Appendix VII

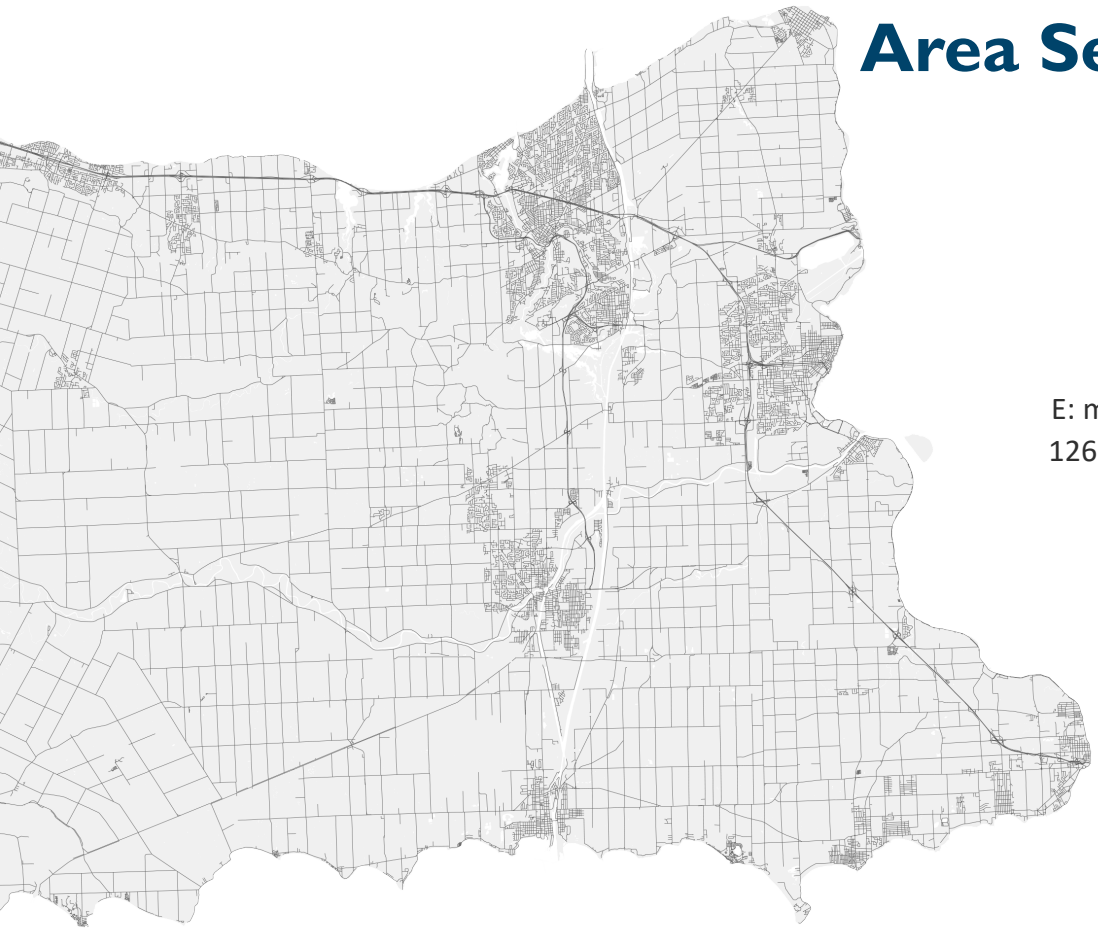
Niagara Region

Water, Wastewater and Stormwater Servicing

Glendale Secondary Plan Update

Area Servicing Plan

October 30, 2024



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October 30, 2024
GMBP File: 722013

The Planning Partnership
1255 Bay Street, Suite 500
Toronto, Ontario M5R 2A9

Attention: Donna Hinde BES, MLA, OALA, FCSLA
Project Manager / Partner

Re: Glendale Secondary Plan Update Area Servicing Plan

Dear Ms. Hinde,

GM BluePlan Engineering Limited is pleased to submit this Water, Wastewater and Stormwater Area Servicing Plan for Niagara Region's Glendale Secondary Plan Update. This draft is based on the preferred land use concept and builds on previous findings and recommendations presented to Niagara Region, the Town of Niagara-on-the-Lake, stakeholders, approval agencies, landowner groups, and the public, and comments received from Niagara Region.

If you have any questions, or require any additional information, please contact the undersigned.

Yours truly,

GM BLUEPLAN ENGINEERING LIMITED

Per: Matthew Fisher, P.Eng.
Project Manager

VERSION LOG

Version	Date	Author(s)	Description
1	November 6, 2023	Matthew Fisher	Draft for Review
2	March 28, 2024	Matthew Fisher	Draft with Revised Submission Package to Niagara Region
3	May 6, 2024	Matthew Fisher	Revised Draft for Submission for Stakeholders' Review
4	July 8, 2024	Matthew Fisher	Final Submission
5	August 28, 2024	Matthew Fisher	Revised Final with Updated Land Use Schedule
6	October 30, 2024	Matthew Fisher	Revised Final with Updated Land Use Schedule

EXECUTIVE SUMMARY

The Glendale Study Area is located at the southwest limit of the Town of Niagara-on-the-Lake (NOTL). The area has been identified as a strategic growth area for Niagara Region with anticipated development into an integrated mixed-use community with higher densities than currently exist.

GM BluePlan (GMBP) was retained to complete a study to review the water, wastewater, and stormwater Area Servicing Plan (ASP) in support of the Glendale Secondary Plan Update that is being led by The Planning Partnership (TPP).

Ultimately, GMBP completed a servicing review and needs assessment to inform the development of a preferred servicing strategy to provide a comprehensive and cost-effective infrastructure phasing plan to accommodate development in the area. The proposed servicing strategies include the following key recommendations:

- Existing water and wastewater infrastructure can generally service the Glendale Study Area to build-out.
- New water and wastewater servicing extensions and connections can be designed and constructed as part of the proposed development application works with confirmation of depth/location and capacity of existing infrastructure.
- Existing stormwater infrastructure can service the southwest portion of the Study Area.
- New storm sewers and stormwater management facilities for development sites in the northeast portion of the Study Area can be designed and constructed as part of the proposed development application works.
- Provisional storm sewers may be required in the northeast to accommodate future high-density development, and can be constructed as part of future road improvements / urbanization projects.

The Glendale Study Area is serviced by the Decew Water Treatment Plant (WTP) and a transmission network comprised of Regional, Local, and Private watermains. Existing water servicing within the Study Area can accommodate growth within the Secondary Plan area.

A new trunk watermain to Virgil Elevated Tank and new elevated tank in Virgil are recommended for 2032 and 2043, respectively to address the storage issues in broader Niagara-on-the-Lake, and will support growth within the Secondary Plan area to buildout.

Fire flow in the Study Area can be provided by the existing trunk watermains. Local mains can supply fire flows to new developments with looping of proposed watermains to be encouraged as part of future development applications detailed engineering design.

Wastewater in the existing Glendale area is conveyed by a network of Regional, Local and Private sewers that ultimately discharge to the Port Weller WWTP in St. Catharines. Existing wastewater servicing within the Study Area and downstream have sufficient capacity to accommodate wastewater flows associated with the projected growth to build-out.

The capacity of the existing sewer siphon used to convey flows in the Queenston Road trunk sewer across the Welland Canal has been identified for additional review. The siphon may require upgrades at Secondary Plan build-out (post-2051) to accommodate flows if densities exceed the minimum targets established in the Secondary Plan. Monitoring should be conducted, and the capacity of the siphon is to be reviewed as part of future Region-wide MSP updates.

