding of the current infrastructure's capacity and identify any physical constraints that could pose an issue with providing servicing to the proposed population growth within the GWSPA.

1.1. Study Area

The GWSPA is approximately 184 hectares (ha) with an estimated 160 ha of net developable land, generally bound by Lundy's Lane to the north, Garner Road to the east, McLeod Road to the south, and Beechwood Road to the west. 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**.



Garner West Secondary Plan Area

Hydro Line

Railway

Stormwater Pond

Stormwater Pipe

Municipal Garner Rd Storm Easement

Parcel

Urban Area Boundary

Municipal Boundary

Waterbody, Watercourse

Major Land Use

Agriculture

Church

Golf Club

Hotel/Mobile Park

Private

Event/Recreation Complex

Hydro One Corridor

Unknown

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

Figure 1-1
Map Title: Study Area

Project Name:
Garner West Secondary Plan Area Functional Servicing Study

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

Last Updated: August 2024
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1.2. Report Objectives

The following objectives have been defined to guide the completion of the Existing Conditions Report:

1. Summarize existing water and wastewater systems, including key network topology, major facilities and any currently known constraints.
2. Review both the City and Region of Niagara's policies and standards associated with water and wastewater services to identify key requirements for future development within the GWSPA.
3. Summarize planned improvements to the existing systems, triggered by existing constraints or by future growth demands.
4. Provide high-level commentary on opportunities and constraints that may impact overall development as well as opportunities for phased development.

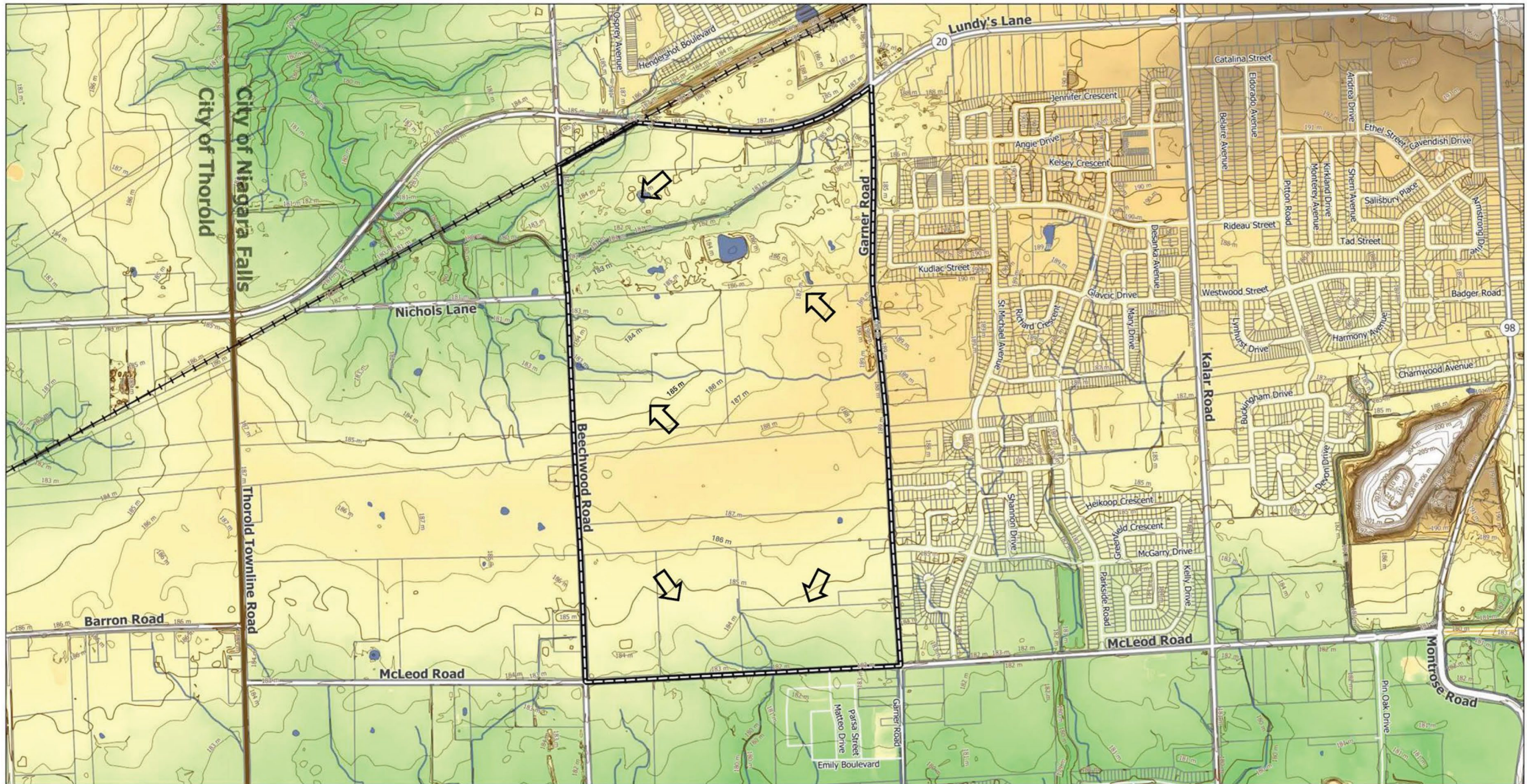
2. Physical Constraints to Study Area

Identifying physical constraints to servicing the Study Area is a key component of Phase 1. These physical constraints can include topographical challenges, sensitive environmental areas, geotechnical conditions, and/or factors that could limit access to servicing. The following sub-sections will identify various physical and natural environmental constraints specific to the GWSPA, along with the assumptions carried for each constraint.

2.1. Topography

Topography refers to the physical features of the Earth's surface, including its elevation, slope, and landforms such as depressions or mounds. It dictates drainage patterns within the Study Area and is an important factor to consider for infrastructure development.

A review of the topography within and adjacent to the Garner West Study Area was completed and it was found that the land surface elevations within the Study Area range from 181 meters above sea level (masl) to 188 masl. The GWSPA contains four (4) tributaries to Beaversdam Creek, which convey stormwater flows from approximately 117 ha of the Study Area to west of Beechwood Road. Three of the four tributaries are generally defined swales through the existing agricultural fields or existing properties, however the fourth tributary that flows through the Niagara Falls Golf Club has been channelized. The remaining 67 ha drains south to a tributary of Thompson Creek which conveys stormwater flows south of McLeod Road. Generally, the topography within the GWSPA was observed to include gradual variations in elevation with a ridge located east-west through the GWSPA at an elevation of 188 masl which defines the split in drainage towards the Beaversdam Creek and Thompson Creek. The Beaversdam Creek tributaries flow east to west and exit the Study Area along Beechwood Road at elevations ranging from 181 – 183 masl. The tributary to Thompson Creek flows north to south and exits the Study Area at McLeod Road at an approximate elevation of 182 masl. The topography of the GWSPA is shown in **Figure 2-1**.



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 GWSPA.

A subwatershed analysis is being completed by Aquafor Beech in support of the Secondary Plan, in parallel with the Functional Servicing Study (FSS). The subwatershed analysis will complete in-depth investigations of the terrestrial habitat, fish habitat, water resources, fluvial geomorphology, and hydrogeology of the GWSPA and surrounding areas. Four seasons of monitoring and field surveys must be completed to support the recommendations of the subwatershed study so information from the subwatershed study will be incorporated into the FSS as it becomes available.

For the purposes of the FSS, the results of the subwatershed study will refine the high-level desktop analysis completed within this report to identify constraints related to terrestrial habitat, fish habitat, water resources, fluvial geomorphology, 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 GWSPA 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 and any updates to the location or sizing of constraining features will be reflected in the location of proposed servicing infrastructure.

Approximately 62% (~114 hectares) of the northern portion of the GWSPA is located in the Beaver Dam Schiner's Creek (BDSC) Beaver Dams Creek subwatershed. This area drains to the four tributaries of the Beaversdam Creek. The southwest portion of the GWSPA (approximately 50 hectares, or ~27% of the GWSPA) is located in the Thompson Creek subwatershed and drains via the tributary to Thompson Creek. The southeast portion of the GWSPA (approximately 20 hectares, or ~11% of the GWSPA) is located in the Chippawa Power Canal subwatershed which drains towards the east, and Garner Road.

As shown in **Figure 2-4**, there are several key environmental features that must be considered for infrastructure planning purposes. The GWSPA includes five (5) NPCA-regulated watercourses; four of which are tributaries to Beaversdam Creek and the fifth being a tributary to Thompson Creek. Three of the Beaversdam Creek tributaries are also identified as Potential Natural Heritage Corridors and have

regulated floodplains associated with them. The receiving watercourse (tributary of Beaverdam's creek) has also been classified as an Important Fish Habitat (Type 2) by the Ministry of Natural Resources. The properties fronting Lundy's Lane have several environmental constraints including Environmental Conservation Areas (ECAs), Locally Significant Wetlands, and Non-Significant Woodlands. A woodland and ECA are also located mid-block along Garner Road. These environmental features will be further investigated as part of the subwatershed study by Aquafor Beech 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 examining maps and data pertaining to the Study Area, along with several background reports provided by the CNF.

An existing SWM facility is located north of the GWSPA, immediately south of Hendershot Boulevard. This facility appears to discharge to the tributary of Beaversdam Creek that flows through the GWSPA.

An existing municipally-owned stormwater management (SWM) facility, designed and constructed as part of the Edgewood Estates development, is located east to Garner Road, immediately north of Forestview Boulevard. The SWM facility collects and treats stormwater from the subdivisions to the east (Edgewood and Deerfield Estates developments) and discharges to an outlet sewer that crosses under Garner Road and through the GWSPA via municipal easement to discharge to the channelized tributary of Beaverdams Creek within the Niagara Falls Golf Course. Refer to **Figure 1-1** for the approximate location of the storm easement.

A review of the Forestview Estates Preliminary Stormwater Management Plan/Scoped Watershed Study (2018) was also completed. This development, bounded by McLeod Road to the north and Garner Road to the east, is just south of the GWSPA and could not use infiltration techniques for stormwater management due to the low soil infiltration rates. The proposed development was recently constructed and includes a constructed wet pond that treats collected stormwater from the subject lands prior to releasing storm flows to the downstream receiving watercourse (a tributary of Thompson Creek).

Immediately to the west of the Forestview Estates development, a residential development known as McLeod Meadows was proposed in 2023. This project extended from the Forestview Estates property west to Beechwood Road. Similar to the Forestview Estates property, the project has proposed a wet pond at the south limits of the property to treat collected stormwater from the subject lands prior to releasing storm flows to the downstream receiving watercourse (a tributary of Thompson Creek) which is to be maintained in-situ.

The findings from these reports should be considered during the stormwater infrastructure analysis for the Study Area.

2.4. Easements or Linkages

The middle portion of the Study Area, approximately 800m north of McLeod Road, features a Hydro One easement extending approximately 1.0km in length and spanning about 60m in width. This easement runs along the entire middle portion of the Study Area.

In addition, a 4.0 metre width storm sewer easement is located within 6051 Garner Road and the adjoining property fronting Lundy's Lane (refer to **Figure 1-1**) and extends from Garner Road to the channelized tributary of Beaverdams Creek within the Niagara Falls Golf Course. This storm sewer easement allows the conveyance of storm flows from the SWM pond east of Garner Road to its receiving watercourse.

As shown in **Figure 2-4**, several of the tributaries to Beaverdams Creek are identified as potential natural heritage corridors thereby potentially functioning as environmental linkages.

2.5. Transportation (Road and Rail) Networks

Beechwood Road is located on the west limits of the GWSPA. This road is under the ownership of the CNF and has a right of way (ROW) width of 20 metres.

Garner Road is located on the east limits of the GWSPA and is owned by the CNF. Garner Road has a ROW width of 26 metres.

McLeod Road is located on the south limits of the GWSPA and is owned by the CNF. McLeod Road has a ROW width of 20 metres.

Lundy's Lane is located on the north limits of the GWSPA. This road is owned by Niagara Region and has a varying ROW width along the frontage of the GWSPA albeit generally with a width of 36 metres.

In addition to the existing road network, there is a CN railway crossing through the GWSPA at the northwest corner. It crosses Beechwood Road and Lundy's Lane. The location of the railway is not anticipated to be a constraint for servicing however it will be avoided if possible to minimize construction and/or approval challenges.

2.6. Wellhead Protection Areas, Highly Vulnerable Aquifers, and Significant Groundwater Recharge Areas

A desktop review was completed to identify Wellhead Protection Areas, Highly Vulnerable Aquifers, and Significant Groundwater Recharge Areas with respect to potential impacts on the proposed servicing layout. It was found that the GWSPA is not located within these areas. Per Figure 3.6 from the CNF Master Drainage Plan Update Study, the GWSPA is not located within an area classified as a Highly Vulnerable Aquifer or a Surface Water Intake Protection Zone.

