Chapter 4

Infrastructure Located in East Gwillimbury

The Regional Municipality of York
The Regional Municipality of Durham

October 31, 2023

Project name York Region Sewage Works - Project Report

Document title Chapter 4 | Infrastructure Located in East Gwillimbury

Project number 12612539

Filename 12612539-CE854200-GHD-GN-00-RPT-PM-0004-Chapter 4_East_Gwillimbury.docx

Status code	Revision	Author	Reviewer	Approver	Approved date
S3	01	Ben Samuell (GHD)	Tom Casher (GHD)	Rachelle Plourde (GHD)	2023 September 06
S4	02	Ben Samuell (GHD)	Tom Casher (GHD)	Rachelle Plourde (GHD)	2023 September 29
S4	03	Ben Samuell (GHD)	Tom Casher (GHD)	Rachelle Plourde (GHD)	2023 October 31

GHD Limited
455 Phillip Street, Unit 100A
Waterloo, Ontario N2L 3X2, Canada
T +1 519 884 0510 | **ghd.com**

Jacobs Consultancy Canada Inc.
245 Consumer Road
Toronto, Ontario M2J 1R3, Canada
T +1 416 499 9000 | **jacobs.com**

Contents

Table index

Figure index

4. Infrastructure Located in East Gwillimbury

4.1 Overview

The York Durham Sewage System (YDSS) currently services eight of the nine local municipalities in the Regional Municipality of York (York Region) through conveyance infrastructure, directing most of the wastewater flows to Duffin Creek Water Pollution Control Plant (WPCP), with a small portion diverted to the Regional Municipality of Peel (Peel Region) wastewater system. The YDSS also services the City of Pickering and the Town of Ajax in the Regional Municipality of Durham (Durham Region). The YDSS conveys wastewater from Newmarket, Aurora and portions of East Gwillimbury, Markham and Richmond Hill to the Southeast Collector and ultimately to the Duffin Creek WPCP.

For the purpose of this report, the East Gwillimbury area includes communities of East Gwillimbury, Holland Landing, Queensville, Green Lane and Sharon. This northern part of York Region is currently serviced by collection infrastructure and sewage pumping stations (SPS) that convey wastewater to the 2nd Concession SPS, which in turn pumps to the Newmarket SPS.

The improvement plan for the East Gwillimbury area includes upgrading the existing local SPS to increase capacity to meet forecasted demands, constructing a new SPS for conveyance from the eastern area and improving the gravity conveyance along 2nd Concession Road. Additionally, a gravity trunk sewer will be constructed to carry the increased flow south towards the Newmarket area, and the construction of a major Newmarket East SPS and forcemains will divert the flow to the new gravity trunk sewer along the Leslie Street corridor, relieving the pressure on the existing Newmarket SPS and Aurora SPS.

This chapter presents the proposed conceptual designs and anticipated environmental impacts associated with project construction and operation servicing the East Gwillimbury area. It considers various aspects of the environment, including natural, cultural, social and built and existing environments.

Within sub-sections of this chapter, the discussion of each project component will include:

– A description of the project-specific study area
– A description of existing conditions for the social and built, natural and cultural environments
– A conceptual design
– A discussion of potential environmental impacts and mitigation measures
– Costs, implementation and schedule.

4.1.1 Key Plan

The general locations for the projects included in this chapter are shown in Figure 4.1.

East Gwillimbury features a varied topography, ranging from flat areas to gentle slopes, enhancing the visual appeal of the region. The towns are located north of the Oak Ridges Moraine (ORM), creating primary surface drainage paths from south to north, ending in Lake Simcoe. This drainage direction creates the need for a combination of gravity sewers, pumping stations and forcemains to convey sewage generated within the region to downstream infrastructure, which flows to Lake Ontario for treatment and discharge. As such, large pumping stations are required within York Region to convey flows south of the elevation high point within the ORM. Specific study areas for project components are outlined in subsequent sections.

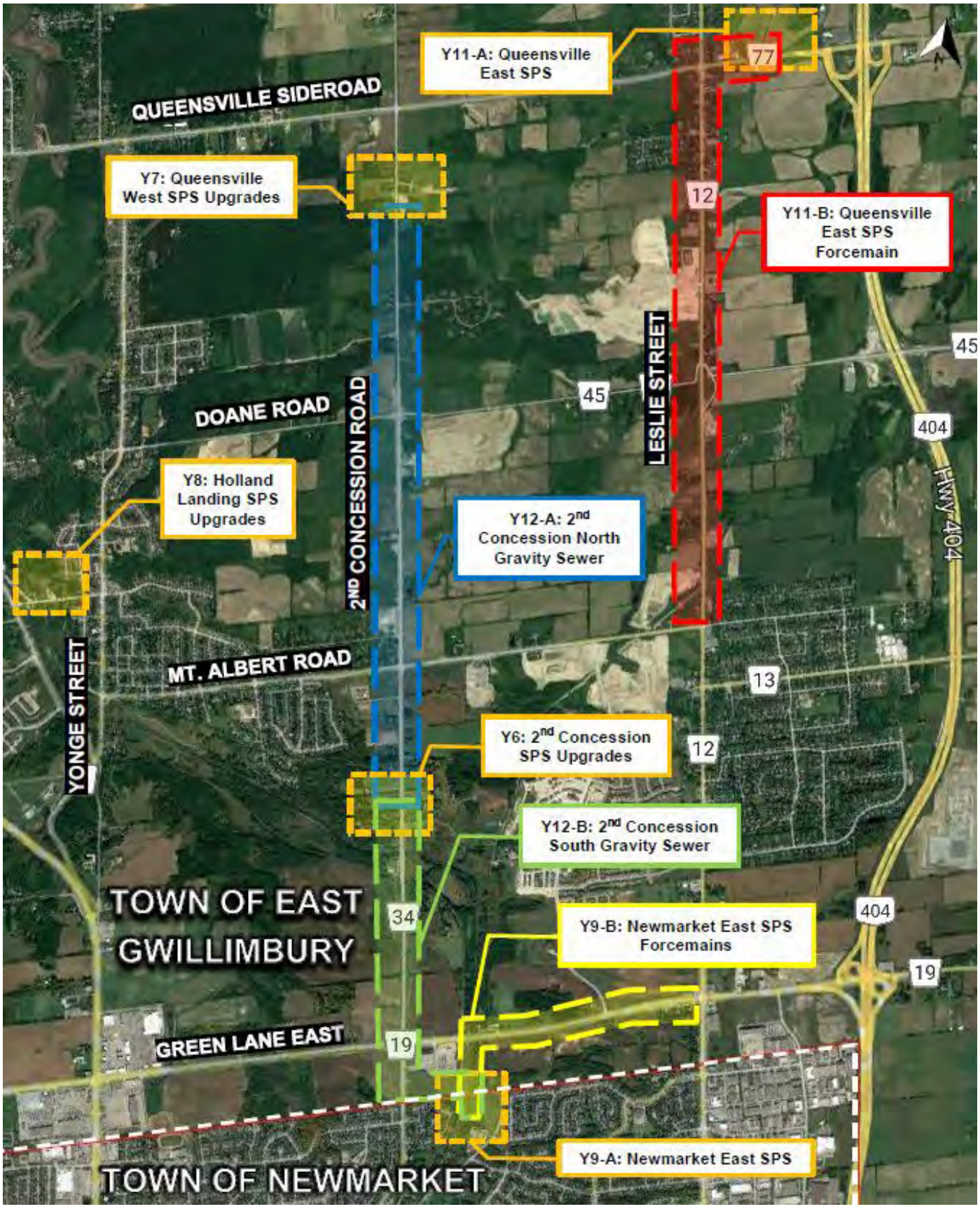


Figure 4.1 **Overview of East Gwillimbury Projects**

4.1.2 Existing Conditions

This component examines the existing environmental conditions of the study area. It establishes a baseline against which the potential impacts are assessed. Factors such as land use patterns, wildlife populations and community resources are evaluated to understand the existing state of the environment.

These different aspects are evaluated through various methods, including scientific studies, surveys and consultation with interested persons and Indigenous communities. The following sections define the different environments.

4.1.2.1 Social and Built Environment

This aspect of the assessment considers the impacts on the social fabric of the community, including human health, quality of life, social well-being and community cohesion, as well as the existing built infrastructure and facilities in the study area. It evaluates factors such as noise, vibration, traffic, public safety, access to services, capacity constraints and changes in land use patterns, recognizing the interplay between social and built elements in the project's environmental impact.

4.1.2.2 Natural Environment

The natural environment investigations looked at the ecological components such as flora, fauna, ecosystems and natural resources to provide a baseline for later evaluation of potential impacts on biodiversity, habitats, water quality, air quality, soil quality and the overall functioning of natural systems. These sections will also discuss subsurface conditions including geotechnical, hydrogeological and contamination.

4.1.2.3 Cultural Environment

This aspect examines the cultural heritage, which includes archaeological sites, historical structures, traditional practices and cultural landscapes that may be affected by the proposed project. It considers the potential impacts on cultural identity, traditional knowledge and the cultural significance of the area.

4.1.3 Conceptual Design

This discussion for each project will outline the general design standards, requirements and assumptions for the construction and implementation of new pumping stations, pumping station upgrades, new gravity sewers and new forcemains. General design parameters have been identified in Chapter 3 and site-specific conditions have been included within this chapter.

The designs presented are conceptual and were developed to demonstrate proof of concept. The designs will be further refined upon collection of field investigations and in consultation with internal and external stakeholders. Final SPS site locations will be selected considering the impacts and mitigations, results of field studies, procurement requirements and other design considerations. Similarly, details related to the construction methodology, pipe sizing, number of shafts, shaft sizing, location and property easement requirements will be confirmed during detailed design.

Refer to Table 4.1 for a list of relevant conceptual design drawing appendices for each project.

Table 4.1 Conceptual Design Drawings per East Gwillimbury Project

Project designation	Project name	Appendix	Sheet number(s)
Y9-A	Newmarket East SPS	Appendix A	4
Y9-B	Newmarket East SPS Forcemain	Appendix A	8
Y11-B	Queensville East SPS Forcemains	Appendix A	9 to 10
Y12-A	2nd Concession North Gravity Sewer	Appendix A	5 to 6
Y12-B	2nd Concession South Gravity Sewer	Appendix A	7

4.1.4 Environmental and Community Impacts and Mitigation

The desktop assessment of existing environmental conditions was compared against the conceptual designs. The findings identify potential environmental impacts, develop mitigation measures, and inform decision-making processes to promote sustainable development that minimizes negative environmental effects while maximizing positive outcomes.

4.1.5 Capital Cost Estimate and Implementation Plan

This chapter discusses the capital cost estimate for each proposed project and the general implementation plan, including future field investigations and permits and approvals required to design and construct the new/upgraded infrastructure. These components will be further reviewed and refined during the preliminary design stage.

4.2 Social and Built Environment Overview

To avoid repetition within this chapter, an overarching discussion on the existing social and built environment across all projects covered under Chapter 4 is presented in this section. Site-specific social and built environment existing conditions are further detailed in sections 4.5 to 4.13.

4.2.1 Town of East Gwillimbury

The Town of East Gwillimbury is located in the northern part of York Region. It covers an area of 238 square kilometres (km^2) and has a population of approximately 38,000 residents. The municipality is made up of several urban areas and villages, including Holland Landing, Queensville, Mount Albert, River Drive Park and Sharon, and approximately 70 percent (%) green space comprising agricultural, forested and recreational areas.

4.2.2 Planning Policy and Land Use

Table 4.2 provides a summary of potentially applicable policies to the projects located within East Gwillimbury, the proposed Y9-B Newmarket East SPS Forcemain (spans the boundary between East Gwillimbury and Newmarket) and the proposed Y9-A Newmarket East SPS (fully situated in Newmarket). Key planning policies that are applicable to the projects addressed in this chapter include those within the York Regional Official Plan.

Table 4.2 Summary of Planning Policies and Applicability to the York Region Sewage Works Project in East Gwillimbury

Jurisdiction and planning policy	Applicability to projects
Federal Impact Assessment Act (IAA, 2019)	– The proposed activities are not included in the physical activities list that describes which projects are subject to the IAA. – The York Region Sewage Works Project is not identified in Schedule 2 of the Act. – The Minister may designate a project upon request or own initiative. – Low likelihood that the projects are subject to the IAA.
Provincial Environmental Assessment Act (EAA)	– York Region Sewage Works Project are exempted from the EAA under Part IV of the Supporting Growth and Housing in York and Durham Regions Act, 2022.
Provincial Provincial Policy Statement (PPS, 2020)	– The PPS provides policy direction on matters of provincial interest related to land use planning and development. – The following sections are relevant to the proposed York Region Sewage Works Project: • Section 1.1.1: Healthy, liveable and safe communities are sustained by: • (g) ensuring that necessary infrastructure and public service facilities are or will be available to meet current and projected needs. • Section 1.6.6 provides policies relating to municipal sewage services. • Section 1.6.8.5: The co-location of linear infrastructure should be promoted where appropriate. • Section 2.1 provides policies for the long-term protection of natural features. • Section 2.2 provides policies for the protection of the quality and quantity of water. • Section 2.3 provides for the long-term protection of prime agricultural lands while allowing planning authorities to permit non-agricultural uses in prime agricultural areas for limited non-residential uses, provided the conditions established in the policy are met.
Provincial Ontario Water Resources Act (1990)	– Regulates sewage infrastructure and construction water taking in Ontario. – Bans new or increased intra-basin water transfer from one Great Lakes watershed to another, with exceptions subject to strictly regulated conditions. York Region Sewage Works Project will manage the movement of wastewater and implications of the Project on York Region's existing intra-basin transfer permission are not anticipated but will be explored.
Provincial Clean Water Act (2006) and South Georgian Bay Lake Simcoe Source Protection Plan (2015)	– The Clean Water Act, along with the source protection planning process it establishes, provides protection to current and future sources of residential municipal drinking water. – The establishment, operation or maintenance of a system that collects, stores, transmits, treats or disposes of sewage is one of the prescribed threats (a condition or activity that adversely affects or has the potential to adversely affect the quality or quantity of current or future drinking water). – East Gwillimbury is in the South Georgian Bay Lake Simcoe source protection region.
Provincial Lake Simcoe Protection Plan, 2009 under the Lake Simcoe Protection Act, 2008	– The Lake Simcoe Protection Plan is a watershed-based plan that outlines a coordinated approach to protecting and restoring the ecological integrity of Lake Simcoe. – With reference to Section 6.23 of the Lake Simcoe Protection Plan, development or site alteration is not permitted within a key natural heritage feature, a key hydrologic feature and within a related vegetation protection zone referred to in Policy 6.24, except in relation to the following: • (g) Infrastructure, but only if the need for the project has been demonstrated through an Environmental Assessment of other similar environmental approval and there is no reasonable alternative. – Projects located in East Gwillimbury are entirely within the Lake Simcoe Protection Plan area. Therefore, will be subject to the plan's policies.

Jurisdiction and planning policy	Applicability to projects
Provincial Growth Plan for the Greater Golden Horseshoe (2020 Consolidation), issued under the authority of the Places to Grow Act (2005)	– Provides direction on urban structure and where and how future growth should be accommodated. – Section 3 provides policies related to infrastructure to support growth, specifically Sections 3.2.5 – Infrastructure Corridors and 3.2.6 – Water and Wastewater Systems. – Section 4.2.3 (1): Outside Settlement Areas, development or site alteration is not permitted in key natural heritage features that are part of the Natural Heritage System for the Growth Plan or in key hydrologic features, except for: • (c) activities that create or maintain infrastructure authorized under an environmental assessment process. – Projects located in East Gwillimbury are entirely within the Growth Plan, and they will be subject to the plan's policies.
Provincial Oak Ridges Moraine Conservation Plan (ORMCP), under the Oak Ridges Moraine Conservation Act, 2001 (ORMC Act)	– The ORMCP is an ecologically based plan that provides land use and resource management direction for the land and water within the ORM landform. – Section 30 provides policies for development and site alteration within Landform Conservation Areas of the ORM. – Section 41 provides policies for the development of infrastructure in or on lands in natural linkage areas, prime agricultural areas and natural core areas, and the conditions under which infrastructure is permitted to cross key natural heritage features or key hydrological features. – Section 42(2) states that sewer service trenches shall be planned, designed and constructed so as to keep disruption of the natural groundwater flow to a minimum. – None of the projects located within East Gwillimbury intersect with areas designated under the ORMCP.
Provincial Greenbelt Plan 2017, under the Greenbelt Act 2005	– The Greenbelt Plan identifies where urbanization should not occur in order to provide permanent protection to the agricultural land base and the ecological and hydrological features, areas and functions occurring on the landscape. – Section 2.1: An application for the development of infrastructure in or on land in a prime agricultural area shall not be approved unless: • (a) the need for the project has been demonstrated, and there is no reasonable alternative that could avoid the development occurring in a prime agricultural area. • (b) an agricultural impact assessment or equivalent analysis carried out as part of an environmental assessment is undertaken that demonstrates that there will be no adverse impacts to the prime agricultural area or that such impacts will be minimized and mitigated to the extent possible. – While the projects located in East Gwillimbury are all outside of the Greenbelt Plan boundary, the 200 metres (m) study area for the Queensville West SPS Upgrades project intersects with areas part of the protected countryside and is designated as an Environmental Protection Area under the Greenbelt Plan.
Regional Lake Simcoe Region Conservation Authority (LSRCA)	– The projects covered in this chapter are situated within the LSRCA jurisdiction. – Permit under O. Reg. 179/06 – Development, Interference with Wetlands and Alterations to Shorelines and Watercourses, will be required for infrastructure within regulated areas (i.e., 120 m of a Provincially Significant Wetland (PSW) or within 30 m of a watercourse or waterbody).

Jurisdiction and planning policy	Applicability to projects
Regional York Region Official Plan 2022, Office Consolidation June 2023	– The York Region Official Plan sets the direction for growth and development within York Region through polices that align with provincial and regional planning documents. – The proposed projects are located on lands designated as community areas, with the 200 m study areas for some project locations extending into employment areas and agricultural areas. – Relevant sections include the following and are discussed below: • Section 3.2 – Regional Greenlands Systems • Section 5.1 – Agricultural System • Section 6.4 – Water and Wastewater Servicing.
Municipal East Gwillimbury Official Plan 2010, 2018 Consolidation	– Similar to the York Region Official Plan, the East Gwillimbury Official Plan provides policies that direct land use and sets long-term goals for development and environmental protection. – The study areas for the proposed projects traverse through numerous designated land uses, described in the sections below: • With reference to Section 4.15.1, public uses, including sewage infrastructure, are permitted in all land use designations with the exception of Environmental Protection Areas and the ORMPA designations. • Section 7.3.3.5 notes that new (private or municipal) sewage system infrastructure, wherever possible, should be located outside of Significant Threat Areas '1' and '2'. – It is noted that there are significant threat areas mapped within the study area of multiple projects.
Municipal East Gwillimbury Official Plan 2022	– The East Gwillimbury's updated Official Plan was adopted June 21, 2022, and has been submitted to York Region for approval. – Project locations are largely within the Central Growth Area, with the study area for one project extending into rural and agricultural areas. – The updated Official Plan similarly provides for sewage infrastructure in all land use designations with the exception of Environmental Protection Areas and the ORMPA designations.
Municipal Newmarket Official Plan 2006, 2022 Consolidation	– The Newmarket Official Plan directs long-term growth and development within the municipality. – Relevant sections include the following: • Section 9.2 – General Natural Heritage Policies • Section 14.0 – Servicing.

4.2.2.1 York Region Official Plan

With reference to the York Region's Official Plan 2022 (Office Consolidation June 2023), section 2.1.3, the regional structure consists of the following land use designations:

– Community areas, where residential, population-related employment and community services are directed to accommodate concentrations of existing and future population and employment growth.
– Employment areas, where clusters of industrial, business, transportation, warehousing and related economic activities are directed and where residential uses are prohibited.
– Hamlets, smaller communities in rural areas where growth potential is limited in accordance with the policies in the Plan.
– Rural areas, lands outside of urban areas and prime agricultural areas which support diverse agricultural, economic, tourism and recreational activities and contain valuable natural resources.
– Agricultural areas, containing a continuous, productive agricultural land base.
– Specialty crop areas for agriculture uses where specialty crops are predominantly grown.

Development and site alteration are restricted within some designations. However, provisions have been made for new wastewater infrastructure subject to demonstrated need and compliance with provincial plans.

Section 3.2 establishes policies for the Regional Greenland Systems. While development and site alteration within the system are generally prohibited, some uses, including new wastewater systems, are permitted subject to meeting requirements of applicable provincial plans. With reference to section 3.2.5 (d), new wastewater systems are permitted if no other reasonable alternative location exists and if an approved environmental impact study demonstrates that it can be constructed without negative impact. The wastewater system shall also be subjected to the policies of the relevant provincial plan, where applicable, or if authorized through an Environmental Assessment.

Section 5.1 provides policies for the Agricultural System. It is understood that the project study areas include active farmland. However, the proposed projects are to be constructed outside of designated agricultural lands.

Section 6.4 provides policies for the delivery of long-term water and wastewater services that are safe, well-managed and sustainable. The following are relevant to the York Region Sewage Works Project:

– Section 6.4.4: That planning efforts for municipal water and wastewater treatment facilities and infrastructure are coordinated with surrounding jurisdictions and shall be in accordance with provincial regulations, guidelines, standards and procedures and, where possible, minimize and mitigate any potential adverse effects from odour, noise and other contaminants.
– Section 6.4.12: To achieve water balance in compliance with the Great Lakes Charter and the Great Lakes Charter Annex by ensuring that all infrastructure planning decision-making processes manage intra-basin transfer to permitted quantities and water removed from the Great Lakes is returned at an equivalent or better quality.
– Section 6.4.14: That all improvements or new water and wastewater infrastructure systems shall conform to the applicable provincial plans, including the source protection plans.
– Section 6.4.16: That the planning and design of water and wastewater infrastructure will consider potential impacts from climate change.
– Section 6.4.19: That the location of new municipal sewage system infrastructure, wherever possible, shall be located outside of the vulnerable areas within a Wellhead Protection Area (WHPA) or Intake Protection Zone where it would be identified as a significant drinking water threat. Specific types of sewage infrastructure may not be permitted where the activity is identified as a significant drinking water threat in accordance with the South Georgian Bay Lake Simcoe and the Credit Valley, Toronto and Region and Central Lake Ontario Source Protection Plans.

4.3 Natural Environment Overview

To avoid repetition within this chapter, the well head protection areas (WHPA) across all projects are presented in this section instead of individually for each project. Site-specific natural environment existing conditions are further detailed in sections 4.5 to 4.13. Figure 4.2 illustrates the WHPA displaying study areas for all projects.

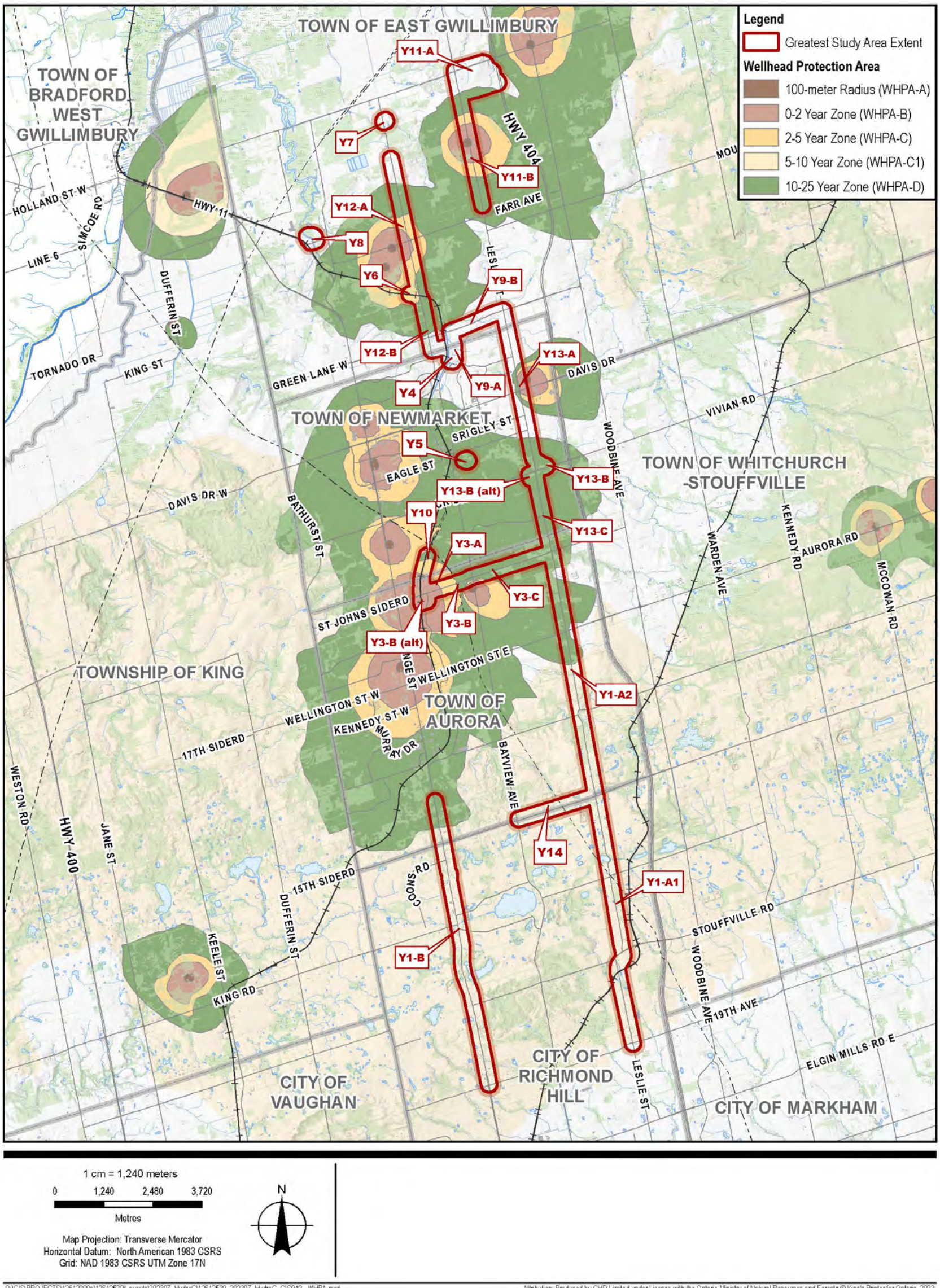


Figure 4.2 **Wellhead Protection Areas**

4.4 Cultural Environment Overview

To avoid repetition within this chapter, an overarching discussion on the existing cultural environment across all projects covered under Chapter 4 is presented in this section. This cultural environment desktop analysis includes a Stage 1 Archaeological Assessment and a Cultural Heritage Report on Existing Conditions and Preliminary Impact Assessment. The following sections summarize the findings of the desktop studies completed for the study areas for within this chapter.

4.4.1 Archaeology

A Stage 1 Archaeological Assessment was conducted to provide a review of current land use, historic and modern maps, past settlement history for the area and a consideration of topographic and physiographic features, soils and drainage. It also involved a review of previously registered archaeological resources within 1 km of the study area and previous archaeological assessments within 50 metres (m). The background study indicated that the York Region Sewage Works Projects had potential for the recovery of archaeological resources due the proximity (i.e., within 300 m) of features that signal archaeological potential, namely:

- Areas of 19th-century settlement (Aurora, Bogarttown, Gormley, Holland Landing, Newmarket, Petchville, Richmond Hill and White Rose).
- 19th-century travel routes (e.g., Leslie Street, Bloomington Road, St. John's Sideroad, Green Lane, etc.).
- Mapped 19th-century structures (numerous homesteads, mills, churches, schools, etc.).
- Historic watercourses (Rouge River, East Holland River and their tributaries).
- Previously registered archaeological sites (104 sites within 300 m, 46 in the study area).
- York Region's Archaeological Potential Map identifies the study area as having archaeological potential.

The following points outline the Cultural Heritage Value or Interest (CHVI) associated with the projects in this chapter.

1. The Y6 study area has no archaeological sites with further CHVI.
2. The Y7 Queensville West SPS Upgrades study area (Y7) has no archaeological sites with further CHVI.
3. The Y8 Holland Landing SPS Upgrades study area (Y8) has no archaeological sites with further CHVI.
4. The Y9-A Newmarket East SPS study area (Y9-A) has no archaeological sites with further CHVI.
5. The Y9-B Newmarket East SPS Forcemains (Y9-B) study area has no archaeological sites with further CHVI.
6. The Y11-A Queensville East SPS study area (Y11-A) has no archaeological sites with further CHVI.
7. The Y11-B Queensville East SPS Forcemains (Y11-B) contains two archaeological sites with further CHVI (BaGu-111 and BaGu-112). A detailed description of this CHVI site can be provided upon request. There is also one registered cemetery located at 19440 Leslie Street (Selby Burying Ground and Weddel Family Plot) that must be taken into consideration during the planning process for this project.
8. The Y12-A 2nd Concession North Gravity Sewer (Y12-A) contains three archaeological sites with further CHVI (BaGu-149, BaGu-198 and BaGu-47). A detailed description of these CHVI sites can be provided upon request.
9. The Y12-B 2nd Concession South Gravity Sewer (Y12-B) contains one archaeological site with further CHVI (BaGu-209). A detailed description of this CHVI site can be provided upon request.

4.4.2 Cultural Heritage

Cultural Heritage Report: Existing Conditions and Preliminary Impact Assessment was produced to provide an overview of the cultural landscape and offer initial insights into potential impacts. The study areas within this chapter pass through the communities of East Gwillimbury and Newmarket in York Region. The purpose of the Assessment is to screen, inventory and conduct preliminary impact assessments in the study area involving multiple properties by:

1. Completing a cultural heritage screening that encompasses all properties within the study area based on the Ministry of Citizenship and Multiculturalism (MCM), Criteria for Evaluating Potential for Built Heritage Resources and Cultural Heritage Landscapes.
2. Completing a heritage screening for existing heritage conditions through background research and the application of professional judgement to identify all known and potential Built Heritage Resources (BHRs) and Cultural Heritage Landscapes (CHLs) in the study area.
3. Completing a preliminary heritage impact assessment (HIA) of all identified BHRs and CHLs. The preliminary HIA follows the general format set out in the MCM's Info Sheet #5: Heritage Impact Assessments and Conservation Plans, which is included in the resource Heritage Resources in the Land Use Planning Process within the Ontario Heritage Toolkit. Subsequent site specific HIAs with the comprehensive application of O. Reg. 9/06 (as amended by O. Reg. 569/22) may be recommended where direct impacts are identified.

During a desktop overview of existing heritage conditions in East Gwillimbury 821 properties were reviewed, of these properties 350 were identified as having known or potential BHR/CHLs. Subsequent field review identified 77 BHRs, nine BHR/CHLs and five CHLs. In Newmarket 1,762 properties were reviewed, of these properties131 properties were identified as having known or potential BHR/CHLs. Subsequent field review identified 51 BHRs and four CHLs. A detailed description of these heritage properties can be provided upon request.

In East Gwillimbury, there are four distinct sections of the study area. The first commences on Leslie Street from a boundary line with the Town of Newmarket that continues approximately 500 m to Green Lane East then moves east-west on Green Lane East toward 2nd Concession Road. The segment then follows 2nd Concession Road north to Doane Road. This portion of the study area is largely rural consisting of farms and natural areas along the Holland River, including the Rogers Reservoir Conservation Area (RRCA). Another former Holland Canal lock is located west of the reservoir at a recently updated bridge in the study area. A few residential subdivisions have recently begun replacing the agricultural lands between Mount Albert Road and Doane Road. The second segment is located on 2nd Concession Road at Evans Farm Boulevard at the location of the Queensville West SPS which is in close proximity of the West/Ellis log house and barn located at 20372 2nd Concession Road. The third segment is located in part of Holland Landing on and around Bradford Street near the HREB. The fourth portion of the study area is an L-shaped segment along Leslie Street commencing at Mount Albert Road/Farr Avenue in Sharon and continuing northward to Queensville where it then turns right onto Queensville Sideroad and terminates near Highway 404. This segment is primarily rural and is characterized by low density housing along both sides of Leslie Street, though suburban development is occurring on the southwest end of Queensville. The Selby Burying Grounds and a smaller adjacent cemetery are located on a rise on the west side of Leslie Street. Queensville, which has tree-lined streets and a concentration of 19th and early 20th century houses.

In Newmarket, there three distinct sections of the study area. The first is a north-south segment that follows along Leslie Street from a boundary line with the Town of Aurora approximately 400 m north of the intersection of Leslie and St. John's Sideroad in the south to a boundary line with East Gwillimbury approximately 500 m south of Leslie Street and Green Lane East. Along this area, relatively recent industrial and commercial development lines most of the east side of Leslie Street. The second section is concentrated in a mature residential neighbourhood composed primarily of late 19th and early 20th century single detached houses located east of Fairy Lake. This area also includes mature parks and infrastructure associated with Bogart Creek. The third section is located west of the Newmarket SPS and York Region water and wastewater operation centre located at 380 Bayview Parkway. The area includes notable parks and trails along the Holland River. This area is a cultural heritage landscape which is part of the Nokiidaa/Tom Taylor Trail and provides linkages to conservation areas, including Rogers Reservoir, Wesley Brooks (Fairy Lake) and Mabel Davis Conservation Area.

The Ontario Heritage Act (OHA) provides a framework for municipalities in Ontario to preserve the conservation of properties with cultural heritage value or interest, including the capacity to designate heritage properties. In the Town of East Gwillimbury, there are two properties designated under Part IV of the OHA and 56 properties listed on the Town's Register of Properties of Cultural Heritage Value or Interest. In the Town of Newmarket, there are four properties designated under Part IV of the OHA and 21 properties listed on the Town's Municipal Register of Non-Designated Heritage Properties.

York Region and Durham Region are located on the traditional territory of many Indigenous peoples including the Anishinaabeg, Haudenosaunee, Huron-Wendat and Métis peoples, and within the treaty territories of the Haudenosaunee, Mississaugas of the Credit First Nation, and Williams Treaties First Nations. Most of the study area is located within the Williams Treaties with the Chippewas of Beausoleil, Georgina Island and Rama First Nations and the Mississaugas of Alderville, Curve Lake, Hiawatha and Scugog Island First Nations. The remaining portion of the study area in Richmond Hill is located within the Treaty 13 with the Mississaugas of the Credit First Nation (also known as the Toronto Purchase). There are also other land claims and treaty rights involving portions of York Region and Durham Region that have not been definitively resolved.

Since time immemorial, Indigenous peoples use and management of land differed greatly from the much more recent era of colonial development. Instead of roads and highways cut through the landscape, Indigenous travel in this area focused on waterways and the portages between them[1].

An example of this is the Toronto Carrying Place Trail. Prior to the arrival of Europeans, many Indigenous groups travelled along the Toronto Carrying Place Trail to trade with other nations near and far as well as to hunt and gather resources. The trail snaked northward along the east bank of the Humber River past Woodbridge in current day Vaughan before heading over the ORM towards the West Holland River. A second iteration of the trail started at the Rouge River moving northwest through the ORM and toward the Holland River East Branch near present day Aurora before heading north to Holland Landing. Northern portions of the Trail correspond to the Chippewas Travel Corridor shown in Figure 4.3.

Figure 4.3 **Map of a portion of Williams Treaties Hunting Territories Showing the East and West Holland Rivers as a Chippewas Travel Corridor Provided by Chippewas of Rama First Nation**

[1] TMHC Inc. 2023. Cultural Heritage Report York Region Sewage Works Project Towns of Richmond Hill, Aurora, Newmarket, and East Gwillimbury, Regional Municipality of York (draft).

In addition to fish and other animals, Indigenous communities harvested wild rice, and actively managed and maintained nut and berry resources for food[2]. Indigenous landscapes included actively managed meadows (Mishkodeh) and forests (such as Black Oak Savannas)[3]. This system of land management is often framed in terms of kinship between people and landscape, a mutual responsibility for each to promote and maintain the health of the other.

Treaties isolated Indigenous communities to relatively small reserves and colonial land development limited the accessibility of lands for subsistence activities. For example, until it was corrected in 2018, the Williams Treaties of 1923 were interpreted by Canada to have extinguished the First Nations' right to hunt, fish and harvest on their traditional territory. Residential schools and cultural discrimination further damaged these traditional lifeways by systematically preventing the transfer of Indigenous knowledge from one generation to the next.

4.5 Y6 2nd Concession SPS Upgrades

4.5.1 Study Area

The 2nd Concession SPS is located at 18676 2nd Concession Road and receives flows from the Sharon Trunk Sewer and Green Lane sewer as well as flows from the Holland Landing SPS and Queensville West SPS, and currently pumps the received flows via forcemain to the existing Newmarket SPS.

With the proposed improvements, the flow from Holland Landing SPS and Queensville West SPS will no longer be received and re-pumped by 2nd Concession SPS under normal operation. Instead, these flows will be pumped directly from those SPSs to the Y12-A 2nd Concession North Gravity Sewer, which will then flow into the Y12-B 2nd Concession South Gravity Sewer.

Flow from the Green Lane trunk will be diverted and flow by gravity directly into the Y12-B 2nd Concession South Gravity Sewer and will no longer be pumped via 2nd Concession SPS. Flow from the Sharon Trunk (and, by extension, the flows from the proposed Queensville East SPS) will continue to be received and conveyed by the 2nd Concession SPS. The discharge from the 2nd Concession SPS will no longer be via forcemain to Newmarket SPS but instead will be a relatively local and lower lift pumping into the Y12-B 2nd Concession South Gravity Sewer.

The proposed permanent modifications to the facility are not anticipated to extend beyond the existing property limits or existing easements, but temporary easements or mitigation impacts or requirements may extend onto or impact adjacent properties. A study area of approximately 200 metres surrounding the existing pumping station was applied as summarized in Figure 4.4.

[2] Williams, Doug (Gidigaa Migizi). 2018 Michi Saagiig: This is Our Territory. Winnipeg, MN: ARP Books.
[3] Mishkodeh Centre for Indigenous Knowledge. n.d. History. Available online: https://mishkodeh.org/history/. Accessed October 27, 2022.

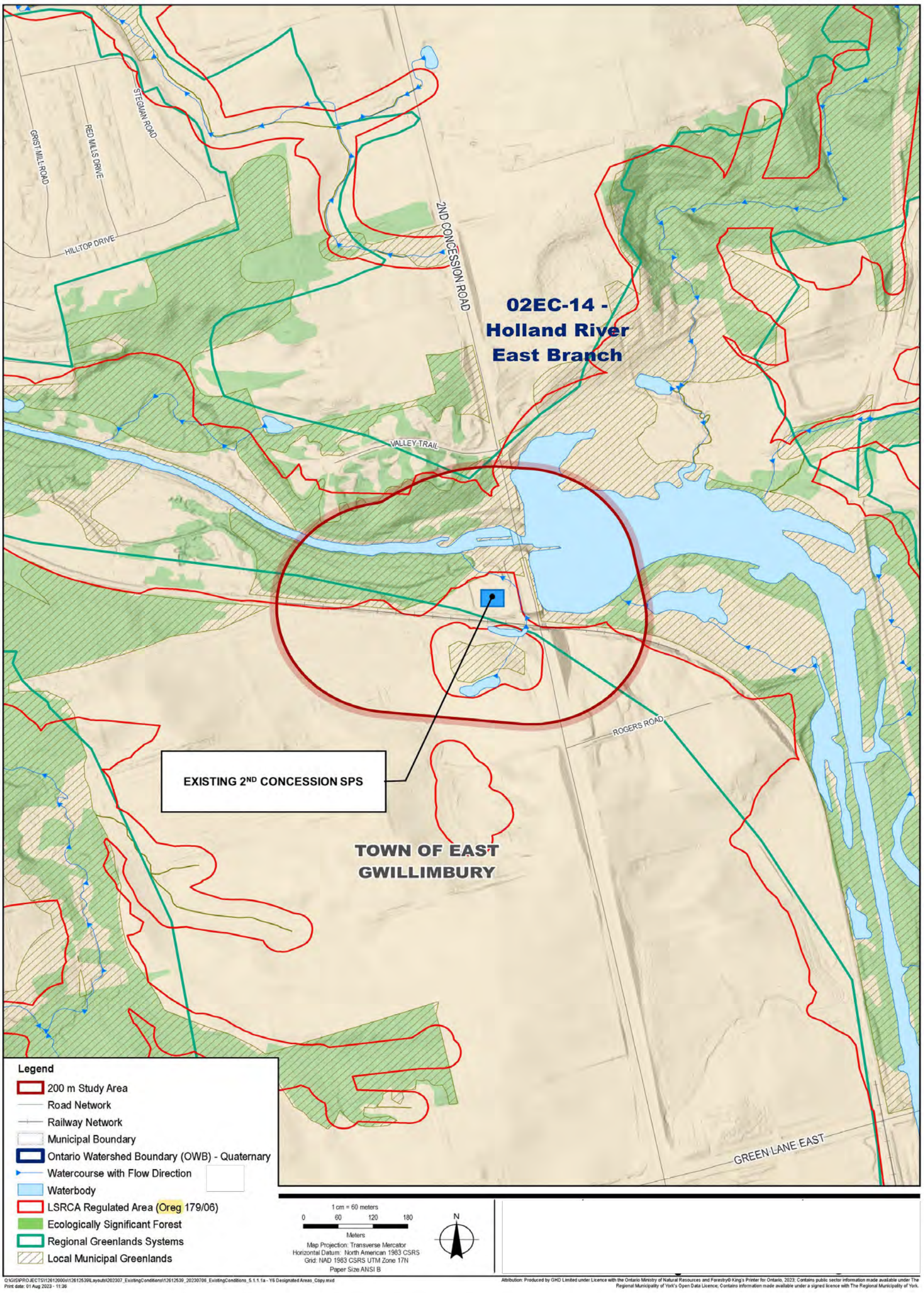


Figure 4.4 **Study Area for Y6 2nd Concession SPS Upgrades**

4.5.2 Existing Conditions

4.5.2.1 Social and Built Environment

The following sections will summarize the findings of the desktop studies completed within the study area, including planning and land use, traffic and transportation and utilities.

4.5.2.1.1 Planning Policy and Land Use

Existing Land Use

Land use within the Y6 study area consists of the following:

– Agricultural lands (southwest of the SPS)
– Conservation area (Rogers Reservoir)
– Canadian National Railway (CNR) rail corridor crossing 2nd Concession Road
– Low-density residential use (northwest and southeast of the SPS)
– Recreational trails, including the Nokiidaa Trail, pass through the study area, generally following the Holland River.

Planning Policy

Regional

The entire study area is designated as a community area in the York Region Official Plan 2022 (June 2023 Office Consolidation). In addition, areas adjacent to the existing SPS and north of the railway are also part of York Region's Greenland System.

Local

The East Gwillimbury Official Plan 2010 (2018 Office Consolidation) designates the lands in the study area as follows:

– North of the rail corridor as Agricultural/Long-term Growth Area, Environmental Protection and Estate Residential
– South of the rail corridor, east of 2nd Concession Road, as an Agricultural/Long-term Growth Area
– Remaining southern portion is within the Green Lane Secondary Plan Area and designated as Low and Medium Density Residential and Neighbourhood Commercial.

The Green Lane Secondary Plan anticipates a minor collector road connecting to the west side of 2nd Concession Road and passing through the southern portion of the study area.

A proposed elementary school is located on the proposed collector road within the southern portion of the study area.

Active Development Applications

One active development application was identified within the Y6 study area:

– Proposed subdivision at Valley Trail Road in East Gwillimbury. The site is located at the northern portion of the study area.

4.5.2.1.2 Transportation in the Study Area

2nd Concession Road is a four-lane arterial road with sidewalks and dedicated bike lanes on both sides, as shown in Figure 4.5.

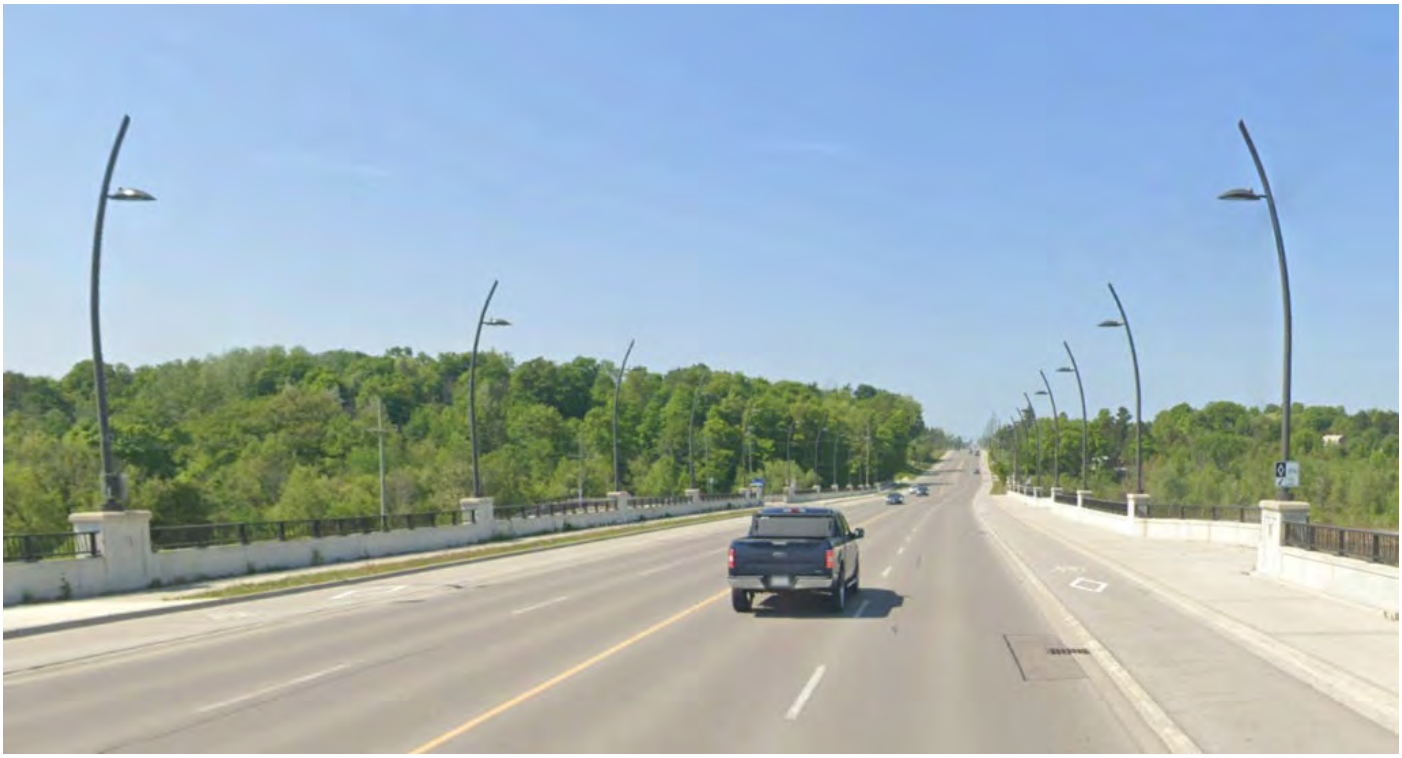


Figure 4.5 **2nd Concession Road Looking North Towards Valley Trail (*Google Maps* "Streetview," digital images http://maps.google.com)**

The annual average daily traffic (AADT) along 2nd Concession Road between Green Lane East and Hillcrest Drive has been counted between 7,225 in the south end and 4,615 in the north end, based on the latest available 2023 data. Historical AADT data along the study area are presented in Table 4.3.

Table 4.3 **2nd Concession Road AADT Counts Between Green Lane East and Hillcrest Drive**

Description of road limits	2012	2013	2014	2018	2019	2023
Green Lane East and Rogers Road	10,543	11,324	8,792	6,548	6,698	7,225
Valley Trail and Mount Albert Road	10,369		8,429	6,199		7,192
Mount Albert Road and Hillcrest Drive	5,880		3,744		3,833	4,615

There are no bus public transit routes running along 2nd Concession Road within the Y6 study area. There is a CNR/Metrolinx GO Transit rail crossing north of Green Lane East, within the proposed SPS location study area.

4.5.2.1.3 Utilities in the Study Area

There are several above and below-grade utilities situated within the study area corridor and in the vicinity of the proposed project. However, we clarify that the works completed will be limited to the extents of the existing 2nd Concession SPS, therefore, minor or no impacts are anticipated to nearby utilities. For any utilities, which are identified to be temporarily impacted during the construction of the SPS upgrades, formal notification and consent would be required from the authorities responsible for these utilities prior to construction.

Known municipal infrastructure that existed on York Region's geographic information system (GIS) database has been provided within the drawing set. A detailed utility investigation program, which would include a "Level A through D" subsurface utility exploration, would be required as part of future site investigations.

Known large infrastructure within the study area include:

– A CNR railway running parallel to the existing SPS property, to the south.

The railway along the study area will require specific geotechnical instrumentation and monitoring requirements during construction to receive infrastructure owner approval of the design. Based on the distance between the rail from the proposed works, and based on the scale of the work, impacts to the track are not anticipated to be extensive but will be assessed as part of a Construction Impact Assessment during design development should the structure fall within the zone of influence (ZOI) of any excavation work.

4.5.2.2 Natural Environment

The following sections will summarize the findings of the desktop studies completed within the Y6 study area for geotechnical, hydrogeological, surface water, natural heritage and contamination.

4.5.2.2.1 Geotechnical

The Y6 study area is bordered on the north by Valley Trail and on the south by Rogers Road, within the boundaries of the Town of East Gwillimbury.

Historical borehole logs (1990) advanced from about 2 to 5 metres below ground surface (mbgs), presented the surface condition generally comprised of non-cohesive till (sandy silt to silty sand till of compact to dense relative density/clayey silt and sand till of stiff to hard consistency). The encountered till deposit is generally damp to moist. Few boreholes encountered sandy silt layer (compact relative density) and clayey silt deposit (very stiff to hard consistency), and the deposits were generally moist to wet. The ground surface elevation at the boreholes varied from elevation 263.7 to 244.5 masl and groundwater table varied from elevation 263.7 to 243.1 masl. It should be noted that the above-mentioned subsurface condition was encountered north of the study area (about 1 km away from the study area), and groundwater is typically found at shallow depths below the ground surface.

The near surface soils within the study area are predominantly comprised of silt and clay deposits in general, mostly consisting of Glaciolacustrine deposits.

The bedrock consists of shale, limestone, dolostone and siltstone Georgian Bay Formation/Blue Mountain Formation/ Billings Formation. Typically, bedrock is mapped at depths of 87 mbgs within the study area and will not be reached during construction.

4.5.2.2.2 Hydrogeological

A hydrogeological desktop review was undertaken within the study area using information from MECP well records, the MECP Source Protection Information Atlas, the ORM database and the Ontario Geological Survey database. Available hydrogeological reports for projects within the area were also reviewed.

The Y6 study area is within the Schomberg Clay Plains physiographic region. The SPS upgrades are anticipated to be within the existing property and are not expected to involve construction excavations below the water table. The SPS is located within the WHPA-C. The water table is at approximately 228 to 229 masl, near ground surface due to proximity to Holland River East Branch (HREB). Groundwater flows towards HREB. We note that the HREB is also considered a historical Chippewa corridor.

The closest private well is 350 m away from the study area.

Refer to Table 4.4 regarding details on anticipated aquifers and aquitards within the study area.

Table 4.4 Aquifers and Aquitards Through the Y6 Study Area

Aquifers and aquitards	Description	Thickness
Undifferentiated upper sediments	An unconfined aquifer consisting of discontinuous fill and unconsolidated overburden deposits. Deposits surface towards the east of the study area.	Maximum 1.5 m
Oak Ridges Moraines Complex (Aquifer)	These sediments consist mostly of silt and fine sand, but also include gravel and minor clay and diamicton. The aquifer is generally unconfined, except the section covered by Halton Till on the south flank of the ORM complex.	Ranges between 8 to 22 m
Newmarket Till (Aquitard)	A continuous layer that acts as an aquitard to the underlying Thorncliffe Formation. Deposits surface towards the east of the study area.	Ranges between 33 to 34 m
Thorncliffe Formation (Aquifer)	Regionally recognized as a highly productive confined aquifer and is laterally continuous.	Generally, 12 m
Sunnybrook Drift, Scarborough Formation (Lower aquitards)	Sunnybrook Drift: A continuous layer that acts as an aquitard to the underlying Scarborough Formation. Scarborough Formation: A confined aquifer that is discontinuous and appears to consist of channel fill deposits that roughly dip to the east.	Generally, 31 m

4.5.2.2.3 Surface Water

There is one sub-watershed within the Y6 study area for the Holland East River Branch. The SPS is located adjacent to the HREB.

Other surface features of interest include:

– Rogers Reservoir wetland is part of the RRCA and is a Provincially Significant Wetland (PSW) found on the east side the study area.
– Two online warmwater ponds (meaning the pond is connected to an active stream, which can warm up the water temperature) discharging to HREB.

Refer to Figure 4.6 for a surface water map of existing conditions within the study area.

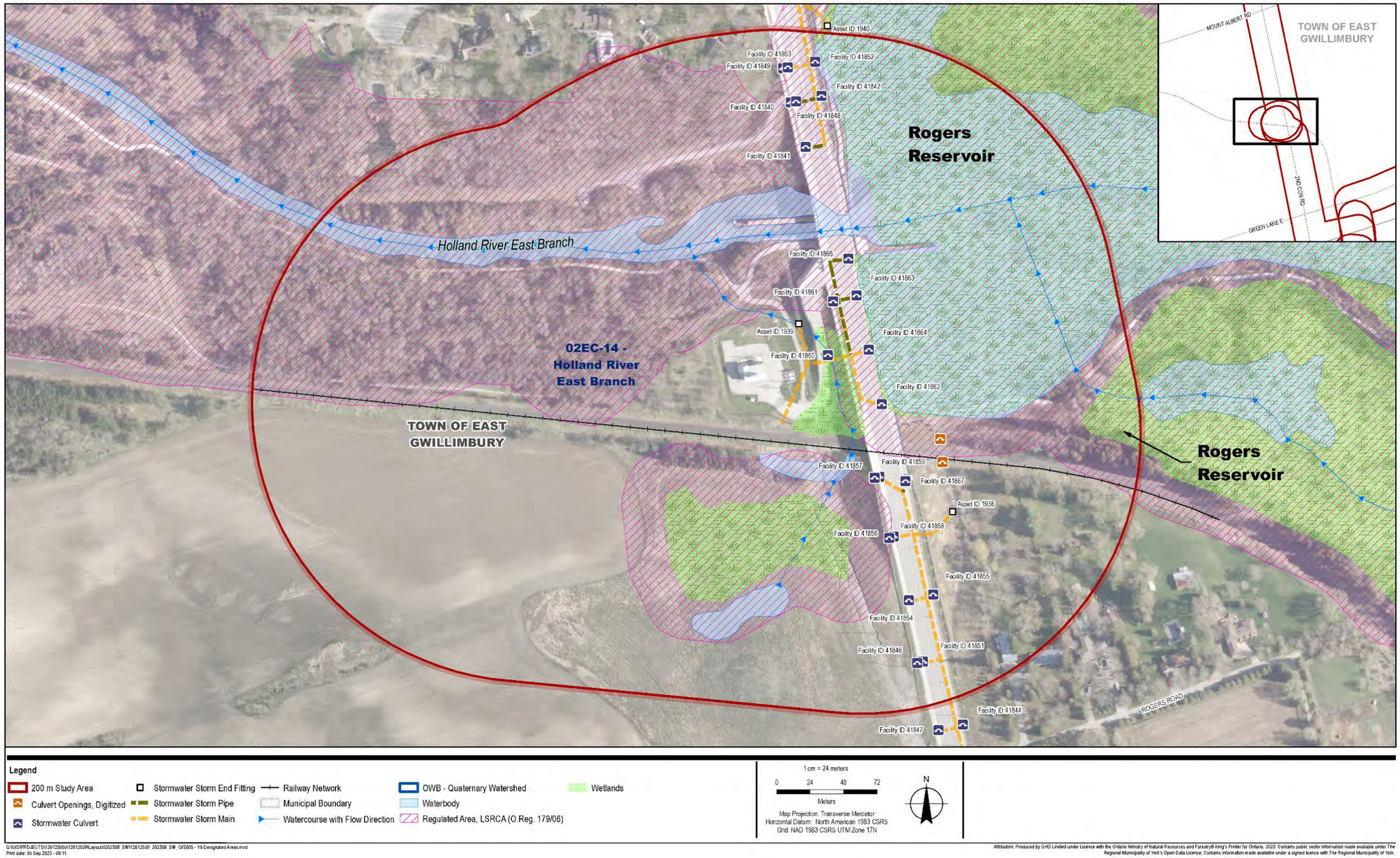


Figure 4.6 Study Area for Y6 Surface Water Map for Existing Conditions

4.5.2.2.4 Natural Heritage Characterization

The Y6 study area consists of agricultural lands under active row crops, ecologically significant forests, wetlands areas associated with the Regional Greenlands System within the LSRCA jurisdiction area.

One evaluated wetland of importance is the Rogers Reservoir Wetland. The Rogers Reservoir Wetland is part of the RRCA and is found on the east side of the study area. A mix of wetland, grassland and forest ecosystems provide habitat for a diverse array of species. The East Holland River itself provides habitat for Species-at-Risk (SAR).

Aquatic Habitat

One watercourse crossing is present within the Y6 study area, namely the HREB. The HREB flows through the study area in an east to west orientation and crosses Y6 under the 2nd Concession Road Bridge. The watercourse generally has a wide riparian buffer, and the surrounding land use consists of agricultural and low density residential. Upstream of the bridge, on the eastern side of the study area, the HREB has a wide floodplain consisting of mostly grasses and sedges with sparse trees. Downstream on the west side of the study area, the HREB passes through areas with higher density of trees. Downstream of the study area, the HREB continues flowing in a northwest direction for approximately 13.3 km before the confluence with the West Holland River and ultimately discharges into Lake Simcoe.

The portion of the HREB in this area is classified as having a warmwater thermal regime. Based on this fish community, the HREB is expected to support a wide diversity of primarily forage/baitfish species with some warmwater sportfish present. No redside daces have been recorded within this study area.

Terrestrial Habitat

The lands within the study area are fairly evenly split between natural areas such as wetlands and forests and anthropogenic landscapes such as agricultural lands and residential areas. The main feature of this study area is the large area of RRCA in the north. Much of the forested area in this polygon is classified as ecologically significant forest and is within East Gwillimbury's Regional Greenlands System. The landscape primarily consists of a large river valley that bottoms out along the HREB, with low density residential properties elevated on the north and south sides of the study area.

All natural and cultural communities present within the study area are considered common in the province.

Significant Wildlife Habitat

Candidate Significant Wildlife Habitat (SWH) for Region 6E as defined by the Ministry of Natural Resources and Forestry (MNRF) was identified in several Natural Areas within the study area. The greatest concentration of these candidate features is associated with the PSWs and Ecologically Significant Areas (ESAs) wetland and woodland habitats. A screening and analysis of all Ecological Land Classification (ELC) communities were completed in the study area for Seasonal Concentration Areas of Animals, Rare Vegetation Communities or Specialized Habitat for Wildlife, Habitat for Species of Conservation Concern and Animal Movement Corridors.

4.5.2.2.5 Areas of Potential Environmental Concern

A review of information from the Environmental Risk Information Services database was completed for properties located within the study area. The review was completed on May 26, 2023, to visually confirm the current land use and associated potential for containing subsurface environmental contamination. This "windshield-level" survey showed that:

– Various residential and commercial properties are present along the majority of the study area.
– Some agricultural and industrial land use are present within the study area.

Refer to Figure 4.7 for locations identified as existing known spills, as well as those identified as three risk categories of potential for existing contamination: Low, Moderate and High. Low risk locations are presented in a green circle, moderate risk in an orange circle and high risk in a red circle. We clarify that not all risk categories may be present in Figure 4.7. The number presented in the circle is a property identifier relevant to the entire York Region Sewage Works Project and not specific to the project being discussed.

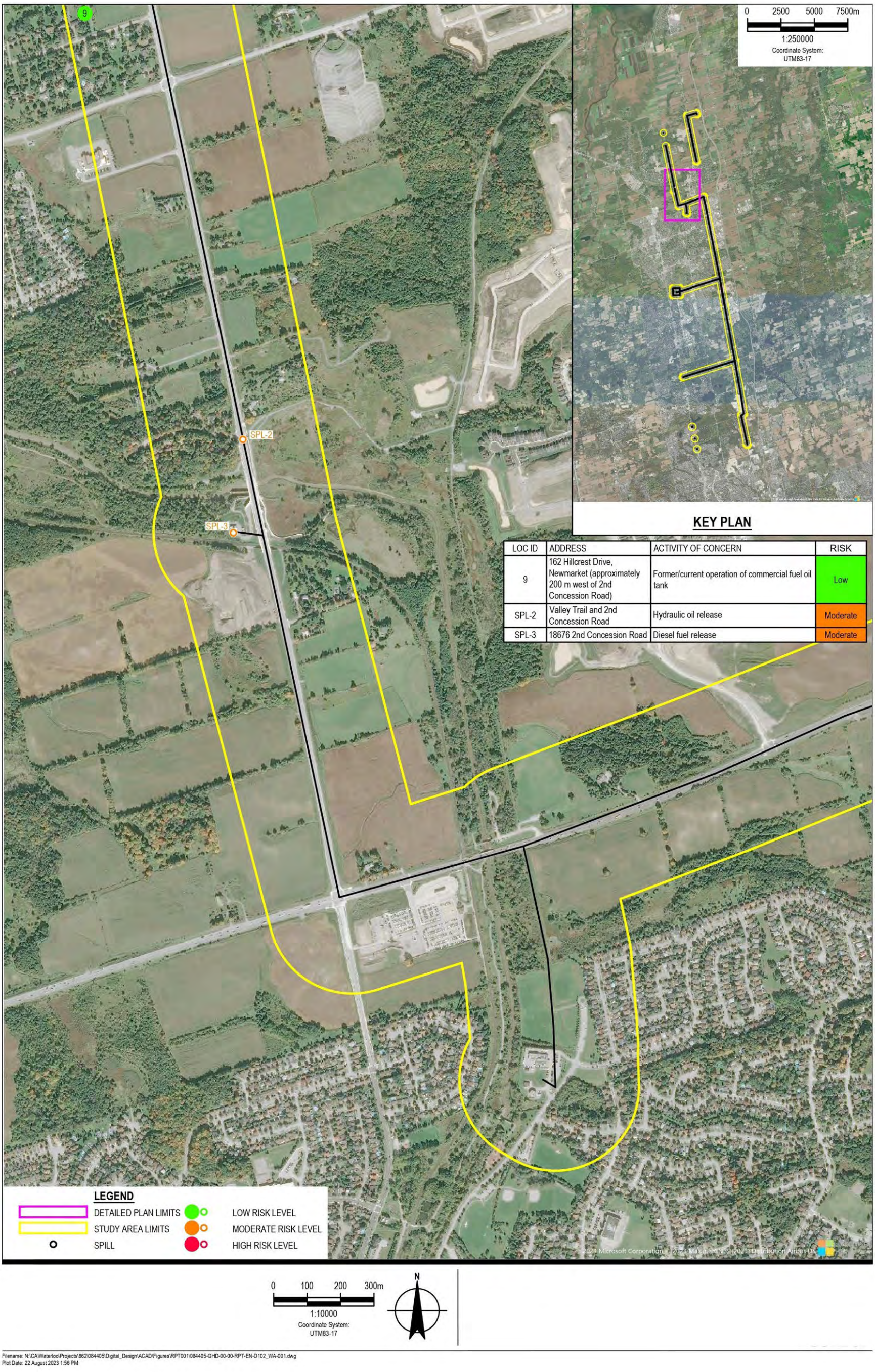


Figure 4.7 Areas of Potential Environmental Concern Within Y6 and Portions of Y12-A and Y12-B Study Areas

4.5.3 Conceptual Design

The conceptual design for the SPS upgrades was based on the design criteria, as described in Chapter 3. The following sections discuss the concept design for the 2nd Concession SPS Upgrades project. The design presented is conceptual and was developed to demonstrate proof of concept. Upon collection of further information through field investigations and in consultation with internal and external stakeholders, the designs will be further refined.

4.5.3.1 Design Basis

The required flow rate for the SPS was determined using modelling and forecasting techniques as outlined in Chapter 3. The 2nd Concession SPS facility has an existing firm design capacity of 354 L/s as defined in the current ECA.

The increasing flows over time mean that the required number of installed pumps will also increase over time.