The Modero Estates residential subdivision development located at the northeast limit of the Study Area proposed a pumped solution to ultimately convey wastewater flows to the south, discharging to the existing Local sewer. The remainder of the Study Area can be serviced by gravity sewers; development will require extensions of local sewers and gravity connections to the existing downstream network.

The Glendale Study Area is located within three subwatersheds, draining to Six Mile Creek, Eight Mile Creek, and Welland Canal. The section of the Study Area southwest of QEW is serviced by Regional and Local storm sewers and a stormwater pond. The area northeast of QEW is primarily serviced by roadside ditches.

A separate Subwatershed Study has also been completed to support the Secondary Plan. It was determined that the existing infrastructure in southeast of QEW has sufficient capacity to service this portion of the Study Area. In the northeast portion of the Study Area, conceptual locations for stormwater management (SWM) facilities were identified. Storm sewers and SWM facilities can be designed and constructed as part of the proposed development application works. Potential future development in the area of Townline Road and York Road may require new storm sewers and SWM facilities – which can be included as part of future road improvements projects in the area.

Existing water, wastewater and stormwater infrastructure within the Glendale Secondary Plan area can service initial development with the flexibility to accommodate water demands and sanitary and storm flows from future development. Growth in the Secondary Plan area and resultants demands and flows are to be tracked with updated input and projections for the area feeding into future Region-wide MSPs. This will ensure timing of planned area capital projects reflects the best available information – and future MSPs and associated Development Charges programs are updated to meet the evolving requirements of the Glendale Secondary Plan area.

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1.0 Introduction

GM BluePlan Engineering Limited (GMBP) has been retained to complete the water, wastewater, and stormwater Area Servicing Plan (ASP) in support of the Glendale Secondary Plan Update. GMBP are part of the project team led by The Planning Partnership (TPP) to develop the Secondary Plan Update for Niagara Region (Region).

The Water, Wastewater, and Stormwater ASP for the Glendale Secondary Plan Update identifies and evaluates water, wastewater, and stormwater servicing alternatives and recommends a servicing strategy for the preferred Secondary Plan land use option. The ASP will also utilize the background information, consultation, and input from the previously completed Glendale District Plan process.

The key objectives of this Water, Wastewater, and Stormwater ASP are to:

- Develop a comprehensive servicing strategy to meet the requirements of the Glendale Secondary Plan that can be cost-effectively constructed.
- Provide a defensible framework and implementation plan for servicing of the Glendale Secondary Plan Area.
- Provide justification and recommendations for timing and phasing of new Regional and Local infrastructure.
- Build on previous studies, including studies completed in support of the Glendale District Plan, to create a forward-looking document that aligns with infrastructure planning across Niagara Region.

1.1 Study Background

The Town of Niagara on the Lake's (Town, NOTL) original Glendale Secondary Plan was adopted in 2010 by the Town and approved in 2011 by the Region. The original Secondary Plan vision has not been realized and the policy framework is required to be updated based on the vision and key direction of the Region's Glendale District Plan. Through this project, the Region and Town have refined the Secondary Plan based on updated technical studies, including the Water, Wastewater and Stormwater Area Servicing Plan.

1.1.1 Study Area

The Glendale Secondary Plan Update study area is approximately 380 hectares (ha), generally bounded by Queenston Road to the north, Concession 7 Road to the east, the Niagara Escarpment to the south and Homer Road to the west. The Study Area is located entirely within the Region's Glendale District Plan boundaries as the Secondary Plan will focus solely on the urban area of Glendale. The Queen Elizabeth Way (QEW) 400-series highway runs through the Study Area with an interchange at Glendale Avenue providing highway access to Glendale. The Glendale Avenue interchange is currently under construction. The Study Area is shown in Figure 1-1.

Figure 1-1: Glendale Secondary Plan Update Study Area

1.2 Approach

The water, wastewater, and stormwater servicing analysis builds on the Infrastructure Strategies identified in the Glendale District Plan. The Servicing Analysis includes the development and evaluation of servicing strategies, as well as the selection of a preferred servicing strategy to meet the needs of planned development, which aligns with the Vision and Community Design Principles established for the Study Area.

The preferred water, wastewater, and stormwater strategies for the area will provide the flexibility to be effectively incorporated into the Town and Region's current and ongoing master servicing plans (MSP).

Extensive collaboration with the Town and Region have been undertaken to understand planning and timing of water infrastructure to supply the Study Area as well as downstream infrastructure to receive wastewater flows from the Study Area.

The preferred servicing strategy is to provide a comprehensive and cost-effective infrastructure phasing plan to service the initial development through to build-out with a focus on meeting desired development timing and supporting the transition to design as part of future development applications.

1.3 Area Servicing Plan Terms of Reference

The ASP Report documents the comprehensive process undertaken to develop and recommend a proposed water and wastewater servicing strategy for the Glendale Secondary Plan Study Area. This Report is organized as follows:

- **Section 1 – Introduction**
  An introduction to the study, description of study area, study purpose and objectives, and the report outline.

- **Section 2 – Background**
  Provides the background plans, related studies, legislative and policy planning context, water and wastewater servicing principles and policies relevant to the Water, Wastewater, and Stormwater ASP being completed in support of the Glendale Secondary Plan Update.

- **Section 3 – Land Use and Planning Projections**
  Outlines the existing land use and environmental conditions, future planned land use, and population and employment growth forecasts for the Secondary Plan area.

- **Section 4 – Existing Conditions**
  Includes the baseline description of the existing water, wastewater, and stormwater systems, including water supply, wastewater and stormwater catchments and outlets, and available infrastructure capacities.

- **Section 5 – Service Policy Review**
  Identifies the applicable water, wastewater, and stormwater service policies for the Secondary Plan Study Area and includes an approach for calculation of the water demand, wastewater flows, and stormwater flows.

- **Section 6 – Servicing Review and Needs Assessment**
  Includes a review of the infrastructure needs for the area, including relevant constraints and the potential to reach the capacity of the servicing infrastructure prior to the build-out of the Secondary Plan area.

- **Section 7 – Proposed Servicing Strategy**
  Documents the proposed water, wastewater, and stormwater servicing strategy to support the ultimate build-out of the Secondary Plan Area. The servicing strategy includes recommended phasing to meet development timing and cost estimates of capital projects to service the Glendale Secondary Plan Area which take into consideration the system-wide needs.

- **Section 8 - Conclusion**
  Summarizes the servicing strategy recommended for the study area and lists the required capital upgrades and improvements.

2.0 Background

2.1 Relevant Documents and Studies

Several studies have been previously completed to detail planned growth within the Glendale Secondary Plan area, which are summarized below. The following key studies have also been referenced as part of the development of the water and wastewater servicing strategies for the Glendale Secondary Plan Update. Reference to the updated plans have been made to ensure the Secondary Plan aligns with the broader servicing strategy through implementation. The servicing strategies will be referenced to existing approved documents with identification of any changes as part of the ongoing studies.

2.1.1 Glendale District Plan

The Glendale District Plan was developed to set out a high-level framework for the land use planning, design, and development of the Glendale community. The District Plan was established for the 700 ha. Study Area, which is generally bound by Queenston Road to the north, the Niagara Escarpment to the south, Concession 7 Road to the east, and Welland Canal to the west. Ultimately the District Plan will be implemented through an amendment to the Niagara Region Official Plan, a review and update of the Glendale Secondary Plan, and continued Planning Act Approval application approvals by the Town and Region. The Glendale District Plan was endorsed by Regional Council on September 17, 2020. Further to this endorsement, the Region has approved Regional Official Plan Amendment 17 to implement the vision and policy direction of the District Plan in the Region's Official Plan.

The infrastructure review, capacity, and upgrades identified a build-out of approximately 21,500 population equivalent for the Glendale plan area and recommended that available servicing capacity be further investigated through detailed technical work and the creation of a phasing plan through the Secondary Plan Update. The District Plan also recommended consideration of a Community Benefit Charge Strategy and an area-specific development charge (DC) by-law by the Town.