2.7. Areas of Environmental Sensitivity

A high level desktop review was completed to identify Areas of Environmental Sensitivity within the GWSPA.

As shown in **Figure 2-4**, the GWSPA includes five (5) NPCA-regulated watercourses; four of which are tributaries to Beaversdam Creek and the fifth being a tributary to Thompson Creek. Three of the Beaversdam Creek tributaries are also identified as Potential Natural Heritage Corridors and have regulated floodplains associated with them. The receiving watercourse (tributary of Beaverdam's creek)

has been classified as an Important Fish Habitat (Type 2) by the Ministry of Natural Resources. Per Figure 3.4 from the CNF Master Drainage Plan Update Study, portions of the tributaries extending through the GWSPA are deemed Important to fish habitat.

The properties fronting Lundy's Lane have several environmental constraints including Environmental Conservation Areas (ECAs), Locally Significant Wetlands, and Non-Significant Woodlands. A woodland and ECA are also located mid-block along Garner Road.

These Areas of Environmental Sensitivity will be avoided during the design of the proposed servicing layout and will be investigated in-depth and refined by the subwatershed Consultant, Aquafor Beech.

These Areas of Environmental Sensitivity will be avoided during the design of the proposed servicing layout and will be investigated in-depth and refined by the sub watershed consultant, Aquafor Beech.

2.8. Regulated Areas (NPCA, Provincial NHS or Greenbelt, Niagara Escarpment, and Oak Midges Moraine Conservation Plan)

A desktop review was completed to identify areas within the GWSPA 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 GWSPA 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 will be avoided during the design of the proposed servicing layout and will be investigated in-depth and refined by the subwatershed consultant, Aquafor Beech.

2.9. Geotechnical Considerations

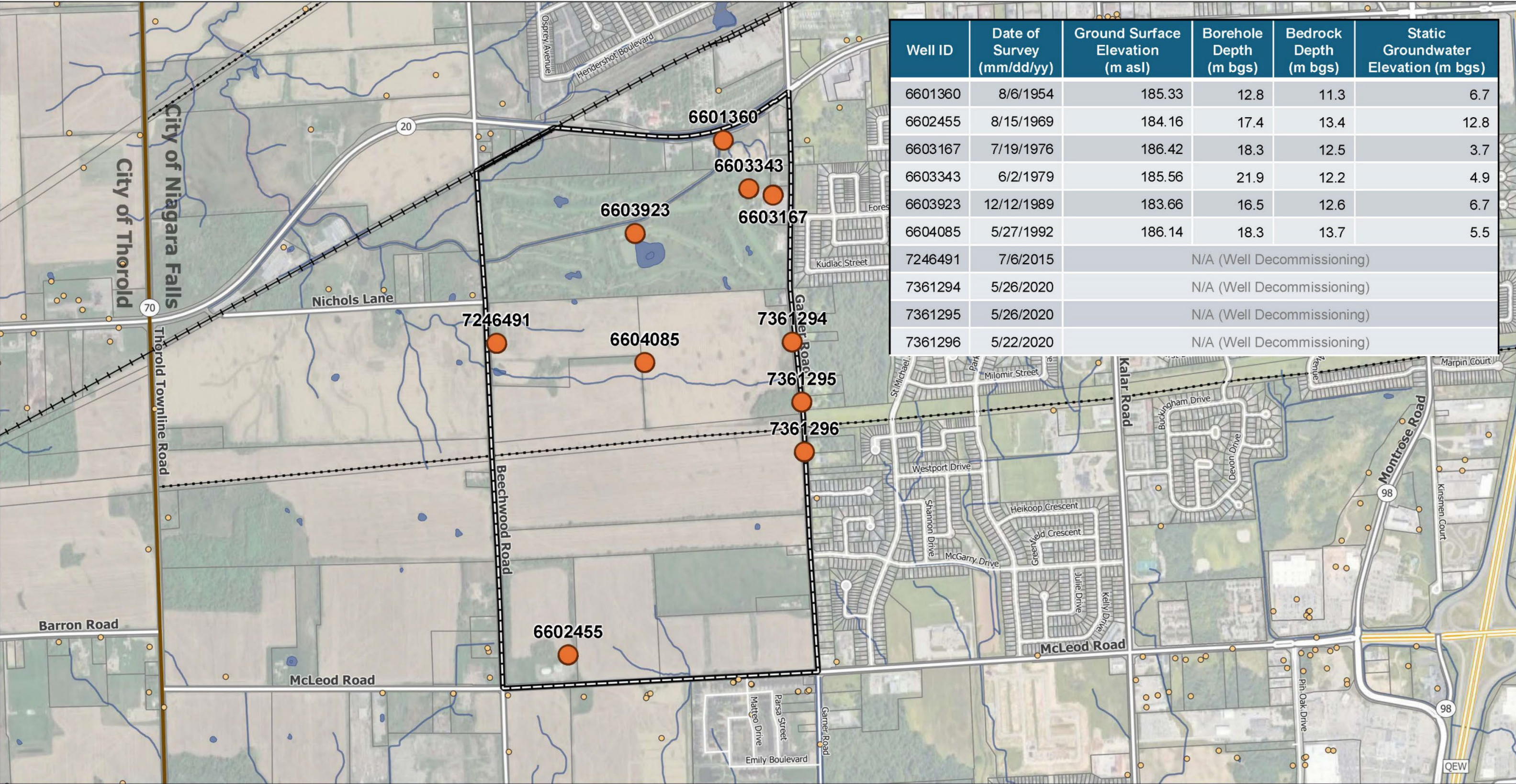
Borehole logs were reviewed from the Ontario Well Records and ten (10) monitoring wells were identified within the GWSPA. The locations of the MWs is shown in **Figure 2-2** with a summary of geotechnical information related to the ten MWs provided in a table included on the figure. Three (3) of the MWs (Well IDs 6603343, 6604085, and 6602455) were chosen within the GWSPA to create a historic geotechnical profile as shown in **Figure 2-3** which illustrates the surface elevations, depth of overburden and 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)
6603343	185.6	180.7	Grey Clay: 0 – 12.2 Niagara Rock: 12.2 – 22.0	173.4
6604085	186.1	180.6	Brown Clay: 0 – 1.2 Grey Clay: 1.2 – 9.8 Grey Gravel: 9.8 – 13.7 Limestone: 13.7 – 18.3	172.4
6602455	184.2	170.8	Brown Clay: 0 – 6.7 Blue Clay: 6.7 – 13.4 Brown Shale Rock: 13.4 – 14.6 Grey Limestone: 14.6 – 17.4	171.0

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 12 to 14 metres below grade. The groundwater levels within the boreholes generally ranged from 4 to 7 metres below grade. This geotechnical information will be considered during the infrastructure planning stage as it can impact the practicality of constructing deep sewers or using certain infiltration practices for stormwater management.

In addition, the CNF provided a geotechnical investigation for the German Village Estates Subdivision development application which provided an overview of the geotechnical conditions identified on-site when boreholes were drilled in 2014. The subdivision has been constructed and is located on Black Forest Crescent which is approximately 600 metres north of McLeod Road, east of Garner Road. The borehole information identified the native subsurface soil conditions in the area to consist of stratified clay, silt, and sand with silty clay being the predominant native overburden soil at the site. Refusal of borehole advancement was encountered at one of the boreholes at 7.7 metres below ground surface (m bps) which was assumed to be the bedrock depth. Groundwater seepage was not encountered in the boreholes during drilling and the boreholes were dry on completion of drilling.



Well ID	Date of Survey (mm/dd/yy)	Ground Surface Elevation (m asl)	Borehole Depth (m bgs)	Bedrock Depth (m bgs)	Static Groundwater Elevation (m bgs)
6601360	8/6/1954	185.33	12.8	11.3	6.7
6602455	8/15/1969	184.16	17.4	13.4	12.8
6603167	7/19/1976	186.42	18.3	12.5	3.7
6603343	6/2/1979	185.56	21.9	12.2	4.9
6603923	12/12/1989	183.66	16.5	12.6	6.7
6604085	5/27/1992	186.14	18.3	13.7	5.5
7246491	7/6/2015	N/A (Well Decommissioning)			
7361294	5/26/2020	N/A (Well Decommissioning)			
7361295	5/26/2020	N/A (Well Decommissioning)			
7361296	5/22/2020	N/A (Well Decommissioning)			

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

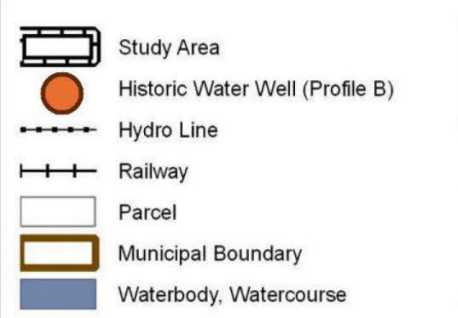
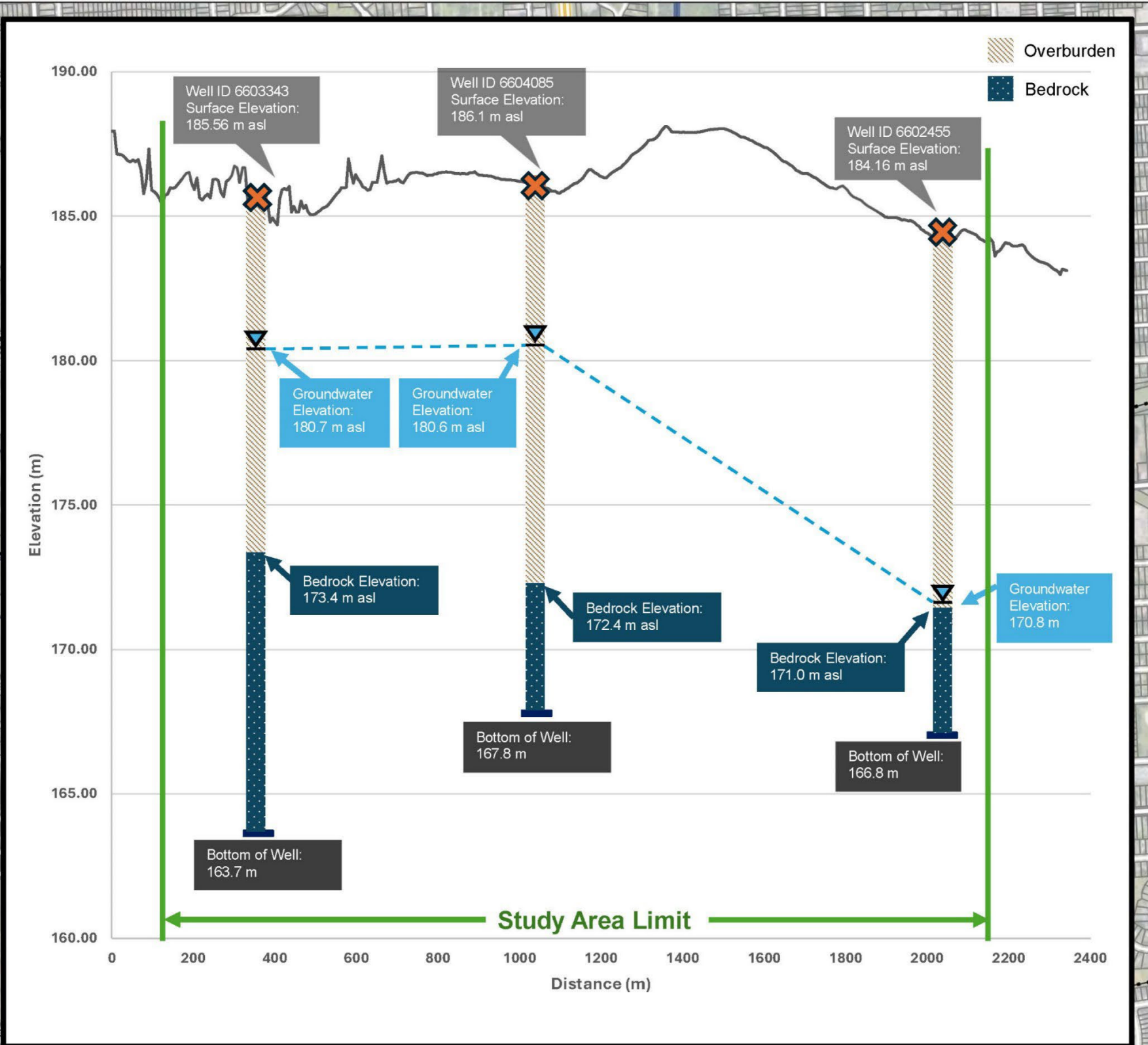
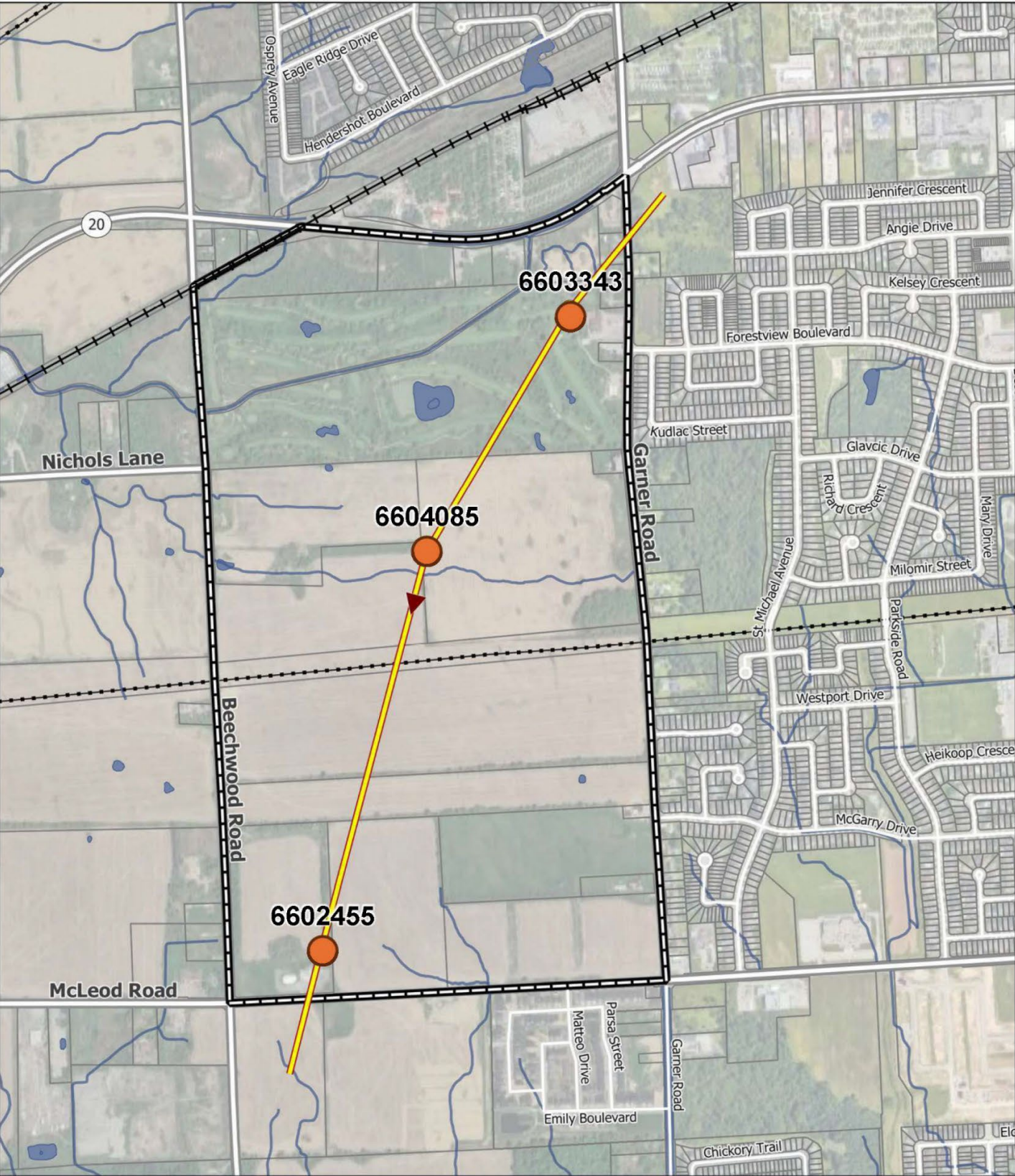
Reference(s)
1. Projection EPSG:26917
2. Base Data: City of Niagara Falls, 2024; Google Satellite, 2024