The number of forcemains in use will also increase over time, as in the early stages the flows are not always sufficient to maintain adequate scour velocities in forcemains that have been designed and installed with the future population requirements in mind. Table 4.5 summarizes the general characteristics and features that will be present from initial construction through to final configuration.

Table 4.5 Staged Sewage Pumping Station Conceptual Design Characteristics for Y6 2nd Concession SPS Upgrade

Design aspect	2031	2041	2051	Comments
Modelled peak flow (L/s)	190	450	650	Station total flow rate target under peak event conditions.
Nominal number of pumps	2, 1 active +1 standby	3, 2 active +1 standby	3, 2 active +1 standby	Nominal number of pumps includes main pumps only. Does not include smaller pumps that may be considered during subsequent design stages to manage low-flow conditions.
Number of forcemains in service	1	2	2	Note that proposed forcemains are very short (located completely within the SPS existing site limits) discharging to the new Y12-B 2nd Concession South Gravity Sewer.
Nominal firm capacity (L/s)	350	680	680	Firm capacity is based on installed pumps in a N-1 configuration (capacity available with the largest pump out of service).

4.5.3.2 Description of Design

The 2nd Concession SPS is an existing pumping station, designed and constructed with future expansion plans and a staging approach already in mind. The station has four existing bays for pumps, including suction and discharge piping, two discharge points and supporting infrastructure (SCADA/controls, primary electrical power, air management and standby power) already existing.

The major change to the 2nd Concession SPS relates to the proposed installation of the Y12-B 2nd Concession South Gravity Sewer. The proposed change is that instead of discharging to the existing forcemain at a high head, the proposed Y12-B will permit the pumps to discharge at a much lower head locally to the gravity sewer. The result is that the proposed pumps will have lower energy consumption. The other significant change to 2nd Concession future flow forecast is that the proposed Y12-B and concurrent improvements under the Y12-A 2nd Concession North Gravity Sewer will permit the Holland Landing SPS and Queensville West SPS to discharge directly to the Y12 gravity system without being re-pumped by the 2nd Concession SPS.

As a result, the future flows being managed by the 2nd Concession SPS will be lower than the original long-term design requirements and will be pumped at a lower head than the current pumps. This means that the majority of the infrastructure and future planning is adequate for the future requirements, with some adjustments to the discharge point and the installed pumps.

The wet well is divided into two cells with two pump bays designed to draw from each and includes an inlet grinder that can hydraulically process a flow greater than the 2051 forecasts, so the inlet infrastructure to the wet well is adequately sized for future flows at conceptual level, with hydraulic profile to be confirmed during detailed design.

The pumps currently installed are dry-pit submersible style since the station below-grade infrastructure is designed with a separate wet-well/dry well configuration. Detailed design will determine whether the use of smaller pumps to manage low flow conditions small (jockey) pumps is desirable from either an operational flexibility or energy management perspective, but for conceptual level design, currently available pumps were sourced to meet the anticipated flow and head demands.

Table 4.6 describes relevant design aspects for the 2nd Concession SPS upgrades.

Table 4.6 General Sewage Pumping Station Conceptual Design Characteristics for SPS Project Y6 2nd Concession SPS Upgrades

Design aspect	Value	Comments
Above-grade anticipated footprint of buildings and infrastructure	No change	No modifications are planned to existing system at conceptual level.
Overflow control/location	To Y12-B	The existing emergency overflow to the East Holland River may be left in place pending detailed design, but the primary overflow is proposed to be directed instead to discharge to the Y12-B Gravity Sewer as the hydraulics of detailed design permits.
Discharge forcemain diameter	2 x 600-mm nominal diameter within station	New header will be installed generally following original planning and layout, including discharge to the buried sections external to the SPS.
Power supply	600-V primary power transformer	No modifications are planned to existing system at conceptual level.
Standby power capability	600-V diesel generator	Includes existing on-site fuel storage. No modifications are planned to existing system at conceptual level.
Air management	Included	No modifications are planned to existing system at conceptual level.
Surge management	Surge relief valves	New surge valves are anticipated to be added to new header during detailed design stage.

4.5.3.3 Construction Methods

Work for the 2nd Concession SPS Upgrade is focused within the existing building footprint and on-site yard piping.

External yard works include the proposed new overflow to Y12-B which is anticipated to be relatively shallow open cut excavation, as will the proposed modifications to the yard piping to divert the pumped discharge to the Y12-B 2nd Concession South Gravity Sewer.

Staging and programming will be considered during detailed design, but the existing infrastructure includes four pump bays (only two of which are currently in use) and provision for a separate discharge header that was originally intended for future flows being pumped north, so it is anticipated that staging will be manageable without significant bypass pumping/planning or temporary systems.

4.5.3.4 Property Requirements

Temporary property easements may be required for construction compounds for staging and storage, as well as traffic management at 2nd Concession depending on the final design requirements.

Permanent property requirements for the SPS are not anticipated to change based on the SPS upgrade portion of the work.

4.5.4 Environmental and Community Impacts and Mitigation

Desktop studies were done to determine the possible extent of potential impacts and to propose mitigation measures that would reduce the likelihood and the consequences should they occur. The major impacts and associated mitigation approaches are described in this section. The assessment criteria and indicators are provided in Table 4.7 and Table 4.8, corresponding to each of the environments (social and built, natural, cultural and traffic impacts) together with a potential effects assessment and identification of avoidance, mitigation and compensation measures for the project.

Table 4.7 Y6 2nd Concession SPS Upgrades Social and Built Environment Effects and Mitigation

Item no.	Criteria	Indicators	Potential effects (Positive/Negative)	Avoidance/Mitigation/Compensation
Social and built environment				
SB-1	Effect on existing views	– Changes are predicted in views from residences in the surrounding area	– No change in existing views from residences in the surrounding area.	– No avoidance, mitigation, or compensation measures required.
SB-2	Effect on existing residences, businesses and/or community, institutional and recreational facilities	– Displacement of residences, businesses and other facilities is too great – Temporary or permanent disruption to residences, businesses and other facilities near construction compounds or permanent works is too great	– No displacement of residences, businesses, or community, institutional and recreational facilities is anticipated. – Disruption to residences, businesses and community, institutional and recreational facilities in proximity to construction compounds/permanent installations.	– No avoidance, mitigation, or compensation measures are anticipated. However, if in fact displacement is required then York Region would provide market value compensation. – Apply standard construction-related mitigation measures to minimize the disruption effects.
Traffic and transportation				
TT-1	Effect on existing rail/bridge infrastructure	– One or more of rail crossings or large infrastructure impacted	– The SPS working compound will be within the CNR/Metrolinx rail crossing the right-of-way (ROW) north of Green Lane East.	– Coordination with CNR and Metrolinx during design development to limit impacts to their services.
TT-2	Effect on traffic	– Traffic flows are disrupted too much – Construction occurs too close to congested traffic zones	– The project will potentially occupy the first lane of traffic on 2nd Concession Road between Green Lane East and Mount Albert Road to allow for trucks to unload and load in this dedicated construction traffic lane. – Traffic movement in to and out of construction compound sites will impact pedestrian, cycling and traffic flow on 2nd Concession Road. – Impacts to public transit involving potential rerouting of buses and/or relocation of stops. – Coordination of alternate routing for emergency service vehicles, if needed.	– Where possible, maintain one lane in each direction. This could be achieved through flagging, temporary signals or temporary road widening. – Pedestrian movement should be maintained during construction, with marked pedestrian detours as applicable. – Consider special traffic arrangements for peak hours should be considered in traffic flow directions in the morning and afternoon. – Make special provisions for emergency service vehicle access. – Make special provisions for pedestrian traffic and safety, including signals, detours and winter maintenance. If feasible, move construction traffic to sideroads.
Utilities				
U-1	Conflict with buried utilities	– Excavation work (if any) is in direct conflict or falls within clearance limits of nearby utilities	– New construction for sewer connections impacts existing utilities and requires design coordination with utility owners which increases project cost and schedule.	– Review historic and as-built documents for utility data. – Complete a subsurface utility engineering (SUE) investigation to identify high risk utilities, including large and/or critical service utilities (e.g., large watermains and all gas mains). – If required, relocate existing utility or move proposed excavation to mitigate conflict.
U-2	Conflict with surface or overhead utilities	– Working compound equipment including cranes will require working directly under overhead utilities or within the hydro wire exclusion zone	– Overhead infrastructure such as electrical or communications cabling is mounted on utility poles between 5 and 12 m above the surface. Depending on the required crane size and operating radius to construct the shaft equipment extents may fall within hydro line exclusion zone or hit overhead wires causing worker harm or death.	– Working compounds will be designed to allow appropriate and safe movement of workers and equipment around the site, away from live overhead wires or surface utility boxes, based on known utility information and topographic surveys. – If required, relocate existing utility or move proposed excavation to mitigate conflict.
Noise and vibration				
N-1	Operation noise	– Complaints from residents within study area	– Noise disruptions to private residents and commercial areas post-construction, near SPS locations or upgrades.	– Any permanent facility, such as new SPS, SPS upgrades, or supporting air management facilities, will require an Environmental Compliance Approval (ECA) application under Section 9 of the Environmental Protection Act to document the noise emissions compliance. – Investigate degree of risk and impact in further detail.
N-2	Construction noise	– Complaints from residents within study area	– Noise disruptions to private residents and commercial areas during construction, near construction compounds for new SPS or existing SPS upgrades.	– Propose construction noise monitoring per MECP NPC-115 Construction Equipment requirements. – Consider completing noise monitoring for the duration of the construction and notify the contractor of any exceedances so that corrective action/contingency actions can be implemented. – Use vehicles and equipment (cranes and excavators) with efficient muffling devices or construct enclosures. – Construction to comply with local noise by-laws.
V-1	Construction vibration	– Complaints from residents within study area	– Disruptions to private residents and commercial areas during construction, near construction compounds for new SPS or existing SPS upgrades.	– Propose appropriate construction vibration benchmarks within the tender document. – Consider pre- and post-construction condition photos.

Item no.	Criteria	Indicators	Potential effects (Positive/Negative)	Avoidance/Mitigation/Compensation
Air management				
O-1	Operation odour at SPS and existing or proposed sewer connection	– Odour near SPS and surface connections	– There is potential for odour release due to turbulence at the existing (or upgraded) SPS and at the connections from sewer to SPS.	– Consider implementation of ventilation design systems with odour control.
O-2	Construction odour	– Complaints are received from residents within the study area	– During live connection of infrastructure, there is the potential for odour release.	– Advance notification to residents, advising them of what work is being completed and the duration of the work.
A-1	Construction dust at SPS location	– Fugitive dust is generated. – Poor air quality	– Fugitive dust is generated during construction (or upgrades) of SPS and related infrastructure.	– Develop a Dust Best Management Practices Plan (BMPP) to be included in the project Construction Management Plan. – Mitigation should be aimed at minimizing emissions of particulate matter and exposure to particulate matter during the construction phase of the project.

Table 4.8 Y6 2nd Concession SPS Upgrades Natural Environment Effects and Mitigation

Item no.	Criteria	Indicators	Potential effects (Positive/Negative)	Avoidance/Mitigation/Compensation
Hydrogeology				
N-1	Effect on groundwater quantity	– Temporary and/or long-term changes in groundwater quantity	– Temporary decrease in groundwater quantity could occur during construction activities depending on the location, depth and construction, methodology and duration. A high groundwater table/hydrostatic groundwater pressure would be expected due to existing soils and anticipated presence of the ORM aquifer. – Potential long-term change in groundwater quantity during operation of the gravity sewer. – Potential effects on groundwater water quality as a result of potential mobilization of contaminated water where active dewatering/depressurization is required. – Reduction in groundwater quality from spills or the mismanagement of fuel/chemical in work areas. – Reduction in groundwater quantity resulting in impact to other groundwater users (private well impacts). – Change in groundwater-surface water interaction (reversal of vertical hydraulic gradient) results in impact to terrestrial and aquatic habitat and associated SAR (where applicable) – reduction in baseflow. – The potential reduction in baseflow from a stream reach that intersects an aquifer in which the water taking is occurring. – Potential ground settlement as a result of active dewatering/depressurization. – Change in shallow groundwater flow patterns resulting from operation of sewer pipe resulting from increased inflow and infiltration (I&I) and/or preferential movement of groundwater within trench sediments.	– Implement construction methods that minimize dewatering requirements for open cut yard piping. – Establish pre-construction baseline groundwater quality and quantity conditions and develop implementation plans for monitoring during and post-construction (install and monitor wells and surface water).
N-2	Effect on groundwater quality	– Temporary and/or long-term change in groundwater quality	– Temporary change in groundwater quality is not anticipated because construction is anticipated to intersect low permeability till. – Potential effects on groundwater water quality as a result of potential mobilization of contaminated water where active dewatering/depressurization is required. – Reduction in groundwater quality from spills or the mismanagement of fuel/chemical in work areas.	– During design, complete a contaminant source investigation to mitigate the risk of drawing contamination from one source to another location. – Develop and implement a spills response plan for construction to mitigate the effect of a spill should one occur. – Establish pre-construction baseline groundwater quality and quantity conditions and develop implementation plans for monitoring during and post-construction (Install and monitor wells and surface water).

Item no.	Criteria	Indicators	Potential effects (Positive/Negative)	Avoidance/Mitigation/Compensation
N-3	Effect on surface water quantity/quality	– Temporary changes in surface water	– Temporary change in surface water quantity/quality is not anticipated because temporary water takings are not anticipated to be required for facility upgrades. – A high groundwater table resulting in groundwater/surface water interaction would be expected due to existing soils and anticipated presence of the ORM aquifer. – Snapping turtles present within study area.	– Field verification of groundwater-surface water interaction suggested for watercourses and wetlands within the study area. – Complete outlet receiver assessment(s) should temporary groundwater discharge be required to surface water. Establish pre-construction baseline surface water quality and quantity conditions and develop implementation plans for monitoring during and post-construction. – Implement/construct treatment (i.e., settlement tanks, etc.) of construction water prior to discharge to storm sewer/surface water. – Minimize construction area disturbance and duration. Implement erosion and sedimentation control measures (e.g., silt fencing, check dams, etc.). – Adhere to fish timing windows to prevent negative impacts on known sensitive fish species within the study area. – Consider completing a geomorphology study during design. – Refer to the Natural Heritage section of the table for further mitigation approaches associated with surface water impacts.
Areas of Potential Environmental Concern				
C-1	Moderate risk contamination	– An area of potential environmental concern is located within or immediately adjacent to the project ROW – Moderate potential for contaminants to be present within the area of potential environmental concern – Moderate potential for contaminants to be present in soil and/or groundwater or there is evidence that contaminants are present – Migration, exposure pathways and/or receptors may be present; and/or – Impacts would need to be assessed and addressed prior to acquisition, design and/or construction	– York Region SPS (18676 2nd Concession Road): 20 litres of diesel fuel released to the ground in 2021. Potential for contaminants of concern (COCs) (petroleum hydrocarbons [PHCs] and benzene, toluene, ethylbenzene and xylenes [BTEX]).	– Advance boreholes as part of the detail design of the proposed improvements, should be placed in the vicinity of the areas of potential environmental concern having moderate risk, to assess for potential subsurface impacts that may affect the proposed construction work. Soil samples should be collected from these boreholes for laboratory analysis of metals and inorganics (including EC and SAR), PHCs, BTEX and volatile organic compounds (VOCs).
Natural heritage				
EG-1	Effect on aquatic habitat or functions	– Watercourses within the study area support a warmwater thermal regime – A large evaluated non-PSW within the study area	– Temporary or permanent loss of aquatic features or categorical loss of functions by type, including PSWs, Locally Significant Wetlands, watercourses by sensitivity type and others. – During construction water quality may be impaired due to elevated total suspended solids (TSS) in surface water runoff from study area locations which can affect aquatic species/habitats. Some concentrations above background may occur temporarily. – Change in surface water temperature from groundwater taking and/or discharge to surface water features. – Potential spill hazard when refuelling equipment.	– Complete site investigations to evaluate potential effects on aquatic habitat function. – Implement best management practices to control surface water runoff and minimize TSS effects. – Where feasible, discharging of surface water during construction should be directed into the municipal storm sewer system to mitigate thermal impacts to watercourses. Should discharge of surface waters be directed to watercourses, additional mitigation measures would need to be adhered to (e.g., enhanced erosion and control measures, water quality guidelines). – Use of erosion and sediment control measures and timing of construction to avoid spawning and egg incubation periods will reduce the potential for effect to fish and aquatic life. – Conduct equipment maintenance and refuelling at the designated and properly contained maintenance areas or at industrial garages located well away from creek banks and wetlands and outside vegetation areas. – Specify a Spills Prevention Plan be prepared and followed.
EG-2	Effect on stream geomorphology	– Watercourses present within the study area	– Change in geomorphic form/function/stability in affected channels.	– Use of erosion and sediment control measures to avoid sedimentation into the stream. – Consider completing a geomorphology study during design, where applicable.

Item no.	Criteria	Indicators	Potential effects (Positive/Negative)	Avoidance/Mitigation/Compensation
EG-3	Effect on aquatic species including SAR, species of local concern, native species and invasive species	– Aquatic species	– Number and type of aquatic species potentially affected temporarily or permanently. – No anticipated impacts to aquatic SAR as there are no aquatic SAR identified within the study area.	– Preventing death of fish or impacts to downstream fish habitat through the use of appropriate timing windows.
EG-4	Effect on terrestrial habitat or functions	– Study area contains ecologically significant forests – Wildlife habitat	– Temporary or permanent loss of natural heritage features (e.g., ESAs, Area of Natural and Scientific Interest [ANSIs], wildlife corridors and others). – Potential effects on terrestrial habitat (e.g., direct vegetation (and wildlife habitat) loss, alteration and fragmentation) may occur from the physical footprint of study area locations. – Project preparation, construction and operation may increase the risk of nest destruction and mortality of migratory birds.	– Site investigations to evaluate potential terrestrial habitat function/significance. – During design, prepare construction constraints with consideration of timing windows to mitigate where possible, vegetation clearing to occur outside of the migratory bird nesting season, bat maternity roosting season, turtle overwintering and amphibian breeding. – Limit the area of project footprint and limit disturbance during construction and operations phases. – The presence of wildlife will be monitored and communicated to site personnel. – Vehicle use will be restricted to designated areas. – Where practical, rehabilitate habitat for plants and wildlife.
EG-5	Effect on terrestrial species, including SAR, species of local concern, native species, invasive species and area-sensitive species	– SAR have the potential to occur within the study areas, including amphibians, insects, birds, reptiles, mammals and tree species	– Number and type of terrestrial species potentially affected temporarily or permanently. – Construction activities have the potential to disturb wildlife within adjacent natural heritage areas. – Project preparation, construction and operation may increase the risk of nest/habitat destruction and mortality of terrestrial SAR. – Project may result in wildlife-vehicle collisions and may cause injury/mortality to individual animals.	– Site investigations to evaluate potential occurrence of terrestrial SAR within the study area. – During design, prepare construction constraints with consideration of timing windows to mitigate where possible, vegetation clearing to occur outside of the migratory bird nesting season, bat maternity roosting season, turtle overwintering and amphibian breeding. – Clearly demarcate work limits at outset of construction and minimize unnecessary vegetation clearing.

4.6 Y7 Queensville West SPS Upgrades

4.6.1 Study Area

The Queensville West SPS is located at 20287 2nd Concession Road and receives flows from the local collection systems. The flow is currently pumped from Queensville West SPS via existing forcemain to a high point in the vicinity of Doane Road and 2nd Concession Road intersection where the forcemain discharges to an existing gravity sewer, which then conveys the flow by gravity to the 2nd Concession SPS.

With the proposed improvements the flow from Holland Landing SPS and Queensville West SPS will no longer be received and re-pumped by 2nd Concession SPS under normal operation. Instead, the flows pumped from Queensville West SPS will discharge to the Y12-A 2nd Concession North Gravity Sewer which will then flow directly into the Y12-B 2nd Concession South Gravity Sewer.

The high point will remain at the new discharge into Y12-A, which will also be located in the vicinity of the intersection of Doane Road and 2nd Concession Road, so the anticipated head requirements will remain similar to the existing design.

The proposed permanent modifications to the facility are not anticipated to extend beyond the existing property limits, but temporary easements or mitigation impacts or requirements may extend onto or impact. A study area of approximately 200 metres surrounding the existing pumping station was applied as summarized in Figure 4.8.

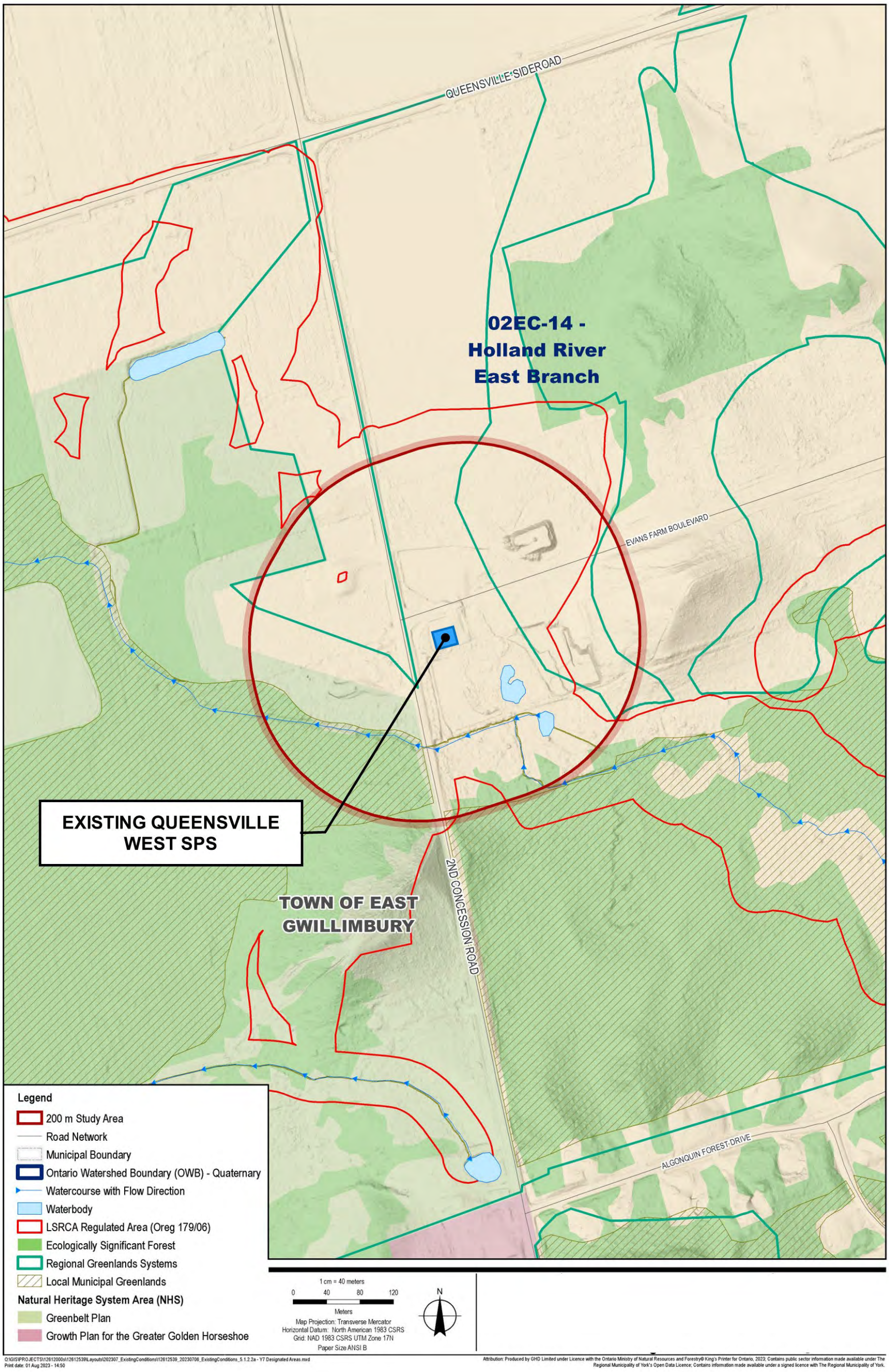


Figure 4.8 **Study Area for Y7 Queensville West SPS Upgrades**

4.6.2 Existing Conditions

4.6.2.1 Social and Built Environment

The following sections will summarize the findings of the desktop studies completed within the study area, including planning and land use, traffic and transportation and utilities.

4.6.2.1.1 Planning Policy and Land Use

Existing Land Use

Land use within the study area consists of the following:

– Low density residential housing (west of 2nd Concession Road)
– Agricultural lands (northwest and northeast of the SPS).

Relevant Planning Policy

Provincial

A portion of the study area west of 2nd Concession Road is outside the settlement area and within the Greenbelt Protected Countryside.

Regional

The York Region Official Plan 2022 (June 2023 Office Consolidation) designates lands within the study area east of 2nd Concession Road as Community Area, while lands west of 2nd Concession Road are part of the agricultural areas. Lands in the southern portion of the study area are part of York Region's Greenlands System.

Local

The East Gwillimbury Official Plan 2010 (2018 Office Consolidation) designates the lands in the study area as follows:

– Lands east of 2nd Concession Road are within the Queensville Secondary Plan Area and are designated as Low Density Residential, with some Environmental Protection Areas south of Evans Farm Boulevard
– Lands west of 2nd Concession Road are designated Agricultural/Term Growth and Environmental Protection Area (Greenbelt Protected Countryside).

Active Development Applications

Existing property use has been described using the following data available to GHD:

– Orthographic Imagery from spring 2022
– Google Earth images
– Farm Tax Program data from 2023 tax year
– Property assessment type via GeoWarehouse (accessed August 2023).

Lands within the Y7 study area do not contain active development applications.

4.6.2.1.2 Transportation in the Study Area

2nd Concession Road is a one-lane rural road with gravel shoulders as shown in Figure 4.9.

Figure 4.9 **2nd Concession Road Looking North Towards Existing Queensville SPS and Queensville Sideroad. (*Google Maps* "Streetview," digital images http://maps.google.com)**

The AADT along 2nd Concession Road between Mount Albert Road and Hillcrest Drive has been counted as 4,615 south of the proposed SPS upgrade location, based on the latest available 2023 data. Historical AADT data along the study area are presented in Table 4.9.

Table 4.9 **2nd Concession Road AADT Counts Between Mount Albert Road and Hillcrest Drive**

Description of road limits	2012	2014	2019	2023
Mount Albert Road and Hillcrest Drive	5,880	3,744	3,833	4,615

There are no pedestrian, rail or bus public transit routes running along or crossing 2nd Concession Road within the study area.

4.6.2.1.3 Utilities in the Study Area

There are several above/below grade utilities situated within the study area corridor and in the vicinity of the proposed project. However, we clarify that the works completed will be limited to the extents of the existing Queensville SPS, therefore, minor or no impacts are anticipated to nearby utilities. For any utilities which are identified to be temporarily impacted during the construction of the SPS upgrades, formal notification and consent would be required from the authorities responsible for these utilities prior to construction.

Known municipal infrastructure that existed on York Region's GIS database has been provided within the drawing set. A detailed utility investigation program, which would include a "Level A through D" subsurface utility exploration, would be required as part of future site investigations.

4.6.2.2 Natural Environment

The following sections will summarize the findings of the desktop studies completed within the study area for: geotechnical, hydrogeology, surface water, natural heritage and contamination.

4.6.2.2.1 Geotechnical

The study area for Y7 is bordered by a residential property to the north and a forested area in all other directions, within the boundaries of the Town of East Gwillimbury.

No site-specific reports or borehole record were encountered within the study area.

Based on the Quaternary geology mapping, the near surface soils within the study area are predominantly comprised of non-cohesive and frequently granular deposits in general. Mapped deposits of sand, gravelly sand and gravel, nearshore and beach deposit, mostly consisting of lacustrine deposits comprise most of the study area. The eastern portion of the study area mostly consists of non-cohesive Newmarket Till deposit.

The bedrock consists of limestone, dolostone, shale, arkose, sandstone Ottawa Group/Simcoe Group. Typically, bedrock is mapped at depths of 67 to 82 mbgs within the study area and will not be reached during construction.

4.6.2.2.2 Hydrogeological

A hydrogeological desktop review was undertaken within the study area using information from MECP well records, the MECP Source Protection Information Atlas, the ORM database and the Ontario Geological Survey database. Available hydrogeological reports for projects within the area were also reviewed.

The study area is for Y7 is located within the Simcoe Lowlands physiographic region, on the border between Clay Plans and Till Plains. The SPS upgrades are anticipated to be within the existing site and are not expected to involve construction excavations below the water table. The study area is near a vulnerable aquifer, within Intake Protection Zone 3 and near a WHPA. The water table is approximately 6 mbgs. Shallow groundwater flows to northwest/west. Location is downgradient from WHPA and vulnerable aquifer.

There are two historic private water supply wells are located within the Y7 study area. It is unknown if they are still in use.

Refer to Table 4.10 regarding details on anticipated aquifers and aquitards within the study area.

Table 4.10 Aquifers and Aquitards Through the Y7 Study Area

Aquifers and aquitards	Description	Thickness
Newmarket Till (Aquitard)	A continuous layer that acts as an aquitard to the underlying Thorncliffe Formation.	Generally, 26 m
Thorncliffe Formation (Aquifer)	Regionally recognized as a highly productive confined aquifer and is laterally continuous.	Generally, 23
Sunnybrook Drift (Lower aquitard)	A continuous layer that acts as an aquitard to the underlying Scarborough Formation.	Generally, 9 m
Scarborough Formation (Lower aquitard)	A confined aquifer that is discontinuous and appears to consist of channel fill deposits that roughly dip to the east.	Generally, 48 m

4.6.2.2.3 Surface Water

There is one sub-watershed within the study area: The HREB. A stream and pond located less than 100 m to the south.

Other surface features of interest include:

– Unnamed tributary of the HREB.

Refer to Figure 4.10 for a surface water map of existing conditions within the study area.

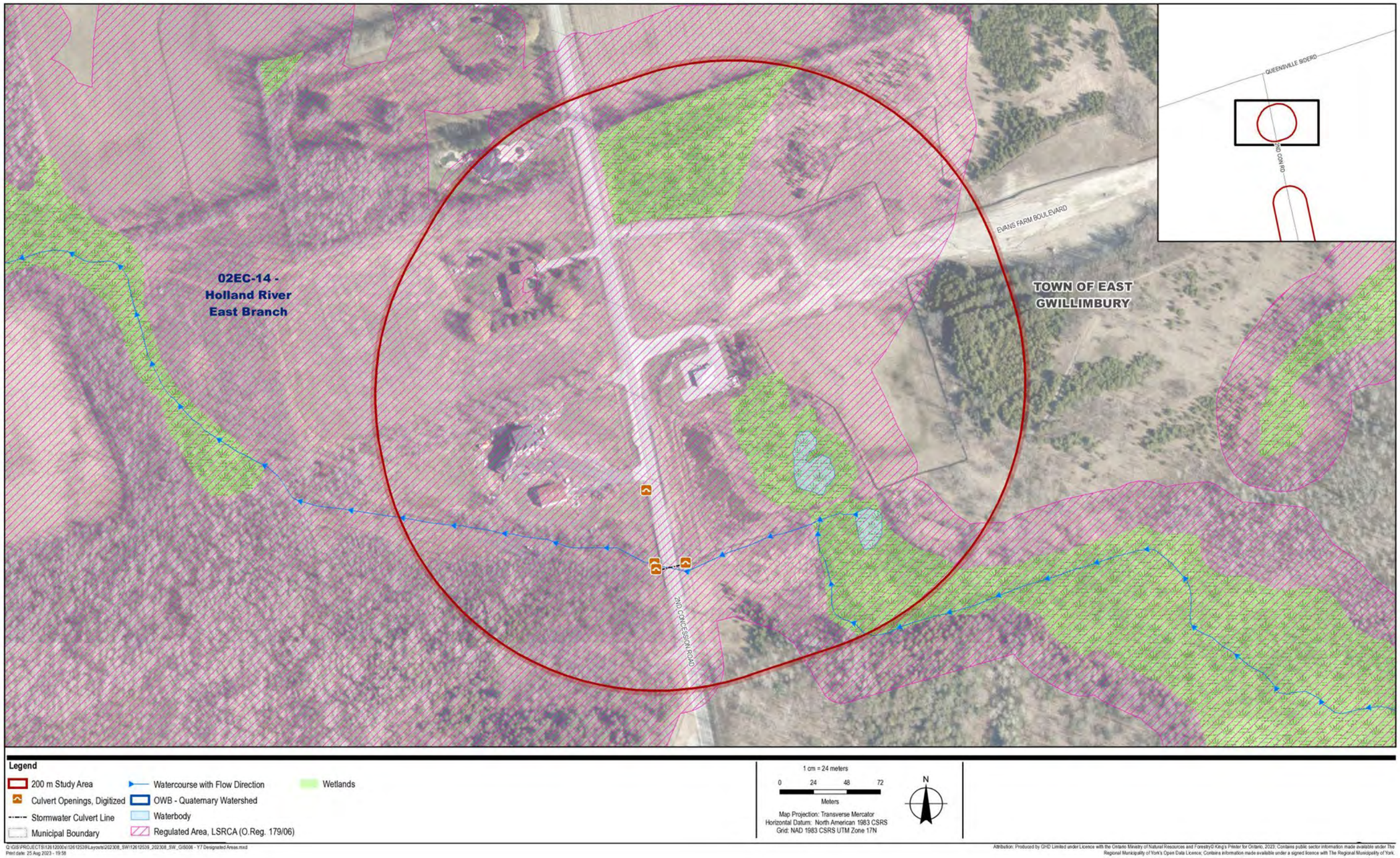


Figure 4.10 Y7 Study Area Surface Water Map for Existing Conditions

4.6.2.2.4 Natural Heritage Characterization

The study area contains forests, unevaluated wetlands and a warmwater tributary of the HREB.

The southwestern portion of the Y7 study area, which is approximately 18% of the total study area, contains deer overwintering habitat classified as Stratum 2. Deer wintering habitats are classified as Stratum 1 (core habitat critical for survival) and Stratum 2 (adjacent mixed forest browse area). Stratum 2 habitat usually surrounds Stratum 1 habitat and includes deciduous or mixed forests with plentiful shrubs and small trees, which serve as a source of food.

The southwestern portion of the Y7 study area is also designated as Protected Countryside under the Greenbelt Plan.

Aquatic Habitat

One watercourse crossing is present within the Y7 study area. An unnamed tributary to the HREB crosses 2nd Concession Road approximately 150 m south of the Queensville West SPS through a double corrugated steel pipe (CSP) culvert. The watercourse has a wide riparian buffer and surrounding land use consists of primarily agricultural land, naturalized woodlots and some low-density residential properties. The upstream reach, east of 2nd Concession Road, flows through marshland which contains standing open water that contributes flow to the watercourse. The watercourse is surrounded by a combination of dense deciduous trees with sedges and open meadows where grasses are the predominant vegetation type. Downstream of Y7, the watercourse flows westwards for approximately 2.5 km prior to the confluence with the HREB and ultimately discharges into Lake Simcoe.

The unnamed tributary to the HREB is classified as having a warmwater thermal regime. Based on this fish community, the unnamed tributary to the HREB is expected to support primarily forage/baitfish species with limited sportfish present. No redside dace have been recorded within this study area.

Terrestrial Habitat

Lands in the study area consist mainly of low density residential and wetland communities, with portions of the east side of the study area currently in the process of being built into a housing development. This study area mainly consists of larger wetlands (i.e., swamp and marsh) and forested areas in its southern half, which extend outside of the study area as part of large natural systems with potentially valuable habitat.

All natural and cultural communities present within the study area are considered common in the province.

Significant Wildlife Habitat

Candidate SWH for Region 6E as defined by MNRF has been identified in several natural areas within the study area. The greatest concentration of these potentials is likely to be found in wetland and woodland habitats associated with the PSWs and ESAs. A screening and analysis of all ELC communities was completed in the study area for Seasonal Concentration Areas of Animals, Rare Vegetation Communities or Specialized Habitat for Wildlife, Habitat for Species of Conservation Concern and Animal Movement Corridors.

4.6.2.2.5 Areas of Potential Environmental Concern

A review of information from the Environmental Risk Information Services database was completed for properties located within the study area. The review was completed on May 26, 2023, to visually confirm the current land use and associated potential for containing subsurface environmental contamination. This “windshield-level” survey showed that:

– Various residential and commercial properties are present along the majority of the study area.
– Some agricultural and Industrial land use are present within the study area.

No areas of at-risk of existing contamination were identified for this study area.

4.6.3 Conceptual Design

The conceptual design for the SPS upgrades was based on the design criteria, as described in Chapter 3. The following sections discuss the concept design for the Queensville West SPS Upgrades project. The design presented is conceptual and was developed to demonstrate proof of concept. Upon collection of further information through field investigations and in consultation with internal and external stakeholders, the designs will be further refined.

4.6.3.1 Design Basis

The required flow rate for the SPS was determined using modelling and forecasting techniques as outlined in Chapter 3. The Queensville West SPS facility has an existing firm design capacity of 99 L/s as defined in the current ECA.

The increasing flows over time mean that the required number of installed pumps will also increase over time. The number of forcemains in use will also increase over time, as in the early stages the flows are not always sufficient to maintain adequate scour velocities in forcemains that have been designed and installed with the future population requirements in mind. Table 4.11 summarizes the general characteristics and features that will be present from initial construction through to final configuration.

Table 4.11 Staged Sewage Pumping Station Conceptual Design Characteristics for Y7 Queensville West SPS Upgrade

Design aspect	2031	2041	2051	Comments
Modelled peak flow (L/s)	100	140	300	Station total flow rate target under peak event conditions.
Nominal number of pumps	2, 1 active +1 standby	3, 2 active +1 standby	4, 3 active +1 standby	Nominal number of pumps includes main pumps only. Does not include smaller pumps that may be considered during subsequent design stages to manage low-flow conditions.
Number of discharge forcemains in service	1	1	2	
Nominal firm capacity (L/s)	105	172	300	Firm capacity is based on installed pumps with N-1 configuration (capacity available with 1 largest pump out of service).

4.6.3.2 Description of Design

The Queensville West SPS is an existing pumping station, designed and constructed with future expansion plans and a staging approach already in mind. The station has four existing bays for pumps, including suction and discharge piping, two discharge points and supporting infrastructure (SCADA/controls, primary electrical power, air management and standby power) already existing.

The major change to the Queensville West SPS relates to the proposed installation of the Y12-A 2nd Concession North Gravity Sewer. The proposed change is that instead of discharging to the common/existing gravity sewer at Doane Road, the proposed Y12-A will convey the flow in a separate, dedicated gravity sewer directly to Y12-B 2nd Concession North Gravity Sewer. This will eliminate the double-pumping at 2nd Concession SPS and will free up space in the gravity sewer that runs from Doane Road to the 2nd Concession SPS along 2nd Concession Road for local collection.

Since the discharge point is a similar elevation also to a gravity sewer system, the future flows being managed by the Queensville West SPS will be pumped at a similar head to the original intent. This means that the majority of the infrastructure and future planning is adequate for the future requirements, with some adjustments to the discharge point and the installed pumps.

The wet well is divided into two cells with two pump bays designed to draw from each, and the wet will includes an inlet grinder that can hydraulically process a flow greater than the 2051 forecasts, so the inlet infrastructure to the wet well is adequately sized for future flows at conceptual level, with hydraulic profile to be confirmed during detailed design.

The pumps currently installed are dry-pit submersibles style since the station below-grade infrastructure is designed with a separate wet-well/dry well configuration. Detailed design will determine whether the use of smaller pumps to manage low flow conditions small (jockey) pumps is desirable from either an operational flexibility or energy management perspective, but at a conceptual level, currently available pumps have been sourced that will meet the anticipated flow and head demands.

There are proposed changes to local/yard piping at 2nd Concession SPS to permit the redirection of the flow to/through the Y12-A 2nd Concession North Gravity Sewer via existing infrastructure. This includes excavation between the SPS site and existing buried infrastructure within the 2nd Concession Road alignment.

Table 4.12 describes relevant design aspects for the Queensville West SPS Upgrades.

Table 4.12 General Sewage Pumping Station Conceptual Design Characteristics for SPS Project Y7 Queensville West SPS Upgrades

Design aspect	Value	Comments
Above-grade anticipated footprint of buildings and infrastructure	Same as existing	Construction included plans for improvements within the existing building footprint. Yard works will be fully below grade once completed.
Overflow control/location	No change	No modifications are planned to existing system at conceptual level.
Discharge forcemain diameter	2 x 350-mm nominal diameter	No modifications are planned to existing system at conceptual level.
Power supply	600-V primary power transformer	No change or modifications are planned to existing system at conceptual level.
Standby power capability	600-V diesel generator	No modifications are planned to existing system at conceptual level.
Air management	Included	No modifications are planned to existing system at conceptual level.
Surge management	Surge relief valves	No modifications are planned to existing system at conceptual level.

4.6.3.3 Construction Methods

Work for the Queensville West SPS Upgrade are focused within the existing building footprint and on-site yard piping.

External yard works include the work to connect to existing buried infrastructure (forcemains). Existing forcemains will convey flow to the new discharge point at Y12-A in the area around the intersection of Doane Road and 2nd Concession Road, but no work is anticipated for this scope outside of the work within the 2nd Concession Road alignment in the immediate west of the SPS property.

Staging and programming will be considered during detailed design, but the existing infrastructure includes four pump bays and two discharge headers, including isolation valves so it is anticipated that staging will be manageable without significant bypass pumping/planning or temporary systems.

4.6.3.4 Property Requirements

Temporary property easements may be required for construction compounds for staging and storage, as well as traffic management at 2nd Concession Road depending on the final general contractor requirements.

The work with the 2nd Concession Road alignment near the entrance to the Queensville West SPS property will require temporary easements and permits to be obtained.

Permanent property requirements for the SPS are not anticipated to change based on the SPS Upgrade portion of the works.

4.6.4 Environmental and Community Impacts and Mitigation

Desktop studies were done to determine the possible extent of potential impacts and to propose mitigation measures that would reduce the likelihood and the consequences should they occur. The major impacts and associated mitigation approaches are described in this section. The assessment criteria and indicators are provided in Table 4.13 and Table 4.14, corresponding to each of the environments (social and built, natural, cultural and traffic impacts) together with a potential effects assessment and identification of avoidance, mitigation and compensation measures for the project.

Table 4.13 Y7 Queensville West SPS Upgrades Social and Built Environment Effects and Mitigation

Item no.	Criteria	Indicators	Potential effects (Positive/Negative)	Avoidance/Mitigation/Compensation
Social and built environment				
SB-1	Effect on existing views	– Changes are predicted in views from residences in the surrounding area	– No change in existing views from residences in the surrounding area.	– No avoidance, mitigation, or compensation measures required.
SB-2	Effect on existing residences, businesses and/or community, institutional and recreational facilities	– Displacement of residences, businesses and other facilities is too great – Temporary or permanent disruption to residences, businesses and other facilities near construction compounds or permanent works is too great	– No displacement of residences, businesses, or community, institutional and recreational facilities is anticipated. – Disruption to residences, businesses and community, institutional and recreational facilities in proximity to construction compounds/ permanent installations.	– No avoidance, mitigation, or compensation measures are anticipated. However, if in fact displacement is required then York Region would provide market value compensation. – Apply standard construction-related mitigation measures to minimize the disruption effects.
Traffic and transportation				
TT-1	Effect on traffic	– Traffic flows are disrupted too much – Construction occurs too close to congested traffic zones	– The project may occupy the shoulder lane of traffic on 2nd Concession Road between Queensville Sideroad and Algonquin Forest Drive to allow for trucks to unload and load. – This project will also require lane closures for installation of the new connections to existing infrastructure within the 2nd Concession roadway alignment. – Traffic movement in to and out of Construction compound sites will impact traffic flow on 2nd Concession Road, south of Queensville Sideroad. – Coordination of alternate routing for emergency service vehicles, if needed.	– Where possible, maintain one lane in each direction. This could be achieved through flagging, temporary signals or temporary road widening. – Pedestrian movement should be maintained during construction, with marked pedestrian detours as applicable. – Consider special traffic arrangements for peak hours should be considered in traffic flow directions in the morning and afternoon. – Make special provisions for emergency service vehicle access. – Make special provisions for pedestrian traffic and safety, including signals, detours and winter maintenance. If feasible, move construction traffic to sideroads.
Utilities				
U-1	Conflict with buried utilities	– Excavation work is in direct conflict or falls within clearance limits of nearby utilities	– New construction for sewer connections impacts existing utilities and requires design coordination with utility owners which increases project cost and schedule.	– Review historic and as-built documents for utility data. – Complete a SUE investigation to identify high risk utilities, including large and/or critical service utilities (e.g., large watermains and all gas mains). – If required, relocate existing utility or move proposed excavation to mitigate conflict.
U-2	Conflict with surface or overhead utilities	– Working compound equipment including cranes will require working directly under overhead utilities or within the hydro wire exclusion zone	– Overhead infrastructure such as electrical or communications cabling is mounted on utility poles between 5 and 12 m above the surface. Depending on the required crane size and operating radius to construct, equipment extents may fall within hydro line exclusion zone, or hit overhead wires causing worker harm or death.	– Working compounds will be designed to allow appropriate and safe movement of workers and equipment around the site, away from live overhead wires or surface utility boxes, based on known utility information and topographic surveys. – If required, relocate existing utility or move proposed excavation to mitigate conflict.
Noise and vibration				
N-1	Operation noise	– Complaints from residents within study area	– Noise disruptions to private residents and commercial areas post-construction, near SPS locations or upgrades.	– Any permanent facility, such as new SPS, SPS upgrades, or supporting air management facilities, will require an ECA application under Section 9 of the Environmental Protection Act to document the noise emissions compliance. – Investigate degree of risk and impact in further detail.
N-2	Construction noise	– Complaints from residents within study area	– Noise disruptions to private residents and commercial areas during construction, near construction compounds for new SPS or existing SPS upgrades.	– Propose construction noise monitoring per MECP NPC-115 Construction Equipment requirements. – Consider completing noise monitoring for the duration of the construction and notify the contractor of any exceedances so that corrective action/contingency actions can be implemented. – Use vehicles and equipment (cranes and excavators) with efficient muffling devices or construct enclosures. – Comply with local noise by-laws.
V-1	Construction vibration	– Complaints from residents within study area	– Disruptions to private residents and commercial areas during construction, near construction compounds for new SPS or existing SPS upgrades.	– Propose appropriate construction vibration benchmarks within the tender documents. – Consider pre- and post-construction condition photos.

Item no.	Criteria	Indicators	Potential effects (Positive/Negative)	Avoidance/Mitigation/Compensation
Air management				
O-1	Operation odour at SPS and existing or proposed sewer connection	– Odour near SPS and surface connections	– There is potential for odour release due to turbulence at the existing (or upgraded) SPS and at the connections from sewer to SPS.	– Consider implementation of ventilation design systems with odour control.
O-2	Construction odour	– Complaints are received from residents within the study area	– During live connection of infrastructure, there is the potential for odour release.	– Advance notification to residents, advising them of what work is being completed and the duration of the work.
A-1	Construction dust at SPS location	– Fugitive dust is generated – Air quality is poor	– Fugitive dust is generated during construction (or upgrades) of SPS and related infrastructure.	– Include requirements for dust management within the tender documents. – Mitigation should be aimed at minimizing emissions of particulate matter and exposure to particulate matter during the construction phase of the project.

Table 4.14 Y7 Queensville West SPS Upgrades Natural Environment Effects and Mitigation

Item no.	Criteria	Indicators	Potential effects (Positive/Negative)	Avoidance/Mitigation/Compensation
Hydrogeology				
N-1	Effect on groundwater quantity	– Temporary and/or long-term change in groundwater quantity	– No long-term change to groundwater quantity is anticipated because no long-term water takings are anticipated to be required for SPS operation. Temporary water takings may be required to facilitate construction if intersecting water table. – Construction expected to intersect Newmarket Till aquitard. Water table may be encountered at approximately 6 mbgs, depending on depth of construction. – Change in groundwater-surface water interaction (reversal of vertical hydraulic gradient) results in impact to terrestrial and aquatic habitat and associated SAR (where applicable) – reduction in baseflow. – The potential reduction in baseflow from a stream reach that intersects an aquifer in which the water taking is occurring. – Potential ground settlement as a result of active dewatering/depressurization. – Change in shallow groundwater flow patterns resulting from operation of sewer pipe resulting from increased I&I and/or preferential movement of groundwater within trench sediments.	– Implement construction methods that minimize dewatering requirements. – Establish pre-construction baseline groundwater quality and quantity conditions and develop implementation plans for monitoring during and post-construction (Install and monitor wells and surface water).
N-2	Effect on groundwater quality	– Temporary and/or long-term change in groundwater quality	– Temporary change in groundwater quality is not anticipated because construction is anticipated to intersect low permeability till. – Potential effects on groundwater water quality as a result of potential mobilization of contaminated water where active dewatering/depressurization is required. – Reduction in groundwater quality from spills or the mismanagement of fuel/chemical in work areas.	– During design, complete a contaminant source investigation to mitigate the risk of drawing contamination from one source to another location. – Develop and implement a spills response plan for construction to mitigate the effect of a spill should one occur. – Establish pre-construction baseline groundwater quality and quantity conditions and develop implementation plans for monitoring during and post-construction (Install and monitor wells and surface water).

Item no.	Criteria	Indicators	Potential effects (Positive/Negative)	Avoidance/Mitigation/Compensation
N-3	Effect on surface water quantity/quality	– Temporary changes in surface water	– Temporary changes in surface water could occur during construction activities depending on the location, depth, construction, methodology, timing and duration. – Temporary change in surface water quantity/quality is not anticipated based on intersection of low permeability till. – Limited dewatering is expected during construction. – Change in surface water temperature from groundwater taking and/or discharge to surface water features. – Changes to stream morphology resulting from the release of groundwater dewatering water. The potential reduction in baseflow due to water taking in a lower confined aquifer due to increased downward hydraulic gradients across the aquitard separating the stream and the confined aquifer. – The potential reduction in baseflow from a stream reach that intersects an aquifer in which the water taking is occurring.	– Field verification of groundwater-surface water interaction suggested for watercourses and wetlands within the study area. – Complete outlet receiver assessment(s) should temporary groundwater discharge be required to surface water. Establish pre-construction baseline surface water quality and quantity conditions and develop implementation plans for monitoring during and post-construction. – Implement/construct treatment (i.e., settlement tanks, etc.) of construction water prior to discharge to storm sewer/surface water. – Minimize construction area disturbance and duration. Implement erosion and sedimentation control measures (e.g., silt fencing, check dams, etc.). – Adhere to fish timing windows to prevent negative impacts on known sensitive fish species within the study area. – Consider completing a geomorphology study during design. – Refer to the Natural Heritage section of the table for further mitigation approaches associated with surface water impacts.
Natural heritage				
EG-1	Effect on aquatic habitat or functions	– The MNRF Aquatic Resource Area (ARA) online data have identified a warmwater thermal regime within the study area	– Temporary or permanent loss of aquatic features or categorical loss of functions by type, including PSWs, Locally Significant Wetlands, watercourses by sensitivity type and others. – During construction water quality may be impaired due to elevated TSS in surface water runoff from study area locations which can affect aquatic species/habitats. Some concentrations above background may occur temporarily. – Change in surface water temperature from groundwater taking and/or discharge to surface water features – Potential spill hazard when refuelling equipment.	– Need to complete site investigations to evaluate potential effects on aquatic habitat function. – Implement best management practices to control surface water runoff and minimize TSS effects. – Where feasible, discharging of surface water during construction should be directed into the municipal storm sewer system to mitigate thermal impacts to watercourses. Should discharge of surface waters be directed to watercourses, additional mitigation measures would need to be adhered to (e.g., enhanced erosion and control measures). The use of erosion and sediment control measures and timing of construction to avoid spawning and egg incubation periods will reduce the potential for effect to fish and aquatic life. – Conduct equipment maintenance and refuelling at the designated and properly contained maintenance areas or at industrial garages located well away from creek banks, wetlands and outside vegetation areas. – Develop a Spill Prevention Plan.
EG-2	Effect on stream geomorphology	– The MNRF ARA online data have identified a warmwater thermal regime within the study area	– Change in geomorphic form/function/stability in affected channels.	– Employ erosion and sediment controls to limit deposition of construction-mobilized soils into watercourses. – Consider completing a geomorphology study during design, where applicable.
EG-3	Effect on aquatic species including SAR, species of local concern, native species and invasive species	– Aquatic species	– Number and type of aquatic species potentially affected temporarily or permanently. – No anticipated impacts to aquatic SAR as there are no aquatic SAR identified within the study area.	– Preventing death of fish or impacts to downstream fish habitat through the use of appropriate timing windows.
EG-4	Effect on terrestrial habitat or functions	– Study area contains ecologically significant forests – Study area contains White-tailed deer overwintering habitat (Stratum 2) – Wildlife habitat	– Temporary or permanent loss of natural heritage features (e.g., ESAs, ANSIs, wildlife corridors and others). – Potential effects on terrestrial habitat (e.g., direct vegetation (and wildlife habitat) loss, alteration and fragmentation) may occur from the physical footprint of study area locations. – Project preparation, construction and operation may increase the risk of nest destruction and mortality of migratory birds.	– Site investigations to evaluate potential terrestrial habitat function/significance. – During design, prepare construction constraints with consideration of timing windows to mitigate where possible, vegetation clearing to occur outside of the migratory bird nesting season, bat maternity roosting season, turtle overwintering and amphibian breeding. – Limit the area of project footprint and limit disturbance during construction and operations phases. – The presence of wildlife will be monitored and communicated to site personnel. – Vehicle use will be restricted to designated areas. – Where practical, rehabilitate habitat for plants and wildlife.

Item no.	Criteria	Indicators	Potential effects (Positive/Negative)	Avoidance/Mitigation/Compensation
EG-5	Effect on terrestrial species, including SAR, species of local concern, native species, invasive species and area-sensitive species	– SAR have the potential to occur within the study areas including amphibians, insects, birds, reptiles, mammals and tree species	– Number and type of terrestrial species potentially affected temporarily or permanently. – Construction activities have the potential to disturb wildlife within adjacent natural heritage areas. – Project preparation, construction and operation may increase the risk of nest/habitat destruction and mortality of terrestrial SAR. – Project may result in wildlife-vehicle collisions and may cause injury/mortality to individual animals.	– Site investigations to evaluate potential occurrence of terrestrial SAR within the study area. – During design, prepare construction constraints with consideration of timing windows to mitigate where possible, vegetation clearing to occur outside of the migratory bird nesting season, bat maternity roosting season, turtle overwintering and amphibian breeding. – Clearly demarcate work limits at outset of construction and minimize unnecessary vegetation clearing.

4.7 Y8 Holland Landing SPS Upgrades

4.7.1 Study Area

The Holland Landing SPS is located at 44 Bradford Street (Thompson Drive and East Holland River) and receives flows from the local collection systems. The flow is currently pumped from Holland Landing SPS via existing forcemain to a high point in the vicinity of Doane Road and 2nd Concession Road intersection where the forcemain discharges to an existing gravity sewer which then conveys the flow by gravity to the 2nd Concession SPS.

With the proposed improvements the flow from Holland Landing SPS and Queensville West SPS will no longer be received and re-pumped by 2nd Concession SPS under normal operation. Instead, the flows pumped from Holland Landing SPS will discharge to the Y12-A 2nd Concession North Gravity Sewer which will then flow directly into the Y12-B 2nd Concession South Gravity Sewer.

The high point will remain at the new discharge into Y12-A, which will also be located in the vicinity of the intersection of Doane Road and 2nd Concession Road, so the anticipated head requirements will remain similar to the existing design.

The proposed permanent modifications to the facility are not anticipated to extend beyond the existing property limits, but temporary easements or mitigation impacts or requirements may extend onto or impact adjacent properties. A study area of approximately 200 metres surrounding the existing pumping station was applied as summarized in Figure 4.11.

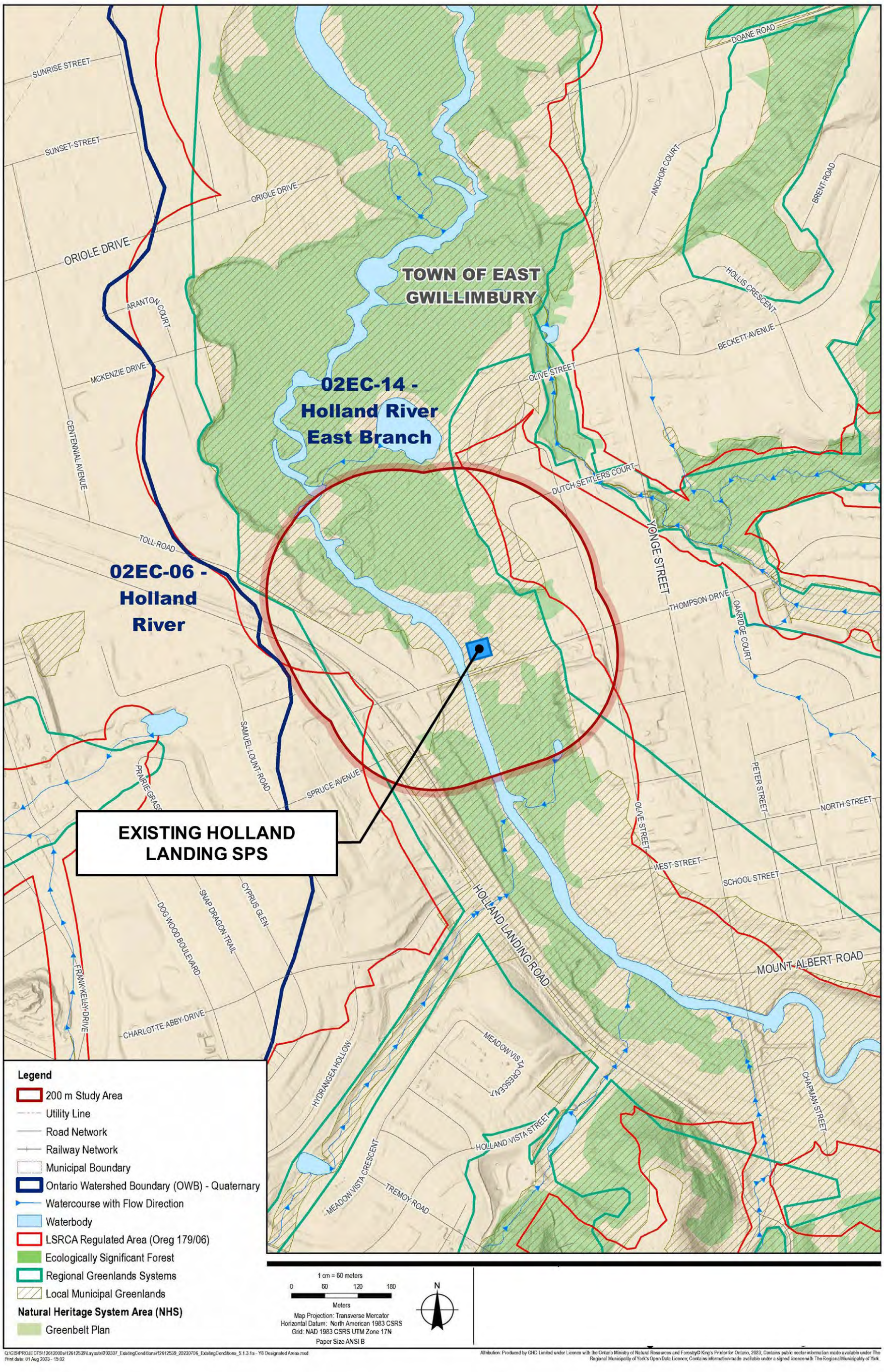


Figure 4.11 **Study Area for Y8 Holland Landing SPS Upgrades**

4.7.2 Existing Conditions

4.7.2.1 Social and Built Environment

The following sections will summarize the findings of the desktop studies completed within the Y8 study area, including planning and land use, traffic and transportation and utilities.

4.7.2.1.1 Planning Policy and Land Use

Existing Land Use

Land use within the Y8 study area consists of the following:

– Low density residential housing (north and south of Bradford Street)
– Low density commercial land use (north of Bradford Street between Olive Street and Toll Road)
– HREB crossing Bradford Street between Toll Road and Olive Street
– CNR rail crossing Bradford Street between Toll Road and Holland Landing Road.

Relevant Planning Policy

Regional

The York Region Official Plan 2022 (June 2023 Office Consolidation) designates lands within the study area as Community Area. Additionally, lands adjacent to the HREB form part of York Region's Greenlands System.

Local

The East Gwillimbury Official Plan 2010 (2018 Office Consolidation) designates the lands in the study area as follows:

– Low density residential
– General employment
– Environmental protection.

Active Development Applications

Existing property use has been described using the following data available to GHD:

– Orthoimagery from spring 2022
– Google Earth images
– Farm Tax Program data from 2023 tax year
– Property assessment type via GeoWarehouse (accessed August 2023).

Active development applications within the 200-m study area for each project location have been summarized based on existing available information. Lands within the Y8 study area contain three active development applications for residential subdivisions. Limited details are available for these applications:

– Toby Court west of Highway 83. Proposed subdivision
– Dutch Settlers Court east of Highway 83. Proposed subdivision
– Olive Street east of Highway 83. Proposed subdivision.

4.7.2.1.2 Transportation in the Study Area

The Holland Landings SPS is located on Bradford Street between Holland Landings and Yonge Street. Bradford Street is a two-lane collector road, with sidewalks on both sides of the road, as shown in Figure 4.12.

Figure 4.12 **Bradford Street Looking East Towards Existing Holland Landing SPS and Yonge Street. (*Google Maps* "Streetview," digital images http://maps.google.com)**

There are no AADT volumes available for Bradford Street.

There is one public transit routes running along Bradford Street with associated bus stop infrastructure, within the study area, including York Region Transit (YRT) Route 52.

There is also a CNR rail crossing at the west end of Bradford Street, ahead of the Holland Landing Road intersection, located approximately 200 m away from the working compound.

4.7.2.1.3 Utilities in the Study Area

There are several above/below grade utilities situated within the Y8 study area corridor and in the vicinity of the proposed project. However, we clarify that the works completed will be limited to the extents of the existing Holland Landing SPS, therefore minor or no impacts are anticipated to nearby utilities. For any utilities which are identified to be temporarily impacted during the construction of the SPS upgrades, formal notification and consent would be required from the authorities responsible for these utilities prior to construction.

Known municipal infrastructure that existed on the York Region's GIS database has been provided within the drawing set. A detailed utility investigation program, which would include a "Level A through D" subsurface utility exploration, would be required as part of future site investigations.

Known large infrastructure within the study area include:

– A CNR railway running parallel to the existing SPS property, to the west.
– There is a roadway bridge crossing a creek of the HREB, southwest of the existing SPS property.

The railway along the study area will require specific geotechnical instrumentation and monitoring requirements to receive infrastructure owner approval of the design. Based on the distance between the rail from the proposed works, and based on the scale of the work, impacts to the track are not anticipated to be extensive but will be assessed as part of a Construction Impact Assessment during design development should the structure fall within the ZOI of any excavation work.

4.7.2.2 Natural Environment

The following sections will summarize the findings of the desktop studies completed within the Y8 study area for geotechnical, hydrogeology, surface water, natural heritage and contamination.

4.7.2.2.1 Geotechnical

The study area for Y8 is bordered on the north and south by forested area and on the east and west by residential/commercial properties, within the boundaries of the Town of East Gwillimbury.

Historical boreholes advanced from about 11 to 25 mbgs identified the near surface condition generally consistent among the boreholes and comprised of cohesive till (clayey silt to silt till of very stiff to hard consistency) to a depth of about 5 to 14.7 mbgs overlying non-cohesive till (silty sand to sandy silt till of very dense relative density). Fill to a depth of about 7 mbgs was also encountered. The ground surface elevation at the boreholes varied from elevation 262.5 to 256.9 masl and groundwater table varied from elevation 256.5 to 255.0 masl. It should be noted that the above-mentioned subsurface condition was encountered near the southern portion of the study area Y8 (in the vicinity of the bridge located over the Holland River East Branch) and groundwater is typically found at shallow depths below the ground surface.

The near surface soils within the study area are predominantly comprised of non-cohesive and frequently granular deposits in general. Mapped deposits of sand, gravelly sand and gravel, nearshore and beach deposit, mostly consisting of glaciolacustrine deposits comprise most of the study area.

The bedrock consists of Limestone, dolostone, shale, arkose, sandstone Ottawa Group/Simcoe Group. Typically, bedrock is mapped at depths of 76 to 82 mbgs within the study area and will not be reached during construction.

