Niagara Region

Glendale Secondary Plan Update

Existing and Planned Context - Background Work to Date

Updated December, 2022

The Planning Partnership

GM Blue Plan
Wood
with NCSI and Matrix
LEA Consulting
urbanMetrics

Glendale Secondary Plan Study Area

Contents

Introduction

The Niagara Region Official Plan identifies Glendale District as a strategic growth area. A strategic growth area has the highest priority for development and intensification and is planned to be a complete, vibrant mixed use community. It is also intended to be a primary location for major public service facilities, major institutional uses, high density and mixed use development, office, commercial, and recreation uses.

Today, Glendale is home to 3,700 residents, representing a population growth of approximately 26% since the 2016 Census. The median age of the population is 47.1, just above the average age of 46 throughout Niagara Region. The average size of a household in Glendale is 2.54 persons, compared to 2.35 for the Region. Over 82% of Glendale residents own their own home. Across Niagara Region, 72% of residents own their own home (2021 Census).

The Glendale Secondary Plan Update will update policies and mapping to ensure alignment with the Council-endorsed District Plan and policies for the Glendale District outlined in the Niagara Official Plan. The work will use the background information, vision, and consultation input from the District Plan process.

The starting point for the Secondary Plan Update is the Glendale District Plan's vision:

> *Glendale District will be a vibrant and complete community for people of all ages, lifestyles, and abilities - a place to live, work, play, learn and grow. Its urban districts, with a mix of uses, will protect, integrate and celebrate the natural and rural surroundings reflecting the distinct character of the area. Glendale District will be framed by connection to green space along the Welland Canal, the creek valleys, the Niagara Escarpment and agricultural lands.Glendale District will put mobility first with a robust transit system, cycling trails and pedestrian routes seamlessly connecting areas north and south of the QEW highway.*

The Update will assess the District Plan's land use concept/demonstration plan through technical supporting studies including:

- Background and planning review;
- Transportation assessment;
- Infrastructure study;
- Natural heritage/Subwatershed study;
- Commercial/employment lands study;
- Urban design guidelines study; and
- Financial Impact Study.

Each of the studies will assist in refining the land use boundaries, confirming the population and employment allocations, and providing the policy direction to achieve the vision of the District Plan through the Glendale Secondary Plan update.

The **objectives** of the project are:

- Policy review of the existing Glendale Secondary Plan and Glendale District Plan to identify alignment and areas for improvement.
- Completion of the technical supporting studies.
- Following completion of the technical work, preparation of an updated Glendale Secondary Plan that is informed by the recommendations of the technical studies.
- Completion of a public and stakeholder engagement program which will also be used to inform the updated secondary plan.
- Preparation of an Official Plan Amendment for the Glendale Secondary Plan and present to Niagara-on-the-Lake Town Council for approval.

The Secondary Plan Update is being completed in three phases to implement the direction of the District Plan and to ensure alignment with Regional and local policy. The work is being completed in three phases:

- **Phase 1**: Understanding the Existing Conditions

  The first phase focuses on tasks related to background review / data collection, stakeholder and public consultation, and initiating the component studies. This phase will culminate in the Background Report. The work in Phase 1 sets a basis and understanding for our team to understand the existing conditions and to identify possible changes to the Land Use Concept.

- **Phase 2:** Confirming the land use, population and employment projections and urban design direction (Spring 2023)

  The second phases focuses on resolving the issues affecting the lands, and generating variations in the Land Use Concept. Phase 2 will include a Public Information Centre and culminate with the presentation and discussion of the revised Land Use Concept.

- **Phase 3:** Secondary Plan (mid to late 2023)

  The basis for the third phase of the study will be the preparation of the Secondary Plan.

The project is undertaken with the assistance and oversight of a **Technical Advisory Committee** (TAC) who will be consulted throughout at key milestones in the work. The TAC includes representatives from the following groups:

- Town of Niagara on-the-Lake
- City of St. Catharines
- Niagara Region
- Niagara District Airport
- Niagara Peninsula Conservation Authority
- Niagara College
- Ministry of Transportation
- Ontario Tourism Marketing Partnership Corporation
- Metrolinx
- Ministry of Municipal Affairs and Housing
- Canadian National Railway
- St Lawrence Seaway Authority

The consulting team will build awareness and understanding of the Secondary Plan Update, inform, consult, and collaborate with key audiences through a variety of forums, and build broad-based support for the Glendale Secondary Plan Update at key milestones in the work.

The team will communicate through:

- Updates posted online to the dedicated webpage
- Posts on social media to encourage engagement and feedback; and,
- Project updates via the Region's and Town's regular communications tools.

The following **key audiences** will be invited to participate in the Update:

- Landowners
- Residents
- Niagara Home Builders Association
- Niagara-on-the-Lake Chamber of Commerce
- Niagara Transit Commission
- District School Board of Niagara
- Conseil Scolaire Viamonde
- Niagara Catholic District School Board
- Conseil Scolaire de District Catholique Centre-Sud

The Region and Town will be engaging, involving and collaborating with **First Nations and Metis** to ensure their interests are reflected in the Secondary Plan Update. The team will be meeting with Haudenosaunee Confederacy Chiefs Council, Mississauga of the Credit First Nation, Metis Nation of Ontario, Six Nations of the Grand River First Nation, Fort Erie Native Friendship Centre, and Niagara Regional Native Centre.

Through the process to prepare the Secondary Plan Update the team will regularly update **Niagara-on-the-Lake Mayor and Councillors** on work in progress and ensure it reflects their priorities.

All input received as part of this consultation will be recorded and written summaries will be used to inform the Secondary Plan Update.

Purpose of the Report

This Background Report provides a summary of the findings of Phase 1 with respect to:

- Planning;
- Commercial and Employment;
- Natural Environment and Subwatershed Study;
- Servicing; and,
- Transportation.

The Phase 1 Background Report involved a comprehensive review of existing documents and available data relevant to the Gelndale Secondary Plan area. Past and current plans, policies, studies, and research that pertain to Glendale were reviewed, analyzed, and synthesized. The objective was to understand the planning and regulatory context, the environmental, transportation, servicing context; and the potential of the study are,a

This Report also includes a preliminary characterization of the environmental systems a provides high-level preliminary constraint rankings for initial input for a preliminary land use concept in the next phase of the work. The work is primarily based on a review of desktop information which will be verified and refined over the course of the Subwatershed Study once the field investigations and detailed analyses have been completed in 2022 and early 2023. The characterization and constraint rankings in the Subwatershed Study are subject to revision as detailed field investigations and analyses are completed.

Next Steps

The team is beginning Phase 2 of the work that includes the population and employment forecasts, the land use plan based on the inputs from the technical reports, and the urban design guidelines. The team's draft forecasts, land use plan and guidelines will be reviewed with the Technical Advisory Committee, landowners, and the public. First Nations and Metis will be engaged to ensure their interests are reflected in the draft plan and guidelines. Forecasts, the draft land use plan and draft guidelines will be presented to the Councils at Niagara-on-the-Lake and the Region.

Summary and Key Directions

Planning

The review of Provincial, Regional, and Local policy frameworks has established the following as key parameters for the Glendale Secondary Plan Update:

- Plan to achieve required densities prescribed under Provincial and Regional policies.
- Design for complete communities.
- Support for economic development and competitiveness by ensuring sufficient and appropriate sites are available for employment uses.
- Provide commercial uses as a fundamental part of a complete community.
- Provide full range and mix of housing options.
- Design with compatible housing forms and appropriate transitions to abutting residential communities and Natural Heritage Systems, and transitions from higher to lower densities within the community.
- Protect cultural heritage resources and involve Indigenous communities in the planning process.
- Encourage and facilitate the coordinated development, maintenance, and expansion of public service facilities in community hubs.
- Design for a high quality public realm to support active transportation and spur private investment.
- Support water and energy conservation, plan for efficient land use and development, support alternative transportation modes and embrace the use of green infrastructure and natural areas for water infiltration.
- Plan for the impacts of a changing climate and identify actions to reduce greenhouse gas emissions and address climate change adaptation.
- Plan for a well connected, attractive, and functional multi-modal transportation system. Support a full spectrum of mobility options.

Commercial & Employment

- Planning for the Glendale Area should strive to achieve greater internal connectivity, particularly between the major uses on the south side of the Queen Elizabeth Way (QEW).
- There will be a need to provide for additional uses to accommodate day-to-day and weekly shopping once the residential components have been built out. A population of approximately 10,000 persons would warrant the establishment of a new supermarket or comparable major food store in the Glendale Secondary Plan Area.
- The Niagara College campus generates additional visitation to the area and could help to attract complementary businesses. The campus has considerable lands capable of accommodating expansion opportunities.
- Niagara-on-the-Green Boulevard represents an opportunity to add additional local serving commercial space and assist in connecting the land uses south of the QEW.
- Glendale Avenue is not currently a conducive street for retail uses as it is an arterial road connecting with an expressway and an important route into the St. Catharines urban area. It is likely not appropriate for on-street parking to serve shops and services. In addition, the market for local retail uses and services is limited by population growth. The suitability of commercial uses on Glendale Avenue will be reviewed as additional information is available (i.e., transportation review, surrounding population etc.). It could be advantageous to concentrate local serving retail and service uses along Niagara-on-the-Green Boulevard rather than to dilute the market by extending them along Glendale Avenue.
- In general, lands designated for employment uses within the Glendale District Plan should be preserved, although there are some lands that are not well positioned for industrial and related uses and could be converted to residential or mixed use. Glendale's employment district is an economic hub of the Town of Niagara-on-the-Lake and helps to diversify the local economy beyond tourist and agricultural activities. In our

opinion, the lands at the eastern edge of the Glendale SP at Concession 7 Road - North of York Road are appropriate for the conversion for residential and mixed-use development given that they are physically separated from other existing employment uses and are located adjacent to a significant Environmental Protection Area at the periphery of the larger planned area.

- Although the Region's Land Needs Assessment (LNA) lists a surplus of 10 hectares of employment land in the Town of Niagara-on-the-Lake, in our professional opinion, this surplus is insufficient to justify major conversions that would significantly reduce the overall availability of employment lands. There is minimal room for growth of the employment area beyond the existing designated zones. Major conversions of the designated employment lands limit the potential prospects for employment uses as part of Glendale's economic growth.

Terrestrial Habitat

Natural features within the study area are predominantly associated with the permanent watercourse corridors, especially those of Six Mile and Eight Mile Creeks and their principal tributaries. The natural feature coverage within the study area includes Provincially Significant and non-Provincially Significant wetlands (PSW), as well as small, fragmented or isolated, comprised of small woodland and wetland communities, hedgerows, cultural meadows and other early successional growth.

Federally, provincially and regionally significant vegetation species have been recorded immediately south of the study area, within the Homer Escarpment Life Science ANSI. Golden Alexanders (*Zizia aurea*), which is considered a regionally rare vegetation species in Niagara Region, has been identified within the study area property located at 335 Townline Road.

Species At Risk (SAR) were confirmed as occurring within the Glendale Secondary Plan area. Some SAR are considered to have, or possibly have, suitable habitat within the Glendale SWS study area (Butternut).

One PSW complex has been identified within the Glendale SWS study area: Welland Canal North Turn Basin Wetland Complex.

The presence or absence of Significant Valleylands within the study area will be assessed through completion of the SWS with regard for Provincial and Regional criteria, other background information sources and the expertise of the SWS Team ecologist.

One Significant Wildlife Habitat (SWH) type (Deer Winter Congregation Area) has been confirmed as present within the study area. Several types of Candidate SWH have been identified for the SWS study area through the screening exercise

Several Species of Conservation Concern (SCC) have been identified as present within the SWS study area. Some SCC are considered to have, or possibly have, suitable habitat within the Glendale SWS study area.

No provincially or regionally significant Life Science ANSIs have been identified within the Glendale SWS study area. However, the Homer Escarpment Life Science ANSI is located immediately south of the study area. This area will therefore be considered within the SWS in consideration of the larger landscape context of the study area features and ecological linkages to the broader NHS.

Fish Habitat

Six Mile Creek originates within the Niagara Escarpment lands south of the study area, and comprises various tributaries that include confluences south of York Road, and also further downstream just south of Queenston Road. These source tributaries are largely characterized as Type 2 “Important” fish habitat. North of the confluence at Queenston Road, the watercourse is channelized as a Class A-type municipal drain.

The Six Mile Creek subwatershed also includes stream flows that are west of and separate from the Six Mile Creek watercourse/tributaries mentioned above where they occur within the study area. This separate drainage area, which generally occurs west of Townline Road, is referred to as the Six Mile Creek West Branch. Within the study area, the Six Mile Creek West Branch and its primary tributaries also represent Type 2 “Important” fish habitat. This watercourse branch is also modified to a Class A municipal drain from just south of Queenston Road and further north.

The majority of Eight Mile Creek has been highly altered and channelized where it occurs within the study area. The majority of the watercourse south of the Queen Elizabeth Way (QEW) is unclassified according to the MNRF rankings. The reach north of York Road has been identified as a Class D municipal drain.

The fish community of Six Mile Creek within and in the immediate vicinity of the study area is characterized primarily by small-bodied, tolerant species. These include both warm- and coolwater species in addition to one coldwater species: Lake Chub. Coldwater migratory species have also been observed throughout the lower Six Mile Creek, well outside of the study area. These species are unlikely to occur within the study area due to the likely presence of in-stream barriers, which would limit their ability to travel upstream from Lake Ontario.

The fish community of Eight Mile Creek is expected to be limited within the study area by relatively small amounts of available fish habitat. Based on background mapping, it appears that the most suitable area of Eight Mile Creek within the study area is limited to the roughly 500m section of drain that extends north from the QEW. A variety of the small-bodied species that occur in Six Mile Creek may utilize the portion of Eight Mile Creek within the study area if suitable conditions are available.

The DFO Species at Risk distribution mapping (DFO 2022) indicates that there are no aquatic SAR within or in the vicinity of the study area.

Water Resources

The Glendale Secondary Plan study area falls within three subwatershed systems, these include the Beaver Dam Schiner’s Creek (BDSC) Welland Canal North to the west, and two Subwatersheds within the Niagara-on-the-Lake (NOTL) Watershed, which includes the NOTL Eight Mile Creek within the center of the site, and the NOTL Six Mile Creek to the east. The majority of the study area contributes runoff directly to the respective watershed systems through rural drainage networks. Various drainage features have been classified as municipal drains.

The soils provide a variety of drainage classes, with the dominant distribution being the “Variable” and “Imperfectly” drained categories. There are also areas identified as “Poorly” drained, which are primarily located near the “Variable” areas, as well as certain areas denoted as “Moderately Well” drained, which is largely focused near the riverine systems of the Eight and Six Mile Creeks.

There are certain urbanized portions of the study area which are drained via urban storm sewer servicing collecting the minor system flows. This drainage is collected and discharges to approximately ten existing stormwater management facilities which are located generally along the QEW corridor and west of Taylor Road, south of the QEW, and are associated with the Niagara on the Green development, the Niagara College (Glendale Campus), the Outlet Collection Niagara, and transportation corridors.

The floodlines in the headwaters for the Eight Mile Creek system are contained within a narrow valley section (considered a medium constraint) which is approximately 300 m (+/-) in length within the study area north of the QEW, hence there is considered to have moderate potential for adjustment of the existing watercourse through channel refinements or valley works. The floodlines of the Eight Mile Creek remain narrow and confined within the watercourse corridor until downstream of the Queenston Road crossing beyond the study area, where the floodlines are wide and not well contained.

Fluvial Geomorphology

Within the study area, features were screened as watercourses when the drainage area generally exceeded 50 ha. Drainage areas were confirmed using the Ontario Flow Assessment Tool. Within the study area, watercourse reaches of Six Mile Creek, Eight Mile Creek, and tributaries to Six Mile Creek are present. Most of these reaches have a mapped Regulated Floodplain. The NPCA regulates floodplains for features draining 125 ha or greater.

Potential geomorphic constraints were applied to watercourse segments, and correspond to the high, medium, and low categories.

The study area contains unconfined, partially confined (valley slopes restrict migration in some parts of the reach) and confined reaches (valley slope restrict migration throughout the reach). Preliminary erosion hazards were delineated for features identified as high and medium constraint watercourses.

Preliminary meander belt widths were delineated based on the existing channel planform. The apparent top of valley slope was delineated using the 1.0 m contour data and Top of Slope Features mapping from the NPCA. In areas with an apparent valley (confined systems), the top of slope mapping was used to define the stable top of slope wherever valley slopes were 3:1 (H:V) or more. A 6 m erosion access allowance was added to the stable top of slope per provincial guidelines.

Medium constraint watercourse reaches may be subject to realignment and therefore erosion setbacks would need to be developed accordingly. Should these reaches be relocated, the corridor width associated with each reach must, at a minimum, be maintained.

Hydrogeology

The surficial geology consists primarily of the silt and clay Halton Till in the western portion of the District Plan Area, and glaciolacustrine silt and clay in the eastern portion of the District Plan Area. A small area of glaciolacustrine sand and gravel is mapped in the northwestern corner of the District Plan Area.

The subcropping bedrock geology in the District Plan Area consists primarily of the red Queenston Formation shale, except for the southeastern part of the area, which is comprised of shales, dolostones, and sandstones of the Clinton-Cataract Group.

Surficial geology mapping suggests bedrock is present at surface in a small portion of the southeastern part of District Plan Area, along the edge of the escarpment where it meets Queen Elizabeth Way. However, water well records suggest a thicker overburden and deeper bedrock in the District Plan Area between 14.6 to 51.8 m bgs below the (north of) escarpment. Bedrock topography is interpreted to slope from a high in the south, to a low in the north, toward Lake Ontario.

Based on water well records, some areas may have deposits of clay from ground surface to bedrock, while other areas may have thick sand and gravel deposits below a surficial clay layer and on top of bedrock.

The predominant groundwater flow pathway within the clay overburden is interpreted within the fractures of the weathered upper 3 to 6 m. Vertical movement of water within this zone is understood to be more dominant than horizontal movement.

The main regionally significant aquifer in the District Plan Area is interpreted to be contact-zone aquifers, where basal sand and gravel deposits lie on fractured bedrock at the overburden-bedrock contact. These aquifers are generally considered to be confined beneath the clays and silts. The Queenston Formation is also known to be a source of some groundwater supply; however, the water quality may be poor.

On a regional scale, shallow and deep groundwater is interpreted to flow from south to north toward Lake Ontario. Potential flow toward and discharge to local water courses will be further evaluated as part of assessment of available local groundwater level data and spot baseflow monitoring to be conducted as part of further characterization.

Infiltration and subsequent groundwater recharge are generally lower across the District Plan Area as a result of the predominant clay and silt deposits. However, infiltration and contaminant susceptibility are greater where the overburden is very thin, where bedrock is exposed, or where deposits of sand and gravel may be found near surface. Infiltration and aquifer recharge in these areas are expected to be locally greater.

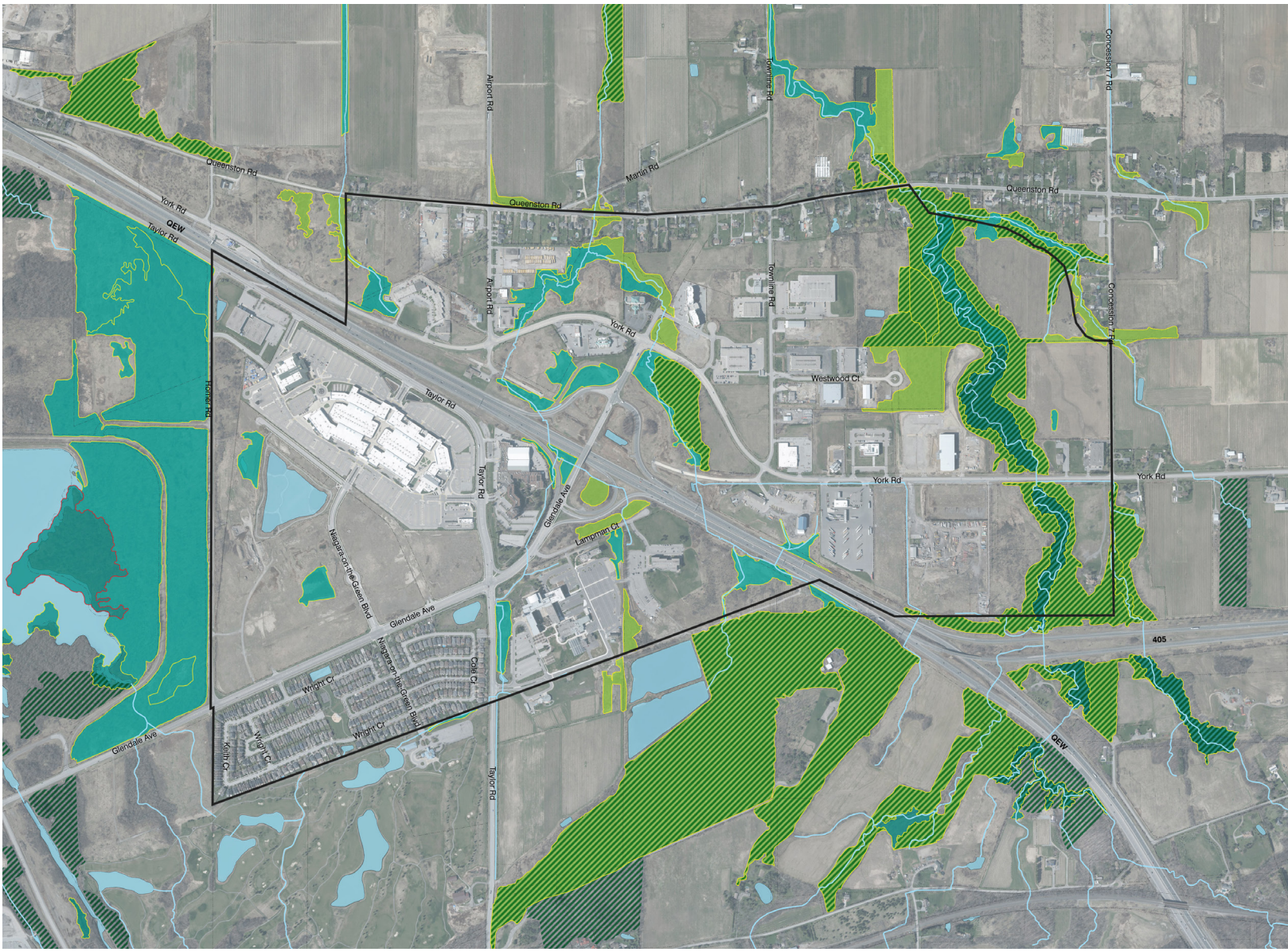
On a regional scale, groundwater discharge may occur in low-lying areas such as within water bodies and wetlands, and along water courses, especially where those features cut into coarser-grained overburden or shallow fractured bedrock. It may also occur in areas of topographic relief, such as along the face and base of the Niagara Escarpment.