2.1.2 Glendale Secondary Plan (2010)

The initial Glendale Secondary Plan was completed in 2010. The 2010 Secondary Plan noted that the Region had identified the potential for servicing issues as Glendale continues to develop, particularly related to sewer capacity. The Secondary Plan called for the initiation of a servicing study to identify problems and solutions, including consideration for a range of development scenarios, development of a preferred servicing strategy, and the costing and phasing of priority capital projects to be coordinated with recommended road improvements.

The sewer strategy was recommended to be coupled with an updated stormwater management strategy including design guidelines and implementation strategies to ensure future stormwater ponds were consolidated, located, and designed to maximize efficiencies and create open space features that enhanced development.

2.1.3 Niagara Region Water and Wastewater Master Plan Update

In 2016, Niagara Region completed a Water and Wastewater MSP that outlined the anticipated infrastructure needs to the year 2041, while maintaining levels of service. In 2021, the Region undertook a MSP Update to the plan to incorporate updated knowledge and current priorities to ensure the Region can accommodate further growth expected by 2051 and beyond, as per the amended Growth Plan for the Greater Golden Horseshoe.

The 2021 Study developed a comprehensive plan that incorporated all facets of the management, expansion, and funding of the water and wastewater systems for the urban service areas of the Region through to the year 2051 with consideration for post-2051 build-out.

Development of water and wastewater principles and policies are integral to providing guidelines and direction to the MSP Update process, as well as to the identification and evaluation of servicing strategies.

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

In support of the 2021 Master Plan Update, the Region updated their water and wastewater models to incorporate recent trends and plan for growth to the 2051 planning horizon.

The Region's updated water model includes:

- An "all-pipe" network including all Region and Local Area Municipality (LAM) owned watermains and facilities;
- Existing demands based on water billing records and proposed demands based on the Region's Municipal Comprehensive Review (MCR) planned growth scenarios to 2051; and,
- Appropriate controls for all facilities to allow for extended period simulation system modelling under a greater range of demand conditions.

The water model has been updated to reflect the current water system including recent expansions, as well as new, updated, or decommissioned facilities (including capacities and controls), along with the proposed growth scenarios to 2051 and the associated capital projects that were recommended.

The Region's updated wastewater model includes:

- All existing and planned Regional facilities and downstream sewer networks (including all Region and LAM-owned sewer mains greater than 300mm diameter) up to the headworks of the wastewater treatment plants (WWTP);
- Existing domestic flows based on water billing records;
- Proposed demands based on Region Municipal Comprehensive Review (MCR) planned growth scenarios to 2051; and
- Calibrated wet weather flow scenarios.

Similarly, the wastewater model has been updated to reflect the current wastewater system including recent expansions, as well as new, updated, or decommissioned facilities (including capacities and controls), along with the proposed growth scenarios to 2051 and the associated capital projects that were recommended.

2.1.4 Town of Niagara on the Lake Pollution Prevention Control Plan

GMBP has been retained by the Town of Niagara-on-the-Lake (Town, NOTL) to complete the Town's Pollution Prevention Control Plan (PPCP), including hydraulic model update and analysis of existing and future conditions.

The PPCP will focus primarily on quantifying system capacity, identifying system hydraulic deficiencies, areas/systems with surplus capacity, quantifying system overflows, identifying areas of high Inflow & Infiltration (I&I), and MECP F-5-5 / F-5-1 analysis. The PPCP builds on the Town's existing 2012 Pollution Control Plan, including updates on implementation of approved recommendations, source validation, and quantification of impacts on the system and remaining/existing areas of concern.
The Town's wastewater model will be updated to reflect the current collection system and wastewater facilities, with SCADA and water billing data used to update existing demand conditions. A comprehensive flow-monitoring program is being undertaken to support calibration of the wastewater model update. The updated model will be utilized to develop the recommended capital program based on the Town's planned growth.

2.2 Development Applications Information

Current information on development applications has been provided by the Region and Town for review and incorporation into the Area Servicing Plan. Development applications' proposed water demands, wastewater flow, stormwater flows, and stormwater management facilities will be considered as part of the development of the ASP.

Development application information will be essential to informing anticipated phasing of development within the Study Area and required phasing of water and wastewater infrastructure to effectively meet the build-out of the area.

3.0 Land Use and Planning Projections

High-level land use and planning projections for the Study Area are available as part of the Region's MCR planned growth and have been utilized to inform the ongoing Region Water and Wastewater MSP Update.

As noted in Section 2.1.2, the Glendale District Plan noted that the available capacity of the sanitary sewer system servicing the Glendale plan area (including Walker Industries and Airport Road areas) correlates to a build-out of approximately 21,500 population equivalents (including residential and employment).

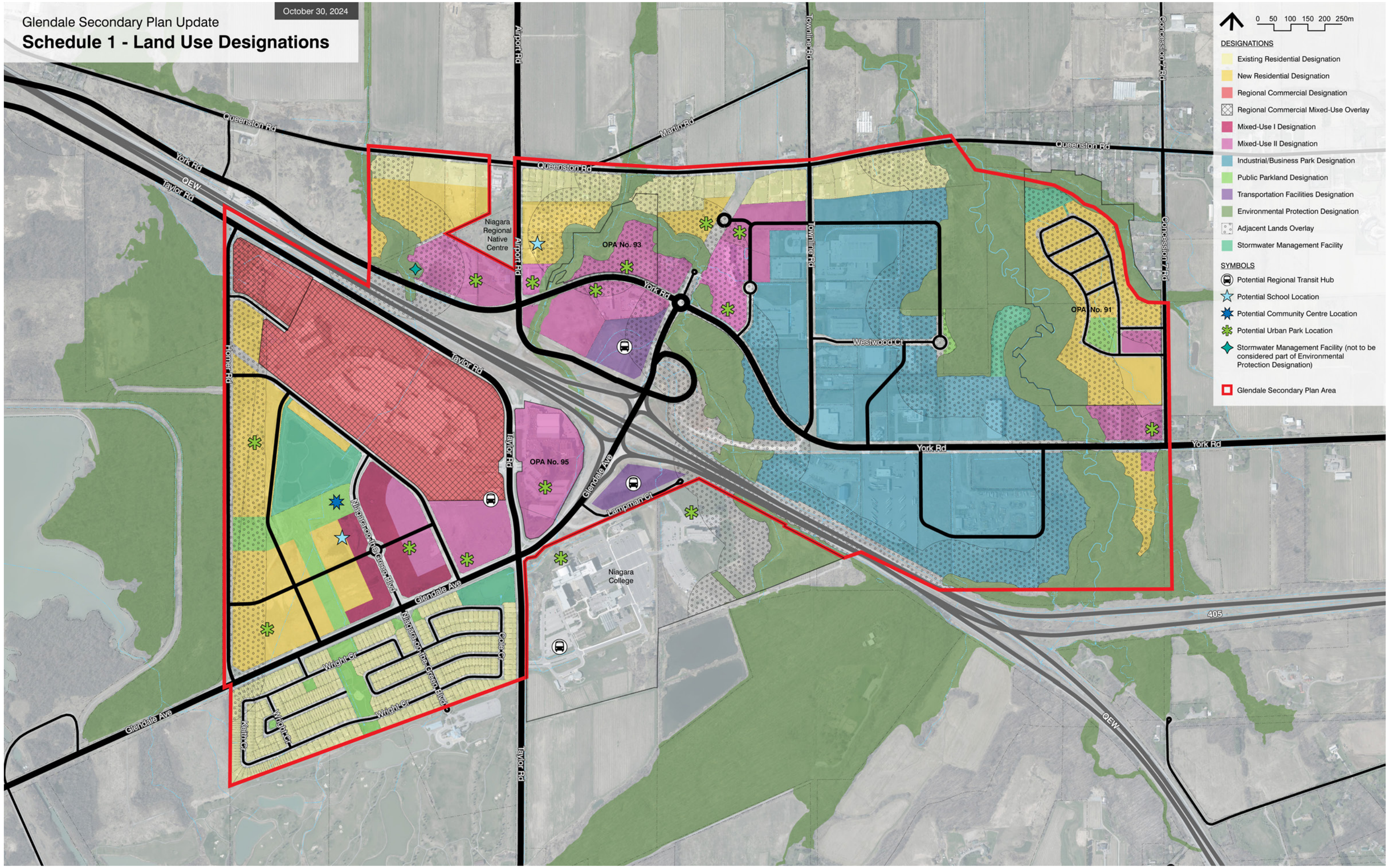
3.1 Preferred Land Use Concept

The preferred land use concept has been developed by The Planning Partnership through extensive consultation with the Region, Town, and key stakeholders, as documented in the associated TPP report. The preferred land use concept is shown in Figure 3-1.