4.7.2.2.2 Hydrogeological

A hydrogeological desktop review was undertaken within the Y8 study area using information from MECP well records, the MECP Source Protection Information Atlas, the ORM database and the Ontario Geological Survey database. Available hydrogeological reports for projects within the area were also reviewed.

The study area for the Y8 project is within the Simcoe Lowlands and the Schomberg Clay Plains physiographic region. The SPS upgrades are anticipated to be within the existing building, and are not expected to involve construction excavations below the water table. The SPS is located within Intake Protection Zone 3. The water table is at approximately 2 to 6 mbgs, near ground surface due to proximity to the HREB.

There are five historic private water supply wells located near the SPS structure.

Refer to Table 4.15 regarding details on anticipated aquifers and aquitards within the study area.

Table 4.15 **Aquifers and Aquitards Through the Y8 Study Area**

Aquifers and aquitards	Description	Thickness
Upper sediments underly topsoil	These sediments consist mostly of silt and fine sand, but also include gravel and minor clay and diamicton. The aquifer is generally unconfined, except the section covered by Halton Till on the south flank of the moraine complex.	Maximum of 2.5 m
Newmarket Till (Aquitard)	A continuous layer that acts as an aquitard to the underlying Thorncliffe Formation.	Ranges between 17 to 39 m
Thorncliffe Formation (Aquifer)	Regionally recognized as a highly productive confined aquifer and is laterally continuous.	Ranges between 6 to 23 m
Sunnybrook Drift (Lower aquitard)	A continuous layer that acts as an aquitard to the underlying Scarborough Formation.	Between 8 to 36 m
Scarborough Formation (Lower aquitard)	A confined aquifer that is discontinuous and appears to consist of channel fill deposits that roughly dip to the east.	The deposits range between 9 to 30 m

4.7.2.2.3 Surface Water

There is one sub-watershed within the study area, the HREB. The SPS is located adjacent to HREB.

Other surface features of interest include:

– One small online pond
– Holland Landing fen and wetland ANSI
– Holland Marsh wetland complex.

Refer to Figure 4.13 for a surface water map of existing conditions within the study area.

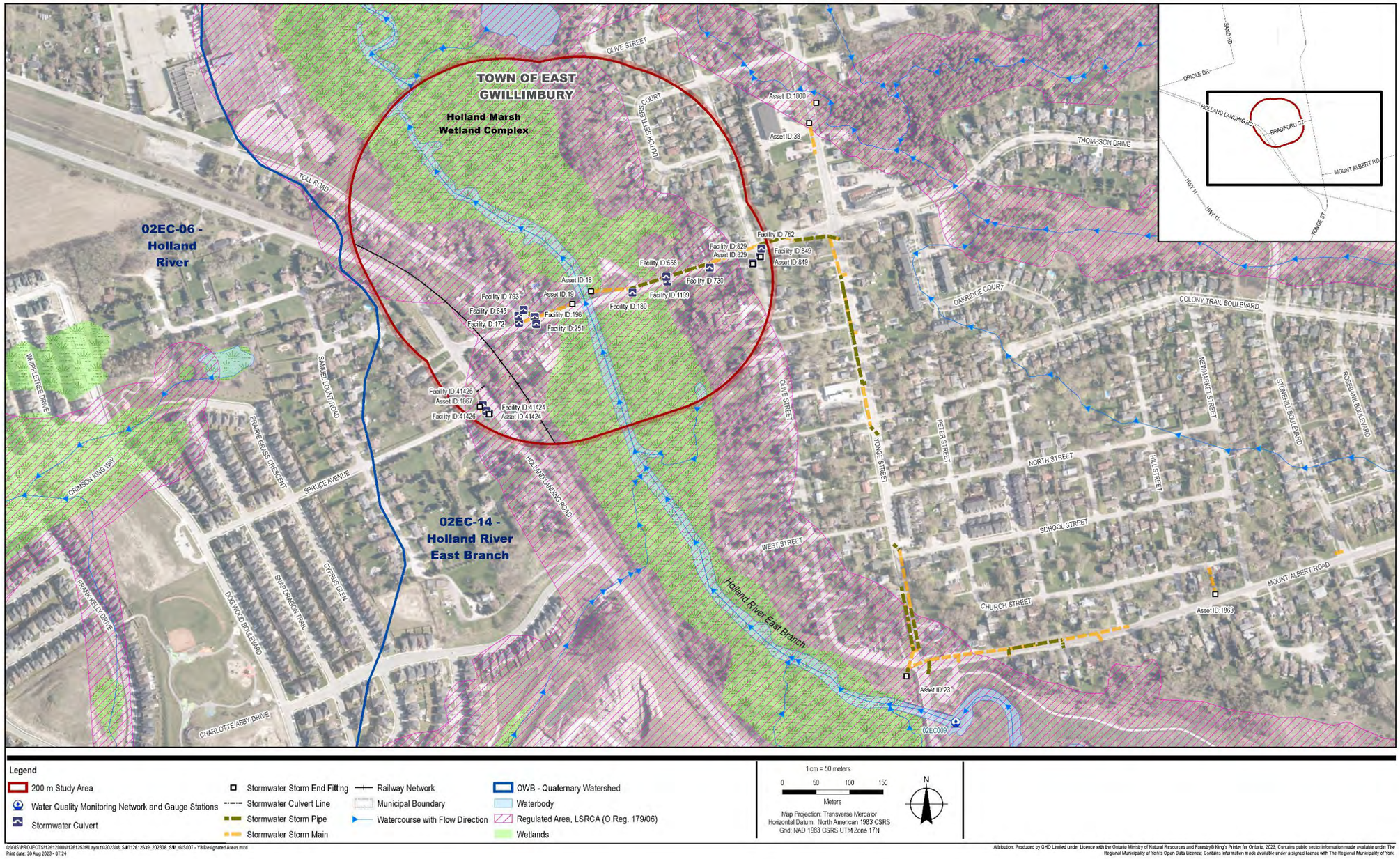


Figure 4.13 Y8 Study Area Surface Water Map for Existing Conditions

4.7.2.2.4 Natural Heritage Characterization

The study area contains both unevaluated wetlands and PSW, ANSI and a section of the HREB.

Located within the centre of the Y8 study area, along the banks of the HREB, there is part of the provincially significant Holland Marsh Wetland Complex and Holland Landing Fen and Wetlands ANSI. This wetland complex is known for having one of the highest organic soil concentrations in the entirety of the HREB subwatershed and provides significant habitat for a plethora of species. It is known to support habitat for 5 bird and 11 plant species of provincial significance, along with 44 species of regional significance. The area provides over-wintering habitat for white-tailed deer, is a waterfowl staging and production site, and has been observed to be a significant spawning area for at least 11 different species of fish. The majority of the study area is designated as municipal Greenland.

Aquatic Habitat

The Y8 study area has one prominent watercourse, the HREB and a small online pond approximately 475 m downstream of the Bradford Street Bridge on the north-eastern side of the study area. The HREB in this study area flows from south to north in a relatively uniform fashion, with little sinuosity and uniform channel structure. The riparian buffer consists of a combination of large deciduous trees and open meadows of grasses and sedges in an urbanized setting. The small pond is connected to a watercourse feature, conveying flow in a southward prior to outletting into the HREB.

All water features in this study area, both lotic and lentic, are considered to have a warmwater thermal regime. Based on the anticipated fish community, the HREB within this study area and small pond is expected to support primarily forage/baitfish species with some large sportfish present. No redside dace have been recorded within this study area.

Terrestrial Habitat

The lands in the Y8 study area consist mainly of medium density residential and wetland communities, with the HREB flowing south to north through the centre of the study area. Almost the entirety of the study area sits at a lower elevation within the HREB valley, with only the far eastern and western extents perched on the valley's edge. The focus of the study area is the dominant and significant wetland communities which run through the middle of the study area and surround the existing SPS.

All natural and cultural communities present within the study area are considered common in the province.

Significant Wildlife Habitat

Potential Candidate SWH for Region 6E as defined by MNRF has been identified in several natural areas within the study area. The greatest concentration of these potentials is likely to be found in wetland and woodland habitats associated with the PSWs and ESAs. A screening and analysis of all ELC communities was completed in the study area for Seasonal Concentration Areas of Animals, Rare Vegetation Communities or Specialized Habitat for Wildlife, Habitat for Species of Conservation Concern and Animal Movement Corridors.

4.7.2.2.5 Areas of Potential Environmental Concern

A review of information from the Environmental Risk Information Services database was not completed for this study area as soil excavation is not required for upgrades at Holland Landing SPS.

4.7.3 Conceptual Design

The conceptual design for the SPS upgrades was based on the design criteria, as described in Chapter 3. The following sections discuss the concept design for the Holland Landing SPS Upgrades project. The design presented is conceptual and was developed to demonstrate proof of concept. Upon collection of further information through field investigations and in consultation with internal and external stakeholders, the designs will be further refined.

4.7.3.1 Design Basis

The required flow rate for the SPS was determined using modelling and forecasting techniques as outlined in Chapter 3. The Holland Landing SPS facility has an existing firm design capacity of 195 L/s as defined in the current ECA.

The increasing flows over time mean that the required number of installed pumps will also increase over time.

The number of forcemains in use will also increase over time, as in the early stages the flows are not always sufficient to maintain adequate scour velocities in forcemains that have been designed and installed with the future population requirements in mind. Forcemains servicing Holland Landing SPS are already twinned. Table 4.16 summarizes the general characteristics and features that will be present from initial construction through to final configuration.

Table 4.16 Staged Sewage Pumping Station Conceptual Design Characteristics for Y8 - Holland Landing SPS Upgrade

Design aspect	2031	2041	2051	Comments
Modelled peak flow (L/s)	140	190	220	Station total flow rate target under peak event conditions.
Nominal number of pumps	3, 2 active +1 standby	4, 3 active +1 standby	4, 3 active +1 standby	Number of pumps in service may adjust based on number of forcemains available.
Number of discharge forcemains in service	1	2	2	
Nominal firm capacity (L/s)	163	238	238	Firm capacity is based on installed pumps with N-1 configuration (capacity available with the largest pump out of service).

4.7.3.2 Description of Design

The Holland Landing SPS is an existing pumping station, designed and constructed with future expansion plans and a staging approach already in mind. The station has four existing bays for pumps, including suction and discharge piping, two discharge points and supporting infrastructure (SCADA/controls, primary electrical power, air management and standby power) already existing.

The major change to the Holland Landing SPS operation relates to the proposed installation of the Y12-A 2nd Concession North Gravity Sewer. The proposed change is that instead of discharging to the common/existing gravity sewer at Doane Road, the proposed Y12-A will convey the flow in a separate, dedicated gravity sewer directly to Y12-B. This will eliminate the double-pumping at 2nd Concession and will free up space in the gravity sewer that runs from Doane Road to the 2nd Concession SPS along 2nd Concession Road for local collection.

Since the discharge point is a similar elevation also to a gravity sewer system, the future flows being managed by the Holland Landing SPS will be pumped at a similar head to the original intent. This means that the majority of the infrastructure and future planning is adequate for the future requirements, with some adjustments to the discharge point and the installed pumps.

The wet well is divided into two cells with two pump bays designed to draw from each, and the wet will includes an inlet grinder that can hydraulically process a flow greater than the 2051 forecasts, so the inlet infrastructure to the wet well is adequately sized for future flows at conceptual level, with hydraulic profile to be confirmed during detailed design.

The pumps currently installed are dry-pit submersibles style since the station below-grade infrastructure is designed with a separate wet-well/dry well configuration. Detailed design will determine whether the use of smaller pumps to manage low flow conditions small (jockey) pumps is desirable from either an operational flexibility or energy management perspective, but for conceptual level design currently available pumps were sourced to meet the anticipated flow and head demands.

There are no required changes anticipated to the yard piping in or around the Holland Landing SPS, but there will be some minor modifications at the discharge point near the intersection of Doan Road and 2nd Concession Road, which will be included as part of the Y12-A project.

Table 4.17 describes relevant design aspects for the Holland Landing SPS Upgrade.

Table 4.17 General Sewage Pumping Station Conceptual Design Characteristics for SPS Project Y8, Holland Landing SPS Upgrade

Design aspect	Value	Comments
Above-grade anticipated footprint of buildings and infrastructure	Same as existing	Construction included plans for improvements within the existing building footprint.
Overflow control/location	No change	No modifications are planned to existing system at conceptual level.
Discharge forcemain diameter	2 x 350-mm nominal diameter	No modifications are planned to existing system at conceptual level.
Power supply	600-V primary power transformer	No modifications are planned to existing system at conceptual level.
Standby power capability	600-V diesel generator	No change or modifications are planned to existing system at conceptual level.
Air management	Included	No modifications are planned to existing system at conceptual level.
Surge management	Surge relief valves	No modifications are planned to existing system at conceptual level.

4.7.3.3 Construction Methods

Work for the Holland Landing SPS Upgrade is focused within the existing building footprint.

Staging and programming will be considered during detailed design, but the existing infrastructure includes four pump bays and two discharge headers, including isolation valves so it is anticipated that staging will be manageable without significant bypass pumping/planning or temporary systems.

4.7.3.4 Property Requirements

Temporary property easements may be required for construction compounds for staging and storage, as well as traffic management.

Permanent property requirements for the SPS are not anticipated to change based on the SPS Upgrade portion of the works.

4.7.4 Environmental and Community Impacts and Mitigation

Desktop studies were done to determine the possible extent of these impacts and to propose mitigation measures that would reduce the likelihood and the consequences should they occur. The major impacts and associated mitigation approaches are described in this section. The assessment criteria and indicators are provided in Table 4.18 and Table 4.19, corresponding to each of the environments (social and built, natural, cultural and traffic impacts) together with a potential effects assessment and identification of avoidance, mitigation and compensation measures for the project.

Table 4.18 Y8 Holland Landing SPS Upgrades Social and Built Environment Effects and Mitigation

Item no.	Criteria	Indicators	Potential effects (Positive/Negative)	Avoidance/Mitigation/Compensation
Social and built environment				
SB-1	Effect on existing views	– Changes are predicted in views from residences in the surrounding area	– No change in existing views from residences in the surrounding area.	– No avoidance, mitigation, or compensation measures required.
SB-2	Effect on existing residences, businesses and/or community, institutional and recreational facilities	– Displacement of residences, businesses and other facilities is too great – Temporary or permanent disruption to residences, businesses and other facilities near construction compounds or permanent works is too great	– No displacement of residences, businesses, or community, institutional and recreational facilities is anticipated. – Disruption to residences, businesses and community, institutional and recreational facilities in proximity to construction compounds/ permanent installations.	– No avoidance, mitigation, or compensation measures are anticipated. – Apply standard construction-related mitigation measures to minimize the disruption effects.
Traffic and transportation				
TT-1	Effect on rail/bridge infrastructure	– One or more of rail crossings or large infrastructure impacted	– At the rail crossing west of the SPS, we do not anticipate the compound area or traffic management extents to extend within the rail ROW.	– Coordination with Metrolinx during design development to limit impacts to their rail services.
TT-2	Effect on traffic	– Traffic flows are disrupted too much – Construction occurs too close to congested traffic zones	– Traffic disruption at location of SPS compound, first lane of traffic to allow for truck loading/unloading. – Traffic movement in to and out of Construction compound sites will impact pedestrian, cycling and traffic flow on Bradford Street. – Impacts to public transit involving potential rerouting of buses and/or relocation of stops. – Coordination of alternate routing for emergency service vehicles, if needed.	– Where possible, maintain one lane in each direction. This could be achieved through flagging, temporary signals or temporary road widening. – Pedestrian movement should be maintained during construction, with marked pedestrian detours as applicable. – Consider special traffic arrangements for peak hours should be considered in traffic flow directions in the morning and afternoon. – Make special provisions for emergency service vehicle access. – Make special provisions for pedestrian traffic and safety, including signals, detours and winter maintenance. If feasible, move construction traffic to sideroads.
Utilities				
U-1	Conflict with buried utilities	– Excavation work (if any) is in direct conflict or falls within clearance limits of nearby utilities	– New construction for sewer connections impacts existing utilities and requires design coordination with utility owners which increases project cost and schedule.	– Review historic and as-built documents for utility data. – Complete a SUE investigation to identify high risk utilities, including large and/or critical service utilities (e.g., large watermains and all gas mains). – If required, relocate existing utility or move proposed excavation to mitigate conflict.
U-2	Conflict with surface or overhead utilities	– Working compound equipment including cranes will require working directly under overhead utilities or within the hydro wire exclusion zone	– Overhead infrastructure such as electrical or communications cabling is mounted on utility poles between 5 and 12 m above the surface. Depending on the required crane size and operating radius to construct the shaft equipment extents may fall within hydro line exclusion zone or hit overhead wires causing worker harm or death.	– Working compounds will be designed to allow appropriate and safe movement of workers and equipment around the site, away from live overhead wires or surface utility boxes, based on known utility information and topographic surveys. – If required, relocate existing utility or move proposed excavation to mitigate conflict.
Noise and vibration				
N-1	Operation noise	– Complaints from residents within study area	– Noise disruptions to private residents and commercial areas post-construction, near SPS locations or upgrades.	– Any permanent facility, such as new SPS, SPS upgrades, or supporting air management facilities, will require an ECA application under Section 9 of the Environmental Protection Act to document the noise emissions compliance. – Investigate degree of risk and impact in further detail.
N-2	Construction noise	– Complaints from residents within study area	– Noise disruptions to private residents and commercial areas during construction, near construction compounds for new SPS or existing SPS upgrades.	– Propose construction noise monitoring per MECP NPC-115 Construction Equipment requirements. – Consider completing noise monitoring for the duration of the construction and notify the contractor of any exceedances so that corrective action/contingency actions can be implemented. – Use vehicles and equipment (cranes and excavators) with efficient muffling devices or construct enclosures. – Comply with local noise by-laws.
V-1	Construction vibration	– Complaints from residents within study area	– Disruptions to private residents and commercial areas during construction, near construction compounds for new SPS or existing SPS upgrades.	– Propose appropriate construction vibration benchmarks within the tender documents. – Consider pre- and post-construction condition photos.

Item no.	Criteria	Indicators	Potential effects (Positive/Negative)	Avoidance/Mitigation/Compensation
Air management				
O-1	Operation odour at SPS and existing or proposed sewer connection	– Odour near SPS and surface connections	– There is potential for odour release due to turbulence at the existing (or upgraded) SPS and at the connections from sewer to SPS.	– Consider implementation of ventilation design systems with odour control.
O-2	Construction odour	– Complaints are received from residents within the study area	– During live connection of infrastructure, there is the potential for odour release.	– Advance notification to residents, advising them of what work is being completed and the duration of the work.
A-1	Construction dust at SPS location	– Fugitive dust is generated – Air quality is poor	– Fugitive dust is generated during construction (or upgrades) of SPS and related infrastructure.	– Develop a BMPP to be included in the project Construction Management Plan. – Mitigation should be aimed at minimizing emissions of particulate matter and exposure to particulate matter during the construction phase of the project.

Table 4.19 Y8 Holland Landing SPS Upgrades Natural Environment Effects and Mitigation

Item no.	Criteria	Indicators	Potential effects (Positive/Negative)	Avoidance/Mitigation/Compensation
Natural heritage				
EG-1	Effect on aquatic habitat or functions	– Watercourses in the study area support a warmwater thermal regime – Study areas contains PSW	– Temporary or permanent loss of aquatic features or categorical loss of functions by type, including PSWs, Locally Significant Wetlands, watercourses by sensitivity type and others. – During construction water quality may be impaired due to elevated TSS in surface water runoff from study area locations which can affect aquatic species/habitats. Some concentrations above background may occur temporarily. – Potential spill hazard when refuelling equipment.	– Need to complete site investigations to evaluate potential effects on aquatic habitat function. – Implement best management practices to control surface water runoff and minimize TSS effects. – Conduct equipment maintenance and refuelling at the designated and properly contained maintenance areas or at industrial garages located well away from creek banks, wetlands and outside vegetation areas. – Specify a Spills Prevention Plan be prepared and followed.
EG-2	Effect on stream geomorphology	– Watercourse present within the study area	– Change in geomorphic form/function/stability in affected channels.	– Any disturbances near a watercourse during construction will need to be restored with native seeding and/or planting. – Use of erosion and sediment control measures to avoid sedimentation into the stream. – Consider completing a geomorphology study during design, where applicable.
EG-3	Effect on aquatic species including SAR, species of local concern, native species and invasive species	– Aquatic species	– Number and type of aquatic species potentially affected temporarily or permanently. – No anticipated impacts to aquatic SAR as there are no aquatic SAR identified within the study area.	– Preventing death of fish or impacts to downstream fish habitat through the use of appropriate timing windows.
EG-4	Effect on terrestrial habitat or functions	– Study area contains ecologically significant forests – Study area contains an ANSI (Holland Landing Fen and Wetlands) – Wildlife habitat	– Temporary or permanent loss of natural heritage features (e.g., ESAs, ANSIs, wildlife corridors and others). – Potential effects on terrestrial habitat (e.g., direct vegetation (and wildlife habitat) loss, alteration and fragmentation) may occur from the physical footprint of study area locations. – Project preparation, construction and operation may increase the risk of nest destruction and mortality of migratory birds.	– Site investigations to evaluate potential terrestrial habitat function/significance. – During design, prepare construction constraints with consideration of timing windows to mitigate where possible, vegetation clearing to occur outside of the migratory bird nesting season, bat maternity roosting season, turtle overwintering and amphibian breeding. – Limit the area of project footprint and limit disturbance during construction and operations phases. – The presence of wildlife will be monitored and communicated to site personnel. – Vehicle use will be restricted to designated areas. – Where practical, rehabilitate habitat for plants and wildlife.
EG-5	Effect on terrestrial species, including SAR, species of local concern, native species, invasive species and area-sensitive species	– SAR have the potential to occur within the study areas including amphibians, insects, birds, reptiles, mammals and tree species	– Number and type of terrestrial species potentially affected temporarily or permanently. – Construction activities have the potential to disturb wildlife within adjacent natural heritage areas. – Project preparation, construction and operation may increase the risk of nest/habitat destruction and mortality of terrestrial SAR. – Project may result in wildlife-vehicle collisions and may cause injury/mortality to individual animals.	– Site investigations to evaluate potential occurrence of terrestrial SAR within the study area. – During design, prepare construction constraints with consideration of timing windows to mitigate where possible, vegetation clearing to occur outside of the migratory bird nesting season, bat maternity roosting season, turtle overwintering and amphibian breeding. – Clearly demarcate work limits at outset of construction and minimize unnecessary vegetation clearing.

4.8 Y9-A Newmarket East SPS

4.8.1 Study Area

The Y9-A Newmarket East SPS will provide pumping capability to convey diverted and collected flows from upstream of the existing Newmarket SPS via the Y12-B 2nd Concession South Gravity Sewer. The SPS will pump via the proposed Y9-B Newmarket East SPS Forcemains to the new Y13-A Leslie Street Trunk Sewer Phase 3.

This section presents a concept design capable of ultimately conveying 2,500 litres/second (L/s) to the Leslie Street Trunk Sewer collected mainly from the East Gwillimbury catchment area. The existing Newmarket SPS is anticipated to remain in operation primarily pumping flows from other local collection systems through the existing YDSS via existing forcemains to the Aurora SPS.

A study area of approximately 200 metres wide was applied surrounding the potential site for the pumping station, however the new pumping station could be located anywhere within this study area or overlapping linear project study areas as shown in Figure 4.14.

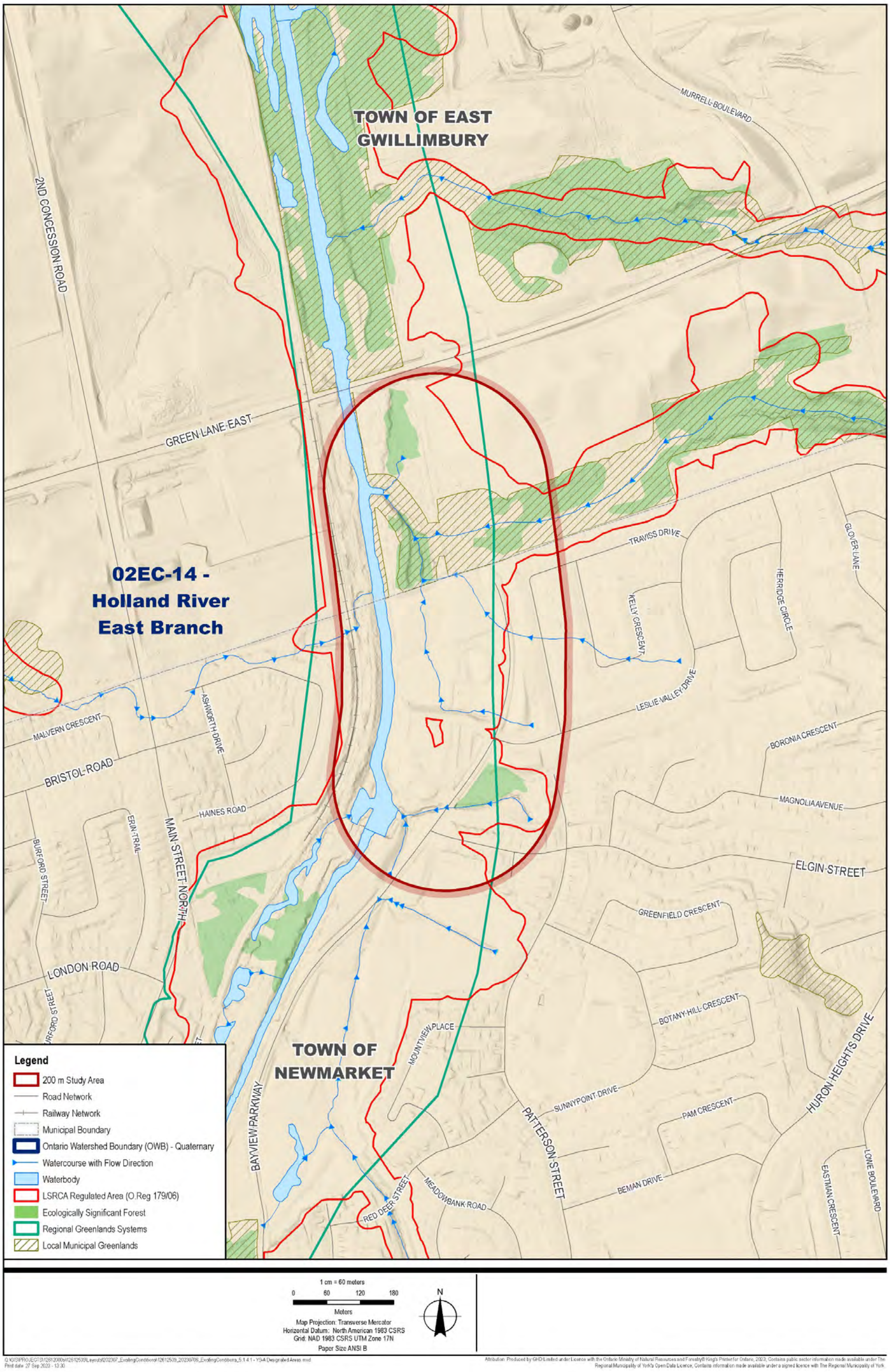


Figure 4.14 Study Area for Y9-A Newmarket East SPS

4.8.2 Existing Conditions

4.8.2.1 Social and Built Environment

The following sections will summarize the findings of the desktop studies completed within the study area, including planning and land use, traffic and transportation and utilities.

4.8.2.1.1 Planning Policy and Land Use

Existing Land Use

Land use within the Y9-A study area includes the following:

– Low and medium density residential (along the periphery of the study area)
– Agricultural use (southeast of Main Street North and Green Lane East)
– Recreational uses (Newmarket micro soccer fields exist between Bayview Parkway and the HREB, and the Nokiidaa Trail extends along the western boundary of the study area)
– York Region water and wastewater plant, Newmarket SPS and parking facility (southwest of Bayview Parkway).

Planning Policy

Regional

The York Region Official Plan 2022 (June 2023 Office Consolidation) designates lands within the study area as Community Area. The protected Major Transit Station Area associated with the East Gwillimbury GO Station is located at the northwest edge of the study area. A large portion of the study area is within the Regional Greenlands System.

Local

The study area is situated on a municipal boundary, with north half in East Gwillimbury and south half in Newmarket.

With reference to the East Gwillimbury Official Plan 2010 (2018 Office Consolidation), study area north of the municipal boundary is part of the Green Lane Secondary Plan and has the following land use designations:

– Environmental Protection Area
– Open space – special study area
– Low and medium density residential.

The Green Lane Secondary Plan also indicates two proposed minor collector roads on the northeast portion of the study area.

With reference to the Newmarket Official Plan (August 2022 Consolidation), lands south of the municipal boundary are designated as Residential Area and Parks and Open Space.

Active Development Applications

Existing property use has been described using the following data available to GHD:

– Orthoimagery from spring 2022
– Google Earth images
– Farm Tax Program data from 2023 tax year
– Property assessment type via GeoWarehouse (accessed August 2023).

Active development applications within the 200-m study area for each project location have been summarized based on existing available information. Lands within the Y9-A study area contain a single active development application:

– Zoning by-law amendment for the Town of Newmarket as part of the Established Neighbourhood's Compatibility Study.

4.8.2.1.2 Transportation in the Study Area

The Newmarket East SPS is located between Green Lane East to the north and Davis Drive to the south, north of Bayview Parkway. Bayview Parkway is a 30-kilometre/hour (km/h) posted speeded, 2-lane collector road, with paved shoulders and no sidewalks, as shown in Figure 4.15.

Figure 4.15 **Bayview Parkway Looking North Towards Proposed Gwillimbury SPS Location to the West. (*Google Maps* "Streetview," digital images http://maps.google.com)**

There are no AADT volumes available for Bayview Parkway, or Davis Drive which connects into Bayview Parkway.

There is one public transit route which passes by Bayview Parkway, which is YRT Route 55. There is a CNR railway used by Metrolinx GO Transit services west of Bayview Parkway, running north south to connect the Newmarket GO Station at Davis Drive and the East Gwillimbury GO Station at Green Lane East. The rail line runs along the west side of the proposed SPS.

There are two cycling trails behind (to the west of) the SPS compound area: Nokiidaa bike trail and Tom Taylor Trail.

4.8.2.1.3 Utilities in the Study Area

There are several above/below grade utilities situated within the Y9-A study area corridor and in the vicinity of the proposed project. These utilities may be temporarily impacted during the construction of SPS, shaft and work compounds. Formal notification and consent would be required from the authorities responsible for these utilities prior to construction.

Buried utilities are typically located within the following limits:

– Shallow-buried electrical and communications cabling are commonly buried between 1.2 and 1.5 mbgs.
– Shallow-buried storm drains, sanitary sewers and watermains are typically buried between 1.2 and 3.5 mbgs.
– Deep-buried utilities are defined as anything buried more deeply than the depths mentioned above.

Known municipal infrastructure that existed on York Region's GIS database has been provided within the drawing set. A detailed utility investigation program, which would include a "Level A through D" subsurface utility exploration, would be required as part of future site investigations.

Known large infrastructure within the study area include:

– A CNR railway running parallel to the existing SPS property.

The railway along the study area will require specific geotechnical instrumentation and monitoring requirements to receive infrastructure owner approval of the design. Based on the distance between the rail from the proposed works, and based on the scale of the work, impacts to the track are not anticipated to be extensive but will be assessed as part of a Construction Impact Assessment during design development should the structure fall within the ZOI of any excavation work.

4.8.2.2 Natural Environment

The following sections will summarize the findings of the desktop studies completed within the study area for geotechnical, hydrogeology, surface water, natural heritage and contamination.

4.8.2.2.1 Geotechnical

The study area for Y9-A is located near the southeast quadrant of the intersection of Green Lane East and Main Street North. The study area is bordered on the north by forested area and by residential/commercial developments on the remaining sides, within the boundaries of the Town of East Gwillimbury.

It should be noted that no site-specific reports or borehole records were encountered within the study area.

Based on the Quaternary geology mapping, the near surface soils within the study area predominantly comprised silt and clay deposits in general, mostly consisting of glaciolacustrine deposits.

The bedrock consists of Limestone, dolostone, shale, arkose, sandstone Ottawa Group, Simcoe Group. Typically, bedrock is mapped at depths of 71 to 79 mbgs within the study area and will not be reached during construction.

4.8.2.2.2 Hydrogeological

A hydrogeological desktop review was undertaken within the study area using information from MECP well records, the MECP Source Protection Information Atlas, the ORM database and the Ontario Geological Survey database. Available hydrogeological reports for projects within the area were also reviewed.

The study area for Y9-A is within the Schomberg Clay Plains physiographic region. The majority of SPS structure is anticipated to intersect low permeability glaciolacustrine deposits and high water table, approximately 1 to 2 mbgs. Local coarse textured glaciolacustrine deposits and interstadial deposits are also anticipated to be intersected within the construction depth (22 mbgs). Temporary water takings may be required to facilitate construction. The SPS is not located within any source water protection WHPAs.

Shallow groundwater flows towards the river from a topographical valley created by the HREB tributary.

Refer to Table 4.20 regarding details on anticipated aquifers and aquitards within the study area, along HEPC.

Table 4.20 Aquifers and Aquitards Through the Y9-A Study Area, Along HEPC

Aquifers and aquitards	Description	Thickness
Alluvial deposits	Surficial alluvial deposits.	Varies
Oak Ridges Moraine Complex (Aquifer)	These sediments consist mostly of silt and fine sand, but also include gravel and minor clay and diamicton. The aquifer is generally unconfined, except the section covered by Halton Till on the south flank of the ORM complex. The sediments slope up towards the north.	Ranges between 4 to 10 m
Channel silt (Aquitard)	Silt deposits. The sediments slope up towards the north.	Ranges between 14 to 24 m
Undifferentiated upper sediments recent deposits (Aquifer)	An unconfined aquifer consisting of discontinuous fill and unconsolidated overburden deposits. Deposits surface towards the east of the study area.	Varies
Newmarket Till (Aquitard)	A continuous layer that acts as an aquitard to the underlying Thorncliffe Formation. Deposits surface towards the east of the study area.	Varies
Thorncliffe Formation (Aquifer)	Regionally recognized as a highly productive confined aquifer and is laterally continuous.	Varies, but has been observed at 5 to 9 m depth near the HEPC

Refer to Table 4.21 regarding details on anticipated aquifers and aquitards within the study area, along Greenlane East.

Table 4.21 Aquifers and Aquitards Through the Y9-A Study Area, Along Green Lane East

Aquifers and aquitards	Description	Thickness
Oak Ridges Moraine Complex (Aquifer)	These sediments consist mostly of silt and fine sand, but also include gravel and minor clay and diamicton. The aquifer is generally unconfined, except the section covered by Halton Till on the south flank of the ORM complex. ORM is at surface towards the west and pinches out towards the east.	Varies
Channel silt (Aquitard)	Silt deposits.	Ranges between 6 to 12 m
Undifferentiated upper sediments recent deposits (Aquifer)	An unconfined aquifer consisting of discontinuous fill and unconsolidated overburden deposits. Deposits surface towards the east of the study area.	Varies
Newmarket Till (Aquitard)	A continuous layer that acts as an aquitard to the underlying Thorncliffe Formation. Deposits surface towards the east of the study area.	Varies
Thorncliffe Formation (Aquifer)	Regionally recognized as a highly productive confined aquifer and is laterally continuous.	Varies but has been observed at 42 mbgs near the east end of the alignment near Leslie Street and Green Lane East intersection

Multiple private wells near intersection of Leslie Street and Green Lane East.

4.8.2.2.3 Surface Water

There is one sub-watershed within the study area, the HREB. The study area has four tributaries of the HREB flowing through it. Three of the tributaries cross Bayview Parkway via culvert. However, the HREB does not cross any major roadway within the study area.

Other surface features of interest include the following:

– Unnamed warmwater watercourse.
– Unnamed watercourses running parallel with the HREB that connect into the unnamed tributary which runs adjacent to the south border of the facility.
– Wetland.

The study area contains ecologically significant wetlands, areas under the GP and areas associated with the Regional Greenlands System regulated under the LSRCA.

Each watercourse within the study area is considered the have a warm thermal regime, with flow moving south to north. Surrounding land use is primarily residential, with some natural green spaces and parks. The riparian characteristics of this portion of the HREB shows a relatively wide, grassy vegetated floodplain, with sparse trees and gentle sloping along the banks. Parts of the channel both within the riparian floodplain and stream channel, have been confined with concrete walls. Small grassy islands persist throughout the reach. Fish presence has been noted in each of the watercourses in the study area.

Refer to Figure 4.16 for a surface water map of existing conditions within the study area.

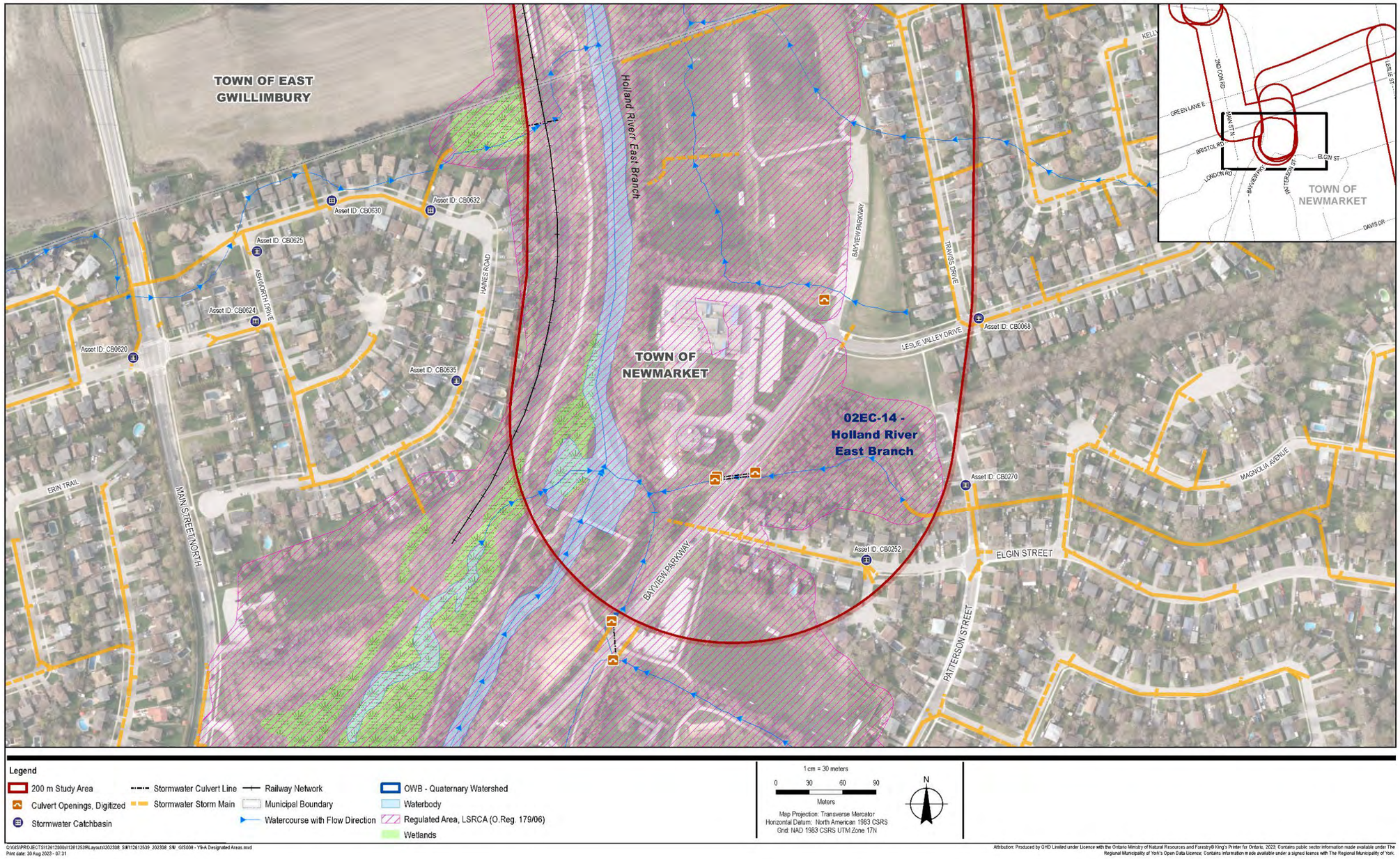


Figure 4.16 Y9-A Study Area Surface Water Map for Existing Conditions

4.8.2.2.4 Natural Heritage Characterization

The study area contains unevaluated wetlands, tributaries and a portion of the HREBs.

Aquatic Habitat

The study area has the HREB flowing through it, along with four tributaries of the HREB. Each watercourse within the study area is considered the have a warmwater thermal regime, with flow moving south to north. Surrounding land use is primarily residential, with some natural green spaces and parks. The riparian characteristics of this portion of the HREB shows a relatively wide, grassy vegetated floodplain, with sparse trees and gentle sloping along the banks. Parts of the channel both within the riparian floodplain and stream channel, have been confined with concrete embankments. Small grassy islands persist throughout the reach.

Fish presence has been noted in each of these watercourses. Based on this fish community, the HREB within this study area and its tributaries are expected to support primarily forage/baitfish species with limited warmwater sportfish present. No redside dace have been recorded within this study area.

Terrestrial Habitat

The lands in the study area consist mainly of institutional, medium density residential and woodland communities, with the HREB flowing south to north, just west of the existing SPS in the study area. A large portion of the study area sits at a lower elevation within the HREB valley, with the housing developments on the eastern and western extents perched on the valley's edge. The focus of the study area is the woodland communities which run along the HREB and border the existing SPS on the west and south sides.

All natural and cultural communities present within the study area are considered common in the province.

Significant Wildlife Habitat

Potential Candidate SWH for Region 6E as defined by MNRF has been identified in several natural areas within the study area. The greatest concentration of these potentials is likely to be found in wetland and shoreline habitats associated with the study area. A screening and analysis of all ELC communities was completed in the study area for Seasonal Concentration Areas of Animals, Rare Vegetation Communities or Specialized Habitat for Wildlife, Habitat for Species of Conservation Concern and Animal Movement Corridors.

4.8.2.2.5 Areas of Potential Environmental Concern

A review of information from the Environmental Risk Information Services database was completed for properties located within the study area. The review was completed on May 26, 2023, to visually confirm the current land use and associated potential for containing subsurface environmental contamination. This "windshield-level" survey showed that:

– Various residential and commercial properties are present along the majority of the study area
– Some agricultural and Industrial land use are present within the study area.

No areas of at-risk of existing contamination were identified for this study area.

4.8.3 Conceptual Design

Conceptual design for this station was based on flow rates and design criteria as described in Chapter 3.

Table 4.22 summarize the general characteristics and features that will be present from initial construction through to final configuration as well as the staged aspects of construction that will adjust over time to suit the needs of the system based on forecast populations and flow rates as shown in Table 4.22.

Refer to Appendix A, Sheet 4 for the conceptual design drawings relevant to this project.

4.8.3.1 Design Basis

Table 4.22 Staged Sewage Pumping Station Conceptual Design Characteristics for Y9-A Newmarket East SPS

Design aspect	2031	2041	2051	Comments
Modelled peak flow (L/s)	Not applicable (N/A)	1,500 x 52 m total design head (TDH)	1,750 x 46 m TDH	Station total flow rate target under peak event conditions.
Number of pumps	N/A	4, 3 duty +1 standby	4, 3 duty +1 standby	Nominal number of pumps includes main pumps only. Does not include smaller pumps that may be considered during subsequent design stages to manage low-flow conditions.
Number of forcemains in service	N/A	1	2	Forcemain size has been selected based on a single forcemain conveying 70% of the ultimate peak flow of the station.
Nominal firm capacity (L/s)	N/A	1,590	1,900	Firm capacity is based on installed pumps with N+1 configuration (capacity available with the largest pump out of service).

4.8.3.2 Description of Design

The location of the proposed Newmarket East SPS has been selected within a greenspace located in a close proximity to and just north of the existing Newmarket SPS. It will be the terminus of Y12-B.

The conceptual level design includes a site footprint for above-grade infrastructure modelled from construction works at stations of similar size currently under construction.

The facility footprint shown allows for separate rooms for electrical systems, control systems, servers, programmable automation controller (PAC) panels, washrooms, office, storage rooms and maintenance bays for equipment. An air management system footprint has been extrapolated from similar sized facilities. It is based on servicing requirements, maintaining a slightly negative pressure within the wet well under most operating conditions and treating the collected air prior to discharge. The odour system is not sized to manage the high rate of ventilation air flow required for staff entry to the wet well area.

The power supply to the facility has been conceptualized to include built-in redundancy, including a dual power feed from the utility, a dual transformer and a main-tie-main configuration to permit feeding of critical loads from either utility connection or either transformer. Standby power in the conceptual design includes diesel generators and fuel tanks, which is consistent with York Region's current approach of providing redundant power supply to SPS facilities. Generators are located within the building for ease of maintenance and to reduce emitted sound. Noise modelling, additional silencing or sound attenuation required to meet current standards will be determined during detailed design.

The overall footprint for the above-grade conceptual infrastructure is approximately 55-m long x 30-m wide, not including any access roads or driveways. The detailed design stage will incorporate the latest requirements for applicable codes, standards and York Region design guidelines for this SPS.

The Newmarket East SPS is a new pumping station, considered a large station by the York Region design guidelines, requiring a wet well/dry well configuration with pumps mounted in the vertical orientation. The station will include a split wet well with benching, access platforms and ventilation per National Fire Protection Association (NFPA) 820 and Occupational Health and Safety Act (OHSA) requirements.

The dry well will have bays for a total of six pumps, with three pumps connected to each cell of the wet well. Pumps will be mounted vertically in a dry-pit configuration. Pump riser and discharge header piping is based on York Region standards using stainless steel pipe and knife gate or plug valves depending on the size and function of the valve.

A common discharge header will allow pumps to operate with both forcemains in combined or independent configurations.

There is a space allowance set aside for surge tanks at the facility, with footprint allocated based on extrapolation from similar sized facilities.

General supporting components such as sumps, access platforms and stairs and lifting equipment have also been included in the generation of the anticipated footprint, layout and costing, based on use within similar York Region facilities.

Table 4.23 describes relevant design aspects for the Newmarket East SPS.

Table 4.23 General Sewage Pumping Station Conceptual Design Characteristics for Y9-A Newmarket East SPS

Design aspect	Value	Comments
Above-grade anticipated footprint of buildings and infrastructure	55-m x 30-m wide	Facility footprint based on recent design and construction of similar capacity facilities.
Overflow control/location	HREB, similar to existing Newmarket SPS	
Discharge forcemain diameter	2 x 1,050-mm nominal diameter	
Power supply	4,160 V	Medium voltage.
Standby power capability	Diesel standby generators	Redundant standby power generation.
Air management	Yes	A portion of the planned footprint has been allocated to integrated air management.

4.8.3.3 Construction Methods

The SPS will generally be constructed as circular wet well/dry well below grade to the depths required with ancillary structures as needed above grade.

Primary incoming and outgoing infrastructure is anticipated to be constructed via trenchless technology and connections in the yard to the SPS will be made via open cut excavation.

4.8.3.4 Property Requirements

The proposed infrastructure concept is located on property that is not currently owned by York Region, and therefore GHD recommends the York Region undertake a property selection process to select a final site for the SPS in the vicinity of the existing Newmarket SPS. Any development on this property may require compensation for loss of the East Holland River floodplain storage. Additional property may be required to fulfill this need, and this will be considered during design development.

Temporary and permanent property easements will be required for construction and operation of the SPS. Permanent property requirements will depend on the final location of the shafts, which are expected to contain a manhole structure that must be accessible by York Region staff for sewer maintenance purposes. The Y9-A SPS will have final connections to the Y12-B gravity sewer and connections to what will then be an existing 900-mm diameter forcemain to the Newmarket Pump Station.

Proposed property locations are conceptual only. Details related to property easement requirements will be confirmed during detailed design.

4.8.4 Environmental and Community Impacts and Mitigation

Desktop studies were done to determine the possible extent of these impacts and to propose mitigation measures that would reduce the likelihood and the consequences should they occur. The major impacts and associated mitigation approaches are described in this section. The assessment criteria and indicators are provided in Table 4.24 and Table 4.25, corresponding to each of the environments (social and built, natural, cultural and traffic impacts) together with a potential effects assessment and identification of avoidance, mitigation and compensation measures for the project.

Table 4.24 Y9-A Newmarket East SPS Upgrades Social and Built Environment Effects and Mitigation

Item no.	Criteria	Indicators	Potential effects (Positive/Negative)	Avoidance/Mitigation/Compensation
Social and built environment				
SB-1	Effect on existing views	– Changes are predicted in views from residences in the surrounding area	– Change in existing views from the rear yards of residences along the west side of Travis Drive.	– Site the proposed SPS to minimize the number of views from residences. – Design the proposed SPS to be architecturally and aesthetically pleasing. – Design and implement a landscape plan for the site to screen the proposed SPS.
SB-2	Effect on existing residences, businesses and/or community, institutional and recreational facilities	– Displacement of residences, businesses and other facilities is too great – Temporary or permanent disruption to residences, businesses and other facilities near construction compounds or permanent works is too great	– No displacement of residences, businesses, or community and institutional facilities are anticipated. However, a Town of Newmarket soccer field may be removed. – Disruption to residences, businesses and community, institutional and recreational facilities in proximity to construction compounds/permanent installations.	– Locate the proposed SPS to avoid the removal of the Town of Newmarket soccer field. – If avoidance is not feasible, then consider relocating the soccer field to an alternate location in the vicinity. – Apply standard construction-related mitigation measures to minimize the disruption effects.
Traffic and transportation				
TT-1	Effect on existing rail/bridge infrastructure	– One or more of rail crossings or large infrastructure impacted	– At the rail west of the SPS, we do not anticipate the compound area or traffic management to extend within the rail ROW.	– Coordination with Metrolinx during design development to limit impacts to their rail services.
TT-2	Effect on traffic	– Traffic flows are disrupted too much – Construction occurs too close to congested traffic zones	– Minimal traffic disruption at location of SPS compound, shoulder lane may be used to allow for truck loading/unloading. – Traffic movement in to and out of construction compound sites will impact cycling and traffic flow on Bayview Parkway. – Impacts to public transit involving potential rerouting of buses and/or relocation of stops. – Coordination of alternate routing for emergency service vehicles, if needed.	– Where possible, maintain one lane in each direction. This could be achieved through flagging, temporary signals or temporary road widening. – Pedestrian movement should be maintained during construction, with marked pedestrian detours as applicable. – Consider special traffic arrangements for peak hours should be considered in traffic flow directions in the morning and afternoon. – Make special provisions for emergency service vehicle access. – Make special provisions for pedestrian traffic and safety, including signals, detours and winter maintenance. If feasible, move construction traffic to sideroads.
Utilities				
U-1	Conflict with buried utilities	– Sewer connection or SPS shaft is in direct conflict or falls within clearance limits of nearby utilities	– New construction impacts existing utilities and requires design coordination with utility owners which increases project cost and schedule.	– Review historic and as-built documents for utility data. – Complete a SUE investigation to identify high risk utilities, including large and/or critical service utilities (e.g., large watermains and all gas mains). – If required, relocate existing utility, or move proposed excavation to mitigate conflict.
U-2	Conflict with surface or overhead utilities	– Excavation of shaft is proposed in location of surface infrastructure – Shaft working compound equipment including cranes will require working directly under overhead utilities or within the hydro wire exclusion zone	– Overhead infrastructure such as electrical or communications cabling is mounted on utility poles between 5 and 12 m above the surface. Depending on the required crane size and operating radius to construct the shaft and lower the tunnel boring machine (TBM), equipment extents may fall within hydro line exclusion zone, or hit overhead wires causing worker harm or death.	– Working compounds will be designed to allow appropriate and safe movement of workers and equipment around the site, away from live overhead wires or surface utility boxes, based on known utility information and topographic surveys. – If required, relocate existing utility, or move proposed excavation to mitigate conflict.
Noise and vibration				
N-1	Operation noise	– Complaints from residents within study area	– Noise disruptions to private residents and commercial areas post-construction, near SPS locations or upgrades.	– Any permanent facility, such as new SPS, SPS upgrades, or supporting air management facilities, will require an ECA application under Section 9 of the Environmental Protection Act to document the noise emissions compliance. – Investigate degree of risk and impact in further detail.

Item no.	Criteria	Indicators	Potential effects (Positive/Negative)	Avoidance/Mitigation/Compensation
N-2	Construction noise	– Complaints from residents within study area	– Noise disruptions to private residents and commercial areas during construction, near construction compounds for new SPS or existing SPS upgrades.	– Propose construction noise monitoring per MECP NPC-115 Construction Equipment requirements. – Consider completing noise monitoring for the duration of the construction and notify the contractor of any exceedances so that corrective action/contingency actions can be implemented. – Use vehicles and equipment (cranes and excavators) with efficient muffling devices or construct enclosures. – Comply with local noise by-laws.
V-1	Construction vibration	– Complaints from residents within study area	– Disruptions to private residents and commercial areas during construction, near construction compounds for new SPS or existing SPS upgrades.	– Propose appropriate construction vibration benchmarks within the tender documents. – Consider pre- and post-construction condition photos.
Air quality and odour				
O-1	Operation odour at SPS and existing or proposed sewer connection	– Odour near SPS and surface connections	– There is potential for odour release due to turbulence at the existing (or upgraded) SPS and at the connections from sewer to SPS.	– Consider implementation of ventilation design systems with odour control. – Extents of risk and impact, will be reviewed in further detail upon investigation.
A-1	Construction dust at SPS location	– Fugitive dust is generated – Air quality is poor	– Fugitive dust is generated during construction (or upgrades) of SPS and related infrastructure.	– Develop a BMPP to be included in the project Construction Management Plan. – Mitigation should be aimed at minimizing emissions of particulate matter and exposure to particulate matter during the construction phase of the project.

Table 4.25 Y9-A Newmarket East SPS Upgrades Natural Environment Effects and Mitigation

Item no.	Criteria	Indicators	Potential effects (Positive/Negative)	Avoidance/Mitigation/Compensation
Hydrogeology				
N-1	Effect on groundwater quantity	– Temporary and/or long-term change in groundwater quantity	– No long-term change to groundwater quantity is anticipated, because no water takings are required during operation of the sewer. – Potential temporary change to groundwater quantity, temporary water takings may be required to facilitate construction. – Reduction in groundwater quantity resulting in impact to other groundwater users (private well impacts). – Potential ground settlement as a result of active dewatering/depressurization. – Change in shallow groundwater flow patterns resulting from operation of sewer pipe resulting from increased I&I and/or preferential movement of groundwater within trench sediments.	– Implement construction methods that minimize dewatering requirements. – Establish pre-construction baseline groundwater quality and quantity conditions and develop implementation plans for monitoring during and post-construction (install and monitor wells and surface water).
N-2	Effect on groundwater quality	– Temporary and/or long-term change in groundwater quality	– Potential temporary change to groundwater quality, temporary water takings may be required to facilitate construction. – Temporary water takings may be required to facilitate construction. – No long-term change to groundwater quality is anticipated. – Potential effects on groundwater water quality as a result of potential mobilization of contaminated water where active dewatering/depressurization is required. – Reduction in groundwater quality from spills or the mismanagement of fuel/chemical in work areas.	– Implement construction methods that minimize dewatering requirements. – Develop and implement a spills response plan for construction to mitigate the effect of a spill should one occur. – Establish pre-construction baseline groundwater quality and quantity conditions and develop implementation plans for monitoring during and post-construction (install and monitor wells and surface water).
N-4	Effect on private wells - temporary construction dewatering	– Temporary construction dewatering private well interference (quantity/quality)	– Temporary decrease in private well quantity/quality could occur during construction activities depending on the location, depth and construction, methodology and duration.	– Implement construction methods that minimize dewatering requirements. – Address construction dewatering private well interference complaints through existing York Region private well assessment and mitigation policy. – Proactively identify any high-risk wells during design and prepare site-specific preventative mitigation and corrective action plans as part of design. Corrective actions should align to York Region's private well assessment and mitigation policy.

Item no.	Criteria	Indicators	Potential effects (Positive/Negative)	Avoidance/Mitigation/Compensation
N-5	Effect on private wells – long-term	– Long-term private well interference (quantity/quality)	– No long-term groundwater quantity/quality interference is anticipated.	– If needed, establish pre-construction baseline groundwater quality and quantity conditions and develop implementation plans for monitoring during and post-construction (install and monitor wells and surface water). – Proactively identify any high-risk wells during design and prepare site-specific preventative mitigation and corrective action plans as part of design. Corrective actions should align to York Region's private well assessment and mitigation policy.
N-6	Effect on surface water quantity/quality	– Temporary changes in surface water	– Temporary changes in surface water could occur during construction activities depending on the location, depth, construction, methodology, timing and duration. – A high groundwater table resulting in groundwater/surface water interaction would be expected due to existing soils and anticipated presence of the ORM aquifer. – The proposed SPS is within the floodplain.	– Field verification of groundwater-surface water interaction suggested for watercourses and wetlands within the study area. – Complete outlet receiver assessment(s) should temporary groundwater discharge be required to surface water. Establish pre-construction baseline surface water quality and quantity conditions and develop implementation plans for monitoring during and post-construction. – Implement/construct treatment (i.e., settlement tanks, etc.) of construction water prior to discharge to storm sewer/surface water. – Minimize construction area disturbance and duration. Implement erosion and sedimentation control measures (e.g., silt fencing, check dams, etc.). – Adhere to fish timing windows to prevent negative impacts on known sensitive fish species within the study area. – Consider completing a geomorphology study during design. – Refer to the Natural Heritage section of the table for further mitigation approaches associated with surface water impacts.
Geotechnical				
G-1	Effect on soil quality	– Contaminant seepage into soil during excavation of shaft	– Chemicals such as drilling fluids, lubricants, ground improvement material, or fuel from construction equipment may contaminate soil.	– Perform regular equipment checks and maintenance. – Prepare an environmental management plan prior to construction in case of contamination.
G-2	Soil movement around shafts	– Vertical or horizontal ground movement around shafts and/or along tunnel during and post excavation – Deformation or damage to nearby structures and/or utilities	– Ground heave/settlement/horizontal shift at surface around shafts. – Deformation or damage to nearby structures and utilities, which may require rehabilitation or repair (e.g., crack formation, angular rotation, strain, pipe joint rotation or pull out).	– Select shaft or open cut construction method and support of excavation (SOE) appropriate with depth, size and geotechnical and hydrogeological conditions at shaft or open cut locations. – Complete soil displacement analytical assessments at all shaft locations.
G-3	Encounter contaminated soil during shaft excavation	– Soil encountered during shaft excavation is tested to surpass allowable contaminant levels	– Spoil must be dispatched at an approved contaminated soil disposal site.	– Complete appropriate geotechnical investigations and contaminants testing during design development to identify confirmed contaminated soil locations or at-risk areas based on historical land use. – Identify and confirm availability of appropriate soil disposal sites based on anticipated contaminants for use during construction.
Natural heritage				
EG-1	Effect on aquatic habitat or functions	– Watercourse in study area supports a warmwater thermal regime – Study areas contain wetlands that have not been evaluated.	– Temporary or permanent loss of aquatic features or categorical loss of functions by type, including PSWs, Locally Significant Wetlands, watercourses by sensitivity type and others. – During construction water quality may be impaired due to elevated TSS in surface water runoff from study area locations which can affect aquatic species/habitats. Some concentrations above background may occur temporarily. – Change in surface water temperature from groundwater taking and/or discharge to surface water features. – Potential spill hazard when refuelling equipment.	– Need to complete site investigations to evaluate potential effects on aquatic habitat function. – Implement best management practices to control surface water runoff and minimize TSS effects. – Where feasible, discharging of surface water during construction should be directed into the municipal storm sewer system to mitigate thermal impacts to watercourses. Should discharge of surface waters be directed to watercourses, additional mitigation measures would need to be adhered to (e.g., enhanced erosion and control measures). The use of erosion and sediment control measures and timing of construction to avoid spawning and egg incubation periods will reduce the potential for effect to fish and aquatic life. – Conduct equipment maintenance and refuelling at the designated and properly contained maintenance areas or at industrial garages located well away from creek banks, wetlands and outside vegetation areas. – Develop a Spill Prevention Plan.

Item no.	Criteria	Indicators	Potential effects (Positive/Negative)	Avoidance/Mitigation/Compensation
EG-2	Effect on stream geomorphology	– Watercourse present within the study area.	– Change in geomorphic form/function/stability in affected channels.	– Employ erosion and sediment controls to limit deposition of construction-mobilized soils into watercourses. – Consider completing a geomorphology study during design, where applicable.
EG-3	Effect on aquatic species including SAR, species of local concern, native species and invasive species	– Aquatic species.	– Number and type of aquatic species potentially affected temporarily or permanently. – No anticipated impacts to aquatic SAR as there are no aquatic SAR identified within the study area.	– Preventing death of fish or impacts to downstream fish habitat through the use of appropriate timing windows.
EG-4	Effect on terrestrial habitat or functions	– Study area contains ecologically significant forests. – Wildlife habitat	– Temporary or permanent loss of natural heritage features (e.g., ESAs, ANSIs, wildlife corridors and others). – Potential effects on terrestrial habitat (e.g., direct vegetation (and wildlife habitat) loss, alteration and fragmentation) may occur from the physical footprint of study area locations. – Project preparation, construction and operation may increase the risk of nest destruction and mortality of migratory birds.	– Site investigations to evaluate potential terrestrial habitat function/significance. – During design, prepare construction constraints with consideration of timing windows to mitigate where possible, vegetation clearing to occur outside of the migratory bird nesting season, bat maternity roosting season, turtle overwintering and amphibian breeding. – Limit the area of project footprint and limit disturbance during construction and operations phases. – The presence of wildlife will be monitored and communicated to site personnel. – Vehicle use will be restricted to designated areas. – Where practical, rehabilitate habitat for plants and wildlife.
EG-5	Effect on terrestrial species, including SAR, species of local concern, native species, invasive species and area-sensitive species	– SAR have the potential to occur within the study areas, including amphibians, insects, birds, reptiles, mammals and tree species	– Number and type of terrestrial species potentially affected temporarily or permanently. – Construction activities have the potential to disturb wildlife within adjacent natural heritage areas. – Project preparation, construction and operation may increase the risk of nest/habitat destruction and mortality of terrestrial SAR. – Project may result in wildlife-vehicle collisions and may cause injury/mortality to individual animals.	– Site investigations to evaluate potential occurrence of terrestrial SAR within the study area. – During design, prepare construction constraints with consideration of timing windows to mitigate where possible, vegetation clearing to occur outside of the migratory bird nesting season, bat maternity roosting season, turtle overwintering and amphibian breeding. – Clearly demarcate work limits at outset of construction and minimize unnecessary vegetation clearing.

4.9 Y11-A Queensville East SPS

4.9.1 Study Area

The proposed Y11-A Queensville East SPS has been located on Queensville Sideroad for conceptual design purposes. Final location will be selected considering the impacts and mitigation, results of field studies, procurement requirements and detailed design. This is consistent with the York Region Master Plan 2022, to service growth in parts of Queensville. This station will convey flows collected by local sanitary systems to the east end of the existing Sharon Trunk gravity sewer, though the proposed Y11-B Queensville East SPS Forcemains.

A study area of approximately 200 metres wide was applied surrounding the potential site for the pumping station as shown in Figure 4.17., however the new pumping station could be located anywhere within this study area or overlapping linear project study areas. In some instances, the study area for the new pumping stations was increased to accommodate for alternative sites.