The following items are currently considered “Low Potential Constraints” related to groundwater based on a preliminary assessment of the data evaluated to date:

- Significant Groundwater Recharge Area (SGRA) – While this SGRA is suitable as a low preliminary constraint, the hydrogeologic sensitivity of this area may be refined with the collection of additional data through future planning stages.
- Highly Vulnerable Aquifer (HVA) – An HVA refers to groundwater aquifers which are highly susceptible to contamination from both human and natural sources and usually correlates with areas where the water table is close to ground surface, and/or overburden units are thin and permeable, and/or potential anthropogenic pathways are present that could allow contaminants to quickly migrate from ground surface to subsurface aquifers. Small areas of HVAs are mapped within both the District Plan Area and Secondary Plan Area. While this HVA designation is suitable as a low preliminary constraint, the hydrogeologic sensitivity of this area may be refined through future planning stages.

The following are additional potential constraints for further evaluation:

- Overburden thickness and interpreted spatial extent of sand and gravel lenses.
- Areas of functional groundwater discharge (e.g., Provincially Significant Wetlands).
- The capacity to infiltrate stormwater.



Map of Significant Natural Heritage in the Glendale Secondary Plan Study Area

Legend

- Watercourse
- Water body
- Provincially Significant Wetland
- Evaluated Non-PSW Wetland
- Other Wetland (ELC)
- Terrestrial Woodland (ELC)
- Significant Woodland

Servicing

Water

As outlined in Niagara Region's 2016 Master Servicing Plan (MSP) Update, the Decew Water Treatment Plan (WTP) has surplus capacity within the 2041 planning horizon and treatment capacity is not anticipated 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 Town of Niagara-on-the-Lake 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 the Town of Niagara-on-the-Lake and/or an increase from St. Catharines and Thorold (and/or Niagara Falls) is required to address storage future Town of Niagara-on-the-Lake needs from 2041.

Planned System Improvements

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

Additionally, a new elevated tank in Virgil to support additional build out growth within the Town of Niagara-on-the-Lake is anticipated to be required from 2042.

The Region's recommended capital program projects are summarized in the table below. Development charges share for planned projects is currently under review by the Region. The table will be updated with Development Charges share upon confirmation from the Region's Master Plan Update team.

Wastewater

The Port Weller Waste Water Treatment Plant (WWTP) has surplus capacity within the 2041 planning horizon; and treatment capacity is not anticipated to constrain development within the Secondary Plan area.

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.

Existing elevations across the Study Area vary significantly and local pumping stations may be required. Recent development applications have incorporated proposed pumping station solutions. The Functional Servicing Design for the Modero Estates development – a 384-unit residential subdivision development located west of Concession 7 and south of Queenston Road – has proposed individual basement pumps for sanitary flows for 37 townhouse units. More comprehensive strategies for pumping within localized areas of the Secondary Plan will be considered (to be aligned with the Region's Sewage Pumping Stations and Forcemains Policy).

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**

The District Plan was based on a full build out of 22,500 persons and jobs. At the time, information was provided by Regional Development Engineering to indicate that this may slightly exceed capacity and it was agreed the Secondary Plan would further review and refine this number, if required. There is no discussion in this section on what population and employment numbers were used to determine the surplus capacity in the system to 2041.

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.

Stormwater

The stormwater management component of the Subwatershed Study will specify the location, size, and contributing drainage area to each stormwater management (SWM) facility. Municipal stormwater servicing will build on the findings and recommendations of the Subwatershed Study to develop stormwater servicing that aligns with the proposed drainage design and meets the requirements of the Conservation Authority, the expectations of the Town, and can be effectively constructed to align with the water and wastewater infrastructure.

The proposed storm drainage plan will be defined as part of the Subwatershed Study, including the conceptual design of stormwater management facilities. The storm sewers will be designed to align with water and wastewater servicing upgrades to ensure efficient municipal corridor design.

Transportation

- Provincial and Regional transportation policy encourages development of active communities supported by safe and accessible public transit and active transportation infrastructure and facilities, as well as a need for future transportation networks to support connectivity, mode choices, safety, and reduced emissions.

- Core objectives include supporting the expansion of public transit improvements and comprehensive active transportation networks in the Region.

- The Region's Transportation Management Plan seeks to establish a sustainably integrated multi-modal transportation system that reduces reliance on any single mode and promotes walking, cycling, transit, and other forms of transportation alternatives to personal vehicles. A focus on multi-modal safety has also been noted.

- The majority of links and nodes are concentrated along the south and west portion of the study area, while there is a relative lack of nodes across the QEW on the north and east side of the study area. Additionally, the study area exhibits a lack of continuous east-west and north-south roadways, with the QEW serving as a significant barrier to connecting the north and south areas of Glendale.

Transit Network

- Transit in the area is currently provided by Niagara Region Transit (NRT) through NRT OnDemand. Trips can be requested in real-time through an app, similar to ridesharing services. NRT OnDemand operates year-round, Monday to Saturday from 7 AM to 10 PM.

- The NRT also provides two traditional transit routes, connecting St. Catharines Terminal to the Morrison/Dorchester Hub, with stops at the Niagara College Glendale Campus and the Outlet Collection of Niagara. GO Transit also operates a service through Glendale, Route 12, connecting Burlington to Niagara-on-the-Lake and Niagara Falls.

- The Moving Transit Forward initiative has been prepared and approved to integrate local and inter-municipal transit services between St. Catharines, Niagara Falls, and Welland. A multi-modal transit hub was proposed as part of the Glendale District Plan at Glendale Avenue and Taylor Road to improve transit connectivity within the Secondary Plan area, as well as the Region as a whole. Consideration of the transit hub will proceed as the Secondary Plan Update progresses, in consultation with the Regional Transit Commission, the Town, landowners, and other interested stakeholders.

Cycling Network & Level of Service

- The existing cycling network is relatively limited. On-road cycling facilities are located along segments of Glendale Avenue, Taylor Road, Airport Road, and Queenston Road. A multi-use trail is also noted along the same segment of Glendale Avenue. The remaining cycling facilities include the Laura Secord and Bruce Trails.

- The study area displays a Bicycle Level of Service (BLOS) of 'C' to 'F', representative of a lack of dedicated cycling infrastructure. Even for road segments with dedicated infrastructure, high vehicle operating speeds and traffic volumes compromise the cyclist environment.

- The redesign of the Glendale Avenue interchange with consideration of active transportation facilities presents a significant opportunity to improve cycling connectivity between north and south Glendale and the BLOS along this route.

Pedestrian Network & Level of Service

- A lack of collector and local streets, discontinuous sidewalks, and physical barriers such as the QEW are the main constraints to pedestrian connectivity in Glendale.

- The study area displays a Pedestrian Level of Service (PLOS)of 'B' to 'F', with the pedestrian environment offering the best level of service where wider sidewalks and relatively lower vehicle operating speeds and traffic volumes are present.

- Key opportunities to improve connectivity and the overall pedestrian environment include expanding the sidewalk network and formalizing informal connections, particularly around the Niagara College Campus.
- The redesign of the Glendale Avenue interchange with consideration of active transportation facilities also presents a significant opportunity to improve pedestrian connectivity between north and south Glendale and the PLOS along this route.

Vehicle Traffic Conditions & Level of Service

- Traffic data was obtained from the 2016 Equilibrium Model/Multimodal Equilibrium (EMME) model, which is a transportation forecasting model, and adjusted based on growth rates from the 2041 EMME model for the weekday peak periods. Turning movement counts were either collected by LEA or obtained from the Region and CIMA for the Saturday peak period.
- A screenline analysis was conducted for the weekday AM and PM peak hours to assess the high-level traffic impacts of the expected future volumes on the broader network. It was found that traffic can generally enter and exit the area via any preferred route with minimal delays.
- An intersection capacity analysis was undertaken for key intersections during the weekday AM and PM and Saturday peak hours. The majority of vehicle movements are expected to be accommodated with sufficient capacity, minimal levels of delay, and with sufficient available storage.


Holiday Inn Express

1 Planning

Policy Review

The planning policy review for the Glendale District is complex. It includes Provincial policies, as well as Regional and local planning policy frameworks. Of primary importance is an understanding of the key planning principles of all of the relevant documents, with a focus on the Glendale District Plan and the policies of Section 6.1.3 of the Niagara Region Official Plan, which guide the implementation of the District Plan's vision and direction.

The review includes:

- Glendale District Plan
- Provincial Policy Statement (PPS), 2020
- A Place to Grow: Growth Plan for the Greater Golden Horseshoe, 2020
- Connecting the GGH: A Transportation Plan for the Greater Golden Horseshoe, 2022
- The Greenbelt Plan, 2017
- Niagara Escarpment Plan (2017) Office Consolidation April 5, 2021
- Niagara Peninsula Conservation Authority
- Approved Region of Niagara Official Plan, November 2022
- Niagara-on-the-Lake Official Plan, Amendment July 17, 2017
- Adopted Niagara-on-the-Lake Official Plan, 2019
- Town of Niagara-on-the-Lake Climate Change Adaptation Plan, 2022
- Niagara Region Smart Growth Principles and Model Urban Design Guidelines, 2005

Glendale District Plan

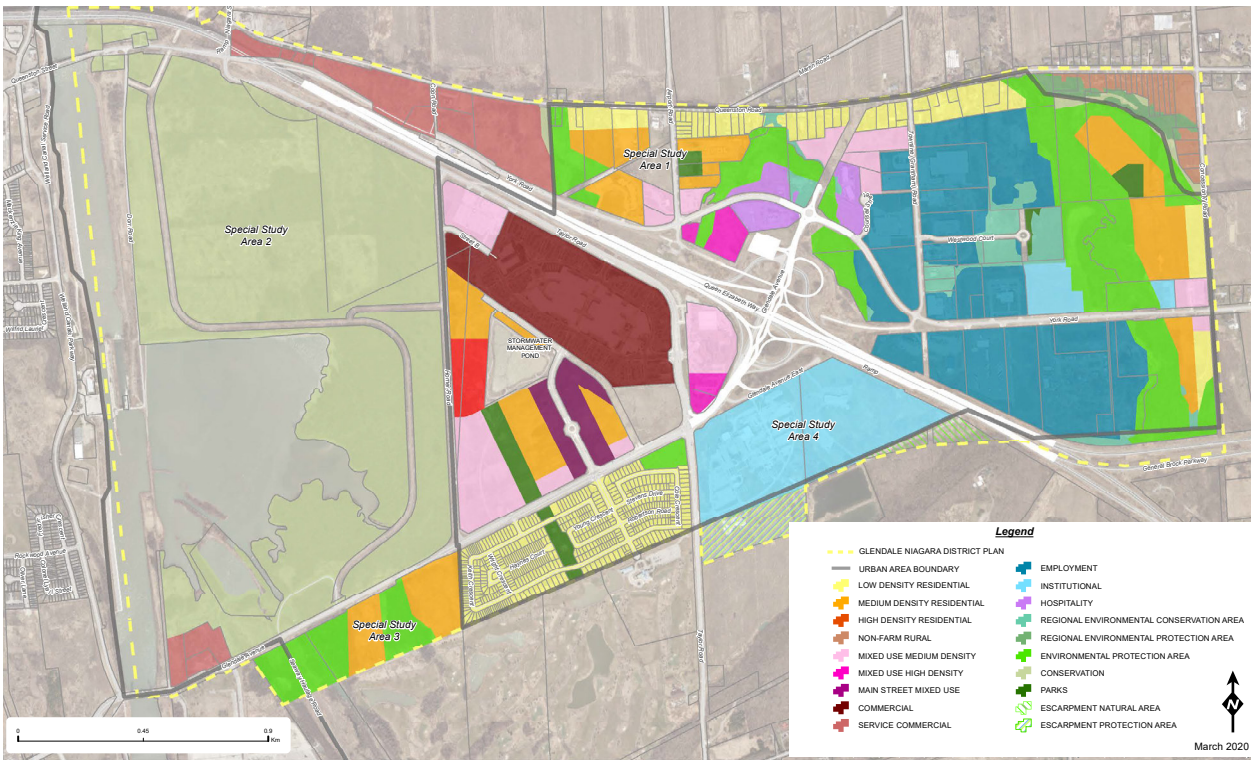
The Glendale District Plan, endorsed by Niagara Region and Town of Niagara-on-the-Lake Council in 2020, is a pro-active development strategy setting the high-level framework for land use planning, design and development of a complete community. The Glendale District Plan area is approximately 700 hectares in size and is generally bound by Queenston Road to the north, the Niagara Escarpment to the south, Concession 7 Road to the east, and the Welland Canal to the west. The District Plan area includes lands outside of the Town of Niagara-on-the-Lake, in the City of St. Catharines, which are not part of the secondary plan update. The QEW bisects the study area and includes the Glendale Avenue interchange.

The vision and direction provided by the policies of ROPA 17 have been incorporated into the new Niagara Official Plan, which was approved by the Minister of Municipal Affairs and Housing on November 4, 2022.

The District Plan identifies **9 key directions** for achieving its vision:

- Protect and enhance natural landscape and features;
- Converging trails and active transportation facilities;
- Provide an accessible and connected transit system;
- Create a strategy to build on existing assets within Glendale, linking Glendale with the surrounding area;
- Create a main street transition from the Outlet Collection;
- Provide a diverse range of housing to ensuring choice and affordability;
- Create a public/civic space focus in Glendale;
- Use sustainability measures related to resiliency and climate change; and,
- Coordination of infrastructure review, capacity and upgrades.

A draft land use concept for the Glendale District was prepared as part of the District Plan. The District Plan provides specific recommendations as to how the overall vision and key directions of the District Plan should be implemented. This includes specific recommendations pertaining to the preparation of an update to the Town's existing Glendale Secondary Plan. These have been used to inform the overall objectives and workplan for this Secondary Plan Update.



Land Use Concept from the Glendale District Plan

Provincial Policy Statement (PPS), 2020

The Provincial Policy Statement (PPS) provides policy direction on matters of provincial interest related to land use planning and development. The PPS provides for appropriate development while protecting resources of provincial interest, public health and safety, and the quality of the natural and built environment. The PPS supports improved land use planning and management, which contributes to a more effective and efficient land use planning system. The PPS is issued under the authority of Section 3 of the Planning Act and came into effect on May 1, 2020.

An overarching theme of the PPS is the promotion of sustainable, *complete communities*. The PPS advises that healthy and livable cities are sustained in part by promoting development and land use patterns that conserve biodiversity and by preparing for the regional and local impacts of a changing climate (Policy 1.1.1).

The Glendale Secondary Plan area is located within a Settlement Area, as defined by the PPS as an urban area that is the focus of growth and development (1.1.3). Land use patterns within settlement areas are to be based on a mix of land uses which minimize negative impacts to air quality and climate change and promote energy efficiency, as well as a mix of land uses that help prepare for the impacts of a changing climate (Policy 1.1.3.2). The PPS calls on municipalities to provide an appropriate range and mix of housing options and densities to meet projected requirements of current and future residents.

The Province requires municipalities to plan for, protect, and preserve Employment Areas, ensure the provision of necessary infrastructure, and protect Employment Areas in proximity to major goods movement facilities and corridors.

The conversion of Employment Areas to non-employment uses is only permitted through a municipal comprehensive review.

The PPS advises that healthy and active communities should be promoted by planning public spaces to be accessible and equitably distributed, to foster social interaction and to promote travel by *active transportation* (1.5.1).

Public service facilities shall be provided in a coordinated and efficient manner, which prepares for the impacts of climate change, and integrated with land use planning and growth management to ensure that they are financially viable over their life cycle and meet projected needs (1.6.1).

The PPS recognizes the connection between land use patterns and transportation choices and calls for integrated planning that minimizes the length and number of vehicle trips and supports transit and active transportation (Section 1.6.7.4).

The PPS also requires planning authorities to plan for and protect corridors and rights-of-way for infrastructure, including transportation and transit (1.6.8.1). Major goods movement facilities and corridors, in particular, are required to be protected for the long term (Section 1.6.8.2).

For lands that are in close proximity to airports, such as the Niagara District Airport, the PPS requires that the operation and economic role of airports is protected and that sensitive land uses are appropriately buffered and separated to minimize and mitigate any potential adverse effects (Policy 1.6.9.1). The PPS further states under Policy 1.6.9.2 that airports shall be protected from incompatible land uses by:

a) *prohibiting new residential development and other sensitive land uses in areas near airports above 30 NEF/NEP;*

b) *considering redevelopment of existing residential uses and other sensitive land uses or infilling of residential and other sensitive land uses in areas above 30 NEF/NEP only if it has been demonstrated that there will be no negative impacts on the long-term function of the airport; and*

c) *discouraging land uses which may cause a potential aviation safety hazard.*

A Place to Grow: Growth Plan for the Greater Golden Horseshoe, 2020

The Growth Plan (2020) builds upon the success of the initial Growth Plan (2006) and responds to the key challenges that the Region continues to face over the coming decades with enhanced policy directions. Progress has been made towards the achievement of complete communities that are compact, transit-supportive, and make effective use of investments in infrastructure and public service facilities. At the same time, efforts must continue to ensure protection of our natural areas and support climate change mitigation and adaptation as Ontario moves towards the goal of environmentally sustainable communities.

One of the foundational elements of the Growth Plan is for municipalities to plan for long-term growth within a defined community structure - a structure that includes the natural heritage system, settlement areas, mixed-use and higher intensity corridors, as well as defined lower intensity residential neighbourhoods and employment areas.

One of the guiding principles of the Growth Plan is to prioritize intensification and higher densities in strategic growth areas. The Glendale Secondary Plan area is identified as a strategic growth area in the Niagara Official Plan, specifically as a District Plan Area, with the highest priority for development and intensification.

A Complete Community - Municipalities will support the achievement of complete communities by:

- Planning to accommodate forecasted growth to the horizon of this Plan;
- Planning to achieve the minimum intensification and density targets in this Plan;
- Considering the range and mix of housing options and densities of the existing housing stock; and,
- Planning to diversify their overall housing stock across the municipality.

Housing - A specific guiding principle within the Growth Plan is to "support a range and mix of housing options, including second units and affordable housing, to serve all sizes, incomes and ages of households."

Future housing development in Niagara-on-the-Lake will be accommodated within the Settlement Area Boundary, as well as within residential neighbourhoods. Within that community structure, new housing will be delivered in two different contexts: Designated Greenfield Areas and Intensification Areas. The Glendale District Plan area is identified as a Greenfield Area in both the Regional and Local Official Plans.

Employment - The Province requires municipalities to plan for, protect, and preserve Employment Areas, ensure the provision of necessary infrastructure, and protect Employment Areas in proximity to major goods movement facilities and corridors.

The development of sensitive land uses, major retail uses, or major office uses will, in accordance with provincial guidelines, avoid, or where avoidance is not possible, minimize and mitigate adverse impacts on industrial, manufacturing, or other uses that are particularly vulnerable to encroachment (2.2.5.8)

The conversion of lands within employment areas to non-employment uses may be permitted only through a municipal comprehensive review, undertaken by an upper or single tier municipality.

Upper- and single-tier municipalities, in consultation with lower-tier municipalities, will establish minimum density targets for all employment areas within settlement areas.

The redevelopment of any employment lands outside of employment areas, should include development criteria to ensure a similar number of jobs remain accommodated on site (Policy 2.2.5.14). The viability for employment land conversion in the Glendale Secondary Plan area will be based on satisfying the criteria established by the PPS, Growth Plan and Niagara Region Official Plan, along with the conclusions derived from the Commercial & Employment Land Needs review prepared by urbanMetrics

Sustainable Infrastructure - Municipalities will assess infrastructure risks and vulnerabilities, including those caused by the impacts of a changing climate (Policy 3.2.1.4) and develop stormwater master plans or equivalent for serviced settlement areas that examine how extreme weather events will exacerbate impact this infrastructure. This assessment will involve the identification of appropriate adaptation strategies (Policy 3.2.7.1).