Figure 2-2
Map Title: Historic Borehole Logs in Study Area

Project Name:
Garner West Secondary Plan Area Functional
Servicing Study

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

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Well ID	Date of Survey	Borehole Depth (m bgs)	Bedrock Depth (m bgs)	Static Groundwater Elevation (m bgs)
6603343	6/2/1979	163.7	173.4	180.7
6604085	9/25/1992	167.8	172.4	180.6
6602455	8/15/1969	166.8	171.0	170.8

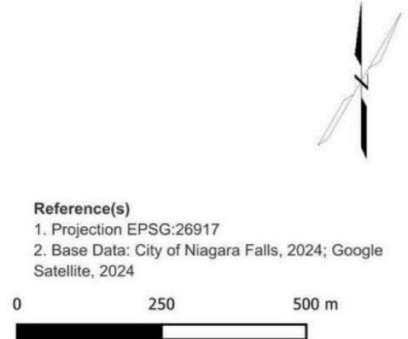


Figure 2-3
Map Title: Borehole Log Profile in Study Area

Project Name:
Garner West Secondary Plan Area Functional Servicing Study

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

GEI

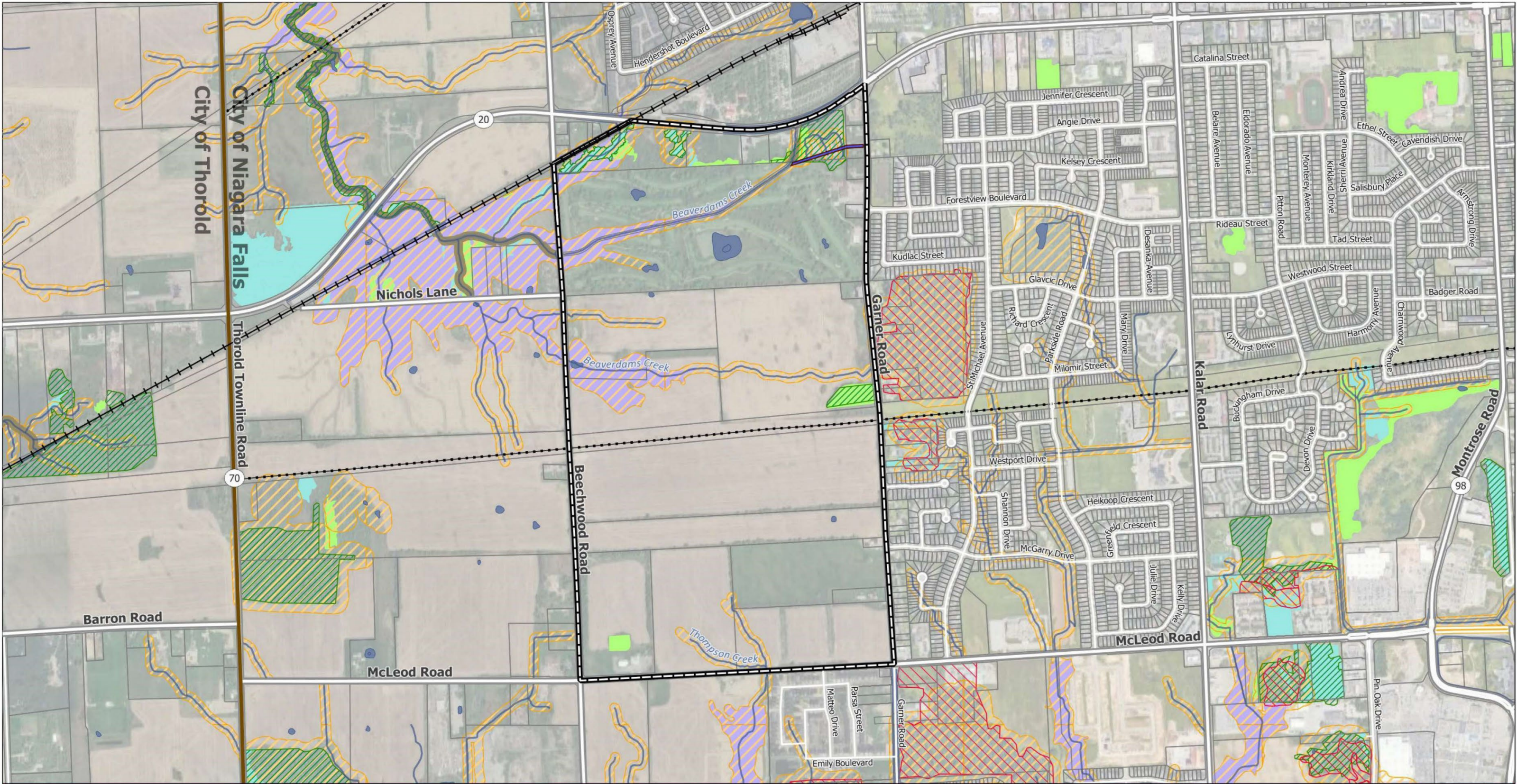
Last Updated: July 2024
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2.10. Summary of Physical Constraints to Servicing

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

- Five (5) NPCA-regulated watercourses; four of which are tributaries to Beaversdam Creek and the fifth being a tributary to Thompson Creek. Three of the Beaversdam Creek tributaries are also identified as Potential Natural Heritage Corridors and have regulated floodplains associated with them. The receiving watercourse (tributary of Beaverdam's creek) has been classified as an Important Fish Habitat (Type 2) by the Ministry of Natural Resources.
- Several wooded area have been identified fronting McLeod Road, Garner Road, and Lundy's Lane. Some of the wooded areas fronting Garner Road and Lundy's Lane include an Environmental Conservation Area (ECA) designation;
- The properties fronting Lundy's Lane have several environmental constraints including Environmental Conservation Areas (ECAs), Locally Significant Wetlands, and Non-Significant Woodlands.
- A Hydro One easement spanning 60 metres in width and 1 kilometre in length that runs east to west through the GWSPA, approximately 800 metres north of McLeod Road.
- A 4.0 metre width storm sewer easement is located within 6051 Garner Road and the adjoining property fronting Lundy's Lane (refer to **Figure 1-1**) and extends from Garner Road to the channelized tributary of Beaverdams Creek within the Niagara Falls Golf Course. This storm sewer easement allows the conveyance of storm flows from the SWM pond east of Garner Road to its receiving watercourse.
- A CN railway crosses Beechwood Road and Lundy's Lane at the northwest corner of the GWSPA.
- Historic geotechnical records identify typical bedrock at 12 to 14 metres in depth, groundwater at 4 to 7 metres in depth, and silty clay as the predominant native soil condition.

The proposed servicing layout will avoid these constraints by minimizing crossings, maintaining appropriate setbacks per regulating bodies, and maintaining suitable 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 GWSPA.



- | | | | | | |
|--|----------------------|--|---|--|--------------------------------------|
| | Study Area | | Potential Natural Heritage Corridor | | Shoreline Area |
| | Hydro Line | | Niagara Peninsula Conservation Authority Approximate Regulation Lands | | Other Woodlands |
| | Railway | | Environmental Protection Area | | Non-Provincially Significant Wetland |
| | Parcel | | Environmental Conservation Area | | Waterbody, Watercourse |
| | Municipal Boundary | | | | |
| | Storm Sewer easement | | | | |

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

0 250 500 m

Figure 2-4
Map Title: Constraints Map

Project Name: Garner West Secondary Plan Area Functional Servicing Study	Client Name: City of Niagara Falls (Ontario, Canada)
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3. Servicing Design Criteria

3.1. Water

3.1.1. Treatment Plant

Treatment plants are designed to treat the maximum day demand. The following criteria were confirmed through the Region's Master Servicing Plan (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.

3.1.2. 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.

3.1.3. 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 $A+B$).

3.1.4. 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 (exceptions being watermains that feed at-grade facilities, such as in-ground reservoirs, where low-pressures are expected and cannot be increased).
- 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.

3.1.5. 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)

Description		Criteria
	Watermain Sizing	Regional transmission main system for PHD and MDD + fire flow demands
	Storage Sizing	MECP methodology (A+B+C)

3.2. Wastewater

3.2.1. 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
- When 90% of plant capacity has been reached, expansion should be completed.

3.2.2. 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 system's 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.

3.2.2.1. 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 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.

3.2.3. 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.

3.2.4. 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.

3.2.5. 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

3.3. Stormwater

3.3.1. Quantity

The Subwatershed Study will include 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 will be completed during Phase 3 of the FSS with recommendations provided on the required level of quantity and erosion controls for the entire Study Area, on-site quantity controls, and required conveyance (storm sewer) measures.

3.3.2. Quality

The Subwatershed Study will provide stormwater management (SWM) criteria for quality controls required of future development within the Study Area based on constraints identified in the receiving watercourses and any applicable SWM criteria and guidelines. Sizing of the conceptual stormwater management (SWM) facilities will be completed during Phase 3 of the FSS with recommendations provided on the required level of quality control for the entire Study Area and potential on-site quality controls that can be further defined at the development application stage.

4. Planning and Growth Projections

4.1. Growth Projections

Population and employment growth projections were identified for the City of Niagara Falls in the 'City Traffic Zone ID, Intensification Polygon ID, and Prorated Yield to 2051' (November, 2023) figure. The Garner West Secondary Plan area is identified as an urban expansion area with a targeted growth density of 60 persons per hectare (pph). The Region OP identified several 'Strategic Growth Areas' where a target density of 100 to 150 pph was identified however the Garner West Secondary Plan area was not identified as one of these areas. **Table 4-1** provides a summary of the projected population and employment growth for the Garner West Secondary Plan area.