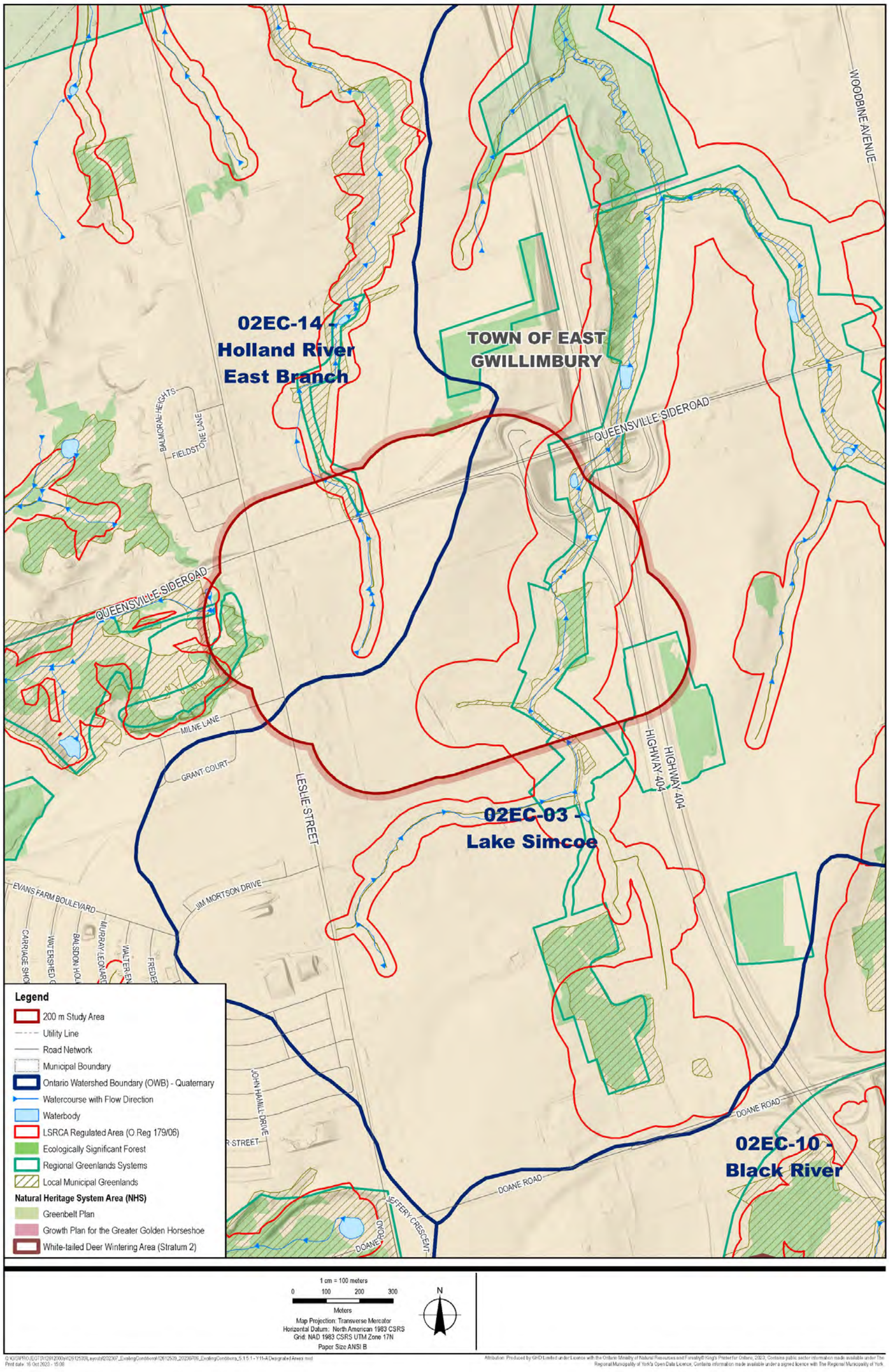


Figure 4.17 Study Area for Y11-A Queensville East SPS

4.9.2 Existing Conditions

4.9.2.1 Social and Built Environment

The following sections will summarize the findings of the desktop studies completed within the study area, including planning and land use, traffic and transportation and utilities.

4.9.2.1.1 Planning Policy and Land Use

Existing Land Use

Land use within the Y11-A study area consists of the following:

– Agricultural use and open space at the centre of the study area and along the north boundary
– Highway 404 ramps
– Institutional/community uses, including a fire station, Canada Post office and Park and Ride located on the north side of Queensville Sideroad East and a church and East Gwillimbury YMCA on the east side of Leslie Street
– Recreational uses (e.g., baseball diamond, tennis court) located on the north side of Queensville Sideroad East approaching Leslie Street
– Commercial uses (e.g., farm supply store, restaurant, pharmacy and auto mechanic) located on the south side of Queensville Sideroad East and east side of Leslie Steet
– Low density residential along Queensville Sideroad East and Leslie Street.

Planning Policy

Regional

The York Region Official Plan 2022 (June 2023 Office Consolidation) designates lands within the study area as Community Area. Additionally, lands adjacent to the watercourse in the eastern portion of the study area are part of York Region's Greenlands System.

Local

With reference to the East Gwillimbury Official Plan 2010 (2018 Office Consolidation), the lands in the study area are part of the Queensville Secondary Plan and are designated as Community Area, Post-Secondary Institution, Environmental Protection Area, Neighbourhood Commercial and Low Density Residential (a special provision was issued December 2012 to permit a gas station and drive-though on lands designated Low Density Residential adjacent to the Neighbourhood Commercial Area).

Additionally, the Queensville Secondary Plan anticipates the following developments within the Y11-A study area:

– A proposed collector road (north south)
– A proposed park and proposed elementary school set back from Leslie Street.

Active Development Applications

Existing property use has been described using the following data available to GHD:

– Orthoimagery from spring 2022
– Google Earth images
– Farm Tax Program data from 2023 tax year
– Property assessment type via GeoWarehouse (accessed August 2023).

There are no active development applications within the site study area limits of Y11-A.

4.9.2.1.2 Transportation in the Study Area

Leslie Street between Jim Morrison Drive and Queensville Sideroad, is a two-lane collector road with paved shoulders on both sides of the road and a sidewalk on the west side, also shown in Figure 4.18.

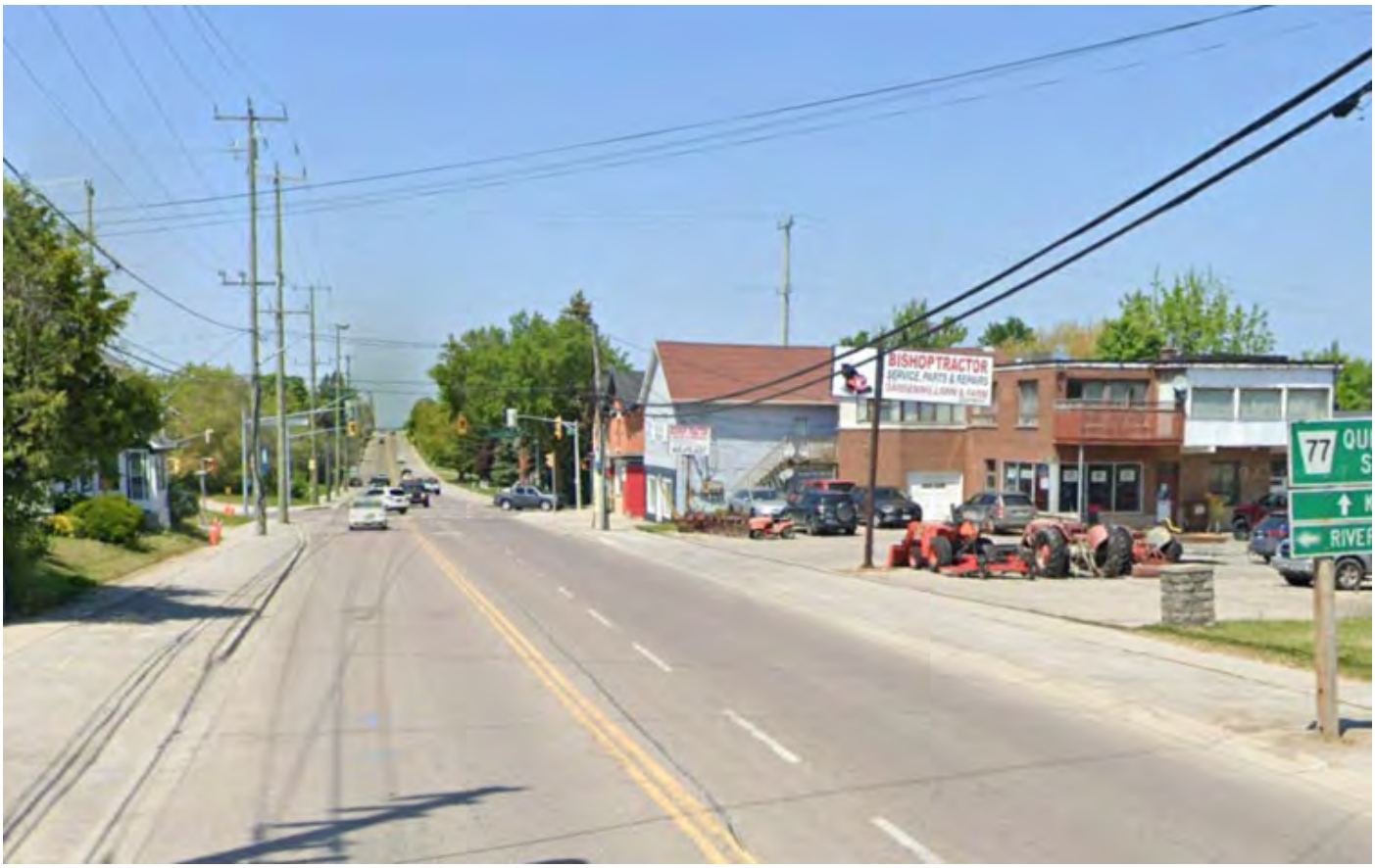


Figure 4.18 **Leslie Street Looking North Towards Queensville Sideroad. (*Google Maps* "Streetview," digital images http://maps.google.com)**

The AADT along Leslie Street between Milne Lane and Queensville Sideroad has been counted at 9,980, based on the latest available 2014 data, respectively. Historical AADT data along the study area are presented in Table 4.26.

Table 4.26 **Leslie Street AADT Counts Between Milne Lane and Queensville Sideroad**

Description of road limits	2012	2014	2022	2023
Milne Lane and Queensville Sideroad	9,703	9,980		

There is one public transit route running along Leslie Street with associated bus stop infrastructure, within the study area, which is YRT Route 50. There are no rail crossings within the study area.

4.9.2.1.3 Utilities in the Study Area

There are several above/below grade utilities situated within the study area corridor and in the vicinity of the proposed project. These utilities may be temporarily impacted during the construction of SPS, shaft and work compounds. Formal notification and consent would be required from the authorities responsible for these utilities prior to construction.

Buried utilities are typically located within the following limits:

– Shallow-buried electrical and communications cabling are commonly buried between 1.2 and 1.5 mbgs.
– Shallow-buried storm drains, sanitary sewers and watermains are typically buried between 1.2 and 3.5 mbgs.
– Deep-buried utilities are defined as anything buried more deeply than the depths mentioned above.

Known municipal infrastructure that existed on York Region's GIS database has been provided within the drawing set. A detailed utility investigation program, which would include a "Level A through D" subsurface utility exploration, would be required as part of future site investigations.

4.9.2.2 Natural Environment

The following sections will summarize the findings of the desktop studies completed within the study area for geotechnical, hydrogeology, surface water, natural heritage and contamination.

4.9.2.2.1 Geotechnical

The study area for Y11-A is located near the southwest corner of the intersection of Highway 404 and Queensville Sideroad East. The study area is bordered on the west by residential area/farmland and by farmland on the remaining three sides, within the boundaries of the Town of East Gwillimbury.

It should be noted that no site-specific reports or borehole records were encountered within the study area.

Based on the Quaternary geology mapping, the native deposit within the study area predominantly comprised sandy silt to silt matrix (Newmarket Till), mostly consisting of Pleistocene deposits.

The bedrock consists of shale, limestone, dolostone, siltstone (Georgian Bay Formation, Blue Mountain Formation, Billings Formation). Typically, bedrock is mapped at depths of 95 to 119 mbgs within the study area and will not be reached during construction.

4.9.2.2.2 Hydrogeological

A hydrogeological desktop review was undertaken within the study area using information from MECP well records, the MECP Source Protection Information Atlas, the ORM database and the Ontario Geological Survey database. Available hydrogeological reports for projects within the area were also reviewed.

The majority of SPS structure is anticipated to intersect low permeability fine textured glaciolacustrine deposits and high water table, approximately 3 to 19 mbgs. Local coarse textured glaciolacustrine deposits and interstadial deposits are also anticipated to be intersected within the construction depth (14 mbgs, shallow sand aquifer 10 to 20 mbgs). Temporary water takings may be required to facilitate construction. The SPS is located within source water protection WHPA-D. There is potential for temporary change in groundwater (quantity, quality) because construction may intersect a shallow aquifer.

Refer to Table 4.27 regarding details on anticipated aquifers and aquitards within the study area.

Table 4.27 Aquifers and Aquitards Through the Y11-A Study Area

Aquifers and aquitards	Description	Thickness
Undifferentiated sediments underly topsoil	Surficial alluvial deposits.	Maximum 19 m.
Oak Ridges Moraine Complex (Aquifer)	These sediments consist mostly of silt and fine sand, but also include gravel and minor clay and diamicton. The aquifer is generally unconfined, except the section covered by Halton Till on the south flank of the ORM complex.	Varies up to 6 m. As the structure approaches Mount Albert Road (~last 50 m), ORMC thickness greatly increases.
Newmarket Till (Aquitard)	A continuous layer that acts as an aquitard to the underlying Thorncliffe Formation. Deposits surface towards the east of the study area.	Ranges between 41 to 65 m.
Thorncliffe Formation (Aquifer)	Regionally recognized as a highly productive confined aquifer and is laterally continuous. Confined aquifer.	Ranges between 22 to 24 m.
Sunnybrook Drift, Scarborough Formation (Lower Aquitards)	Sunnybrook Drift: A continuous layer that acts as an aquitard to the underlying Scarborough Formation. Scarborough Formation: A confined aquifer that is discontinuous and appears to consist of channel fill deposits that roughly dip to the east.	Ranges between 20 to 22 m.

4.9.2.2.3 Surface Water

There are two sub-watersheds within the Y11-A study area, the HREB and Lake Simcoe. The area has two watercourses mapped within it. One watercourse is located on the eastern portion of the study area and is a warmwater headwater feature that flows northwards under Queensville Sideroad East for approximately 1 km before draining into a small pond outside of the study area. A second headwater drainage feature is mapped centrally within the study area and flows in a north direction through a narrow-vegetated strip between two agricultural fields. The surrounding land use around these watercourses are dominated by agricultural fields with the majority of the channels flowing either through or adjacent to active farm fields. The riparian area is dominated by grasses, sedges and *Phragmites spp.,* with high abundance of overhanging vegetation cover.

The Maskinonge River Wetland Complex is a PSW found along the channel and floodplain of the Maskinonge River. This wetland complex is present within the Y11-A study area, found on the eastern portion of the study area along the banks of the Maskinonge River headwaters also present within the study area. LSRCA regulated area is present within the Y11-A study area surrounding the wetlands and watercourse features.

Other surface features of interest include the following:

– Two warmwater headwater features
– Maskinonge River headwaters
– Maskinonge River wetland complex.

Refer to Figure 4.19 for a surface water map of existing conditions within the study area.

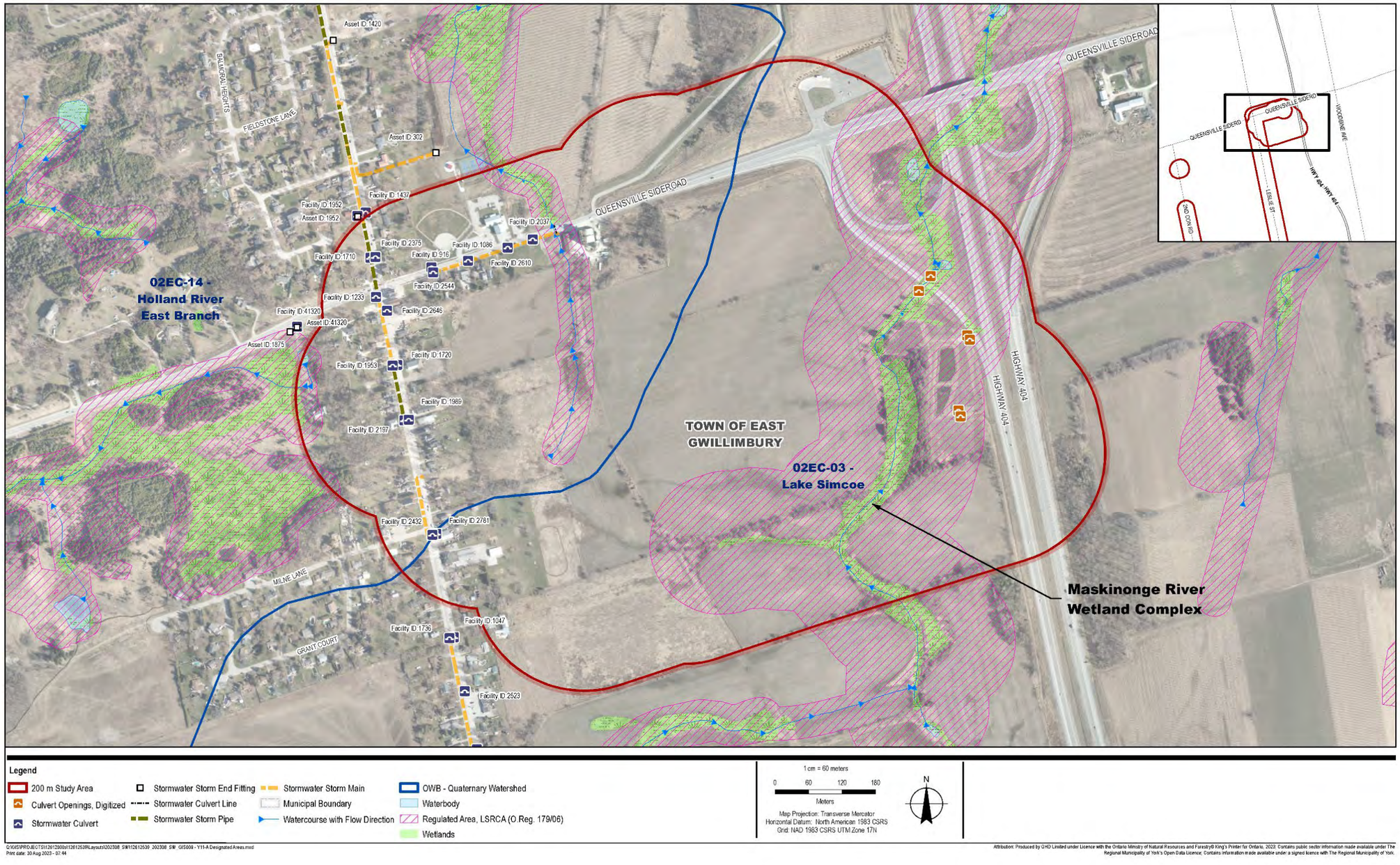


Figure 4.19 Y11-A Study Area Surface Water Map for Existing Conditions

4.9.2.2.4 Natural Heritage Characterization

The study area contains forests, unevaluated wetlands and PSWs.

The Maskinonge River Wetland Complex is a PSW found along the channel and floodplain of the Maskinonge River. This wetland complex is present within the eastern portion of Y11-A study area, along the banks of the Maskinonge River headwaters (which are also present within the study area). LSRCA regulated area is present within the Y11-A study area surrounding the wetlands and watercourse features.

Aquatic Habitat

The study area Y11-A has two watercourses mapped within the study area. One watercourse is located on the eastern portion of the study area and is a warmwater headwater feature that flows northwards under Queensville Sideroad East for approximately 1 km before draining into a small pond outside of the study area. A second headwater drainage feature, that of the Maskinonge (Jersey) River, is mapped centrally within the study area and flows in a north direction through a narrow-vegetated strip between two agricultural fields. The surrounding land use around these watercourses are dominated by agricultural fields with the majority of the channels flowing either through or adjacent to active farm fields. The riparian area is dominated by grasses, sedges and *Phragmites spp.,* with high abundance of overhanging vegetation cover. Sparse deciduous trees can also be seen growing stream side in some areas.

Fish presence has been noted in these watercourses. Based on this fish community this stream supports bait/forage fish but is unlikely to support many warmwater sportfish due to habitat conditions. No redside dace have been recorded within this study area.

Terrestrial Habitat

The lands in the study area consist mainly of agricultural land and low-density residential communities, with small pockets of woodland and wetland communities along the periphery of the study area. This study area sits at the north edge of the project boundary and faces little pressure from competing development. The focus of the study area is the expansive agricultural area that dominates this region.

All natural and cultural communities present within the study area are considered common in the province.

Significant Wildlife Habitat

Candidate SWH for Region 6E as defined by MNRF was identified in several natural areas within the study area. The greatest concentration of these candidate features is associated with the PSWs and ESAs wetland and woodland habitats. A screening and analysis of all ELC communities was completed in the study area for Seasonal Concentration Areas of Animals, Rare Vegetation Communities or Specialized Habitat for Wildlife, Habitat for Species of Conservation Concern and Animal Movement Corridors.

4.9.2.2.5 Areas of Potential Environmental Concern

A review of information from the Environmental Risk Information Services database was completed for properties located within the study area. The review was completed on May 26, 2023, to visually confirm the current land use and associated potential for containing subsurface environmental contamination. This “windshield-level” survey showed that:

– Various residential and commercial properties are present along the majority of the study area.
– Some agricultural and Industrial land use is present within the study area.

No areas of at-risk of existing contamination were identified for this study area.

4.9.3 Conceptual Design

The conceptual design for this station was based generally on flow rates and design criteria as described in Chapter 3.

Table 4.28 summarizes the general characteristics and features that will be present from initial construction through to final configuration as well as the staged aspects of construction that will adjust over time to suit the needs of the system based on forecast populations and flow rates as shown in Table 4.28.

4.9.3.1 Design Basis

The required flow rate for the SPS was determined using modelling and forecasting techniques as outlined in Chapter 3.

The increasing flows over time mean that the required number of installed pumps will also increase over time.

The number of forcemains in use will also increase over time, as in the early stages the flows are not always sufficient to maintain adequate scour velocities in forcemains that have been designed and installed with the future population requirements in mind.

Table 4.28 Staged Sewage Pumping Station Conceptual Design Characteristics for Y11-A Queensville East SPS

Design aspect	2031	2041	2051	Comments
Modelled peak flow (L/s)	N/A	85	120	Station total flow rate target under peak event conditions.
Nominal number of pumps	N/A	2, 1 duty +1 standby	3, 2 duty +1 standby	Nominal number of pumps includes main pumps only. Does not include smaller pumps that may be considered during subsequent design stages to manage low-flow conditions.
Number of forcemains in service	N/A	1	2	
Nominal firm capacity (L/s)	N/A	90	180	Firm capacity is based on installed pumps with N-1 configuration (capacity available with the largest pump out of service).

4.9.3.2 Description of Design

The conceptual level design includes a site footprint for above-grade infrastructure modelled from construction works at stations of similar size currently under construction.

The facility footprint shown allows for separate rooms for electrical systems, control systems, servers, PAC panels, washrooms, office, storage rooms and maintenance bays for equipment. An air management system footprint has been extrapolated from similar sized facilities. It is based on servicing requirements, maintaining a slightly negative pressure within the wet well under most operating conditions and treating the collected air prior to discharge. The odour system is not sized to manage the high rate of ventilation air flow required for staff entry to the wet well area.

The power supply to the facility has been conceptualized to include built-in redundancy, including a power feed from the utility. Standby power in the conceptual design includes diesel generators and fuel tanks, which is consistent with York Region's current approach of providing redundant power supply to SPS facilities. Generators are located within building for ease of maintenance and to reduce emitted sound. Noise modelling, additional silencing or sound attenuation required to meet current standards will be determined during detailed design.

The overall footprint for the above-grade conceptual infrastructure is approximately 15-m long x 12-m wide, not including any access roads or driveways. The detailed design stage will incorporate the latest requirements for applicable codes, standards and York Region design guidelines for this SPS.

The Queensville East SPS is a new pumping station and will include a wet well/dry well configuration with pumps mounted in the vertical orientation. The station will include a split wet well with benching, access platforms and ventilation per NFPA 820 and OHSA requirements.

The dry well will have bays for a total of four pumps, with two pumps connected to each cell of the wet well. Pumps will be mounted vertically in a dry-pit configuration. Pump riser and discharge header piping is based on York Region standards using stainless steel pipe and knife gate or plug valves depending on the size and function of the valve.

A common discharge header will allow pumps to operate with both forcemains in combined or independent configurations.

There is a space allowance set aside for surge valves at the facility, with footprint allocated based on extrapolation from similar sized facilities.

General supporting components such as sumps, access platforms and stairs and lifting equipment have also been included in the generation of the anticipated footprint, layout and costing, based on use within similar York Region facilities.

Detailed design will determine whether the use of smaller pumps to manage low flow conditions small (jockey) pumps is desirable from either an operational flexibility or energy management perspective, but for conceptual level design currently available pumps were sourced to meet the anticipated flow and head demands. Table 4.29 describes relevant design aspects for the Queensville East SPS.

Table 4.29 General Sewage Pumping Station Conceptual Design Characteristics for SPS Project Y11-A Queensville East SPS

Design aspect	Value	Comments
Above-grade anticipated footprint of buildings and infrastructure	15-m x 13-m wide	Facility footprint based on recent design and construction of similar capacity facilities.
Overflow control/location	To adjacent surface water	
Discharge forcemain diameter	2 x 300-mm nominal diameter	
Power supply	600 V	Low voltage.
Standby power capability	Diesel standby generators	Redundant standby power generation.
Air management	Yes	A portion of the planned footprint has been allocated to integrated air management.

4.9.3.3 Construction Methods

The SPS will generally be constructed as wet well/dry well below grade to the depths required with ancillary structures as needed above grade.

Primary incoming and outgoing infrastructure is anticipated to be constructed via a combination of trenchless technology and connections in the yard to the SPS will be made via open cut excavation.

4.9.3.4 Property Requirements

The proposed infrastructure concept will be located on property that is not currently owned by York Region, and therefore GHD recommends York Region undertake a property selection process to select a final site for the SPS in the vicinity of the Queensville Sideroad in accordance with York Region Master Plan.

Temporary and permanent property easements of a minimum nominal size of 50-m x 35-m will be required for operation of the SPS, with an area twice that size as a nominal minimum to allow for construction. Permanent property requirements will depend on the final location of the station but will also depend on the access off of Queensville Sideroad, which is limited by the minimum setback from Highway 404 to a start of driveway at a location similar to the entry that services the water tower to the north of Queensville Sideroad. Easements will be required to provide access roadway to the final station location.

The proposed property locations and requirements for construction are conceptual only. Details related to property easement requirements will be confirmed during detailed design.

4.9.4 Environmental and Community Impacts and Mitigation

Desktop studies were done to determine the possible extent of these impacts and to propose mitigation measures that would reduce the likelihood and the consequences should they occur. The major impacts and associated mitigation approaches are described in this section. The assessment criteria and indicators are provided in Table 4.30 and Table 4.31 corresponding to each of the environments (social and built, natural, cultural and traffic impacts) together with a potential effects assessment and identification of avoidance, mitigation and compensation measures for the project.

Table 4.30 Y11-A Queensville East SPS Social and Built Environment Effects and Mitigation

Item no.	Criteria	Indicators	Potential effects (Positive/Negative)	Avoidance/Mitigation/Compensation
Social and built environment				
SB-1	Effect on existing views	– Changes are predicted in views from residences in the surrounding area	– Possible change in existing views from residences in the surrounding area depending on the site-specific location of the proposed SPS (to be determined).	– Site the proposed SPS to minimize the number of views from residences. – Design the proposed SPS to be architecturally and aesthetically pleasing. – Design and implement a landscape plan for the site to screen the proposed SPS.
SB-2	Effect on existing residences, businesses and/or community, institutional and recreational facilities	– Displacement of residences, businesses and other facilities is too great – Temporary or permanent disruption to residences, businesses and other facilities near construction compounds or permanent works is too great	– No displacement of residences, businesses, or community, institutional and recreational facilities is anticipated. – Disruption to residences, businesses and community, institutional and recreational facilities in proximity to construction compounds/ permanent installations.	– No avoidance, mitigation, or compensation measures are anticipated. However, if in fact displacement is required then York Region would provide market value compensation. – Apply standard construction-related mitigation measures to minimize the disruption effects.
Traffic and transportation				
TT-1	Effect on existing rail/bridge infrastructure	– One or more of rail crossings or large infrastructure impacted	– At the rail west of the SPS, we do not anticipate the compound area or traffic management to extend within the rail ROW.	– Coordination with Metrolinx during design development to limit impacts to their rail services.
TT-2	Effect on traffic	– Traffic flows are disrupted too much – Construction occurs too close to congested traffic zones	– Traffic disruption at location of SPS compound, first lane of traffic on Leslie Street to allow for truck loading/unloading. – Traffic movement in to and out of construction compound sites will impact pedestrian, cycling and traffic flow on Leslie Street. – Impacts to public transit involving potential rerouting of buses and/or relocation of stops. – Coordination of alternate routing for emergency service vehicles, if needed. – Private entrances extend along the north end of the study area.	– Where possible, maintain one lane in each direction. This could be achieved through flagging, temporary signals or temporary road widening. – Pedestrian movement should be maintained during construction, with marked pedestrian detours as applicable. – Consider special traffic arrangements for peak hours should be considered in traffic flow directions in the morning and afternoon. – Make special provisions for emergency service vehicle access. – Make special provisions for pedestrian traffic and safety, including signals, detours and winter maintenance. If feasible, move construction traffic to sideroads. – Access to private entrances to be maintained, or alternative solution to access provided.
Utilities				
U-1	Conflict with buried utilities	– Sewer connection or SPS shaft is in direct conflict or falls within clearance limits of nearby utilities	– New construction impacts existing utilities and requires design coordination with utility owners which increases project cost and schedule.	– Review historic and as-built documents for utility data. – Complete a SUE investigation to identify high risk utilities, including large and/or critical service utilities (e.g., large watermains and all gas mains). – If required, relocate existing utility or move proposed excavation to mitigate conflict.
U-2	Conflict with surface or overhead utilities	– Excavation of shaft is proposed in location of surface infrastructure – Shaft working compound equipment including cranes will require working directly under overhead utilities or within the hydro wire exclusion zone	– Overhead infrastructure such as electrical or communications cabling is mounted on utility poles between 5 and 12 m above the surface. Depending on the required crane size and operating radius to construct the shaft and lower the TBM, equipment extents may fall within hydro line exclusion zone, or hit overhead wires causing worker harm or death.	– Working compounds will be designed to allow appropriate and safe movement of workers and equipment around the site, away from live overhead wires or surface utility boxes, based on known utility information and topographic surveys. – If required, relocate existing utility or move proposed excavation to mitigate conflict.
Noise and vibration				
N-1	Operation noise	– Complaints from residents within study area	– Noise disruptions to private residents and commercial areas post-construction, near SPS locations or upgrades.	– Any permanent facility, such as new SPS, SPS upgrades, or supporting air management facilities, will require an ECA application under Section 9 of the Environmental Protection Act to document the noise emissions compliance.

Item no.	Criteria	Indicators	Potential effects (Positive/Negative)	Avoidance/Mitigation/Compensation
N-2	Construction noise	– Complaints from residents within study area	– Disruptions to private residents and commercial areas during construction, near construction compounds for new SPS or existing SPS upgrades.	– Propose construction noise monitoring per MECP NPC-115 Construction Equipment requirements. – Consider completing noise monitoring for the duration of the construction and notify the contractor of any exceedances so that corrective action/contingency actions can be implemented. – Use vehicles and equipment (cranes and excavators) with efficient muffling devices or construct enclosures. – Comply with local noise by-laws.
V-1	Construction vibration	– Complaints from residents within study area	– Disruptions to private residents and commercial areas during construction, near construction compounds for new SPS or existing SPS upgrades.	– Propose appropriate construction vibration benchmarks within the tender documents. – Consider pre- and post-construction condition photos.
Air management				
O-1	Operation odour at SPS and existing or proposed sewer connection	– Odour near SPS and surface connections	– There is potential for odour release due to turbulence at the existing (or upgraded) SPS and at the connections from sewer to SPS.	– Consider implementation of ventilation design systems with odour control. – Extents of risk and impact, will be reviewed in further detail upon investigation.
A-1	Construction dust at SPS location	– Fugitive dust is generated – Air quality is poor	– Fugitive dust is generated during construction (or upgrades) of SPS and related infrastructure.	– Develop a BMPP to be included in the project Construction Management Plan. – Mitigation should be aimed at minimizing emissions of particulate matter and exposure to particulate matter during the construction phase of the project.

Table 4.31 Y11-A Queensville East SPS Natural Environment Effects and Mitigation

Item no.	Criteria	Indicators	Potential effects (Positive/Negative)	Avoidance/Mitigation/Compensation
Hydrogeology				
N-1	Effect on groundwater quantity	– Temporary and/or long-term change in groundwater quantity	– No long-term change to groundwater quantity is anticipated, because no water takings are required during operation of the sewer. – Potential temporary change to groundwater quantity because construction may intersect a shallow sand aquifer (estimated 10 to 20 mbgs). Temporary water takings may be required to facilitate construction. – Reduction in groundwater quantity resulting in impact to other groundwater users (private well impacts). – Potential ground settlement as a result of active dewatering/depressurization. – Change in shallow groundwater flow patterns resulting from operation of sewer pipe resulting from increased I&I and/or preferential movement of groundwater within trench sediments.	– Implement construction methods that minimize dewatering requirements. – Establish pre-construction baseline groundwater quality and quantity conditions and develop implementation plans for monitoring during and post-construction (install and monitor wells and surface water).
N-2	Effect on groundwater quality	– Temporary and/or long-term change in groundwater quality	– Potential temporary change in groundwater quality because construction may intersect a shallow sand aquifer (estimated 10 to 20 mbgs). Temporary water takings may be required to facilitate construction. – No long-term change to groundwater quality is anticipated. – Potential effects on groundwater water quality as a result of potential mobilization of contaminated water where active dewatering/depressurization is required. – Reduction in groundwater quality from spills or the mismanagement of fuel/chemical in work areas.	– Implement construction methods that minimize dewatering requirements. – Develop and implement a spills response plan for construction to mitigate the effect of a spill should one occur. – Establish pre-construction baseline groundwater quality and quantity conditions and develop implementation plans for monitoring during and post-construction (install and monitor wells and surface water).
N-3	Effect on municipal well(s), WHPA	– Intersects Queensville-Sharon WHPA-A, B, C, D and Highly Vulnerable Aquifers (HVA)	– Source Water Protection Plan, Clean Water Act (2006) sanitary sewer infrastructure WHPA-A, B, C, D and policy compliance evaluation.	– Implications on York Region Sewage Works Projects requires further exploration, exclusionary WHPA-A may be intersected. – Source Water Protection Plan, Clean Water Act (2006) sanitary sewer infrastructure WHPA-A, B, C, D and HVA policy, mitigation and monitoring evaluation.

Item no.	Criteria	Indicators	Potential effects (Positive/Negative)	Avoidance/Mitigation/Compensation
N-4	Effect on private wells – temporary construction dewatering	– Temporary construction dewatering private well interference (quantity/quality)	– Temporary decrease in private well quantity/quality could occur during construction activities depending on the location, depth and construction, methodology and duration.	– Implement construction methods that minimize dewatering requirements. – Address construction dewatering private well interference complaints through existing York Region private well assessment and mitigation policy. – Proactively identify any high-risk wells during design and prepare site-specific preventative mitigation and corrective action plans as part of design. Corrective actions should align to York Region's private well assessment and mitigation policy.
N-5	Effect on private wells – long-term	– Long-term private well interference (quantity/quality)	– No long-term groundwater quantity/quality interference is anticipated.	– If needed, establish pre-construction baseline groundwater quality and quantity conditions, and develop implementation plans for monitoring during and post-construction (install and monitor wells and surface water). – Proactively identify any high-risk wells during design and prepare site-specific preventative mitigation and corrective action plans as part of design. Corrective actions should align to York Region's private well assessment and mitigation policy.
N-6	Effect on surface water quantity/quality	– Temporary changes in surface water (i.e., impacts to baseflow/quality)	– Temporary changes in surface water could occur during construction activities depending on the location, depth, construction, methodology, timing and duration. – A high groundwater table resulting in groundwater/surface water interaction would be expected due to existing soils and anticipated presence of the ORM aquifer. – Change in groundwater-surface water interaction (reversal of vertical hydraulic gradient) results in impact to terrestrial and aquatic habitat and associated SAR (where applicable) – reduction in baseflow. – Change in surface water temperature from groundwater taking and/or discharge to surface water features. – Changes to stream morphology resulting from the release of groundwater dewatering water. The potential reduction in baseflow due to water taking in a lower confined aquifer due to increased downward hydraulic gradients across the aquitard separating the stream and the confined aquifer. – The potential reduction in baseflow from a stream reach that intersects an aquifer in which the water taking is occurring.	– Field verification of groundwater-surface water interaction suggested for watercourses and wetlands within the study area. – Complete outlet receiver assessment(s) should temporary groundwater discharge be required to surface water. Establish pre-construction baseline surface water quality and quantity conditions and develop implementation plans for monitoring during and post-construction. – Implement/construct treatment (i.e., settlement tanks, etc.) of construction water prior to discharge to storm sewer/surface water. – Minimize construction area disturbance and duration. Implement erosion and sedimentation control measures (e.g., silt fencing, check dams, etc.). – Adhere to fish timing windows to prevent negative impacts on known sensitive fish species within the study area. – Consider completing a geomorphology study during design. – Refer to the Natural Heritage section of the table for further mitigation approaches associated with surface water impacts.
Geotechnical				
G-1	Effect on soil quality	– Contaminant seepage into soil during excavation of shaft	– Chemicals such as drilling fluids, lubricants, ground improvement material, or fuel from construction equipment may contaminate soil.	– Perform regular equipment checks and maintenance. – Prepare an environmental management plan prior to construction in case of contamination.
G-2	Soil movement around shafts	– Vertical or horizontal ground movement around shafts and/or along tunnel during and post excavation – Deformation or damage to nearby structures and/or utilities	– Ground heave/settlement/horizontal shift at surface around shafts. – Deformation or damage to nearby structures and utilities (e.g., crack formation, angular rotation, strain, or pipe joint rotation or pull out) that may require rehabilitation or repair.	– Select shaft or open cut construction method and SOE appropriate with depth, size and geotechnical and hydrogeological conditions at shaft or open cut locations. – Complete soil displacement analytical assessments at all shaft locations.
G-3	Encounter contaminated soil during shaft excavation	– Soil encountered during shaft excavation is tested to surpass allowable contaminant levels	– Spoil must be dispatched at an approved contaminated soil disposal site.	– Complete appropriate geotechnical investigations and contaminants testing during design development to identify confirmed contaminated soil locations or at-risk areas based on historical land use. – Identify and confirm availability of appropriate soil disposal sites based on anticipated contaminants for use during construction.

Item no.	Criteria	Indicators	Potential effects (Positive/Negative)	Avoidance/Mitigation/Compensation
Natural heritage				
EG-1	Effect on aquatic habitat or functions	– Watercourses within study area support a warmwater thermal regime – Study area contains wetlands that have not been evaluated	– Temporary or permanent loss of aquatic features or categorical loss of functions by type, including PSWs, Locally Significant Wetlands, watercourses by sensitivity type and others. – During construction water quality may be impaired due to elevated TSS in surface water runoff from study area locations which can affect aquatic species/habitats. Some concentrations above background may occur temporarily. – Change in surface water temperature from groundwater taking and/or discharge to surface water features. – Potential spill hazard when refuelling equipment.	– Need to complete site investigations to evaluate potential effects on aquatic habitat function. – Implement best management practices to control surface water runoff and minimize TSS effects. – Where feasible, discharging of surface water during construction should be directed into the municipal storm sewer system to mitigate thermal impacts to watercourses. Should discharge of surface waters be directed to watercourses, additional mitigation measures would need to be adhered to (e.g., enhanced erosion and control measures). The use of erosion and sediment control measures and timing of construction to avoid spawning and egg incubation periods will reduce the potential for effect to fish and aquatic life. – Conduct equipment maintenance and refuelling at the designated and properly contained maintenance areas or at industrial garages located well away from creek banks, wetlands and outside vegetation areas. – Develop a Spill Prevention Plan.
EG-2	Effect on stream geomorphology	– Watercourse present within study area	– Change in geomorphic form/function/stability in affected channels.	– Employ erosion and sediment controls to limit deposition of construction-mobilized soils into watercourses. – Consider completing a geomorphology study during design, where applicable.
EG-3	Effect on aquatic species including SAR, species of local concern, native species and invasive species	– Aquatic species	– Number and type of aquatic species potentially affected temporarily or permanently. – No anticipated impacts to aquatic SAR as there are no aquatic SAR identified within the study area.	– Preventing death of fish or impacts to downstream fish habitat through the use of appropriate timing windows.
EG-4	Effect on terrestrial habitat or functions	– Study area contains ecologically significant forests – Wildlife habitat	– Temporary or permanent loss of natural heritage features (e.g., ESAs, ANSIs, wildlife corridors and others). – Potential effects on terrestrial habitat (e.g., direct vegetation (and wildlife habitat) loss, alteration and fragmentation) may occur from the physical footprint of study area locations. – Project preparation, construction and operation may increase the risk of nest destruction and mortality of migratory birds.	– Site investigations to evaluate potential terrestrial habitat function/significance. – During design, prepare construction constraints with consideration of timing windows to mitigate where possible, vegetation clearing to occur outside of the migratory bird nesting season, bat maternity roosting season, turtle overwintering and amphibian breeding. – Limit the area of project footprint and limit disturbance during construction and operations phases. – The presence of wildlife will be monitored and communicated to site personnel. – Vehicle use will be restricted to designated areas. – Where practical, rehabilitate habitat for plants and wildlife.
EG-5	Effect on terrestrial species, including SAR, species of local concern, native species, invasive species and area-sensitive species	– SAR have the potential to occur within the study areas including amphibians, insects, birds, reptiles, mammals and tree species	– Number and type of terrestrial species potentially affected temporarily or permanently. – Construction activities have the potential to disturb wildlife within adjacent natural heritage areas. – Project preparation, construction and operation may increase the risk of nest/habitat destruction and mortality of terrestrial SAR. – Project may result in wildlife-vehicle collisions and may cause injury/mortality to individual animals.	– Site investigations to evaluate potential occurrence of terrestrial SAR within the study area. – During design, prepare construction constraints with consideration of timing windows to mitigate where possible, vegetation clearing to occur outside of the migratory bird nesting season, bat maternity roosting season, turtle overwintering and amphibian breeding. – Clearly demarcate work limits at outset of construction and minimize unnecessary vegetation clearing.

4.10 Y12-A 2nd Concession North Gravity Sewer

4.10.1 Study Area

The proposed permanent modifications to the collection and conveyance system for the Y12-A 2nd Concession North Gravity Sewer are not anticipated to extend beyond the existing road right-of-way (ROW) limits, but temporary easements for construction staging, or mitigation of impact requirements may extend onto or impact adjacent properties. A study area of approximately 200 metres surrounding the centerline of the road right of way was applied as shown in Figure 4.20.

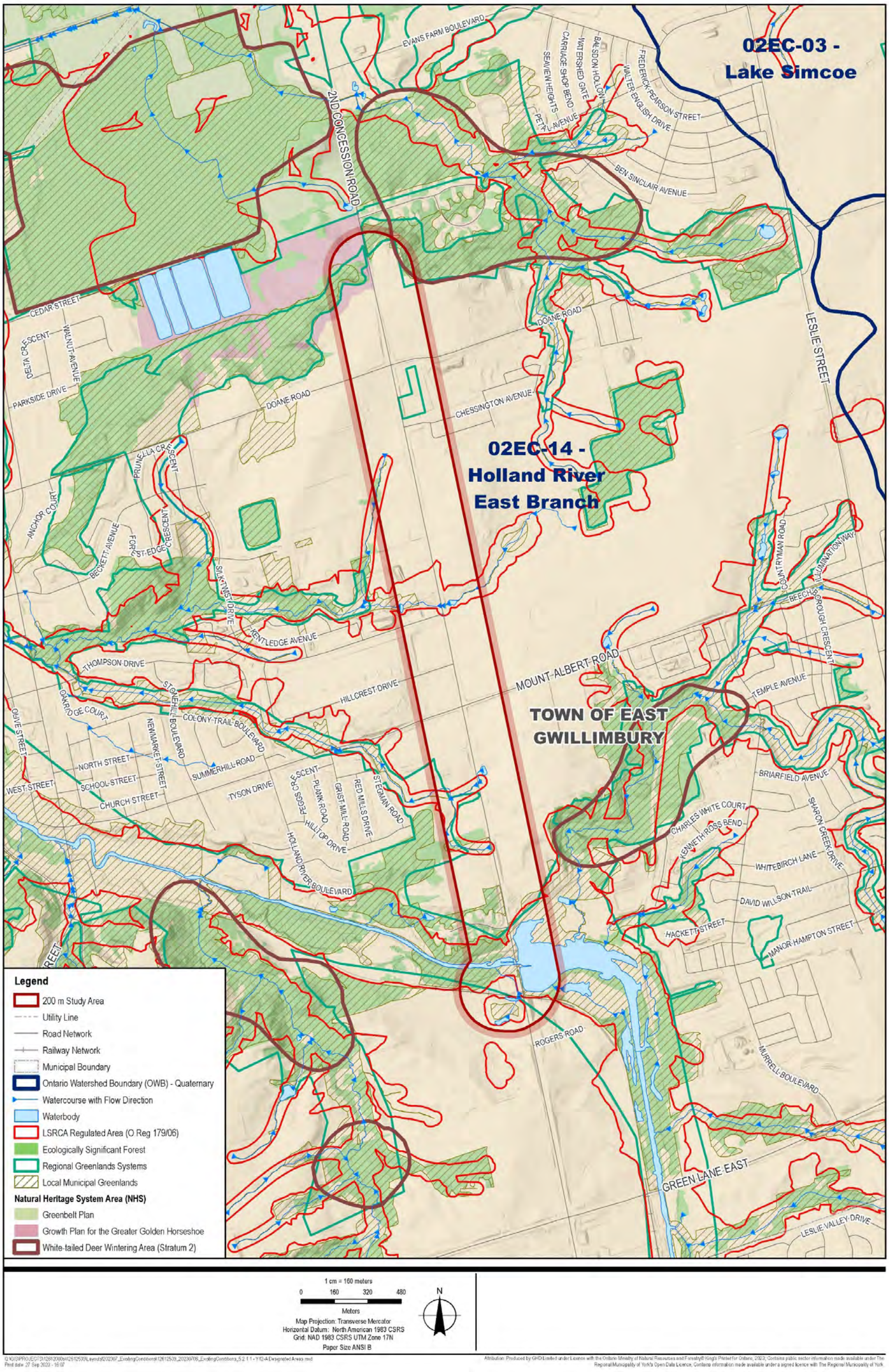


Figure 4.20 **Study Area for Y12-A 2nd Concession North Gravity Sewer**

4.10.2 Existing Conditions

4.10.2.1 Social and Built Environment

The following sections will summarize the findings of the desktop studies completed within the study area, including planning and land use, traffic and transportation and utilities.

4.10.2.1.1 Planning Policy and Land Use

Existing Land Use

Along 2nd Concession Road, from Algonquin Forest Drive to Doane Road land uses consist of the following:

– West side:
  - Agricultural lands
  - Low density residential housing.
– East side:
  - Agricultural lands
  - Low density residential housing.

Along 2nd Concession Road, from Doane Road to Mount Albert Road, land uses consist of the following:

– West side:
  - Low density residential housing
  - Agricultural lands
  - Institutional use (York Region Paramedic Services – Station 13, Jean Beliveau Catholic Elementary School).
– East side:
  - Low density residential housing
  - Agricultural lands
  - Transformer station.

Along 2nd Concession Road, from Mount Albert Road to Rogers Road, land uses consist of the following:

– West side:
  - Low density residential housing
  - Agricultural lands
  - Pumping station
  - CNR rail crossing 2nd Concession Road South of SPS.
– East side:
  - Low density residential housing
  - Agricultural lands
  - Conservation area (RRCA)
  - HREB crossing 2nd Concession Road.

Planning Policy

Regional

The York Region Official Plan 2022 (June 2023 Office Consolidation) designates lands within the study area as Community Area. Additionally, lands at both the north and south ends of the study area are part of York Region's Greenlands System.

Local

With reference to the East Gwillimbury Official Plan 2010 (2018 Office Consolidation) the study area traverses areas subject to the Queensville Secondary Plan, Holland Landing Secondary Plan and Green Lane Secondary Plan, and consist of the following land use designations: Environmental Protection, Low and Medium Density Residential, Estate Residential, Agricultural/Long-term Growth Area and Neighbourhood Residential.

The Holland Landing Secondary Plan indicates a proposed a proposed secondary school west of 2nd Concession Road, between Doane Road and Mount Albert Road.

The Green Lane Secondary Plan anticipates a Minor Collector Road connecting to the west side of 2nd Concession Road and passing through the southern portion of the study area and a proposed elementary school located on the proposed collector road, within the southern portion of the study area.

Active Development Applications

Existing property use has been described using the following data available to GHD:

– Orthoimagery from spring 2022
– Google Earth images
– Farm Tax Program data from 2023 tax year
– Property assessment type via GeoWarehouse (accessed August 2023).

Active development applications within the 200-m study area for each project location have been summarized based on existing available information. Lands within the Y12-A study area contains several active development applications.

Subdivision applications:

– Algonquin Forest Drive – Proposed subdivision.
– 19879 2nd Concession Road – Two applications. To amend by-law 2018-043 by rezoning the lands from "Rural (RU) Zone" to "Residential Two Exception (R2-3X(H1) Zone" and "Residential Four Exception (R4-X(H1) Zone" and to amend By-law 97-50 by rezoning the lands from "Rural (RU) Zone" to "Urban Residential (R7-X(H)) Zone" and "Residential Urban (R9-X(H)) Zone" in order to facilitate the development of 71 single-detached dwellings and 25 townhouse dwellings in addition to 14 part lots for future development.
– 52 Algonquin Forest Drive – Two applications. To re-zone the lands from Rural (RU) to various residential zones and to facilitate the development of 344 residential units including 217 single-detached dwelling units and 134 townhouse dwelling units, as well as a stormwater management pond, park, woodlot, valley-land and associated buffers.
– East of 2nd Concession Road, south of Doane Road – To facilitate the development of 381 single-detached units and 280 townhouse units on 37.18 hectares (ha) of land with future development blocks, park blocks and open space blocks.
– South of Doane Road, East of Yonge Street – To facilitate the development of 401 single-detached units, 152 semi-detached units and 123 block townhouse units.
– South of Doane Road, East of Yonge Street - Proposed subdivision.
– North of Mount Albert Road, West of 2nd Concession Road – To facilitate the development of 419 single-detached units, 5 part lots, 122 semi-detached units and 32 blocks of 145 street townhouse units.

– SE Mount Albert Road and 2nd Concession Road – Two applications. Proposed subdivision for Holland Landing Mount Albert Residential Development Phase 1. Includes construction of "Street D" off 2nd Concession Road.
– Valley Trail – Proposed subdivision.

Education facility applications:

– West of 2nd Concession Road, north of Mount Albert Road – To facilitate the development of a two-storey French Catholic elementary school.

Miscellaneous applications:

– East side of 2nd Concession Road, South of Doane Road – Two applications. To facilitate a temporary sales office. To facilitate the development of 381 single-detached units and 280 townhouse units on 37.18 ha of land with future development blocks, park blocks and open space blocks.
– West of 2nd Concession, South of Doane Road – Two applications. Site Plan. Draft Plan of Subdivision.

4.10.2.1.2 Transportation in the Study Area

2nd Concession Road between Valley Trail and Doane Road is a four-lane arterial road with dedicated cycling lanes on both sides, as shown in Figure 4.21. There are no pedestrian sidewalks north of Valley Trail.

Figure 4.21 **2nd Concession Road Looking North (1) from Valley Trail, (2) Towards Doane Road. (*Google Maps* "Streetview," digital images http://maps.google.com)**

The AADT along 2nd Concession Road between Valley Trail and Hillcrest Drive has been counted between 7,192 in the south end and 4,615 in the north end, based on the latest available 2023 data. There is no AADT data between Hillcrest Drive and Doane Road, at the limit of the gravity sewer conversion. Historical AADT data along the study area are presented in Table 4.32

Table 4.32 **2nd Concession Road AADT Counts Between Valley Trail and Hillcrest Drive**

Description of road limits	2012	2013	2014	2018	2019	2023
Valley Trail and Mount Albert Road	10,369		8,429	6,199		7,192
Mount Albert Road and Hillcrest Drive	5,880		3,744		3,833	4,615

There are no bus public transit routes along 2nd Concession Road within the study area. A CNR rail crossing is located south of the existing SPS, crossing under a bridge within the study area to the southeast.

4.10.2.1.3 Utilities in the Study Area

There are several above/below grade utilities situated within the study area corridor and in the vicinity of the proposed project. These utilities may be temporarily impacted during the construction of open-cut works. Formal notification and consent would be required from the authorities responsible for these utilities prior to construction.

Buried utilities are typically located within the following limits:

– For shallow buried services, these are commonly buried between 1.2 and 3.5 mbgs, with electrical and communications cabling buried between 1.2 and 1.5 mbgs.
– Shallow municipal services such as storm drain, sanitary sewers and watermains are typically buried between 1.2 and 3.5 mbgs.
– Deep utilities are anything deeper than the typical depths listed above.

Known municipal infrastructure that existed on York Region's GIS database has been provided within the drawing set. A detailed utility investigation program, which would include a "Level A through D" subsurface utility exploration, would be required as part of future site investigations.

Known large infrastructure within the study area include:

– A rail underpass roadway bridge on 2nd Concession southeast of the existing 2nd Concession SPS.
– A CNR rail crossing under the above noted bridge.
– Underpass bridge crossing over East Holland River and pedestrian trail at the south end of the alignment, north of the existing SPS.

The three critical structures will require specific geotechnical instrumentation and monitoring requirements to receive infrastructure owner approval of the design, should they fall within the ZOI induced by excavation work. Based on the distance between the tracks and rail underpass bridge south of the proposed sewer conversion and roadway bridge just north of the SPS sewer yard works, and based on the scale of the work, impacts to the tracks and bridges are not anticipated to be extensive but may be assessed as part of a Construction Impact Assessment during design development based on their location within the ZOI.

4.10.2.2 Natural Environment

The following sections will summarize the findings of the desktop studies completed within the study area for: geotechnical, hydrogeology, surface water, natural heritage and contamination.

4.10.2.2.1 Geotechnical

The study area is bordered by farmland in general, within the boundaries of the Town of East Gwillimbury.

Historical boreholes (1990) within the middle portion of the study area, advanced from about 2 to 5 mbgs identified the near surface condition generally comprised of non-cohesive till (sandy silt to silty sand till of compact to dense relative density/clayey silt and sand till of stiff to hard consistency). The encountered till deposit is generally damp to moist. Few boreholes encountered sandy silt layer (compact relative density) and clayey silt deposit (very stiff to hard consistency), and the deposits were generally moist to wet. The ground surface elevation at the boreholes varied from elevation 263.7 to 244.5 masl and groundwater table varied from elevation 263.7 to 243.1 masl. It should be noted that the groundwater is typically found at shallow depths below the ground surface.

The near surface soils within the northern portion of the study area (above Mount Albert Road) are predominantly comprised of non-cohesive and frequently granular deposits in general. Mapped deposits of sand, gravelly sand and gravel, nearshore and beach deposit, mostly consisting of lacustrine deposits comprise most of the study area. The near surface soils within the southern portion of the study area are predominantly comprised of silt and clay deposits in general, mostly consisting of Glaciolacustrine deposits.

The bedrock (near the northern portion of the study area) consists of shale, limestone, dolostone, siltstone Georgian Bay Formation/ Blue Mountain Formation/ Billings Formation. The bedrock near the southern portion of the study area consists of Limestone, dolostone, shale, arkose, sandstone Ottawa Group/Simcoe Group. Typically, bedrock is mapped at depths of 87 to 113 mbgs within the study area and will not be reached during construction.

4.10.2.2.2 Hydrogeological

A hydrogeological desktop review was undertaken within the study area using information from MECP well records, the MECP Source Protection Information Atlas, the ORM database and the Ontario Geological Survey database. Available hydrogeological reports for projects within the area were also reviewed.

The study area for Y12-A is located within the Schomberg Clay Plains physiographic region. North section of Y12-A (where they will construct 1 shaft) will be in the Lower Simcoe physiographic region – till plains. The section of the sewer to be re-laid goes through WHPA-B, C and D. WHPA-A is located further west of alignment. The sewer does not go through vulnerable aquifer. The water table is approximately 2 mbgs to the north and drops to approximately 14 mbgs. Shallow groundwater flows towards the HREB.

There are 15 historic private water supply wells located near the section to be re-laid along Y12-A.

Refer to Table 4.33 regarding details on anticipated aquifers and aquitards within the study area, along sections of sewer to be re-laid.

Table 4.33 Aquifers and Aquitards Through the Y12-A Study Area, Along Sections of Sewer to be Re-Laid

Aquifers and aquitards	Description	Thickness
Undifferentiated upper sediments recent deposits (Aquifer)	An unconfined aquifer consisting of discontinuous fill and unconsolidated overburden deposits.	Maximum of 1.5 m
Newmarket Till (Aquitard)	A continuous layer that acts as an aquitard to the underlying Thorncliffe Formation.	Approximately 57 m
Thorncliffe Formation (Aquifer)	Regionally recognized as a highly productive confined aquifer and is laterally continuous.	Approximately 18 m
Sunnybrook Formation (Lower aquitard)	A continuous layer that acts as an aquitard to the underlying Scarborough Formation.	Approximately 13 m
Scarborough Formation (Lower aquifer)	A confined aquifer that is discontinuous and appears to consist of channel fill deposits that roughly dip to the east.	Approximately 11 m

Refer to Table 4.34 regarding details on anticipated aquifers and aquitards within the study area, near the 2nd Concession SPS shaft and sewer.

Table 4.34 Aquifers and Aquitards Through the Y12-A Study Area, Near the 2nd Concession SPS Shaft and Sewer

Aquifers and aquitards	Description	Thickness
Undifferentiated upper sediments recent deposits (Aquifer)	An unconfined aquifer consisting of discontinuous fill and unconsolidated overburden deposits.	Ranges between 1 to 2.5 m
Oak Ridges Moraine Complex (Aquifer)	These sediments consist mostly of silt and fine sand, but also include gravel and minor clay and diamicton. The aquifer is generally unconfined, except the section covered by Halton Till on the south flank of the ORM complex.	Ranges between 7.5 to 33 m
Inter-Newmarket sediments (Aquifer)	Regionally recognized as a highly productive confined aquifer and is laterally continuous.	Varies, between ORM and Newmarket Till
Newmarket Till (Aquitard)	A continuous layer that acts as an aquitard to the underlying Thorncliffe Formation.	Varies. Located at approximately 25 m deep

4.10.2.2.3 Surface Water

There is one sub-watershed within the study area: The HREB. The tributary of the HREB intersects section to be re-laid along Y12-A.

Other surface features of interest include:

– HREB
– Four unnamed watercourses
– Four small online ponds.

Refer to Figure 4.22 for a surface water map of existing conditions within the study area, north section.

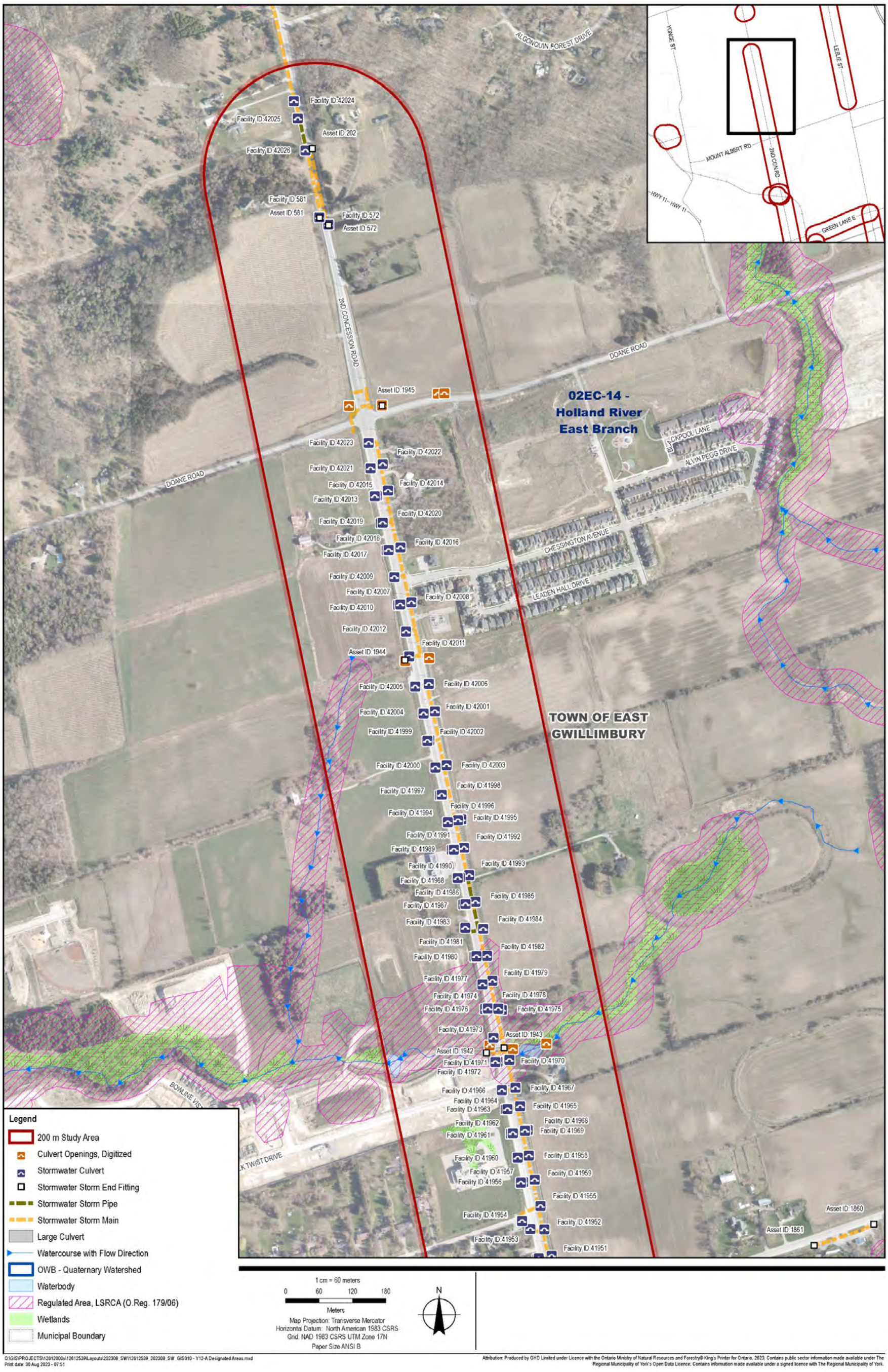


Figure 4.22 **Y12-A Study Area Surface Water Map for Existing Conditions, North Section**

4.10.2.2.4 Natural Heritage Characterization

The study area contains evaluated and unevaluated wetlands and a few unnamed watercourses.

The evaluated Rogers Reservoir Wetland is part of the RRCA and is found at the southern limit of the Y12-A study area. A mix of wetland, grassland and forest ecosystems provide habitat for a diverse array of species. Forests provide habitat for species such as great horned owl, eastern wood-pewee, gray treefrog, western chorus frog and wood frog. The grasslands provide key habitat for field sparrow, savannah sparrow, alder flycatcher, willow flycatcher, brown thrasher, and indigo bunting. The wetlands provide foraging and breeding habitat for great blue heron and northern leopard frog (LSRCA, 2013). The East Holland River itself provides habitat for SAR species.

Aquatic Habitat

The study area for Y12-A has four unnamed watercourses along 2nd Concession Road. Along with these watercourses, this study area also contains three small online ponds. Each of the three ponds and four unnamed watercourses all connect downstream, approximately 1.7 km westerly outside of the study area. These connected water features continue to flow westerly for another 1.1 km before draining into the HREB. Surrounding land use around the water features within the study area is primarily agricultural, with sparse residential areas throughout. The watercourses within the study area have relatively limited riparian buffers. Portions of the riparian areas are covered by a thin tree lined buffer. However, overhead stream cover is limited due to the presence of reed and grasses along the stream banks. The small ponds appear to be manmade and reside on private property. The vegetation surrounding the ponds varies between cattails, grasses and sparse deciduous trees.

Each of the four unnamed watercourses and ponds are interconnected and have warmwater thermal regimes, with Aquatic Resource Area (ARA) datasets showing a combined fish community consisting of blacknose dace, bluntnose minnow, brook stickleback, creek chub, fathead minnow and northern redbelly dace (*Chrosomus eos*). Based on these fish communities, these aquatic environments support warmwater bait/forage fish with no presence of sportfish.