Climate Change - Municipalities are directed to develop policies in their OP to identify actions for GHG emissions and address climate change adaptation goals by supporting complete communities, reducing automobile dependence, supporting transit and active transportation, assessing infrastructure risks, stormwater management planning that incorporates low impact development, protecting the natural environment, and promoting local food (Policy 4.2.10.1).

Connecting the GGH: A Transportation Plan for the Greater Golden Horseshoe, Feb. 2022

The Ministry of Transportation (MTO) has developed Connecting the GGH: A Transportation Plan for the Greater Golden Horseshoe to provide a 30-year vision for mobility within and across the Greater Golden Horseshoe (GGH) and Ontario. The Plan sets out a vision and actions under four themes.

"Our vision is of a connected transportation system that provides safe, efficient and convenient options for people and businesses and supports the well-being and economic prosperity of the region into the future."

The four interconnected themes include the following:

- Fighting Grid-lock and Improving Road Performance
- Getting People Moving on a Connected Transit System
- Supporting a More Sustainable and Resilient Region
- Efficiently Moving Goods

Under each theme are a number of solutions that include new infrastructure, better services, and policies. These represent the long-term vision for the transportation system in the GGH to 2051.

To work towards achieving the vision and solutions, over 100 actions are set forth under seven goals:

- Fight Gridlock
- Improve Transit Connectivity
- •Give Users More Choice
- Keep Goods Moving
- Safe and Inclusive Transportation System
- Future Ready
- Connections Beyond the GGH

This plan will inform planning and program delivery processes for both MTO and Metrolinx. Municipalities in the GGH are encouraged to use this plan to inform future reviews and updates of their transportation master plans.

The Greenbelt Plan, 2017

The purpose of the Greenbelt Plan is to protect against loss and fragmentation of agricultural areas and to support appropriate economic diversification within agricultural areas across the Greater Golden Horseshoe.

Schedule 1 of the Greenbelt Plan designates the Glendale District as A Town/Village, which are the focus of development within the Greenbelt. Two major land use types surround Glendale District: Protected Countryside to the north; and the Niagara Escarpment Plan Area to the south. The Protected Countryside lands are the Niagara Peninsula Tender Fruit and Grape Area, as shown on Schedule 2.

Section 1.2.2 of the Greenbelt Plan outlines the goals for the Protected Countryside. Specifically, under Agricultural viability and protection is the protection of the specialty crop area. The Niagara Peninsula Tender Fruit and Grape Area is identified as a specialty crop area and a destination for and centre of agriculture focused on the agri-food sector and agritourism (1.2.2.1 b) i). For lands within the Specialty Crop Area, land use compatibility shall be achieved by avoiding or, where avoidance is not possible, minimizing and mitigating adverse impacts on the Agricultural System (3.1.2.5).

Under 3.2.1 of the Greenbelt Plan, Towns/Villages are not permitted to expand into specialty crop areas. Further under 3.4.3 lands within Towns/Villages in the Protected Countryside, are subject to the policies of the Growth Plan and continue to be governed by local policies.

Niagara Escarpment Plan (2017) Office Consolidation April 5, 2021

The Niagara Escarpment Plan compliments the natural systems identified within the Greenbelt Plan and the Oak Ridges Moraine Conservation Plan. The Glendale Secondary Plan area is located outside of the Niagara Escarpment Plan boundary but borders the Escarpment Protection Area and an Escarpment Natural Area.

The Escarpment Natural Areas are features in a natural state that are relatively undisturbed and are the most sensitive natural and scenic resources of the Escarpment. It is the objective of the NEP that these features, which include valleylands, wetlands, and woodlands are to be protected and enhanced. (Policy 1.3)

The Escarpment Protection Areas are visually prominent and have environmental significance due to their increased resilience to climate change through the provision of essential ecosystem services (Policy 1.4). Objectives of the Escarpment Protection Area are to maintain the character of the escarpment, provide a buffer to prominent features, encourage forest management, compatible recreation, conservation and educational activities; and encourage and protect agricultural lands.

Niagara Peninsula Conservation Authority

The Niagara Peninsula Conservation Authority (NPCA) is a resource management agency that protects, enhances, and sustains healthy watersheds, with a focus on flood and hazard management, source water protection, species protection, ecosystem restoration, community stewardship, and land management. The principal mandate is to protect people and property from natural hazards and to regulate development to ensure avoidance of negative impact on natural hazards, watercourses, and wetlands. Under the authority of the Conservation Authorities Act and Ontario Regulation 155/06, the NPCA has the authority to regulate development surrounding Glendale's existing watercourses.

The NPCA is in the process of reviewing and updating their Planning and Permitting Policy document which may have implications for the Glendale Secondary Plan area.

Approved Region of Niagara Official Plan, November 2022

The Region undertook a Municipal Comprehensive Review to bring its Official Plan into conformity with the Provincial Growth Plan in order to assess its future land needs and growth strategy. On November 4, 2022, the Minister of Municipal Affairs and Housing approved the Niagara Official Plan. It is now in force and in effect.

Policy 2.2.2.1 a) establishes that within urban areas, growth will be accommodated primarily through intensification in built-up areas in strategic growth areas including district plan areas. Strategic growth areas (e.g. District Plan Areas) are the highest priority for development and intensification, as well as the primary location for major public service facilities, major institutional uses, high density and mixed-use development, major office uses, major commercial uses, and major recreational uses (Policy 2.2.2.11).

The Official Plan establishes minimum density targets for strategic growth areas in the Region and identifies the Glendale Niagara District Plan as required to achieve a minimum 100 people and jobs per hectare to 2051 (Policy 2.2.2.12).

The Official Plan establishes District Plans as a tool for the Region to coordinate with local municipalities, providing a guiding framework for land using planning and design for areas of Regional significance (6.1). Section 6.1.1 establishes criteria for preparing and endorsing District Plans, coordination with Local Area Municipalities, and implementation of District Plans through municipal Official Plans via Secondary Plans. The Official Plan gives the following vision for the Glendale District Plan (Policy 6.1.3):

- Transform Glendale settlement area into a vibrant and complete community;
- Encourage a mix of uses and built form within its urban districts;
- Emphasize and integrate natural and rural surroundings reflecting the distinct character of the area; and,
- Put mobility first, with a robust transit system and active transportation routes seamlessly connecting areas north and south of the QEW.

The Glendale District shall:

- Promote a range and mix of housing in terms of affordability and built form;
- Incorporate a centrally located, accessible transit hub/station area;
- Promote sustainability and resiliency through development and redevelopment;
- Support all forms of mobility through a safe, connected transportation network;
- Protect and enhance natural features and agricultural areas;
- Leverage the proximity of the Niagara District Airport supporting social and economic links; and,
- Encourage a high quality public and private realm through a strong urban design direction.

The policies of Section 6.1.3 support the vision and direction for the Council endorsed Glendale District Plan. The District Plan provides the framework for updating the existing Glendale Secondary Plan, setting forth recommendations identified as needing to be addressed through the update to the secondary plan to ensure consistency with the District Plan. A number of key recommendations include the identification of important views and vistas, appropriate transition from urban uses to rural areas, confirmation of natural heritage features, preparation of a commercial land needs review, at-grade commercial uses long Main Street, a range of housing types to support an age-friendly community, incorporation of sustainability measures and green building design, and a detailed phasing plan.

The Region supports the development of healthy and safe communities. Under Policy 6.3.1, the Region supports planning for all ages, incomes, and abilities, creating walkable and bikeable neighbourhoods, integrating open spaces and parks, providing space for urban agriculture, co-locating public service facilities, and encouraging the implementation of a health impact assessment during the planning process. The Glendale Secondary Plan Update will include a Health

Impact Assessment as part of the study process to understand and evaluate how planning, land use, and transportation decisions have public health consequences.

A portion of the Glendale Secondary Plan area is identified in the Official Plan as a Knowledge and Innovation employment area with a minimum employment density target of 60 jobs/hectare. Policy 4.2.1.7 states that Knowledge and Innovation employment areas are clusters of higher density employment uses, including office parks, and major institutional uses. These areas will:

a) *contain a mix of complementary land uses to facilitate partnerships and promote the sharing of ideas and information;*

b) *accommodate built form that supports nearby major institutional uses and major office uses where permitted;*

c) *attain high-quality urban design;*

d) *encourage densities that are transit-supportive; and*

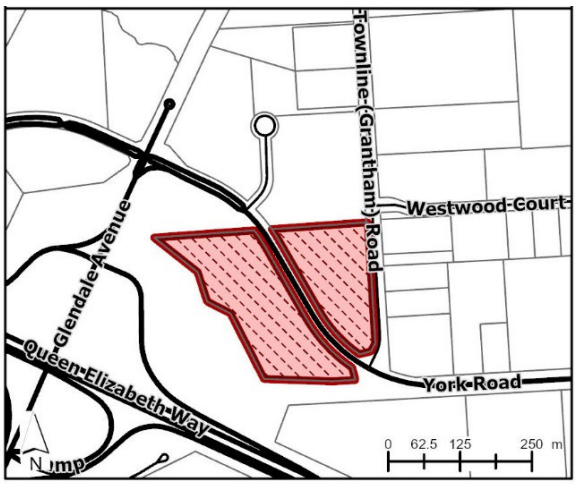
e) *incorporate active transportation facilities along active transportation networks.*

The conversion of lands within designated Employment Areas is not permitted except during the Region's municipal comprehensive review (Policy 4.2.1.11).

Employment lands are lands that are designated in Local official plans or zoning by-laws for employment uses. Employment lands may be within and outside of employment areas. Section 4.2.5 provides policies for the redevelopment of lands that are outside of designated employment areas. Policy 4.2.5.1 states *"Any proposed redevelopment of non-employment uses on employment land, outside of employment areas, shall retain space for a similar number of jobs to remain accommodated on site."*

Further under Policy 4.2.5.2 criteria for employment land redevelopment to non-employment uses may be in Local official plans. In the absence of criteria, the policy directs the use the of Region's Employment Land Redevelopment Criteria Guideline. It is also noted, that the redevelopment of employment land that may restrict the ability for adjacent existing or planned employment uses to operate or expand, is discouraged (Policy 4.2.5.3).

A site specific policy applies to lands within the Glendale Secondary Plan area under Section 8.6. The area is identified in site specific policy 8.6.5 as an Employment Area within Glendale Momentum District Employment Area. The Policy states that *"through the Glendale Secondary Plan update, technical studies may support adjusting the types of uses permitted or adjusting the boundary of Glendale Momentum District Employment Area for the identified area provided there is sufficient justification to support modification to the Region's satisfaction."*

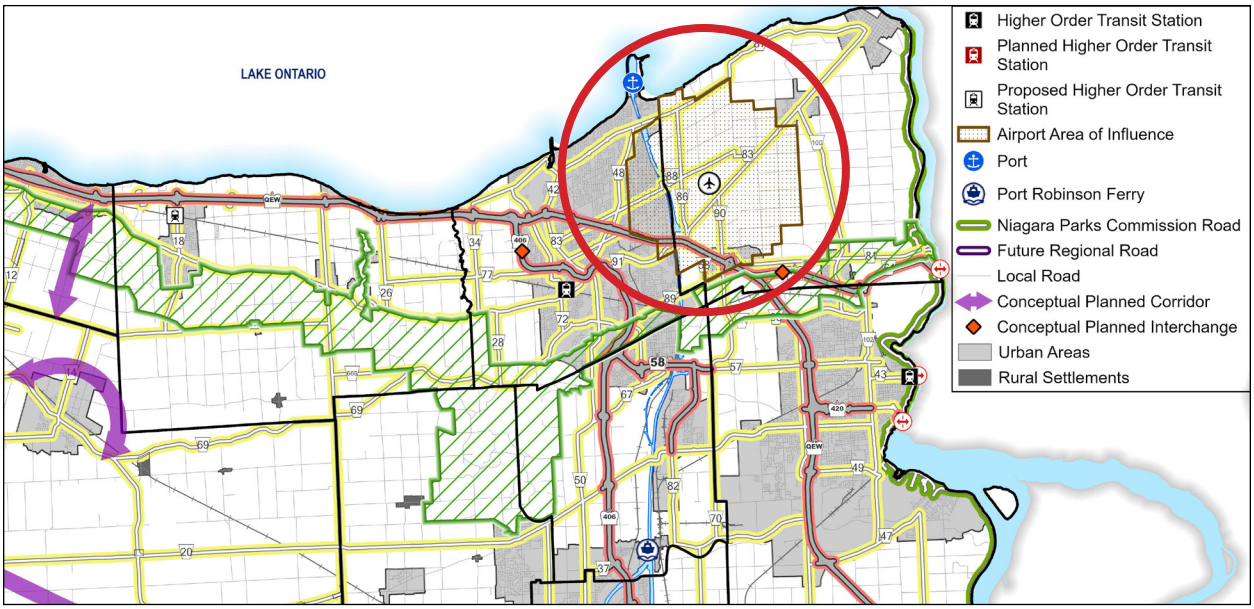


Map of lands identified in site specific Policy 8.6.5, Niagara Region Official Plan, Nov. 2022

Supporting the PPS policies regarding lands in proximity to airports, and to minimize and mitigate any adverse effects, the Official Plan, under Policy 4.2.6.5 states *"Land use permissions and zoning for lands within the airport's area of influence shall maintain the Federal Government's recommended Noise Exposure Forecast (NEF) contours where applicable and be compatible with the operations of the airport."* The Area of Influence shown on Schedule J1 of the Official Plan includes the Glendale District. The proximity of the airport to the northern boundary of the Glendale District Plan is approximately 2.4 kilometres. The efftects of the airport will be evaluated through the Secondary Plan Update process.

The Official Plan sets forth that Secondary Plans shall demonstrate how the plan will contribute towards achieving the following targets (Policy 6.1.4.8). The Glendale Secondary Plan shall meet the following:

- 20% of all new rental housing is to be affordable and 10% of all new ownership housing is to be affordable (Policy 2.3.2.3);
- Strategic Growth Area target of a minimum 100 people and jobs per hectare by 2051;
- Contribution to the Town of Niagara-on-the-Lake housing mix target.



Excerpt of Schedule J1 identifying the Airport Area of Influence. Niagara Region Official Plan, Nov. 2022

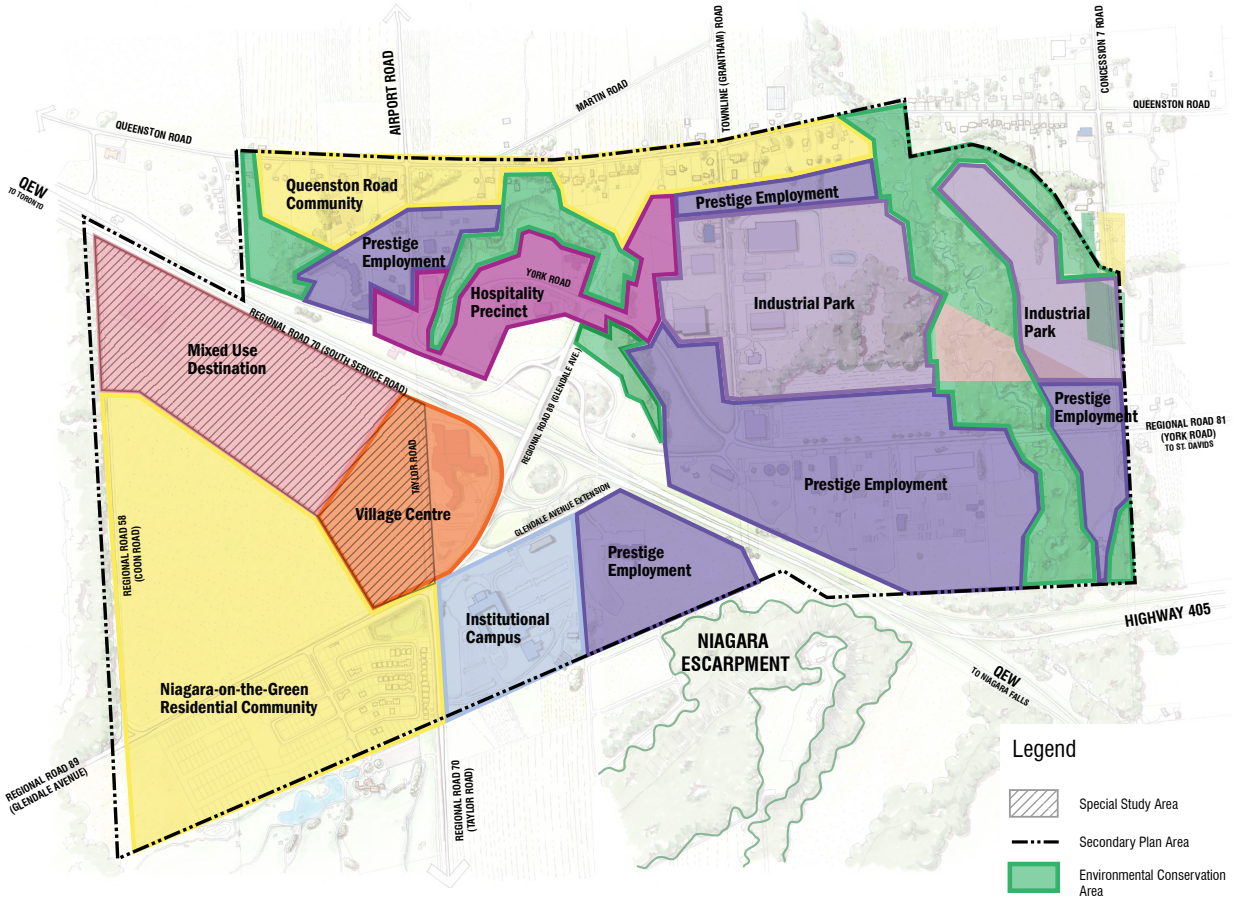
Niagara-on-the-Lake Official Plan, Amendment July 17, 2017

The Town of Niagara-on-the-Lake consists of five urban communities: Virgil, St. Davids, Queenston, Glendale, and the Old Town of Niagara, all in an agricultural setting with their settlement boundaries defined by the *Specialty Crop Area* designation. The Town's Official Plan currently sets out a general land use pattern and policies for Glendale but does not articulate a comprehensive vision or objectives for the community. A more detailed policy regime is set forth under Section 6.32 of the Official Plan and includes Special Policy Area A-7, the Glendale Secondary Plan. The Secondary Plan includes nine planning principles for Glendale, that are consistent with the Town's objectives for the area, and include: place-making and beauty; diversity; mixed uses; street walls; conservation; adaptability; built form and variety; walkable streets; and efficiency.

The intent of this Secondary Plan is to ensure "all future development and improvements in Glendale contribute to achieving a unified, holistic vision of a distinct, "walkable" community that attracts the highest order employment uses and establishes a remarkable gateway to the Town." The Glendale Secondary Plan organizes Glendale into different areas or precincts as identified in Schedule A: Land Use & Character Precincts.

Queenston Road Community – This is an existing residential area that is not expected to change significantly and acts as a buffer or transition between the existing and planned employment uses to the south and the agricultural lands to the north.

Prestige Employment Areas – A large portion of Glendale is designated for Prestige Employment



Schedule A: Land Use & Character Precincts from NOTL's Glendale Secondary Plan

uses and are intended to accommodate a range of office and industrial uses. Under Policy 3.3 a) the following uses are permitted in Prestige Employment Areas: corporate or other business office; research and development facility; manufacturing and assembly; information processing; goods distribution and warehousing; and, enclosed technical or commercial school.

Industrial Park Areas – Permitted uses in Industrial Park areas include research and development facility, manufacturing and assembly, fabrication, information processing, goods distribution and warehousing, industrial and transportation servicing and maintenance facility, and construction and agricultural equipment sales and rental facility.

Hospitality Precinct – Intended to become a focal area for hotels, restaurants, and other commercial uses catering to the travelling public and business community in Glendale. It is intended the precinct will develop a village character and distinguish itself from other highway commercial areas along the QEW. Under 3.5 (a) the following uses are permitted in the hospitality precinct: hotel; convention centre; restaurant; retail store; medical or other professional office; corporate or other business office; and, financial institution.

Mixed Use Destination Area – intended to become a major inter-Regional shopping and entertainment destination, to make Glendale a more complete community by providing amenities for residents, workers and students. Under 3.6 a) the permitted uses include: retail store; cinema; restaurant; personal or business service; medical or other professional office; financial institution; apartment and live/work dwellings; places of entertainment and amusement; health or fitness facility; micro-brewery; and, enclosed commercial school.

Village Centre – intended to accommodate a mix of uses and provide a focal point for commercial and social activities for residents, workers, students and visitors in Glendale. It includes the White Oaks Resort and Spa on a large and prominent site bounded by the QEW, Glendale Avenue and Taylor Road. Under 3.7 a) the following uses shall be permitted in the Village Centre: hotel; convention centre; recreation facilities; restaurants; retail stores; medical or other professional office; corporate or other business office; apartment and live/work dwellings; educational facility; day care centre; and, place of worship.