Table 4-1: Growth Projections for Study Area

Study Area	Gross Expansion Area (ha)	Net Developable (ha)	Population Estimate (persons)	Employment Estimate (employees)	Total Growth Estimate
Garner West Secondary Plan	180	160	9,600	-	9,600

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.

For this secondary plan the total growth estimate (persons) was strictly residential, and no 25% reduction was accounted for non-revenue water. A sample calculation for the ADD is provided below.

$$\begin{array}{lcl}
 \boxed{\text{ADD}} & = & \boxed{\text{Total Residential Growth}} \times \boxed{240 \text{ lpcd}} \\
 \boxed{26.67 \text{ L/s}} & = & \boxed{9600 \text{ Persons}} \times \boxed{240 \text{ lpcd}}
 \end{array}$$

4.2.2. Wastewater Flow Projection Flow 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.

For this secondary plan the total growth estimate (persons) was strictly residential, and no 25% reduction was accounted for non-revenue water. A sample calculation for the ADF is provided below.

$$\begin{array}{lcl}
 \boxed{\text{ADF}} & = & \boxed{\text{Total Residential Growth}} \times \boxed{255 \text{ lpcd}} \\
 \boxed{28.33 \text{ L/s}} & = & \boxed{9600 \text{ Persons}} \times \boxed{255 \text{ lpcd}}
 \end{array}$$

4.3. Projected Water Demand

Projected water demands and storage requirements using the flow criteria and storage sizing methodology from the Region MSP are summarized below in **Table 4-2**. The maximum daily demand (MDD) and peak hourly flow (PHF) factors were 1.6 and 2.1, respectively.

Table 4-2: Projected Water Demand

Study Area	Average Day Flow (L/s)	Maximum Daily Demand (L/s)	Peak Hourly Flow (L/s)	Total Storage Required (m ³)
Garner West Secondary Plan	26.7	42.7	56.0	3,663

4.4. Projected Wastewater Flows

Projected wastewater flows and extraneous flows using the flow criteria and methodology from the Region MSP are summarized below in **Table 4-3**. The calculated Harmon peaking factor was 2.97 based on the anticipated population growth.

Table 4-3: Projected Wastewater Flows

Study Area	Total Average Dry Weather Flow (L/s)	Peak Dry Weather Flow (L/s)	Total Extraneous Flow (L/s)	Total Peak Wet Weather Flow (L/s)
Garner West Secondary Plan	28.3	84.2	45.8	130.0

5. Water Infrastructure

5.1. Existing Infrastructure

The Niagara Falls water system servicing the City of Niagara Falls 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 City of Niagara Falls. 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 City of Niagara Falls 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

Facility Information	Niagara Falls WTP High Lift Station	Kent Avenue BPS
Address	3599 Macklem Street, Niagara Falls	4281 Kent Avenue, Niagara Falls
Inlet Source (Pressure Zone and 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

Facility Information	Niagara Falls WTP High Lift Station	Kent Avenue BPS
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

Story Facility Information	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.

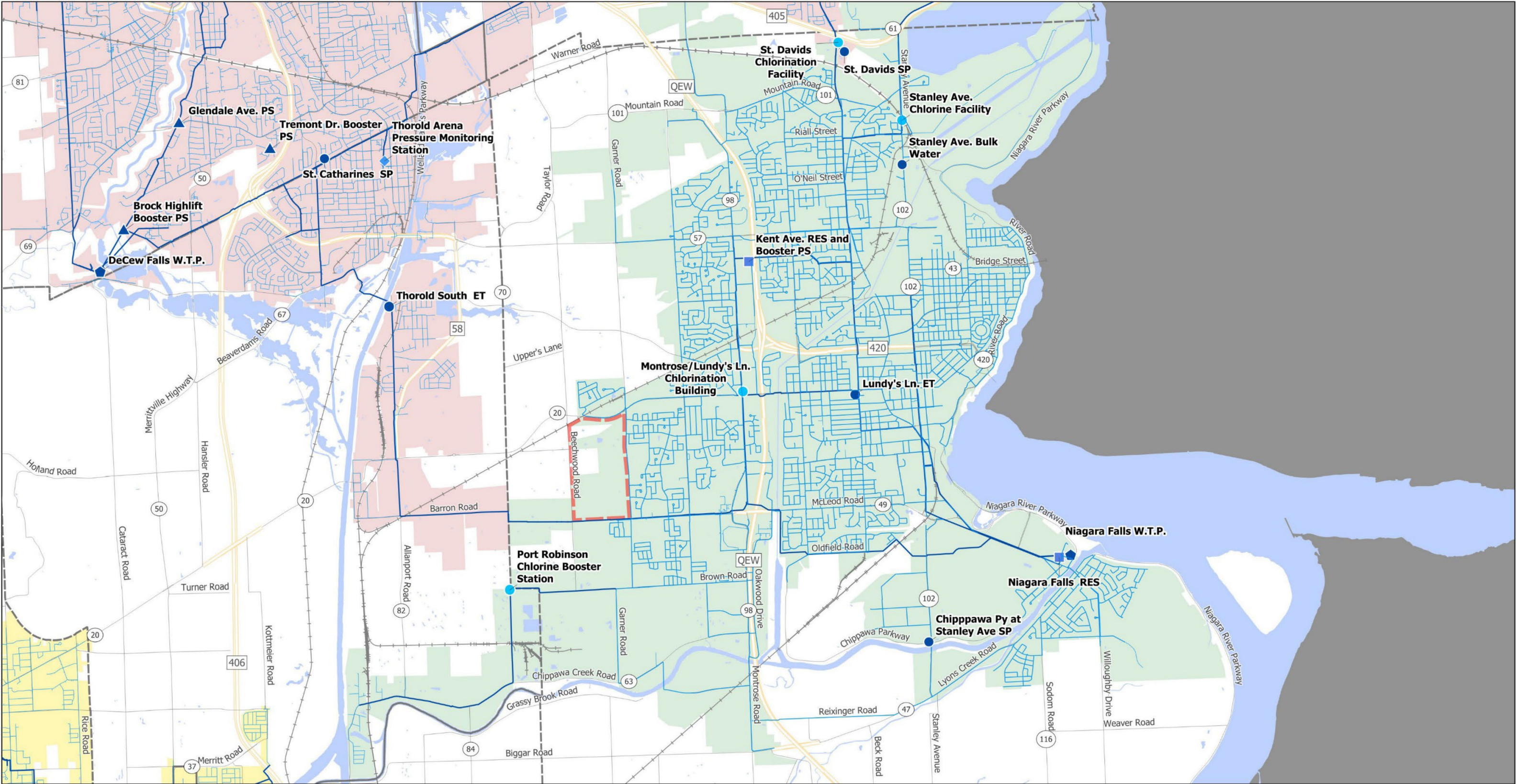
5.1.4. Trunk Distribution Network

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 GWSPA contains the following water distribution network:

- 200mmØ watermain on a 750m length section of Lundy's Lane
- 300mmØ watermain on Garner Road
- 500mmØ watermain on McLeod Road

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:

Garner West Secondary Plan Area Functional Servicing Study

Client Name:

City of Niagara Falls (Ontario, Canada)

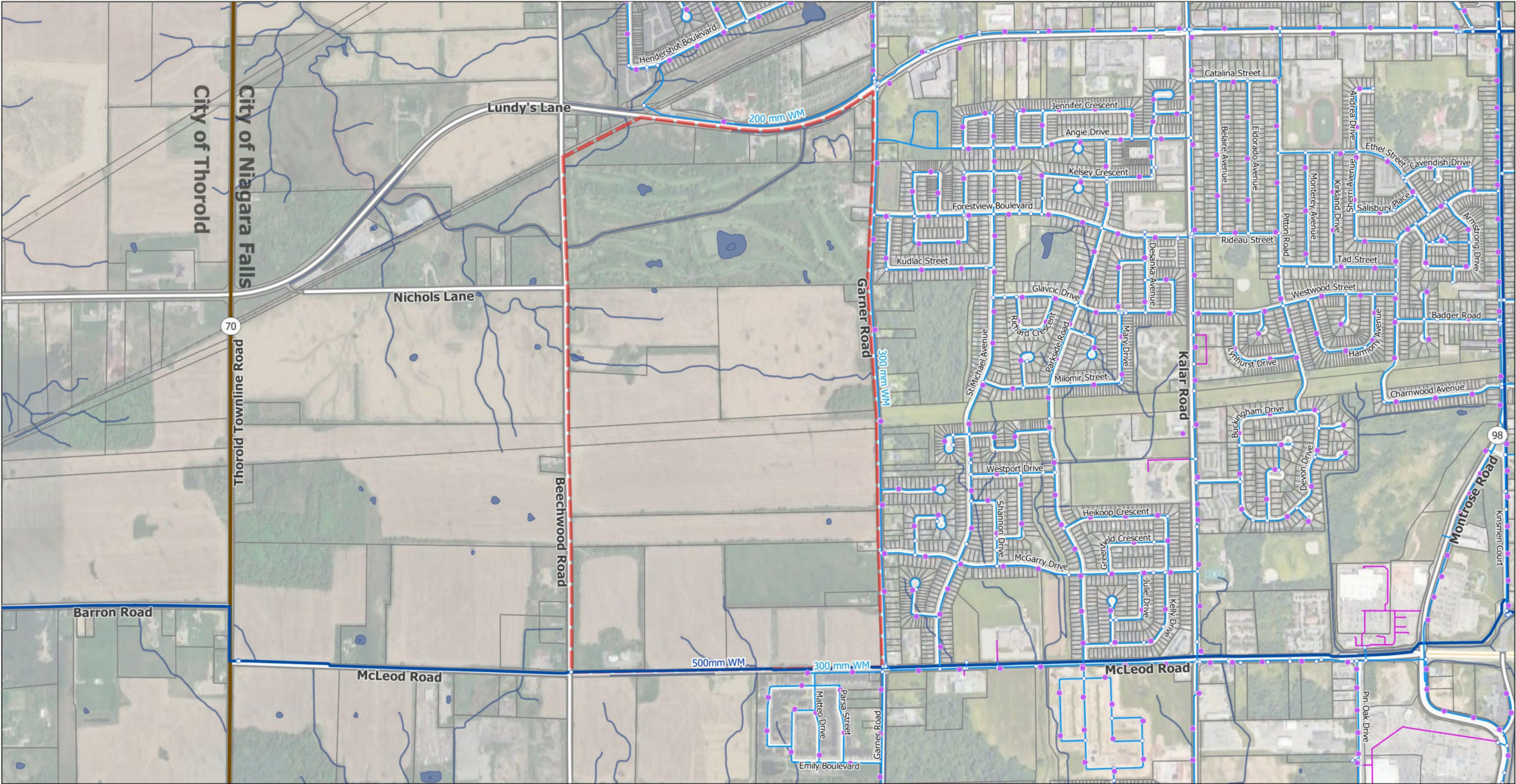
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Engineering & Environmental Inc.