October 30, 2024

Glendale Secondary Plan Update

Schedule 1 - Land Use Designations



The preferred land use considers two density scenarios:

- Scenario 1 – Higher Density Assumptions; and,
- Scenario 2 – Lower Density Assumptions

The Glendale Secondary Plan Area is anticipated to evolve beyond the time horizon of 2051 into an integrated mixed-use community, with higher densities than exist today. As noted in the Secondary Plan document, this ongoing evolution is anticipated to require an extended period of time to fully achieve. Overall, the Glendale Secondary Plan area is planned to accommodate the estimated population and employment yields as identified in Table 3-1.

Table 3-1: Estimated Population and Employment Yields for Glendale Secondary Plan Area

Scenario	Residential Population	Employment	Population + Jobs	Area	PPJ/ha
2051 Lower Density Assumptions	9,740	7,275	17,015	380 Ha.	~60 PPJ/ha
2051 Higher Density Assumptions	13,170	9,200	22,320		~80 PPJ/ha

As noted in the Secondary Plan, the population and employment projections included in this Plan are not to be considered as maximum build-out populations, or limitations on development, but rather minimum growth targets to be achieved to the year 2051. The Area Servicing Plan considers this and is based on the range of development – with infrastructure upgrade triggers that can be considered for increased (or decreased) densities/development.

The Region's 2021 MSP Update included growth of 19,146 persons between 2021 and 2051 for the entire treatment plant catchment. As part of the analysis in support of the Secondary Plan, the updated densities were considered for additional infrastructure upgrade requirements.

It is recommended that the Glendale Secondary Plan continue to be identified as a strategic growth area for future Region-wide MSP updates, with consideration for increased densities. This recommendation is based on continued monitoring of the required timing for planned infrastructure upgrades and should consider additional infrastructure upgrades that may be required to meet development/growth beyond the minimum growth targets identified in the Secondary Plan.

4.0 Existing Conditions

4.1 Water

The Study Area is located within the Decew Water Treatment Plant (WTP) service area. The Decew WTP is located in St. Catharines and supplies NOTL through the St. Catharines transmission system. The Glendale Secondary Plan Study Area is located in Region Pressure Zones 161, 168, and 180. As noted in the 2016 MSP, the existing neighbourhoods within the Study Area experience a wide range in water pressure (50 to 100 psi) as a function of the varying elevation in the Study Area. There are existing pressure regulation valves installed on the Region transmission main within the area.

There is an existing distribution network throughout the Study Area. The existing water system for the Study Area is shown in Figure 4-1.

4.2 Wastewater

Flows from the Secondary Plan area will be received at the Port Weller Wastewater Treatment Plant (WWTP) located in St. Catharines via a Regional trunk sewer on Queenston Road that conveys flows across the Welland Canal and continues north (ultimately discharging to the Port Weller WWTP). There are no downstream sewage pumping stations (SPS) to the Port Weller WWTP, therefore sewers within the Glendale Secondary Plan drain entirely by gravity.

The existing sewers in the Study Area are shown in Figure 4-2.

4.3 Stormwater

The majority of the Study Area (east of Airport Road/Taylor Road) is located in the NOTL Six Mile Creek Subwatershed, with the area west of Airport Road/Taylor Road located in NOTL Eight Mile Creek Subwatershed; both of which drain to the noted creeks. A small portion along the west limit of the Study Area drains to the Welland Canal and is located in the Beaver Dam Schiner's Creek (BDSC) Welland Canal North Subwatershed. The Study Area is located within the jurisdiction of the Niagara Peninsula Conservation Authority (NPCA).

The section of the Secondary Plan Area located southwest of the QEW, and generally located within the Eight Mile Creek tributary, is generally well serviced by existing storm sewers, and a large pond stormwater management facility located west of Niagara on the Green Boulevard.

Northeast of the QEW, stormwater servicing is primarily by roadside ditch to various outlets to tributaries to Six Mile Creek. Various current development applications for the area propose on-site stormwater management facilities with quantity and quality control to service the individual development.

Existing storm sewers in the Study Area are shown in Figure 4-3.

Niagara Region

Glendale Secondary Plan Update
Water, Wastewater and Stormwater Area Servicing Plan

Existing Water Infrastructure

- Pressure Regulation Valve
- Region Mains
- Local Mains
- Private

Water Pressure Zones (HGL)

- DeCew Falls WTP-161
- DeCew Falls WTP-168
- DeCew Falls WTP-180

Other Features

- Glendale Secondary Plan Area
- Municipal Boundaries
- Urban Area Boundary

Figure 4-1
Existing Water System

Baseline System and Understanding

BluePlan

August 2024
12013-001
Projection EPSG 26917

Niagara Region

Glendale Secondary Plan Update
Water, Wastewater and Stormwater Area Servicing Plan

Existing Wastewater Infrastructure

- Sanitary Force Main
- Regional Gravity Main
- Local Gravity Main
- Private

Sewer Catchment

- Port Weller WWTP

Other Features

- Glendale Secondary Plan Area
- Municipal Boundaries
- Urban Area Boundary

Figure 4-2
Existing Wastewater System

Baseline System and Understanding

BluePlan Engineering

August 2024
722013-002
Projection EPSG:26917

Niagara Region

Glendale Secondary Plan Update
Water, Wastewater and Stormwater Area Servicing Plan

Existing Stormwater Infrastructure

Regional
- Catchbasins
- Maintenance Holes
- Stormwater Main
- Stormwater Lead

Municipal
- Catchbasins
- Maintenance Holes
- Stormwater Pond
- Stormwater Main
- Stormwater Lead

Other Features
- Glendale Secondary Plan Area
- Municipal Boundaries
- Urban Area Boundary
- Watercourse

Figure 4-3
Existing Regional and Municipal Stormwater System

Baseline System and Understanding

BluePlan

August 2024
122013-004
Projection:EPSG 26917

5.0 Service Policy Review

Development of the water and wastewater policies has been based on existing documentation and related sources, including primarily, the ongoing Region Water and Wastewater MSP Update. Water and wastewater policy was reviewed and updated as part of the ongoing MSP and is recommended to be carried forward for use as part of the ASP.

The objectives of the MSP Update Principles and Policy document include:

- Providing direction for planning and identifying water and wastewater servicing issues that may impact growth options;
- Providing direction for normal operation and maintenance of the water and wastewater systems;
- Providing direction for development and evaluation of servicing strategies for the Water and Wastewater MSP Update;
- Ensuring appropriate design and costing criteria are utilized for developing and evaluating servicing strategies for the Water and Wastewater Master Plan Update;
- Setting policies that are reasonably implemented; and,
- Setting policies that are robust and sustainable.