Institutional Campus – this area is occupied by the Niagara-on-the-Lake campus of Niagara College. Under 3.8 a) uses permitted include: College or university; enclosed technical or commercial school; research facility; student housing; day care centre; winery; accessory retail of products developed in College programs; and, other ancillary uses to a College or University.

Niagara-on-the-Green Residential Community – Niagara-on-the-Green is an existing community that will continue to develop with a mix of medium density forms of housing, including Townhouses, stacked Townhouses and low-rise apartment buildings, integrated with detached and semi-detached housing.

Environmental Conservation Areas – Any development adjacent to the environmental conservation areas which are associated with the two branches of Six Mile Creek shall be subject to the policies, regulations, and guidelines of the Niagara Peninsula Conservation Authority.

Energy and Water – Section 6 of the Secondary Plan supports objectives to provide water and waste water services in an optimal manner; to manage energy, water, and waste water efficiently; to promote renewable energy generation and reduction of non-renewable energy sources; and promote building technologies to maximize energy conservation.

Adopted Niagara-on-the-Lake Official Plan, 2019

The Council of the Town of Niagara-on-the-Lake adopted a new Official Plan for the municipality which has been sent to the Regional Municipality of Niagara for approval. Town staff are currently undertaking a conformity review of the adopted Official Plan in collaboration with Regional Staff, to address outstanding matters to ensure conformity with current Regional and Provincial policies. Specific to Glendale, the adopted Official Plan does not reference the direction for the Glendale District Plan and the Region's identification of Glendale as a strategic growth area in the Region's Official Plan.

The Niagara-on-the-Lake Official Plan sets forth the Town's vision for a sustainable future with eight strategic pillars that include a diverse economy, environmental stewardship, integrated and healthy, centre for culture, heritage and recreation, mobility choices, a well-planned built environment, sustainable agriculture, and well-managed finances. An overarching concept for the Official Plan is that of Complete Communities which is supported by sustainability, healthy neighbourhoods, housing, community infrastructure, and parks and open space systems.

The Niagara-on-the-Lake Official Plan carries forward the Town's 2011 Growth Management Strategy which maintains the current settlement boundaries but will need to be updated to reflect the Region's 2051 Population and Employment Forecasts by Local Area Municipality which identifies a population of 28,900 and 17,610 jobs for Niagara-on-the-Lake.

The Official Plan includes a policy that supports the PPS and Regional policies for lands in proximity to airports. Policy 1.4.5 states that *"Lands in the vicinity of the Niagara District Airport may be subject to Federal Airport zoning Regulations that include height restrictions due to potential aviation safety hazards."*

Glendale is one of the five Settlement Areas in the Official Plan. The OP designates Glendale as a Greenfield Area with a density target of 50 persons and jobs per hectare. This does not reflect the Region's identification of Glendale as a District Plan. The Council adopted ROP directs local municipalities to identify the applicable strategic growth area minimum density targets, which for Glendale, is a minimum density target of 100 persons and jobs per hectare by 2051.

The Glendale Secondary Plan has been carried forward from the previous Official Plan and is Appendix 5 to the OP.

Niagara-on-the-Lake Climate Change Adaptation Plan, 2022

The Town of Niagara-on-the-Lake prepared a Climate Change Adaptation Plan in response to the impacts of climate change to help the Town become more resilient. Climate change continues to put significant pressure on both natural and built environments and will be felt locally in terms of both extreme events and incremental change. Niagara-on-the-Lake will be directly impacted by extreme weather events, air quality concerns, extreme heat and cold, as well as the spread of vector and rodent born disease.

The Climate Change Adaptation Plan includes six overarching goals for the Town:

- Integrate Climate Change into Plans, Policies, By-Laws and Standards
- Build Urban Forest Resiliency
- Reduce Flooding Risks
- Incorporate Climate Change in Design and Construction
- Minimize Health and Safety Risks to Community Members
- Support Public Awareness and Education

Each goal is supported by a number of actions that the Town will take to adapt to climate change. A few of the actions are outlined below:

- Incorporate climate change projections into Engineering Design Standards.
- Promote planting of native vegetation along creeks, ravines and lakes.
- Create a flood preparedness and evacuation plan with flood alerts and mapping.
- Explore projects suitable for Low Impact Development (LID).
- Increase shade coverage in urban areas.
- Utilize Town website to convey climate change and adaptation information.

Niagara Region Smart Growth Principles and Model Urban Design Guidelines, 2005

The Region Model Urban Design Guidelines assist with facilitating development and redevelopment that supports the broad implementation of the Region's Smart Growth principles. The ten Smart Growth Principles include:

- Create a mix of land uses
- Promote compact built form
- Offer a range of housing opportunities and choices
- Produce walkable neighbourhoods and communities
- Foster attractive communities and a sense of place
- Preserve farmland and natural resources
- Direct development into existing communities
- Provide a variety of transportation choices
- Make development predictable and cost effective
- Encourage community stakeholder collaboration

Glendale Niagara District Cultural Heritage Resource Assessment Study Existing Conditions Report, 2018

The built heritage and cultural heritage was assessed as input to the Visioning Exercise completed as input to the District Plan. The report describes the existing conditions of the study area, includes an inventory of potential cultural heritage resources, and proposes mitigation measures and recommendations for minimizing and avoiding potential negative impacts to identified potential cultural heritage resources.

The background research, data collection, and field review conducted for the study area determined that there are:

- five existing municipal cultural heritage resources, three resources recognized by other jurisdictions and
- 14 potential cultural heritage resources located within or adjacent to the Glendale District study area

Of the 22 resources identified, 18 are built heritage resources and four are cultural heritage landscapes. The potential cultural heritage resources represent a rural land use history within the study area dating back to the late-1700s. The Report identified that the existing and identified potential cultural heritage resources could be candidates for conservation and integration into future land uses in the secondary plan area and should be subject to cultural heritage impact assessments during subsequent development planning applications.

Legislative changes

The following are recent legislative changes that should be addressed as part of the secondary plan.

Bill 108/197: More Homes, More Choice Act

In addition to the changes to Section 37 of the *Planning Act*, Bill 108/197 introduces the requirement that municipalities authorize in their Official Plan and Zoning By-Law the use of 'additional residential units' in detached, semi-detached, and row houses, and in an ancillary building or structure (e.g., above laneway garages or coach houses), totalling three residential units on the property.

BILL 109: More Homes for Everyone Act, 2022

Bill 109 has introduced amendments to the *Planning Act* that include:

- Requiring municipalities to provide refunds for zoning by-law amendment and site plan application fees where no decision is made during the statutory timeframe. Changes to application timelines and new refund requirements take effect on January 1, 2023;
- The introduction of a new ministerial zoning tool, the Community Infrastructure and Housing Accelerator (CIHA). The CIHA tool permits the Minister to make a zoning order at the request of the municipality, by Council resolution. CIHAs can be used to regulate the use of land and the location, height, size and spacing of buildings and structures to permit certain types of development ;
- An established 5 year review process for community benefit charge ("CBC") by-laws;
- Amendments to parkland requirements on lands designated as Transit-Oriented Communities (TOC); and,
- Empowering the Minister with new powers regarding certain official plan amendments and new official plans.

Future legislative changes will be assessed as the secondary plan update progresses.

Key Discussion Points/ Opportunities

The review of the existing Provincial, Regional, and Local policy frameworks has established a series of key discussion points for the update of the Glendale Secondary Plan.

Complete Communities

To support complete communities, the key principles for growth management in Niagara-on-the-Lake are to encourage opportunities for intensification and mixed use development, and plan for new communities which are compact, well connected, and provide a range of housing opportunities.

Provincial policy is clear about where and how residential growth should occur. The Growth Plan establishes long term planning objectives related to the location of new growth and allocation of resources. The Growth Plan directs major growth to Urban Growth Centres in the Greater Golden Horseshoe which are to be planned for a broad range of land uses, including major transit infrastructure, high-density employment, and population growth.

Employment

Provincial and Regional policy frameworks place a strong emphasis on promoting economic development and competitiveness by ensuring that sufficient and appropriate sites are available for employment uses. Further, Provincial policy provides clear direction on the need to protect and promote employment areas for current and future employment uses. The Province and Region direct a significant portion of employment growth to Primary Settlement Areas and encourage the efficient use of employment areas by increasing employment densities.

Commercial development is a fundamental part of a complete community. Retail and service commercial uses, accommodations and restaurants create agglomerations of activity that are both highly utilized by businesses and residents and cherished as social centres. These facilities are important in establishing the character of the Town. Planning for these uses is an important municipal activity because there is a strong desire to ensure the maximum commercial opportunity and choice for residents, businesses, and tourists, while attempting to manage those opportunities to ensure healthy competition.

Provincial policy states that accommodating an appropriate range and mix of employment including commercial is important for creating a healthy and livable community. Commercial land uses need to occur within settlement areas and should be supported by transit and active transportation. In addition, the retail sector will be supported by promoting compact built form and intensification, encouraging the integration of those uses with other land uses to support the achievement of complete communities.

Employment conversion in designated Employment Areas to non-employment uses may be permitted only through a Municipal Comprehensive Review. The Region's Municipal Comprehensive Review was recently completed, and Employment Areas are now identified in Schedule G of the Niagara Official Plan. Conversions are therefore not permitted outside of the next Municipal Comprehensive Review, with the exception of the lands identified in site specific policy 8.6.5 of the Official Plan. The use of these lands for employment will be reviewed as part of the secondary plan update.

Outside of the employment areas identified in the Niagara Official Plan, the viability for employment land conversion in the Glendale District will be based on satisfying the criteria established by the PPS and the Growth Plan, and Niagara Official Plan, along with the findings and recommendations from the Commercial & Employment Land Needs review.

Housing

Ensuring the availability of a full range of housing options is critical in meeting the needs of current and future residents of all incomes, ages, lifestyles, and abilities. A diversity of housing types will assist the Town in welcoming new residents and make it possible for them to stay within their community as their needs and preferences change throughout their lifecycle. Providing for a sufficient supply of affordable housing is also

an important goal, and recognized by Niagara Region, with the Niagara Official Plan stating that a minimum of 20 percent of new rental housing and 10% of new ownership housing units across the Region must be affordable.

Further, one of the key directions of the District Plan is to provide a diverse range of housing to ensure choice and affordability. The Glendale Secondary Plan update should maximize the use of municipal land resources, and provide planning policy that supports 'intrinsically affordable' housing opportunities (housing that is generally more affordable because of higher density and smaller units) and integrate more medium and higher density housing, purpose-built rental, and mixed-use buildings to diversify the housing options within the study area.

Policy should also be provided to facilitate additional residential units in detached, semi-detached, and row houses, and in an ancillary building or structure in the Glendale Secondary Plan area. This has the potential to help increase the range of housing options and in particular introduce additional rental options, particularly for students attending Niagara College. Housing options for Niagara College students will need to be further explored with consideration to integrate purpose-built student housing within the secondary plan area.

With respect to the policy review, it is clear that there is significant coordination among Provincial, Region, and Town planning documents with respect to the issue of the provision of a full range and mix of housing options. Housing is dealt with in direct policy statements that require a range and mix of housing options, as well as through the provision of a minimum residential greenfield density requirement and the requirement for a minimum amount of residential growth in District Plan areas.

Secondary Plan Targets

The Region has established minimum density targets for strategic growth areas in the Region and identifies the Glendale Niagara District Plan as required to achieve a minimum 100 people and jobs per hectare to 2051. In addition, a portion of the Glendale District Plan is identified as a Knowledge and Innovation employment area with a minimum employment density target of 60 jobs/hectare. The affordable housing targets are discussed above, under Housing.

Community Design

Growth will play an important role in providing a full range of housing forms, while also contributing to a dynamic community, and increased support for local businesses. With the introduction of new housing development and intensified built forms, it will be increasingly important to support measures which ensure that new development fit within the vision for Glendale.

Community design considerations are related to compatible housing forms and appropriate transitions at the edges of residential communities and abutting Natural Heritage Systems. Further, new development must support a built form that transitions from higher to lower densities, promotes a mix of housing sizes, and creates attractive streetscapes. Community design policies are geared towards creating an attractive streetscape, protecting, and enhancing heritage resources and focal features, creating a sense of place, preserving scenic features, and improving pedestrian comfort.

Urban design will be an integral component of the Secondary Plan; the urban design framework should provide guidance for the design of built form and the public realm to ensure that the character and mixed-use function of the community is enhanced. Urban design will direct and shape the ongoing development of Glendale in a balanced manner.

A high quality and ultimately a beautiful community includes well designed buildings, streetscapes, parks and open spaces. Policies for a beautiful community should protect natural heritage features and viewscapes and include an accessible and well-designed system of public parks and open spaces that celebrate the site and provide opportunities for enjoyment by the entire population. Polices for a high-quality community should include destinations, landmarks, and gateways that distinguish Glendale within its context and establish a sense of place.

The Glendale Secondary Plan is located within a unique and beautiful natural setting adjacent to

significant natural heritage features, vineyards, and the Niagara Escarpment. The pattern of streets must be oriented to these features and provide the opportunity, through streetscape enhancements and redevelopment, to protect and elevate their presence within the plan area and provide both physical, as well as visual connections to these areas.

Cultural Heritage

Cultural heritage resources play a valuable role in providing communities with a sense of identity and reconnecting communities with their past. It is further critical to coordinate and work with Indigenous communities to ensure that they are involved in matters in which they have an interest, and that cultural heritage resources, sites and traditions are properly protected for future generations. The preservation of these resources can make important contributions to place-making and establish a unique architectural character in communities, which helps foster a sense of pride and supports a pleasant and interesting public realm.

Cultural heritage resources frequently support place-making and the creation of a unique character, which is especially valuable in areas experiencing intensification, as a way to balance new development.

Cultural heritage conservation is supported by Provincial and Regional policy frameworks. These policy frameworks require Niagara-on-the-Lake to conserve significant cultural heritage resources, cultural heritage landscapes, and archaeological resources and identify the important role they play in fostering a sense of place, particularly in high growth areas. Further, Provincial policy requires that development on lands adjacent to protected heritage property ensure that the heritage resources are conserved.

Provincial policy now also provides important emphasis on the need to engage with Indigenous communities, recognizing and considering their interests in identifying, protecting, and managing cultural heritage and archaeological resources. Provincial policy further encourages municipalities to consider and promote archaeological management plans and cultural plans and consider them in their decision-making.

Public Service Facilities and Neighbourhood Nodes

It is important to encourage and facilitate the coordinated development, maintenance, and expansion of public service facilities to meet the needs of residents, regardless of age, physical ability, and financial means. Locating public service facilities in mixed use neighbourhood nodes, where transit is available or planned, or in proximity to higher density residential communities, supports the vitality of those communities, contributes to quality of life/quality of place and facilitates access by all residents. Public service facilities are an important component of creating complete communities, by serving the social, health, educational, recreational, cultural, and other needs of local residents.

In addition to incorporating public service facilities, neighbourhood nodes can also include local commercial uses. These types of local, neighbourhood-supportive uses also play an important role in creating complete communities and healthy lifestyles and can support the use of active transportation for meeting daily needs.

The availability and access to public services and amenities for residents of all incomes, ages and abilities is also important for maintaining a high quality of life and a sense of community and belonging. The District Plan identified a key direction to create public/civic space as a focus for Glendale. A community hub will be an important central focus for the community, offering a location for service providers, such as public health, police services, daycare or a library site. The community hub may also include recreational facilities or parkland to support social interaction and active living. The Glendale District Plan recommended that the community hub be co-located with a transit hub.

The need for an elementary or secondary school site will be determined through discussions with the School Boards. The anticipated population for the secondary plan area may trigger a school site and this requirement will need to be evaluated to determine the need.

Provincial policy directs that priority should be given to locating public service facilities

in community hubs, such as the main streets or mixed use corridors, where they are easily accessible to a significant population through active transportation and transit. Provincial and Regional policy further emphasize the importance of planning for complete communities, which includes providing a broad range of uses to meet daily needs and which are accessible by a range of transportation options.

Public Realm Design

The design of the public realm plays an incredibly important role in defining the community character and presenting an attractive and successful image to residents and visitors. Good design can improve the walkability/bikeability of the Glendale, attract visitors and customers for local businesses, spur private investment, and generally improve Niagara-on-the-Lakes's quality of life.

The Provincial and Regional policy frameworks generally support a high quality of urban design, and particularly emphasize the need for good design in downtowns and other higher density mixed use areas. Additionally, there is significant policy support for ensuring that public rights-of-way are designed in a way that supports active transportation, prioritizes pedestrian comfort and safety, and incorporates green infrastructure where appropriate.

Sustainability

A sustainable community is environmentally and socially healthy and resilient. It meets the challenges of climate change and other environmental issues through integrated solutions, rather than through fragmented, incremental approaches that meet one objective at the expense of the others. A sustainable community manages its human, natural, and financial resources equitably and takes a long-term view – one that is focused on both present and future generations. Sustainability success relies upon having specific and measurable targets for indicators related to climate change, energy use, water, and waste.

Sustainability has become an issue of ever increasing importance due to, and not limited to, climate change, rising greenhouse gas emissions, aging populations, resource depletion, and increasing public health challenges, all related to the way in which we interact with our built and natural environments. The evidence of the linkage between improvements to both sustainability and public health through meaningful interventions in community design has made significant progress in recent years. The limited supply of land for development within urban boundaries and the current pattern of development in many municipalities is placing a strain on the natural environment and the health of residents. The nature and shape of development needs to change to respond to these limits if we are to achieve any meaningful sustainable measures.

With respect to the policy review there is clear direction from the Province and Region to mitigate the impacts of a changing climate by supporting water and energy conservation, planning for efficient land use and development patterns, supporting the use of alternative transportation modes, and embracing the use of green infrastructure and natural areas for water infiltration. It is increasingly recognized by the various policy documents that past and in some cases current development patterns are no longer a sustainable way to grow and that municipalities, including Niagara-on-the-Lake, must shift to a more compact built form and find ways to reduce impacts on the natural environment.

Climate Change Mitigation and Resilience

Climate change is a direct consequence of elevated greenhouse gas (GHG) concentrations in the atmosphere and feedback mechanisms. The largest sources of GHGs are emitted from the combustion of fossil fuels to make energy, including heat and electricity. After transportation, manufacturing is responsible for a significant slice of this pie, followed closely by houses, shops, schools, and other private and public buildings.

To minimize the rise of global temperatures and other climate change related impacts, there is an urgent need to promote the reduction of greenhouse gas emissions and improve community resiliency in land use planning. The need for resiliency is becoming more urgent as communities like Niagara-on-the-Lake experience the impacts of a changing climate, such as weather extremes, severe storm events, economic disruption, and resource depletion.

The Provincial and Regional policy frameworks direct municipalities to plan for the impacts of a changing climate, and Provincial policy in particular has placed a stronger emphasis on this

concern with its most recent Growth Plan and Provincial Policy Statement. One of the guiding principles of the Growth Plan specifically cites integrating climate change considerations and minimizing greenhouse gas emissions, and there is also an emphasis on ensuring that the impacts of a changing climate are considered in planning for infrastructure investments. The Growth Plan further directs municipalities to identify actions to reduce greenhouse gas emissions and address climate change adaptation, such as creating complete communities and promoting active transportation, and encourages the development of greenhouse gas inventories and reduction targets.

Healthy Communities

Healthy communities are a priority for Niagara-on-the-Lake. A supportive, inclusive, and healthy community ensures the well-being of residents by providing all the pieces they need to thrive and meet their basic needs of food, shelter, water, income, and safety. A healthy community not only meets basic needs but provides a high quality living environment, access to public health services, a variety of experiences, support of cultural heritage, a vibrant economy, and a healthy ecosystem.

A healthy community consciously seeks to improve the health of its citizens by putting public health high on the social and political agenda. Physical, social, and mental well-being are the necessary components of public health, and the built environment should be designed to ensure access to healthy food, clean air and water, safe environments, and opportunities for physical activity.

Public health and land use planning are intrinsically linked, bringing to the forefront several public health challenges related to the way in which we interact with our built and natural environments. Built environments that encourage physical activity can reduce the incidence of diseases such as obesity, cardiovascular disease, diabetes, asthma, and respiratory disease and contribute to better overall public health. Public health considerations must become part of policy development and integrated with design and built form policies and guidelines.

Key considerations for healthy community design include community structure, street connectivity, streetscaping, building orientation, how parking is provided, land use mix, variety of parks and trails, and access to services and amenities. Other considerations include sustainable design (e.g., passive solar orientation, Low Impact Development), active transportation, and Crime Prevention Through Environmental Design (CPTED).

An accessible, animated and varied hierarchy of park spaces is vital to promoting a healthy community and important to fostering a strong sense of place within Glendale. Well designed, interesting and unique park spaces where people go to rest, relax, play, walk their dogs, eat lunch, enjoy the landscape, and access community amenities, become the jewels of the community and are crucial components of the Public Realm Network. These spaces must support a variety of special, seasonal and daily activities, their design must reflect their context and enhance the character of the Glendale Secondary Plan area.

Provincial and Regional planning frameworks provide some direction for healthy communities. However, it is not one single action or policy topic that will define or lead to the achievement of a healthy community, but rather an approach to implementation that considers all the sections of the Secondary Plan comprehensively.