Last Updated: September 2024

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Study Area
 Parcel
 Municipal Boundary
 Waterbody, Watercourse

Existing Water Infrastructure
 Junction
 Hydrant
 Transmission Mains
 Distribution Mains
 Private

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

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

Project Name:
 Garner West Secondary Plan Area Functional Servicing Study

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

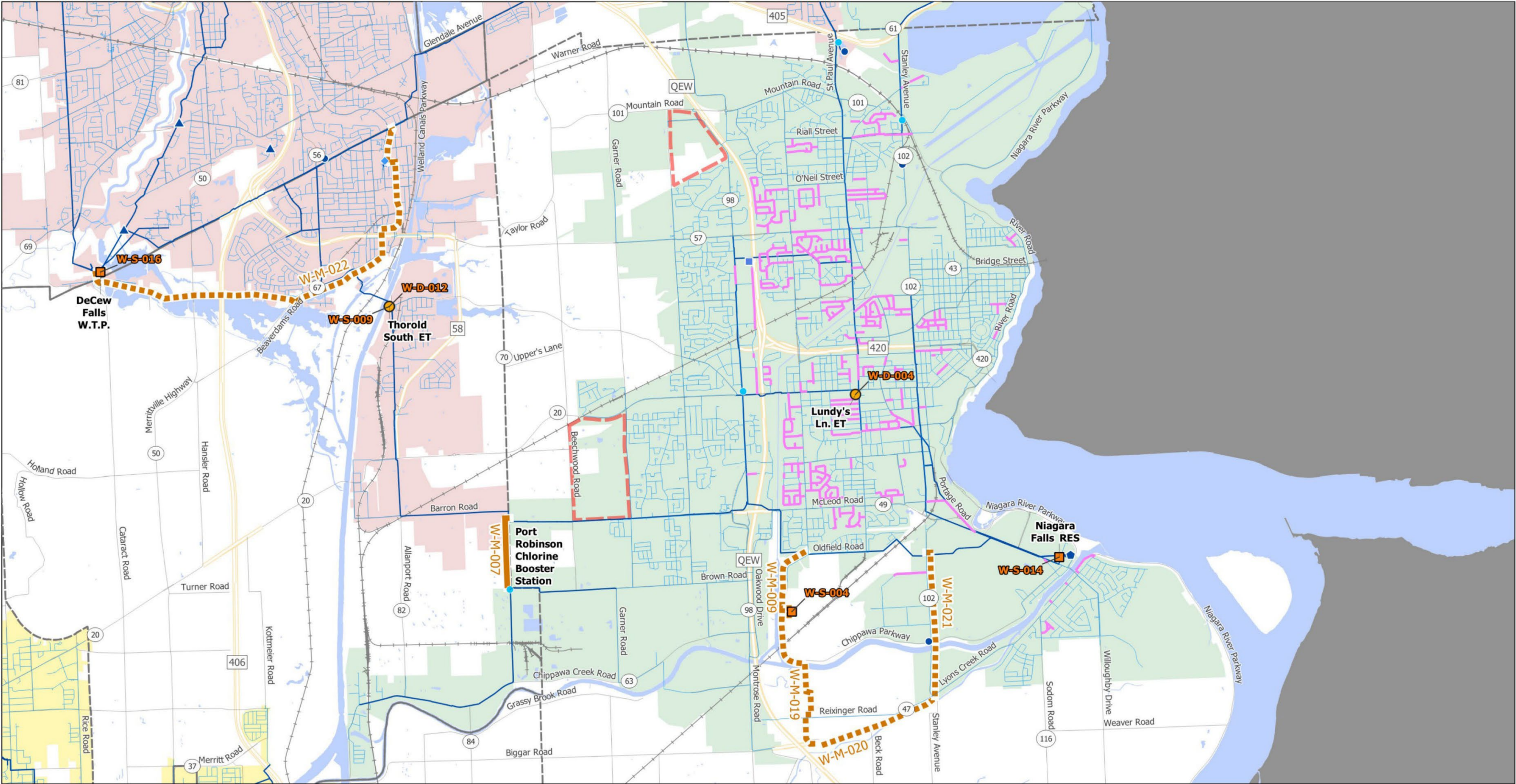
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5.2. Planned Capital Projects

The Region's 2021 MSP identified several capital projects to support the planned growth within the DeCew WTP and Niagara Falls WTP system service areas to 2051, which includes the GWSPA. **Table 5-3** and **Figure 5-3** identify and describe the planned water capital projects potentially impacting growth in the GWSPA. Water projects included within the City of Niagara Falls' 10-year capital program are also identified in **Figure 5-3**.

Table 5-3: Planned Regional 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



Study Area

Railway

Waterbody, Watercourse

Municipal Boundary

City of Niagara Falls 10-Year W Capital Project

2020 Niagara Region Capital Program

Elevated Tank

Reservoir

Transmission

Distribution

Existing Water Infrastructure

Water Treatment Plant (WTP)

Pumping Station (PS)

Elevated Tank (ET), Stand Pipe (SP)

Chlorine Facility

Fluoride Station

Reservoir (RES)

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 5-3

Map Title: Planned Water Capital Projects in Niagara Falls

Project Name:

Garner West Secondary Plan Area Functional Servicing Study

Client Name:

City of Niagara Falls
(Ontario, Canada)

Last Updated: September 2024
Document ID: 2402620-001

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5.3. Potential Connection Points

As previously noted, the GWSPA has existing watermains located along the majority of the boundary roads surrounding the Study Area. Lundy's Lane has a 200mmØ watermain (from Garner Road to the CN railway tracks), Garner Road has a 300mmØ watermain, and McLeod Road has a 500mmØ watermain. Beechwood Road does not currently contain a local watermain and the portion of Lundy's Lane from the CN railway tracks west to Beechwood Road also does not contain a local watermain. Refer to **Figure 5-2** for the location of the existing watermains.

Potential connection points for the GWSPA could involve extending local watermains throughout the Study Area off of these existing watermains. Connecting the existing 200mmØ watermain on Lundy's Lane to the 500mmØ watermain on McLeod Road by extending a watermain along Lundy's Lane and Beechwood Road for approximately 2.2 kilometres could improve water quality, system resiliency, and redundancy of supply. Looping the existing watermains could also be accomplished through watermain installed within internal subdivision roads.

Section 7 will review the hydraulic modelling completed as part of Phase 1, specifically looking at how the existing water system will respond to the increased demand from the GWSPA and potential system improvements to facilitate the growth.

6. Wastewater Infrastructure

6.1. Existing Infrastructure

The Niagara Falls wastewater system services the CNF and 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 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 Megalitres per day (MLD). It was projected that by 2051 the average daily flow will be 61.6 MLD which exceeds the 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 and 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 and 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 and Allanport Road.

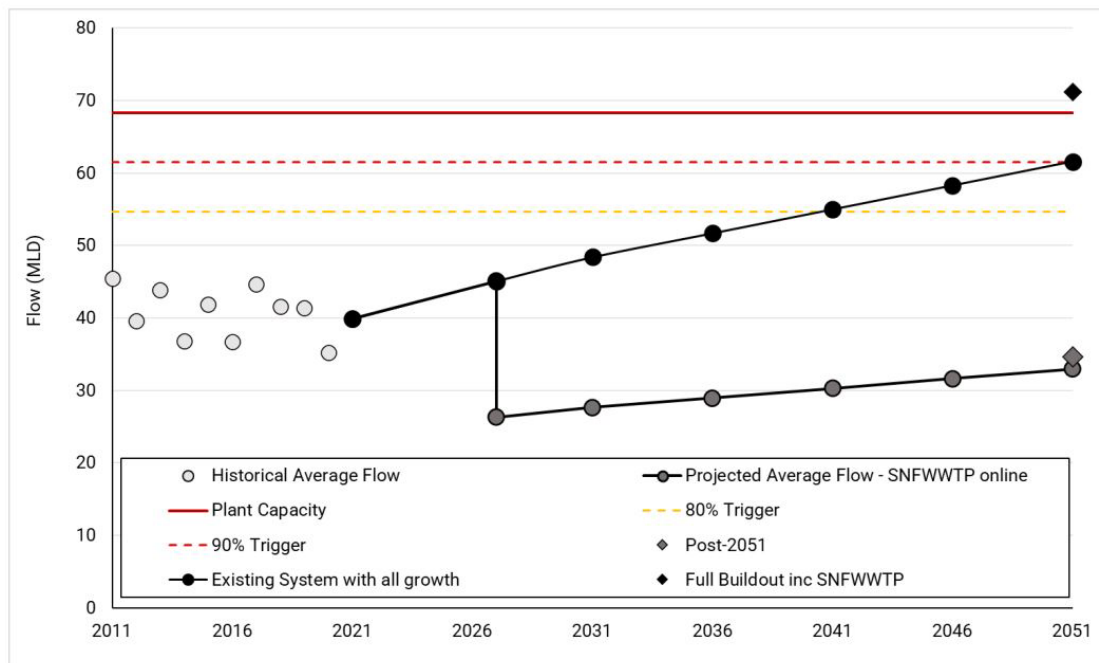


Figure 6-1: Projected Future ADF at Niagara Falls WWTP (2021 Region MSP)

With the implementation of the South Niagara Falls WWTP, the 2051 flows to the Niagara Falls WWTP will be reduced to 33.0 MLD and the post-2051 flow to 34.6 MLD. As such, the Niagara Falls WWTP has surplus capacity and will not reach 80% capacity within the 2051 planning period. The South Niagara Falls WWTP is anticipated to be online by 2027 per the projected flows graphed in **Figure 6-2** which was extracted from the Region’s 2021 MSPU. The timeline identified for the implementation of the South Niagara Falls WWTP is subject to Provincial and Federal funding and requires Regional Council approval.

6.1.2. 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 6-3**. The Lundy’s Lane SPS and South Side High Lift SPS service areas are in close proximity to the GWSPA and their details are provided in **Table 6-1**. The Dorchester SPS is also relevant as it pumps flows received from the Lundy’s Lane SPS so its details are also provided in **Table 6-1**.

Table 6-1: Summary of Relevant SPS Details

Facility Details		Lundy’s Lane SPS 8971 Lundy’s Lane	South Side High Lift SPS 7606 Oakwood Drive	Dorchester SPS 5149 Pettit Avenue
Pump Station Details	ECA Firm Capacity (L/s)	98.4	760.0	235.0
	Operational Firm Capacity (L/s)	56.3	609.0	185.0
	Number of Pumps	3	5	3
Forcemain Details	No. of Forcemains	Single	Single	Single
	Forcemain Diameter (mm)	250	750	350
	Forcemain Length (m)	1,349	3,983	48

Facility Details		Lundy's Lane SPS 8971 Lundy's Lane	South Side High Lift SPS 7606 Oakwood Drive	Dorchester SPS 5149 Pettit Avenue
Catchment Details	Sewershed (ha)	97.1	1,175.1	360.3
	Sewershed Inclusive of Upstream Catchments (ha)	97.1	2,077.7	577.1
Peak Dry Weather Flow (L/s)	2021 Flows	10.8	271.5	73.4
	2051 Flows	27.1	486.3	98.0
	Post-2051 Flows	29.8	582.8	110.8
Design Allowance - Peak Wet Weather Flow (L/s)	2021 Flows	49.7	1,102.6	304.2
	2051 Flows	66.3	1,390.8	329.2
	Post-2051 Flows	69.1	1,532.8	342.1
5-Year Storm – Peak Wet Weather Flow (L/s)	2021 Flows	149.8	1,531.8	445.2
	2051 Flows	166.4	1,820.0	470.2
	Post-2051 Flows	169.1	1,962.0	483.0

As shown in **Figure 6-3**, the Lundy's Lane SPS is located approximately 150 metres north of the northern limits of the GWSPA. Its' service area is approximately 97 hectares and abuts the north and northeast limits of the Study Area. The Lundy's Lane SPS pumps flows via a 250mmØ forcemain east to a 450mmØ gravity trunk sewer on Lundy's Lane, just east of Kalar Road. This trunk sewer conveys flows to the Dorchester Road SPS which is approximately 3.4 kilometres from the northern limits of the GWSPA. The service area for the Dorchester Road SPS is approximately 360 hectares, however it conveys an additional 217 hectares of upstream sewersheds, which includes the Lundy's Lane SPS sewershed. The Dorchester SPS pumps flows via a 350mmØ forcemain to a 1200mmØ gravity trunk sewer that conveys flows directly to the Niagara Falls WWTP. There are several potential connection points to the local sewers draining to the Lundy's Lane SPS that will be explored further in Section 6.3.

The South Side High Lift SPS is located approximately 2.6 kilometres from the southeastern limits of the GWSPA. Its' service area is approximately 1,175 hectares however it also conveys sewage from an additional 903 hectares of upstream service area. This station pumps flows via a 750mmØ forcemain that extends approximately 4 kilometers north to the same 1200mmØ gravity trunk sewer that the Dorchester SPS discharges to. There are several potential connection points to the local sewers that drain to the South Side High Lift SPS that will be explored further in Section 6.3.

The anticipated flows experienced at the Lundy's Lane SPS, Dorchester SPS, and South Side High Lift SPS were extracted from the 2021 Region MSP and indicate that all three stations operate within their firm capacity for peak dry weather flow (PDWF) events however all of the facilities exceed their respective firm capacities' for the design and 5-year peak wet weather flow (PWWF) events for 2021, 2051, and post-2051 flows with the exception of Lundy's Lane SPS during the PWWF (design) event for the 2021 scenario. As the GWSPA is anticipated to contribute approximately 130 L/s of PWWF, all of the existing facilities are undersized to convey the PWWF however some interim capacity may be available at the Lundy's Lane SPS prior to the capital projects outlined in Section 6.1.3 coming on-line.