Policy is the overall guiding principle. Criteria is the practical implementation of policy.

5.1 Water

Water service policy for the Study Area will be based on the criteria developed as part of the Region's ongoing Water and Wastewater Master Plan Update. These criteria are included in the current Regional water and wastewater models which will be used for strategy evaluation purposes. Water service policy for the Study Area includes:

1. **Water Demand Projection Methodology**
    - Utilize starting point methodology;
    - Starting point based on local billing meter records from last 3 years of data; and
    - Growth demands applied to starting point using design criteria.

2. **Water System Criteria**
    - Maintain water system between 40 – 100 psi;
    - Sizing water supply, transmission, and storage facilities for maximum day demand;
    - Sizing water distribution system for peak hour flows and maximum day plus fire flow demands;
    - Plant and facility planning process triggered at 80% capacity; and
    - Plant and facility expansion process complete before 90% capacity achieved.

3. **Water Consumption Criteria for Growth (from 2021 Water and Wastewater MSP Update)**
    - Residential criteria 240 L/cap/day;
    - Employment criteria 270 L/emp/day;
    - Maximum day factor based on rolling average from last 5 years of data; and
    - Peak hour factor (residential and employment) is 1.5 times maximum day factor for MSPU purposes.
        - Local area municipalities (LAM) should use a maximum day factor of 2 and a peak hour demand factor of 3 in order to provide protection for local infrastructure sizing in the development review process.

4. **Fire Flow Criteria**
    - Regional transmission mains to provide 250 L/s fire flow at 30 psi residual pressure; and
    - Fire flow and duration for system storage calculation is based on Ministry of Environment, Conservation and Parks (MECP) recommendations and methodology.

Region and Town Engineering Design Guidelines will be referenced for the conceptual design of water servicing.

5.2 Wastewater

Wastewater service policy for the Study Area will be based on the criteria developed as part of the Region's ongoing Water and Wastewater Master Plan Update which are included in the Region's current water and wastewater models. Region and Town Engineering Design Guidelines will also be referenced for the conceptual design of wastewater servicing. Wastewater criteria developed in support of the Region MSP Update and wastewater model analysis includes:

1. **Wastewater Demand Projection Methodology**
    - Utilize starting point methodology;
    - Starting point based on local billing meter records from last 3 years of data; and
    - Growth flows applied to starting point using design criteria.

2. **Wastewater System Criteria**
    - Sizing treatment facilities for average day flows;
    - Sizing of trunk sewer, pumping and collection system for peak wet weather flows;
    - Firm capacity based on largest pump out of service;
    - Plant and facility planning process triggered at 80% capacity;
    - Plant and facility expansion process complete before 90% capacity achieved;
    - System triggers as follows:

- Review if sewer flows are greater than 50% of pipe full (by depth) under peak dry weather flow;
- Review if sewer flows are greater than 90% of pipe full (by depth) under peak wet weather flow;
- Review if pumping station flows based on 2 times peak dry weather flows are greater than firm capacity;
- Review if peak wet weather flows are greater than sewer capacity and pumping station firm capacity;
- Review if sewer system hydraulic grade line is within 1.8m depth from surface under peak wet weather flow;
- Plan the system based on a 2-year design storm
- Under the 2-year design storm, allow for a maximum extraneous flow contribution from local catchment areas;

- Forcemain velocities should be maintained between 1 m/s to 2 m/s.

3. **Wastewater Criteria for Growth (from 2021 Water and Wastewater MSP Update)**
   - Residential criteria 255 L/cap/day;
   - Employment criteria 310 L/emp/day;
   - Peaking factor based on Harmon formula with values between 2.0 and 4.0 with consideration to the catchment area performance; and
   - Utilize extraneous flow rates of 0.286 L/s/ha as the wet weather level of service for triggering and sizing Regional wastewater infrastructure.

Region and Town Engineering Design Guidelines will be referenced for the conceptual design of wastewater servicing.

5.2.1 Sewage Pumping Stations and Forcemains Policy Proposed Policy Amendments

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

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

Region policy maintains that:

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

5.3 Stormwater

5.3.1 Quantity

Phase 2 of the Secondary Plan Subwatershed Study (SWS) has been completed and includes hydrologic analyses to establish stormwater management criteria for future development within the Study Area. Sizing of conceptual stormwater management (SWM) facilities was completed to determine the required level of quantity control for the area, required on-site quantity controls, and required conveyance (storm sewers) measures.

The SWS work confirmed that SWM facilities providing quantity controls along the receiving watercourses can maintain the Town's standard stormwater quantity control requirement of post-development to pre-development peak flow control for design storms ranging from 1 in 2-year to 1 in 100-year.

The SWS also noted that over-control at the watercourses will be provided for more frequent storm events; which may provide opportunities to encourage the incorporation of Low Impact Development (LID) Best Management Practices (BMP) at the individual property level.

5.3.2 Quality

Phase 2 of the Subwatershed Study notes:

- The future development within the Glendale Secondary Plan area is anticipated to result in increased mass loadings of various water quality contaminants, including heavy metals, nutrients, and thermal enrichment. The stormwater management system within future development areas will be required to address Provincial standards for stormwater quality control to an Enhanced standard of treatment by adopting a treatment train approach per Provincial guidance, as well as measures to mitigate thermal enrichment of storm runoff.

The specific quality control measures to be used to achieve this criteria will need to be determined at the development application stage, as the site-specific details will need to be reviewed with respect to potential constraints, development form, site design, infrastructure connections, etc. However, there are various technologies available which can be designed to achieve a treatment train approach to SWM and achieve the required water quality and thermal mitigation measures, thereby providing flexibility at the future site plan design stage.

5.4 Infrastructure Oversizing

All new water, wastewater, and stormwater infrastructure proposed in support of development applications should be considered compared to the potential for the higher densities proposed as part of the Secondary Plan. There are recent examples of sanitary sewers installed across Niagara Region that have been required to be upgraded in advance of the end of life-cycle because they were sized too small to convey flows from new, higher density development. Proposed local sanitary sewer, sized only to convey flows from low-density development, may not have additional capacity to convey flows from high-density land use that may be approved for development in the future. There is the potential for extensive sections of recently installed sanitary sewer to require replacement to support the new development, which may be cost prohibitive as it will require removal of the existing sanitary sewer and installation within an existing street / right-of-way. Additionally, funding for the upgrade costs will need to be considered as there is the possibility that the first high-density development that triggers the need for additional capacity to be responsible for these costs. The removal of newly installed (but undersized) infrastructure does not represent best management practices for Town and Region assets.

5.4.1 Water

Local water infrastructure can be difficult to oversize from an operational perspective as it can result in water quality (water age) issues within infrastructure prior to the higher-density development coming online. This issue can become a permanent issue throughout the lifecycle of the watermain if the higher density development is not realized. Opportunities to loop watermain to support available fire flow is key to achieving best management of local water infrastructure across the Secondary Plan Area. Proposed watermain looping through developments will:

- Increase available fire flow (provision of flow from multiple connections to Region watermain);
- Provide system redundancy (maintenance of a secondary feed from the Region watermain in case of a watermain break); and,
- Improve water quality (mitigating water age concerns within single-feed “dead end” watermains).

5.4.2 Wastewater

Local sanitary infrastructure can be effectively over-sized to service an ultimate build-out population which will mitigate future upgrade requirements if higher-density development is achieved. Sanitary sewers can be oversized at minimal additional cost which is often primarily the additional material cost for upgraded PVC sewers as depth and construction trench dimensions for oversized sewers are typically similar. Installing sewers sized for ultimate build-out reduces the risk of future removal and upgrade to service higher density development flows. It is important to ensure that the design of oversized sewers maintains minimum cleansing velocities (0.6 m/s under full flow conditions).