A high quality, well-designed built environment is valued within Niagara-on-the-Lake. To support this environment Niagara-on-the-Lake promotes complete communities that include a diverse mix of land uses, a range and mix of housing types and tenures, employment opportunities, high quality public open spaces, amenities and services, and active transportation options.

Sustainable Transportation

Recent trends in land use and transportation planning, as well as public health research, emphasize the importance of ensuring the provision of a well-connected, attractive, and functional multi-modal system to provide more balanced access to alternative transportation modes. Alternative transportation modes, including walking, cycling and transit, will become increasingly important within Niagara-on-the-Lake as more intensified development occurs and as a means to increase the accessibility of all residents.

There is the opportunity to support a full spectrum of mobility options for all residents and improved connectivity within a fully integrated network. This is an essential element of planning for sustained transportation methods and healthier lifestyles. Providing enhanced mobility for people of all ages means understanding opportunities to make any type of street a “complete street”. Complete streets provide pleasing pedestrian experiences, improved safety for cyclists and enhanced opportunities for active transportation, all while ensuring the efficient movement of goods, transit, and passenger vehicles within a balanced right-of-way.

Provincial, Regional, and Local policies require the need to meet the transportation needs of all users, irrespective of mode, including the implementation of a ‘complete streets’ approach. Further, a priority of the Town is to enhance the multi-modal connectivity for residents throughout the Town’s settlement areas and to the wider region, which will better facilitate access to jobs, services, recreation, and housing.

Niagara College and Student Population

The Daniel J. Patterson campus of Niagara College is located at Glendale Avenue and the Queen Elizabeth Way. The college has a student population of approximately 4500 students with an estimated 500 students living on campus in the student residence and in off-campus housing in the study area. The student population provides immediate users for the existing facilities and amenities in Glendale, supporting many businesses.

The college is also surrounded by many natural features of the Niagara Escarpment, and includes on-site vineyards, greenhouses, and field nursery operations.

The Niagara College campus generates additional visitation to the area and could help to attract complementary businesses. The campus has considerable lands capable of accommodating expansion opportunities.

Landowner Interviews

One-on-one conversations with Glendale District Plan landowners or their representatives were undertaken in September of 2022. The purpose of the conversations was to provide a better understanding of the development plans and/or application status.

Discussions included where the landowner was in the development process, current use of the property, the intent or vision for the property, and description of proposal or application.

These one-on-one interviews afforded the consulting team with a better understanding of the direction of development applications in the secondary plan area and how to accommodate the uses.

Development Activity

One on one conversations with landowners or their representatives:

1 Niagara on the Green

2 White Oaks

3 Niagara College

4 Northwest corner of Airport Road and York Road

5 349 Airport Road

6 North side of York Road, east of Airport Road

7 Vrancor – hotel and lands to the north and south of York Road

8 West side of Townline Road, north of York

9 475-481 Queenston Road

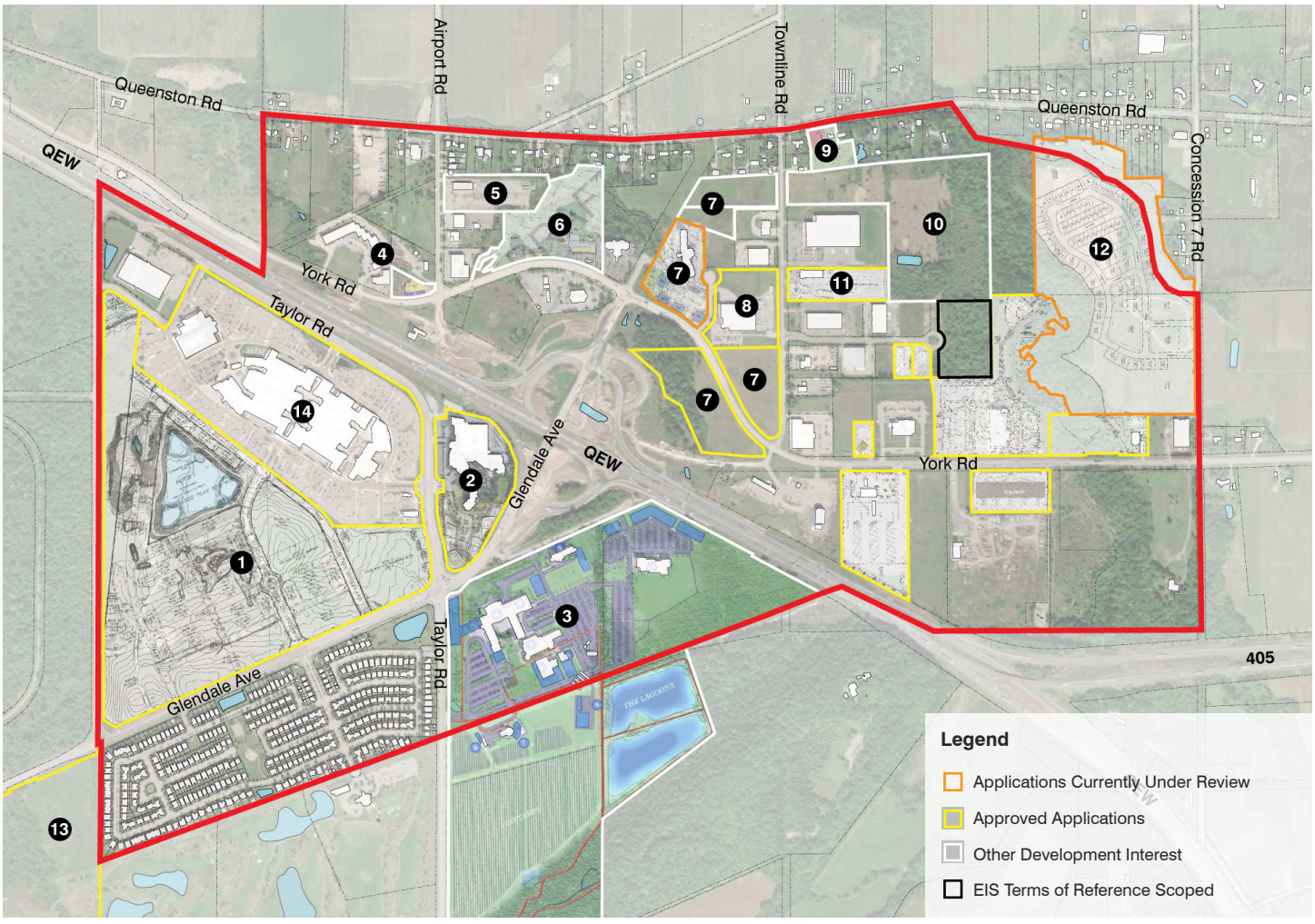
10 353 Townline Road

11 335Townline Road,Miller Paving

12 Hummel Properties (Modero Estates)

13 Kaneff lands (outside of the Secondary Plan area, south of Glendale Road)

14 Outlet Collection at Niagara



Map of development activity in the Study Area


345

2 Commercial & Employment

Commercial & Institutional

There is limited commercial development serving the residents of the Glendale area today. Outlet Collection at Niagara is a major retail centre, but it is primarily oriented to providing specialized retail items to the regional market and tourists. The absence of local-serving retail facilities is largely due to the lack of a concentrated residential population in the area. A commercial structure is situated on the south of side of York Road, west of Glendale Avenue, and is comprised of a gas station and fast-food establishments. Consistent with the string of employment uses that dominate the northern region of Glendale today, these commercial establishments primarily serve the highway interchange.

The remaining commercial uses in Glendale are located in the Outlet Collection. As a large open-air shopping centre with over one hundred brands, this commercial hub draws people from across the Region and beyond, rather than catering to the commercial needs of local residents. The existing composition of stores at the Centre—mainly apparel and miscellaneous retailers—further highlights its role as a destination attraction.

The Niagara Outlet Mall is located less than one kilometer northwest of the developing Niagara-on-the-Green residential community. This community has created a foundation for more local-serving retail/service commercial uses that support the daily and ongoing needs of people living and visiting the area.

Opportunities

- The Glendale Secondary Plan Area has developed into a major visitor node for the Niagara Region, anchored by the Niagara Outlet Centre, White Oaks Resort and Spa, other hotels and complementary commercial services. These attractions will draw many tourists to the area, including overnight visitors. There may be an opportunity to add services to the area to support the visitor population.
- The Niagara College campus generates additional visitation to the area and could help to attract complementary businesses. The campus has considerable lands capable of accommodating expansion opportunities.
- There are currently some 646,400 square feet of retail/service commercial space in the Glendale SP Area. Some 546,500 square feet (84.5%) of this space is located at the Niagara Outlet Centre, which services residents, visitors and tourists from well beyond the Glendale SP Area. The remaining 100,000 square feet is distributed across the Glendale SP Area.
- As detailed in the table below, this space is largely comprised of Non-Food Store Retail space and Services space—much of which is contained in business and industrial buildings along York Road, just north of the QEW.

Outlet Collection	**84.5%**
Other Secondary Plan Area	**15.5%**
FSR	
BWL	
NFSR	7.3%
SERVICES	7.9%
VACANT	0.2%
Grand Total	**100%**

Table of Retail/Service Commercial Space (source: urbanMetrics inc. based on desktop inventory completed July 2022)

- Despite the large commercial space inventory, the area is lacking in retail outlets and services required to serve the day-to-day and weekly shopping necessary to support a residential neighbourhood. As residential development occurs, there will be a need to increase local commercial facilities, notably a major food operator, such as a supermarket. The large number of visitors already drawn to the area will help to support a larger concentration of local retail and services space than would the residential population on its own.
- The White Oaks Resort, Niagara College, the Niagara Outlet Centre and the Niagara-on-

the-Green residential community represent four established but distinct precincts on the south side of the QEW. However, each area is isolated from the broader community and is integrated within their own network of roadways and amenities.

- As a start, Niagara-on-the-Green Boulevard would link the existing neighbourhood with the Niagara Outlet Centre. Transforming the Boulevard into a commercial street presents an opportunity to integrate existing activities and establish a more walkable, pedestrian-oriented streetscape for residents and visitors.

- Further to above, commercial development along Niagara-on-the-Green Boulevard presents an opportunity to create a distinct sense of place, that complements existing regional serving uses and introduces local-serving shopping opportunities for residents. It may also increase the attractiveness of surrounding residential and employment lands, by providing key services in an attractive setting.

- It is anticipated that there will be some opportunity for local-serving retail/service commercial to be integrated as part of larger mixed-use developments, in addition to community/neighbourhood nodes. These sites will further support future residents and visitors by introducing a range of goods and services at optimal locations, which are tailored to support the day-to-day shopping needs for residents. By integrating local-serving uses at strategic locations throughout Glendale, these uses will also help achieve a complete community by introducing more convenient shopping opportunities (e.g., pharmacy, convenient store, food services etc.) for residents

Constraints

- As noted above, the most significant constraint is the fact that the Secondary Plan Area lacks internal connectivity. The QEW represents a significant barrier between the north and south sides of the district. Even within the southside, the major uses tend to operate independently of each other with internal road systems. In our opinion, to enhance commercial opportunities, increased connectivity for pedestrians, active transportation and vehicular movement is required.

- The Glendale Secondary Plan Area contains a large commercial centre: the Niagara Outlet Mall. This major retail centre hosts significant retail attractions including Bass Pro Shops, Nike Factory Store, Marshalls, Saks Fifth Avenue, Coach Outlet, Gap Factory Store. It is a notably large, open air mall that is easily accessible off of the Glendale Road / QEW exist. It serves as a unique tourist and visitor attraction for Glendale, Niagara-on-the-Lake and southern Ontario more broadly.

  Some potential retail/service commercial facilities integrated in the Glendale Secondary Plan will likely need to compete with established regional scale retail stores for a share of Glendale resident's expenditures. While the Niagara Outlet Centre relies on a population well beyond the Secondary Plan market, it nonetheless will derive a portion of its sales from Glendale residents, impacting the demand for targeted local serving retail stores elsewhere in the area.

- The amount of commercial space that can be developed on Niagara-on-the-Green Boulevard, will be limited by the future population and existing neighbourhoods, as well as, being separated from future residential development north of the QEW. Development of a vibrant Main Street will require enhanced connectivity and the attraction of tourists and other visitors from outside of the Secondary Plan Area.

- The District Plan designates the northern portion of Glendale Avenue as *Mixed-Use Medium*, extending east and west from Niagara-on-the-Green Boulevard.

  Glendale Avenue is not currently a conducive street for retail uses as it is an arterial road connecting with an expressway and an important route into the St. Catharines urban area. It is likely not appropriate for on-street parking to serve shops and services. In addition, the market for local retail uses and services is limited by population growth. The suitability of commercial uses on Glendale Avenue will be reviewed as additional information is available (i.e., transportation review, surrounding population etc.). It could be advantageous to concentrate local serving retail and service uses along Niagara-on-the-Green Boulevard rather than to dilute the market by extending them along Glendale Avenue.

  In addition, the parcel designated *Mixed-Use Medium* at the northeastern corner of Glendale Avenue and Homer Road abuts a conservation area, which likely restricts any future development on the western portion of Homer Road. This further limits the capacity of any ground floor retail on Homer Road to attract sufficient pedestrian traffic.

  Future retail opportunities South of the QEW could be concentrated on Niagara-on-the-Green Boulevard, rather than diluting the market by also placing them on Glendale Boulevard.

Employment

Glendale currently hosts the majority of the Town's industrial employment land, primarily clustered on the north side of the QEW. Existing industrial uses located in the Glendale area include warehouses, a depot for waste collection vehicles, road maintenance and distribution facilities, and a variety of other small general industrial uses. Each of these uses contain a relatively small built form despite being located on large parcels of land. They are also located in proximity to the highway interchange and benefit from direct access to major roadways.

Lands surrounding existing employment lands—internal to the Glendale area—largely cater to existing employment uses and are key to funnelling trucks and employment-related infrastructure from industrial sites. Conversely, the area surrounding the Glendale area is predominantly rural and includes prime agricultural lands and vineyards, in addition to lands that can and may accommodate commercial and hospitality uses.

Opportunities

- Both St. Catharines and Niagara Falls have a constrained supply of employment lands. The Glendale Employment lands are well located in proximity to a major highway interchange on the route to the US Niagara border crossings. As we understand, there are a growing number of inquiries for lands in the area that cannot be accommodated in other nearby communities.
- Glendale already has a small core of small to mid-sized businesses, a number of which (e.g., industrial services, waste management, road construction companies, industrial suppliers) play an important role in serving Niagara Region. The proposed industrial subdivision on an 11-hectare parcel at 353 Townline Road may help to bolster this role.
- Existing and future employment uses also benefit from their proximity to Niagara College, representing a source of local labour, investment and opportunity for businesses.

- While there is a small industrial area in Virgil, it lacks highway exposure and has a very limited vacant land supply. The employment lands in Glendale will be important to maintaining a diverse range of employment opportunities within Niagara-on-the-Lake in the future.
- Glendale is home to Niagara College. The proximity of Niagara College, and its ability to foster research and innovation in fields such as mechanical engineering, business administration and environmental and horticulture studies, offers ongoing opportunity for collaboration with new and existing start-ups and businesses in Glendale and Niagara Region. It also provides regular access to skilled labour and opportunities to diversify the local and broader economy.
- As an area classified as a Knowledge and Innovation Employment Area, the Region and local municipalities are also anticipated to direct major office uses, office parks and major institutional uses to Glendale. This will further support economic growth, the viability of employment uses in this area of Niagara-on-the-Lake and the unique opportunity for higher density employment going forward.

Constraints

- There is limited availability of vacant employment land in Glendale and the broader Town of Niagara-on-the-Lake (NOTL). According to the June 2022 Land Needs Assessment ("LNA") prepared by Niagara Region, there are approximately 32 hectares of vacant employment land in Glendale, and a total of 37 hectares in NOTL.
- Employment land parcels in the Glendale Secondary Plan area are small (generally less than 5 hectares in size) and are limited in their ability to accommodate the full range of employment uses that are seeking a site in Niagara Region.
- According to ICI real estate brokers in Niagara Region, interest in employment land in the Region is driven by companies seeking lands 8 to 16 hectares in size for immediate development and up to 32 hectares for long-term development. Generally, lands need to be at least 6 hectares to garner interest from larger occupiers, above the average size of remaining vacant parcels in the Glendale SP.
- Many vacant employment parcels in Glendale are constrained by their proximity to environmental protection areas. Environmental areas may present unexpected development constraints, as well as potentially extend project timelines tied to risk and mitigation of sensitive areas. In particular, the lands designated for Industrial Park and Prestige Employment uses in the existing Glendale Secondary Plan situated in the eastern part of the area are completely surrounded by environmental lands and isolated from the balance of employment lands. Furthermore, unlike the balance of employment lands, they are poorly positioned with respect to the QEW. We would concur with the Glendale District Plan that these lands are better suited for residential uses.
- The LNA indicates that approximately 17% of the anticipated employment growth in NOTL will be through office/major office type employment. However, local brokers indicate that there has been minimal interest in the office market in the Niagara Region. This confirms previous work urbanMetrics has undertaken in Niagara Region. While office should be a permitted use in parts of the Secondary Plan, there should be enough flexibility to provide for alternative land uses.
- Prospective employment land users favour other municipalities in Niagara Region over NOTL, such as Welland and West Lincoln, which are less constrained.

Key Directions

- Planning for the Glendale Area should strive to achieve greater internal connectivity, particularly between the major uses on the south side of the QEW.
- There will be a need to provide for additional uses to accommodate day-to-day and weekly shopping once the residential components have been built out. A population of approximately 10,000 persons would warrant the establishment of a new supermarket or comparable major food store in the Glendale SP Area.
- A new supermarket should be developed in line with market growth in the area. The industry average for Supermarket and Grocery Store space ranges between 3.0 and 4.0 square feet per capita, meaning a minimum population of 10,000 residents should be achieved prior to the development of a full supermarket.
- The Niagara College campus generates additional visitation to the area and could help to attract complementary businesses. The campus has considerable lands capable of accommodating expansion opportunities.
- Niagara-on-the-Green Boulevard represents an opportunity to add additional local serving commercial space and assist in connecting the land uses south of the QEW.
- Glendale Avenue is not a conducive street for retail uses as it is an arterial road connecting with an expressway and an important route into the St. Catharines urban area. The suitability of commercial uses on Glendale Avenue will be reviewed as additional information is available (i.e., transportation review, surrounding population etc.)
- In general, lands designated for employment uses within the Glendale District Plan should be preserved, although there are some lands that are not well positioned for industrial and related uses and could be converted to residential or mixed use. Glendale's employment district is an economic hub of the Town of Niagara-on-the-Lake and helps to diversify the local economy beyond tourist and agricultural activities. In our opinion, the lands at the eastern edge of the Glendale Secondary Plan area at Concession 7 Road - North of York Road are appropriate for the conversion for residential and mixed-use development given that they are physically separated from other existing employment uses and are located adjacent to a significant Environmental Protection Area at the periphery of the larger planned area. Other properties may be suitable for conversion depending on their ability to accommodate future employment uses but should be evaluated on a site-by-site basis.
- Although the LNA lists a surplus of 10 hectares of employment land in the Town of Niagara-on-the-Lake, in our professional opinion, this surplus is insufficient to justify major conversions that would significantly reduce the overall availability of employment lands. There is minimal room for growth of the employment area beyond the existing designated zones. Major conversions of the designated employment lands limit the potential prospects for employment uses as part of Glendale's economic growth and diversification.