6.1.3. Trunk Collection Network

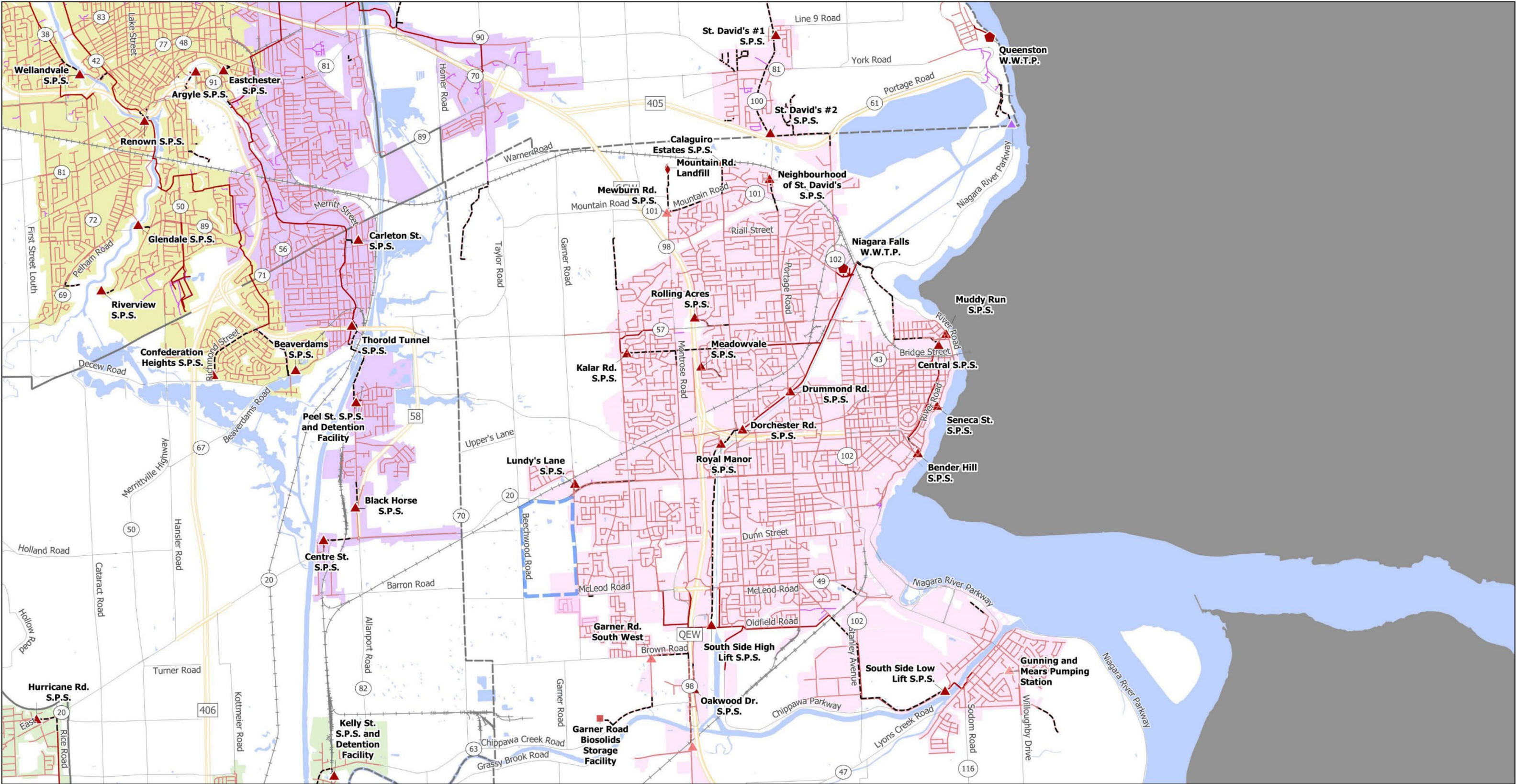
As previously noted, sewage flows from urban areas surrounding the GWSPA are conveyed to the Niagara Falls WWTP via a network of local and Regionally owned sewers, and Regionally owned sewage pumping stations and forcemains. The sewersheds immediately adjacent to the Study Area use the Lundy's Lane SPS and South Side High Lift SPS to convey these flows to downstream receiving trunk sewers that discharge to the Niagara Falls WWTP. As shown in **Figure 6-4**, the majority of the sewers in close proximity to the Study Area are local sewers which are typically designed to convey flows from the neighbourhoods they were installed within. The closest trunk sewer is a 600mmØ trunk sewer located approximately 1,050 metres east of the Study Area which is tributary to the South Side High Lift SPS. The viability of using this sewer as a connection point will be explored further in Section 6.3.

6.1.3.1. Trunk Sewers and South Niagara Falls WWTP

As detailed in Section 6.1.1, the Region undertook a Schedule 'C' Class Environmental Assessment 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 the conceptual location and sizing for a new WWTP and associated trunk conveyance system. The projects associated with these recommendations are listed as WW-TP-002, WW-TP-003, WW-TP-004, WW-SS-06, and WW-SS-07 in **Table 6-2**.

The recommended conveyance system includes a trunk sewer that extends from the new WWTP west on Reixinger Road, north on Montrose Road, west on Brown Road, north on Beechwood Road, west on McLeod Road, north on Thorold Townline Road, and west on Barron Road to Allanport Road (WW-SS-06 and WW-SS-07). This trunk sewer is proposed at the southwest corner of the Study Area at the corner of Beechwood Road and McLeod Road and is sized to convey sewage flows from the Study Area.

Accordingly, the new South Niagara WWTP is sized to treat sewage flows from the Study Area to 2051 (WW-TP-002, WW-TP-003, and WW-TP-004). In line with the Region's 2021 MSP, discharging sewage flows from the Study Area to this new trunk sewer will be the ultimate sewage conveyance strategy for the Study Area however if the new WWTP and tributary trunk sewers are not commissioned ahead of the development of the Secondary Plan Area, interim servicing strategies will need to be considered, as discussed further in Section 6.3.



- 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



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

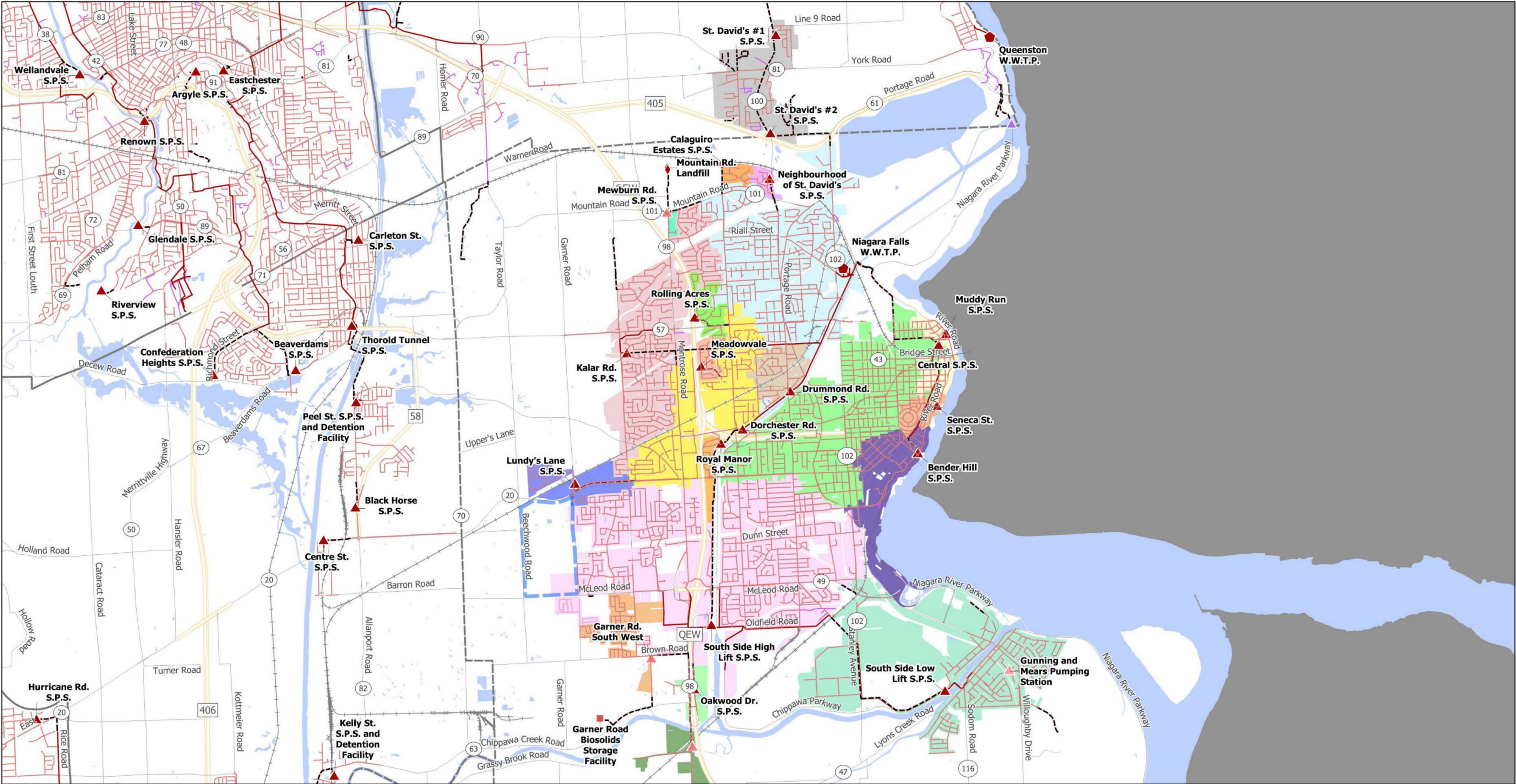
Project Name:
Garner West Secondary Plan Area Functional
Servicing Study

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



Last Updated: September 2024
Document ID: 2402620-001

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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

Calaguio

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



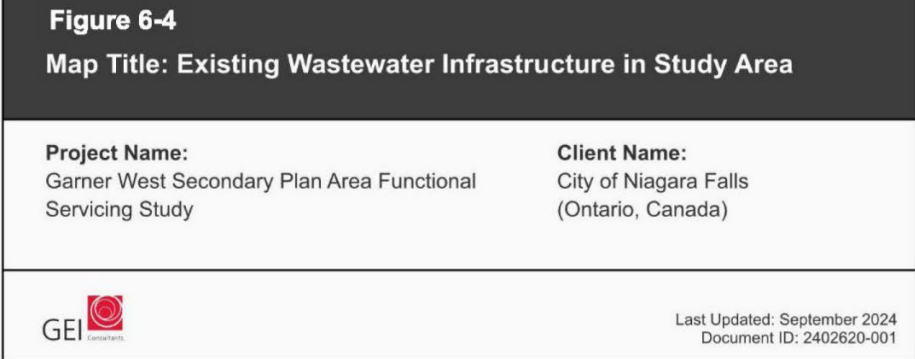
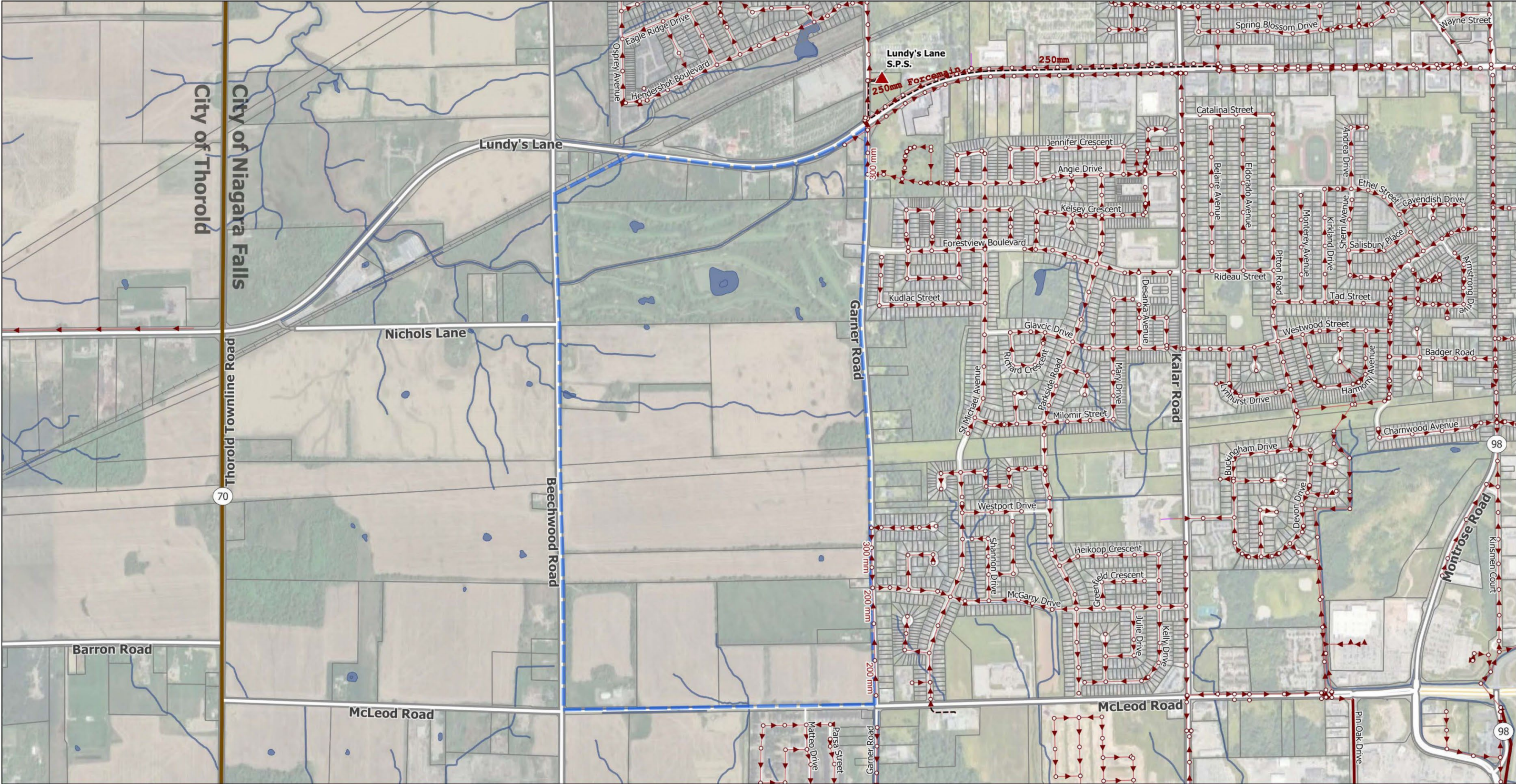
Figure 6-3
Existing Wastewater Catchments by Sewage Pumping Station