Additionally, the HREB crosses 2nd Concession Road at the southern extend of the Y12-A study area The HREB flows through the study area in an east to west orientation and crosses Y12-A under the 2nd Concession Road Bridge. The watercourse generally has a wide riparian buffer. Upstream of the bridge, on the eastern side of the study area, the HREB has a wide floodplain consisting of mostly grasses and sedges with sparse trees. Downstream on the west side of the study area, the HREB passes through areas with higher density of trees. Downstream of the study area, the HREB continues flowing in a northwest direction for approximately 13.3 km before the confluence with the West Holland River and ultimately discharges into Lake Simcoe.

The portion of the HREB in this area is classified as having a warmwater thermal regime. Based on the anticipated fish community, the HREB is expected to support a wide diversity of primarily forage/baitfish species with some warmwater sportfish present. No redside dace have been recorded within this study area.

Terrestrial Habitat

The lands in the study area consist mainly of agricultural land and low-density residential communities, with pockets of woodland and wetland communities scattered throughout. This study area is in the northern portion of the study area and faces limited development pressure from Newmarket to the south, when compared to some of the more southernly study areas. The focus of the study area is the RRCA present at its southern boundary, which contains a variety of wetland and forested communities.

All natural and cultural communities present within the study area are considered common in the province.

Significant Wildlife Habitat

Potential candidate SWH for Region 6E as defined by MNRF has been identified in several natural areas within the study area. The greatest concentration of these potentials is likely to be found in wetland and forest habitats associated with the PSWs and ESAs. A screening and analysis of all ELC communities was completed in the study area for seasonal concentration areas of animals, rare vegetation communities or specialized habitat for wildlife, habitat for species of conservation concern and animal movement corridors.

4.10.2.2.5 Areas of Potential Environmental Concern

A review of information from the Environmental Risk Information Services database was completed for properties located within the study area. The review was completed on May 26, 2023, to visually confirm the current land use and associated potential for containing subsurface environmental contamination. This “windshield-level” survey showed that:

– Various residential and commercial properties are present along the majority of the study area.
– Some agricultural and Industrial land use is present within the study area.

Refer to Figure 4.23 for locations identified at-risk of contamination within Y12-A, north section. The locations are identified as existing known spills, as well as those identified as three risk categories of potential for existing contamination: Low, Moderate and High. Low risk locations are presented in a green circle, moderate risk in an orange circle and high risk in a red circle. We clarify that not all risk categories may be present in the below figure. The number presented in the circle is a property identifier relevant to the entire York Region Sewage Works Project, and not specific to the project being discussed.

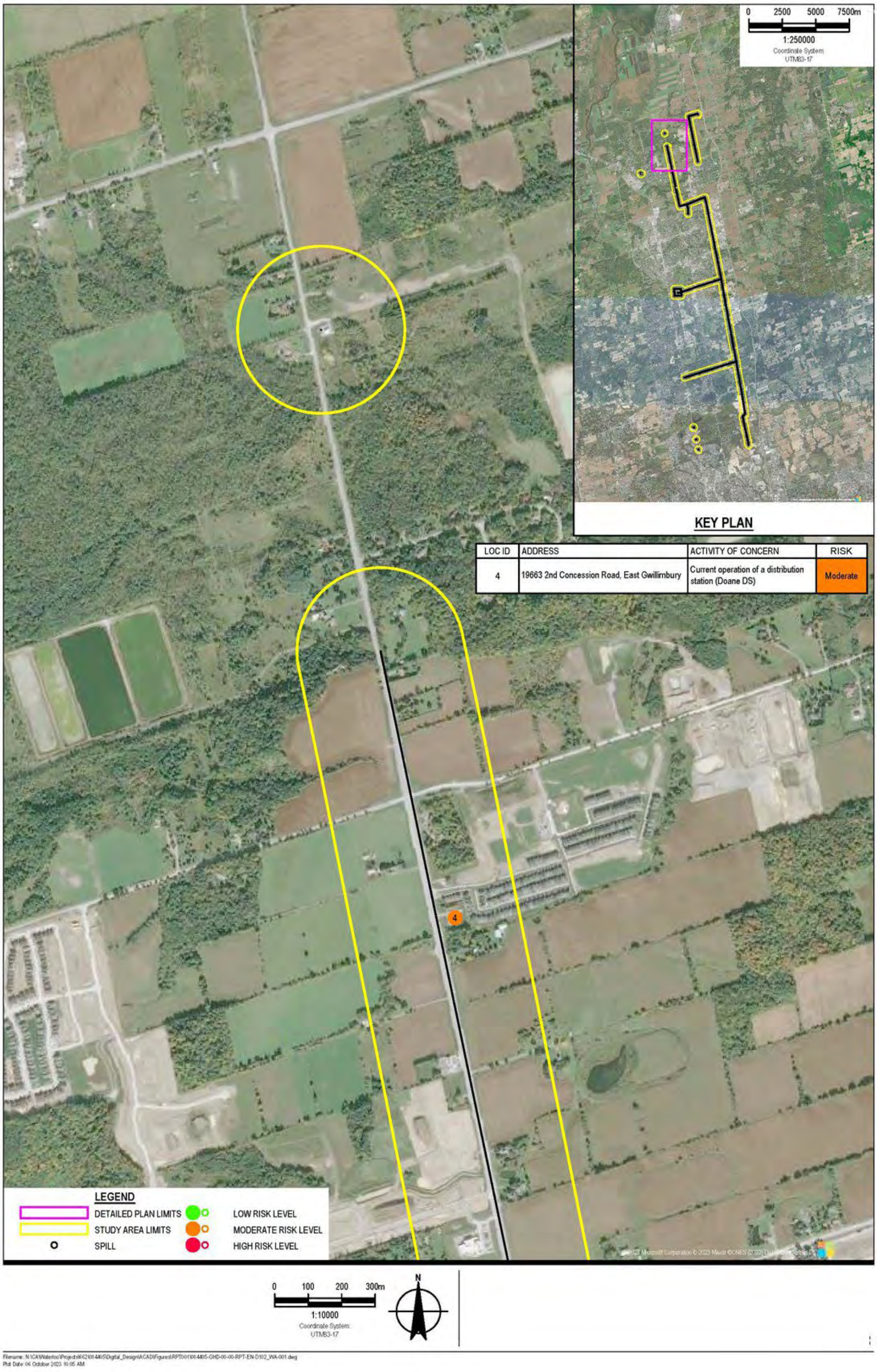


Figure 4.23 Areas of Potential Environmental Concern within Y12-A Study Area, North Portion

4.10.3 Conceptual Design

Conceptual design for this pair of gravity sewers was based on flow rates and design criteria as described in Chapter 3. The twinned gravity sewer is actually a conversion of existing piping that was original designed and installed to convey flows from the south to the previously proposed Water Reclamation Centre (WRC) in the north. With the York Region Sewage Works Project, the in-ground infrastructure will be converted to instead flow south by gravity as the Y12-A 2nd Concession North Gravity Sewer for the section from approximately Doane Road and 2nd Concession down to the 2nd Concession SPS site, where it will flow directly into the proposed Y12-B 2nd Concession South Gravity Sewer.

The proposed repurposed piping will convey the flows from the Holland Landing SPS and the Queensville West SPS, leaving the existing sanitary collection sewer free to convey locally collected flows.

Refer to Appendix A, Sheets 5 to 6 for the Conceptual Design Drawings relevant to this project.

4.10.3.1 Design Basis

For design basis specifics relevant to Y12-A 2nd Concession North Gravity Sewer, refer to Table 4.35.

Table 4.35 Design Basis for the Development of Y12-A 2nd Concession North Gravity Sewer

Design basis	Assumptions
Study area	200-m area along infrastructure alignment
Study area boundaries	2nd Concession Road, bounded by 2nd Concession SPS to the south and Doane Road to the north
Nominal diameter	750 mm
Sewer type	Gravity
Upstream connection point	2nd Concession Road and Doane Road
Downstream connection point	2nd Concession SPS
Design criteria	Based on York Region Design Guidelines (2021), including: – PIPE size and material – Hydraulic design – Air management – Method of construction – Major utility crossings – End connection points
Method of construction	Open cut within the ROW
Land use	Mixture of residential and agricultural land uses
Modelled peak flow	520 L/s
Major infrastructure considerations	– CNR rail crossing south of 2nd Concession SPS – Roadway bridge north of 2nd Concession SPS – Hydro corridor
Environmental feature considerations	– Rogers Reservoir Conservative Authority (RRCA) lands – East Holland River – Several wooded areas

4.10.3.2 Description of Design

In order to make the most efficient use of existing built infrastructure, the existing buried twin 615 mm inner diameter (i.d.) forcemains will be intercepted at or around the existing Valve Chamber 18. The section that is converting to gravity sewer is slightly over 3 km long flowing from approximately the intersection of Doane Road down to the northern terminus of the Y12-B gravity sewer, located at the 2nd Concession SPS Site.

At the north end of the section, a new chamber will be constructed to provide a break between the forcemains to the North (conveying flows from Holland Landing SPS and Queensville West SPS), so the section running south from this new chamber that will act as gravity conveyance. Air management will likely be required at this point area due to the transition from pumped flow to gravity at this chamber. From the new transition chamber, the flow will convey south for approximately 1.3 km where the existing pipe maintains a downwards gradient.

At this point for a length of about 800 m the installed piping runs at an unacceptable slope for gravity conveyance, so this section will be open cut excavated, and the piping replaced/re-laid at a constant downward gradient, at which point it will reconnect to the existing piping. The existing piping from this point flows at a downward gradient steadily until it reaches the bridge over the rail tracks.

The slope over the bridge is an upward gradient, which will create a siphon. We note that there are pipes hanging under the bridge, for which the pipe load, insulation and heat tracing units need to be confirmed during design development. The existing piping is installed within the bridge structure and the slope of this piping cannot be adjusted. As a result, a siphon will be created at this area. Just north of the bridge a new siphon diversion chamber will be installed to manage flows and allow maintenance and draining of the siphon piping. Any impacts to the bridge from sewer construction (tunnelled or open cut) will be assessed as part of a Construction Impact Assessment during design development.

The sewer will also cross under a CNR railway, which passes under the above noted bridge. As with the bridge, any impacts to the bridge from sewer construction will be assessed as part of a Construction Impact Assessment during design development.

4.10.3.3 Construction Methods

Construction of the re-laid section will be by open cut methods. Installation of intercept chambers and any subsequent installation of maintenance holes for access and cleaning will also be by open cut methods.

We note that construction will occur near critical infrastructure. Any construction works within or near CNR corridors require extensive stakeholder coordination and communication on the progress of the design, to achieve infrastructure owner approval for construction.

All rail crossings are deemed critical infrastructure and thus will automatically require a Construction Impact Assessment to predict anticipated ground movement during and post-construction, should they fall within the anticipated ZOI of the works, until the proposed design soil displacement remains below limits established by both CNR and Metrolinx GO Transit.

Another concern for critical infrastructure within the study area are the bridges south and north of the existing SPS property. While no sewer work for Y12-A is proposed under the bridges, there may be impacts to the bridge foundations from vibrations or settlement/heave induced during nearby open cut excavation. As all bridge structures are considered a critical infrastructure, should they fall within the excavation ZOI, it will automatically be considered for a construction impact assessment, as discussed above.

4.10.3.4 Property Requirements

Permanent property requirements will depend on the final location of the new chambers, manholes and any air management structures. Property easements will be required for permanent access to maintenance holes and chambers, but these are anticipated to be located within the existing ROW, on the west side of the 2nd Concession Road.

Air management is likely to be considered at the transition chamber (intersection of Doane Road and 2nd Concession Road) and there is further potential for air management requirements in the vicinity of the siphon chamber. Exact details on the location and property easement requirements will be confirmed during detailed design, but these air management components are not anticipated to be large structures.

The proposed property locations and requirements are conceptual only. Details related to the number of shafts, shaft sizing, location and property easement requirements will be confirmed during detailed design.

4.10.4 Environmental and Community Impacts and Mitigation

Desktop studies were done to determine the possible extent of these impacts and to propose mitigation measures that would reduce the likelihood and the consequences should they occur. The major impacts and associated mitigation approaches are described in this section.

Because the current designs are only at the conceptual level, potential impacts and mitigation measures could change during design development, depending on:

– The ability to co-locate the proposed design with other planned infrastructure to minimize community effects, to be investigated after field investigations are completed. This change will depend on the number and scale of other planned infrastructure (e.g., utilities, transportation) in the ROW or area.
– Confirmation of available property for temporary and permanent use. The extent of temporary easements or acquired private property, as well as the construction schedule may dictate future design changes or mitigation measures.

The assessment criteria and indicators are provided in Table 4.36, Table 4.37 and Table 4.38, corresponding to each of the environments (social and built, natural, cultural and traffic impacts) together with a potential effects assessment and identification of avoidance, mitigation and compensation measures for the project.

Table 4.36 Y12-A 2nd Concession North Gravity Sewer Social and Built Environment Effects and Mitigation

Item no.	Criteria	Indicators	Potential effects (Positive/Negative)	Avoidance/Mitigation/Compensation
Social and built environment				
SB-1	Effect on existing views	– Changes are predicted in views from residences in the surrounding area	– No change in existing views from residences in the surrounding area.	– No avoidance, mitigation, or compensation measures required.
SB-2	Effect on existing residences, businesses and/or community, institutional and recreational facilities	– Displacement of residences, businesses and other facilities is too great – Temporary or permanent disruption to residences, businesses and other facilities near construction compounds or permanent works is too great	– No displacement of residences, businesses, or community, institutional and recreational facilities is anticipated. – Disruption to residences, businesses and community, institutional and recreational facilities in proximity to construction compounds/ permanent installations.	– No avoidance, mitigation, or compensation measures are anticipated. However, if in fact displacement is required then York Region would provide market value compensation. – Apply standard construction-related mitigation measures to minimize the disruption effects.
Traffic and transportation				
TT-1	Effect on rail/bridge infrastructure	– One or more of rail crossings or large infrastructure impacted	– The sewer excavation ZOI may extent to under the roadway overpass bridge south of the existing SPS and the CNR rail infrastructure passing beneath it.	– Impacts to the bridge/railway induced from sewer construction will be assessed as part of a Construction Impact Assessment during design development.
TT-2	Effect on traffic	– Traffic flows are disrupted too much – Construction occurs too close to congested traffic zones	– Traffic disruption at construction compounds, compound staging may extend into the travelled portion of the ROW. – Traffic movement in to and out of Construction compound sites will impact pedestrian, cycling and traffic flow on 2nd Concession Road. – Impacts to public transit involving potential rerouting of buses and/or relocation of stops. – Coordination of alternate routing for emergency service vehicles, if needed.	– Where possible, maintain one lane in each direction. This could be achieved through flagging, temporary signals or temporary road widening. – Pedestrian movement should be maintained during construction, with marked pedestrian detours as applicable. – Consider special traffic arrangements for peak hours should be considered in traffic flow directions in the morning and afternoon. – Pay duty police officers may be required to direct traffic. – Make special provisions for emergency service vehicle access. – Make special provisions for pedestrian traffic and safety, including signals, detours and winter maintenance. If feasible, move construction traffic to sideroads.
Utilities				
U-1	Conflict with buried utilities	– Sewer or shaft is in direct conflict or falls within clearance limits of nearby utilities	– New construction impacts existing utilities and requires design coordination with utility owners which increases project cost and schedule.	– Review historic and as-built documents for utility data. – Complete a SUE investigation to identify high-risk utilities, including large and/or critical service utilities (e.g., large watermains and all gas mains). – If a conflict occurred with a proposed sewer tunnel, construction shaft or overall work compound location following receipt of utility information, consider temporary or permanent relocation of utilities safely around or through the work area. Depending on the utility, it may be possible to support the utility above an open cut excavation to be reburied. Modifications of the alignment and shaft locations may also be proposed during design development to mitigate utility conflicts.
U-2	Conflict with surface or overhead utilities	– Excavation of shaft is proposed in location of surface infrastructure – Shaft working compound equipment including cranes will require working directly under overhead utilities or within the hydro wire exclusion zone	– Overhead infrastructure such as electrical or communications cabling is mounted on utility poles between 5 and 12 m above the surface. Depending on the required crane size and operating radius to construct the shaft/pit//open cut sections, equipment extents may fall within hydro line exclusion zone, or hit overhead wires causing worker harm or death.	– Working compounds will be designed to allow appropriate and safe movement of workers and equipment around the site, away from live overhead wires or surface utility boxes, based on known utility information and topographic surveys. – If a conflict occurred with a proposed sewer tunnel, construction shaft or overall work compound location, following receipt of utility information, modifications of the alignment and shaft locations may be proposed during design development, the utilities would need to be temporarily or permanently relocated safely around or through the work area.

Item no.	Criteria	Indicators	Potential effects (Positive/Negative)	Avoidance/Mitigation/Compensation
U-3	Damage and/or Deformation to surface infrastructure and buried utilities (including railways, bridges and structural culverts)	– Soil movement next to the utility or structure from sewer open cut construction	– Ground heave/settlement/horizontal shift around open cut excavations during and post-excavation. This information can be obtained from nearby geotechnical instrumentation. – Deformation or damage to nearby surface or buried utilities as a result of soil movement, which may require rehabilitation or repair (e.g., crack formation, angular rotation, strain, pipe joint rotation or pull out).	– For utilities within sewer tunnel ZOI: Select a tunnel excavation method capable of limiting volume losses at the cutting face (limit overcutting of excavation) to limit ground losses. – For utilities near shaft/sewer open cut ZOI: Select a shaft construction method and SOE appropriate with depth, size and geotechnical and hydrogeological conditions at shaft location. – For each, complete analytical assessments at at-risk locations, including low soil cover locations or areas where the tunnel crosses or runs parallel near sensitive, large or critical utilities and services. – Where applicable, propose mitigation methods, such as relocation of utilities or, for deep utilities, relocation of tunnel horizon, based on assessment results. Should neither of these options be applicable, then investigate ground improvement in proximity of utilities to limit ground movement or investigate modification of the tunnel and/or shaft design or construction methodology.
Noise and vibration				
N-1	Operation noise	– Complaints from residents within study area	– Noise disruptions to private residents and commercial areas post-construction, near manholes and other surface connections, SPS locations.	– Any permanent facility, such as supporting air management facilities, will require an ECA application under Section 9 of the Environmental Protection Act to document the noise emissions compliance. – Investigate degree of risk and impact in further detail.
N-2	Construction noise	– Complaints from residents within study area	– Noise disruptions to private residents and commercial areas during construction, near construction compounds.	– Propose construction noise monitoring per MECP NPC-115 Construction Equipment requirements. – Consider completing noise monitoring for the duration of the construction and notify the contractor of any exceedances so that corrective action/contingency actions can be implemented. – Use vehicles and equipment (cranes and excavators) with efficient muffling devices or construct enclosures. – Limit truck movements to comply with noise by-laws for 24/7 construction operations.
V-1	Construction vibration	– Complaints from residents within study area	– Disruptions to private residents and commercial areas during construction, near construction compounds.	– Propose appropriate construction vibration benchmarks within the tender documents. – Consider pre- and post-construction condition photos.
Air management				
O-1	Operation odour at drop structures	– Odour near surface connections	– Where there are bends in the gravity sewer and drop structures, there may be the potential for fugitive releases of odour. The potential for odour at these locations will depend on the ventilation design systems and specific venting locations.	– Consider implementation of ventilation design systems with specific venting locations. – Investigate degree of risk and impact in further detail.
O-2	Operation odour at existing or proposed sewer connection	– Odour near surface connections	– There is potential for odour release due to turbulence at the connection of the proposed sewer to existing sewers.	– Consider implementation of ventilation design systems with odour control. – Extents of risk and impact, will be reviewed in further detail upon investigation.
O-3	Construction odour	– Complaints are received from residents within the study area	– During live connection of infrastructure, there is the potential for odour release.	– Advance notification to residents, advising them of what work is being completed and the duration of the work.
A-1	Construction dust at sewer construction locations	– Fugitive dust is generated – Air quality is poor	– Fugitive dust is generated during construction of gravity sewer, interconnecting shaft/chambers, including the connection points.	– Develop a BMPP to be included in the project Construction Management Plan. – Mitigation should be aimed at minimizing emissions of particulate matter and exposure to particulate matter during the construction phase of the project.
A-2	Construction dust at air management infrastructure	– Fugitive dust is generated – Air quality is poor	– Fugitive dust is generated during construction of the potential air management infrastructure.	– Develop a Dust BMPP to be included in the project Construction Management Plan. – Mitigation should be aimed at minimizing emissions of particulate matter and exposure to particulate matter during the construction phase of the project.

Table 4.37 Y12-A 2nd Concession North Gravity Sewer Natural Environment Effects and Mitigation

Item no.	Criteria	Indicators	Potential effects (Positive/Negative)	Avoidance/Mitigation/Compensation
Hydrogeology				
For 760 m forcemain section to be converted to gravity sewer				
N-1	Effect on groundwater quantity	– Temporary and/or long-term change in groundwater quantity	– No long-term change to groundwater quantity is anticipated, because no water takings are required during operation of the sewer. – Potential temporary change to groundwater quantity is minimal because construction expected to mainly intersect Newmarket Till aquitard and potentially some Inter Newmarket Sediment. Water table anticipated to be encountered at approximately 2 mbgs for the north section of the gravity sewer and approximately 14 mbgs towards for the south section of the gravity sewer. – Potential ground settlement as a result of active dewatering/depressurization. – Change in shallow groundwater flow patterns resulting from operation of sewer pipe resulting from increased I&I and/or preferential movement of groundwater within trench sediments.	– Implement construction methods that minimize dewatering requirements.
N-2	Effect on groundwater quality	– Temporary and/or long-term change in groundwater quality	– Temporary change in groundwater quality is minimal because construction is anticipated to mainly intersect low permeability till. – No long-term change to groundwater quality is anticipated. – Potential effects on groundwater water quality as a result of potential mobilization of contaminated water where active dewatering/depressurization is required. – Reduction in groundwater quality from spills or the mismanagement of fuel/chemical in work areas.	– Develop and implement a spills response plan for construction to mitigate the effect of a spill should one occur. – Establish pre-construction baseline groundwater quality and quantity conditions and develop implementation plans for monitoring during and post-construction (install and monitor wells and surface water).
N-3	Effect on municipal well(s), WHPA	– Intersects Holland Landing WHPA-B, C, D and HVA	– Source Water Protection Plan, Clean Water Act (2006) sanitary sewer infrastructure WHPA-B, C, D and HVA policy compliance evaluation.	– Source Water Protection Plan, Clean Water Act (2006) sanitary sewer infrastructure WHPA-B, C, D and HVA policy, mitigation and monitoring evaluation. – As of January 2023, source water protection requirements under the York Region Municipal Sewage Works CLI ECA apply for any new or alterations to existing sewage works in WHPA-A or B, Vulnerability Score of 10, which applies to a portion of this alignment. These requirements include: • Design must include a Source Protection Supplementary Report that demonstrates that the proposed design recognized the significant drinking water threat and has implemented mitigation measures to protect drinking water sources. The report should identify drinking water sources, how the sewage works has met the requirements of the CWA and the ministry's design and operational requirements and how the works considered the Risk Management Measures Catalogue (e.g., monitoring, reporting requirements), as amended, to address the risks • Designs must be accompanied with a monitoring and reporting plan. • Designs must be accompanied with a Spill Prevention and Contingency Plan, covering information requirements as per O. Reg. 224/07 to prevent, eliminate or ameliorate any adverse drinking water effects that result or may result from spills of pollutants. This includes steps taken in the event drinking water sources are contaminated for example, notifying members of the public who may be directly affected by a spill. – New and replacement sewers are to be constructed of materials and with joints that are equivalent to watermain standards of construction and are to be pressure tested in accordance with Division 441 (formerly 701) of the Ontario Provincial Standards Specification (OPSS).

Item no.	Criteria	Indicators	Potential effects (Positive/Negative)	Avoidance/Mitigation/Compensation
N-4	Effect on private wells - temporary construction dewatering	– Temporary construction dewatering private well interference (quantity/quality)	– Temporary decrease in private well quantity/quality not anticipated due to intersection of low permeability till. – Limited dewatering is expected during construction.	– Implement construction methods that minimize dewatering requirements. – Address construction dewatering private well interference complaints through existing York Region private well assessment and mitigation policy. – Proactively identify any high-risk wells during design and prepare site-specific preventative mitigation and corrective action plans as part of design. Corrective actions should align to York Region's private well assessment and mitigation policy. If needed, establish pre-construction baseline groundwater quality and quantity conditions and develop implementation plans for monitoring during and post-construction (install and monitor wells and surface water). – Address construction dewatering private well interference complaints through existing York Region private well assessment and mitigation policy. – Proactively identify any high-risk wells during design and prepare site-specific preventative mitigation and corrective action plans as part of design. Corrective actions should align to York Region's private well assessment and mitigation policy.
N-5	Effect on private wells – long-term	– Long-term private well interference (quantity/quality)	– No long-term groundwater quantity/quality interference is anticipated.	– If needed, establish pre-construction baseline groundwater quality and quantity conditions and develop implementation plans for monitoring during and post-construction (install and monitor wells and surface water). – Proactively identify any high-risk wells during design and prepare site-specific preventative mitigation and corrective action plans as part of design. Corrective actions should align to York Region's private well assessment and mitigation policy.
N-6	Effect on surface water quantity/quality	– Temporary change in surface water quantity/quality	– Temporary change in surface water quantity/quality is not anticipated based on intersection of low permeability till. – Limited dewatering is expected during construction. – Change in groundwater-surface water interaction (reversal of vertical hydraulic gradient) results in impact to terrestrial and aquatic habitat and associated SAR (where applicable) - reduction in baseflow. – Change in surface water temperature from groundwater taking and/or discharge to surface water features. – Changes to stream morphology resulting from the release of groundwater dewatering water. The potential reduction in baseflow due to water taking in a lower confined aquifer due to increased downward hydraulic gradients across the aquitard separating the stream and the confined aquifer. – The potential reduction in baseflow from a stream reach that intersects an aquifer in which the water taking is occurring.	– Field verification of groundwater-surface water interaction suggested for watercourses and wetlands within the study area. – Complete outlet receiver assessment(s) should temporary groundwater discharge be required to surface water. Establish pre-construction baseline surface water quality and quantity conditions and develop implementation plans for monitoring during and post-construction. – Implement/construct treatment (i.e., settlement tanks, etc.) of construction water prior to discharge to storm sewer/surface water. – Minimize construction area disturbance and duration. Implement erosion and sedimentation control measures (e.g., silt fencing, check dams, etc.). – Adhere to fish timing windows to prevent negative impacts on known sensitive fish species within the study area. – Consider completing a geomorphology study during design. – Refer to the Natural Heritage section of the table for further mitigation approaches associated with surface water impacts.
For sewer replacements near 2nd Concession SPS				
N-7	Effect on groundwater quantity	– Temporary and/or long-term change in groundwater quantity	– No long-term change to groundwater quantity is anticipated, because no water takings are required during operation of the sewer. – Potential temporary change to groundwater quantity because construction may intersect a shallow sand aquifer (encountered at 1 mbgs). Temporary water takings may be required to facilitate construction. – Potential ground settlement as a result of active dewatering/depressurization – Change in shallow groundwater flow patterns resulting from operation of sewer pipe resulting from increased I&I and/or preferential movement of groundwater within trench sediments.	– Implement construction methods that minimize dewatering requirements. – Establish pre-construction baseline groundwater quality and quantity conditions and develop implementation plans for monitoring during and post-construction (install and monitor wells and surface water).
N-8	Effect on groundwater quality	– Temporary and/or long-term change in groundwater quality	– Potential temporary change in groundwater quality because construction may intersect a shallow sand aquifer (estimated 10 to 20 mbgs). Temporary water takings may be required to facilitate construction. – No long-term change to groundwater quality is anticipated. – Potential effects on groundwater water quality as a result of potential mobilization of contaminated water where active dewatering/depressurization is required. – Reduction in groundwater quality from spills or the mismanagement of fuel/chemical in work areas.	– Implement construction methods that minimize dewatering requirements. – Develop and implement a spills response plan for construction to mitigate the effect of a spill should one occur. – Establish pre-construction baseline groundwater quality and quantity conditions and develop implementation plans for monitoring during and post-construction (install and monitor wells and surface water). – During design, complete a contaminant source investigation to mitigate the risk of drawing contamination from one source to another location.

Item no.	Criteria	Indicators	Potential effects (Positive/Negative)	Avoidance/Mitigation/Compensation
N-9	Effect on municipal well(s), WHPA	– Intersects Holland Landing WHPA-C	– Source Water Protection Plan, Clean Water Act (2006) sanitary sewer infrastructure WHPA-C and policy compliance evaluation.	– Source Water Protection Plan, Clean Water Act (2006) sanitary sewer infrastructure WHPA-C and HVA policy, mitigation and monitoring evaluation.
N-10	Effect on private wells - temporary construction dewatering	– Temporary construction dewatering private well interference (quantity/quality)	– Temporary decrease in private well quantity/quality could occur during construction activities depending on the location, depth and construction, methodology and duration.	– Implement construction methods that minimize dewatering requirements, as needed. – If needed, establish pre-construction baseline groundwater quality and quantity conditions and develop implementation plans for monitoring during and post-construction (install and monitor wells and surface water). – Address construction dewatering private well interference complaints through existing York Region private well assessment and mitigation policy. – Proactively identify any high-risk wells during design and prepare site-specific preventative mitigation and corrective action plans as part of design. Corrective actions should align to York Region's private well assessment and mitigation policy.
N-11	Effect on private wells – long-term	– Long-term private well interference (quantity/quality)	– No long-term groundwater quantity/quality interference is anticipated.	– If needed, establish pre-construction baseline groundwater quality and quantity conditions and develop implementation plans for monitoring during and post-construction (install and monitor wells and surface water). – Proactively identify any high-risk wells during design and prepare site-specific preventative mitigation and corrective action plans as part of design. Corrective actions should align to York Region's private well assessment and mitigation policy.
N-12	Effect on surface water quantity/quality	– Temporary change in surface water quantity/quality	– Temporary change in surface water quantity/quality could occur during construction activities depending on the location, depth and construction. – A high groundwater table resulting in groundwater/surface water interaction would be expected due to existing soils and anticipated presence of the ORM aquifer. – 2nd Concession SPS is located adjacent to HREB. – Change in groundwater-surface water interaction (reversal of vertical hydraulic gradient) results in impact to terrestrial and aquatic habitat and associated SAR (where applicable) - reduction in baseflow. – Change in surface water temperature from groundwater taking and/or discharge to surface water features. – Changes to stream morphology resulting from the release of groundwater dewatering water. The potential reduction in baseflow due to water taking in a lower confined aquifer due to increased downward hydraulic gradients across the aquitard separating the stream and the confined aquifer. – The potential reduction in baseflow from a stream reach that intersects an aquifer in which the water taking is occurring.	– Field verification of groundwater-surface water interaction suggested for watercourses and wetlands within the study area. – Complete outlet receiver assessment(s) should temporary groundwater discharge be required to surface water. Establish pre-construction baseline surface water quality and quantity conditions and develop implementation plans for monitoring during and post-construction. – Implement/construct treatment (i.e., settlement tanks, etc.) of construction water prior to discharge to storm sewer/surface water. – Minimize construction area disturbance and duration. Implement erosion and sedimentation control measures (e.g., silt fencing, check dams, etc.). – Adhere to fish timing windows to prevent negative impacts on known sensitive fish species within the study area. – Consider completing a geomorphology study during design. – Refer to the Natural Heritage section of the table for further mitigation approaches associated with surface water impacts.

Item no.	Criteria	Indicators	Potential effects (Positive/Negative)	Avoidance/Mitigation/Compensation
Areas of Potential Environmental Concern				
C-1	Low risk contamination	– An area of potential environmental concern is not located directly in or immediately adjacent to the project ROW – Low potential for contaminants to be present and if present, are likely limited in extent and likely only present in surficial soil – Migration, exposure pathways and receptors are limited; and/or – Impacts can be easily managed prior to or during construction	– 1095 Ringwell Drive: Retail Storage Tank. Operation located adjacent to Leslie Street with potential for COCs (PHCs and BTEX). – 162 Hillcrest Drive: Associated with former and current operation of a commercial fuel oil tank. Low potential PHCs and BTEX.	– No mitigation required.
C-2	Moderate risk contamination	– An area of potential environmental concern is located within or immediately adjacent to the project ROW – Moderate potential for contaminants to be present within the area of potential environmental concern – Moderate potential for contaminants to be present in soil and/or groundwater or there is evidence that contaminants are present – Migration, exposure pathways and/or receptors may be present; and/or – Impacts would need to be assessed and addressed prior to acquisition, design and/or construction	– Intersection of 2nd Concession Road and Valley Trail: Wessuc Inc. released an unknown quantity of hydraulic oil to the land due to equipment failure in 2017. Potential for PHCs and BTEX. – 19663 2nd Concession Road: Associated with current operation of a distribution station (Doane DS), constructed sometime between 1978 and 1988. Potential for Metals and Inorganics, PCBs, PHCs and BTEX.	– Advance boreholes as part of the detail design of the proposed improvements, should be placed in the vicinity of the areas of potential environmental concern having moderate risk, to assess for potential subsurface impacts that may affect the proposed construction work. Soil samples should be collected from these boreholes for laboratory analysis of metals and inorganics (including EC and SAR), PHCs, BTEX and VOCs.
Geotechnical				
G-1	Effect on soil quality	– Contaminant seepage into soil during excavation of shaft	– Chemicals such as drilling fluids, lubricants, ground improvement material, or fuel from construction equipment may contaminate soil.	– Perform regular equipment checks and maintenance. – Prepare an environmental management plan prior to construction in case of contamination.
G-2	Soil movement around shafts and/or open cut excavations	– Vertical or horizontal ground movement around shafts during and post excavation – Deformation or damage to nearby structures and/or utilities	– Ground heave/settlement/horizontal shift at surface around shafts. – Deformation or damage to nearby structures and utilities (e.g., crack formation, angular rotation, strain, or pipe joint rotation or pull out) that may require rehabilitation or repair.	– Select shaft or open cut construction method and SOE appropriate with depth, size and geotechnical and hydrogeological conditions at shaft or open cut locations. – Complete soil displacement analytical assessments at all shaft locations.
G-3	Soil movement along tunnel	– Vertical or horizontal ground movement along tunnel during and post excavation – Movement or damage to nearby structures and/or utilities	– Ground heave/settlement/horizontal shift along tunnel ahead of and along excavated alignment. – Deformation or damage to nearby structures and utilities (e.g., crack formation, angular rotation, strain, or pipe joint rotation or pull out) that may require rehabilitation or repair.	– Select tunnel excavation method capable of limiting volume losses at the cutting face (limit overcutting of excavation) to limit ground losses. – Complete soil displacement analytical assessments of at-risk tunnel locations, including low soil cover locations or areas where the tunnel crosses or runs parallel in close proximity to sensitive natural features, utilities and critical infrastructure such as creeks, gas main, structural culverts, bridges and rail crossings.
G-4	Encounter boulders during shaft and/or tunnel excavation	– Boulders encountered during excavation of shaft and/or tunnel	– For tunnels, boulder presence and properties may require change of preferred excavation methodology (segmented tunnel vs pipe jacking) and tunnel boring machine technical specifications. – For shafts, boulder presence and properties may require change of preferred shaft SOE methodology.	– Complete appropriate geotechnical investigations with strength testing for any encountered boulders. – Prepare a Geological Baseline Report (GBR) during design development with appropriate baseline for boulder strength, sizing and anticipated encounter rates and locations. – Recommend a shaft construction SOE capable of maintaining verticality in boulder-prone soils. – Recommend appropriate technical specifications for tunnel boring machine.

Item no.	Criteria	Indicators	Potential effects (Positive/Negative)	Avoidance/Mitigation/Compensation
G-5	Frac-out of drilling fluids along tunnel	– Drilling fluid breaches surface during tunnel excavation – Unanticipated change in drilling fluid pressure and/or volume	– Drilling fluid may breach beds of water bodies such as creeks, lakes and rivers. – Drilling fluid may breach aquifers. – Drilling fluid may cause cracking on surface infrastructure such as pavement and may require closure of traffic lanes to clean up fluid at surface.	– Select contractor with experienced microtunnelling machines (MTBM) or TBM operators. – Require a “frac-out contingency plan” be prepared prior to construction for cleanup of drilling fluids.
G-6	Encounter contaminated soil during shaft and/or tunnel excavation	– Soil encountered during shaft and/or tunnel excavation is tested to surpass allowable contaminant levels	– Spoil must be dispatched at an approved contaminated soil disposal site.	– Complete appropriate geotechnical investigations and contaminants testing during design development to identify confirmed contaminated soil locations or at-risk areas based on historical land use. – Identify and confirm availability of appropriate soil disposal sites based on anticipated contaminants for use during construction.
G-7	Encounter weak or incompetent soil during tunnel excavation	– Volume loss at surface and depths	– Soil heave, soil settlement or sink hole formation at surface.	– Complete appropriate geotechnical investigations with strength testing for anticipate soils along tunnel horizon. – Prepare a GBR during design development with appropriate baseline for soil properties, including stratigraphic profile inferred from borehole investigations. – Recommend appropriate preventative or compensation ground improvement of at-risk locations.
G-3.2	Movement and vibration near live CNR rail crossings	– Vertical or horizontal ground movement along tunnel during and post excavation – Movement or damage to nearby rail infrastructure – Vibrations surpass allowable typical threshold for live tracks	– Soil settlement and/or heave causing deformation or damage to rail infrastructure which may require rehabilitation or repair. – Associated soil movement deformations and vibrations from machinery can cause derailing of trains, if surpassing allowable soil displacement limits established by CNR and GO Transit.	– Analytically assess rail crossings for soil displacement and structural deformations to confirm anticipated ground movement during and post-construction remains below limits established by CNR and GO Transit. Modify relevant shaft and/or tunnel designs or construction methodology, or and propose mitigation methods such as ground improvement, accordingly.
Natural heritage				
EG-1	Effect on aquatic habitat or functions	– Watercourse in the study area supports a warm water thermal regime – The study area contains wetlands. The study area contains the Rogers River Reservoir, which has been evaluated, and other unevaluated wetlands	– Temporary or permanent loss of aquatic features or categorical loss of functions by type, including PSWs, Locally Significant Wetlands, watercourses by sensitivity type and others. – During construction water quality may be impaired due to elevated TSS in surface water runoff from study area locations which can affect aquatic species/habitats. Some concentrations above background may occur temporarily. – Change in surface water temperature from groundwater taking and/or discharge to surface water features – Potential spill hazard when refuelling equipment.	– Need to complete site investigations to evaluate potential effects on aquatic habitat function. – Implement best management practices to control surface water runoff and minimize TSS effects. – Where feasible, discharging of surface water during construction should be directed into the municipal storm sewer system to mitigate thermal impacts to watercourses. Should discharge of surface waters be directed to watercourses, additional mitigation measures would need to be adhered to (e.g., enhanced erosion and control measures). The use of erosion and sediment control measures and timing of construction to avoid spawning and egg incubation periods will reduce the potential for effect to fish and aquatic life. – Conduct equipment maintenance and refuelling at the designated and properly contained maintenance areas or at industrial garages located well away from creek banks, wetlands and outside vegetation areas. – Develop a Spill Prevention Plan.
EG-2	Effect on stream geomorphology	– Change in geomorphic form/function/ stability in affected channels within study area of both locations	– No anticipated impacts to stream geomorphology in affected channels.	– Employ erosion and sediment controls to limit deposition of construction-mobilized soils into watercourses. – Consider completing a geomorphology study during design, where applicable.
EG-3	Effect on aquatic species including SAR, species of local concern, native species and invasive species	– Aquatic species	– Number and type of aquatic species potentially affected temporarily or permanently. – No anticipated impacts to aquatic SAR as there are no aquatic SAR identified within the study area.	– Preventing death of fish or impacts to downstream fish habitat through the use of appropriate timing windows.

Item no.	Criteria	Indicators	Potential effects (Positive/Negative)	Avoidance/Mitigation/Compensation
EG-4	Effect on terrestrial habitat or functions	– No study areas contain ANSIs – The study area contains ecologically significant forests – Wildlife habitat	– Temporary or permanent loss of natural heritage features (e.g., ESAs, ANSIs, wildlife corridors and others). – Potential effects on terrestrial habitat (e.g., direct vegetation (and wildlife habitat) loss, alteration and fragmentation) may occur from the physical footprint of study area locations. – Project preparation, construction and operation may increase the risk of nest destruction and mortality of migratory birds.	– Site investigations to evaluate potential terrestrial habitat function/significance. – During design, prepare construction constraints with consideration of timing windows to mitigate where possible, vegetation clearing to occur outside of the migratory bird nesting season, bat maternity roosting season, turtle overwintering and amphibian breeding. – Limit the area of project footprint and limit disturbance from employees. – The presence of wildlife will be monitored and communicated to site personnel. – Vehicle use will be restricted to designated areas. – Where practical, rehabilitate habitat for plants and wildlife.
EG-5	Effect on terrestrial species, including SAR, species of local concern, native species, invasive species and area-sensitive species	– SAR has the potential to occur within the study areas including amphibians, insects, birds, reptiles, mammals and tree species	– Number and type of terrestrial species potentially affected temporarily or permanently. – Construction activities have the potential to disturb wildlife within adjacent natural heritage areas. – Project preparation, construction and operation may increase the risk of nest/habitat destruction and mortality of terrestrial SAR. – Project may result in wildlife-vehicle collisions and may cause injury/mortality to individual animals.	– Site investigations to evaluate potential occurrence of terrestrial SAR within the study area. – During design, prepare construction constraints with consideration of timing windows to mitigate where possible, vegetation clearing to occur outside of the migratory bird nesting season, bat maternity roosting season, turtle overwintering and amphibian breeding. – Clearly demarcate work limits at outset of construction and minimize unnecessary vegetation clearing.

Table 4.38 Y12-A 2nd Concession North Gravity Sewer Cultural Environment Effects and Mitigation

Item no.	Criteria	Indicators	Potential effects (Positive/Negative)	Avoidance/Mitigation/Compensation
CE-1	Effect on OHA-designated properties and properties listed on municipal heritage registries	– Project components are in the vicinity of the heritage property/landscape	– Encroachment onto the property/landscape resulting in a physical impact to the potential BHRs and/or CHLs. – New structures or landscape features and/or alterations to the property/landscape that result in a physical impact to the potential BHRs and/or CHLs. – Relocation of all or part of the potential BHRs and/or CHLs. – Demolition or destruction of all or part of the potential BHRs and/or CHLs. – Vibration impacts to the potential heritage buildings identified on the property/landscape in and on adjacent properties. – Ground disturbance impacts relating to landscape features on the property/landscape in and on adjacent properties.	– If direct impacts are unavoidable design project to minimize encroachment on the property/landscape while avoiding all impacts to the potential BHRs and/or CHLs. The following options and mitigations should be considered: • Consult during detailed design to determine if any approvals or permits are required as a result of physical impacts to the property/landscape. – If avoidance of the property/landscape or the above-noted options are not feasible, and if a physical impact to potential BHRs and/or CHLs is unavoidable, then the following is required: • Consult during detailed design to determine if any approvals or permits are required as a result of physical impacts to the property/landscape. • Complete a property-specific CHER/HIA prior to any alterations including evaluation of the property against O. Reg. 9/06 and, if necessary, detailed documentation of any confirmed BHRs and/or CHLs and recommendation of specific mitigation measures for impacts to any identified heritage attributes. • The CHER/HIA should also consider the compatibility of new structures or landscape features with existing heritage attributes, layouts and designs of the property/landscape.

Item no.	Criteria	Indicators	Potential effects (Positive/Negative)	Avoidance/Mitigation/Compensation
CE-2	Effect on archeological sites	– Project components are in the vicinity of the archeological sites	– Encroachment onto the site resulting in a physical impact. – New structures or landscape features and/or alterations to the site that result in a physical impact. – Demolition or destruction of all or part of the archeological sites. – Vibration impacts to the archeological sites identified on the property/landscape. – Ground disturbance impacts to the archeological sites.	– Should impacts be proposed within the vicinity of the site, then additional assessment may be required. Depending on the location of the proposed impacts, this may be Stage 2 archaeological assessement, Stage 3 archaeological assessment, or Stage 4 avoidance and protection. Stage 3 test unit excavation must be completed across the remainder of the site as per Sections 3.2.2 and 3.2.3 of the Standards and Guidelines (MCM 2011:49-53). – However, if proposed impacts will avoid the site, but construction-related activities will occur within the vicinity of the site, then the site will require Stage 4 avoidance and protection monitoring, to be conducted by a licensed consultant archaeologist. The avoidance, protection and construction monitoring requirements for construction activities would include: • Erection of a temporary barrier that extends a minimum of 10 m beyond site limits. • Issuing “no go” instructions to all on-site construction crews and personnel during construction. • Depicting the 10-m protective buffer zone on all contract drawings with explicit instructions that a licensed consultant archaeologist will be present to monitor construction. • Ensuring the presence of a licensed archaeologist during construction to monitor the area to be avoided and verify the effectiveness of the avoidance strategy. • If any archaeological materials are identified during construction, then all construction activities must stop until the archaeological materials are evaluated and mitigated, if necessary, by a licensed archaeologist. • After the completion of the soil disturbing activities, having licensed archaeologist inspect the site area and prepare a report for the MCM on the effectiveness of the avoidance strategy and in ensuring that the area to be avoided remained intact.

4.11 Y12-B 2nd Concession South Gravity Sewer

4.11.1 Study Area

The Y12-B 2nd Concession South Gravity Sewer will provide conveyance along primarily existing ROW from the Y6 2nd Concession SPS site to the proposed Y9-A Newmarket East SPS. This trunk sewer will convey the discharge of the Holland Landing SPS, the Queensville West SPS, the 2nd Concession SPS, the Green Lane trunk and the Sharon Trunk (the Sharon Trunk includes the Queensville East SPS). A study area of approximately 200 metres surrounding the centerline of the road right of way was applied as shown in Figure 4.24.

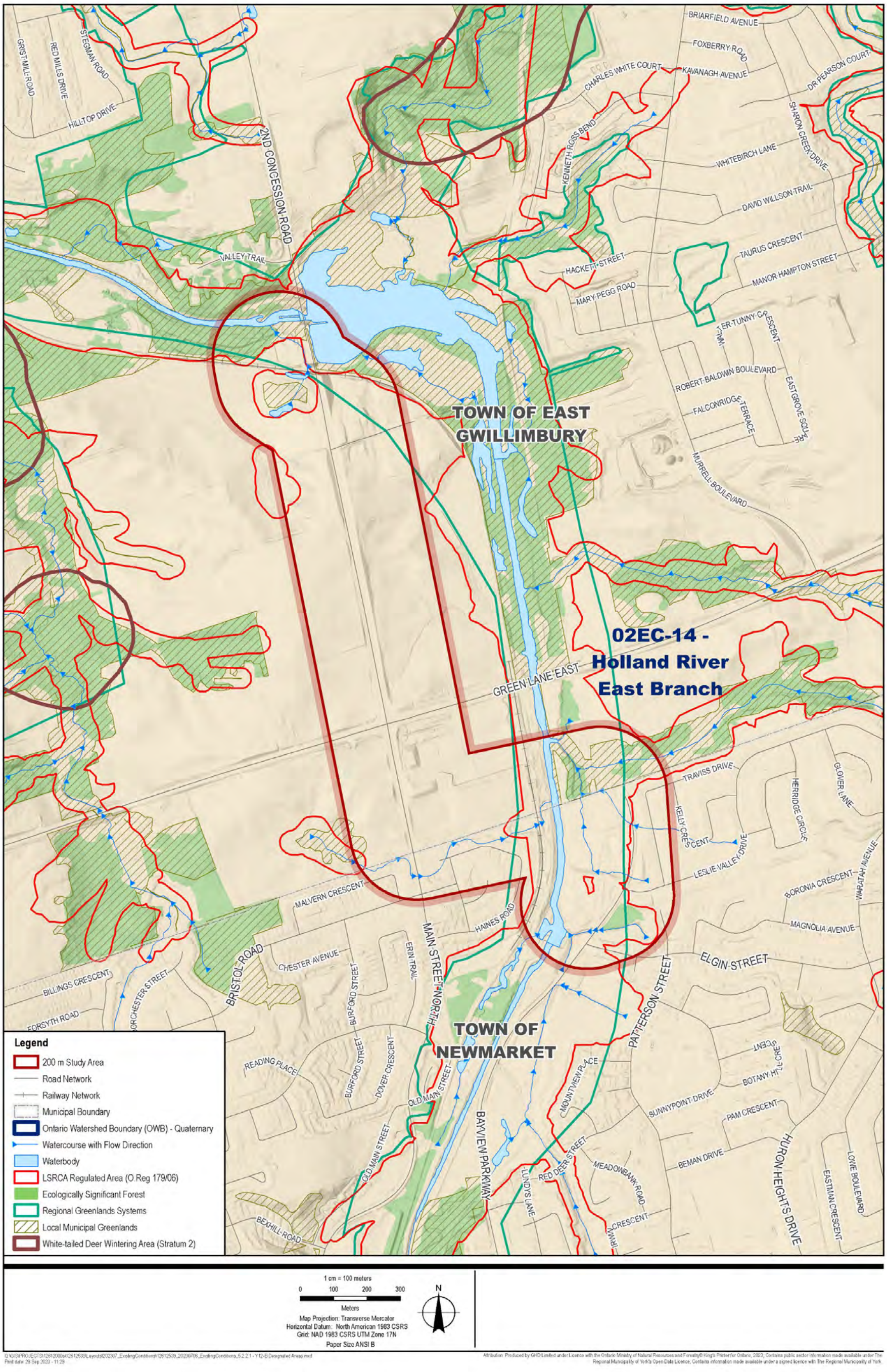


Figure 4.24 **Study Area for Y12-B 2nd Concession South Gravity Sewer**

4.11.2 Existing Conditions

4.11.2.1 Social and Built Environment

The following sections will summarize the findings of the desktop studies completed within the study area, including planning and land use, traffic and transportation and utilities.

4.11.2.1.1 Planning Policy and Land Use

Existing Land Use

Along 2nd Concession Road, from Valley Trail to Green Lane East, land uses consist of the following:

– West side:
  - Agricultural lands
  - Pumping station
  - HREB crossing 2nd Concession Road north of SPS
  - CNR rail crossing 2nd Concession Road.
– East side:
  - Low density residential housing
  - Agricultural lands
  - Conservation area (RRCA).

Along Main Street North, from Green Lane East to Bristol Road, land uses consist of the following:

– West side:
  - Low density residential housing
  - Agricultural lands.
– East side:
  - Low density residential housing
  - Agricultural housing
  - Institutional use (East Gwillimbury GO Transit parking facility).

Along Bayview Parkway, land uses consist of the following:

– West side:
  - Recreational land use (Newmarket micro sports fields)
  - York Region water and wastewater plant
  - Newmarket SPS
  - HREB
  - Nokiidaa Trail
  - CNR rail crossing.
– East side:
  - Low density residential housing
  - Agricultural lands.

Planning Policy

Regional

The York Region Official Plan 2022 (June 2023 Office Consolidation) designates lands within the study area as Community Area. Lands at the south end of the study area are part of York Region's Greenlands System.

Local

The study area crosses the municipal boundary between East Gwillimbury and Newmarket.

With reference to the East Gwillimbury Official Plan 2010 (2018 Office Consolidation), the portion of the study area north of the municipal boundary is subject to the Green Lane Secondary Plan and has the following land use designations:

– Agricultural/Long-term Growth Area
– Environmental Protection Area
– Open Space – Special Study Area
– Low and Medium Density Residential
– Neighbourhood Commercial
– Residential Mixed Use, High Density Residential, Office Priority Area and Institutional within major local centre at the intersection of Green Lane and 2nd Concession Road.

The Green Lane Secondary Plan indicates two proposed minor collector roads west of the GO station and a proposed elementary school and proposed minor collector road south of the 2nd Concession SPS.

With reference to the Newmarket Official Plan (August 2022 Consolidation), lands south of the municipal boundary are designated as Residential Area and Parks and Open Space.

Active Development Applications

Existing property use has been described using the following data available to GHD:

– Orthoimagery from spring 2022
– Google Earth images
– Farm Tax Program data from 2023 tax year
– Property assessment type via GeoWarehouse (accessed August 2023).

Active development applications within the 200-m study area for each project location have been summarized based on existing available information. Lands within the Y12-B study area contains several active development applications. The nature of these applications is for the development of residential subdivisions and associated amenities, including parklands and educational facilities.

– Valley Trail – Proposed subdivision.
– 574 Old Green Lane – Two applications. To facilitate the development of 119 single-detached, 131 townhouse units, one mixed use block, one medium density block, one apartment block, one mixed use apartment block, an elementary school and a park. To rezone the lands from Rural to Institutional Application 3 (Town of Newmarket) Zoning By-Law Amendment as part of the Established Neighbourhood's Compatibility Study.

4.11.2.1.2 Transportation in the Study Area

2nd Concession between south of Green Lane East and 2nd Concession SPS is a two-lane arterial road with dedicated cycling lanes and sidewalks, on both sides, as shown in Figure 4.25 North of Green Lane East, the road becomes a four-lane arterial road with dedicated cycling lanes on both sides, also shown in Figure 4.25. There are no pedestrian sidewalks north of Valley Trail.

Figure 4.25 2nd Concession Looking North (1) Towards Green Lane East, (2) Towards 2nd Concession SPS. (*Google Maps* "Streetview," digital images http://maps.google.com)

The AADT along Green Lane East between East Gwillimbury GO Station and Old Green Lane has been counted at 38,188, based on the latest available 2022 data. AADT along 2nd Concession Road south of Green Lane East are lower, at 7,225 based on the latest available 2023 data. Historical AADT data along the study area are presented in Table 4.39.

Table 4.39 Green Lane East and 2nd Concession Road AADT Counts Between East Gwillimbury GO Station and Old Green Lane

Description of road limits	2012	2013	2014	2016	2018	2019	2022	2023
Green Lane East between East Gwillimbury GO Station and Old Green Lane	33,512	33,832	No data	34,327	32,914	No data	38,188	No data
2nd Concession Road between Green Lane East and Rogers Road	10,543	11,324	8,792	No data	6,548	6,698	6,698	7,225

There are several public transit routes running along Yonge Street with associated bus stop infrastructure, within the study area, including YRT Route 54, which runs north to Green Lane East and turns east.

The sewer will also cross under two rail crossings for the same GO Transit rail corridor south and north of Green Lane East. The tracks pass through the East Gwillimbury GO Station located northeast of the southern limits of the sewer alignment. However, this infrastructure falls immediately outside of the study area.

4.11.2.1.3 Utilities in the Study Area

There are several above/below grade utilities situated within the study area corridor and in the vicinity of the proposed project. These utilities may be temporarily impacted during the construction of the sewer, shafts/pits and work compounds. Formal notification and consent would be required from the authorities responsible for these utilities prior to construction.

Buried utilities are typically located within the following limits:

– Shallow-buried electrical and communications cabling are commonly buried between 1.2 and 1.5 mbgs
– Shallow-buried storm drains, sanitary sewers and watermains are typically buried between 1.2 and 3.5 mbgs
– Deep-buried utilities are defined as anything buried more deeply than the depths mentioned above.

Known municipal infrastructure that existed on York Region's GIS database has been provided within the drawing set. A detailed utility investigation program, which would include a "Level A through D" subsurface utility exploration, would be required as part of future site investigations.

Known large infrastructure within the study area include:

– An overpass roadway bridge on 2nd Concession southeast of the existing SPS (sewer will avoid crossing under)
– A CNR rail crossing under the above noted bridge at station 2+060
– The same CNR rail crossing at the southeast end of the project study area and near the limit of the sewer alignment, at station 0+167
– Roadway bridge crossing over East Holland River at station 0+125.

The four critical structures will require specific geotechnical instrumentation and monitoring requirements to receive infrastructure owner approval of the design. The sewer will not be crossing directly underneath the roadway bridge to the north. However, the foundations are likely within the proximity of the ZOI from tunnel excavation. Both rail crossings are directly above the sewer installation. Any construction impacts to the tracks and bridges will be assessed as part of a Construction Impact Assessment during design development.

4.11.2.2 Natural Environment

The following sections will summarize the findings of the desktop studies completed within the study area for geotechnical, hydrogeology, surface water, natural heritage and contamination.

4.11.2.2.1 Geotechnical

The study area for Y12-B is located from the southeast quadrant of the intersection of Green Lane East and Main Street North, up to the 2nd Concession SPS along 2nd Concession Road. The southern portion of study area is mostly bordered by residential area and farmland, within the boundaries of the Town of East Gwillimbury. It should be noted that no site-specific reports or borehole records were encountered within the study area.

Based on the Quaternary geology mapping, the native deposit within the study area predominantly comprised silt and clay matrix, mostly consisting of Glaciolacustrine deposits.

The bedrock consists of limestone, dolostone, shale, arkose, sandstone Ottawa Group, Simcoe Group and Shadow Lake Formation. The bedrock is not mapped within the study area and depth of bedrock is not known.

4.11.2.2.2 Hydrogeological

A hydrogeological desktop review was undertaken within the study area using information from MECP well records, the MECP Source Protection Information Atlas, the ORM database and the Ontario Geological Survey database. Available hydrogeological reports for projects within the area were also reviewed.

The study area for Y12-B is located within the Schomberg clay Plains physiographic region. The gravity sewer is anticipated to intersect coarse-grained glaciolacustrine and interstadial deposits (ORM) at ground surface. A high groundwater table/hydrostatic groundwater pressure would be expected due to existing soils and anticipated presence of the ORM aquifer. Temporary water takings may be required to facilitate construction.

The gravity sewer is located within source water protection WHPA-C and D. The section near 2nd Concession SPS is within WHPA-C. The section along 2nd Concession is within WHPA-D. The section along Green Lane East and towards Newmarket East SPS is within a vulnerable aquifer. The water table depth varies based on topographic surface between 2 and 12 mbgs. Shallow groundwater flowing towards HREB towards 2nd Concession SPS. Water table high near topography high along 2nd Concession. From groundwater high, shallow groundwater flows to the south and east.

The gravity sewer along 2nd Concession goes through ORM and channel silt aquitard. The gravity sewer parallel to Green Lane East goes through the bottom of the ORM and top of channel silt aquitard. The north/south easement goes through bottom of the ORM and top of channel silt aquitard.

There are four private supply wells located near intersection of Green Lane East and 2nd Concession.

– Refer to Table 4.40 regarding details on anticipated aquifers and aquitards within the study area.

Table 4.40 Aquifers and Aquitards Through the Y12-B Study Area

Aquifers and aquitards	Description	Thickness
Undifferentiated upper sediments recent deposits (Aquifer)	An unconfined aquifer consisting of discontinuous fill and unconsolidated overburden deposits. Surfaces and overlies ORM complex along 2nd Concession.	Varies
Oak Ridges Moraine Complex (Aquifer)	These sediments consist mostly of silt and fine sand, but also include gravel and minor clay and diamicton. The aquifer is generally unconfined, except the section covered by Halton Till on the south flank of the ORM complex. Towards 2nd Concessions SPS, sediments are at surface.	Approximately 52 m south of 2nd Concession SPS and becomes thinner and shallower along 2nd Concession
Channel silt (Aquitard)	Silt deposits.	Ranges between 9 to 23 m
Channel sand (Aquifer)	Sand deposits.	Varies
Thorncliffe Formation (Aquifer)	Regionally recognized as a highly productive confined aquifer and is laterally continuous.	Generally 5 m

4.11.2.2.3 Surface Water

There is one sub-watershed within the study area: The HREB. The HREB is located to the east of proposed location for Newmarket East SPS.

Other surface features of interest include:

– Main branch of the HREB. We note that the HREB is also considered a historical Chippewa corridor.

– Multiple watercourses and drainage features.

Refer to Figure 4.26 for a surface water map of existing conditions within the study area, south section.

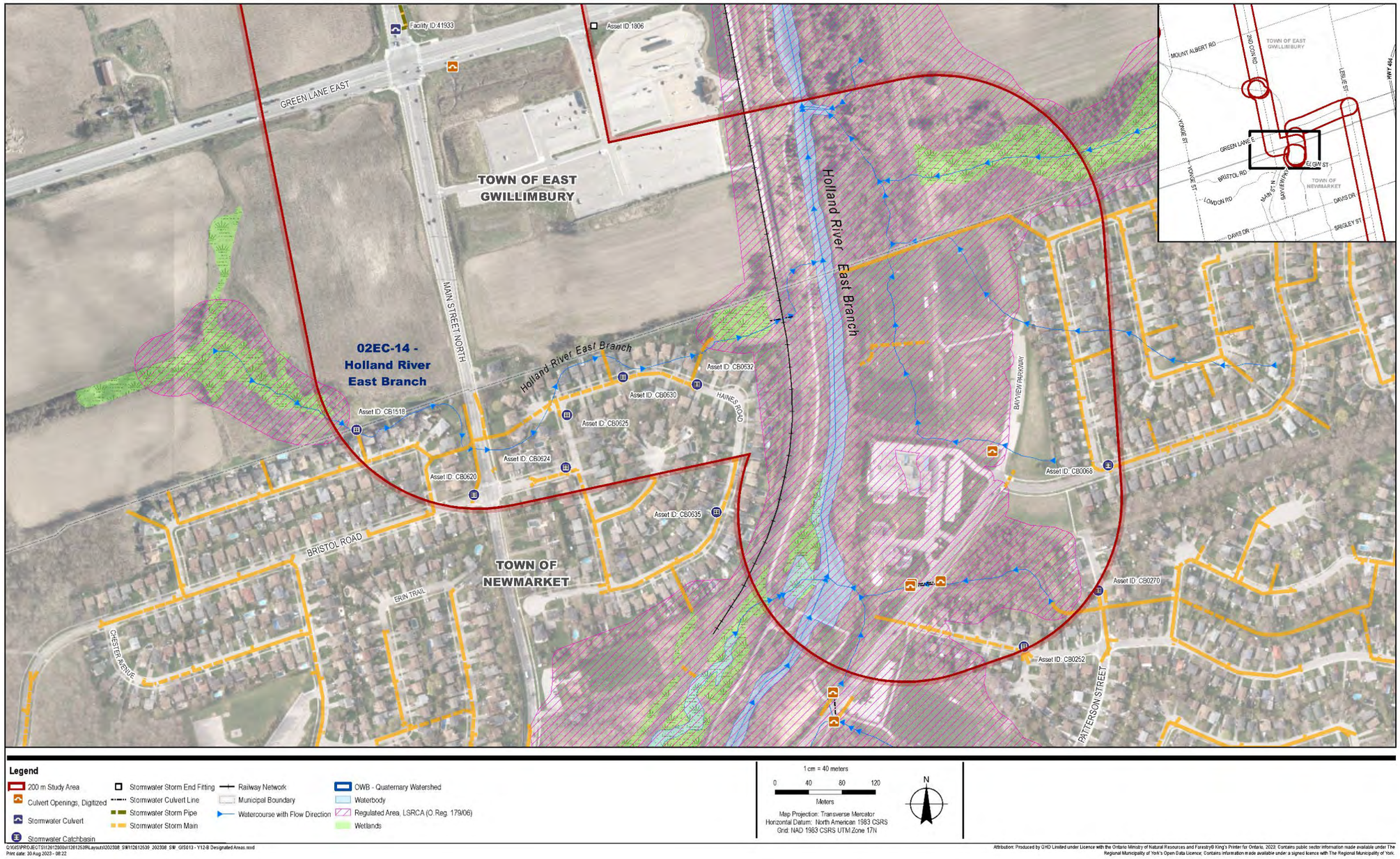


Figure 4.26 **Y12-B Study Area Surface Water Map for Existing Conditions, South Section**

4.11.2.2.4 Natural Heritage Characterization

The study area contains unevaluated and evaluated wetlands, forests, a section of the HREB and a few tributaries. The East Holland River itself provides habitat for SAR species.

The evaluated Rogers Reservoir Wetland is found in the northeast portion of the Y12-B study area. A mix of wetland, grassland and forest ecosystems provide habitat for a diverse array of species. Forests provide habitat for species such as great horned owl, eastern wood-pewee, gray treefrog, western chorus frog and wood frog. The grasslands provide key habitat for field sparrow, savannah sparrow, alder flycatcher, willow flycatcher, brown thrasher and indigo bunting. The wetlands provide foraging and breeding habitat for great blue heron and northern leopard frog (LSRCA, 2013).