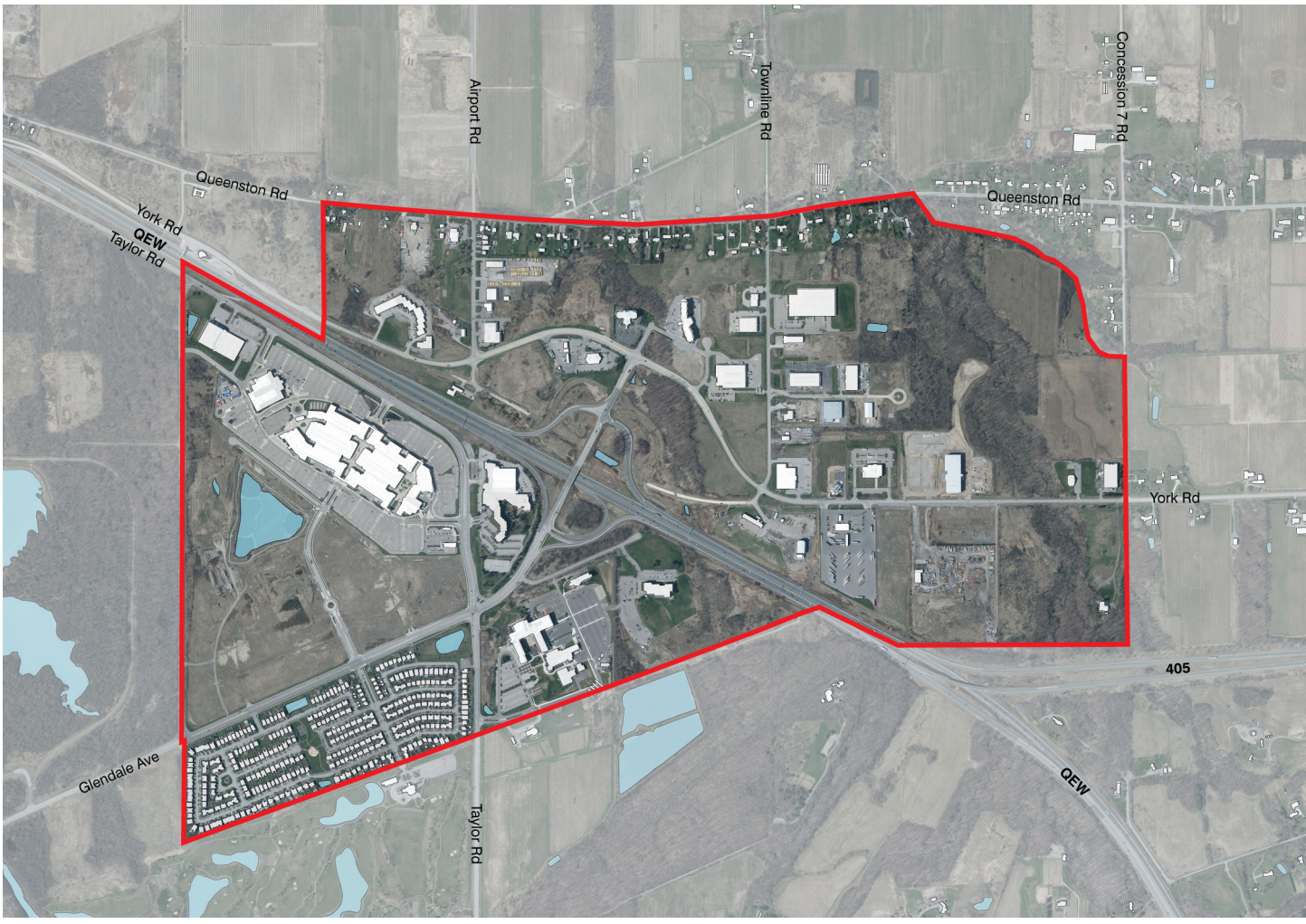
3 Subwatershed Study

Preliminary Characterization & Constraint Assessment

Introduction

The Glendale Secondary Plan Area, within the Town of Niagara-On-The-Lake, straddles the boundaries between the Beaver Dam Schiner's Creek (BDSC) Welland Canal North, the Eight Mile Creek and Six Mile Creek Watersheds. The Region of Niagara has initiated a Subwatershed Study to support the preparation of a Secondary Plan for the future development within the Glendale Secondary Plan Area (study area). The study area is generally bounded by Homer Road to the west, Concession 7 Road to the east, Queenston Road to the north, and encompasses some lands south of Glendale Avenue at the south limit of the area (ref. map below). The study area encompasses existing rural lands as well as some developed areas, and also includes properties for which development applications have been submitted and have been either approved or are currently under review.

The Subwatershed Study was initiated late May 2022, and field investigations were initiated in July and August of 2022 to characterize and evaluate the natural environmental features and systems within the Glendale Secondary Plan area, and ultimately inform the development of an environmental and stormwater management plan for the future development.



Study Area map

Background Information & Process

The characterization of the environmental features and systems within the study area represents an integrated, multi-disciplinary exercise, involving terrestrial and aquatic ecology, surface water and groundwater quality, hydrology and hydrogeology, and fluvial geomorphology. At present, a **preliminary characterization** of the features has been completed, primarily based upon a review of desktop information provided for use and reference in the Subwatershed Study, **which will be verified and refined over the course of the Subwatershed Study** once the field investigations and detailed analyses have been completed over the course of 2022 and early 2023.

This provides the findings of the preliminary characterization of the environmental features and systems, and associated high-level preliminary constraint rankings, to provide **initial input for developing land use concepts**, as part of the Secondary Plan process. As noted, the characterization and constraint rankings presented have been developed based upon a desktop review of the background information, and have been informed by the initial field reconnaissance conducted to-date.

The characterization and constraint rankings are subject to revision as part of the Subwatershed Study, as detailed field investigations and analyses are completed.

The Technical Advisory Committee (TAC) for the Subwatershed Study is comprised of representatives from the Region of Niagara, the Niagara Peninsula Conservation Authority (NPCA), the Town of Niagara-on-the-Lake, the City of St. Catharines, Niagara College, and the Ontario Ministry of Transportation, as well as Team Members leading the Planning Study. Background information has been provided to the Subwatershed Study Team by the TAC for use in the study.

For the purpose of this preliminary assessment, constraint rankings have been established for the various features and systems specifically pertaining to each discipline of the Subwatershed Study; constraint rankings have been defined as follows:

- **High Potential Constraint:** Includes mapped natural environment features and areas with existing designations or significance that would be anticipated to be afforded protection under current provincial or municipal plans / policies. Presence and limits of features has been prepared using available mapping; confirmation and / or refinement of limits will be required through subsequent stages of study, as additional, more detailed information becomes available.
- M**oderate Potential Constraint:** Includes mapped natural environment features and areas that may, through future assessment represent constraints to development or are indicators of potentially significant functions. These features may pose a constraint to development, but their exact location, width, etc. requires refinement through further levels of study. Moderate potential constraint areas may become high constraint or be assessed as posing little or no constraint (e.g., not present) to development, as additional information becomes known and based on the feature type and associated policies.

- **Low Potential Constraint:** Includes mapped natural environment areas that, based on current knowledge, likely do not represent constraints to development (i.e. do not preclude development), but may influence some aspects of land use planning decisions (e.g., densities, type of development) or may present additional study requirements, enhanced management requirements, etc. that could increase development complexity, management needs, or otherwise affect the planning and / or development processes.

Preliminary Characterization & Constraint Assessment

The high-level preliminary characterization and constraint rankings for the respective environmental and hazard features and systems within the study area have been completed by the respective disciplines for the Subwatershed Study. The findings from each discipline will be integrated over the course of the Subwatershed Study to establish final recommendations for feature constraints and associated management opportunities. For the purpose of this preliminary characterization, the discipline-specific findings have been prepared and documented, as presented in the following sections.

Terrestrial Features

Natural Heritage System

Provincial Systems

The Provincial Policy Statement (2020, p.47) defines a Natural Heritage System (NHS) as *"a system made up of natural heritage features and areas, and linkages intended to provide connectivity (at the regional or site level) and support natural processes which are necessary to maintain biological and geological diversity, natural functions, viable populations of indigenous species, and ecosystems. These systems can include natural heritage features and areas, federal and provincial parks and conservation reserves, other natural heritage features, lands that have been restored or have the potential to be restored to a natural state, areas that support hydrologic functions, and working landscapes that enable ecological functions to continue."* The Province has identified multiple NHS, which include the Greenbelt, Niagara Escarpment, and the Growth Plan NHS.

The Greenbelt Plan NHS (herein, "the Greenbelt") extends into two portions of the SWS study area. At the west end of the study area, the Greenbelt encompasses natural and naturalizing lands located to the east of the Welland Canal, including but not limited to the Welland Canal North Turn Basin Provincially Significant Wetland (PSW) complex. A small portion of the Greenbelt extends

into the far northeast corner of the study area, following a wooded corridor containing a tributary of Six Mile Creek. See Map 1a and Map 1b for the extent of the Greenbelt within the SWS study area.

Lands mapped as Escarpment Protection Area and Escarpment Natural Area under the Niagara Escarpment Plan (NEP) predominantly occur to the immediate south of the study area. Some minor exceptions occur where small sections of Escarpment Protection Area lands extend into the south and southwestern extents of the study area, and a very small section of Escarpment Natural Area extends over the south limit of the study area as shown on Map 1a and Map 1b. The majority of Escarpment Natural Area to the south of the SWS study area comprises the regionally significant Homer Escarpment Life Science Area of Natural and Scientific Interest (ANSI). At a broader scale, the Niagara Escarpment represents a UNESCO World Biosphere Reserve.

Collectively, the NEP's Escarpment Natural Areas and Escarpment Protection Areas, as well as the Greenbelt Plan NHS, comprise the provincial NHS identified under the Growth Plan for the Greater Golden Horseshoe (Government of Ontario 2020).

Regional and Local Systems

The Niagara Official Plan was approved by the Minister of Municipal Affairs and Housing on November 4, 2022, replacing the earlier 2014-consolidated OP. The natural heritage policies in the Niagara Official Plan are referenced herein to reflect the Regional OP strategy toward natural heritage moving forward. However, for completeness, the existing 2014-consolidated OP policies and natural heritage mapping are also referenced. By considering both the existing and the new OPs, a comprehensive assessment of Regional natural heritage policies, criteria and definitions inform the preliminary identification of ecological constraints.

Regional Official Plan (2014 Consolidation)

The 2014 Niagara Region OP identifies a Core NHS that consists of natural areas of special significance. The Core NHS is shown on Schedule C of the OP, and policies related to the Core NHS are 7.B.1.1, 7.B.1.3, 7.B.1.4, and 7.B.1.6. The Region's Core NHS, comprising Environmental Protection Areas (EPAs) and Environmental Conservation Areas (ECAs), as well as the provincial Greenbelt Plan NHS and NEP land designations, is shown on Map 1a and Map 1b. Outside of the Region's Core NHS, natural vegetation and wildlife are also to be maintained, enhanced, and restored where possible, as part of the Region's Healthy Landscape approach (Policy 7.A.1.B).

The Core NHS includes EPAs, ECAs, potential Natural Heritage Corridors, fish habitat, and the Greenbelt Natural Heritage and Water Resource Systems.

EPAs include the following components:

- PSWs;
- Provincially significant Life Science ANSIs;
- Significant habitat of Endangered or Threatened species;
- Key Natural Heritage Features within the Greenbelt NHS, including:
  - Wetlands;
  - Significant Valleylands;
  - Significant Woodlands;
  - Significant Wildlife Habitat;
  - Habitat of Species of Concern;
  - Publicly-owned conservation lands;
  - Savannahs and tallgrass prairies; and,
  - Alvars.

ECAs include the following components:

- Significant Woodlands;
- Significant Wildlife Habitat;
- Significant habitat of Species of Concern;
- Regionally significant Life Science ANSIs;
- Other evaluated wetlands;
- Significant Valleylands;
- Savannahs and tallgrass prairies;
- Alvars; and,
- Publicly-owned conservation lands.

See Map 1a and Map 1b for an overlay of the Regionally-mapped Core Natural Areas. Note that habitat for Threatened and Endangered species (i.e., Species at Risk (SAR) habitat) is not mapped as a component of these Core Natural Areas.

Note that for the purposes of Maps 1a and 1b, features designated as EPA or ECA are shown as a coarse overlay against Regional Ecological Land Classification (ELC) mapping. However, refined ELC mapping has been incorporated on Map 1b for two properties (the "Modero Estates Lands"), for which an Environmental Impact Study (EIS) has been completed. Regional staff have field-reviewed and confirmed the "Modero Estates ELC" as shown on the maps. Since ELC has been refined for these properties, the EPA and ECA layers as shown within the Modero Estates Lands have been updated in accordance with the criteria listed above and fit to the revised ELC polygon boundaries.

The Core NHS also includes potential Natural Heritage Corridors, fish habitat, and the Greenbelt Natural Heritage and Water Resource Systems.

The 2014 Regional OP provides additional details on definitions and significance criteria associated with the Regional Core NHS.

Development and site alteration are not permitted in EPAs, within fish habitat within the Greenbelt, nor within any associated Vegetation Protection Zones (VPZs) within the Greenbelt, except for certain specific land uses as described in Policy 7.B.1.10. An Environmental Impact Study (EIS) is required if development is proposed within any of the above features or areas (Region of Niagara 2014).

Development and site alteration may be permitted in ECAs, and on lands adjacent to EPAs and ECAs, except where specified in Policy 7.B.1.11 provided that, over the long term, there will be no significant negative impacts on the Core NHS component or adjacent lands, and that the proposed development is not prohibited by other policies of the OP (Region of Niagara 2014).

Development should be located, designed, and constructed to maintain, and where possible, enhance the ecological functions of Natural Heritage Corridors in linking Core Natural Areas, or an alternative corridor should be developed (Policy 7.B.1.13; Region of Niagara 2014).

Although no potential Natural Heritage Corridors have been identified for the SWS study area on OP Schedule C, potential corridors may be identified through further study with regard for Regional definitions and criteria.

Development and site alteration may be permitted in fish habitat provided it will result in no net loss of the productive capacity of fish habitat as determined by the federal Department of Fisheries and Oceans (DFO) in accordance with Policy 7.B.1.15.

Refer to Chapter 7.B of the 2014 Regional OP for additional policies governing the protection of the Core NHS. See Schedule C of the 2014 Regional OP (attached) illustrating the Core NHS.

Approved Regional Official Plan (November 2022)

The Regional OP defines a "Natural Environment System" that is comprised of a Regional NHS and a "Water Resource System". These two systems are highly integrated and co-dependent, and are therefore to be considered jointly in the Natural Environment System. A Regional NHS has been defined and mapped, and includes the provincial NHS areas collectively defined in the Greenbelt Plan, NEP, and Growth Plan for the Greater Golden Horseshoe. The Regional NHS is comprised of several natural features, and areas of significant ecological and hydrological function which are further highly linked and interdependent. The individual components of the NHS are listed and defined in Schedule L of the OP. In addition to the components listed in Schedule L, the Natural Environment System includes groundwater features, surface water features, and other hydrologic functions (as identified in OP Policy 3.1.1.2).

OP Section 3.1.1.2 lists the component of these categories, and OP Chapter 9 provides the definitions of these terms. These collectively represent the Water Resource System.

The Natural Environment System is mapped on Schedule C1 of the OP. "Key Hydrologic Areas", which form a part of the Natural Environment System, and comprise Significant Groundwater Recharge Areas, Highly Vulnerable Aquifers and Significant Surface Water Contribution Areas, are mapped separately on Schedule C3. Individual components and features of the NHS are shown on Schedule C2. See Schedules C1, C2 and C3 of the 2022 adopted Regional OP (attached).

Natural Environment System components that are or may be of relevance to the Glendale SWS study area include, but are not limited to, the following:

- Significant Woodlands;
- Other woodlands;
- PSWs;
- Non-PSW and other wetlands;
- Life Science ANSIs;
- Habitat for Endangered and Threatened Species;
- SWH;
- Significant Valleylands;
- Fish habitat;
- Permanent and intermittent streams,
- Linkages; and,
- Buffers/VPZs

The preliminary mapping of these Natural Environment System components within the study area are presented on Map 2a and Map 2b. The location of these components has been interpreted based on the Region's ELC and watercourse mapping as showing on Map 2a and Map 2b. The locations and boundaries of these features will be verified and further refined through subsequent field studies completed by the SWS team. Certain components (e.g., Linkages) are not mapped and will be determined through completion of the SWS.

The proposed Modero Estates Plan of Subdivision has undergone a planning approval process that is subject to the previous (2014) Official Plan policies. Since Draft Plan Approval was issued for the Plan of Subdivision prior to the Region's adoption of the 2022 Official Plan, the 2014 Official Plan natural heritage policies apply with respect to those properties. Natural features within the Modero Estate properties are therefore shown with an overlay of the relevant 2014 Official Plan Core NHS designations on Map 2b, whereas the 2022 Official Plan Natural Environment System mapping applies to all other study area lands.

The policies governing the 2022 Official Plan NHS components differ depending on whether the features in question fall within the "Provincial NHS" (i.e., the NHS areas collectively defined in the Growth Plan and the Greenbelt Plan), within the NEP lands, or outside of both the Provincial NHS and the NEP lands.

Development and site alteration is not permitted within the following, with the exception of certain approved land uses, in accordance with their respective policies:

- Key Natural Heritage Features located within the Provincial NHS or in any Key Hydrologic Features outside of settlement areas (Policy 3.1.5.5);
- Within VPZs that are applied to Key Natural Heritage Features or Key Hydrologic Features within the Provincial NHS, except where permitted (Policy 3.1.5.7.3);
- PSWs located outside of the Provincial NHS (Policy 3.1.9.5.1);
- Significant Woodlands located outside of the Provincial NHS (Policy 3.1.9.5.1);
- Fish habitat located outside of the Provincial NHS, except in accordance with federal and provincial requirements (Policy 3.1.12.1);
- Habitat of Threatened or Endangered species (i.e., SAR habitat) outside of the Provincial NHS, except in accordance with federal and provincial requirements (Policy 3.1.13.1).

New development or site alteration within a Provincial NHS will need to demonstrate limitations to the extent of land area to be developed within the "total developable area", limitations on impervious surface and other requirements as described in Policies 3.1.5.8.2 d, e, and f.

Development and site alteration is not permitted within the following, with the exception of certain approved land uses, unless it can be demonstrated that there will be no negative impacts on the natural features or their ecological functions, in accordance with their respective policies:

- Other woodlands outside of the Provincial NHS (Policy 3.1.9.5.2);
- Significant Valleylands outside of the Provincial NHS (Policy 3.1.9.5.2);
- SWH outside of the Provincial NHS (Policy 3.1.9.5.2);
- ANSIs outside of the Provincial NHS (Policy 3.1.9.5.2);
- Other wetlands (non-PSW) within a settlement area, which has been determined to not be regulated under the Conservation Authorities Act, in accordance with other requirements identified under Policy 3.1.9.5.6;
- Lands adjacent to a natural heritage feature or area outside of the Provincial NHS (Policy 3.1.9.7.1).

Development and site alteration is not permitted within Key Hydrologic Areas, Key Hydrologic Features, and Other Important Water Resources unless it can be demonstrated that it will not have a negative impact on various characteristics of those features/areas as described in Policy 3.1.10.1.

Development and site alteration within and adjacent to Key Natural Heritage Features and Key Hydrological Features in the NEP area is subject to the policies of the NEP (Policy 3.1.8.1). The NEP (MNRF 2018) provides details of permitted uses and prohibitions within Escarpment Natural Areas and Escarpment Protection Areas.

Features and areas that fall within the NPCA's regulation limit are subject to the NPCA's Ontario Regulation 155/06 (Regulation of Development, Interference with Wetlands and Alterations to Shorelines and Watercourses).

In accordance with Policy 3.1.15, the Glendale SWS will screen for the presence of "Supporting Features and Areas", and will determine the extent of the feature/area, whether it warrants protection due to its supporting function toward adjacent natural or hydrologic features and areas, and any conditions to be attached to the approval of future proposed developments and site alterations affecting the Supporting Feature and Area.

In accordance with Policy 3.1.17.2, the Glendale SWS will screen for opportunities for additional ecologically appropriate Linkages to those already shown on OP Schedule C2. Currently, no Linkages are mapped on Schedule C2 within the SWS study area.

Chapter 3 of the 2022 Regional OP provides details of policies, definitions and criteria that define the Regional Natural Environment System, its various components, and the policies that govern the protection of these features and their ecological or hydrological functions.

Town of Niagara-on-the-Lake Official Plan

Schedule F of the Town's OP maps "Conservation" lands within the Glendale district (attached). These largely, but may not exactly, coincide with Core Natural Heritage areas and the Natural Environment System mapped in the 2014 and 2022 Regional OPs, respectively. Policy 16.3.1 of the OP identifies specific permitted uses within lands designated as Conservation; other incompatible uses are prohibited.

The OP identifies that development and site alteration is prohibited in PSWs, in conformance with provincial policy. Development adjacent to PSWs may be permitted subject to demonstration of no negative impacts as described in Policy 16.3.2(4). Development in or adjacent to ANSIs may also be permitted subject to demonstration of no negative effects as per Policy 16.3.3 (Town of Niagara-on-the-Lake 2017).

Section 16 of the Town's OP provides details defining and describing protection policies for Conservation and wetland areas within the Town's jurisdiction.

Vegetation

The Glendale SWS study area falls within the Carolinian zone, which corresponds roughly with Ecoregion 7E. This area has a warmer climate than areas further north, and contains more endangered and rare flora and fauna than anywhere else in Canada (Carolinian Canada 2022).

Ecological Land Classification (ELC) for the study area has been provided by the Region of Niagara as shown on Map 2. Vegetation units are mapped

in a very detailed way, but are only provided to ELC Community Series level. More detailed identification will be provided through field work completed in 2022 by the SWS team.

Natural features within the study area are predominantly associated with the permanent watercourse corridors, especially those of Six Mile and Eight Mile Creeks and their principal tributaries. In various locations, areas of floodplain, valley and other adjacent lands to these watercourses have been maintained outside of development and agricultural production over the past several decades such that natural woodland and wetland features have been maintained or have re-established. This has resulted in relatively narrow or confined natural feature corridors that roughly follow a north-south orientation through the study area, with certain exceptions. The Six Mile Creek corridor represents the most robust of these natural watercourse-centred systems within the study area, where larger blocks of woodland and the MNRF-evaluated, non-PSW Upper Six Mile Creek wetland complex occur.

The Upper Six Mile Creek wetland complex consists of a series of palustrine swamp features. Two of the largest units of this complex fall within the study area. The provincially significant Pawpaw (Asimina triloba) (Natural Heritage Information Centre (NHIC) ranking of S3 ("vulnerable" in Ontario)) and Butternut (Juglans cinerea) (provincially and federally Endangered) have been recorded within or nearby to the Upper Six Mile Creek wetland complex according to NHIC data (OMNR 2012). Both species may be found within the study area, which will be confirmed through vegetation inventories.