5.4.3 Stormwater

Storm sewers installed within the right-of-way are designed to accommodate stormwater flows from development sites that are based on quantity controls of post-development to pre-development peak flow control. This does not typically change for development type and additional quantity controls (as well as stormwater quality controls) can be accommodated as part of site design. Oversizing of storm sewers for future higher-density development is not required or recommended. Increased conveyance capacity from oversized storm sewers can also negatively impact the downstream / end-of-pipe facilities under more intense storm events.

5.4.4 Development Charges

5.4.4.1 Regional

Updated growth projections for the Glendale Secondary Plan may have impacts on the Region's existing DC Program, as the higher growth numbers may trigger requirements for more significant water and wastewater upgrades and/or impact the required timing for planned upgrades. The required infrastructure upgrades compared to the Region's MSP Update Capital Program is detailed further in Section 6.0 - Servicing Review and Needs Assessment and Section 7.0 - Proposed Servicing Strategy, with recommendations on impacts to future DC Programs.

5.4.4.2 Local

The Glendale Secondary Plan identifies that to implement the required growth-related costs anticipated for the long-term development of the Secondary Plan Area, the Town may prepare a background study and enact an area-specific development charge by-law under the DC Act. Additional costs to accommodate strategic looping of local watermains and oversizing of sanitary sewers should be considered as part of required growth-related costs anticipated for the long-term development of the Secondary Plan Area. If an area-specific DC Background Study is to be completed, then the water, wastewater, and stormwater infrastructure costs associated with the long-term development of the Secondary Plan Area are to be included within the Study.

6.0 Servicing Review and Needs Assessment

6.1 Water

As outlined in Niagara Region's 2016 Master Servicing Plan (MSP) Update, the Decew WTP has surplus capacity within the 2041 planning horizon and treatment capacity is not anticipated to constrain development of the Secondary Plan area.

The Study Area experiences a wide range in water pressure (50 to 100 psi) as a function of the varying elevation across the Secondary Plan area.

In isolation, the NOTL system does not have sufficient storage capacity and relies on surplus conveyance capacity to support a portion of the storage deficiencies through transfers from the surplus storage from St. Catharines and Thorold. Increased intensification throughout St. Catharines will continue to limit the available surplus capacity to supplement peak flow transfers to the Niagara-on-the-Lake system.

New storage within NOTL and/or an increase from St. Catharines and Thorold (and/or Niagara Falls) is required to address future NOTL storage needs to 2041. Future MSP updates will incorporate the updated planning numbers for the Glendale Secondary Plan area.

The existing Region trunk watermain system across the Secondary Plan area can provide the Region's specified minimum fire flow requirement of 250 L/s at a minimum system pressure of 30 psi. Local distribution watermain within the area can supply sufficient available fire flow to proposed development with appropriate watermain looping.

Single watermain feeds to proposed developments with backflow prevention devices (typically as part of metered chambers and private watermains to condominiums) are to be avoided, where possible, to ensure the supply of sufficient available fire flow to meet long-term development densities within the Secondary Plan Area.

6.1.1 Planned System Improvements

A new trunk 600mm diameter feedermain from South NOTL to the Virgil Elevated Tank with a new pressure reducing valve (PRV) in NOTL is recommended as part of the Region's MP capital program to address the storage issues that will result from growth within the NOTL system (combined with growth within the "upstream" St. Catharines system) to 2032.

Additionally, a new elevated tank in Virgil to support additional build-out growth within NOTL is anticipated to be required to 2042.

The capital program projects recommended by the Region are summarized in Table 6-1.

Table 6-1: Region Planned System Improvements Impacting Glendale Secondary Plan Area

Master Plan ID	Name	Size / Capacity	Year in Service	Class EA Schedule	Estimated Cost (2022$)
W-M-008	Trunk main from South Niagara-on-the-Lake to Virgil Elevated Tank	600 mm	2032 - 2041	A+	$15.0M
W-S-008	New ET in Virgil to support 2051 and buildout growth	7.5 ML	2042 - 2051	B	$17.5M
Total					**$32.5M**

As part of the future MSP Updates and DC Background Study Updates, the required timing of both projects is to be considered incorporating the updated planning numbers for the Glendale Secondary Plan Area.

6.2 Wastewater

6.2.1 Treatment

The Region's 2021 MSP Update has identified that the Port Weller WWTP has surplus capacity within the 2041 planning horizon; and treatment capacity is not anticipated to constrain development within the Secondary Plan area.

6.2.2 Planned System Improvements

The existing downstream St. Catharines trunk sewer infrastructure has sufficient capacity to support future design peak wet weather flows and development within the Study Area will be serviced through existing or new local sewers, outletting to the existing trunk sewer.

6.2.3 Existing Siphon Under Welland Canal (Downstream Queenston Road Trunk Sewer)

The MP Update also identifies that the existing downstream St. Catharines trunk sewer infrastructure has sufficient capacity to support future design peak wet weather flows. It is not anticipated that downstream sewer capacity will be a constraint to development within the Study Area. As noted in Section 3.0, the Region's MSP Update is based on planning projections developed as part of the Region's MCR. As part of previous servicing work supporting the District Plan, the existing downstream sewer siphon was identified for further capacity review (the District Plan considered the planned ultimate buildout population of 21,500 population equivalents). In 2018, Region Water and Wastewater Planning identified the hydraulic capacity range for the sanitary sewer system servicing the Glendale Secondary Plan area, as well as Walker Industries and the Airport Road SPS collected through the Siphon, inclusive of the Walker Landfill maximum agreed flow rate, can be considered to be at 300 L/s. Region Infrastructure Planning staff noted that this flow generation correlates to a build out of 21,714 population equivalents including residential and employment, existing and future.

Capacity of the existing siphon is to be reviewed as part of future MSP updates, incorporating updated and planned growth for the Glendale Secondary Plan Update.

6.2.4 Existing Niagara-on-the-Lake 450mm Diameter Sewer Crossing of QEW

Wastewater flows from growth areas southwest of the QEW within the Secondary Plan can continue to be conveyed to the Niagara-on-the-Lake sanitary sewers that ultimately discharge under the QEW, north of Taylor Road, via a Town-owned 450mm diameter sewer and outlet into the Region's 600mm diameter sewer that conveys flows north along Airport Road. The existing 450mm diameter sewer crossing has the capacity to convey flows to build-out and is anticipated to reach 70% full capacity at build-out. For the proposed development within the southwest portion of the Secondary Plan area that exceeds the minimum growth targets established as part of the Secondary Plan, consideration should be given to impacts on wastewater flows to the existing sewer crossing the QEW.

6.2.5 Pumped Solution for Modero Estates Development Lands

The recent development application for the Modero Estates Development (a 384-unit residential subdivision development located west of Concession 7 and south of Queenston Road, and east of Six Mile Creek) has proposed a pumping solution that complies with the Region's Sewage Pumping Stations and Forcemains Policy. Proposed townhomes at the north limit of the development convey flows to individual eOne sanitary pumping station units that pump sewage via a common forcemain to a gravity sewer that ultimately conveys flows to the south and discharges into the existing 375mm dia. Town sewer. The development application is currently under review by the Town.

Under the evolving land use plan for the Secondary Plan Area, it is unlikely that a pumping station would meet the Region policy criteria for this small area of development. As part of the Area Servicing Plan, it is assumed that the current proposed pumped solution will be approved, constructed, and maintained to the 2051 build-out timeline.

The remainder of the Secondary Plan Area can be serviced by proposed gravity sewers, with gravity connections to the existing downstream sanitary sewer network.

6.3 Stormwater

A separate Subwatershed Study is being completed in support of the Glendale Secondary Plan. Phase 1 (Subwatershed Characterization and Integration) and Phase 2 (Impact Assessment) of the Subwatershed Study have been completed. Phase 3 (Management, Implementation and Monitoring Plan) is being finalized.