Aquatic Habitat

The HREB flows through the Y12-B study area at two locations. At the north extent of the study area, the HREB crosses 2nd Concession Road in an east to west direction. The second crossing occurs at the southeast extent of the study area where the HREB flows through the study area in a south to north direction through a green space and park area. Additionally, four unnamed tributaries exist flowing into the HREB at the southeast crossing location. The watercourses generally have a wide riparian buffer, and the surrounding land use consists of agricultural and low density residential. Portions of the HREB have a relatively wide floodplain consisting of mostly grasses and sedges with sparse trees. Downstream of the study area, the HREB continues flowing in a northwest direction for approximately 13.3 km before the confluence with the West Holland River and ultimately discharges into Lake Simcoe.

The watercourses present within the study area are classified as having a warmwater thermal regime. Based on the anticipated fish community, the HREB within this study area and its tributaries are expected to support primarily forage/baitfish species with limited sportfish present. No redside dace have been recorded within this study area.

Terrestrial Habitat

The lands in the study area consist mainly of agricultural land and low-density residential communities, with accumulations of woodland and wetland communities at the northern and southern extremes. This study area is in the northern portion of the study area and may soon face development pressure as it is in between East Gwillimbury and Newmarket. The focus of the study area is the variety of wetland and forested communities present within the RRCA at its northern boundary and the riparian area surrounding the HREB at its southern boundary.

All natural and cultural communities present within the study area are considered common in the province.

Significant Wildlife Habitat

Potential Candidate SWH for Region 6E as defined by MNRF has been identified in several natural areas within the study area. The greatest concentration of these potentials is likely to be found in wetland and woodland habitats associated with the PSWs and ESAs. A screening and analysis of all ELC communities was completed in the study area for Seasonal Concentration Areas of Animals, Rare Vegetation Communities or Specialized Habitat for Wildlife, Habitat for Species of Conservation Concern and Animal Movement Corridors.

4.11.2.2.5 Areas of Potential Environmental Concern

A review of information from the Environmental Risk Information Services database was completed for properties located within the study area. The review was completed on May 26, 2023, to visually confirm the current land use and associated potential for containing subsurface environmental contamination. This “windshield-level” survey showed that:

– Various residential and commercial properties are present along the majority of the study area.
– Some agricultural and Industrial land use is present within the study area.

Refer to Figure 4.27 for locations identified at-risk of contamination within the Y12-B study area. The locations are identified as existing known spills, as well as those identified as three risk categories of potential for existing

contamination: Low, Moderate and High. Low risk locations are presented in a green circle, moderate risk in an orange circle and high risk in a red circle. We clarify that not all risk categories may be present in the below figure. The number presented in the circle is a property identifier relevant to the entire York Region Sewage Works Project, and not specific to the project being discussed.

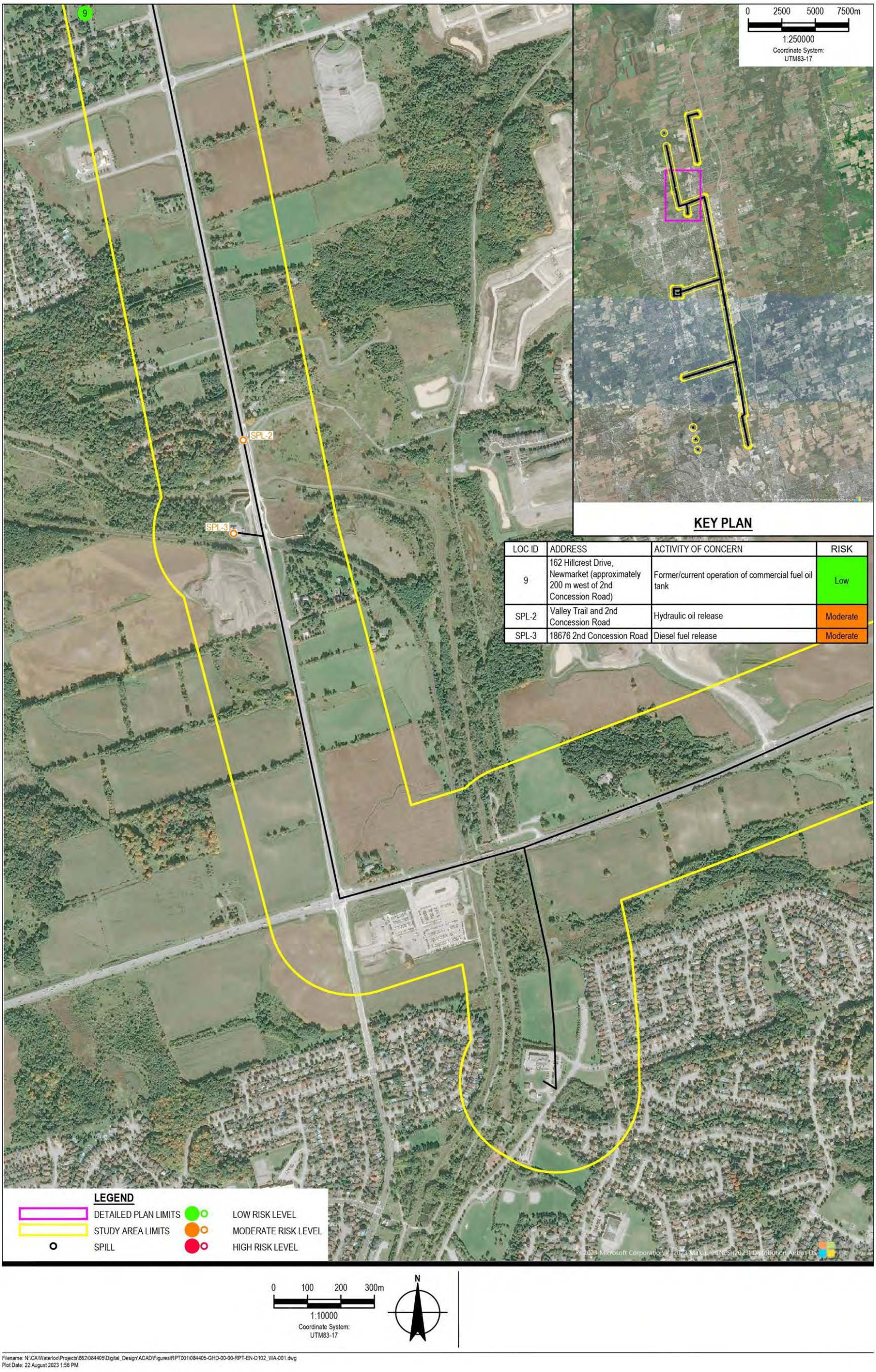


Figure 4.27 Areas of Potential Environmental Concern within Y12-B Study Area

4.11.3 Conceptual Design

Conceptual design for this gravity sewer was based generally on flow rates and design criteria as described in Chapter 3. Table 4.41 summarize the general characteristics and features that will be present from initial construction through to final configuration.

Refer to Appendix A, Sheet 7 for the Conceptual Design Drawings relevant to this project.

4.11.3.1 Design Basis

For design basis specifics relevant to Y12-B 2nd Concession South Gravity Sewer, refer to Table 4.41.

Table 4.41 Design Basis for the Development of Y12-B 2nd Concession South Gravity Sewer

Design basis	Assumptions
Study area	200 m area along infrastructure alignment
Study area boundaries	2nd Concession Road, bounded by 2nd Concession SPS to the north, 400 m south of Green Lane East to the south and 600 m east of Yonge Street to the east
Nominal diameter	1,800 mm
Sewer type	Gravity
Upstream connection point	2nd Concession SPS
Downstream connection point	Newmarket SPS
Design criteria	Based on York Region Design Guidelines (2021), including: – Pipe size and material – Hydraulic design – Air management – Method of construction – Major utility crossings – End connection points
Method of construction	Tunneling within the ROW and Regional easements
Land use	Mixture of residential and agricultural land uses
Modelled peak flow	1,761 L/s
Major infrastructure considerations	– CNR rail crossing south of 2nd Concession SPS – CNR rail crossing 400 m east of Yonge Street, on Green Lane East – Roadway bridge crossing East Holland River – Hydro corridor
Environmental feature considerations	– Rogers Reservoir Conservative Authority – Nokiidaa Trail – East Holland River – Several wooded areas

4.11.3.2 Description of Design

The proof of concept was based on the following alignment with the greatest impacts. Alternate alignments will be explored during detailed design to minimize impacts. The Y12-B gravity sewer will be approximately 2,500 m in length. The top end of this new installation will be immediately south of the 2nd Concession SPS, pass below the Metrolinx track and follow the east side of 2nd Concession Road crossing Green Lane East and continue southbound along Main Street North.

The new gravity sewer will then turn 90 degrees to the east following an existing east-west sewer easement on the north side of a residential area, and then again cross underneath the Metrolinx track, a local bicycle network path and the East Holland River.

Following the crossing under the East Holland River, the new gravity sewer is proposed to continue East, crossing an existing hydro easement and existing soccer fields, and discharge into the new proposed Y9-A Newmarket East SPS. An alternate alignment along Green Lane will be evaluated during detailed design, the Green Lane study corridor has already been assessed for impacts as part of the Y9-B Newmarket East SPS Forcemains.

The sections of the proposed Y12-B gravity sewer on Main Street north, the east-west sewer easement and the north south hydro easement will run parallel to an existing 825-mm diameter trunk sanitary sewer, that conveys wastewater from Green Lane (west of 2nd Concession) directly to the existing Newmarket SPS. Existing flows from the existing 825-mm diameter trunk sewer are anticipated to be transferred into the Y12-B gravity sewer to the proposed new Newmarket East SPS.

Preliminary capacity calculations require an 1,800-mm diameter sanitary sewer needed hydraulically to install this new line at a uniform grade of 0.10% from north to south. This uniform grade will result in a maximum depth of close to 30 m at the peak on 2nd Concession Road, a peak cover of 20 m along Main Street North, between 11 and 18 m within the east-west easement, and an average of 10-m depth for the final 500-m run southbound into the Newmarket East SPS. We note that the sewer grade is subject to change during design development.

This line will also be used in conjunction with the Y4 Newmarket SPS Upgrade (temporary SPS) as in-line storage during peak storm events to hold back some of the collected flow to relieve pressure on the existing Newmarket SPS and the downstream existing Aurora SPS until other new infrastructure is constructed and commissioned.

4.11.3.3 Construction Methods

The 2nd Concession South Gravity Sewer is proposed to be installed by trenchless technology to allow for the crossing of the East Holland River and the two CNR rail crossings used by Metrolinx GO Transit trains The connections at either end of the alignment (at 2nd Concession SPS and at Newmarket SPS) will be open cut, as may some of the shallower work depending on results of the field investigations and the detailed design.

4.11.3.3.1 Tunnel Construction

Trenchless installations of this diameter gravity sewer are typically installed via microtunnelling boring machines (MTBMs), a smaller, remote version of the tunnel boring machine (TBM). MTBMs employ the slurry pressure balance principle in combination with pipe jacking for pipe installation as described above, although the machines are operated remotely from the surface and workers do not enter the tunnel. For production operations except for TBM maintenance and survey, making it a safer method with lower construction crew requirements. MTBMs are sized to install pipes ranging from 0.5 to 3.4 m i.d. For larger diameter pipe sizes (>1.8 m i.d.) tunnel drives lengths of greater than 1 km, with minimum horizontal curve radius of approximately 500 m, are being achieved nowadays. Typical drive lengths can vary from 200 m to over 1,000 m, with construction being more economical the longer the drive. Constructible length of drive is typically related to the size of the tunnel, with larger MTBMs able to achieve longer drives than smaller diameter machines.

TBM allows for installation of pipes 2.5 m and larger and could be applied to this project if using a two-pass approach, which entails the installation of a larger casing tunnel, within which the carrier (sewer) pipe is then installed. This method provides additional protection from groundwater infiltration and sewage exfiltration.

One key concern with microtunnelling jacking pipe installation relates to any sensitive infrastructure along or crossing the tunnel alignment. In the case of the 2nd Concession South Gravity Sewer, there are two CNR rail crossings, used by Metrolinx GO Transit, at the upstream and downstream ends of the tunnel at station 0+167 and 2+060, which are part of the same rail corridor and infrastructure.

Tunneling adjacent to railways using any of the above methodologies will require additional design considerations, particularly for the vibrations and soil heave and/or settlement impacting the tracks, which can be generated by the MTBMs. Some horizontal displacement of soil is also anticipated during tunneling and shaft excavation works. These displacements can generate structural deformations on rail infrastructure, including tracks. Depending on the type and intensity of the deformation, the tracks may become unsuitable for safe travel and closure of the tracks may be required to repair the tracks. As these are high traffic, heavy rails, neither short- or long-term closure of the rails will be accepted for this project and special attention must be provided to avoid or mitigate deformations induced by soil movement during and post-construction.

Any construction works within CNR corridors require extensive stakeholder coordination and communication on the progress of the design, to achieve infrastructure owner approval for construction, as well as including a visual pre- and post-construction conditions assessment of the structure, and CNR specified geotechnical instruments and monitoring requirements (per document “Utility Crossing/Encroachment Application Packet” dated December 4, 2018). In addition, as all rail crossings are considered a critical infrastructure, it will automatically be considered for construction impact assessment, which involves an analytical review of ground movement induced structural deformations by the tunneling and nearby shafts excavation works.

Both CNR and GO Transit have standards for review and alert limits for vertical and horizontal displacement thresholds for their infrastructure (per “Metrolinx Trenchless Utility Works Design and Construction Guidelines on Metrolinx Right Of-Way (Heavy Rail)” dated October 31, 2019) which will act as a key design standard for all excavations near (within calculated ZOI from excavation settlement) or under active rails.

All rail crossings are deemed critical infrastructure and thus will automatically require a Construction Impact Assessment to predict anticipated ground movement during and post-construction, until the proposed design soil displacement remains below limits established by both CNR and GO Transit. Should the limits be surpassed, the team will apply modifications to the relevant shaft and/or tunnel designs or construction methodology, or proposing pre-excavation mitigation methods such as ground improvement, whichever is considered more appropriate, with approval from CNR and GO Transit.

A second concern for critical infrastructure within the study area are the two bridges, located on 2nd Concession southeast of the existing SPS property near station 2+000 and crossing East Holland River at station 0+125. While the sewer will not directly cross the bridge, there may be impacts to the bridge foundations from vibrations or settlement/heave induced during tunneling or nearby shaft excavation. As all bridge structures are considered a critical infrastructure, it will automatically be considered for a construction impact assessment, as discussed above.

4.11.3.3.2 Shaft Construction

Shafts are required for launch of TBMs, servicing tunnelling operations and TBM retrieval, and are commonly used to house maintenance holes, access chambers and other permanent facilities.

From a tunnel construction perspective, the required shaft dimensions, particularly shape and internal diameter, are a function of the following:

– Length of tunnel segments (pipe or PCTL)
– Tunnel diameter
– Tunnelling machine dimensions, particularly length
– Thrust wall design
– Jacking rig size
– Tunnel eye sealing ring
– Guide rail systems.

The shaft details proposed on the concept alignment for the Y12-B gravity sewer are as follows. Methodologies for shaft excavation and support are commonly classified as sealed or unsealed, depending on the degree of leakage into the shaft and impacts on the surrounding water table that occur during construction. As highlighted previously, it is expected that the shafts will be constructed in a variety of soft ground conditions, largely below the water table. Both shaft classifications are further described in the sections below.

Unsealed Shafts

Unsealed shafts are typically specified where ground conditions are stable, where there are no restrictions on dewatering to permit lowering the surrounding water table, or where conditions are dry and dewatering is not required for shaft construction). Common methods are described below.

Steel liner plate

Steel liner plates provide a relatively light-weight, easy-to-handle, safe support for soft ground tunnelling because the ground that supplies the loading also supplies the resistance to the load. The liner plate assembly simply distributes and transmits the load to the surrounding earth.

Driven sheet pile

Sheet pile walls are used as an earth retention system in soils that allow driving from the surface to bottom of shaft. They do not work well in soil conditions with boulders or large obstructions. Sheet piles are prefabricated steel sheet sections with interlocking edges. As the sheets are installed, they form a continuous barrier in the ground. The sheets are typically driven with vibratory hammers or drop hammers. More recently, this type of construction can also be sealed but requires specialty sealants to be applied at joints, which increase construction schedule, cost and failure modes.

Soldier piles with timber laggings

Soldier piles are steel H piles that are vertically driven or drilled into the earth at regular intervals prior to excavation. As excavation progresses in stages, horizontal lagging in the form of timber is added behind the flanges to create the wall structure with connecting joints.

Sealed Shafts

Sealed shafts are typically specified where unstable ground conditions exist or where there are restrictions on dewatering to lower the surrounding water table. Sealed shafts tend to be more expensive than unsealed shafts, although they have become almost mandatory in many Canadian jurisdictions where there are strict environmental requirements to minimize groundwater lowering and effects on adjacent water courses as well as infrastructure. Common sealed shaft methodologies include:

Secant pile walls

Secant pile shafts utilize bored piling methods (incorporating use of temporary steel casings driven, or vibrated into place, in advance of pile excavation to prevent ground collapse) to create a vertical perimeter of interlocking poured concrete cylindrical piles. The overlapping of piles creates a waterproof liner and supporting wall. It cannot be used as a final structure and will require a permanent structure such as a manhole chamber to be installed within the shaft.

Concrete sinking caissons

The method involves sinking the shaft in several lifts by building a circular (or oval) shaft structure on the surface and placing kentledge blocks (weights) or rams on top of it. Many contractors assist the sinking operation by lubricating the annular gap between the outer walls and surrounding ground. A clamshell grab (granular soils) or mini excavator (competent soils such as clays or rock) is then used for shaft excavation, and the shaft structure slowly sinks to fill the excavated void. The shaft structure is typically constructed using precast concrete segments or cast in place reinforced concrete. Once the shaft has been sunk to the desired formation elevation, a mass concrete base plug is placed using a tremie (underwater) concreting, if the shaft is in a flooded condition. A major advantage of this method is that the shaft wall can be used as future permanent structure for maintenance.

Slurry (diaphragm) walls

To commence excavation, guide walls are installed around the desired shaft location. These guide walls act as a guide for installation of the slurry walls. A trench is then excavated between the guide walls, typically several metres long and 1 to 1.5 m wide and extending to the required depth. A bentonite slurry mix is pumped into the trench as it is excavated to support the surrounding soil. The slurry is composed of water, bentonite clay and other additives to achieve the desired properties, acting as a temporary support system to prevent collapse. Once the trench reaches the desired depth, steel cages or vertical steel sections are inserted for reinforcement, enhancing the wall's load-bearing capacity. As the concrete is pumped into position, the slurry is displaced to the surface where it can be collected, treated and used for subsequent wall construction. The slurry wall shaft construction method is highly advantageous for constructing deep excavations in urban environments.

Pending geotechnical and hydrogeological field investigation and laboratory testing results along the sewer alignment and at shaft locations, a preferred shaft construction methodology cannot be selected. The appropriate methods will be assessed and compared in a future phase of design development.

4.11.3.4 Property Requirements

Permanent property requirements will depend on the final location of the new trunk sewer. Property easements may be required for permanent access to maintenance holes depending on the final location of the infrastructure. Exact details on shaft sizing, location and property easement requirements will be confirmed during detailed design.

Temporary and permanent property easements may be required for construction and operation of the trunk sewer. Permanent property requirements will depend on the final location of the shafts, which are expected to contain access structures that must be accessible by York Region staff for sewer maintenance purposes. The shaft locations are not all currently within York Region ROW and property easements may be required for permanent access to the maintenance holes. Exact details on shaft sizing, location and property easement requirements will be confirmed during detailed design.

The proposed property locations and requirements for construction of the shafts are conceptual only. Details related to the number of shafts, shaft sizing, location and property easement requirements will be confirmed during detailed design.

4.11.4 Environmental and Community Impacts and Mitigation

Desktop studies were done to determine the possible extent of these impacts and to propose mitigation measures that would reduce the likelihood and the consequences should they occur. The major impacts and associated mitigation approaches are described in this section.

Because the current designs are only at the conceptual level, potential impacts and mitigation measures could change during design development, depending on:

– The ability to co-locate the proposed design with other planned infrastructure to minimize community effects, to be investigated after field investigations are completed. This change will depend on the number and scale of other planned infrastructure (e.g., utilities, transportation) in the ROW or area.
– Confirmation of available property for temporary and permanent use. The extent of temporary easements or acquired private property, as well as the construction schedule may dictate future design changes or mitigation measures.

The assessment criteria and indicators are provided in Table 4.42, Table 4.43 and Table 4.44, corresponding to each of the environments (social and built, natural, cultural and traffic impacts) together with a potential effects assessment and identification of avoidance, mitigation and compensation measures for the project.

Table 4.42 Y12-B 2nd Concession South Gravity Sewer Social and Built Environment Effects and Mitigation

Item no.	Criteria	Indicators	Potential effects (Positive/Negative)	Avoidance/Mitigation/Compensation
Social and built environment				
SB-1	Effect on existing views	– Changes are predicted in views from residences in the surrounding area	– No change in existing views from residences in the surrounding area.	– No avoidance, mitigation, or compensation measures required.
SB-2	Effect on existing residences, businesses and/or community, institutional and recreational facilities	– Displacement of residences, businesses and other facilities is too great – Temporary or permanent disruption to residences, businesses and other facilities near construction compounds or permanent works is too great	– No displacement of residences, businesses, or community, institutional and recreational facilities is anticipated. – Disruption to residences, businesses and community, institutional and recreational facilities in proximity to construction compounds/ permanent installations.	– No avoidance, mitigation, or compensation measures are anticipated. However, if in fact displacement is required then York Region would provide market value compensation. – Apply standard construction-related mitigation measures to minimize the disruption effects.
Traffic and transportation				
TT-1	Effect on existing rail/bridge infrastructure	– One or more of rail crossings or large infrastructure impacted	– The sewer will cross under two GO Transit rail crossings, south of Green Lane and southwest of the 2nd Concession SPS. – The sewer excavation ZOI may extent to under the roadway overpass bridge southeast of the 2nd Concession SPS.	– Coordination with Metrolinx during design development to limit impacts to their rail services. – Any impacts to the bridge/railway induced from sewer construction (tunnelled or open cut) will be assessed as part of a Construction Impact Assessment during design development, to avoid loss of service to the railway or bridge.
TT-2	Effect on traffic	– Traffic flows are disrupted too much – Construction occurs too close to congested traffic zones	– Traffic disruption at construction compounds, compound staging may extend into the travelled portion of the ROW. – Traffic movement in to and out of Construction compound sites will impact pedestrian, cycling and traffic flow on 2nd Concession Road. – Impacts to public transit involving potential rerouting of buses and/or relocation of stops. – Coordination of alternate routing for emergency service vehicles, if needed.	– Where possible, maintain one lane in each direction. This could be achieved through flagging, temporary signals or temporary road widening. – Pedestrian movement should be maintained during construction, with marked pedestrian detours as applicable. – Consider special traffic arrangements for peak hours should be considered in traffic flow directions in the morning and afternoon. – Pay duty police officers may be required to direct traffic. – Make special provisions for emergency service vehicle access. – Make special provisions for pedestrian traffic and safety, including signals, detours and winter maintenance. If feasible, move construction traffic to sideroads.
TT-3	Effect on GO Station	– Extent of disruption to vehicular and pedestrian traffic flows in and out of station	– The sewer construction will extent from Green Lane East to past the south property line of the East Gwillimbury GO Station. Depending on minimum traffic lane and sidewalk closures, there may be congestion entering and entering the property, especially during peak times, at the west entrance.	– The property has two exits and entrances, including pedestrian access, to the west and north of the property. The north entrances are not anticipated to be impacted during construction and this will be the preferred access point for the GO Station. For other applicable mitigation measures, refer to SB-1.
Utilities				
U-1	Conflict with buried utilities	– Sewer or shaft is in direct conflict or falls within clearance limits of nearby utilities	– New construction impacts existing utilities and requires design coordination with utility owners which increases project cost and schedule.	– Review historic and as-built documents for utility data. – Complete a SUE investigation to identify high-risk utilities, including large and/or critical service utilities (e.g., large watermains and all gas mains). – If a conflict occurred with a proposed sewer tunnel, construction shaft or overall work compound location following receipt of utility information, consider temporary or permanent relocation of utilities safely around or through the work area. Depending on the utility, it may be possible to support the utility above an open cut excavation to be reburied. Modifications of the alignment and shaft locations may also be proposed during design development to mitigate utility conflicts.

Item no.	Criteria	Indicators	Potential effects (Positive/Negative)	Avoidance/Mitigation/Compensation
U-2	Conflict with surface or overhead utilities	– Excavation of shaft is proposed in location of surface infrastructure – Shaft working compound equipment including cranes will require working directly under overhead utilities or within the hydro wire exclusion zone	– Overhead infrastructure such as electrical or communications cabling is mounted on utility poles between 5 and 12 m above the surface. Depending on the required crane size and operating radius to construct the shaft and lower the TBM, equipment extents may fall within hydro line exclusion zone, or hit overhead wires causing worker harm or death.	– Working compounds will be designed to allow appropriate and safe movement of workers and equipment around the site, away from live overhead wires or surface utility boxes, based on known utility information and topographic surveys. – If a conflict occurred with a proposed sewer tunnel, construction shaft or overall work compound location, following receipt of utility information, modifications of the alignment and shaft locations may be proposed during design development, the utilities would need to be temporarily or permanently relocated safely around or through the work area.
U-3	Damage and/or deformation to surface infrastructure and buried utilities (including railways, bridges and structural culverts)	– Soil movement under or next to the utility from tunnel or shaft/open cut construction	– Ground heave/settlement/horizontal shift along tunnel ahead of and along excavated alignment, and around shafts and open cut excavations during and post-excavation. This information can be obtained from nearby geotechnical instrumentation. – Deformation or damage to nearby surface or buried utilities as a result of soil movement, which may require rehabilitation or repair (e.g., crack formation, angular rotation, strain, pipe joint rotation or pull out).	– For utilities within sewer tunnel ZOI: Select a tunnel excavation method capable of limiting volume losses at the cutting face (limit overcutting of excavation) to limit ground losses. – For utilities near shaft/sewer open cut ZOI: Select a shaft construction method and SOE appropriate with depth, size and geotechnical and hydrogeological conditions at shaft location. – For each, complete analytical assessments of at-risk locations, including low soil cover locations or areas where the tunnel crosses or runs parallel near sensitive, large, or critical utilities and services. – Where applicable, propose mitigation methods such relocation of utilities, or for deep utilities, relocation of the tunnel horizon based on assessment results. Should neither of these options be applicable, then investigate ground improvement in proximity of utilities to limit ground movement or investigate modification of the tunnel and/or shaft design or construction methodology.
Noise and vibration				
N-1	Operation noise	– Complaints from residents within study area	– Noise disruptions to private residents and commercial areas post-construction, near manholes and other surface connections, SPS locations.	– Any permanent facility, such as supporting air management facilities, will require an ECA application under Section 9 of the Environmental Protection Act to document the noise emissions compliance. – Investigate degree of risk and impact in further detail.
N-2	Construction noise	– Complaints from residents within study area	– Noise disruptions to private residents and commercial areas during construction, near construction compounds.	– Propose construction noise monitoring per MECP NPC-115 Construction Equipment requirements. – Consider completing noise monitoring for the duration of the construction and notify the contractor of any exceedances so that corrective action/contingency actions can be implemented. – Use vehicles and equipment (cranes and excavators) with efficient muffling devices or construct enclosures. – Limit truck movements to comply with noise by-laws for 24/7 construction operations.
V-1	Construction vibration	– Complaints from residents within study area	– Disruptions to private residents and commercial areas during construction, near construction compounds.	– Propose appropriate construction vibration benchmarks within the tender documents. – Consider pre- and post-construction condition photos.
Air management				
O-1	Operation odour at existing or proposed sewer connection	– Odour near surface connections	– There is potential for odour release due to turbulence at the connection of the proposed sewer to existing sewers.	– Consider implementation of ventilation design systems with odour control. – Extents of risk and impact, will be reviewed in further detail upon investigation.
O-2	Construction odour	– Complaints are received from residents within the study area	– During live connection of infrastructure, there is the potential for odour release.	– Advance notification to residents, advising them of what work is being completed and the duration of the work.

Item no.	Criteria	Indicators	Potential effects (Positive/Negative)	Avoidance/Mitigation/Compensation
A-1	Construction dust at sewer construction locations	– Fugitive dust is generated – Air quality is poor	– Fugitive dust is generated during construction of gravity sewer, interconnecting shaft/chambers, including the connection points.	– Develop a BMPP to be included in the project Construction Management Plan. – Mitigation should be aimed at minimizing emissions of particulate matter and exposure to particulate matter during the construction phase of the project.
A-2	Construction dust at air management infrastructure	– Fugitive dust is generated – Air quality is poor	– Fugitive dust is generated during construction of the potential air management infrastructure.	– Develop a BMPP to be included in the project Construction Management Plan. – Mitigation should be aimed at minimizing emissions of particulate matter and exposure to particulate matter during the construction phase of the project.

Table 4.43 Y12-B 2nd Concession South Gravity Sewer Natural Environment Effects and Mitigation

Item no.	Criteria	Indicators	Potential effects (Positive/Negative)	Avoidance/Mitigation/Compensation
Hydrogeology				
N-1	Effect on groundwater quantity	– Temporary and/or long-term change in groundwater quantity	– Potential temporary change to groundwater quantity because construction may intersect ORM aquifer (estimated at ground surface to variable depths). Temporary water takings may be required to facilitate construction. A high groundwater table/hydrostatic groundwater pressure would be expected due to existing soils and anticipated presence of the ORM aquifer. – Potential local leakage and long-term change in groundwater quality during operation. Majority of gravity sewer anticipated to have high groundwater table/hydrostatic groundwater pressures such that there would be minimal leakage (i.e., primarily potential infiltration). – Potential ground settlement as a result of active dewatering/depressurization. – Change in shallow groundwater flow patterns resulting from operation of sewer pipe resulting from increased I&I and/or preferential movement of groundwater within trench sediments.	– Implement construction methods that minimize dewatering requirements including sealed shafts and tunnel face stability control (e.g., earth pressure balance tunnelling machine). – Establish pre-construction baseline groundwater quality and quantity conditions and develop implementation plans for monitoring during and post-construction (install and monitor wells and surface water).
N-2	Effect on groundwater quality	– Temporary and/or long-term change in groundwater quality	– Potential temporary change in groundwater quality because construction may intersect ORM aquifer. Temporary water takings may be required to facilitate construction. – No long-term change to groundwater quality is anticipated. – Potential effects on groundwater water quality as a result of potential mobilization of contaminated water where active dewatering/depressurization is required. – Reduction in groundwater quality from spills or the mismanagement of fuel/chemical in work areas.	– Implement construction methods that minimize dewatering requirements including sealed shafts and tunnel face stability control (e.g., earth pressure balance tunnelling machine). – Develop and implement a spills response plan for construction to mitigate the effect of a spill should one occur. – Establish pre-construction baseline groundwater quality and quantity conditions and develop implementation plans for monitoring during and post-construction (install and monitor wells and surface water). – During design, complete a contaminant source investigation to mitigate the risk of drawing contamination from one source to another location.
N-3	Effect on municipal well(s), WHPA	– Intersects WHPA-C, D and HVA	– Source Water Protection Plan, Clean Water Act (2006) sanitary sewer infrastructure WHPA-C, D and HVA policy compliance evaluation. – Section along 2nd Concession located within WHPA-C and D.	– Source Water Protection Plan, Clean Water Act (2006) sanitary sewer infrastructure WHPA-C, D and HVA policy, mitigation and monitoring evaluation.
N-4	Effect on private wells - temporary construction dewatering	– Temporary construction dewatering private well interference (quantity/quality)	– Temporary decrease in private well quantity/quality could occur during construction activities depending on the location, depth and construction, methodology and duration.	– If needed, establish pre-construction baseline groundwater quality and quantity conditions and develop implementation plans for monitoring during and post-construction (install and monitor wells and surface water). – Address construction dewatering private well interference complaints through existing York Region private well assessment and mitigation policy. – Proactively identify any high-risk wells during design and prepare site-specific preventative mitigation and corrective action plans as part of design. Corrective actions should align to York Region's private well assessment and mitigation policy.
N-5	Effect on private wells – long-term	– Long-term private well interference (quantity/quality)	– Potential long-term change in groundwater quality during operation of the gravity sewer.	– If needed, establish pre-construction baseline groundwater quality and quantity conditions and develop implementation plans for monitoring during and post-construction (install and monitor wells and surface water). – Proactively identify any high-risk wells during design and prepare site-specific preventative mitigation and corrective action plans as part of design. Corrective actions should align to York Region's private well assessment and mitigation policy.

Item no.	Criteria	Indicators	Potential effects (Positive/Negative)	Avoidance/Mitigation/Compensation
N-6	Effect on surface water quantity/quality	– Temporary changes in surface water	– Temporary changes in surface water could occur during construction activities depending on the location, depth, construction, methodology, timing, and duration. – A high groundwater table resulting in groundwater/surface water interaction would be expected due to existing soils and anticipated presence of the ORM aquifer. – Change in groundwater-surface water interaction (reversal of vertical hydraulic gradient) results in impact to terrestrial and aquatic habitat and associated SAR (where applicable) – reduction in baseflow. – Change in surface water temperature from groundwater taking and/or discharge to surface water features. – Changes to stream morphology resulting from the release of groundwater dewatering water. The potential reduction in baseflow due to water taking in a lower confined aquifer due to increased downward hydraulic gradients across the aquitard separating the stream and the confined aquifer. – The potential reduction in baseflow from a stream reach that intersects an aquifer in which the water taking is occurring.	– Field verification of groundwater-surface water interaction suggested for watercourses and wetlands within the study area. – Complete outlet receiver assessment(s) should temporary groundwater discharge be required to surface water. Establish pre-construction baseline surface water quality and quantity conditions and develop implementation plans for monitoring during and post-construction. – Implement/construct treatment (i.e., settlement tanks, etc.) of construction water prior to discharge to storm sewer/surface water. – Minimize construction area disturbance and duration. Implement erosion and sedimentation control measures (e.g., silt fencing, check dams, etc.). – Adhere to fish timing windows to prevent negative impacts on known sensitive fish species within the study area. – Consider completing a geomorphology study during design. – Refer to the Natural Heritage section of the table for further mitigation approaches associated with surface water impacts.
Geotechnical				
G-1	Effect on soil quality	– Contaminant seepage into soil during excavation of shaft	– Chemicals such as drilling fluids, lubricants, ground improvement material, or fuel from construction equipment may contaminate soil.	– Perform regular equipment checks and maintenance. – Prepare an environmental management plan prior to construction in case of contamination.
G-2	Soil movement around shafts and/or open cut excavations	– Vertical or horizontal ground movement around shafts during and post excavation – Deformation or damage to nearby structures and/or utilities	– Ground heave/settlement/horizontal shift at surface around shafts. – Deformation or damage to nearby structures and utilities (e.g., crack formation, angular rotation, strain, or pipe joint rotation or pull out) that may require rehabilitation or repair.	– Select shaft or open cut construction method and SOE appropriate with depth, size and geotechnical and hydrogeological conditions at shaft or open cut locations. – Complete soil displacement analytical assessments at all shaft locations.
G-3	Soil movement along tunnel	– Vertical or horizontal ground movement along tunnel during and post excavation – Movement or damage to nearby structures and/or utilities	– Ground heave/settlement/horizontal shift along tunnel ahead of and along excavated alignment. – Deformation or damage to nearby structures and utilities, which may require rehabilitation or repair (e.g., crack formation, angular rotation, strain, pipe joint rotation or pull out), including	– Select tunnel excavation method capable of limiting volume losses at the cutting face (limit overcutting of excavation) to limit ground losses. – Complete soil displacement analytical assessments of at-risk tunnel locations, including low soil cover locations or areas where the tunnel crosses or runs parallel in close proximity to sensitive natural features, utilities and critical infrastructure such as creeks, gas main, structural culverts, bridges and rail crossings.
G-4	Movement and vibration under live CNR rail crossings	– Vertical or horizontal ground movement along tunnel during and post excavation – Movement or damage to nearby rail infrastructure – Vibrations surpass allowable typical threshold for live tracks	– Soil settlement and/or heave causing deformation or damage to rail infrastructure which may require rehabilitation or repair. – Associated soil movement deformations and vibrations from machinery can cause derailing of trains, if surpassing allowable soil displacement limits established by CNR and GO Transit.	– Analytically assess rail crossings for soil displacement and structural deformations to estimate anticipated ground movement during and post-construction remains below limits established by CNR and GO Transit. Modify relevant shaft and/or tunnel designs or construction methodology, or and propose mitigation methods such as ground improvement, accordingly.
G-5	Encounter boulders during shaft and/or tunnel excavation	– Boulders encountered during excavation of shaft and/or tunnel	– For tunnels, boulder presence and properties may require change of preferred excavation methodology (segmented tunnel vs pipe jacking) and tunnel boring machine technical specifications. – For shafts, boulder presence and properties may require change of preferred shaft SOE methodology.	– Complete appropriate geotechnical investigations with strength testing for any encountered boulders. – Prepare a GBR during design development with appropriate baseline for boulder strength, sizing and anticipated encounter rates and locations. – Recommend a shaft construction SOE capable of maintaining verticality in boulder-prone soils. – Recommend appropriate technical specifications for tunnel boring machine.
G-6	Frac-out of drilling fluids along tunnel	– Drilling fluid breaches surface during tunnel excavation – Unanticipated change in drilling fluid pressure and/or volume	– Drilling fluid may breach beds of water bodies such as creeks, lakes and rivers. – Drilling fluid may breach aquifers. – Drilling fluid may cause cracking on surface infrastructure such as pavement and may require closure of traffic lanes to clean up fluid at surface.	– Select contractor with experienced MTBM or TBM operators. – Require a “frac-out contingency plan” be prepared prior to construction for cleanup of drilling fluids.

Item no.	Criteria	Indicators	Potential effects (Positive/Negative)	Avoidance/Mitigation/Compensation
G-7	Encounter contaminated soil during shaft and/or tunnel excavation	– Soil encountered during shaft and/or tunnel excavation is tested to surpass allowable contaminant levels	– Spoil must be dispatched at an approved contaminated soil disposal site.	– Complete appropriate geotechnical investigations and contaminants testing during design development to identify confirmed contaminated soil locations or at-risk areas based on historical land use. – Identify and confirm availability of appropriate soil disposal sites based on anticipated contaminants for use during construction.
G-8	Encounter weak or incompetent soil during tunnel excavation	– Volume loss at surface and depths	– Soil heave, soil settlement or sink hole formation at surface.	– Complete appropriate geotechnical investigations with strength testing for anticipate soils along tunnel horizon. – Prepare a GBR during design development with appropriate baseline for soil properties, including stratigraphic profile inferred from borehole investigations. – Recommend appropriate preventative or compensation ground improvement of at-risk locations.
Natural heritage				
EG-1	Effect on aquatic habitat or functions	– Watercourse in the study area supports a warm water thermal regime – The study area contains wetlands – The study areas contain the Rogers River Reservoir, which has been evaluated, and other unevaluated wetlands	– Temporary or permanent loss of aquatic features or categorical loss of functions by type, including PSWs, Locally Significant Wetlands, watercourses by sensitivity type and others. – During construction water quality may be impaired due to elevated TSS in surface water runoff from study area locations which can affect aquatic species/habitats. Some concentrations above background may occur temporarily. – Potential spill hazard when refuelling equipment.	– Need to complete site investigations to evaluate potential effects on aquatic habitat function. – Implement best management practices to control surface water runoff and minimize TSS effects. – Where feasible, discharging of surface water during construction should be directed into the municipal storm sewer system to mitigate thermal impacts to watercourses. Should discharge of surface waters be directed to watercourses, additional mitigation measures would need to be adhered to (e.g., enhanced erosion and control measures). The use of erosion and sediment control measures and timing of construction to avoid spawning and egg incubation periods will reduce the potential for effect to fish and aquatic life. – Conduct equipment maintenance and refuelling at the designated and properly contained maintenance areas or at industrial garages located well away from creek banks, wetlands and outside vegetation areas. – Develop a Spill Prevention Plan.
EG-2	Effect on stream geomorphology	– Change in geomorphic form/function/ stability in affected channels within study area of both locations	– No anticipated impacts to stream geomorphology in affected channels.	– Employ erosion and sediment controls to limit deposition of construction-mobilized soils into watercourses. – Consider completing a geomorphology study during design, where applicable.
EG-3	Effect on aquatic species including SAR, species of local concern, native species and invasive species	– Aquatic species	– Number and type of aquatic species potentially affected temporarily or permanently. – No anticipated impacts to aquatic SAR as there are no aquatic SAR identified within the study area.	– Preventing death of fish or impacts to downstream fish habitat through the use of appropriate timing windows.
EG-4	Effect on terrestrial habitat or functions	– No study areas contain ANSIs – Study area contains ecologically significant forests – Wildlife habitat	– Temporary or permanent loss of natural heritage features (e.g., ESAs, ANSIs, wildlife corridors and others). – Potential effects on terrestrial habitat (e.g., direct vegetation (and wildlife habitat) loss, alteration and fragmentation) may occur from the physical footprint of study area locations. – Project preparation, construction and operation may increase the risk of nest destruction and mortality of migratory birds.	– Site investigations to evaluate potential terrestrial habitat function/significance. – During design, prepare construction constraints with consideration of timing windows to mitigate where possible, vegetation clearing to occur outside of the migratory bird nesting season, bat maternity roosting season, turtle overwintering and amphibian breeding. – Limit the area of project footprint and limit disturbance from employees. – The presence of wildlife will be monitored and communicated to site personnel. – Vehicle use will be restricted to designated areas. – Where practical, rehabilitate habitat for plants and wildlife.
EG-5	Effect on terrestrial species, including SAR, species of local concern, native species, invasive species and area-sensitive species	– SAR has the potential to occur within the study areas including amphibians, insects, birds, reptiles, mammals and tree species	– Number and type of terrestrial species potentially affected temporarily or permanently. – Construction activities have the potential to disturb wildlife within adjacent natural heritage areas. – Project preparation, construction and operation may increase the risk of nest/habitat destruction and mortality of terrestrial SAR. – Project may result in wildlife-vehicle collisions and may cause injury/mortality to individual animals.	– Site investigations to evaluate potential occurrence of terrestrial SAR within the study area. – During design, prepare construction constraints with consideration of timing windows to mitigate where possible, vegetation clearing to occur outside of the migratory bird nesting season, bat maternity roosting season, turtle overwintering and amphibian breeding. – Clearly demarcate work limits at outset of construction and minimize unnecessary vegetation clearing.

Table 4.44 Y12-B 2nd Concession South Gravity Sewer Cultural Environment Effects and Mitigation

Item no.	Criteria	Indicators	Potential effects (Positive/Negative)	Avoidance/Mitigation/Compensation
CE-1	Effect on OHA-designated properties and properties listed on municipal heritage registries	– Project components are in the vicinity of the heritage property/landscape	– Encroachment onto the property/landscape resulting in a physical impact to the potential BHRs and/or CHLs. – New structures or landscape features and/or alterations to the property/landscape that result in a physical impact to the potential BHRs and/or CHLs. – Relocation of all or part of the potential BHRs and/or CHLs. – Demolition or destruction of all or part of the potential BHRs and/or CHLs. – Vibration impacts to the potential heritage buildings identified on the property/landscape in and on adjacent properties. – Ground disturbance impacts relating to landscape features on the property/landscape in and on adjacent properties.	– If direct impacts are unavoidable, design project to minimize encroachment on the property/landscape while avoiding all impacts to the potential BHRs and/or CHLs. The following options and mitigations should be considered: • Consult with the Town during detailed design to determine if any approvals or permits are required as a result of physical impacts to the property/landscape. – If avoidance of the property/landscape or the above-noted options are not feasible, and if a physical impact to potential BHRs and/or CHLs is unavoidable, then the following is required: • Consult with the Town during detailed design to determine if any approvals or permits are required as a result of physical impacts to the property/landscape. • Complete a property-specific CHER/HIA prior to any alterations including evaluation of the property against O. Reg. 9/06 and, if necessary, detailed documentation of any confirmed BHRs and/or CHLs and recommendation of specific mitigation measures for impacts to any identified heritage attributes. • The CHER/HIA should also consider the compatibility of new structures or landscape features with existing heritage attributes, layouts and designs of the property/landscape.
CE-2	Effect on archeological sites	– Project components are in the vicinity of the archeological sites	– Encroachment onto the site resulting in a physical impact. – New structures or landscape features and/or alterations to the site that result in a physical impact. – Demolition or destruction of all or part of the archeological sites. – Vibration impacts to the archeological sites identified on the property/landscape. – Ground disturbance impacts to the archeological sites.	– Should impacts be proposed within the vicinity of the site, then additional assessment may be required. Depending on the location of the proposed impacts, this may be Stage 2 archaeological assessment, Stage 3 archaeological assessment, or Stage 4 avoidance and protection. Stage 3 test unit excavation must be completed across the remainder of the site as per Sections 3.2.2 and 3.2.3 of the Standards and Guidelines (MCM 2011:49-53). However, if proposed impacts will avoid the site, but construction-related activities will occur within the vicinity of the site, then the site will require Stage 4 avoidance and protection monitoring, to be conducted by a licensed consultant archaeologist. The avoidance, protection and construction monitoring requirements for construction activities would include: • Erection of a temporary barrier that extends a minimum of 10 m beyond site limits. • Issuing “no go” instructions to all on-site construction crews and personnel during construction. • Depicting the 10-m protective buffer zone on all contract drawings with explicit instructions that a licensed consultant archaeologist will be present to monitor construction. • Ensuring the presence of a licensed archaeologist during construction to monitor the area to be avoided and verify the effectiveness of the avoidance strategy. • If any archaeological materials are identified during construction, then all construction activities must stop until the archaeological materials are evaluated and mitigated, if necessary, by a licensed archaeologist. • After the completion of the soil disturbing activities, having licensed archaeologist inspect the site area and prepare a report for the MCM on the effectiveness of the avoidance strategy and in ensuring that the area to be avoided remained intact.

4.12 Y9-B Newmarket East SPS Forcemains

4.12.1 Study Area

The Y9-B Newmarket East SPS Forcemains will convey wastewater from the new Y9-A Newmarket East SPS at the north end of Bayview Parkway in Newmarket, northerly and easterly to the intersection of Green Lane East and Leslie Street North, and into the head end of the new Y13-A Leslie Street Gravity Sewer Phase 3.

The proposed Y9-A Newmarket East SPS Forcemains are proposed to be located along the existing hydro easement running north from Bayview Parkway, then turning east to follow the Green Lane Road ROW. A study area of approximately 200 metres surrounding the centerline of the road right of way was applied as shown in Figure 4.28.

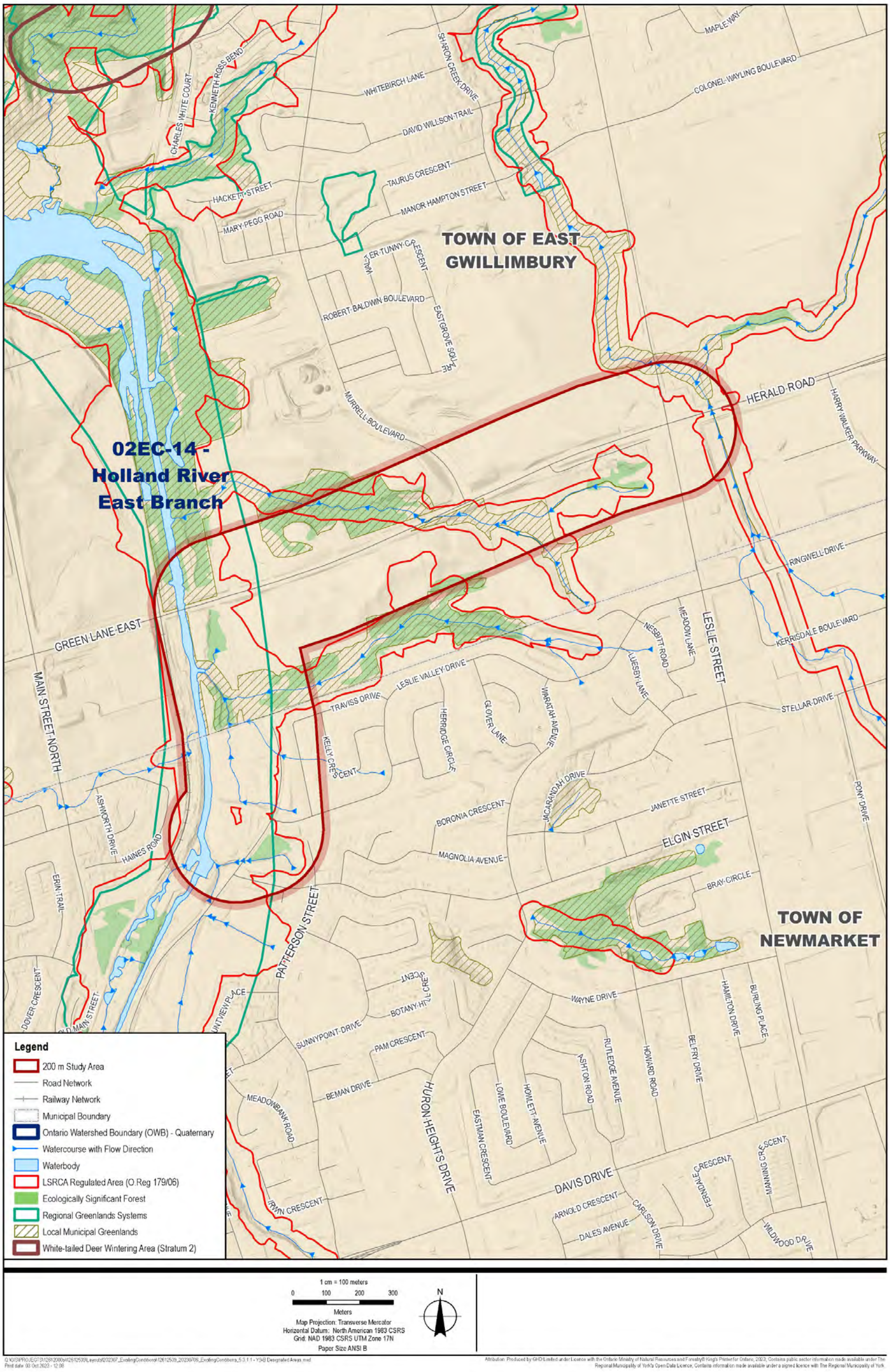


Figure 4.28 **Study Area for Y9-B – Newmarket East SPS Forcemain**

4.12.2 Existing Conditions

4.12.2.1 Social and Built Environment

The following sections will summarize the findings of the desktop studies completed within the study area, including planning and land use, traffic and transportation and utilities.

4.12.2.1.1 Planning policy and land use

Existing Land Use

Along Green Lane East, from Main Street North to Harry Walker Parkway, land uses consist of the following:

– North side:
  - Low density residential housing
  - Commercial lands (Circle K, Tim Hortons).
– South side:
  - Low density residential housing
  - Agricultural lands
  - Recreational lands (Newmarket micro soccer fields)
  - Commercial lands (Princess Auto, Shell)
  - Newmarket water and wastewater plant and Newmarket SPS
  - CNR, Nokiidaa Trail and HREB crossing Green Lane East
  - Parking facility (southwest of Bayview Parkway).

Planning Policy

Regional

The York Region Official Plan 2022 (June 2023 Office Consolidation) designates lands within the study area west of Leslie Street as Community Area and east of Leslie Street as Employment Area. Lands along the west boundary of the study area are part of York Region's Greenlands System.

Local

The study area crosses the municipal boundary between East Gwillimbury and Newmarket.

With reference to the East Gwillimbury Official Plan 2010 (2018 Office Consolidation), the portion of the study area north of the municipal boundary is subject to the Green Lane Secondary Plan and has the following land use designations:

– Environmental Protection Area
– Open Space – Special Study Area
– Low and Medium Density Residential
– Neighbourhood Commercial
– Residential Mixed Use.

The Green Lane Secondary Plan also indicates three proposed Minor Collector Roads west of the GO Station and south of Green Lane.

With reference to the Newmarket Official Plan (August 2022 Consolidation), lands south of the municipal boundary are designated as Residential Area and Parks and Open Space.

Active Development Applications

Existing property use has been described using the following data available to GHD:

– Orthoimagery from spring 2022
– Google Earth images
– Farm Tax Program data from 2023 tax year
– Property assessment type via GeoWarehouse (accessed August 2023).

Active development applications within the 200-m study area for each project location have been summarized based on existing available information. Lands within the Y9-B study area contains several active development applications.

Zoning by-law amendments:

– 1150 Green Lane East – To continue the existing driving range and Christmas tree sales for a period of three years.
– Newmarket – Proposed subdivision through a zoning-by-law amendment.

Proposed development applications:

– 18326 Leslie Street – Two applications. To increase the retail use and reduce the height requirement to create a commercial mixed-use development consisting of 6 buildings that provide a range of office, retail, restaurant and service commercial uses. To rezone the lands from "Rural (RU)" to "Mixed Use Five (MU5-XX)" and "Neighbourhood Commercial Four (C4-XX)" to facilitate a commercial mixed-use development consisting of 6 buildings.
– 18326 Leslie Street – To permit a temporary sales trailer.

4.12.2.1.2 Transportation in the Study Area

Green Lane East between 2nd Concession and Leslie Street is a four-lane collector road with dedicated center turning lane. The shoulders are paved are there are no dedicated cycling lanes or sidewalks, as shown in Figure 4.29.

Figure 4.29 Green Lane East Looking East Towards Leslie Street. (*Google Maps* "Streetview," digital images http://maps.google.com)

The AADT along Green Lane East between East Gwillimbury GO Station and Old Green Lane has been counted as 38,188, based on the latest available 2023 data. Historical AADT data along the study area are presented in Table 4.45.

Table 4.45 Green Lane East AADT Counts Between East Gwillimbury GO Station and Old Green Lane

Description of road limits	2012	2013	2016	2018	2022
East Gwillimbury GO Station and Old Green Lane	33,512	33,832	34,327	32,914	38,188

There are no public transit routes running along Green Lane East within the study area. There is a railway used by GO Transit, as well as the East Gwillimbury GO Station located west of the sewer alignment. However, this infrastructure falls immediately outside of the study area.

4.12.2.1.3 Utilities in the Study Area

There are several above/below grade utilities situated within the study area corridor and in the vicinity of the proposed project. These utilities may be temporarily impacted during the construction of tunnel, shaft and work compounds. Formal notification and consent would be required from the authorities responsible for these utilities prior to construction.

Buried utilities are typically located within the following limits:

– Shallow-buried electrical and communications cabling are commonly buried between 1.2 and 1.5 mbgs.
– Shallow-buried storm drains, sanitary sewers and watermains are typically buried between 1.2 and 3.5 mbgs.
– Deep-buried utilities are defined as anything buried more deeply than the depths mentioned above.

Known municipal infrastructure that existed on York Region's GIS database has been provided within the drawing set. A detailed utility investigation program, which would include a "Level A through D" subsurface utility exploration, would be required as part of future site investigations.

4.12.2.2 Natural Environment

The following sections will summarize the findings of the desktop studies completed within the study area for: geotechnical, hydrogeology, surface water, natural heritage and contamination.

4.12.2.2.1 Geotechnical

The study area for Y9-B is located along the Green Lane East, just east of Main Street North. The study area is bordered on the north by forested area/farmland in general and by residential/commercial developments on the remaining three sides, within the boundaries of the Town of East Gwillimbury.

It should be noted that no site-specific reports or borehole records were encountered within the study area.

Based on the Quaternary geology mapping, the near surface soils within the study area predominantly comprised silt and clay deposits in general, mostly consisting of glaciolacustrine deposits.

The bedrock consists of Limestone, dolostone, shale, arkose, sandstone Ottawa Group and Simcoe Group. Typically, bedrock is mapped at depths of 71 to 79 mbgs within the study area and will not be reached during construction.

4.12.2.2.2 Hydrogeological

A hydrogeological desktop review was undertaken within the study area using information from MECP well records, the MECP Source Protection Information Atlas, the ORM database and the Ontario Geological Survey database. Available hydrogeological reports for projects within the area were also reviewed.

The study area for Y9-B is within the Schomberg Clay Plains physiographic region. The linear infrastructure is anticipated to intersect fine-textured glaciolacustrine deposits. Modern alluvial deposits may be intercepted at

excavations lowest depths and a high water table, approximately 1 to 7 mbgs. Temporary water takings may be required to facilitate construction. The linear infrastructure is not located within any source water protection WHPAs.

Shallow groundwater flows towards the HREB to the west and follows the topography towards the west.

Multiple private wells near intersection of Leslie Street and Green Lane East.

Refer to Table 4.46 regarding details on anticipated aquifers and aquitards within the study area, along HEPC.

Table 4.46 Aquifers and Aquitards Through the Y9-B Study Area, Along HEPC

Aquifers and aquitards	Description	Thickness
Alluvial deposits	Surficial alluvial deposits.	Varies
Oak Ridges Moraine Complex (Aquifer)	These sediments consist mostly of silt and fine sand, but also include gravel and minor clay and diamicton. The aquifer is generally unconfined, except the section covered by Halton Till on the south flank of the ORM complex. The sediments slope up towards the north.	Ranges between 4 to 10 m
Channel silt (Aquitard)	Silt deposits. The sediments slopes up towards the north.	Ranges between 14 to 24 m
Undifferentiated upper sediments recent deposits (Aquifer)	An unconfined aquifer consisting of discontinuous fill and unconsolidated overburden deposits. Deposits surface towards the east of the study area.	Varies
Newmarket Till (Aquitard)	A continuous layer that acts as an aquitard to the underlying Thorncliffe Formation. Deposits surface towards the east of the study area.	Varies
Thorncliffe Formation (Aquifer)	Regionally recognized as a highly productive confined aquifer and is laterally continuous.	Varies. Depth also varies between 5 and 43 m

Refer to Table 4.47 regarding details on anticipated aquifers and aquitards within the study area, along Green Lane East.

Table 4.47 Aquifers and Aquitards Through the Y9-B Study Area, Along Green Lane East

Aquifers and aquitards	Description	Thickness
Oak Ridges Moraine Complex (Aquifer)	These sediments consist mostly of silt and fine sand, but also include gravel and minor clay and diamicton. The aquifer is generally unconfined, except the section covered by Halton Till on the south flank of the ORM complex. ORM is at surface towards the west and pinches out towards the east.	Varies
Channel silt (Aquitard)	Silt deposits.	Ranges between 6 to 12 m
Undifferentiated upper sediments recent deposits (Aquifer)	An unconfined aquifer consisting of discontinuous fill and unconsolidated overburden deposits. Deposits surface towards the east of the study area.	Varies
Newmarket Till (Aquitard)	A continuous layer that acts as an aquitard to the underlying Thorncliffe Formation. Deposits surface towards the east of the study area.	Varies
Thorncliffe Formation (Aquifer)	Regionally recognized as a highly productive confined aquifer and is laterally continuous.	Varies. Depth also varies between 5 and 43 m

4.12.2.2.3 Surface Water

There is one sub-watershed within the study area: The HREB. The forcemains will cross under a creek near Murrel Boulevard (tributary of the HREB).

Other surface features of interest include the following:

– Unnamed warmwater watercourse
– Unnamed coldwater watercourse
– Marshes
– Swamps.

Refer to Figure 4.30 for a surface water map of existing conditions within the study area.

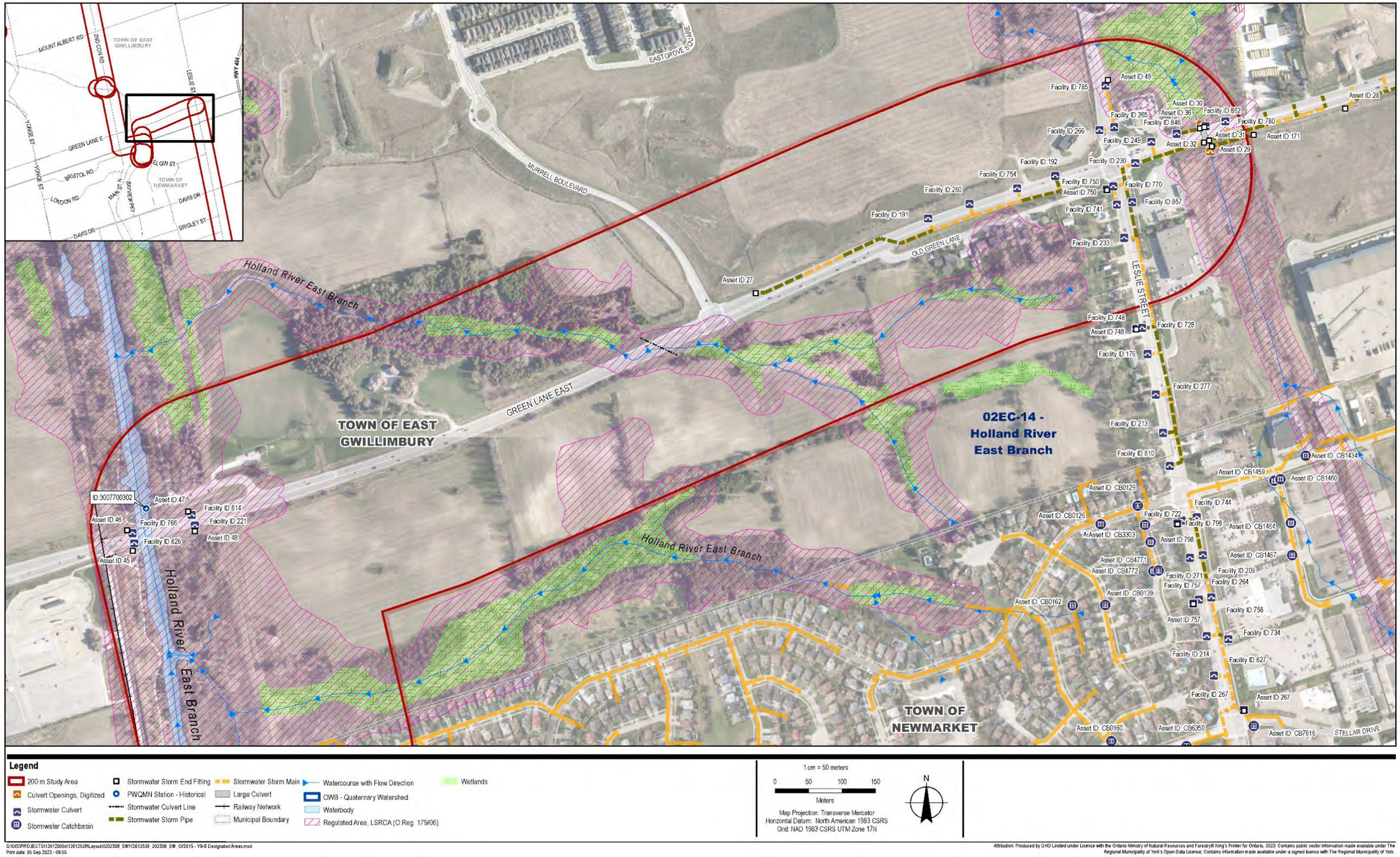


Figure 4.30 Y9-B Study Area Surface Water Map for Existing Conditions

4.12.2.2.4 Natural Heritage Characterization

The study area contains ecologically significant forest and areas part of the regional and local municipal Greenlands System under the LSRCA. Various unevaluated wetlands, consisting of both marshes and swamps, are also present within the study area.

Aquatic Habitat

Numerous watercourse features are present within the Y9-B study area. The HREB is the main watercourse which flows in a south to north direction along the western extent of the study area. Additionally, four warmwater unnamed tributaries to the HERB are present. The HREB and associated tributaries are considered to have a warmwater thermal regime. Surrounding land use is a mix of residential, natural green spaces and parks and agricultural. The riparian characteristics of this portion of the HREB shows a relatively wide, grassy vegetated floodplain, with sparse trees and gentle sloping along the banks. Parts of the channel both within the riparian floodplain and stream channel, have been confined with concrete embankment.

An additional unnamed watercourse can be found within the Y9-B study area. This unnamed watercourse is a warmwater stream that passes under Green Lane 140 m west of Murrel Boulevard, where it meanders northwest for approximately 830 m before draining into the HREB. This watercourse flows through a mix of agricultural and naturalized mixed forest areas. Riparian buffer is relatively narrow and canopy coverage is low due to the adjacent agricultural practices.

Fish presence has been noted in each of these watercourses. Based on the anticipated fish community, the HREB within this study area and its tributaries are expected to support primarily forage/baitfish species with limited warmwater sportfish present.

Another watercourse present within the eastern limits of the Y9-B study area at the intersection of Leslie Street and Herald Road is an unnamed coldwater watercourse. This unnamed watercourse flows in a south to north direction, crossing Herald Road and then Leslie Road, approximately 230 m downstream. The watercourse is surrounded by a meadow which provides a wide riparian buffer around the channel, consisting mainly of sedges, tall grasses and sparser populations of small deciduous trees. Based on the anticipated fish community, this unnamed watercourse support mostly bait/forage fish and some coldwater sportfish. No redside dace have been recorded within this study area.