The other major area of natural feature coverage within the study area falls within the west end, associated with the Welland Canal North Turn Basin PSW complex and adjacent areas of unevaluated swamp wetland and early successional growth to the immediate east and north. This includes lands that fall within the planned future Eco-Park. The Welland Canal North Turn Basin PSW is primarily comprised of riverine swamp features with a smaller proportion of riverine marsh communities. The provincially significant Swamp Rose-Mallow (Hibiscus moscheutos) (provincial and federal species of Special Concern) has been recorded within this complex.

The remainder of natural feature coverage within the study area is largely small, fragmented or isolated. These include small woodland and wetland communities (the latter of which are predominantly meadow marsh), hedgerows, cultural meadows and other early successional growth. These areas have likely been subject to a high degree of anthropogenic disturbance and/or may have resulted from anthropogenic activities (e.g., the formation of meadow marsh from long-term water impoundment caused by adjacent land developments).

Federally, provincially and regionally significant vegetation species have been recorded immediately south of the study area, within the Homer Escarpment Life Science ANSI, including Ribbed Sedge (Carex virescens) (NHIC ranking of S3; previously referred to as "Greenish Sedge"), Red Mulberry (Morus rubra) (provincially and federally Endangered), and Pawpaw (Varga 1995). Golden Alexanders (Zizia aurea), which is considered a regionally rare vegetation species in Niagara Region (Oldham 2017), was identified within the study area property located at 335 Townline Road (NSE 2020).

In Niagara-on-the-Lake, woodlands make up 8.46% of the area; wetlands 2.17%, and successional communities (meadows and thickets) make up 7.13%. Swamps, which are forested wetlands (and therefore included in the percentages above), make up 0.12% of the Town (NPCA 2010). The proportional area coverage of woodland within Niagara-on-the-Lake is the lowest among the assessed municipalities within the NPCA jurisdictional area, with the exception of the City of Hamilton, in which only a small portion of the City's area falls within the NPCA's boundaries. Wetland coverage in Niagara-on-the-Lake is the second lowest, ahead of the City of St. Catharines which has 1.33% wetland cover (NPCA 2010).

Species at Risk

Species at Risk (SAR) are those listed on the Species at Risk in Ontario List (MECP 2022). These include species identified by the Committee on the Status of Species at Risk in

Ontario (COSSARO) as provincially Endangered, Threatened, or Special Concern. Species listed as Endangered or Threatened are protected under the Endangered Species Act (ESA), which includes protection of their habitat.

Species considered Special Concern are included in the definition of Species of Conservation Concern (SCC), which includes the following:

- species designated provincially as Special Concern,
- species that have been assigned a conservation status (S-Rank) of S1 to S3 or SH by the Natural Heritage Information Centre (MNRF 2022), and
- species that are designated federally as Threatened or Endangered by the Committee for the Status of Endangered Wildlife in Canada (COSEWIC) but not provincially by the COSSARO. These species may be protected by the federal Species at Risk Act if they are listed as Threatened or Endangered on Schedule 1 of the Species at Risk Act.

Habitat for SCC is considered SWH (OMNR 2010), which is afforded protection under the Provincial Policy Statement (OMMAH 2020) and municipal natural heritage protection policies. Section 3.1.8, below, provides a discussion about SWH. For the purposes of this report, the term "SAR" will refer to provincially Threatened and Endangered species regulated under the ESA while provincial species of Special Concern will be considered SCC.

A review of existing reports, online resources, and wildlife atlases was undertaken to identify species that are reported from the SWS study area and surrounding vicinity within up to 10km, based on the size of the wildlife data atlas squares. Based on the results of this screening, the following SAR were confirmed as occurring within the Glendale Secondary Plan area:

- Bank Swallow (*Riparia riparia*) (provincially and federally Threatened)
  - Recorded within the study area during the general bird breeding period of May 1-August 31 (eBird 2022).
- Barn Swallow (*Hirundo rustica*) (provincially and federally Threatened)
  - Observed foraging over open habitat lands at the site of the "Intercontinental Combo Hotel" (current Holiday Inn Express and Staybridge Suites hotels, now constructed); no nesting habitat was observed (Quartek 2015).
  - Observed foraging over open habitat lands at the site of the proposed Modero Estates residential subdivision; no nesting habitat was observed (E&E Solutions and LCA Environmental 2022).
  - A potential Barn Swallow nest was observed within a culvert inlet under Glendale Avenue north of York Road (AECOM 2018).
  - Recorded within the study area during the general bird breeding period of May 1-August 31 (eBird 2022).
- Butternut
  - Historically documented as occurring within or nearby to the Upper Six Mile Creek Wetland Complex by the NHIC (OMNR 2012).
- Chimney Swift (*Chaetura pelagica*) (provincially and federally Threatened)
  - Recorded as foraging/flying within the study area during the general bird breeding period of May 1-August 31 (eBird 2022).
- Eastern Meadowlark (*Sturnella magna*) (provincially and federally Threatened)
  - Recorded within the study area during the general bird breeding period of May 1-August 31 (eBird 2022).
- Eastern Whip-poor-will (*Antrostomus vociferus*) (provincially and federally Threatened)
  - Recorded within the study area during the general bird breeding period of May 1-August 31 (eBird 2022)
- Least Bittern (*Ixobrychus exilis*) (provincially and federally Threatened)
  - Recorded within the study area during the general bird breeding period of May 1-August 31 (eBird 2022).

Based on the results of the screening, the SAR in the following table are considered to have, or possibly have, suitable habitat within the Glendale SWS study area.

Scientific Name	Common Name	NHIC S-Rank	SARO	COSEWIC	SARA	SARA Schedule
Birds						
Antrostomus vociferus	Eastern Whip-poor-will	S4B	THR	T	T	Schedule 1
Chaetura pelagica	Chimney Swift	S3B	THR	T	T	Schedule 1
Colinus virginianus	Northern Bobwhite	S1?B	END	E	E	Schedule 1
Dolichonyx oryzivorus	Bobolink	S4B	THR	T	T	Schedule 1
Empidonax virescens	Acadian Flycatcher	S1B	END	E	E	Schedule 1
Hirundo rustica	Barn Swallow	S4B	THR	SC	T	Schedule 1
Ixobrychus exilis	Least Bittern	S4B	THR	T	T	Schedule 1
Riparia riparia	Bank Swallow	S4B	THR	T	T	Schedule 1
Sturnella magna	Eastern Meadowlark	S4B, S3N	THR	T	T	Schedule 1
Mammals						
Myotis leibii	Eastern Small-footed Myotis	S2S3	END			
Myotis lucifungus	Little Brown Myotis	S3	END	E	E	Schedule 1
Myotis septentrionalis	Northern Myotis	S3	END	E	E	Schedule 1
Perimyotis subflavus	Tri-colored Bat	S3?	END	E	E	Schedule 1
Plants						
Cornus florida	Eastern Flowering Dogwood	S2?	END	E	E	Schedule 1
Eurybia divaricata	White Wood Aster	S3	THR	T	T	Schedule 1
Juglans cinerea	Butternut	S2?	END	E	E	Schedule 1
Magnolia acuminata	Cucumber Tree	S2	END	E	E	Schedule 1

Table of Species at Risk with Suitable Habitat within the Study Area

Specific habitat features or areas that are known to be used by SAR within the study area have not been identified. Field work to be completed in 2022 and 2023 will confirm which species are present within the study area and may identify additional species.

Significant Wetlands

One PSW complex has been identified within the study area: Welland Canal North Turn Basin Wetland Complex. This complex was evaluated in 2009 by the NDMNRF and determined to be provincially significant. It is comprised of 11 wetland units in close proximity, four of which are located within the SWS study area south of the future Eco-Park. The wetlands within the complex are a riverine wetland type being hydrologically influenced by the adjacent Welland Canal. As noted above, it is comprised primarily of swamp with lesser areas of marsh. Water levels within this wetland are subject to anthropogenic fluctuations as a result of seasonal lowering of water levels within the canal. The wetland was described as having experienced moderate human disturbance (OMNR 2009).

The Upper Six Mile Creek Wetland Complex in the eastern portion of the study area was evaluated in 2010 and was determined to not be provincially significant (OMNR 2012).

Significant Woodlands

The 2014 Regional OP identifies woodlands as significant if they meet one or more of the following criteria (criteria that are relevant to the SWS study area are listed below):

- Contain Threatened or Endangered species or Species of Concern;
- Are ≥2ha in size if located within or overlapping Urban Area Boundaries (≥10ha if located outside an urban area);

- Are ≥4ha in size if located outside Urban Areas and north of the Niagara Escarpment;
- Contain interior woodland habitat ≥100m in from the woodland edge;
- Contain older growth forest and ≥2ha in area;
- Overlap or contain one or more of the other significant natural heritage features that comprise EPAs or ECAs; or,
- Abut or be crossed by a watercourse or water body and ≥2ha in area.

Significant Woodlands are not specifically mapped in the 2014 Regional OP, but represent a component of the mapped ECAs within the Region outside of the Greenbelt Plan NHS. Within the Modero Estate properties, the ECA overlay that represents Significant Woodland has been refined to match EIS-confirmed ELC communities, and excludes features that were determined to not represent woodland (Map 1b).

The 2022 Regional OP specifically maps Significant Woodlands within the Region, as a component of the broader Natural Environment System, as shown on Schedule C2. Regionally-mapped Significant Woodland has been interpreted by NRSI as an overlay for the SWS study area, fit to Regionally-mapped ELC woodland polygons (FOD, FOM, WOD, and SWD), as shown on Map 2a and Map 2b. Areas of Significant Woodland coverage particularly include the Six Mile Creek corridor as well as portions of wooded natural features located adjacent to the Welland Canal turning basin.

The 2022 Regional OP defines Significant Woodlands in conformance with that of the Provincial Policy Statement (OMMAH 2020):

> *Woodlands that are ecologically important in terms of features such as species composition, age of trees and stand history; functionally important due to its contribution to the broader landscape because of its location, size or due to the amount of forest cover in the planning area; or economically important due to site quality, species composition or past management history.*

Woodland significance and mapping has been further assessed and refined at a site-level as part of individual development applications within the study area (e.g., Quartek 2015, E&E Solutions and LCA Environmental 2022). Additional Significant Woodlands within the study area may be identified through the fieldwork being completed by the SWS Team.

Significant Valleylands

The 2014 Regional OP consolidation describes Significant Valleylands as a component of EPAs within the Greenbelt Plan NHS, and as a component of ECAs outside of the Greenbelt Plan NHS. Schedule C of the 2014 OP does not differentiate the presence of Significant Valleylands.

Valleyland is defined in the 2014 OP as "a natural area that occurs in a valley or other landform depression that has flowing water through or standing for some period of the year". The OP does not specifically define "Significant Valleylands"; however, Significant Valleylands could be presumed to fall under the following OP definition of "Significant" as described in Section 15:

> *c) in regard to other natural features and areas, ecologically important in terms of features, functions, representation or amount, and contributing to the quality, diversity, ecological health and integrity of the Core Natural Heritage System.*

The 2022 Regional OP identifies "valleylands" as a component of the NHS. The OP further defines "Significant Valleylands" as the following:

> *"Valleyland which is ecologically important in terms of features, functions, representation or amount, and contributing to the quality and diversity of an identifiable geographic area or natural heritage system. These are to be identified using criteria established by the Province"*

The 2022 Regional OP does not map the presence of Significant Valleylands. The presence or absence of Significant Valleylands within the study area will be assessed through completion of

the SWS with regard for Provincial and Regional criteria, other background information sources and the expertise of the SWS Team ecologist.

Significant Wildlife Habitat

SWH can generally only be identified through site-specific surveys. As such, it is not mapped in larger-scale studies or in Official Plan mapping (e.g., NPCA 2010; Region of Niagara 2014, 2022; Town of Niagara-on-the-Lake 2017). Based on a review of background information sources and satellite imagery, a SWH screening has been undertaken to identify which categories SWH may be present within the SWS study area.

Based on a review of background information sources, one SWH type (Deer Winter Congregation Area) has been confirmed as present within the study area. This SWH type is mapped by the MNRF and includes various woodlands within the study area as deer overwintering habitat (Map 3a and Map 3b). The extent of the MNRF-mapped Deer Winter Congregation Area habitat has been examined and refined through completion of site-level EIS studies. Specifically, deer overwintering habitat was determined to be absent within the study area of the Intercontinental Combo Hotel EIS studies, and this conclusion was affirmed by the MNRF (MEC 2021). The EIS completed for the proposed Modero Estates residential subdivision stated that winter field surveys could not confirm the presence or absence of deer wintering activity within that site, but also stated in its SWH screening results that Deer Winter Congregation Area SWH was absent in the EIS study area due to a lack of suitable habitat (E&E Solutions and LCA Environmental 2022). MNRF-mapped deer overwintering habitat on the Modero Estates lands is therefore currently shown as “Potential” SWH, to be clarified through the SWS. Nonetheless, due to other SWS study area woodlands having been mapped as deer overwintering habitat by the MNRF, Deer Winter Congregation Area SWH for the SWS study area as a whole is considered confirmed. The SWS will further assess the presence of this SWH type to the extent feasible based on continued background information review and direct site investigations where access allows.

Several types of Candidate SWH have been identified for the SWS study area through the screening exercise. These comprise the following:

Seasonal Concentration Areas

- Waterfowl Stopover and Staging Areas (Aquatic)
- Shorebird Migratory Stopover Area
- Bat Maternity Colonies
- Turtle Wintering Area
- Reptile Hibernaculum
- Colonially-nesting Bird Breeding Habitat (Bank and Cliff)
- Colonially-nesting Bird Breeding Habitat (Trees and Shrubs)

Rare Vegetation Communities

- None currently identified within the background information, however this is to be confirmed through SWS fieldwork

Specialized Wildlife Habitat

- Waterfowl Nesting Area
- Bald Eagle and Osprey Nesting, Foraging and Perching Habitat
- Turtle Nesting Area
- Seeps and Springs
- Amphibian Breeding Habitat (Woodland)
- Amphibian Breeding Habitat (Wetland)

Habitat for Species of Conservation Concern

- Marsh Bird Breeding Habitat
- Terrestrial Crayfish
- Special Concern and Rare Wildlife Species

Animal Movement Corridors

- Amphibian Movement Corridors

The presence, location and extent of SWH within the study area will be assessed through completion of the SWS. The first stage involves completion of a preliminary screening (desktop-level) of potential SWH based on the results of background information review and existing natural feature mapping resources. The second stage involves site-based assessment of the potential SWH categories based on the results of our fieldwork program and through targeted searches for SWH features. For SWH categories that require specialized surveys that fall outside of the fieldwork scope, those features would be identified as Candidate SWH and should be carried forward for further investigation during future detailed site studies/EISs.

Species of Conservation Concern

Special Concern and Rare Wildlife Species are collectively considered to represent SCC (see Section 3.1.4 for definition of SCC in the context of this report). Based on the results of background information review, several SCC have been identified as present within the SWS study area, comprising the following:

- Black-crowned Night-Heron (*Nycticorax nycticorax*) (NHIC ranking of S3)
  - Recorded within the study area during the general bird breeding period of May 1-August 31 (eBird 2022)
- Canada Warbler (*Cardellina canadensis*) (provincial species of Special Concern; federally Threatened)
  - Recorded within the study area during the general bird breeding period of May 1-August 31 (eBird 2022)
- Common Gallinule (*Gallinula galeata*) (NHIC ranking of S3)
  - Recorded within the study area during the general bird breeding period of May 1-August 31 (eBird 2022)
- Common Nighthawk (*Chordeiles minor*) (provincial species of Special Concern; federally Threatened)
  - Recorded within the study area during the general bird breeding period of May 1-August 31 (eBird 2022)
- Eastern Wood-Pewee (*Contopus virens*) (provincial and federal species of Special Concern)
  - Recorded within the study area during the general bird breeding period of May 1-August 31 (eBird 2022)
- Pawpaw (*Asimina triloba*) (NHIC ranking of S3)
  - Identified by NHIC as having occurred within or nearby to the SWS study area, including potentially within the Upper Six Mile Creek Wetland Complex (MNRF 2022, OMNR 2012)
- Snapping Turtle (*Chelydra serpentina*) (provincial and federal species of Special Concern)
  - Recorded as present within or nearby to the study area based on NHIC (MNRF 2022)
  - Recorded as present within the Welland Canal North Turn Basin PSW Complex (OMNR 2009)
- Swamp Rose-mallow (*Hibiscus moscheutos ssp. moscheutos*) (provincial and federal species of Special Concern)
  - Identified by NHIC as having occurred within or nearby to the SWS study area (MNRF 2022)
  - Identified as present within the Welland Canal North Turn Basin PSW complex (OMNR 2009)
- Tufted Titmouse (*Baeolophus bicolor*) (NHIC ranking of S3)
  - Recorded within the study area during the general bird breeding period of May 1-August 31 (eBird 2022)
- Wood Thrush (*Hylocichla mustelina*) (provincial species of Special Concern; federally Threatened)
  - Recorded within the study area during the general bird breeding period of May 1-August 31 (eBird 2022)

Based on the results of the SAR/SCC screening, the SCC in the following table are considered to have, or possibly have, suitable habitat within the Glendale SWS study area.

Scientific Name	Common Name	NHIC S-Rank	SARO	COSEWIC	SARA	SARA Schedule
Birds						
Ammodramus savannarum	Grasshopper Sparrow	S4B	SC	SC	SC	Schedule 1
Baeolophus bicolor	Tufted Titmouse	S3				
Cardellina canadensis	Canada Warbler	S5B	SC	SC	T	Schedule 1
Chordeiles minor	Common Nighthawk	S4B	SC	SC	T	Schedule 1
Contopus virens	Eastern Wood-Pewee	S4B	SC	SC	SC	Schedule 1
Gallinula galeata	Common Gallinule	S3B				
Hylocichla mustelina	Wood Thrush	S4B	SC	T	T	Schedule 1
Melanerpes erythrocephalus	Red-headed Woodpecker	S3	SC	E	E	Schedule 1
Nycticorax nycticorax	Black-crowned Night-Heron	S3B, S2N, S4M				
Herpetofauna						
Chelydra serpentina	Snapping Turtle	S4	SC	SC	SC	Schedule 1
Graptemys geographica	Northern Map Turtle	S3	SC	SC	SC	Schedule 1
Insects						
Danaus plexippus	Monarch	S2N, S4B	SC	END	SC	Schedule 1
Plants						
Asimina triloba	Pawpaw	S3				
Carya glabra	Pignut Hickory	S3				
Hibiscus moscheutos ssp. moscheutos	Swamp Rose-mallow	S3	SC	SC	SC	Schedule 1

Table of Species of Conservation Concern with Confirmed or Potential Suitable Habitat within the Study Area

Specific habitat features or areas that are known to be used by SCC within the study area have not been identified. Field work to be completed in 2022 as part of the SWS will confirm which species are present within the study area and may include the identification of additional species.

Areas of Natural and Scientific Interest

No provincially or regionally significant Life Science ANSIs have been identified within the Glendale SWS study area. However, the Homer Escarpment Life Science ANSI is located immediately south of the study area. This area will therefore be considered within the SWS in consideration of the larger landscape context of the study area features and ecological linkages to the broader NHS. The ecological significance and sensitivity of the Homer Escarpment ANSI, as well as management objectives that have been identified for it (Varga 1995), will also be accounted for in consideration of how this feature should be integrated with the Glendale study area's NHS and ecological restoration and enhancement strategy.

Aquatic Features

Fish Habitat

The *Niagara-on-the-Lake Watershed Plan* (Aquafor Beech 2008) identifies fish habitat types and provides characterization based on MNRF classification and DFO municipal drain class authorization. These classifications, shown in Map 4, and listed in the table below, are described based on their sensitivity to development and overall productive capacity for fish. The fish habitat types are based on designations provided by the MNRF (OMNR 2000).

Fish habitat is recognized as a component of the Greenbelt Plan NHS as well the Core Natural Heritage System as defined in the 2014 Regional OP. Protections to fish habitat are also identified in the 2022 Regional OP (e.g., Policy 3.1.12). It should be noted that provincial habitat types pertain to restoration potential to achieve fisheries management objectives and for the rehabilitation of fish habitat and are not specifically associated with presence of fish or current habitat conditions or functions (NSE et al. 2019).

Watercourse Classification Type	Description
Type 1	Habitats have high productive capacity, are rare, in space and/or time, are highly sensitive to development, or have a critical role in sustaining fisheries (e.g., critical spawning and rearing areas, migration routes, overwintering areas, habitats occupied by sensitive species).
Type 2	Habitats are moderately sensitive to development and, although important to the fish population, are not considered critical (e.g., feeding areas for adult fish, unspecialized spawning habitat). These areas are considered ideal for enhancement or restoration projects.
Type 3	Habitats have low productive capacity or are highly degraded, and do not currently contribute directly to fish productivity. They often have the potential to be improved significantly (e.g., a portion of a waterbody, a channelized stream that has been highly altered physically).