The Phase 2 Report identified conceptual locations for stormwater management facilities. The existing storm sewer network for the area southwest of the QEW is sufficient to service the area. Northeast of the QEW, current development applications have proposed site-specific stormwater quantity and quality controls with outlets typically to the existing roadside ditches in the area. The conceptual stormwater management facility locations identified within the Subwatershed Study Phase 2 report have been located to service proposed developments. Considering the evolving land use of the Secondary Plan Area, storm sewers may be required in the area northeast of the QEW to service higher density buildout. There is an opportunity to construct storm sewers to service multiple higher-density developments - with outlets to conceptual SWM facilities sized for long-term land use within the Secondary Plan Area. This will be further detailed upon completion of Phase 3 of the Subwatershed Study.

7.0 Proposed Servicing Strategy

7.1 Water

The existing water servicing within the Glendale Secondary Plan Area is sufficient to service the proposed growth areas, including the low-density and high-density scenarios, as well as for densities higher than the minimum specified in the Secondary Plan.

Any distribution watermain proposed as part of development applications should be looped where the development allows for it (via subdivision roads, Town easements, etc.). This will ensure sufficient available fire flow to service long-term land use within the Secondary Plan Area.

7.1.1 Phasing of Servicing

Upgrades to the existing water system within the Glendale Secondary Plan Area are not required to service growth within the development area. Allocation of new development within the Secondary Plan area is to be monitored and compared to total development within the combined NOTL and "upstream" St. Catharines system to ensure that the planned trunk main from South Niagara on the Lake to the Virgil Elevated Tank, as well as the new elevated tank in Virgil to support 2051 and buildout growth, are planned (via Municipal Class EAs), budgeted for, designed, constructed and commissioned to meet the timing of anticipated growth. Future Region MSP Updates should directly reference growth within the Glendale Secondary Plan area, a strategic growth area, that may trigger need and drive timing for broader network improvements.

The transmission watermain along Airport Road, crossing the QEW, Taylor Road, and Glendale Avenue was constructed in the late 1970s and early 1980s, as well as the watermain on York Road, east of the QEW interchange. The Region's transmission pipe may be nearing the end of its expected 75-year life-cycle around the anticipated 2051 build-out timeline for the Secondary Plan area. State-of-good-repair replacements can be considered and compared to servicing requirements for the ultimate build-out of the Secondary Plan area.

7.1.2 Cost Estimates

No upgrades to the existing Region and Town watermain within the Secondary Plan area are required. Extension of the local distribution network can be accomplished through development applications and direct developer construction of local watermains to service the respective developments.

7.2 Wastewater

The existing wastewater servicing within the Glendale Secondary Plan, and downstream has sufficient capacity to accommodate growth under both the low-density and high-density scenarios. Extensions of local sewers and connections to existing trunk sewers will be required as part of proposed developments but can be designed and constructed entirely as part of proposed development applications. An extension of the Glendale Avenue local sewer, southwest of Niagara on the Green Boulevard can be considered but may not be required if future development in areas west of the existing Niagara Outlet Mall are via a subdivision with sewers aligned with proposed internal roads.

Existing sewers have been confirmed to be designed at depths and profiles to effectively connect new local sewers to service area developments.

7.2.1 Provisional Upgrade of Siphon Under Welland Canal (Downstream Queenston Road Trunk Sewer)

If the 2051 high-density scenario can be fully achieved (and more than 22,000 PPJ within the Glendale Area), the downstream siphon may be required to be upgraded near build-out. Siphon capacity along with development progress and planned (and anticipated) densities for the Glendale Secondary Plan area should continue to be monitored with specific attention given to future Region-wide MSP Updates.

Incorporation of planned growth for Glendale into future MSP updates - along with consideration for development trends within the Study Area will inform potential upgrade timing for the existing downstream siphon. If a future MSP Updated identifies that the siphon will be required to be upgraded to meet growth flows for the area, then the project will need to be incorporated as part of future Region capital programs and associated DC Background Studies.

The existing siphon was installed in 1983 and there may be an opportunity to upgrade the siphon near the 2051 build-out timing to service both ultimate build-out of the Secondary Plan area as well as align with expected replacement timelines under the Region's State of Good Repair infrastructure replacement program. Linear PE / HDPE infrastructure is expected to have a 75-year lifespan before requiring replacement which would require the existing siphon be considered for replacement in the 2050s. Downstream wastewater upgrades have not been identified as part of the Area Servicing Plan and are to be monitored going forward.

7.2.2 Phasing of Servicing

Monitoring of development densities and wastewater flows for the area will continue to be important in order to plan flexible servicing solutions to meet the actual development densities that evolve over the lifecycle of the Secondary Plan area build-out.

As noted in Section 6.2.4, an upgraded sewer crossing of the QEW is not anticipated, but if a crossing is required to convey flows from developments at densities greater than the minimum specified, it will be costly infrastructure requiring substantial planning and design and construction budget. Allocation and planned long-term development within the southwest portion of the Secondary Plan are to be tracked and compared to the available capacity of the QEW crossing – with future MSP Updates (and associated capital programs and DC Background Study Updates) incorporating area development trends and updated planning numbers.

7.2.3 Cost Estimates

A cost estimate for the provisional proposed upgrade to the downstream Queenston siphon under the Welland Canal is shown in Table 7-1.

Table 7-1: Cost Estimate for Provisional Upgrade of the Queenston Road Siphon (under the Welland Canal)

Project	Anticipated Timing	Total Cost (2024$)
Upgrade of Existing Queenston Road Siphon	2051 (or post 2051) Likely only required if higher than minimum target densities are achieved.	$3.1M

Cost estimates have been prepared in accordance with Niagara Region guidelines and the Association for the Advancement of Cost Engineering (AACE) Cost Estimate Classification System and include 18% Engineering fees and 40% project contingency for a Class 4 (Feasibility Level) Estimate. The cost estimate for the provisional siphon upgrade (including the -10% and +30% accuracy range) is detailed further in Appendix A.

Upgrade of the siphon would be growth-driven and should be considered as a future DC eligible project under future MSP and DC Update programs.