Project Name:
Garner West Secondary Plan Area Functional Servicing Study

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



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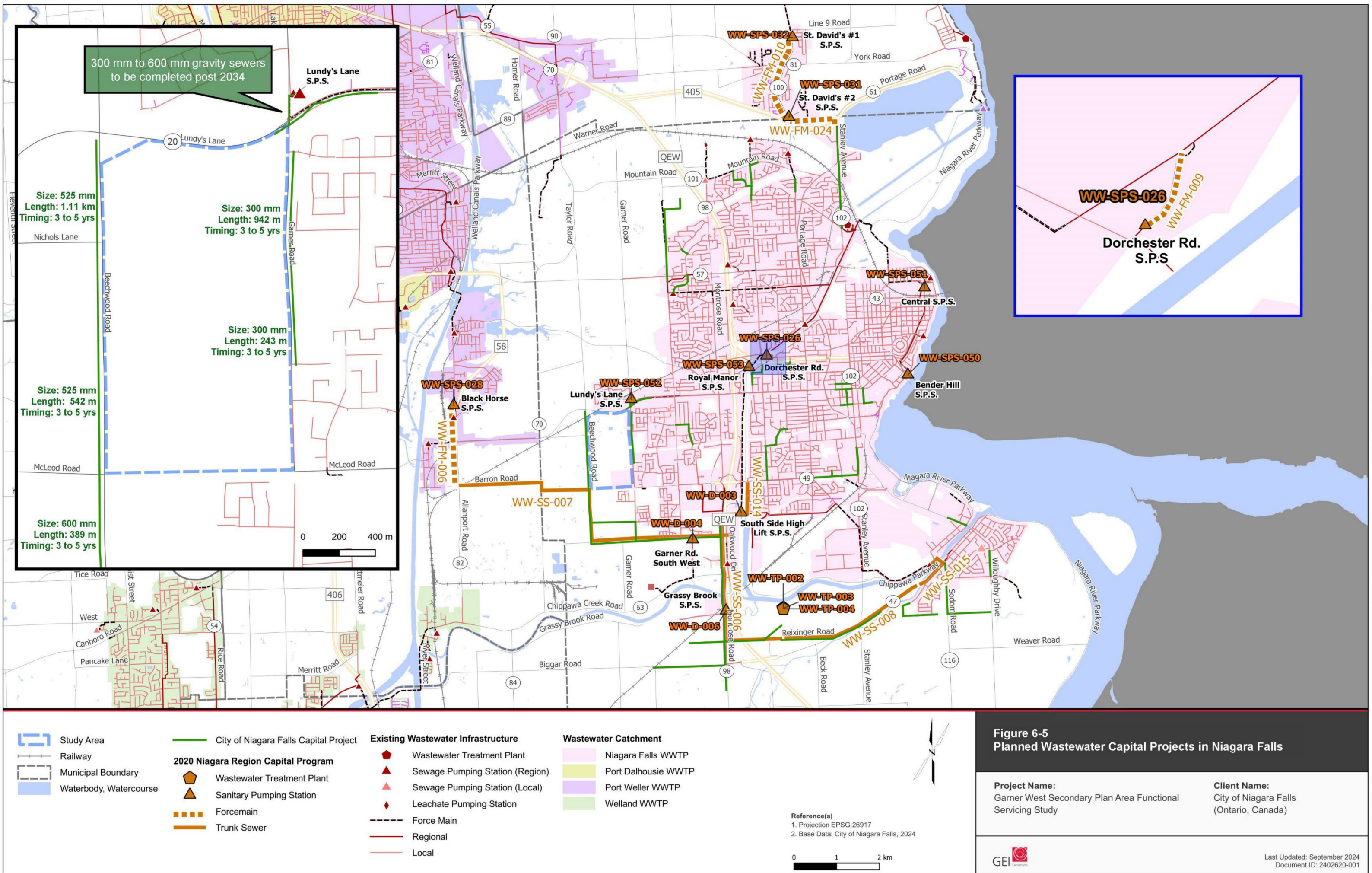
6.2. Planned Capital Projects

The Region's 2021 Master Plan identified several capital projects to support the planned growth within the DeCew WTP and Niagara Falls WTP system service areas to 2051, which includes the GWSPA. **Table 6-2** and **Figure 6-5** identify and describe the planned Regional wastewater capital projects potentially impacting growth in the GWSPA. Wastewater projects included within the City of Niagara Falls' 10-year capital program are also identified in **Figure 6-5**.

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 400mm 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 tunneled 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



6.3. Potential Connection Points

As shown in **Figure 7-2**, there are several potential connection points for future sewers within the GWSPA which are detailed in **Table 6-3**. Section 7.2 will review the hydraulic modelling completed as part of Phase 1, specifically looking at how the existing wastewater system will respond to the increased demand from the GWSPA and potential system improvements to facilitate the growth.

Table 6-3: Summary of Potential Connection Points for GWSPA Wastewater System

Potential Connection Point No.	Location / Description	Comments
1	Connect to inlet of Lundy's Lane SPS	- Inlet sewer invert is ~181.6 masl (Study Area would require local SPS to convey flows to this SPS). - Lundy's Lane SPS has firm capacity of 56.3 L/s; Study Area will generate 130 L/s of PWWF meaning station expansion would be required. - Expansion at Dorchester SPS may also be required. - Drains to the Niagara Falls WWTP which is not planned to accommodate flows from the Study Area.
2	Connect to 300mmØ local sewer at 5972 Garner Road	- Sewer invert is ~183.0 masl (Study Area would require local SPS to convey flows to this SPS). - Potential for capacity constraints and required local upgrades as downstream sewers are small diameter. - Drains to Lundy's Lane SPS which would require expansion per comment under Potential Connection Point No.1. - Expansion at Dorchester SPS may also be required. - Drains to the Niagara Falls WWTP which is not planned to accommodate flows from the Study Area.
3	Connect to 200mmØ local sewer at 9132 Kudlac Road	- Sewer invert is ~185.3 masl (Study Area would require local SPS to convey flows to this SPS). - Potential for capacity constraints and required local upgrades as downstream sewers are small diameter. - Drains to the SSHL SPS which has a firm capacity of 609 L/s and a 2051 anticipated PWWF of 1,391 L/s (design) and 1,820 L/s (5-year). As Study Area is anticipated to generate a PWWF of 130 L/s, the existing station may require expansion to accommodate flows. - Currently drains to the Niagara Falls WWTP which is not planned to accommodate flows from the Study Area, however flows will be re-routed to the SNF WWTP once the SSHL SPS is decommissioned.
4	Connect to 300mmØ local sewer at McGarry Drive and Garner Road	- Sewer invert is ~180.6 masl (Study Area would require local SPS to convey flows to this SPS). - Potential for capacity constraints and required local upgrades as downstream sewers are small diameter. - Drains to the SSHL SPS which has a firm capacity of 609 L/s and a 2051 anticipated PWWF of 1,391 L/s (design) and

Potential Connection Point No.	Location / Description	Comments
		1,820 L/s (5-year). As Study Area is anticipated to generate a PWWF of 130 L/s, the existing station may require expansion to accommodate flows. Drains to the Niagara Falls WWTP which is not planned to accommodate flows from the Study Area, however flows will be re-routed to the SNF WWTP once the SSHL SPS is decommissioned.
5	Connect to 600mmØ trunk sewer at McLeod Road and Kalar Road	- Sewer invert is ~177.2 masl (Study Area would require local SPS to convey flows to this SPS). - Drains to the SSHL SPS which has a firm capacity of 609 L/s and a 2051 anticipated PWWF of 1,391 L/s (design) and 1,820 L/s (5-year). As Study Area is anticipated to generate a PWWF of 130 L/s, the existing station may require expansion to accommodate flows. - Drains to the Niagara Falls WWTP which is not planned to accommodate flows from the Study Area, however flows will be re-routed to the SNF WWTP once the SSHL SPS is decommissioned.
6	Connect to future planned trunk sewer at McLeod Road and Beechwood Road	- Sewer invert is ~175.7 masl (Study Area can drain by gravity to trunk sewer). - No downstream pumping stations or conveyance constraints to the new South Niagara WWTP which has been designed to accommodate the treatment flows from the Study Area.

7. Hydraulic Modelling

The hydraulic modelling for this study was completed using the Region's water and wastewater models. The goal was to review the impact of the increased water demand and wastewater flows on the existing systems in order to identify constraints within the existing networks. These constraints, along with the potential servicing strategies available for the GWSPA, will guide the development of potential servicing strategies for the GWSPA that will be further refined in Phases 2 and 3 of the study.

7.1. Water Model

Water modelling was completed for the GWSPA to identify deficiencies and/or required upgrades within the existing water system to facilitate the development of the Study Area. The various components of the Regional water system relevant to development of the Study Area are detailed below:

Treatment: As noted in Section 5.1.1, the Study Area will be supplied treated drinking water by the Niagara Falls WTP which has a rated capacity of 145.5 MLD (1,684 L/s). 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, based on the population growth estimates carried within that study. As shown in **Table 7-2**, the growth estimates for the GWSPA were updated and it was confirmed that the Niagara Falls WTP will have sufficient treatment capacity for the build-out of the GWSPA.

Table 7-1: Water Treatment Plant Demands to Build-out

Demand Details		Region MSP	Region MSP (including GWSPA)
Population Identified for Study Area		3,833	9,600
Existing (MLD)	Average Day Demand (ADD)	43.0	43.0
	Maximum Day Demand (MDD)	64.5	64.5
2051 (MLD)	Average Day Demand (ADD)	59.5	60.8
	Maximum Day Demand (MDD)	90.9	93.1
Build-out (MLD)	Average Day Demand (ADD)	66.1	67.5
	Maximum Day Demand (MDD)	101.4	103.6

Pumping: As detailed in Section 5.1.2, water pressure is maintained throughout the Niagara Falls water system via a series of booster pumping stations (BPS) and storage facilities. The pumping stations include the Niagara Falls WTP High Lift Station and the Kent Avenue Booster Station. A summary of the pumping stations' performance as outlined in the 2021 Region MSP, along with a scenario considering the addition of the GWSPA, is outlined in **Table 7-2**.

Table 7-2: Summary of Water Booster Station Performance Details

Performance Details		Region MSP	Region MSP (including GWSPA)
Pump Station Firm Capacity (MLD)	Niagara Falls WTP / High Lift PS	146.0	
	Kent Avenue BPS	46.0	
Pressure Zone Supplied		250	
Total Effective Capacity (MLD)		146.0	

Performance Details		Region MSP	Region MSP (including GWSPA)
Existing (MLD)	Maximum Day Demand	64.5	64.5
	Surplus / Deficit	81.5	81.5
2051 (MLD)	Maximum Day Demand	90.9	93.1
	Surplus / Deficit	55.1	52.9
Build-out (MLD)	Maximum Day Demand	101.4	103.6
	Surplus / Deficit	44.6	42.4

As shown in **Table 7-2**, there is sufficient pumping capacity at the Region's existing water pumping stations to provide adequate water conveyance throughout the GWSPA.

Storage: As detailed in Section 5.1.3, there are three water storage facilities within the Niagara Falls WTP service area which are the Niagara Falls Reservoir, the Kent Avenue Reservoir, and Lundy's Lane Elevated Tank (ET). A summary of the storage facilities' performance details as outlined in the 2021 Region MSP, along with a scenario considering the addition of the GWSPA, is outlined in **Table 7-3** and **Table 7-4**.