Terrestrial Habitat

The lands in the study area are a collection of agricultural land, low-density residential communities, woodland and wetland communities that are scattered throughout. This study area is in the northern portion of the study area and may soon face development pressure as it is in between East Gwillimbury and Newmarket. The focus of the study area is the HREB and its surrounding riparian area which is present in the southwest corner of the study area, as it contains a variety of wetland and forested communities.

All natural and cultural communities present within the study area are considered common in the province.

Significant Wildlife Habitat

Potential Candidate SWH for Region 6E as defined by MNRF has been identified in several natural areas within the study area. The greatest concentration of these potentials is likely to be found in wetland and woodland habitats associated with the HREB and ESAs. A screening and analysis of all ELC communities was completed in the study area for Seasonal Concentration Areas of Animals, Rare Vegetation Communities or Specialized Habitat for Wildlife, Habitat for Species of Conservation Concern and Animal Movement Corridors.

4.12.2.2.5 Areas of Potential Environmental Concern

A review of information from the Environmental Risk Information Services database was completed for properties located within the study area. The review was completed on May 26, 2023, to visually confirm the current land use and associated potential for containing subsurface environmental contamination. This “windshield-level” survey showed that:

– Various residential and commercial properties are present along the majority of the study area.
– Some agricultural and Industrial land use is present within the study area.

Refer to Figure 4.31 for four locations within the Y9-B study area that have been identified to be at-risk of contamination. The locations are identified as existing known spills, as well as those identified as three risk categories of potential for existing contamination: Low, Moderate and High. Low risk locations are presented in a green circle, moderate risk in an orange circle and high risk in a red circle. We clarify that not all risk categories may be present in the below figure. The number presented in the circle is a property identifier relevant to the entire York Region Sewage Works Project, and not specific to the project being discussed.

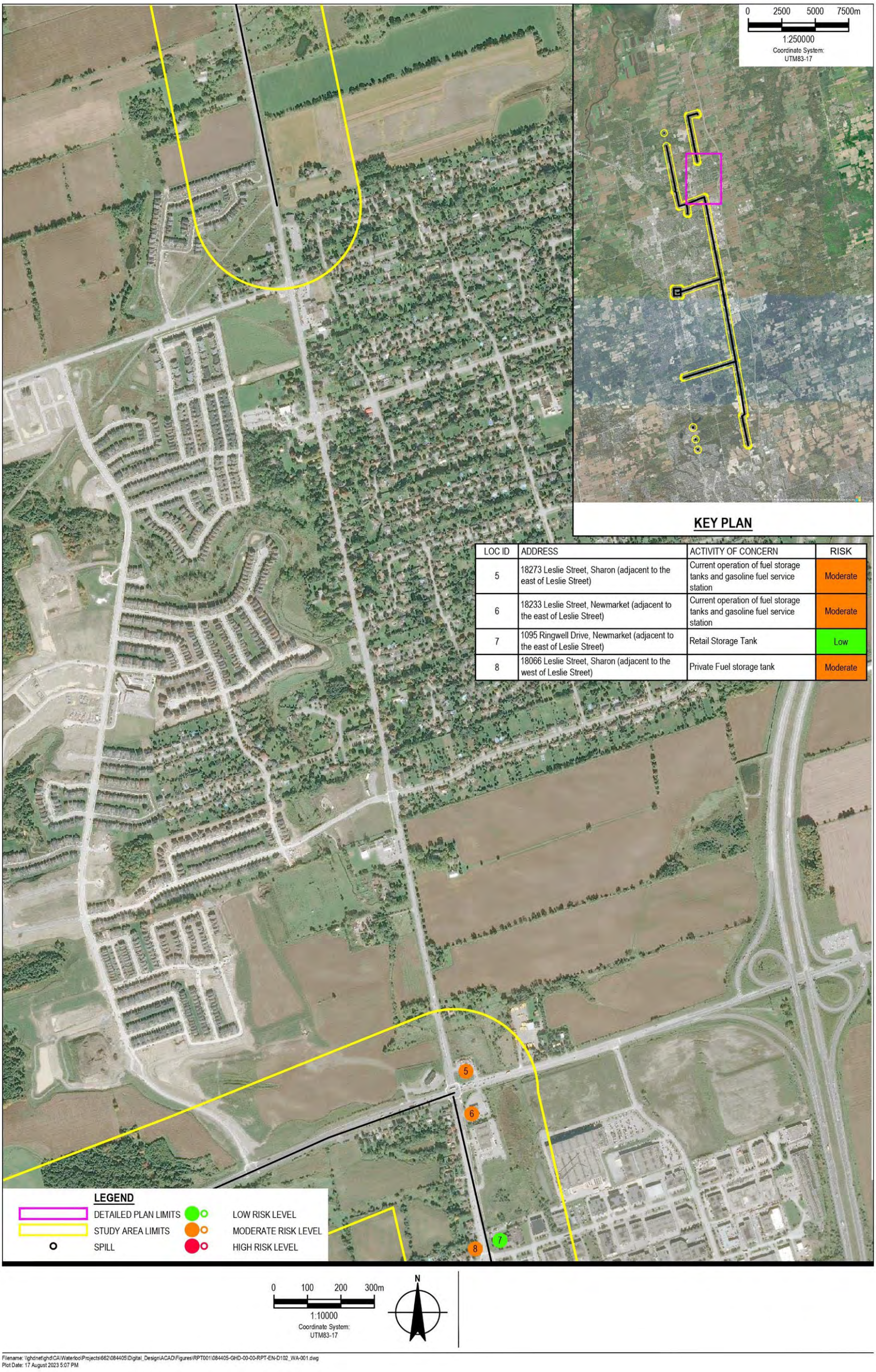


Figure 4.31 Areas of Potential Environmental Concern within Y9-B Study Areas

4.12.3 Conceptual Design

Conceptual design for these forcemains were based generally on flow rates and design criteria as described in Chapter 3. For design basis specifics relevant to Newmarket East SPS Forcemains (Y9-B), refer to Table 4.48.

Refer to Appendix A, Sheet 8 for the Conceptual Design Drawings relevant to this project.

Table 4.48 Design Basis for the Development of Y9-B Newmarket East SPS Forcemains

Design basis	Assumptions
Study area	200-m area along infrastructure alignment
Study area boundaries	Green Lane East, bounded by Newmarket SPS to the south, 600 m east of Yonge Street to the west and Leslie Street to the east
Nominal diameter	1,050 mm
Sewer type	Forcemain
Upstream connection point	Newmarket SPS
Downstream connection point	Leslie Street and Green Lane East
Design criteria	Based on York Region Design Guidelines (2021), including: – Pipe size and material – Hydraulic design – Air management – Method of construction – Major utility crossings – End connection points
Method of construction	Tunnelling within the ROW
Land use	Mixture of residential and agricultural land uses
Modelled peak flow	1,750 L/s
Major infrastructure considerations	Hydro corridor
Environmental feature considerations	– LSRCA governed area – Wetlands – Several wooded areas

4.12.3.1 Description of Design

The proposed twinned forcemains will be approximately 2,200-m in length each. The lines will run parallel from the Newmarket East SPS north along an existing hydro easement of approximately 750 m to a location on the south side of Green Lane East. The lines will then turn easterly, with a gradual crossing to the north side of Green Lane East, ending at the northwest corner of Green Lane East and Leslie Street North. Flows then continue southbound in the Leslie Street Gravity Sewer.

This alignment utilizes existing corridors and minimizes property requirement to be associated with temporary compound locations. This alignment will require confirmation for conflict with existing major infrastructure.

Existing grades along the northbound leg of the proposed alignment are generally consistent between 231 and 233 masl. The existing ground profile along Green Lane East rises from 233 m to approximately 266 m at the intersection of Leslie Street. Preliminary profile drawings suggest the forcemains will be installed at a depth of between 12 and 14 mbgs. Effort is made to have a gradual upward alignment meaning the need for intermediate air release and drainage chambers is minimized. This is generally considered an ideal vertical alignment for a forcemain.

Table 4.49 summarizes the general characteristics and features that will be present from initial construction through to final configuration.

Table 4.49 General Conceptual Design Characteristics for Y9-B – Newmarket East SPS Forcemain

Design aspect	Value	Comments
Number of forcemains	2	
Diameter	2 x 1,050 mm	3,000-mm diameter tunnel with twin 1,050-mm diameter forcemains.
Material of construction	Concrete pressure pipe (CPP)	
Roughness	C = 100 to 140	Range to create envelope of possible operating condition.
Elevations		
Starting invert (m)	216.0 m	
Discharge invert (m)	258.2 m	
High point invert (m)	258.2 m	
Static head (m)	42.2 m	Static head of forcemain only, excluding pump station piping.
Chambers		
Air release points	None required	
Air management	At forcemain discharge chamber	Where water surface interacts with air (i.e., air release chambers, if required, or discharge locations).
Valve chamber(s) and access points	At each shaft location	Dictated by construction method, to be determined during detailed design.

4.12.3.2 Construction Methods

Tunnelling and/or microtunnelling is proposed for construction of the project for the deeper sections. Open-cut construction is typically not economic and feasible for sewer depths greater than 6 to 8 m.

There will be open cut areas most likely in and around the connection points at the start and completion of the infrastructure, as well as potentially the initial section within the hydro corridor running north from Bayview parkway, as this section is relatively shallow and there is a strong potential for cost savings.

4.12.3.2.1 Tunnel Construction

There are three categories of TBMs as follows that are potentially suitable for dealing with the anticipated ground conditions, which are described as follows:

Slurry Pressure Balance Tunnel Boring Machine

A closed face machine where pressurized slurry is used to counteract soil and groundwater pressures acting at the face of the machine. This type of machine is typically used in granular ground deposits below the water table but may also be used in more competent clay and till materials. The minimum size of these machines is typically 2,500 mm i.d. and they can be configured for installation of jacking pipe or precast concrete tunnel linings (PCTL).

Slurry machines use pressurized slurry that is circulated in the mucking chamber behind the cutter head, via slurry supply and return lines, to balance soil and hydrostatic pressures. The slurry supply and return lines run the full length of the tunnel, and are extended as the tunnel advances, with the return line being used to remove the spoil (excavated material, suspended in slurry) from the tunnel. This spoil is then discharged to a surface separation unit comprising a system of screens, cyclones and centrifuges that separate the excavated material from the slurry. The treated slurry is then recycled back through the tunnel for further advancement of the tunnel, while the spoil is collected in a pile for removal from site.

The cutterheads of slurry TBMs can be configured to deal with boulders to that will be encountered in the glacial soils along the route, Cutter tools are typically rear loading and permit replacement of worn cutters from behind the cutterhead. To manage the risk of major stoppages due to boulder obstructions, a trailing airlock can be used with the slurry TBM. The airlock permits pressurisation of the mucking chamber and tunnel face and permits workers to access the chamber for manual removal of boulders and cutterhead repairs.

Microtunnelling Boring Machines

Most MTBMs employ the slurry pressure balance principle in combination with pipe jacking for pipe installation as described above, although the machines are operated remotely from the surface and workers do not enter the tunnel. For production operations except for TBM maintenance and survey, making it a safer method with lower construction crew requirements. MTBMs are sized to install pipes ranging from 0.5 to 3.4 m i.d. For larger diameter pipe sizes (>1.8 m i.d.) tunnel drives lengths of greater than 1 km, with minimum horizontal curve radius of approximately 500 m, are being achieved nowadays. Typical drive lengths can vary from 200 m to over 1,000 m, with construction being more economical the longer the drive. Constructible length of drive is typically related to the size of the tunnel, with larger MTBMs able to achieve longer drives than smaller diameter machines.

One key risk with microtunnelling and pipe installation is that pipes can be damaged by the action of hard boulders and cobbles that cause significant wear to the pipe exterior as they are jacked through the ground. This risk can be mitigated by good bentonite practise, including employing the use of 'automatic bentoniting' system.

For larger MTBMs, an airlock can be installed in the machine to allow worker access to the machine face if repairs or maintenance is required. Such airlocks work in a similar fashion to that described for slurry TBM above.

Earth Pressure Balance Tunnel Boring Machine

A closed face machine most commonly used in fine granular soils below the water table, although they have also been used in sands and gravels and for excavating soft rock. Such machines commonly have a precast concrete segmental lining erected behind them as the tunnel advances although they can also be configured for installation of pipe. The machines utilize an auger screw penetrating a sealed bulkhead immediately behind the earth pressure balance tunnel boring machine (EPBTBM) cutterhead, to permit controlled removal of the spoil at the tunnel face. A balancing pressure is maintained at the tunnel face, via simultaneous slow rotation of the auger (for spoil removal) and forward propulsion of the EPBTBM. Spoil removal from the tunnel is typically achieved through use of conveyor belt immediately behind the auger screw and a line of rail mounted muck cars travelling back and forward between Launch Shaft and EPBTBM. A crane, located on the surface deposits the excavated material from the muck cars into a spoil pile for removal from the project site. Trailing airlocks can also be used with EPBTBM’s, and these function in a similar fashion to that described for slurry TBM above, permitting cutterhead repairs and removal of boulder obstructions.

4.12.3.2.2 Shaft Construction

Shafts are required for launch of TBMs, servicing tunnelling operations and TBM retrieval, and are commonly used to house maintenance holes, access chambers and other permanent facilities.

From a tunnel construction perspective, the required shaft dimensions, particularly shape and internal diameter, are a function of the following:

– Length of tunnel segments (pipe or PCTL)
– Tunnel diameter
– Tunnelling machine dimensions, particularly length
– Thrust wall design
– Jacking rig size
– Tunnel eye sealing ring
– Guide rail systems.

The shaft details proposed on the concept alignment for the Y9-B forcemains are as follows. Methodologies for shaft excavation and support are commonly classified as sealed or unsealed, depending on the degree of leakage into the shaft and impacts on the surrounding water table that occur during construction. As highlighted previously, it is expected that the shafts will be constructed in a variety of soft ground conditions, largely below the water table. Both shaft classifications are further described in the sections below.

Unsealed Shafts

Unsealed shafts are typically specified where ground conditions are stable, where there are no restrictions on dewatering to permit lowering the surrounding water table, or where conditions are dry and dewatering is not required for shaft construction). Common methods are described below.

Steel liner plate

Steel liner plates provide a relatively light-weight, easy-to-handle, safe support for soft ground tunnelling because the ground that supplies the loading also supplies the resistance to the load. The liner plate assembly simply distributes and transmits the load to the surrounding earth.

Driven sheet pile

Sheet pile walls are used as an earth retention system in soils that allow driving from the surface to bottom of shaft. They do not work well in soil conditions with boulders or large obstructions. Sheet piles are prefabricated steel sheet sections with interlocking edges. As the sheets are installed, they form a continuous barrier in the ground. The sheets are typically driven with vibratory hammers or drop hammers. More recently, this type of construction can also be sealed but requires specialty sealants to be applied at joints, which increase construction schedule, cost and failure modes.

Soldier piles with timber laggings

Soldier piles are steel H piles that are vertically driven or drilled into the earth at regular intervals prior to excavation. As excavation progresses in stages, horizontal lagging in the form of timber is added behind the flanges to create the wall structure with connecting joints.

Sealed Shafts

Sealed shafts are typically specified where unstable ground conditions exist or where there are restrictions on dewatering to lower the surrounding water table. Sealed shafts tend to be more expensive than unsealed shafts, although they have become almost mandatory in many Canadian jurisdictions where there are strict environmental requirements to minimize groundwater lowering and effects on adjacent water courses as well as infrastructure. Common sealed shaft methodologies include:

Secant pile walls

Secant pile shafts utilize bored piling methods (incorporating use of temporary steel casings driven, or vibrated into place, in advance of pile excavation to prevent ground collapse) to create a vertical perimeter of interlocking poured concrete cylindrical piles. The overlapping of piles creates a waterproof liner and supporting wall. It cannot be used as a final structure and will require a permanent structure such as a manhole chamber to be installed within the shaft.

Concrete sinking caissons

The method involves sinking the shaft in several lifts by building a circular (or oval) shaft structure on the surface and placing kentledge blocks (weights) or rams on top of it. Many contractors assist the sinking operation by lubricating the annular gap between the outer walls and surrounding ground. A clamshell grab (granular soils) or mini excavator (competent soils such as clays or rock) is then used for shaft excavation, and the shaft structure slowly sinks to fill the excavated void. The shaft structure is typically constructed using precast concrete segments or cast in place reinforced concrete. Once the shaft has been sunk to the desired formation elevation, a mass concrete base plug is placed using a tremie (underwater) concreting, if the shaft is in a flooded condition. A major advantage of this method is that the shaft wall can be used as future permanent structure for maintenance.

Slurry (diaphragm) walls

To commence excavation, guide walls are installed around the desired shaft location. These guide walls act as a guide for installation of the slurry walls. A trench is then excavated between the guide walls, typically several metres long and 1 to 1.5 m wide and extending to the required depth. A bentonite slurry mix is pumped into the trench as it is excavated to support the surrounding soil. The slurry is composed of water, bentonite clay and other additives to achieve the desired properties, acting as a temporary support system to prevent collapse. Once the trench reaches the desired depth, steel cages or vertical steel sections are inserted for reinforcement, enhancing the wall's load-bearing capacity. As the concrete is pumped into position, the slurry is displaced to the surface where it can be collected, treated and used for subsequent wall construction. The slurry wall shaft construction method is highly advantageous for constructing deep excavations in urban environments.

Pending geotechnical and hydrogeological field investigation and laboratory testing results along the sewer alignment and at shaft locations, a preferred shaft construction methodology cannot be selected. The appropriate methods will be assessed and compared in a future phase of design development.

4.12.3.3 Property Requirements

Permanent property requirements will depend on the final alignment of the new trunk sewer and location of the Newmarket East SPS. Property easements may be required for permanent access to maintenance holes depending on the final location of the infrastructure. For launching of TBMs able to install 3,000-mm i.d. tunnels, a large launch shaft compound is required for the (typically) largest shaft along the alignment and to allow for storage of the tunnel material (such as pipe or segmented tunnel liners), as well as the additional equipment required to move these materials around the compound. Exact details on shaft sizing, location and property easement requirements will be confirmed during detailed design.

Temporary and permanent property easements may be required for construction and operation of the trunk sewer. Permanent property requirements will depend on the final location of the shafts, which are expected to contain a maintenance structure that must be accessible by York Region staff for sewer maintenance purposes. The shaft locations are not all currently within the ROW, and property easements may be required for permanent access to the maintenance holes.

The proposed property locations and requirements for construction of the shafts are conceptual only. Details related to the number of shafts, shaft sizing, location and property easement requirements will be confirmed during detailed design.

4.12.4 Environmental and Community Impacts and Mitigation

Desktop studies were done to determine the possible extent of these impacts and to propose mitigation measures that would reduce the likelihood and the consequences should they occur. The major impacts and associated mitigation approaches are described in this section.

Because the current designs are only at the conceptual level, potential impacts and mitigation measures could change during design development, depending on:

– The ability to co-locate the proposed design with other planned infrastructure to minimize community effects, to be investigated after field investigations are completed. This change will depend on the number and scale of other planned infrastructure (e.g., utilities, transportation) in the ROW or area.
– Confirmation of available property for temporary and permanent use. The extent of temporary easements or acquired private property, as well as the construction schedule may dictate future design changes or mitigation measures.

The assessment criteria and indicators are provided in Table 4.50, Table 4.51 and Table 4.52, corresponding to each of the environments (social and built, natural, cultural and traffic impacts) together with a potential effects assessment and identification of avoidance, mitigation and compensation measures for the project.

Table 4.50 Y9-B Newmarket East SPS Forcemain Social and Built Environment Effects and Mitigation

Item no.	Criteria	Indicators	Potential effects (Positive/Negative)	Avoidance/Mitigation/Compensation
Social and built environment				
SB-1	Effect on existing views	– Changes are predicted in views from residences in the surrounding area	– No change in existing views from residences in the surrounding area.	– No avoidance, mitigation, or compensation measures required.
SB-2	Effect on existing residences, businesses and/or community, institutional and recreational facilities	– Displacement of residences, businesses and other facilities is too great – Temporary or permanent disruption to residences, businesses and other facilities near construction compounds or permanent works is too great	– No displacement of residences, businesses, or community, institutional and recreational facilities is anticipated. – Disruption to residences, businesses and community, institutional and recreational facilities in proximity to construction compounds/ permanent installations.	– No avoidance, mitigation, or compensation measures are anticipated. However, if in fact displacement is required then York Region would provide market value compensation. – Apply standard construction-related mitigation measures to minimize the disruption effects.
Traffic and transportation				
TT-1	Effect on traffic	– Traffic flows are disrupted too much – Construction occurs too close to congested traffic zones	– Traffic disruption at construction compounds, compound staging may extend into the travelled portion of the ROW. – Traffic movement in to and out of Construction compound sites will impact pedestrian, cycling and traffic flow on Green Lane East. – Impacts to public transit involving potential rerouting of buses and/or relocation of stops. – Coordination of alternate routing for emergency service vehicles, if needed.	– Where possible, maintain one lane in each direction. This could be achieved through flagging, temporary signals or temporary road widening. – Pedestrian movement should be maintained during construction, with marked pedestrian detours as applicable. – Consider special traffic arrangements for peak hours should be considered in traffic flow directions in the morning and afternoon. – Pay duty police officers may be required to direct traffic. – Make special provisions for emergency service vehicle access. – Make special provisions for pedestrian traffic and safety, including signals, detours and winter maintenance. If feasible, move construction traffic to sideroads.
TT-2	Effect on nearby GO Station	– Extent of disruption to vehicular and pedestrian traffic flows in and out of station	– The sewer construction will extent from along Green Lane East to just east of the East Gwillimbury GO Station north entrance. Depending on minimum traffic lane and sidewalk closures, there may be congestion entering and exiting the property, especially during peak times, at the north entrance	– The property has two exits and entrances, including pedestrian access, to the west and north of the property. Traffic at the west entrance is not anticipated to be impacted during construction and this will be the preferred access point for the GO Station.
Utilities				
U-1	Conflict with buried utilities	– Sewer or shaft is in direct conflict or falls within clearance limits of nearby utilities	– New construction impacts existing utilities and requires design coordination with utility owners which increases project cost and schedule.	– Review historic and as-built documents for utility data. – Complete a SUE investigation to identify high-risk utilities, including large and/or critical service utilities (e.g., large watermains and all gas mains). – If a conflict occurred with a proposed sewer tunnel, construction shaft or overall work compound location following receipt of utility information, consider temporary or permanent relocation of utilities safely around or through the work area. Depending on the utility, it may be possible to support the utility above an open cut excavation to be reburied. Modifications of the alignment and shaft locations may also be proposed during design development to mitigate utility conflicts.
U-2	Conflict with surface or overhead utilities	– Excavation of shaft is proposed in location of surface infrastructure – Shaft working compound equipment including cranes will require working directly under overhead utilities or within the hydro wire exclusion zone	– Overhead infrastructure such as electrical or communications cabling is mounted on utility poles between 5 and 12 m above the surface. Depending on the required crane size and operating radius to construct the shaft and lower the TBM, equipment extents may fall within hydro line exclusion zone, or hit overhead wires causing worker harm or death.	– Working compounds will be designed to allow appropriate and safe movement of workers and equipment around the site, away from live overhead wires or surface utility boxes, based on known utility information and topographic surveys. – If a conflict occurred with a proposed sewer tunnel, construction shaft or overall work compound location, following receipt of utility information, modifications of the alignment and shaft locations may be proposed during design development, the utilities would need to be temporarily or permanently relocated safely around or through the work area.

Item no.	Criteria	Indicators	Potential effects (Positive/Negative)	Avoidance/Mitigation/Compensation
U-3	Damage and/or Deformation to surface infrastructure and buried utilities (including railways, rail infrastructure, bridges and structural culverts)	– Soil movement under or next to the utility from tunnel or shaft/open cut construction – GO Station falls within construction ZOI	– Ground heave/settlement/horizontal shift along tunnel ahead of and along excavated alignment, and around shafts and open cut excavations during and post-excavation. This information can be obtained from nearby geotechnical instrumentation. – Deformation or damage to nearby surface or buried utilities as a result of soil movement, which may require rehabilitation or repair (e.g., crack formation, angular rotation, strain, pipe joint rotation or pull out). – Should any GO infrastructure fall within the ZOI from sewer construction, there may be structural deformation and damage to the infrastructure.	– For utilities within sewer tunnel ZOI: Select a tunnel excavation method capable of limiting volume losses at the cutting face (limit overcutting of excavation) to limit ground losses. – For utilities near shaft/sewer open cut ZOI: Select a shaft construction method and SOE appropriate with depth, size and geotechnical and hydrogeological conditions at shaft location. – For each, complete analytical assessments of at-risk locations, including low soil cover locations or areas where the tunnel crosses or runs parallel near sensitive, large, or critical utilities and services. – Where applicable, propose mitigation methods such relocation of utilities, or for deep utilities, relocation of the tunnel horizon based on assessment results. Should neither of these options be applicable, then investigate ground improvement in proximity of utilities to limit ground movement or investigate modification of the tunnel and/or shaft design or construction methodology.
Noise and vibration				
N-1	Operation Noise	– Complaints from residents within study area	– Noise disruptions to private residents and commercial areas post-construction, near manholes and other surface connections, SPS locations.	– Any permanent facility, such as supporting air management facilities, will require an ECA application under Section 9 of the Environmental Protection Act to document the noise emissions compliance. – Investigate degree of risk and impact in further detail.
N-2	Construction Noise	– Complaints from residents within study area	– Noise disruptions to private residents and commercial areas during construction, near construction compounds.	– Propose construction noise monitoring per MECP NPC-115 Construction Equipment requirements. – Consider completing noise monitoring for the duration of the construction and notify the contractor of any exceedances so that corrective action/contingency actions can be implemented. – Use vehicles and equipment (cranes and excavators) with efficient muffling devices or construct enclosures. – Limit truck movements to comply with noise by-laws for 24/7 construction operations.
V-1	Construction Vibration	– Complaints from residents within study area	– Disruptions to private residents and commercial areas during construction, near construction compounds.	– Propose appropriate construction vibration benchmarks within the tender documents. – Consider pre- and post-construction condition photos.
Air management				
O-1	Operation odour at existing or proposed sewer connection	– Odour near surface connections	– There is potential for odour release due to turbulence at the connection of the proposed sewer to existing sewers	– Consider implementation of ventilation design systems with odour control. – Extents of risk and impact, will be reviewed in further detail upon investigation.
O-2	Construction odour	– Complaints are received from residents within the study area	– During live connection of infrastructure, there is the potential for odour release.	– Advance notification to residents, advising them of what work is being completed and the duration of the work.
A-1	Construction dust at sewer construction locations	– Fugitive dust is generated – Air quality is poor	– Fugitive dust is generated during construction of gravity sewer, interconnecting shaft/chambers, including the connection points.	– Develop a BMPP to be included in the project Construction Management Plan. – Mitigation should be aimed at minimizing emissions of particulate matter and exposure to particulate matter during the construction phase of the project.
A-2	Construction dust at air management infrastructure	– Fugitive dust is generated – Air quality is poor	– Fugitive dust is generated during construction of the potential air management infrastructure.	– Develop a BMPP to be included in the project Construction Management Plan. – Mitigation should be aimed at minimizing emissions of particulate matter and exposure to particulate matter during the construction phase of the project.

Table 4.51 Y9-B Newmarket East SPS Forcemain Natural Environment Effects and Mitigation

Item no.	Criteria	Indicators	Potential effects (Positive/Negative)	Avoidance/Mitigation/Compensation
Hydrogeology				
N-1	Effect on groundwater quantity	– Temporary and/or long-term changes in groundwater quantity	– Potential temporary change to groundwater quantity. Construction anticipated to intersect low permeability till aquitard that is underlying shallow aquifer. Temporary water takings may be required to facilitate construction. More information needed to evaluate geology along specific alignment at proposed depths. – No long-term change to groundwater quantity is anticipated as no active or passive long-term groundwater takings related to the forcemain are anticipated. – Potential ground settlement as a result of active dewatering/depressurization. – Change in shallow groundwater flow patterns resulting from operation of sewer pipe resulting from increased I&I and/or preferential movement of groundwater within trench sediments.	– Implement construction methods that minimize dewatering requirements. – Establish pre-construction baseline groundwater quality and quantity conditions and develop implementation plans for monitoring during and post-construction (install and monitor wells and surface water).
N-2	Effect on groundwater quality	– Temporary and/or long-term change in groundwater quality	– Potential temporary change in groundwater quality because construction may intersect aquitard soils underlying a shallow aquifer. Temporary water takings may be required to facilitate construction. – No long-term change to groundwater quality is anticipated. – Potential effects on groundwater water quality as a result of potential mobilization of contaminated water where active dewatering/depressurization is required. – Reduction in groundwater quality from spills or the mismanagement of fuel/chemical in work areas.	– Implement construction methods that minimize dewatering requirements. – Develop and implement a spills response plan for construction to mitigate the effect of a spill should one occur. – Establish pre-construction baseline groundwater quality and quantity conditions and develop implementation plans for monitoring during and post-construction (install and monitor wells and surface water). – During design, complete a contaminant source investigation to mitigate the risk of drawing contamination from one source to another location.
N-3	Effect on private wells - temporary construction dewatering	– Temporary construction dewatering private well interference (quantity/quality)	– Temporary decrease in private well quantity/quality could occur during construction activities depending on the location, depth and construction, methodology and duration.	– Implement construction methods that minimize dewatering requirements. – Address construction dewatering private well interference complaints through existing York Region private well assessment and mitigation policy. – Proactively identify any high-risk wells during design and prepare site-specific preventative mitigation and corrective action plans as part of design. Corrective actions should align to York Region's private well assessment and mitigation policy.
N-4	Effect on surface water quantity/quality	– Temporary changes in surface water quantity (i.e., impacts to baseflow/quality)	– Temporary changes in surface water quantity (i.e., impacts to baseflow/quality) could occur during construction activities depending on the location, depth, construction, methodology, timing and duration. – A high groundwater table resulting in groundwater/surface water interaction would be expected due to existing soils and anticipated presence of the ORM aquifer. – Forcemain passes under tributary to the HREB. – Change in groundwater-surface water interaction (reversal of vertical hydraulic gradient) results in impact to terrestrial and aquatic habitat and associated SAR (where applicable) - reduction in baseflow. – Change in surface water temperature from groundwater taking and/or discharge to surface water features. – Changes to stream morphology resulting from the release of groundwater dewatering water. The potential reduction in baseflow due to water taking in a lower confined aquifer due to increased downward hydraulic gradients across the aquitard separating the stream and the confined aquifer. – The potential reduction in baseflow from a stream reach that intersects an aquifer in which the water taking is occurring.	– Field verification of groundwater-surface water interaction suggested for watercourses and wetlands within the study area. – Complete outlet receiver assessment(s) should temporary groundwater discharge be required to surface water. Establish pre-construction baseline surface water quality and quantity conditions and develop implementation plans for monitoring during and post-construction. – Implement/construct treatment (i.e., settlement tanks, etc.) of construction water prior to discharge to storm sewer/surface water. – Minimize construction area disturbance and duration. Implement erosion and sedimentation control measures (e.g., silt fencing, check dams, etc.). – Adhere to fish timing windows to prevent negative impacts on known sensitive fish species within the study area. – Consider completing a geomorphology study during design. – Refer to the Natural Heritage section of the table for further mitigation approaches associated with surface water impacts.
Geotechnical				
G-1	Effect on soil quality	– Contaminant seepage into soil during excavation of shaft	– Chemicals such as drilling fluids, lubricants, ground improvement material, or fuel from construction equipment may contaminate soil.	– Perform regular equipment checks and maintenance. – Prepare an environmental management plan prior to construction in case of contamination.
G-2	Soil movement around shafts and/or open cut excavations	– Vertical or horizontal ground movement around shafts during and post excavation. – Deformation or damage to nearby structures and/or utilities	– Ground heave/settlement/horizontal shift at surface around shafts. – Deformation or damage to nearby structures and utilities (e.g., crack formation, angular rotation, strain, or pipe joint rotation or pull out) that may require rehabilitation or repair.	– Select shaft or open cut construction method and SOE appropriate with depth, size and geotechnical and hydrogeological conditions at shaft or open cut locations. – Complete soil displacement analytical assessments at all shaft locations.

Item no.	Criteria	Indicators	Potential effects (Positive/Negative)	Avoidance/Mitigation/Compensation
G-3	Soil movement along tunnel	– Vertical or horizontal ground movement along tunnel during and post excavation – Movement or damage to nearby structures and/or utilities	– Ground heave/settlement/horizontal shift along tunnel ahead of and along excavated alignment. – Deformation or damage to nearby structures and utilities (e.g., crack formation, angular rotation, strain, or pipe joint rotation or pull out) that may require rehabilitation or repair.	– Select tunnel excavation method capable of limiting volume losses at the cutting face (limit overcutting of excavation) to limit ground losses. – Complete soil displacement analytical assessments of at-risk tunnel locations, including low soil cover locations or areas where the tunnel crosses or runs parallel in close proximity to sensitive natural features, utilities and critical infrastructure such as creeks, gas main, structural culverts, bridges and rail crossings.
G-4	Encounter boulders during shaft and/or tunnel excavation	– Boulders encountered during excavation of shaft and/or tunnel	– For tunnels, boulder presence and properties may require change of preferred excavation methodology (segmented tunnel vs pipe jacking) and tunnel boring machine technical specifications. – For shafts, boulder presence and properties may require change of preferred shaft SOE methodology.	– Complete appropriate geotechnical investigations with strength testing for any encountered boulders. – Prepare a GBR during design development with appropriate baseline for boulder strength, sizing and anticipated encounter rates and locations. – Recommend a shaft construction SOE capable of maintaining verticality in boulder-prone soils. – Recommend appropriate technical specifications for tunnel boring machine.
G-5	Frac-out of drilling fluids along tunnel	– Drilling fluid breaches surface during tunnel excavation – Unanticipated change in drilling fluid pressure and/or volume	– Drilling fluid may breach beds of water bodies such as creeks, lakes and rivers. – Drilling fluid may breach aquifers. – Drilling fluid may cause cracking on surface infrastructure such as pavement and may require closure of traffic lanes to clean up fluid at surface.	– Select contractor with experienced MTBM or TBM operators. – Require a “frac-out contingency plan” be prepared prior to construction for cleanup of drilling fluids.
G-6	Encounter contaminated soil during shaft and/or tunnel excavation	– Soil encountered during shaft and/or tunnel excavation is tested to surpass allowable contaminant levels	– Spoil must be dispatched at an approved contaminated soil disposal site.	– Complete appropriate geotechnical investigations and contaminants testing during design development to identify confirmed contaminated soil locations or at-risk areas based on historical land use. – Identify and confirm availability of appropriate soil disposal sites based on anticipated contaminants for use during construction.
G-7	Encounter weak or incompetent soil during tunnel excavation	– Volume loss at surface and depths	– Soil heave, soil settlement or sink hole formation at surface.	– Complete appropriate geotechnical investigations with strength testing for anticipate soils along tunnel horizon. – Prepare a GBR during design development with appropriate baseline for soil properties, including stratigraphic profile inferred from borehole investigations. – Recommend appropriate preventative or compensation ground improvement of at-risk locations.
G-8	Movement and vibration near live CNR rail crossings	– Vertical or horizontal ground movement along tunnel during and post excavation – Movement or damage to nearby rail infrastructure – Vibrations surpass allowable typical threshold for live tracks	– Soil settlement and/or heave causing deformation or damage to rail infrastructure which may require rehabilitation or repair. – Associated soil movement deformations and vibrations from machinery can cause derailing of trains, if surpassing allowable soil displacement limits established by CNR and GO Transit.	– Analytically assess rail crossings for soil displacement and structural deformations to estimate anticipated ground movement during and post-construction remains below limits established by CNR and GO Transit. Modify relevant shaft and/or tunnel designs or construction methodology, or and propose mitigation methods such as ground improvement, accordingly.
Natural environment				
EG-4	Effect on aquatic habitat or functions	– Study area contains cold water and warm water watercourses – Study area contains wetlands – Study area has a wetland that has been evaluated but is not considered to be provincially significant – Unevaluated wetlands are also in the study areas	– Temporary or permanent loss of aquatic features or categorical loss of functions by type, including PSWs, locally significant wetlands, watercourses by sensitivity type and others. – During construction water quality may be impaired due to elevated TSS in surface water runoff from study area locations which can affect aquatic species/habitats. Some concentrations above background may occur temporarily. – Change in surface water temperature from groundwater taking and/or discharge to surface water features. – Potential spill hazard when refuelling equipment.	– Need to complete site investigations to evaluate potential effects on aquatic habitat function. – Implement best management practices to control surface water runoff and minimize TSS effects. – Where feasible, discharging of surface water during construction should be directed into the municipal storm sewer system to mitigate thermal impacts to watercourses. Should discharge of surface waters be directed to watercourses, additional mitigation measures would need to be adhered to (e.g., enhanced erosion and control measures). The use of erosion and sediment control measures and timing of construction to avoid spawning and egg incubation periods will reduce the potential for effect to fish and aquatic life. – Conduct equipment maintenance and refuelling at the designated and properly contained maintenance areas or at industrial garages located well away from creek banks, wetlands and outside vegetation areas. – Develop a Spill Prevention Plan.

Item no.	Criteria	Indicators	Potential effects (Positive/Negative)	Avoidance/Mitigation/Compensation
EG-2	Effect on stream geomorphology	– Change in geomorphic form/function/stability in affected channels within study area of both locations	– No anticipated impacts to stream geomorphology in affected channels.	– Employ erosion and sediment controls to limit deposition of construction-mobilized soils into watercourses. – Consider completing a geomorphology study during design, where applicable.
EG-3	Effect on aquatic species including SAR, species of local concern, native species and invasive species	– Aquatic species	– Number and type of aquatic species potentially affected temporarily or permanently. – No anticipated impacts to aquatic SAR as there are no aquatic SAR identified within the study area.	– Preventing death of fish or impacts to downstream fish habitat through the use of appropriate timing windows.
EG-4	Effect on terrestrial habitat or functions	– Study area does not contain ANSIs – Study area contains ecologically significant forests – Wildlife habitat	– Temporary or permanent loss of natural heritage features (e.g., ESAs, ANSIs, wildlife corridors and others). – Potential effects on terrestrial habitat (e.g., direct vegetation (and wildlife habitat) loss, alteration and fragmentation) may occur from the physical footprint of the study area locations. – Project preparation, construction and operation may increase the risk of nest destruction and mortality of migratory birds.	– Site investigations to evaluate potential terrestrial habitat function/significance. – During design, prepare construction constraints with consideration of timing windows to mitigate where possible, vegetation clearing to occur outside of the migratory bird nesting season, bat maternity roosting season, turtle overwintering and amphibian breeding. – Limit the area of project footprint and limit disturbance from employees. – The presence of wildlife will be monitored and communicated to site personnel. – Vehicle use will be restricted to designated areas. – Where practical, rehabilitate habitat for plants and wildlife.
EG-5	Effect on terrestrial species, including SAR, species of local concern, native species, invasive species and area -sensitive species	– SAR have the potential to occur within the study areas including amphibians, insects, birds, reptiles, mammals and tree species	– Number and type of terrestrial species potentially affected temporarily or permanently. – Construction activities have the potential to disturb wildlife within adjacent natural heritage areas. – Project preparation, construction and operation may increase the risk of nest/habitat destruction and mortality of terrestrial SAR. – Project may result in wildlife-vehicle collisions and may cause injury/mortality to individual animals.	– Site investigations to evaluate potential occurrence of terrestrial SAR within the study area. – During design, prepare construction constraints with consideration of timing windows to mitigate where possible, vegetation clearing to occur outside of the migratory bird nesting season, bat maternity roosting season, turtle overwintering and amphibian breeding. – Clearly demarcate work limits at outset of construction and minimize unnecessary vegetation clearing.

Table 4.52 Y9-B Newmarket East SPS Forcemain Cultural Environment Effects and Mitigation

Item no.	Criteria	Indicators	Potential effects (Positive/Negative)	Avoidance/Mitigation/Compensation
CE-1	Effect on OHA-designated properties and properties listed on municipal heritage registries	– Project components are in the vicinity of the heritage property/landscape	– Encroachment onto the property/landscape resulting in a physical impact to the potential BHRs and/or CHLs. – New structures or landscape features and/or alterations to the property/landscape that result in a physical impact to the potential BHRs and/or CHLs. – Relocation of all or part of the potential BHRs and/or CHLs. – Demolition or destruction of all or part of the potential BHRs and/or CHLs. – Vibration impacts to the potential heritage buildings identified on the property/landscape in and on adjacent properties. – Ground disturbance impacts relating to landscape features on the property/landscape in and on adjacent properties.	– If direct impacts are unavoidable, design project to minimize encroachment on the property/landscape while avoiding all impacts to the potential BHRs and/or CHLs. The following options and mitigations should be considered: • Consult with the Town during detailed design to determine if any approvals or permits are required as a result of physical impacts to the property/ landscape. – If avoidance of the property/landscape or the above-noted options are not feasible, and if a physical impact to potential BHRs and/or CHLs is unavoidable, then the following is required: • Consult with the Town during detailed design to determine if any approvals or permits are required as a result of physical impacts to the property/landscape. • Complete a property-specific CHER/HIA prior to any alterations including evaluation of the property against O. Reg. 9/06 and, if necessary, detailed documentation of any confirmed BHRs and/or CHLs and recommendation of specific mitigation measures for impacts to any identified heritage attributes. • The CHER/HIA should also consider the compatibility of new structures or landscape features with existing heritage attributes, layouts and designs of the property/landscape.

.

4.13 Y11-B Queensville East SPS Forcemains

4.13.1 Study Area

The Y11-B Queensville East SPS Forcemains will convey wastewater through a combination of twinned forcemains and gravity sewer from the new Queensville East SPS to the northeast terminus of the Sharon Trunk Sewer, approximately 1 km north of the intersection of Leslie Street and Mount Albert Road in the Town of East Gwillimbury.

The proposed alignment will run west along Queensville Side Road East then will turn south to run along Leslie Street. A study area of approximately 200 metres surrounding the centerline of the road right of way was applied as shown in Figure 4.32.

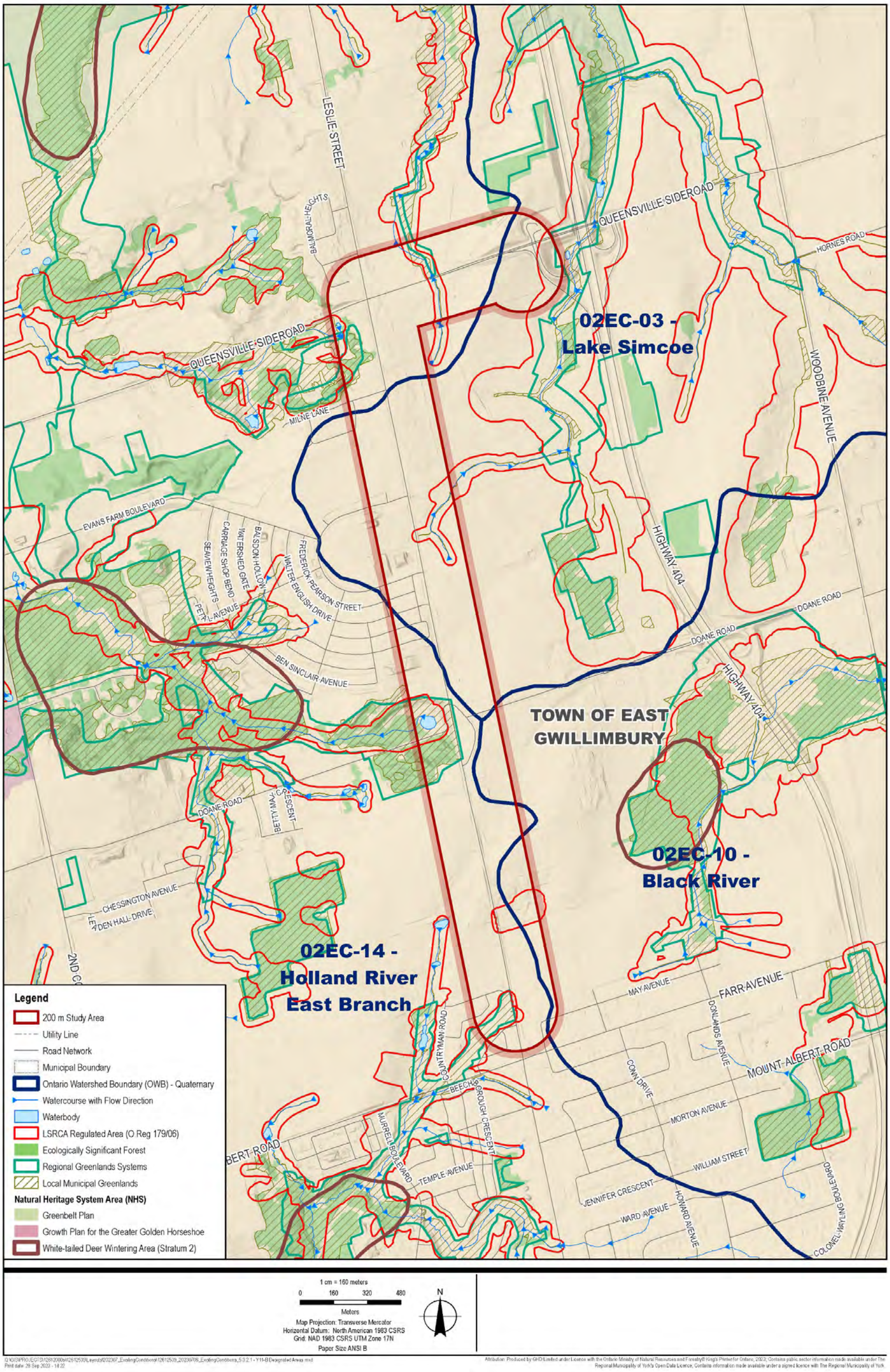


Figure 4.32 Study Area for Y11-B – Queensville East SPS Forcemain

4.13.2 Existing Conditions

4.13.2.1 Social and Built Environment

The following sections will summarize the findings of the desktop studies completed within the study area, including planning and land use, traffic and transportation and utilities.

4.13.2.1.1 Planning Policy and Land Use

Existing Land Use

Study area along Leslie Street, from Queensville Sideroad East to Doane Road, land uses consist of the following:

– West side:
  - Low density residential housing
  - Agricultural lands.
– East side:
  - Low density residential housing
  - Commercial lands (Restaurant, Bishop Tractor and Equipment Ltd., pharmacy, auto shop).

Along Leslie Street, from Doane Road to Farr Avenue, land use consists of the following:

– West side:
  - Low density residential housing
  - Agricultural lands
  - Transformer station
  - Recreational land use (Tennis court)
  - Selby Burying Ground.
– East side:
  - Low density residential housing
  - Commercial lands (gas station, garden centre)
  - Agricultural lands
  - Institutional lands (Church).

Along Queensville Sideroad East, from Leslie Street to Highway 404, land uses consist of the following:

– North side:
  - Low density residential housing
  - Agricultural lands
  - Institutional lands (Queensville Fire Station 28, Canada Post)
  - Recreational lands (Baseball diamond, tennis court)
  - Queensville parking facility.
– South side:
  - Low density residential housing
  - Agricultural lands
  - Commercial lands (Queensville Farm Supply)
  - Highway 404 ramps.

Planning Policy

Regional

The York Region Official Plan 2022 (June 2023 Office Consolidation) designates lands within the study area as Community Area. Lands on the west side of Leslie Street at Doane Road, along with some smaller areas at the north and south ends of the study area are part of York Region's Greenlands System.

Local

With reference to the East Gwillimbury Official Plan 2010 (2018 Office Consolidation), the study area is subject to the Queensville Secondary Plan and the Mount Albert Secondary Plan consists of the following land use designations:

– Agricultural/Long-term Growth Area
– Environmental Protection Area (generally located at Queensville Sideroad East and Highway 404, Queensville Sideroad East and Leslie Street, Leslie Street and Doane Road and Leslie Street and Mount Albert Road)
– Post-Secondary Institution (north side of Queensville Sideroad East)
– Neighbourhood Commercial (south side of Queensville Sideroad East and east side of Leslie Street south of Doane Road)
– Queensville Centre
– Low, Medium and High Density Residential.

The Queensville Secondary Plan indicates a proposed park and proposed elementary school set back on the east side of Leslie Street across from Milne Lane and a proposed collector road connecting Leslie Street to Woodbine Avenue at Queensville Centre.

The Mount Albert Secondary Plan indicates a proposed collector road crossing Leslie Street north of Mount Albert Road.

Active Development Applications

Existing property use has been described using the following data available to GHD:

– Orthoimagery from spring 2022
– Google Earth images
– Farm Tax Program data from 2023 tax year
– Property assessment type via GeoWarehouse (accessed August 2023).

Active development applications within the 200-m study area for each project location have been summarized based on existing available information. Lands within the Y11-B study area contain several active development applications.

Development applications:

– Queensville and Leslie Street – Second vehicular entrance to park.
– 19841 Leslie Street, north of Doane Road – Proposed development of a sales trailer.
– Leslie Street, north of Mount Albert Road – Proposed development of a sales trailer.
– East side of Leslie Street, north of Doane Road – Site Plan.
– Grant Park – Proposed subdivision.
– 179 Jim Mortson Drive – Three applications. To permit 273 single-detached residential lots and 81 townhouse units. To facilitate the construction of 273 single-detached residential lots and 81 townhouse units. Supplementary community works.
– 17 Mondial Crescent – Proposed subdivision.

– South of Doane Road and East of Leslie Street – Two applications. Both applications are associated with an amendment to the Town's Zoning By-law 2018-034 to facilitate the development of 14 townhouse dwelling units on two blocks.
– 19291 Leslie Street – To facilitate the development of 551 single-detached units and 56 semi-detached units.

Carwash application:

– South of Doane Road, east of Leslie Street – Three applications. To facilitate the construction of a car wash bay and associated site works as accessory to the existing gas bar. Proposed re-development of an existing site. Proposal to convert 115.46 m of the existing convenience store into a restaurant with a drive thru.

Variance application:

– 1420 Mount Albert Road, 19202 Leslie Street - Three applications. To permit a proposed encroachment into the rear yard, urban townhouse dwelling located south of the condominium lake connecting Leslie and Mount Albert Road and a decreased 1.5-m setback for all urban townhouse dwellings. To facilitate the development of 86 townhouse units provided by a common element laneway. To create an easement for construction and maintenance of underground servicing.

4.13.2.1.2 Transportation in the Study Area

Leslie Street between Mount Albert Road and Jim Morrison Drive is a two-lane collector road with gravel shoulders, and no dedicated cycling lanes or sidewalks, as shown in Figure 4.33. Between Jim Morrison Drive and Queensville Sideroad, there are paved shoulders on both sides of the road and a sidewalk on the west side, also shown in Figure 4.33.

Figure 4.33 **Leslie Street Looking North (1) from Mount Albert Road and (2) Towards Queensville Sideroad. (*Google Maps* "Streetview," digital images http://maps.google.com)**

The AADT along Leslie Street between Mount Albert Road and Queensville Sideroad has been counted between 7,884 in the south end and 12,139 in the north end, based on the latest available 2022 and 2023 data, respectively. Historical AADT data along the study area are presented in Table 4.53.

There is one public transit route running along Leslie Street with associated bus stop infrastructure, within the study area, which is YRT Route 50. There are no rail crossings within the study area.

Table 4.53 Leslie Street AADT Counts Between Mount Albert Road and Queensville Sideroad

Description of road limits	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
Farr Avenue/Mount Albert Road and Jeffery Crescent	10,447	9,893	8,826	6,381	5,802	5,922	6734	6,904	6,151	8,478	8,631	7,884
Jeffery Crescent/Doane Road and Milne Lane	9,703	10,966			1,0640		10,219				12,139	
Milne Lane and Queensville Sideroad	9,703		9,980									

4.13.2.1.3 Utilities in the Study Area

There are several above/below grade utilities situated within the study area corridor and in the vicinity of the proposed project. These utilities may be temporarily impacted during the construction of sewer, shafts and pits and work compounds. Formal notification and consent would be required from the authorities responsible for these utilities prior to construction.

Buried utilities are typically located within the following limits:

– Shallow-buried electrical and communications cabling are commonly buried between 1.2 and 1.5 mbgs.
– Shallow-buried storm drains, sanitary sewers and watermains are typically buried between 1.2 and 3.5 mbgs.
– Deep-buried utilities are defined as anything buried more deeply than the depths mentioned above.

Known municipal infrastructure that existed on York Region's GIS database has been provided within the drawing set. A detailed utility investigation program, which would include a "Level A through D" subsurface utility exploration, would be required as part of future site investigations.

4.13.2.2 Natural Environment

The following sections will summarize the findings of the desktop studies completed within the study area for geotechnical, hydrogeology, surface water, natural heritage and contamination.

4.13.2.2.1 Geotechnical

The study area for Y11-B is located near the southwest quadrant of the intersection of Highway 404 and Queensville Sideroad East and extended along the Leslie Street (south side of Queensville Sideroad East). The study area is mostly bordered by residential area/farmland, within the boundaries of the Town of East Gwillimbury.

It should be noted that no site-specific reports or borehole record were encountered within the study area.

Based on the Quaternary geology mapping, the native deposit within the study area predominantly comprised sandy silt to silt matrix (Newmarket Till), mostly consisting of Pleistocene deposits.

The bedrock consists of shale, limestone, dolostone, siltstone (Georgian Bay Formation, Blue Mountain Formation and Billings Formation). Typically, bedrock is mapped at depths of 95 to 119 mbgs within the study area and will not be reached during construction.

4.13.2.2.2 Hydrogeological

A hydrogeological desktop review was undertaken within the study area using information from MECP well records, the MECP Source Protection Information Atlas, the ORM database and the Ontario Geological Survey database. Available hydrogeological reports for projects within the area were also reviewed.

The linear infrastructure is anticipated to intersect low permeability fine textured glaciolacustrine deposits and high water table, approximately 3 to 19 mbgs. Local coarse textured glaciolacustrine deposits and interstadial deposits are also anticipated to be intersected within the construction depth (3 to 20 mbgs, shallow sand aquifer 10 to 20 mbgs). Temporary water takings may be required to facilitate construction. The linear infrastructure is proposed to go directly past a municipal water supply well (Queensville #3 and 4) and is located within source water protection WHPA-A, B, C and D.

Refer to Table 4.46 regarding details on anticipated aquifers and aquitards within the study area.

Table 4.54 Aquifers and Aquitards Through the Y11-B Study Area

Aquifers and aquitards	Description	Thickness
Undifferentiated sediments underly topsoil	Surficial alluvial deposits.	Maximum 19 m.
ORM complex (Aquifer)	These sediments consist mostly of silt and fine sand, but also include gravel and minor clay and diamicton. The aquifer is generally unconfined, except the section covered by Halton Till on the south flank of the ORM complex.	Varies up to 6 m. As the structure approaches Mount Albert Road (approx. last 50 m), ORMC thickness greatly increases.
Newmarket Till (Aquitard)	A continuous layer that acts as an aquitard to the underlying Thorncliffe Formation. Deposits surface towards the east of the study area.	Ranges between 41 to 65 m.
Thorncliffe Formation (Aquifer)	Regionally recognized as a highly productive confined aquifer and is laterally continuous. Confined aquifer.	Ranges between 22 to 24 m.
Sunnybrook Drift, Scarborough Formation (Lower aquitards)	Sunnybrook Drift: A continuous layer that acts as an aquitard to the underlying Scarborough Formation. Scarborough Formation: A confined aquifer that is discontinuous and appears to consist of channel fill deposits that roughly dip to the east.	Ranges between 20 to 22 m.

4.13.2.2.3 Surface Water

In the northern portion of the Y11-B study area, a small warmwater headwater feature passes under Queensville Sideroad. There is one sub-watershed within the study area, the HREB, Lake Simcoe and Black River.

165 m southwest of the Leslie Street and Queensville Sideroad intersection a small pond environment located within a non-evaluated wetland exists within the study area (Figure 4.34). This pond is on private property and is surrounded by a mostly naturalized area consisting of marshy areas and deciduous forest. Additionally, a small warmwater stream drains out of this pond, flowing southwest out of the study area and continuing to flow through marshland for approximately 1.2 km before draining into another marsh pond.

Further south down the study area, 180 m south of Jim Mortson Drive and 75 m east of Leslie Street, another warmwater headwater feature exists in the Y11-B- Queensville East SPS Forcemains study area. This warmwater headwater feature is a headwater of the Maskinonge (Jersey) River, where it originates within an agricultural area within the study area, flows for approximately 400 m into a marsh before exiting the study area. It continues to flow for another approximately 620 m before entering the provincially significant Maskinonge River Wetland Complex, where it will eventually drain into Lake Simcoe. As stated above, the surrounding land use of this small warmwater stream is agricultural, with a riparian buffer that consists of mostly grasses, sedges, *Phragmites spp.,* with sparse trees both coniferous and deciduous occasionally occupying the streamside. The ARA dataset shows this stream having a fish community.

85 m west of the Leslie Street and Doane Road intersection, another small warmwater pond in a marshland exists within the boundaries of the Y11-B study area. This pond is fenced off, with the surrounding land use of this pond is naturalized, being situated in a marsh, and surrounded by meadows to the northeast and a mixed forest towards the southwest. A warmwater outlet stream flows westerly from the pond out of the study area, where it meanders through mixed forest, wetlands and agricultural areas, forming confluences with many other tributaries before eventually draining into the HREB 5.2 km downstream of the pond.

Other surface features of interest include the following:

- Small warmwater headwater feature
- Small pond within a non-evaluated wetland located on private property
- Small warmwater watercourse
- Warmwater headwater feature of the Maskinonge River
- Small warmwater pond
- Marshes.

Refer to Figure 4.34 for a surface water map of existing conditions within the study area, north section.

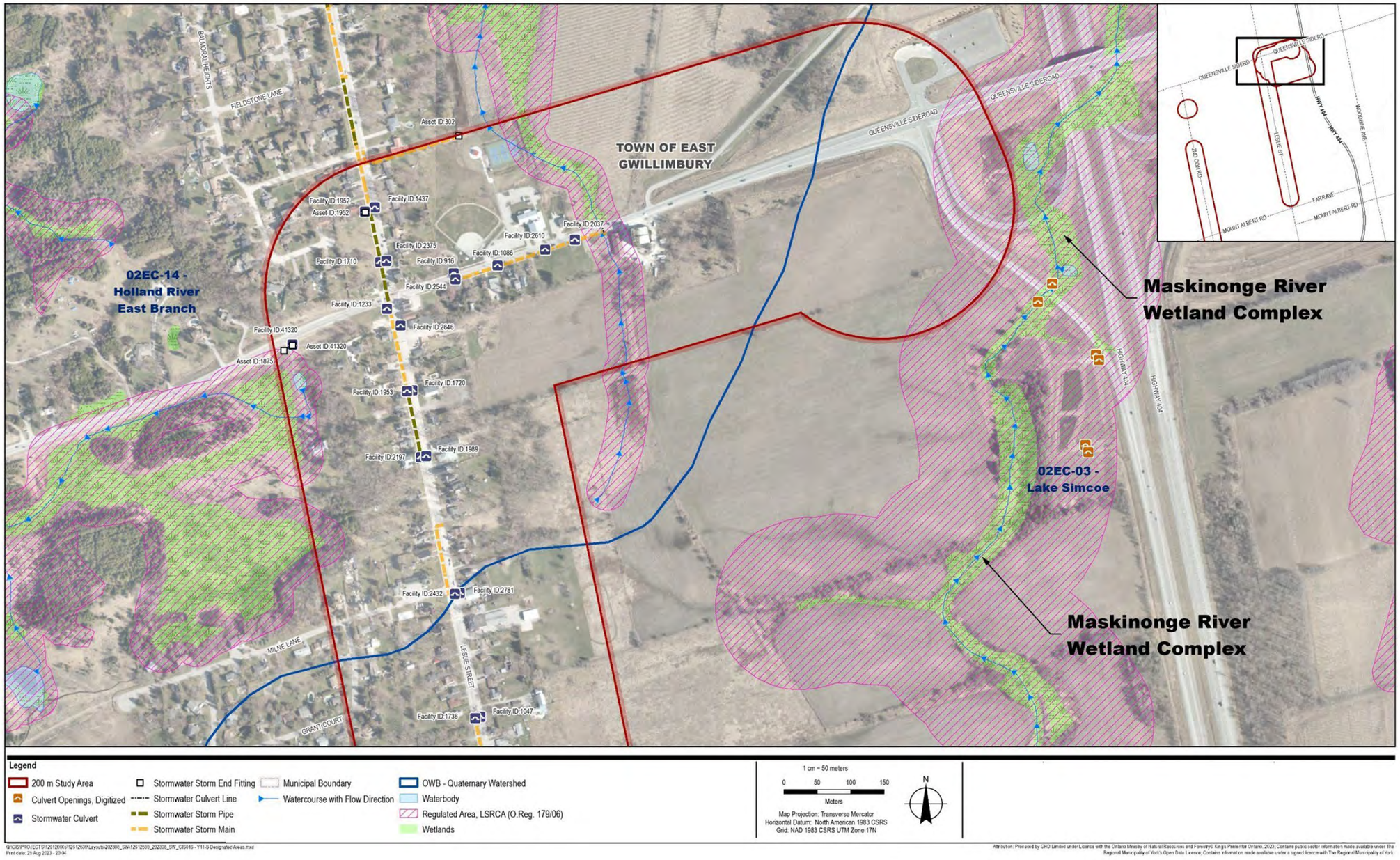


Figure 4.34 Y11-B Study Area Surface Water Map for Existing Conditions, North Section

4.13.2.2.4 Natural Heritage Characterization

The study area contains ecologically significant forest and areas part of the regional and local municipal Greenlands System under the LSRCA. Unevaluated wetlands, consisting of both marshes and swamps, are also present within the study area.

Aquatic Habitat

A number of watercourse and drainage features are present within the Y11-B study area. One of these drainage features is located on the northeastern portion of the study area and is classified as a warmwater headwater drainage feature that flows northwards under Queensville Sideroad East for approximately 1 km before draining into a small pond outside of the study area. The surrounding land use around this drainage feature is dominated by agricultural fields with the majority of the channel flowing either through or adjacent to active farm fields. The riparian area is dominated by grasses, sedges and *Phragmites spp.,* with high abundance of overhanging vegetation cover. A few deciduous trees are present in areas adjacent to the drainage feature, however overhead shading is considered low.

A second warmwater waterbody is present approximately 165 m southwest of the Leslie Street and Queensville Sideroad intersection within the study area. This small pond is located within an unevaluated wetland and situated on private property. The surrounded area is mostly naturalized and consists of marshy areas and deciduous forest. Additionally, flow from the pond drains through a vegetated feature southwest out of the study area and continues flowing through marshland for approximately 1.2 km before draining into a tributary to the HREB.

These warmwater waterbodies share similar fish communities with ARA data. Based on the anticipated fish community data, these waterbodies can support bait/forage fish, as well as warmwater sportfish.

Another headwater drainage feature is located 180 m south of Jim Mortson Drive and 75 m east of Leslie Street. This warmwater headwater drainage feature is a tributary of the Maskinonge (Jersey) River, where it originates within an agricultural area within the study area. The feature flows for approximately 400 m northeast into a marsh before exiting the study area. It continues to flow for another approximately 620 m before entering the Provincially Significant Maskinonge River Wetland Complex, where it will eventually drain into Lake Simcoe. The surrounding land use is agricultural, with a riparian buffer that consists of mostly grasses, sedges, *Phragmites spp.,* with sparse trees consisting of both coniferous and deciduous occasionally occupying the streamside. The ARA dataset shows this stream having a fish community. However, due to this headwater feature being confined in an agricultural area, it is unlikely to support such a diverse community of fish and is likely only able to support bait/forage fish species as indirect habitat.

Lastly, another small pond is located at the south end of the study area approximately 85 m west of the Leslie Street and Doane Road intersection. This pond is fenced off and associated with an unevaluated wetland. The surrounding land use consists of naturalized meadow and mixed forest. The pond drains through a small, vegetated feature and flows westerly outside of the study area, where it meanders through a mixed forest, wetlands,and agricultural areas, forming confluences with many other tributaries before eventually draining into the HREB 5.2 km downstream. From the anticipated fish community data, this pond and its outlet stream support bait/forage fish, along with some warmwater sportfish. No redside dace have been recorded within this study area.