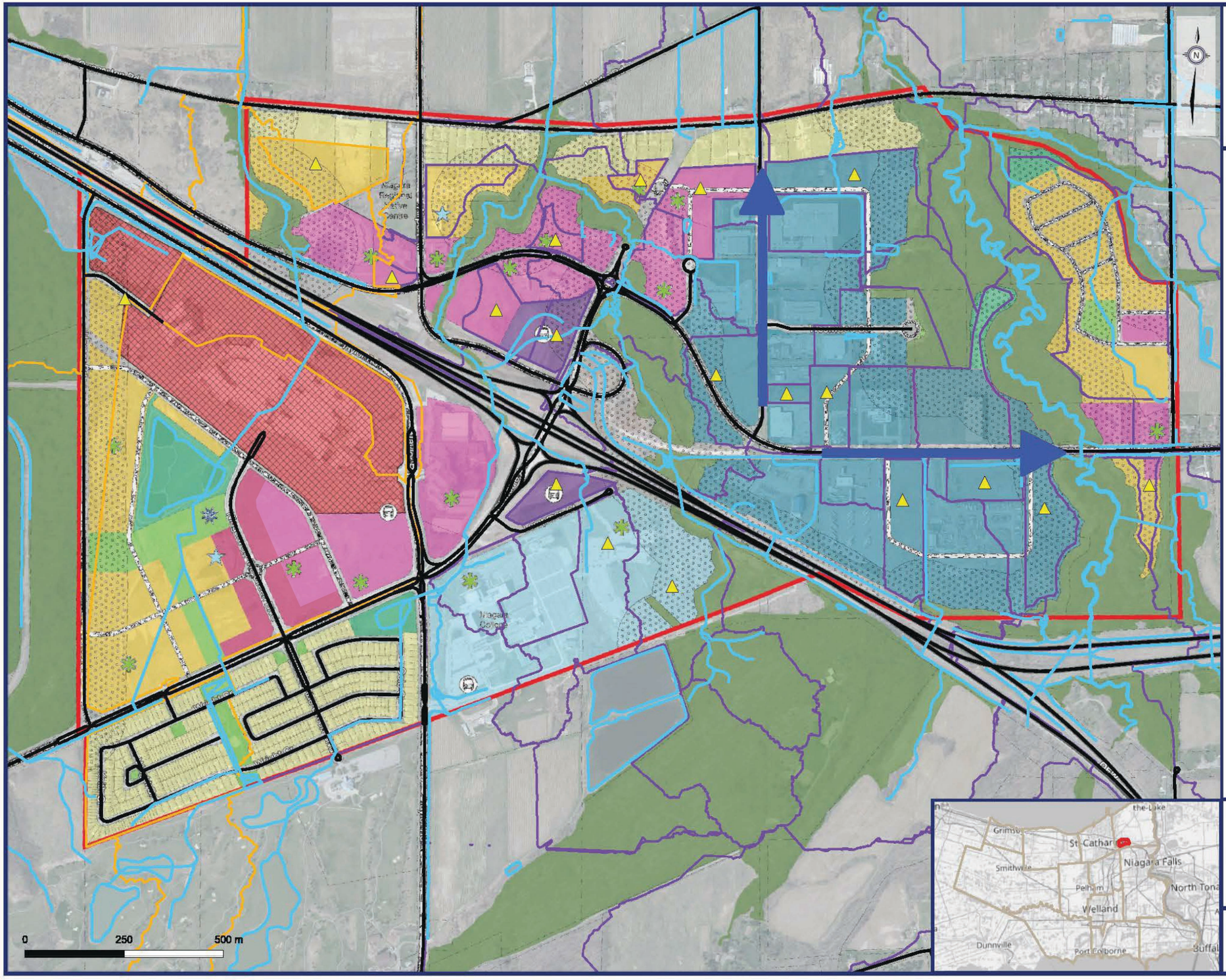
7.3 Stormwater

The Subwatershed Study Phase 2 Report identified conceptual locations for stormwater management (SWM) facilities within the Glendale area. For most development sites, on-site storm sewers and SWM facilities can be designed and constructed as part of the development application works, potentially with connections to existing storm sewers. For potential future development in the area of Townline Road and York Road, the evolving land use that replaces current development application works with future higher density development may require new storm sewers, including:

- Proposed storm sewers running north along Townline Road (from north of York Road) to a proposed common stormwater management facility (to be located south of Queenston Road); and,
- Proposed storm sewers running east along York Road (from east of Townline Road) to a proposed common stormwater management facility located at Six Mile Creek.

Existing ditches for roads planned for urbanization will ultimately be required to be replaced by storm sewers. Storm sewer design and construction can be completed as part of future road improvements projects, and will incorporate existing as well as future flows for the area. Consideration for site specific controls and outlets to existing and future / provisional storm infrastructure is to be addressed as part of the development application and review process. Plans for the site controls and outlets are to prioritise flexibility for future connection solutions - with understanding that future road improvements may only be completed well after site development.

Proposed storm sewer infrastructure is shown in Figure 7-1.



Niagara Region

Glendale Secondary Plan Update
Water, Wastewater and Stormwater Area Servicing Plan

Stormwater Infrastructure

- Provisional Proposed Storm Sewer
- Conceptual Quantity Control Facilities
- Glendale Secondary Plan Area
- Drainage Pathways
- Roads

Proposed Subcatchments Boundaries

- 6 Mile Creek
- 8 Mile Creek

Landuse Designation

- Existing Residential Designation
- New Residential Designation
- Regional Commercial Designation
- Regional Commercial Mixed-Use Overlay
- Mixed Use I Designation
- Mixed Use II Designation
- Industrial/Business Park Designation
- Institutional Campus Designation
- Public Parkland Designation
- Transportation Facilities Designation
- Environmental Protection Designation
- Adjacent Lands Overlay
- Stormwater Management Facility

Land Use shown based on Schedule 1 - Land Use Designations.
Refer to Figure 3-1 for detailed designations and symbol definitions.

Figure 7-1

Provisional Storm Sewers Long-Term Growth Scenario

BluePlan Engineering

October, 2024
722013
Projection EPSG:26917
Base Data: © OpenStreetMap contributors

7.3.1 Phasing of Servicing

Current development applications have generally proposed site-specific stormwater servicing and SWM facilities. Storm sewers to service evolving higher-density land uses to be developed in the future should be considered as part of any road upgrade projects to ensure available infrastructure ahead of new land use development.

7.3.2 Cost Estimates

Cost estimates for the provisional future storm sewers to be provisionally installed along Townline Road and York Road is shown in Table 7-2.

Table 7-2: Cost Estimate for Provisional Future Storm Sewer

Project	Anticipated Timing	Total Cost (2024$)
1,000 metre length Townline Road Storm Sewer	Only to Support Evolving (Higher) Density within Northeast Area of Glendale	$3.0M
850 metre length York Road Storm Sewer		$2.5M
	Total	**$5.5M**

Cost estimates have been prepared in accordance with Niagara Region guidelines and the Association for the Advancement of Cost Engineering (AACE) Cost Estimate Classification System and include 18% Engineering fees and 40% project contingency for a Class 4 (Feasibility Level) Estimate. The cost estimate for the provisional storm sewer upgrades (including the -10% and +30% accuracy range) is detailed further in Appendix A.

8.0 Conclusion

It is anticipated that servicing of the Glendale Secondary Plan area can generally be achieved by utilizing the existing water, wastewater, and stormwater systems with localized infrastructure upgrades as required for new developments. Projected development within the study area is unlikely to trigger upgrades to the Region's water and wastewater systems, however it must be carefully monitored throughout the build-out of the Secondary Plan Area. If densities greater than the minimum densities specified as part of the Secondary Plan are achieved than potential upgrades to significant wastewater infrastructure may be required.

8.1 Water and Wastewater

It is recommended that as part of future Region Water and Wastewater MSP updates, the Region specifically consider the Glendale Secondary Plan study area to ensure timing for water servicing upgrades for the broader NOTL and "upstream" St. Catharines area is reflective of development progress and trends within the Glendale Secondary Plan study area. The Glendale Secondary Plan study area is anticipated to be a driver for larger system upgrades, albeit this growth will be balanced with St. Catharines' growth trends and development progress.

There is potential that the existing downstream Queenston Road / Welland Canal siphon upgrade is triggered if densities greater than the minimum specified in the Secondary Plan can be achieved. The upgrade would be required only at build-out of the Secondary Plan area, thereby allowing time to monitor and update future MSP Update and DC programs if necessary.

The existing sewer crossing of the QEW within the Secondary Plan also has sufficient capacity for low-density and high density build-out. If densities greater than minimum can be achieved in southwest portion of the Secondary Plan area, the crossing could reach full capacity.

Local water and wastewater infrastructure can be designed and constructed as part of development applications with existing infrastructure confirmed to be at sufficient depth/location with capacity for water demands and wastewater flows.

8.2 Stormwater

The existing storm sewer network southwest of QEW can provide sufficient service to build-out of the area. Provisional storm sewers along Townline Road and York Road may be required to service future higher density development over the evolving land use within Secondary Plan area (to be aligned with Phase 3 of the Subwatershed Study).

A

Regional Municipality of Niagara

APPENDIX A

CONSTRUCTION COST ESTIMATES