Table 7-3: Summary of Water Storage Rated Capacity (2021 to Buildout)

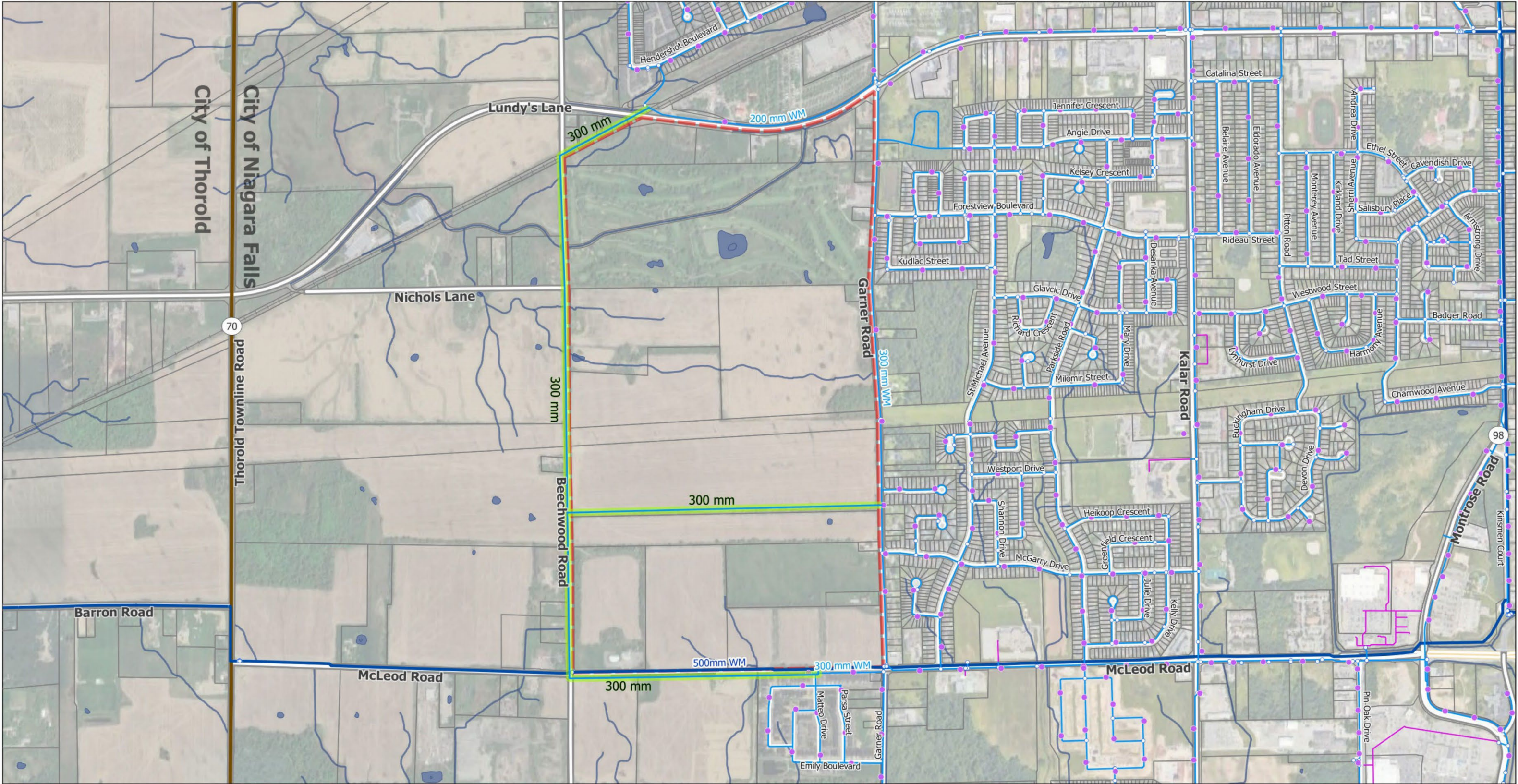
Facility	2021 Rated Capacity (ML)	2051 Rated Capacity (ML)	Buildout Rated Capacity (ML)
Niagara Falls WTP Reservoir (250 Pumped)	6.27	6.27	5.37
Kent Avenue Reservoir (250 Pumped)	20.91	20.91	20.91
Lundy's Lane ET (250 Floating)	2.46	12.00	12.00

Table 7-4 Summary of the Water Storage Performance Details

Projection Year	Storage	Region MSP	Region MSP (including GWSPA)
2021	Available Storage (ML)	29.64	29.64
	Required Storage (ML)	31.33	31.33
	Surplus / Deficit (ML)	-1.69	-1.69
2051	Available Storage (ML)	39.18	39.18
	Required Storage (ML)	40.23	40.91
	Surplus / Deficit (ML)	-1.05	-1.73
Build-Out	Available Storage (ML)	38.29	38.29
	Required Storage (ML)	44.06	44.76
	Surplus / Deficit (ML)	-5.77	-6.47

As shown in **Table 7-4**, there is a deficit in storage within the Region's water system during the existing, 2051, and build-out scenarios with the addition of growth within the GWSPA having a minor impact.

System Improvements: As shown in **Figure 7-1**, a potential servicing strategy for the GWSPA includes the extension of local 300mmØ watermain along Beechwood Road and McLeod Road, as well as through the GWSPA via a future subdivision road. Local service extensions to the development parcels can be made from these watermains. This scenario will ensure that water pressure within the GWSPA is maintained



 Study Area

 Parcel

 Municipal Boundary

 Waterbody, Watercourse

Proposed Infrastructure

 New Local Distribution Main

Existing Water Infrastructure

 Junction

 Hydrant

 Transmission Mains

 Distribution Mains

 Private

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

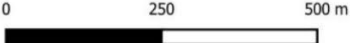

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Figure 7-1
Map Title: Modelling Recommendations and Potential Connection Points for Water Infrastructure

Project Name:
Garner West Secondary Plan Area Functional Servicing Study

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



Last Updated: September 2024
Document ID: 2402620-001

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between 40-100 psi and available fire flow above 250 L/s under the 2051 and build-out conditions. As demonstrated in Section 7.1, treatment and pumping are not constraints to development of the GWSPA however there is a storage deficit within the Region (refer to **Table 7-3** for details) that will need to be reviewed and addressed in future MSP updates.

7.2. Wastewater Model

Wastewater hydraulic modelling was completed to identify constraints within the existing system to development of the Secondary Plan Area. The constraints were considered within the context of developing a potential wastewater servicing strategy to discharge sewage flows from the GWSPA to the existing and/or future planned system with minimal impacts. The various components of the Regional and local wastewater system relevant to development of the Study Area are detailed below:

Treatment: Based on the location of the GWSPA, the South Niagara Falls WWTP is the ultimate receiving treatment facility for flows from the Study Area. As detailed in **Table 6-2**, this future plant is currently undergoing design and construction is planned to be completed by 2026.

Conveyance: As detailed in the Region's 2021 MSP, the recommended conveyance system for the GWSPA includes a future trunk sewer that will extend from the new WWTP west on Reixinger Road, north on Montrose Road, west on Brown Road, north on Beechwood Road, west on McLeod Road, north on Thorold Townline Road, and west on Barron Road to Allanport Road (WW-SS-06 and WW-SS-07). This trunk sewer passes the southwest corner of the Study Area at the corner of Beechwood Road and McLeod Road and will be sized to convey sewage flows from the Study Area. In line with the Region's 2021 MSP, discharging sewage flows from the Study Area to this new trunk sewer will be the sewage strategy for the Study Area. As detailed in **Table 6-2**, the construction of the new trunk sewer is planned to be completed by 2031.

System Improvements: As shown in **Figure 7-2**, the wastewater servicing strategy for the GWSPA includes extending a local 525mmØ sewer on Beechwood Road which will discharge to the future planned trunk sewer at the intersection of Beechwood Road and McLeod Road. Local sewers can extend along subdivision roads within the GWSPA and convey sewage flows to this 525mmØ sewer and ultimately to the future planned trunk sewer. A local 300mmØ sewer is also proposed along Garner Road which will discharge to existing sewers on Garner Road. The conceptual location and sizing of the local sewers for the GWSPA will be further explored in Phases 2 and 3 of the FSS.

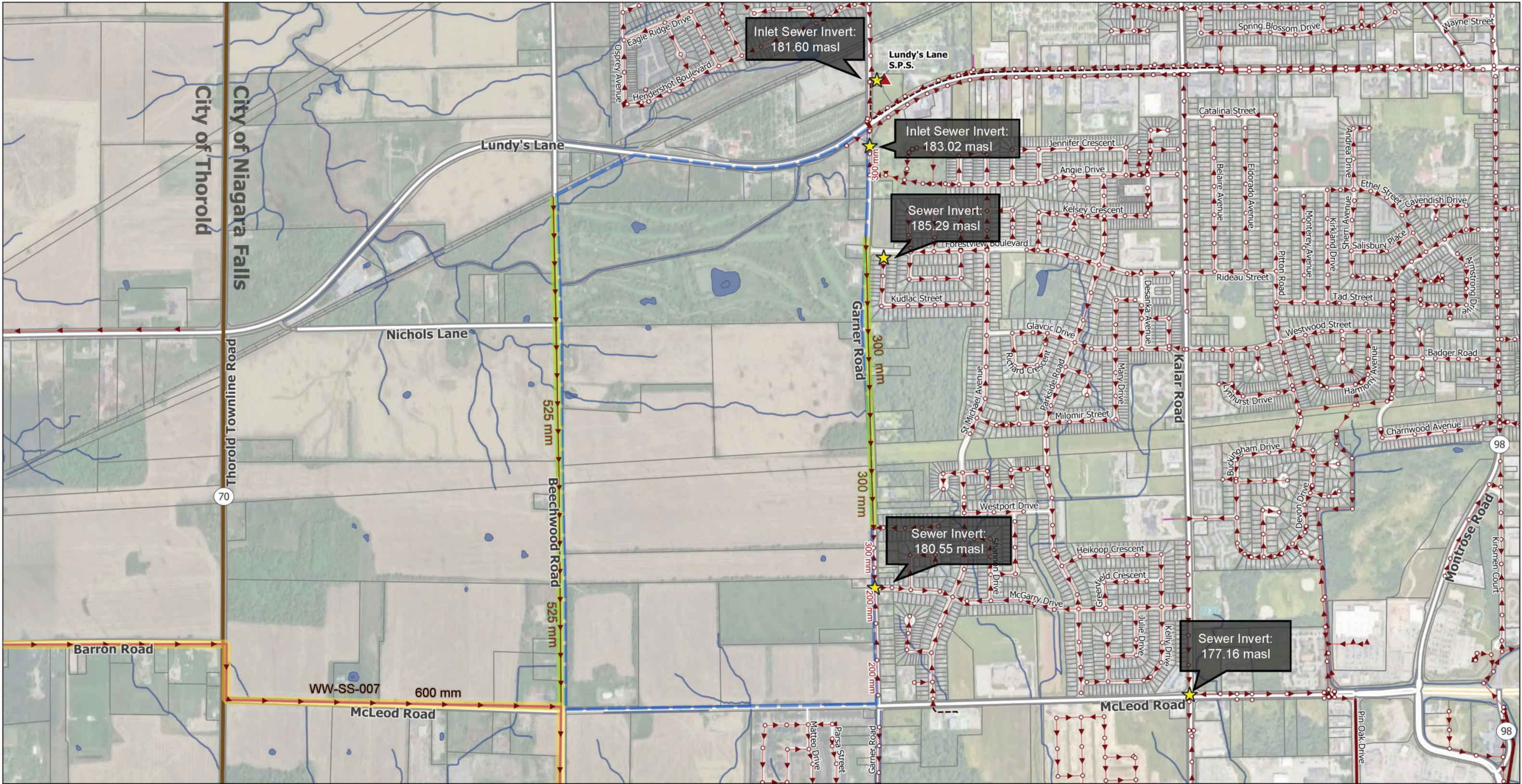


Figure 7-2
Map Title: Modelling Recommendations and Potential Connection Points for Wastewater Infrastructure

Project Name:
Garner West Secondary Plan Area Functional Servicing Study

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

8. Recommendations for Phase 2

Phase 2 of the Functional Servicing Study will build upon the information within the Existing Conditions Report to evaluate servicing alternatives for alternative land use options for the GWSPA. The goal will be to evaluate the land use options from a servicing perspective, given the potential impacts to scheduling, phasing, ease of construction, and infrastructure costs. The following recommendations for Phase 2 are provided based on the information gathered during Phase 1:

- The preferred land use option should allow an infrastructure layout that protects or avoids the physical constraints identified in Section 2 of the Existing Conditions Report;
- The servicing design criteria identified in Section 3 of the Existing Conditions Report should be considered during Phase 2 and implemented into the recommended servicing layout identified in Phase 3;
- The timing identified in Sections 5.2 and 6.2 of the Existing Conditions Report for the planned water and wastewater capital projects should be considered when reviewing potential servicing and phasing strategies during Phases 2 and 3; and,
- The water and wastewater system constraints, along with the potential servicing strategies for the GWSPA, as identified in Section 7 of the Existing Conditions Report, should be considered when evaluating the alternative land use options in Phase 2.

GEI will continue to work closely with the project team, City, Region, and stakeholders throughout Phases 2 and 3 to develop a detailed and effective servicing plan for the Garner West Secondary Plan Area.