Terrestrial Habitat

The lands in the study area consist mainly of agricultural land and low-density residential communities, with small pockets of woodland and wetland communities scattered throughout. This study area begins at the north edge of the project boundary and travels south toward the East Gwillimbury population centre, which is currently expanding relatively rapidly. The focus of the study area is the expansive agricultural area that dominates this region.

All natural and cultural communities present within the study area are considered common in the province.

Significant Wildlife Habitat

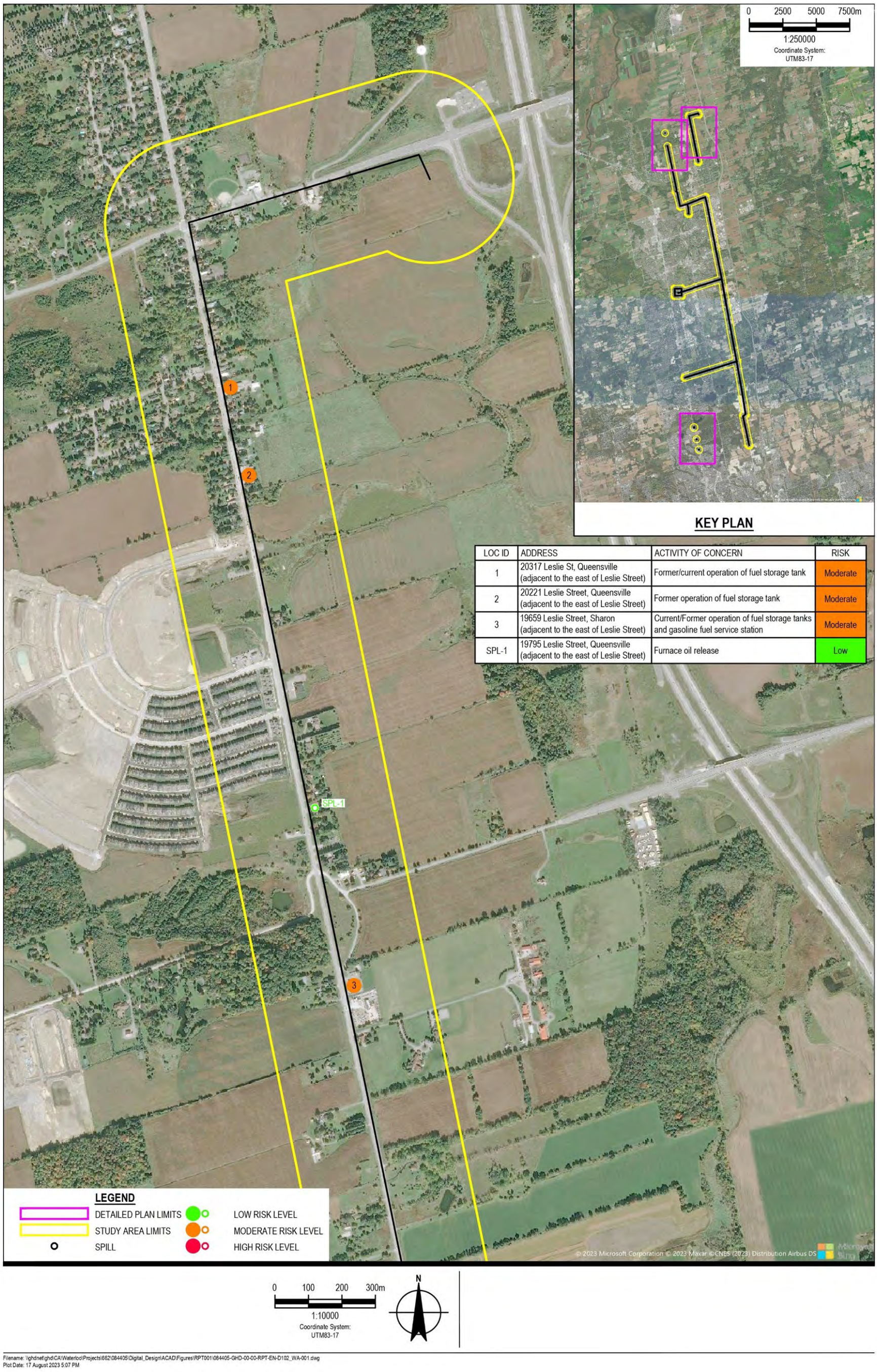
Potential Candidate SWH for Region 6E as defined by MNRF has been identified in several natural areas within the study area. The greatest concentration of these potentials is likely to be found in the unevaluated wetlands, areas associated with the Greenlands System and ecologically significant forest. A screening and analysis of all ELC polygons was completed in the study area for Seasonal Concentration Areas of Animals, Rare Vegetation Communities or Specialized Habitat for Wildlife, Habitat for Species of Conservation Concern and Animal Movement Corridors.

4.13.2.2.5 Areas of Potential Environmental Concern

A review of information from the Environmental Risk Information Services database was completed for properties located within the study area. The review was completed on May 26, 2023, to visually confirm the current land use and associated potential for containing subsurface environmental contamination. This “windshield-level” survey showed that:

– Various residential and commercial properties are present along the majority of the study area.
– Some agricultural and Industrial land use is present within the study area.
– Various gas stations operations were present along the entire the study area which are potential environmental concerns.

Refer to Figure 4.35 for four locations identified at-risk of contamination. The locations are identified as existing known spills, as well as those identified as three risk categories of potential for existing contamination: Low, Moderate and High. Low risk locations are presented in a green circle, moderate risk in an orange circle and high risk in a red circle. We clarify that not all risk categories may be present in the below figure. The number presented in the circle is a property identifier relevant to the entire York Region Sewage Works Project, and not specific to the project being discussed.



LOC ID	ADDRESS	ACTIVITY OF CONCERN	RISK
1	20317 Leslie St, Queensville (adjacent to the east of Leslie Street)	Former/current operation of fuel storage tank	Moderate
2	20221 Leslie Street, Queensville (adjacent to the east of Leslie Street)	Former operation of fuel storage tank	Moderate
3	19659 Leslie Street, Sharon (adjacent to the east of Leslie Street)	Current/Former operation of fuel storage tanks and gasoline fuel service station	Moderate
SPL-1	19795 Leslie Street, Queensville (adjacent to the east of Leslie Street)	Furnace oil release	Low

Figure 4.35 Areas of Potential Environmental Concern within Y11-B Study Area

4.13.3 Conceptual Design

Conceptual design for this linear infrastructure (combination of forcemains and a section of gravity sewer) was based generally on the flow rates and design criteria as described in Chapter 3.

The forcemains will be installed to the high point in the alignment, at which point a gravity sewer section will be installed and discharge into the end of the Sharon Trunk to the 2nd Concession SPS.

Refer to Appendix A, Sheets 9 to 10 for the Conceptual Design Drawings relevant to this project.

4.13.3.1 Design Basis

Table 4.55 summarizes the general characteristics and features that will be present from initial construction through to final configuration.

Table 4.55 Staged Sewage Pumping Station Conceptual Design Characteristics for Y11-B Queensville East SPS Forcemains

Design aspect	2031	2041	2051	Comments
Modelled peak flow (L/s)	N/A	85	120	Station total flow rate target under peak event conditions.
Nominal number of pumps	N/A	2, 1 duty +1 standby	3, 2 duty +1 standby	Nominal number of pumps includes main pumps only. Does not include smaller pumps that may be considered during subsequent design stages to manage low-flow conditions.
Number of forcemains in service	N/A	1	2	
Nominal firm capacity (L/s)	N/A	90	180	Firm capacity is based on installed pumps with N-1 configuration (capacity available with the largest pump out of service).

For design basis specifics relevant to Y11-B Queensville East SPS Forcemains, refer to Table 4.56.

Table 4.56 Design Basis for the Development of Y11-B Queensville East SPS Forcemains

Design basis	Assumptions
Study area	200 m area along infrastructure alignment
Study area boundaries	Leslie Street, bounded by Mount Albert Road to the south and Queensville Sideroad to the north
Nominal diameter	350 mm and 450 mm
Sewer type	Forcemain
Upstream connection point	Leslie Street and Queensville Sideroad
Downstream connection point	Leslie Street and Mount Albert Road
Design criteria	Based on York Region Design Guidelines (2021), including: – Pipe size and material – Hydraulic design Air management – Method of construction – Major utility crossings – End connection points Note: If the final alignment resulting from detailed design coincides with WHPAs, Source Water Protection requirements will be implemented, including additional standards of construction, material and joint selection and pressure testing.

Design basis	Assumptions
Method of construction	Tunnelling within the ROW
Land use	Mixture of residential, agricultural, recreational and commercial land uses
Modelled peak flow	120 L/s
Major infrastructure considerations	– Highway 404 ramps – Hydro corridor
Environmental feature considerations	– LSRCA governed area – Wetlands – Several wooded areas

4.13.3.2 Description of Design

The proposed twinned forcemains will be approximately 3,100 m in length each. The lines will run approximately 400 m west from the proposed location of the new Queensville East SPS along Queensville Side Road East and then turn south along Leslie Street approximately 2.7 km to a discharge point just north of the intersection of Leslie Street and Mount Albert Road. A gravity sewer will then be constructed from this discharge point to the existing Sharon Trunk Sewer.

Existing grades along the proposed alignment are generally between 268 and 290 masl. Preliminary profile drawings suggest the forcemains will be installed at a depth of between 3 and 13 mbgs via trenchless installation.

Table 4.57 General Sewage Pumping Station Conceptual Design Characteristics for Y11-B Queensville East SPS Forcemains

Design aspect	Value	Comments
Number of forcemains	2	
Diameter	2 x 300 mm nominal	
Material of construction	High density polyethylene (HDPE) or CPP	
Roughness	C = 100 to 140	Range to create envelope of possible operating conditions.
Elevations		
Starting invert (m)	260.5 m	Wet well level.
Discharge invert (m)	280.00 m	
High point invert (m)	280.00 m	
Static head (m)		Static head of forcemain only, excluding pump station piping.
Chambers		
Air release points	None required	
Air management	At forcemain discharge chamber	Where water surface interacts with air (i.e., air release chambers, if required, or discharge locations).
Valve chamber(s) and access points	At each shaft location	Dictated by construction method, determined during detailed design.

4.13.3.3 Construction Methods

The majority of the alignment for these works are relatively shallow and are likely to be constructed via open cut technology, with exceptions being made for any deeper ends. Because the forcemains are small in diameter, horizontal directional drilling (HDD) also becomes a viable trenchless technology. HDD is widely used for below-ground pipeline and utility installations that require a trenchless solution. It is a low disturbance approach for accurately and efficiently crossing roads, railways, water crossings and a variety of other obstacles or structures with minimal environmental impact. HDD is used in situations that allow for an angled installation and requires adequate space to set up a drill pad at the rig site, however the required area is considerably smaller than that required for a launch or receipt shaft excavation for other trenchless methods used for larger (>1,000-mm diameter) tunnels, such as microtunnelling.

4.13.3.4 Property Requirements

Temporary and permanent property easements may be required for construction and operation of the forcemains. Permanent property requirements will depend on the final location of the chambers, which are expected to contain a maintenance structure that must be accessible by York Region staff for maintenance purposes.

The proposed property locations and requirements are conceptual only. Details related to location and property easement requirements will be confirmed during detailed design.

4.13.4 Environmental and Community Impacts and Mitigation

Desktop studies were done to determine the possible extent of these impacts and to propose mitigation measures that would reduce the likelihood and the consequences should they occur. The major impacts and associated mitigation approaches are described in this section.

Because the current designs are only at the conceptual level, potential impacts and mitigation measures could change during design development, depending on:

– The ability to co-locate the proposed design with other planned infrastructure to minimize community effects, to be investigated after field investigations are completed. This change will depend on the number and scale of other planned infrastructure (e.g., utilities, transportation) in the ROW or area.
– Confirmation of available property for temporary and permanent use. The extent of temporary easements or acquired private property, as well as the construction schedule may dictate future design changes or mitigation measures.

The assessment criteria and indicators are provided in Table 4.58, Table 4.59 and Table 4.60 corresponding to each of the environments (social and built, natural heritage, cultural heritage and traffic impacts) together with a potential effects assessment and identification of avoidance, mitigation and compensation measures for the project.

Table 4.58 Y11-B Queensville East SPS Forcemains Social and Built Environment Effects and Mitigation

Item no.	Criteria	Indicators	Potential effects (Positive/Negative)	Avoidance/Mitigation/Compensation
Social and built environment				
SB-1	Effect on existing views	– Changes are predicted in views from residences in the surrounding area	– No change in existing views from residences in the surrounding area.	– No avoidance, mitigation, or compensation measures required.
SB-2	Effect on existing residences, businesses and/or community, institutional and recreational facilities	– Displacement of residences, businesses and other facilities is too great – Temporary or permanent disruption to residences, businesses and other facilities near construction compounds or permanent works is too great	– No displacement of residences, businesses, or community, institutional and recreational facilities is anticipated. – Disruption to residences, businesses and community, institutional and recreational facilities in proximity to construction compounds/permanent installations.	– No avoidance, mitigation, or compensation measures are anticipated. However, if in fact displacement is required then York Region would provide market value compensation. – Apply standard construction-related mitigation measures to minimize the disruption effects.
Traffic and transportation				
TT-1	Effect on traffic	– Traffic flows are disrupted too much – Construction occurs too close to congested traffic zones	– Traffic disruption at location along forcemain alignment. – Traffic movement in to and out of Construction compound sites will impact pedestrian, cycling and traffic flow on Leslie Street. – Impacts to public transit involving potential rerouting of buses and/or relocation of stops. – Coordination of alternate routing for emergency service vehicles, if needed. – Private entrances extend along the north end of the study area.	– Where possible, maintain one lane in each direction. This could be achieved through flagging, temporary signals or temporary road widening. – Pedestrian movement should be maintained during construction, with marked pedestrian detours as applicable. – Consider special traffic arrangements for peak hours should be considered in traffic flow directions in the morning and afternoon. – Pay duty police officers may be required to direct traffic. – Make special provisions for emergency service vehicle access. – Make special provisions for pedestrian traffic and safety, including signals, detours and winter maintenance. If feasible, move construction traffic to sideroads. – Access to private entrances to be maintained or alternative access solution provided.
Utilities				
U-1	Conflict with buried utilities	– Sewer or shaft is in direct conflict or falls within clearance limits of nearby utilities	– New construction impacts existing utilities and requires design coordination with utility owners, which increases project cost and schedule.	– Review historic and as-built documents for utility data. – Complete a subsurface utility engineering investigation to identify high-risk utilities, including large and/or critical service utilities (e.g., large watermains and all gas mains). – If a conflict is identified, consider temporary or permanent relocation of utilities safely around or through the work area. Depending on the utility, it may be possible to support the utility above an open cut excavation to be reburied. Modifications of the alignment may also be proposed during design development to mitigate utility conflicts.
U-2	Conflict with surface or overhead utilities	– Excavation of shaft is proposed in location of surface infrastructure – Shaft working compound equipment including cranes will require working directly under overhead utilities or within the hydro wire exclusion zone	– Overhead infrastructure such as electrical or communications cabling is mounted on utility poles between 5 and 12 m above the surface. Depending on the required crane size and operating radius to construct the shaft/pit//open cut sections, equipment extents may fall within hydro line exclusion zone or hit overhead wires causing worker harm or death.	– Working compounds will be designed to allow appropriate and safe movement of workers and equipment around the site, away from live overhead wires or surface utility boxes, based on known utility information and topographic surveys. – If a conflict is identified, modifications of the alignment may be proposed during design development, the utilities would need to be temporarily or permanently relocated safely around or through the work area.

Item no.	Criteria	Indicators	Potential effects (Positive/Negative)	Avoidance/Mitigation/Compensation
U-3	Damage and/or Deformation to surface infrastructure and buried utilities (including railways, bridges and structural culverts)	– Soil movement under or next to the utility from sewer trenchless or shaft/open cut construction	– Ground heave/settlement/horizontal shift along trenchless construction ahead of and along excavated alignment and around shafts and open cut excavations during and post-excavation. This information can be obtained from nearby geotechnical instrumentation. – Deformation or damage to nearby surface or buried utilities as a result of soil movement, which may require rehabilitation or repair (e.g., crack formation, angular rotation, strain and pipe joint rotation or pull out).	– For utilities within sewer tunnel ZOI: Select a tunnel excavation method capable of limiting volume losses at the cutting face (limit overcutting of excavation) to limit ground losses. – For utilities near shaft/sewer open cut ZOI: Select a shaft construction method and SOE appropriate with depth, size and geotechnical and hydrogeological conditions at shaft location. – For each, complete analytical assessments of at-risk locations, including low soil cover locations or areas where the tunnel crosses or runs parallel near sensitive, large, or critical utilities and services. – Where applicable, propose mitigation methods such relocation of utilities, or for deep utilities, relocation of the tunnel horizon based on assessment results. Should neither of these options be applicable, then investigate ground improvement in proximity of utilities to limit ground movement or investigate modification of the tunnel and/or shaft design or construction methodology.
Noise and vibration				
N-1	Operation noise	– Complaints from residents within study area	– Noise disruptions to private residents and commercial areas post-construction, near manholes and other surface connections, SPS locations.	– Any permanent facility, such as supporting air management facilities, will require an ECA application under Section 9 of the Environmental Protection Act to document the noise emissions compliance according. – Investigate degree of risk and impact in further detail.
N-2	Construction noise	– Complaints from residents within study area	– Noise disruptions to private residents and commercial areas during construction, near construction compounds.	– Propose construction noise monitoring per MECP NPC-115 Construction Equipment requirements. – Consider completing noise monitoring for the duration of the construction and notify the contractor of any exceedances so that corrective action/contingency actions can be implemented. – Use vehicles and equipment (cranes and excavators) with efficient muffling devices or construct enclosures. – Comply with local noise by-law.
V-1	Construction vibration	– Complaints from residents within study area	– Disruptions to private residents and commercial areas during construction, near construction compounds.	– Propose appropriate construction vibration benchmarks within the tender documents. – Consider pre- and post-construction condition photos.
Air management				
O-1	Operation odour at drop structures	– Odour near surface connections	– Where there are bends in the gravity sewer and drop structures, there may be the potential for fugitive releases of odour. The potential for odour at these locations will depend on the ventilation design systems and specific venting locations.	– Consider implementation of ventilation design systems with specific venting locations. – Investigate degree of risk and impact in further detail.
O-2	Operation odour at existing or proposed sewer connection or SPS	– Odour near surface connections	– There is potential for odour release due to turbulence at the connection of the proposed sewer to existing sewers.	– Consider implementation of ventilation design systems with odour control. – Investigate degree of risk and impact in further detail.
O-3	Construction odour	– Complaints are received from residents within the study area	– During live connection of infrastructure, there is the potential for odour release.	– Advance notification to residents, advising them of what work is being completed and the duration of the work.
A-1	Construction dust at sewer construction locations	– Fugitive dust is generated – Poor air quality	– Fugitive dust is generated during construction of gravity sewer, interconnecting shaft/chambers, including the connection points.	– Develop a Dust Best Management Practices Plan to be included in the project Construction Management Plan. – Mitigation should be aimed at minimizing emissions of particulate matter and exposure to particulate matter during the construction phase of the project.
A-2	Construction dust at air management infrastructure	– Fugitive dust is generated – Poor air quality	– Fugitive dust is generated during construction of the potential air management infrastructure.	– Develop a Dust Best Management Practices Plan to be included in the project Construction Management Plan. – Mitigation should be aimed at minimizing emissions of particulate matter and exposure to particulate matter during the construction phase of the project.

Table 4.59 Y11-B Queensville East SPS Forcemains Natural Environment Effects and Mitigation

Item no.	Criteria	Indicators	Potential effects (Positive/Negative)	Avoidance/Mitigation/Compensation
Hydrogeology				
N-1	Effect on groundwater quantity	– Temporary and/or long-term change in groundwater quantity	– No long-term change to groundwater quantity is anticipated because no water takings are required during operation of the sewer. – Potential temporary change to groundwater quantity because construction may intersect a shallow sand aquifer (estimated 10 to 20 mbgs). Temporary water takings may be required to facilitate construction. – Potential ground settlement as a result of active dewatering/depressurization. – Change in shallow groundwater flow patterns resulting from operation of sewer pipe resulting from increased I&I and/or preferential movement of groundwater within trench sediments.	– Implement construction methods that minimize dewatering requirements. – Establish pre-construction baseline groundwater quality and quantity conditions and develop implementation plans for monitoring during and post-construction (install and monitor wells and surface water).
N-2	Effect on groundwater quality	– Temporary and/or long-term change in groundwater quality	– Potential temporary change in groundwater quality because construction may intersect a shallow sand aquifer (estimated 10 to 20 mbgs). Temporary water takings may be required to facilitate construction. – No long-term change to groundwater quality is anticipated. – Potential effects on groundwater water quality as a result of potential mobilization of contaminated water where active dewatering/depressurization is required. – Reduction in groundwater quality from spills or the mismanagement of fuel/chemical in work areas.	– Implement construction methods that minimize dewatering requirements. – Develop and implement a Spill Response Plan for construction to mitigate the effect of a spill should one occur. – Establish pre-construction baseline groundwater quality and quantity conditions and develop implementation plans for monitoring during and post-construction (install and monitor wells and surface water). – During design, complete a contaminant source investigation to mitigate the risk of drawing contamination from one source to another location.
N-3	Effect on municipal well(s), WHPA	– Intersects Queensville-Sharon WHPA-A, B, C, D and HVA	– Source Water Protection Plan, Clean Water Act (2006) sanitary sewer infrastructure WHPA-A, B, C, D and policy compliance evaluation.	– Implications on York Region Sewage Works Projects requires further exploration, exclusionary WHPA-A may be intersected. – Source Water Protection Plan, Clean Water Act (2006) sanitary sewer infrastructure WHPA-A, B, C, D and HVA policy, mitigation and monitoring evaluation. – As of January 2023, source water protection requirements under the York Region Municipal Sewage Works CLI ECA apply for any new or alterations to existing sewage works in WHPA-A or B, Vulnerability Score of 10, which applies to a portion of this alignment. These requirements include: • Design must include a Source Protection Supplementary Report that demonstrates that the proposed design recognized the significant drinking water threat and has implemented mitigation measures to protect drinking water sources. The report should identify drinking water sources, how the sewage works has met the requirements of the CWA and the ministry's design and operational requirements and how the works considered the Risk Management Measures Catalogue (e.g., monitoring, reporting requirements), as amended, to address the risks • Designs must be accompanied with a monitoring and reporting plan. • Designs must be accompanied with a Spill Prevention and Contingency Plan, covering information requirements as per O. Reg. 224/07 to prevent, eliminate or ameliorate any adverse drinking water effects that result or may result from spills of pollutants. This includes steps taken in the event drinking water sources are contaminated for example, notifying members of the public who may be directly affected by a spill. • New and replacement sewers are to be constructed of materials and with joints that are equivalent to watermain standards of construction and are to be pressure tested in accordance with Division 441 (formerly 701) of the OPSS.
N-4	Effect on private wells - temporary construction dewatering	– Temporary construction dewatering private well interference (quantity/quality)	– Temporary decrease in private well quantity/quality could occur during construction activities depending on the location, depth and construction, methodology and duration.	– Implement construction methods that minimize dewatering requirements. – Address construction dewatering private well interference complaints through existing York Region private well assessment and mitigation policy. – Proactively identify any high-risk wells during design and prepare site-specific preventative mitigation and corrective action plans as part of design. Corrective actions should align to York Region's private well assessment and mitigation policy.

Item no.	Criteria	Indicators	Potential effects (Positive/Negative)	Avoidance/Mitigation/Compensation
N-5	Effect on private wells – long-term	– Long-term private well interference (quantity/quality)	– No long-term groundwater quantity/quality interference is anticipated.	– If needed, establish pre-construction baseline groundwater quality and quantity conditions and develop implementation plans for monitoring during and post-construction (install and monitor wells and surface water). – Proactively identify any high-risk wells during design and prepare site-specific preventative mitigation and corrective action plans as part of design. Corrective actions should align to York Region's private well assessment and mitigation policy.
N-6	Effect on surface water quantity/quality	– Temporary changes in surface water	– Temporary changes in surface water could occur during construction activities depending on the location, depth, construction, methodology, timing and duration. – A high groundwater table resulting in groundwater/surface water interaction would be expected due to existing soils and anticipated presence of the ORM aquifer. – Change in groundwater-surface water interaction (reversal of vertical hydraulic gradient) results in impact to terrestrial and aquatic habitat and associated SAR (where applicable) – reduction in baseflow. – Change in surface water temperature from groundwater taking and/or discharge to surface water features. – Changes to stream morphology resulting from the release of groundwater dewatering water. The potential reduction in baseflow due to water taking in a lower confined aquifer due to increased downward hydraulic gradients across the aquitard separating the stream and the confined aquifer. – The potential reduction in baseflow from a stream reach that intersects an aquifer in which the water taking is occurring.	– Field verification of groundwater-surface water interaction suggested for watercourses and wetlands within the study area. – Complete outlet receiver assessment(s) should temporary groundwater discharge be required to surface water. Establish pre-construction baseline surface water quality and quantity conditions and develop implementation plans for monitoring during and post-construction. – Implement/construct treatment (i.e., settlement tanks, etc.) of construction water prior to discharge to storm sewer/surface water. – Minimize construction area disturbance and duration. Implement erosion and sedimentation control measures (e.g., silt fencing, check dams, etc.). – Adhere to fish timing windows to prevent negative impacts on known sensitive fish species within the study area. – Consider completing a geomorphology study during design. – Refer to the Natural Heritage section of the table for further mitigation approaches associated with surface water impacts.
Areas of Potential Environmental Concern				
C-1	Low risk contamination	– An area of potential environmental concern is not located directly in or immediately adjacent to the project ROW – Low potential for contaminants to be present and if present, are likely limited in extent and likely only present in surficial soil – Migration, exposure pathways and receptors are limited – Impacts can be easily managed prior to or during construction	– 19795 Leslie Street: Furnace oil release. Recorded observation of COC on site (PHCs and BTEX). Unknown volume of release identified.	– No mitigation required.
C-2	Moderate risk contamination	– An area of potential environmental concern is located within or immediately adjacent to the project ROW – Moderate potential for contaminants to be present within the area of potential environmental concern – Moderate potential for contaminants to be present in soil and/or groundwater or there is evidence that contaminants are present – Migration, exposure pathways and/or receptors may be present – Impacts would need to be assessed and addressed prior to acquisition, design and/or construction	– 20317 Leslie St, Queensville: Former/current operation of fuel storage tank. Operation located adjacent to Leslie Street with potential for COCs (PHCs and BTEX). – 20221 Leslie Street, Queensville: Former operation of fuel storage tank. Operation located adjacent to Leslie Street with potential for COCs (PHCs and BTEX). – 19659 Leslie Street: Current/Former operation of fuel storage tanks and gasoline fuel service station. Operation located adjacent to Leslie Street with potential for COCs (PHCs and BTEX).	– Advance boreholes as part of the detail design of the proposed improvements, should be placed in the vicinity of the areas of potential environmental concern having moderate risk, to assess for potential subsurface impacts that may affect the proposed construction work. Soil samples should be collected from these boreholes for laboratory analysis of metals and inorganics (including EC and SAR), PHCs, BTEX and VOCs.
Geotechnical				
G-1	Effect on soil quality	– Contaminant seepage into soil during excavation of shaft	– Chemicals such as drilling fluids, lubricants, ground improvement material or fuel from construction equipment may contaminate soil.	– Perform regular equipment checks and maintenance. – Prepare an environmental management plan prior to construction in case of contamination.

Item no.	Criteria	Indicators	Potential effects (Positive/Negative)	Avoidance/Mitigation/Compensation
G-2	Soil movement around shafts and/or open cut excavations	– Vertical or horizontal ground movement around shafts during and post excavation – Deformation or damage to nearby structures and/or utilities	– Ground heave/settlement/horizontal shift at surface around shafts. – Deformation or damage to nearby structures and utilities (e.g., crack formation, angular rotation, strain, or pipe joint rotation or pull out) that may require rehabilitation or repair.	– Select shaft or open cut construction method and SOE appropriate with depth, size and geotechnical and hydrogeological conditions at shaft or open cut locations. – Complete soil displacement analytical assessments at all shaft locations.
G-3	Soil movement along tunnel	– Vertical or horizontal ground movement along tunnel during and post excavation – Movement or damage to nearby structures and/or utilities.	– Ground heave/settlement/horizontal shift along tunnel ahead of and along excavated alignment. – Deformation or damage to nearby structures and utilities (e.g., crack formation, angular rotation, strain, or pipe joint rotation or pull out) that may require rehabilitation or repair.	– Select tunnel excavation method capable of limiting volume losses at the cutting face (limit overcutting of excavation) to limit ground losses. – Complete soil displacement analytical assessments of at-risk tunnel locations, including low soil cover locations or areas where the tunnel crosses or runs parallel in close proximity to sensitive natural features, utilities and critical infrastructure such as creeks, gas main, structural culverts, bridges and rail crossings.
G-4	Encounter boulders during shaft and/or tunnel excavation	– Boulders encountered during excavation of shaft and/or tunnel	– For tunnels, boulder presence and properties may require change of preferred excavation methodology (segmented tunnel vs pipe jacking) and tunnel boring machine technical specifications. – For shafts, boulder presence and properties may require change of preferred shaft SOE methodology.	– Complete appropriate geotechnical investigations with strength testing for any encountered boulders. – Recommend appropriate technical specifications for tunnel boring machine.
G-5	Frac-out of drilling fluids along tunnel	– Drilling fluid breaches surface during tunnel excavation – Unanticipated change in drilling fluid pressure and/or volume	– Drilling fluid may breach beds of water bodies such as creeks, lakes and rivers. – Drilling fluid may breach aquifers. – Drilling fluid may cause cracking on surface infrastructure such as pavement and may require closure of traffic lanes to clean up fluid at surface.	– Select contractor with experienced operators. – Require a “frac-out contingency plan” be prepared prior to construction for cleanup of drilling fluids.
G-6	Encounter contaminated soil during shaft and/or tunnel excavation	– Soil encountered during shaft and/or tunnel excavation is tested to surpass allowable contaminant levels	– Spoil must be dispatched at an approved contaminated soil disposal site.	– Complete appropriate geotechnical investigations and contaminants testing during design development to identify confirmed contaminated soil locations or at-risk areas based on historical land use. – Identify and confirm availability of appropriate soil disposal sites based on anticipated contaminants for use during construction.
G-7	Encounter weak or incompetent soil during tunnel excavation	– Volume loss at surface and depths	– Soil heave, soil settlement or sink hole formation at surface.	– Complete appropriate geotechnical investigations with strength testing for anticipate soils along tunnel horizon. – Recommend appropriate preventative or compensation ground improvement of at-risk locations.
Natural heritage				
EG-1	Effect on aquatic habitat or functions	– The study area contains warm water watercourses – The study area contains wetlands – Unevaluated wetlands are also in the study areas	– Temporary or permanent loss of aquatic features or categorical loss of functions by type, including PSWs, locally significant wetlands, watercourses by sensitivity type and others. – During construction water quality may be impaired due to elevated TSS in surface water runoff from study area locations which can affect aquatic species/habitats. Some concentrations above background may occur temporarily. – Change in surface water temperature from groundwater taking and/or discharge to surface water features. – Potential spill hazard when refuelling equipment.	– Need to complete site investigations to evaluate potential effects on aquatic habitat function. – Implement best management practices to control surface water runoff and minimize TSS effects. – Where feasible, discharging of surface water during construction should be directed into the municipal storm sewer system to mitigate thermal impacts to watercourses. Should discharge of surface waters be directed to watercourses, additional mitigation measures would need to be adhered to (e.g., enhanced erosion and control measures). The use of erosion and sediment control measures and timing of construction to avoid spawning and egg incubation periods will reduce the potential for effect to fish and aquatic life. – Conduct equipment maintenance and refuelling at the designated and properly contained maintenance areas or at industrial garages located well away from creek banks, wetlands and outside vegetation areas. – Develop a Spill Prevention Plan.
EG-2	Effect on stream geomorphology	– Change in geomorphic form/function/ stability in affected channels within study area of both locations	– No anticipated impacts to stream geomorphology in affected channels.	– Employ erosion and sediment controls to limit deposition of construction-mobilized soils into watercourses.
EG-3	Effect on aquatic species including SAR, species of local concern, native species and invasive species	– Aquatic species	– Number and type of aquatic species potentially affected temporarily or permanently. – No anticipated impacts to aquatic SAR as there are no aquatic SAR identified within the study area.	– Preventing death of fish or impacts to downstream fish habitat through the use of appropriate timing windows.

Item no.	Criteria	Indicators	Potential effects (Positive/Negative)	Avoidance/Mitigation/Compensation
EG-4	Effect on terrestrial habitat or functions	– The study area does not contain ANSIs – The study area contains ecologically significant forests – The study area contains white-tailed deer overwintering habitat (Stratum 2) – Wildlife habitat	– Temporary or permanent loss of natural heritage features (e.g., ESAs, ANSIs, wildlife corridors and others). – Potential effects on terrestrial habitat (e.g., direct vegetation (and wildlife habitat) loss, alteration and fragmentation) may occur from the physical footprint of the study area locations. – Project preparation, construction, and operation may increase the risk of nest destruction and mortality of migratory birds.	– Site investigations to evaluate potential terrestrial habitat function/significance. – During design, prepare construction constraints with consideration of timing windows to mitigate where possible, vegetation clearing to occur outside of the migratory bird nesting season, bat maternity roosting season, turtle overwintering and amphibian breeding. – Limit the area of project footprint and limit disturbance from employees. – The presence of wildlife will be monitored and communicated to site personnel. – Vehicle use will be restricted to designated areas. – Where practical, rehabilitate habitat for plants and wildlife.
EG-5	Effect on terrestrial species, including SAR, species of local concern, native species, invasive species and area-sensitive species	– SAR have the potential to occur within the study areas including amphibians, insects, birds, reptiles, mammals and tree species	– Number and type of terrestrial species potentially affected temporarily or permanently. – Construction activities have the potential to disturb wildlife within adjacent natural heritage areas. – Project preparation, construction and operation may increase the risk of nest/habitat destruction and mortality of terrestrial SAR. – Project may result in wildlife-vehicle collisions and may cause injury/mortality to individual animals.	– Site investigations to evaluate potential occurrence of terrestrial SAR within the study area. – During design, prepare construction constraints with consideration of timing windows to mitigate where possible, vegetation clearing to occur outside of the migratory bird nesting season, bat maternity roosting season, turtle overwintering and amphibian breeding. – Clearly demarcate work limits at outset of construction and minimize unnecessary vegetation clearing.

Table 4.60 Y11-B Queensville East SPS Forcemains Cultural Environment Effects and Mitigation

Item no.	Criteria	Indicators	Potential effects (Positive/Negative)	Avoidance/Mitigation/Compensation
CE-1	Effect on OHA-designated properties and properties listed on municipal heritage registries	– Project components are in the vicinity of the heritage property/landscape	– Encroachment onto the property/landscape resulting in a physical impact to the potential BHRs and/or CHLs. – New structures or landscape features and/or alterations to the property/landscape that result in a physical impact to the potential BHRs and/or CHLs. – Relocation of all or part of the potential BHRs and/or CHLs. – Demolition or destruction of all or part of the potential BHRs and/or CHLs. – Vibration impacts to the potential heritage buildings identified on the property/landscape in and on adjacent properties. – Ground disturbance impacts relating to landscape features on the property/landscape in and on adjacent properties.	– If direct impacts are unavoidable, design project to minimize encroachment on the property/landscape while avoiding all impacts to the potential BHRs and/or CHLs. The following options and mitigations should be considered: • Consult with the Town during detailed design to determine if any approvals or permits are required as a result of physical impacts to the property/landscape. – If avoidance of the property/landscape or the above-noted options are not feasible, and if a physical impact to potential BHRs and/or CHLs is unavoidable, then the following is required: • Consult with the Town during detailed design to determine if any approvals or permits are required as a result of physical impacts to the property/landscape. • Complete a property-specific CHER/HIA prior to any alterations including evaluation of the property against O. Reg. 9/06 and, if necessary, detailed documentation of any confirmed BHRs and/or CHLs and recommendation of specific mitigation measures for impacts to any identified heritage attributes. • The CHER/HIA should also consider the compatibility of new structures or landscape features with existing heritage attributes, layouts and designs of the property/landscape.

Item no.	Criteria	Indicators	Potential effects (Positive/Negative)	Avoidance/Mitigation/Compensation
CE-2	Effect on archeological sites	– Project components are in the vicinity of the archeological sites	– Encroachment onto the site resulting in a physical impact. – New structures or landscape features and/or alterations to the site that result in a physical impact. – Demolition or destruction of all or part of the archeological sites. – Vibration impacts to the archeological sites identified on the property/landscape. – Ground disturbance impacts to the archeological sites.	– Should impacts be proposed within the vicinity of the site, then additional assessment may be required. Depending on the location of the proposed impacts, this may be Stage 2 archaeological assessment, Stage 3 archaeological assessment, or Stage 4 avoidance and protection. Stage 3 test unit excavation must be completed across the remainder of the site as per Sections 3.2.2 and 3.2.3 of the Standards and Guidelines (MCM 2011:49-53). – However, if proposed impacts will avoid the site, but construction-related activities will occur within the vicinity of the site, then the site will require Stage 4 avoidance and protection monitoring, to be conducted by a licensed consultant archaeologist. The avoidance, protection and construction monitoring requirements for construction activities would include: • Erection a temporary barrier that extends a minimum of 10 m beyond site limits. • Issuing “no go” instructions to all on-site construction crews and personnel during construction. • Depicting the 10 m protective buffer zone on all contract drawings with explicit instructions that a licensed consultant archaeologist will be present to monitor construction. • Ensuring the presence of a licensed archaeologist during construction to monitor the area to be avoided and verify the effectiveness of the avoidance strategy. • If any archaeological materials are identified during construction, then all construction activities must stop until the archaeological materials are evaluated and mitigated, if necessary, by a licensed archaeologist. • After the completion of the soil disturbing activities, having licensed archaeologist inspect the site area and prepare a report for the MCM on the effectiveness of the avoidance strategy and in ensuring that the area to be avoided remained intact.
CE-3	Effect on registered cemeteries	– Project components are in the vicinity of registered cemeteries	– Encroachment onto the cemetery resulting in a physical impact. – New structures or landscape features and/or alterations to the cemetery that results in a physical impact. – Demolition or destruction of all or part of the cemetery. – Vibration impacts to the cemetery identified on the property/landscape. – Ground disturbance impacts to the cemetery.	– It is desirable to locate any planned impacts away from the cemetery and on the opposite side of the road. If this cannot occur and impacts are planned within 20 m of the Selby Burying Ground and Weddel Family Plot, a cemetery investigation may be required, as determined through consultation with the MCM and the BAO. This will minimally involve background research to collect information about the history of the cemetery, location of burials in proximity to the ROW and potentially followed by Stage 2 test pit survey and MTR to actively search for burials.

4.14 Capital Cost Estimate

The cost estimate methodology and the estimate basis are from the Association for the AACE International (AACE) methodology and represent a Class 5 cost estimate with an accuracy to -50% to +100%. The estimate reflects the probable cost obtained for the Greater Toronto Area and is a determination of fair market value for the proposed scope of work. Allowances and markups were also included in the estimate for additional items such as design contingency, construction contingency, property acquisition and future investigations.

The provided cost estimate is presented in 2023 dollars, meaning that it reflects the monetary value as of the present year. In this context, the cost estimate does not incorporate any adjustments for potential future increases in prices due to inflation. As a result, it offers a snapshot of the projected costs in terms of the currency's current value, providing a clear and unadjusted perspective on the financial aspects at play. It's important to note that the absence of inflation adjustment in the cost estimate could impact its accuracy over an extended period, especially if the project or analysis spans several years.

This cost estimate has been prepared for guidance in project evaluation and implementation based on the information available at the time of the estimate. The final costs of the project will depend on the following factors:

– Actual labour and material costs
– Competitive market conditions
– Implementation schedule
– Other variables.

As a result, the final project costs will likely vary from the estimate presented herein. Due to this fact, project feasibility and funding needs must be carefully reviewed before making specific financial decisions to help support a proper evaluation and adequate funding.

4.14.1 Cost Assumptions

4.14.1.1 Scope of Work

The capital cost estimate was developed based on project specific assumptions. It is important to emphasize that certain assumptions, including but not limited to the number of shafts, may undergo modifications as the project progresses.

Based on this concept, the scope of work used for the purposes of determining the construction costs includes the following:

– Upgrades to 2nd Concession SPS.
– Upgrades to Queensville West SPS.
– Upgrades to Holland Landing SPS.
– Construction of Newmarket East SPS.
– Construction of Queensville East SPS.
– Replacing two 750 mm diameter forcemains with a south-flowing 750 mm diameter gravity sewer, which includes the installation of associated manholes, all part of the 2nd Concession North Gravity Sewer spanning 3000 m.
– Construction of 15 shafts and associated chambers and maintenance holes for 2nd Concession North Gravity Sewer.
– Construction of the 2500 m of 1800-mm-diameter 2nd Concession South Gravity Sewer via tunnelling.
– Construction of seven shafts and associated chambers and maintenance holes for 2nd Concession South Gravity Sewer.
– Construction of two 1050 mm diameter Newmarket East SPS Forcemains via a 2200 m tunnel.

– Construction of three shafts and associated chambers and maintenance holes for Newmarket East SPS Forcemains.
– Construction of two 300 mm diameter Queensville East SPS Forcemains through a 3100 m HDD and open cut process.
– Construction of three valve chambers, associated compounds and maintenance holes for Queensville East SPS Forcemains.
– Connections between infrastructure components
– Site preparation and restoration.

4.14.1.2 General Assumptions

The cost estimate was developed based on general assumptions and allowances, which include, but are not limited to:

1. Due to limited information at this conceptual design stage, the prices used are based on similar projects and/ or conceptual drawings.
2. Estimates are based on historical data from past or recently tendered similar projects, with allowances for installation based on ratios of the material cost.
3. No rock excavation.
4. A reasonable project schedule was assumed, with no overtime accounted for.
5. Each project will be constructed under a single contract.
6. An allowance of 15% design contingency is considered to cover design and pricing unknowns in the preparation of this estimate. The allowance is not meant to cover additional scope of work or quality modifications, but rather to provide some flexibility as the design develops. The design allowance typically decreases as the design progresses and is a nominal percentage at the pretender stage.
7. An allowance of 10% construction contingency is considered to cover the unexpected increase in costs or unforeseen site conditions resulted in design modifications during the construction phase.
8. An allowance of 15% is considered to cover the cost of engineering services.
9. An allowance of 10% contingency is considered to cover any property acquisition for projects where permanent and temporary easements are required.
10. An allowance of 2% contingency is considered to cover any property acquisition for sanitary sewer upgrades projects that will only require temporary easements for staging during construction.
11. An allowance of 4% is considered to the cost of future investigations.

4.14.1.3 Linear Infrastructure

The following assumptions have been developed in preparation of cost estimates for linear assets:

1. Tunnelling method of construction is preferred for depths greater than 8 m due to cost and impacts on existing highways, traffic and the natural environment.
2. Tunnel shafts are located at all significant sewer bends and spaced at up to 2,000 m along straight runs depending on installation method.
3. Access/maintenance chambers are assumed to be situated at shaft locations.
4. Shaft sizing does not need to consider oversizing of the shaft to accommodate a maintenance hole that can fit stairways.
5. For gravity sewer diameters of 1,800 mm or less, tunnelling construction has been assumed to be via microtunnelling and includes a non-structural liner to protect against H_2S.
6. For gravity sewer diameters above 1,800 mm, tunnelling construction has been assumed to be via earth pressuring boring, with a two-pass system and includes a non-structural liner to protect against H_2S.

7. A two-pass system has been assumed for trenchless installation of the forcemains. The carrier pipe has been assumed to be concrete pressure pipe (CPP).
8. Tunnel and pipe lengths and invert elevations were noted, and invert depth differential and average depth of segments were calculated from the alignment drawings. The length, average depth, diameter and location of the pipes shown in the alignment figure were used to calculate the tunnel and pipe installation costs. Installation cost assumptions were informed by previous projects of similar scope and experience, and these were used as a basis for the unit prices applied in the pipe installation estimate.
9. A diameter was assumed for each shaft based on whether it was a launch or reception shaft, as well as the size and number of tunnels to be installed. This assumption was informed by previous tunnelling projects, calculation of unit costs and tunnel equipment supplier minimum requirements. The depth of each shaft was identified from the alignment figures, and over-excavation for a shaft base slab was added. A unit price for installation per metre depth was used in the calculation of the cost of the shaft. Additional costs were added for the shafts located within the ORM to deal with the added complexity of deep shaft construction in high-water aquifers. Finally, a price for the installation of manholes was added to this to determine the total cost of installation.

4.14.1.4 Facilities

Air management has been included at identified locations with an allowance of $2,850,000 per location. This is intended to cover the additional cost of a small permanent building at a selected shaft location with air management installed within. The size, type and number of these units will be determined during detailed design.

4.14.2 Excluded Costs

The following costs have not been included in the construction cost estimates:

1. Market contingency
2. Non-construction costs for the following items:
1. Legal
2. Owner administration costs
3. Any unforeseen significant increase in material prices
4. Unavailability of materials and skilled labour
5. Accelerated or delayed schedule
6. Overtime premiums.

4.14.3 Cost Estimate

The estimate construction costs for each of the projects in this chapter are presented in Table 4.61 to Table 4.78, excluding rate escalation and HST. The project construction cost estimate ranges from -50% to +100% these values are presented for each project in Table 4.61, Table 4.63,

Table 4.65, Table 4.67,

Table 4.69, Table 4.71, Table 4.73, Table 4.75 and Table 4.77.

Table 4.61 Estimated Construction Costs for Y6 2nd Concession SPS Upgrades

Low range (-50%) ($CAD 2023, excluding HST)	Estimated costs ($CAD 2023, excluding HST)	High range (+100%) ($CAD 2023, excluding HST)
7,750,000	15,500,000	31,000,000

Table 4.62 Estimated cost for Y6 2nd Concession SPS Upgrades

Item	Description	Amount ($CAD 2023)
1	General construction	1,400,000
2	Tunnel construction cost	0
3	Shaft construction cost	0
4	Facility cost (pump stations and air)	11,000,000
5	Design contingency (15%)	1,900,000
6	Construction contingency (10%)	1,200,000
	Total construction cost	**15,500,000**
7	Engineering services (15%)	2,300,000
8	Property acquisition (2%)	310,000
9	Future investigations (4%)	620,000
	Total capital cost (excluding HST)	**18,730,000**

Table 4.63 Estimated Construction Costs for Y7 Queensville West SPS Upgrades

Low range (-50%) ($CAD 2023, excluding HST)	Estimated costs ($CAD 2023, excluding HST)	High range (+100%) ($CAD 2023, excluding HST)
3,930,000	7,860,000	15,720,000

Table 4.64 Estimated cost for Y7 Queensville West SPS Upgrades

Item	Description	Amount ($CAD 2023)
1	General construction	690,000
2	Tunnel construction cost	0
3	Shaft construction cost	0
4	Facility cost (pump stations and air)	5,600,000
5	Design contingency (15%)	940,000
6	Construction contingency (10%)	630,000
	Total construction cost	**7,860,000**
7	Engineering services (15%)	1,200,000
8	Property Acquisition (2%)	160,000
9	Future Investigations (4%)	310,000
	Total Capital Cost (excluding HST)	**9,530,000**

Table 4.65 Estimated Construction Costs for Y8

Low range (-50%) ($CAD 2023, excluding HST)	Estimated costs ($CAD 2023, excluding HST)	High range (+100%) ($CAD 2023, excluding HST)
2,600,000	5,200,000	10,400,000

Table 4.66 Estimated cost for Y8 Holland Landing SPS Upgrades

Item	Description	Amount ($CAD 2023)
1	General construction	460,000
2	Tunnel construction cost	0
3	Shaft construction cost	0
4	Facility cost (pump stations and air)	3,700,000
5	Design contingency (15%)	620,000
6	Construction contingency (10%)	420,000
	Total construction cost	**5,200,000**
7	Engineering services (15%)	**780,000**
8	Property acquisition (2%)	100,000
9	Future investigations (4%)	210,000
	Total capital cost (excluding HST)	**6,290,000**

Table 4.67 Estimated Construction Costs for Y9-A

Low range (-50%) ($CAD 2023, excluding HST)	Estimated costs ($CAD 2023, excluding HST)	High range (+100%) ($CAD 2023, excluding HST)
51,750,000	103,500,000	207,000,000

Table 4.68 Estimated cost for Y9-A Newmarket East SPS

Item	Description	Amount ($CAD 2023)
1	General construction	9,200,000
2	Tunnel construction cost	0
3	Shaft construction cost	0
4	Facility cost (pump stations/air)	74,000,000
5	Design contingency (15%)	12,000,000
6	Construction contingency (10%)	8,300,000
	Total construction cost	**103,500,000**
7	Engineering services (15%)	16,000,000
8	Property acquisition (10%)	10,000,000
9	Future investigations (4%)	4,100,000
	Total capital cost (excluding HST)	**133,600,000**

Table 4.69 Estimated Construction Costs for Y11-A

Low range (-50%) ($CAD 2023, excluding HST)	Estimated costs ($CAD 2023, excluding HST)	High range (+100%) ($CAD 2023, excluding HST)
7,250,000	14,500,000	29,000,000

Table 4.70 Estimated Cost for Y11-A Queensville East SPS

Item	Description	Amount ($CAD 2023)
1	General construction	1,300,000
2	Tunnel construction cost	0
3	Shaft construction cost	2,300,000
4	Facility cost (pump stations and air)	8,000,000
5	Design contingency (15%)	1,700,000
6	Construction contingency (10%)	1,200,000
	Total construction cost	**14,500,000**
7	Engineering services (15%)	2,200,000
8	Property acquisition (10%)	1,500,000
9	Future investigations (4%)	580,000
	Total capital cost (excluding HST)	**18,780,000**

Table 4.71 Estimated Construction Costs for Y12-A

Low range (-50%) ($CAD 2023, excluding HST)	Estimated costs ($CAD 2023, excluding HST)	High range (+100%) ($CAD 2023, excluding HST)
11,750,000	23,500,000	47,000,000

Table 4.72 Estimated Cost for Y12-A 2nd Concession North Gravity Sewer

Item	Description	Amount ($CAD 2023)
1	General construction	2,100,000
2	Tunnel construction cost	7,900,000
3	Shaft construction cost	8,800,000
4	Facility cost (pump stations and air)	0
5	Design contingency (15%)	2,800,000
6	Construction contingency (10%)	1,900,000
	Total construction cost	**23,500,000**
7	Engineering services (15%)	3,500,000
8	Property acquisition (10%)	2,400,000
9	Future investigations (4%)	940,000
	Total capital cost (excluding HST)	**30,340,000**

Table 4.73 Estimated Construction Costs for Y12-B

Low range (-50%) ($CAD 2023, excluding HST)	Estimated costs ($CAD 2023, excluding HST)	High range (+100%) ($CAD 2023, excluding HST)
52,800,000	105,600,000	211,200,000

Table 4.74 Estimated Cost for Y12-B 2nd Concession South Gravity Sewer

Item	Description	Amount ($CAD 2023)
1	General construction	9,200,000
2	Tunnel construction cost	54,000,000
3	Shaft construction cost	21,000,000
4	Facility cost (pump stations and air)	0
5	Design contingency (15%)	13,000,000
6	Construction contingency (10%)	8,400,000
	Total construction cost	**105,600,000**
7	Engineering services (15%)	16,000,000
8	Property acquisition (10%)	11,000,000
9	Future investigations (4%)	4,200,000
	Total capital cost (excluding HST)	**136,800,000**

Table 4.75 Estimated Construction Costs for Y9-B

Low range (-50%) ($CAD 2023, excluding HST)	Estimated costs ($CAD 2023, excluding HST)	High range (+100%) ($CAD 2023, excluding HST)
63,400,000	126,800,000	253,600,000

Table 4.76 Estimated Cost for Y9-B Newmarket East SPS Forcemains

Item	Description	Amount ($CAD 2023)
1	General construction	11,000,000
2	Tunnel construction cost	82,000,000
3	Shaft construction cost	8,800,000
4	Facility cost (pump stations and air)	0
5	Design contingency (15%)	15,000,000
6	Construction contingency (10%)	10,000,000
	Total construction cost	**126,800,000**
7	Engineering services (15%)	19,000,000
8	Property acquisition (10%)	13,000,000
9	Future investigations (4%)	5,100,000
	Total capital cost (excluding HST)	**163,900,000**

Table 4.77 Estimated Construction Costs for Y11-B

Low range (-50%) ($CAD 2023, excluding HST)	Estimated costs ($CAD 2023, excluding HST)	High range (+100%) ($CAD 2023, excluding HST)
6,200,000	12,390,000	24,780,000

Table 4.78 Estimated Cost for Y11-B Queensville East SPS Forcemains

Item	Description	Amount ($CAD 2023)
1	General construction	1,100,000
2	Tunnel construction cost	8,800,000
3	Shaft construction cost	0
4	Facility cost (pump stations and air)	0
5	Design contingency (15%)	1,500,000
6	Construction contingency (10%)	990,000
	Total construction cost	**12,390,000**
7	Engineering services (15%)	1,900,000
8	Property acquisition (10%)	1,200,000
9	Future investigations (4%)	500,000
	Total capital cost (excluding HST)	**15,990,000**

4.15 Implementation Plan

4.15.1 Field Investigations

The conceptual designs of the projects are based on a desktop review of available information. Field investigations are required prior to and during the design stage to ascertain factual data required for preliminary and detailed design, which could either confirm or modify the concept. Table 4.79 outlines the field investigations that are anticipated for the design phase of the project.

Table 4.79 Future Field Investigations

Field investigation	Comments
Topographic survey	– Topographic survey to collect surface features within the ROW and private properties. – Survey for preparation of r-plans.
Subsurface utility engineering (SUE)	– Quality Level B SUE within the ROW and private properties. – Quality Level A SUE as required.
Geotechnical investigations	– An initial drilling program is proposed to support setting the vertical alignment. – The first phase of drilling leverages boreholes at approximately 1-km spacing and the second phase will decrease the spacing based on final alignment. – Approximately 183 boreholes are expected for the projects within this chapter.
Hydrogeological investigations	– An initial drilling program is proposed to support setting the vertical alignment. – The first phase of drilling leverages boreholes at approximately 1-km spacing and the second phase will decrease the spacing based on final alignment. Investigations will include hydrogeological scope and soil management and excess soil testing. – Investigation scope may involve the following: Installation of nested monitoring wells, groundwater quality sampling, hydraulic testing (i.e., slug tests) to understand in-situ hydraulic conductivities and the local hydrogeological setting for dewatering estimate purposes and confirmation of use of private supply wells in within the study area.
Excess soils management	– Desktop and field investigations are required for compliance with O. Reg. 406/19. – Soil sampling will be completed in tandem with the geotechnical investigations.
Archaeological assessment	– Pending results of the Stage 1 Archaeological Assessment and shaft locations, a Stage 2 Archaeological Assessment, which would include field test pitting, may be required.
Natural environment studies	– An arborist inventory and field natural environment studies would be required based on shaft locations and private property requirements. – Geomorphology investigations will likely be required where there are potential impacts to surface water.
Phase 1 and Phase 2 ESA	– Phase 1 and Phase 2 ESAs may be required, depending on the final shaft locations and property requirements.

4.15.2 Permit and Approval Requirements

Table 4.80 summarizes the anticipated permits and assumed timeline for approval that will be considered as part of the scheduled assessment. The anticipated permits are based on a conceptual level of design/assessment and will need to be confirmed as part of both the detailed design and pre-construction stages.

In addition to the permits listed in Table 4.80 that may be required to allow the project to proceed to construction, there are several regulations, guidelines and policies that will need to be confirmed and addressed as part of the detailed design and pre-construction stages. Figure 4.36 shows the anticipated permits and approvals timeline.

All projects constructed in Ontario must follow O. Reg. 406/19: On-Site and Excess Soil Management, under the Environmental Protection Act, R.S.O. 1990, c. E.19. Reports and testing will be completed during detailed design.

Table 4.80 Permits and Timelines

Agency	Anticipated permit	Assumed approval timeline
Environment and Climate Change Canada (ECCC)	Species-at-Risk Act (SARA) permit	Minimum 90 days
Department of Fisheries and Ocean (DFO)	Project Authorization	2 to 5 months
Department of Fisheries and Ocean (DFO)	SARA permit	3 months
Department of Fisheries and Ocean (DFO)	In-Water Construction Authorization	1-2 months (If applicable)
Transport Canada	Railway Safety Act (RSA) – Crossing in accordance with TC E-10 Standards, Respecting Pipeline Crossings Under Railways (pursuant to RSA to verify conformance and requirements are met)	Minimum 60 days
Ministry of Environment, Conservation and Parks (MECP)	Environmental Compliance Approvals (Environmental Protection Act) – ECA, water and air Section 53 of the Ontario Water Resources Act for Sewage Works	Minimum 12 months
MECP	Permit to Take Water (Ontario Water Resources Act) – PTTW	6 to 12 months
MECP	Endangered Species Act (i.e., activity registry, overall benefit permit)	Minimum 12 months
Ministry of Citizenship and Multiculturalism (MCM)	Clearance letter (Ontario Heritage Act) for archaeological assessments	Minimum 12 weeks
Ministry of Transportation	Encroachment permit	Minimum 4 weeks
York Region	Dewatering activity discharge approval (Municipal Sewer Use By-Law No. 2011-56 and 2012-70))	To be determined
York Region	Traffic Management Plan	To be determined
York Region	Tree cutting permit (Forest Conservation By-Law No. TR – 0004-2005-036)	To be determined
York Region	Road occupancy permits	Minimum 1 week
Lake Simcoe Region Conservation Authority (LSRCA)	LSRCA permit for Development, Interference with Wetlands and Alterations to Shorelines and Watercourses (Conservation Authorities Act and O. Reg. 179/06179)	1 month
Local Area Municipalities	Sanitary – Storm sewer discharge permit	To be determined
Local Area Municipalities	Site Plan approval and building permit	To be determined (Dependent on municipality)
Local Area Municipalities	Road occupancy permits	Minimum 2 weeks
Local Area Municipalities	Noise by-laws	To be determined (Dependent on municipality)
Local Area Municipalities	Fill by-laws	To be determined (Dependent on municipality)
Utilities	Utility relocations	To be determined (Dependent on utility)
Metrolinx	Consent from Metrolinx	To be determined
Canadian National Railway	Consent from CNR	To be determined

Agency	Anticipated permit	Assumed approval timeline
Infrastructure Ontario	Approval under the Ministry of Infrastructure Public Work Class Environmental Assessment	To be determined

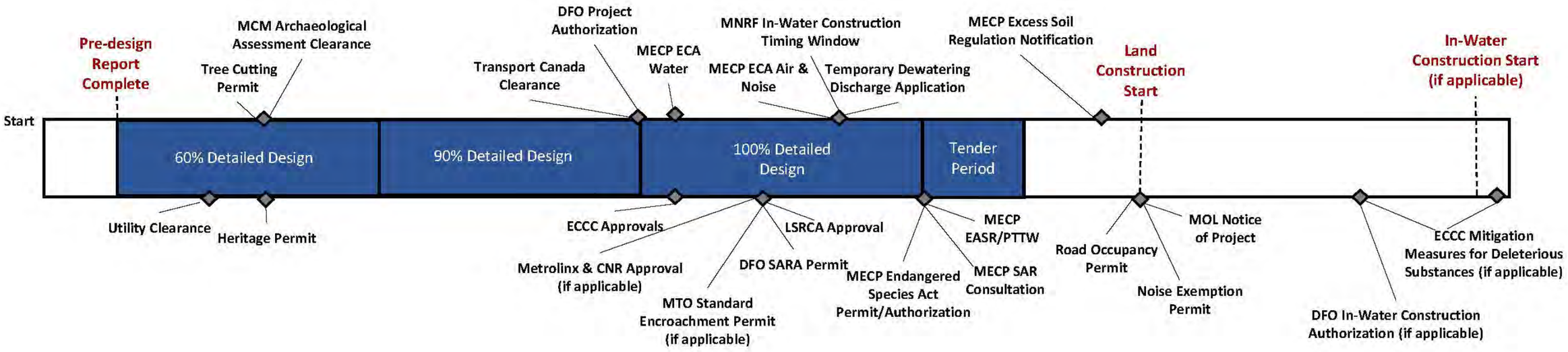


Figure 4.36 Typical Permits and Approvals Timeline

4.15.3 Project Delivery Schedule

The schedules for the individual implementation of the East Gwillimbury components are shown in Table 4.81 to Table 4.89. The schedules are based on a traditional design-bid-build delivery method. Preliminary design, including initial field investigations, starts in year one (1).

Property acquisition can take up to 18 months, should expropriation be required and should be a key consideration in development of the detailed project schedules during the design phase.

Procurement of design consultants would fall half a year ahead of commencing the planning and design phase.

The following assumptions were considered in the preparation of the schedules for the projects:

– A conservative “planning and design” process timeline, inclusive of the delivery in accordance with York Region’s Consultant Requirements Manual, was established as 18 months. Exact months required may be adjusted over the course of design development, depending on the findings of the field investigations.
– Construction start does not consider any early works, such as utility relocations. Where applicable, these works should be conducted in parallel with detailed design.
– Construction timeline is based on typical construction production rates for the means and methods described herein for linear sewer and vertical infrastructure, as well as similar projects recently completed in the area.
– The schedule assumes 5 days/week construction for most components of construction. Tunnelling works typically operate on a 6 days/week schedule. Durations are subject to change based on final construction methodology and contractor means and methods.
– Shaft construction timelines are subject to change based on selected construction methodology, to be determined in a future phase.
– Sewer construction timelines are subject to change based on selected construction methodology, to be determined in a future phase.
– There may be overlap between “construction” and “commission and operations”, although this is not shown in the below tables.

Individual timelines are provided for each East Gwillimbury projects in Table 4.81 to Table 4.89. The symbol X in Table 4.81 to Table 4.89 denotes the project stage duration.

Table 4.81 Proposed Schedule for Y6 2nd Concession SPS Upgrade

Description	Duration (years)	1	2	3	4	5	6
Planning and design	1.5	X	X				
Procurement	0.5		X				
Construction	2			X	X		
Commissioning and operations	2					X	X

Table 4.82 Proposed Schedule for Y7 Queensville West SPS Upgrade

Description	Duration (years)	1	2	3	4	5	6
Planning and design	1.5	X	X				
Procurement	0.5		X				
Construction	2			X	X		
Commissioning and operations	2					X	X

Table 4.83 Proposed Schedule for Y8 Holland Landing SPS Upgrade

Description	Duration (years)	1	2	3	4	5	6
Planning and design	1.5	X	X				
Procurement	0.5		X				
Construction	2			X	X		
Commissioning and operations	2					X	X

Table 4.84 Proposed Schedule for Y9-A Newmarket East SPS

Description	Duration (years)	1	2	3	4	5	6	7
Planning and design	1.5	X	X					
Procurement	0.5		X					
Construction	3			X	X	X		
Commissioning and operations	2						X	X

Table 4.85 Proposed Schedule for Y11-A Queensville East SPS

Description	Duration (years)	1	2	3	4	5	6	7
Planning and design	1.5	X	X					
Procurement	0.5		X					
Construction	3			X	X	X		
Commissioning and operations	2						X	X

Table 4.86 Proposed Schedule for Y12-A 2nd Concession North Gravity Sewer

Description	Duration (years)	1	2	3	4	5
Planning and design	1.5	X	X			
Procurement	0.5		X			
Construction	2			X	X	
Commissioning and operations	1					X

Table 4.87 Proposed Schedule for Y12-B 2nd Concession South Gravity Sewer

Description	Duration (years)	1	2	3	4	5
Planning and design	1.5	X	X			
Procurement	0.5		X			
Construction	2			X	X	
Commissioning and operations	1					X

Table 4.88 Proposed Schedule for Y9-B Newmarket East SPS Forcemain

Description	Duration (years)	1	2	3	4	5	6
Planning and design	2	X	X				
Procurement	0.5			X			
Construction	2.5				X	X	X
Commissioning and operations	1						X

Table 4.89 Proposed Schedule for Y11-B Queensville East SPS Forcemains

Description	Duration (years)	1	2	3	4	5
Planning and design	1.5	X	X			
Procurement	0.5		X			
Construction	2			X	X	
Commissioning and operations	1					X

York Region

DURHAM REGION

ghd.com

jacobs.com

GHD

Jacobs