Table of MNRF Classification of Fish Habitat Types for Types 1-3 Watercourses

Type	Flow	Temperature	Species	Time Since Last Clean-out	Authorization
A	Permanent	Cool/Cold/Unknown	No trout or salmon	N/A	Class A
B	Permanent	Warm	Top predators (bass, pike, muskie, crappie)	<10 years	Class B
C	Permanent	Warm	Baitfish	N/A	Class C
D	Permanent	Cool/Cold/Unknown	Trout and/or salmon	N/A	Project-specific
E	Permanent	Warm	Top predators (bass, pike, muskie, crappie)		Project-specific
F	Intermittent	N/A	N/A	N/A	Conditional

Table of MNRF Municipal Drain Classifications (from Aquafor Beech 2008)

There are two principal watercourse drainage systems that flow through the study area, generally in a south to north direction toward Lake Ontario: Six Mile Creek and Eight Mile Creek.

Six Mile Creek

Six Mile Creek originates within the Niagara Escarpment lands south of the study area, and comprises various tributaries that include confluences south of York Road, and also further downstream just south of Queenston Road. These source tributaries are largely characterized as Type 2 "Important" fish habitat. North of the confluence at Queenston Road, the watercourse is channelized as a Class A-type municipal drain (Aquafor Beech 2008).

The Six Mile Creek subwatershed also includes stream flows that are west of and separate from the Six Mile Creek watercourse/tributaries mentioned above where they occur within the study area, but which confluence with the Six Mile Creek >2km to the north of the study area. This separate drainage area, which generally occurs west of Townline Road, is referred to as the Six Mile Creek West Branch. Within the study area, the Six Mile Creek West Branch and its primary tributaries also represent Type 2 "Important" fish habitat. The furthest upstream extents of these tributaries are unclassified (Aquafor Beech 2008). This watercourse branch is also modified to a Class A municipal drain from just south of Queenston Road and further north (Aquafor Beech 2008).

Eight Mile Creek

The majority of Eight Mile Creek has been highly altered and channelized where it occurs within the study area. The majority of the watercourse south of the Queen Elizabeth Way (QEW) is unclassified according to the MNRF rankings. The reach north of York Road has been identified as a Class D municipal drain (Aquafor Beech 2008).

Fish Community

Fish surveys have been completed at various locations along Six Mile Creek and Eight Mile Creek, including within and in the immediate vicinity of the study area.

The fish community of Six Mile Creek within and in the immediate vicinity of the study area is characterized primarily by small-bodied, tolerant species including Bluntnose Minnow (*Pimephales notatus*), Creek Chub (*Semotilus atromaculatus*), Emerald Shiner (*Notropis atherinoides*), Fathead Minnow (*Pimephales promelas*), Green Sunfish (*Lepomis cyanellus*), Lake Chub (*Couesius plumbeus*), and White Sucker (*Catostomus commersonii*). These include both warm- and coolwater species in addition to one coldwater species; Lake Chub. Coldwater migratory species including Chinook Salmon (*Oncorhynchus tshawytscha*) and Rainbow Trout (*Oncorhynchus mykiss*) have also been observed throughout the lower Six Mile Creek, well outside of the study area. These species are unlikely to occur within the study area due to the likely presence of in-stream barriers, which would limit their ability to travel upstream from Lake Ontario. Pumpkinseed (*Lepomis gibbosus*), Smallmouth Bass (*Micropterus dolomieu*), Common Carp (Cyprinus carpio), and Round Goby (*Neogobius melanostomus*) have also been identified throughout the lower section of Six Mile Creek (Aquafor Beech 2008).

The fish community of Eight Mile Creek is expected to be limited within the study area by relatively small amounts of available fish habitat. Based on background mapping, it appears that the most suitable area of Eight Mile Creek within the study area is limited to the roughly 500m section of drain that extends north from the QEW. No fish habitat records were available for Eight Mile Creek within or in the immediate vicinity of the study area. However, throughout the lower and middle sections of the creek the community resembles that of Six Mile Creek and includes Bluntnose Minnow, Chinook Salmon, Common Shiner, Creek Chub, Emerald Shiner, Green Sunfish, Pumpkinseed, Round Goby, Smallmouth Bass and White Sucker (Aquafor Beech 2008). A variety of these small-bodied species may utilize the portion of Eight Mile Creek within the study area if suitable conditions are available.

The DFO Species at Risk distribution mapping (DFO 2022) indicates that there are no aquatic SAR within or in the vicinity of the study area.

Natural Environment Constraints Analysis

Buffers/Vegetation Protection Zones

For the purposes of this report, the term "Vegetation Protection Zone" (VPZ) is equivalent to, and referred to interchangeably with, an ecological buffer. The Regional OPs refer to buffers as VPZs.

The following minimum buffers are required based on applicable policy:

2014 Regional Official Plan Consolidation

- Within the Greenbelt Plan area:
  - 30m from wetlands, seepage areas and springs, fish habitat, permanent and intermittent streams, lakes and Significant Woodlands (Policy 7.B.1.22);
- 30m from the stable top of bank of watercourses identified by the MNRF as Critical Fish Habitat (Policy 7.B.1.15)
- 15m from the stable top of bank of watercourses identified by the MNRF as Important or Marginal Fish Habitat (Policy 7.B.1.15)

2022 Regional Official Plan

- Within the Provincial NHS (Greenbelt Plan NHS):
  - 30m from Significant Woodlands, wetlands, permanent and intermittent streams, and inland lakes (Policy 3.1.5.3);
  - 15m from certain Key Hydrologic Features in accordance with the policies of the Greenbelt Plan (Policy 3.1.5.4);
- Outside of the Provincial NHS (Greenbelt Plan NHS) and the NEP area, and outside settlement areas:
  - 30m from all wetlands, permanent and intermittent streams, and inland lakes with their littoral zones which are Key Hydrologic Features (Policy 3.1.9.2)
  - 20m from Significant Woodlands (Table 3-2)
  - 20m from Life Science ANSIs (Table 3-2)
  - 15m from Significant Valleyland (Table 3-2)
  - 10m from Other Woodland (Table 3-2)

In other cases, in accordance with Regional OP policies, the width of required buffers is to be determined in conjunction with EIS studies based on what is determined to be most appropriate (e.g., based on significance and sensitivity of the natural feature/area, based on the nature of the proposed development or site alteration).

Where applicable within the SWS study area, the minimum buffer widths listed above will be applied to known NHS components through completion of the SWS. Where any conflict in required buffer width for a given feature type exists between two plan policies, the more conservative (wider buffer) policy applies.

Potential Terrestrial Natural Environment Constraints

With regard for the constraint rankings described in Section 2, and based on the results of the background information review summarized above, the following is a summary of Potential Natural Environment Constraints present within the Glendale SWS study area, by ranking level, and as illustrated on Map 5a and Map 5b.

High Potential Constraints:

- Greenbelt Plan NHS Key Natural Heritage Features and Key Hydrological Features;
- NEP Escarpment Natural Area;
- NEP Escarpment Protection Area;
- EPA (as mapped in the 2014 Regional OP);
- ECA (as mapped in the 2014 Regional OP);
- Natural Environment System (as mapped in the 2022 Regional OP);
- "Conservation" lands (as mapped in the 2017 Town OP);
- Individual components of the above NHS systems, including but not limited to the following:
  - PSW wetland complexes
  - Non-PSW wetland complexes

- Other wetlands (unevaluated)
- Significant Woodlands
- Significant Valleylands
- Habitat for Threatened and Endangered Species (SAR Habitats)
- SWH
- Life Science ANSIs
- Fish Habitat
- Permanent and Intermittent Streams
- Minimum buffers associated with the above features, where applicable

Moderate Potential Constraints:

- Linkages
- Other Woodlands
- Ephemeral or Intermittent Watercourses

Low Potential Constraints:

- Other mapped natural features (e.g., hedgerows, cultural meadows, cultural thickets and other early successional features)

Certain NHS components listed above are not illustrated on Map 5a and Map 5b. Certain of these will be further assessed and mapped through completion of the SWS, to the extent feasible (e.g., Significant Valleylands). Others will not be, or will not fully be, mapped through completion of the SWS due to the reliance on site-level studies (e.g., EISs) to assess and map these features (e.g., SAR habitat, SWH). Recommended buffers will be illustrated on future SWS mapping.

Water Resources

Background Review and Approach

The drainage features within the study area have been reviewed to determine preliminary surface water drainage constraints for the Glendale Secondary Plan area. The preliminary drainage constraints have been established based on a review of relevant information including:

- Topographic contour mapping provided by the Region of Niagara
- Existing stream network contained in the "Watercourse Mapping_Glendale" shapefile provided by the Region
- Existing storm sewer system and minor system capture points provided by the Town of Niagara on the Lake (NOTL)
- Background information available from legacy projects by predecessor firms
- Hydrologic catchment mapping provided by NPCA
- Floodline/hazard mapping and modelling provided by NPCA
- Subwatershed 2K boundary mapping sourced from the NPCA

The background information has been reviewed to support a preliminary characterization and constraint rankings for the area watercourse systems and to provide preliminary input for the integrated constraint assessment for the overall study area characterization. In addition, the existing NPCA floodline mapping has been reviewed to provide a high-level characterization of the hazards associated with the drainage features and systems within the study area, and to determine the preliminary constraints specifically associated with the area floodlines. The following summarizes the findings of these assessments.

Preliminary Characterization

Local Drainage Systems

The Glendale Secondary Plan study area falls within a total of three (3) subwatershed systems, these include the Beaver Dam Schiner's Creek

(BDSC) Welland Canal North to the west, and two (2) Subwatersheds within the Niagara-on-the-Lake (NOTL) Watershed, which includes the NOTL Eight Mile Creek within the center of the site, and the NOTL Six Mile Creek to the east. The majority of the study area contributes runoff directly to the respective watershed systems through rural drainage networks, including roadside ditches and open watercourses. The information provided in the Niagara on the Lake Watershed Study (Aquafor Beech, 2008) further indicates that various drainage features have been classified as municipal drains.

There are certain urbanized portions of the study area which are drained via urban storm sewer servicing collecting the minor system flows; these are largely associated with the Outlet Collection Niagara Shopping Centre and the Niagara on the Green residential development lands. From the existing urban areas, drainage is collected and discharges to approximately ten (10) existing stormwater management facilities (based upon Watercourse Mapping and Aerial Imagery). These stormwater management facilities (SWMFs) are located generally along the QEW corridor and west of Taylor Road, south of the QEW, and are associated with the Niagara on the Green development, the Niagara College (Glendale Campus), the Outlet Collection Niagara, and transportation corridors. The locations of the currently identified SWMFs and the storm sewer infrastructure are demonstrated on Drawing WR-1.

It should be noted that there are a number of private developments within the Glendale Secondary Plan study area for which Stormwater Management Plans have been developed; these may have included other private SWMFs including detention ponds, infiltration basins, swales, etc. The Stormwater Management Plans / Reports for applicable private site development applications have been provided by the Town of NOTL and will be reviewed in further detail as part of subsequent study phases, to identify any proposed stormwater management measures and the corresponding status of approval and construction/implementation within the existing land uses.

Subwatershed Systems

The BDSC Welland Canal North subwatershed system receives drainage from the western limits of the Glendale Secondary Plan area and does not have any regulated watercourses within the study area boundary. There are minimal drainage features within this portion of the site, consisting primarily of roadside ditches and/or rural drainage, which are considered to be relatively minor. It should be noted that while the NPCA's Subwatershed mapping demonstrates the western portion of the site falls within the Welland Canal North subwatershed, the hydrologic catchment mapping from the Eight Mile Creek hydrologic study includes this portion of the site as part of drainage area contributing to the Eight Mile Creek system, further downstream of the Glendale Secondary Plan study area. This discrepancy will be reviewed in further detail as the study advances as part of the Phase 1 Characterization.

The NOTL Eight Mile Creek subwatershed system begins south of the study area, along the CNR and continues to drain north passing through the Glendale Secondary Plan area; the drainage area contributing to the crossing at the QEW is approximately 133.8 ha (+/-) contributing to the regulated watercourse north of the QEW. The contributing drainage area consists of the existing urban areas (i.e., south of Niagara Wine Route and the Glendale Shopping Centre), which includes both storm sewer servicing and stormwater management facilities. The NPCA regulated flood hazard for the headwaters of the NOTL Eight Mile Creek begins within the study area boundary, located north of the QEW and south of York Road and continues to the outlet at Lake Ontario.

The third subwatershed system encompassing the study area is the NOTL Six Mile Creek subwatershed, which is the dominant subwatershed system within the Glendale Secondary Plan study area. There are three (3) significant tributaries which drain throughout the study area and have portions which are regulated by the NPCA; this includes two (2) branches which combine in the west of the subwatershed and one (1) branch receiving drainage from the east of the subwatershed.

The two (2) branches of the NOTL Six Mile Creek which are located within the west of the subwatershed drain approximately 129.9 ha (+/-) and 124.6 ha (+/-) respectively, which combine into a single branch north of York Road south of Queenston Road. Both tributary branches are regulated by the NPCA near the confluence point, with flood hazard mapping initiating upstream of the York Road and Niagara Wine Route crossings, north of the QEW. Other drainage features are located upstream of the QEW crossing, which primarily consist of rural drainage, roadside drainage and some headwater drainage features.

The single branch located to the east of the NOTL Six Mile Creek receives drainage from external contributing areas extending south-east beyond the study area boundary; based upon NPCA's current catchment mapping, this eastern branch drains approximately 595 ha (+/-) to the Niagara Wine Route crossing, which is located within the Glendale Secondary Plan area. This branch receives an additional approximately 100 ha (+/-) drainage area via rural tributaries to the east, which generates a total drainage area of approximately 695 ha (+/-) contributing to this branch of the system at the study area boundary along Queenston Road. The entire length of the main branch passing through the study area is regulated by the NPCA, with other minor drainage features contributing throughout (i.e., rural/ agricultural drainage, roadside drainage, etc.).

Surficial Soils

The surficial soils present within the Glendale Secondary Plan area have been sourced from the OMAFRA Soil Complex Survey mapping, which is a compilation of soil surveys completed on a county-by-county basis between 1929 and 2002 at a variety of map scales (ref. Land Information Ontario Data Description, Soil Complex Survey, OMAFRA, 2012). Across the study area there are a wide variety of different surficial soil types varying in composition, properties, and hydrologic condition.

In order to provide a meaningful characterization at the study area scale, the surficial soil types have been summarized based upon their Drainage Classes, which provide an indication of the soil's ability to drain water and therein create runoff. This classification can infer the soil's potential response to urbanization, as well as the applicability and suitability for select stormwater management (SWM) practices should future development advance (i.e. infiltrative source controls for best management practices).

The Drainage Classes assigned in OMAFRA's Soil Complex Survey include the following:

- – = Not Applicable
- VA = Variable
- R = Rapidly
- W = Well
- MW = Moderately Well
- I = Imperfectly
- P = Poorly
- VP = Very Poorly

The drainage class "not applicable (–)" typically represents areas of unclassified soils, or areas underlying water features and therefore drainage classifications have not been assigned. Soils with "variable (VA)" drainage capacities are typically found within, or near, the bounds of existing urban areas, as these are disturbed soils as a result of existing urban development.

The soil types denoted as "very rapidly (WR)", "rapidly (R)" and "well (W)" drainage classes would represent higher infiltrative soils and thereby constitute areas that may be more sensitive to impacts from urbanization, as the impervious coverage resulting from urban development would generate a more significant relative change in the local hydrologic relationships. These could include sensitivity to changes in peak flows to receiving systems, impacts to the local water balance, as well as higher susceptibility for urban contaminants draining within the soils and potentially entering the subsurface systems.

By contrast, the soil types with "poorly (P)" and "very poorly (VP)" designations may indicate areas less sensitive to urban development, seeing as under the current or native soil

conditions, poorly drained soils generally consist of less permeable material and would typically produce higher runoff in their in-situ condition. These soil types can also provide indications of pre-settlement wetland extents and can be used as part of wetland restoration targets. Due to the poorly drained nature of these soils, an impervious condition from urban development may not result in as significant hydrologic changes when compared to the well-drained set of soils. An additional consideration of poorly drained soil conditions is the potential limitations to SWM options or on-site controls (i.e., infiltrative BMPs), should urban development be advanced in these areas.

From the mapping available within the study area boundary (ref. Drawing WR-2), the soils provide a variety of drainage classes, with the dominant distribution being the "Variable" and "Imperfectly" drained categories. There are also areas identified as "Poorly" drained, which are primarily located near the "Variable" areas, as well as certain areas denoted as "Moderately Well" drained, which is largely focused near the riverine systems of the Eight and Six Mile Creeks. This information will be further refined in subsequent study tasks to support characterization and modelling for the surface water component and development of the SWM strategy for future urban development.

Watercourse Constraint Rankings

The watercourses within the study area have been reviewed to assign preliminary constraint rankings, specifically from the water resources perspective. Consistent with the approach applied in other studies completed by Wood, the watercourses within the study area have been assigned preliminary constraint rankings of "high", "medium" or "low" based upon size of contributing drainage area (ref. "Hydrology Catchments" developed as part of the previous hydrologic modelling, provided by the NPCA).

Watercourses with more than 500 ha of drainage area have been ranked as "high constraint", as theses would be anticipated to have limited opportunity for relocation/realignment as these features would generally be situated within well-defined systems, hence the nature and extent of works required to accommodate relocation/ alteration would generally be significant in nature.

Watercourses with more than 125 ha but less than 500 ha of drainage area have been ranked as "medium constraint", as these features would be regulated by NPCA, although realignment / alteration may be feasible to provide a contiguous land use and provide for enhancements to the Natural Heritage System (NHS). Watercourses with less than 125 ha have been ranked as "low constraint", as these may not be regulated by NPCA, and may hence require replication of hydrologic and hydraulic function only post-development. This initial preliminary assessment has evaluated the drainage features depicted within the Watercourse Mapping – Glendale mapping provided for use in the current study.

The watercourse constraint rankings are presented on Drawing WR-3. As noted previously, a future integrated assessment of the area watercourses will be completed as part of the Phase 1 Characterization, combining the findings of each respective discipline. This integrated assessment will thereby provide a "net" constraint ranking for the watercourses, as well as guidance regarding the potential management requirements for the features.

Preliminary Floodline Hazard Constraint Rankings

As outlined previously, the study area comprises of three (3) different subwatersheds, whereas only two (2) have formative watercourse systems which pass through the study area of focus, these include the NOTL Eight Mile Creek and Six Mile Creek subwatershed systems. The regulated flood hazard limit, provided by NPCA for the currently regulated watercourses within the study area, has been reviewed to develop a desktop characterization of the extent of regulated floodplains throughout the study area, and assign preliminary constraint rankings based upon anticipated potential for floodplain alteration along regulated watercourses.

Wide floodplains may require significant effort to replicate/maintain riparian storage and have thus been assigned a "high constraint"; similarly, floodplains within well-defined valley systems would require extensive effort to replicate the natural aquatic and terrestrial features and systems, hence have likewise been assigned a "high constraint". Narrow floodplains situated

along drainage features across agricultural fields with no defined valley system have been assigned a “medium constraint”, as alteration to the floodplain is considered to be functionally feasible. None of the floodplains have been assigned a “low constraint”, as all floodplains noted are regulated by the NPCA.

The floodline constraint rankings are also presented on Drawing WR-3. The floodlines in the headwaters for the Eight Mile Creek system are contained within a narrow valley section (hatched in yellow to designate the medium constraint) which is approximately 300 m (+/-) in length within the study area north of the QEW, hence there is considered to have moderate potential for adjustment of the existing watercourse through channel refinements or valley works. The floodlines of the Eight Mile Creek remain narrow and confined within the watercourse corridor until downstream of the Queenston Road crossing beyond the study area, where the floodlines are wide and not well contained. In areas such as this, it has been presumed, for the purpose of this preliminary constraint ranking, that minimal potential for channel works exist to impact the extent of the floodplain and thus minimal potential exists to adjust the watercourse to support development; this will be confirmed through the course of the Phase 1 Characterization work.

The floodlines for the east and west branches of the Six Mile Creek system have significant drainage areas and are already well defined in valley sections (>5 m deep) and therefore have minimum potential for adjusting the floodlines through valley works.

Interpretation

The watercourses within the study area have been assigned preliminary constraint rankings from a water resources perspective. In general, all “medium” and “high” constraint watercourses within the study area are currently located within defined floodplains and regulated by NPCA based upon their existing flood hazard. The defined floodlines within the study area are generally within well-defined valley systems and thus offer limited potential for alteration or adjustment.

The constraint mapping will be reviewed and refined as required, throughout the study process to confirm the preliminary findings presented herein. The constraint mapping will be updated as the existing conditions hydrologic model is developed (proposed to be PCSWMM) and the existing hydraulic models are refined, and surface drainage features are confirmed, based upon findings from field investigations to confirm the capture points of the existing storm sewer system.

Source	Layer Name
NPCA	1 m contours, watercourses, quaternary watersheds, subwatersheds, waterbodies, regulatory floodlines, regulated wetlands, regulated floodplain, 2k hydrography, DEM/DTM, top of slope and top of slope setbacks
NOTL	Catchbasins, maintenance holes, sewers
Niagara Air photo Index at Brock University and Niagara Region	Air photos (1954-1955, 1971, 2000-2018)
Other	Roads, property fabric, environmental studies (including those in support of development applications)

Stream Morphology Background Data Summary List

Watercourses (Stream Morphology)

The objective of the stream morphology study in Phase 1 is to identify and characterize watercourse and headwater drainage features (HDFs), establish erosion hazard setbacks, erosion sensitivity (thresholds), and determine preliminary constraints (watercourses) and classifications of headwater drainage features (HDFs). The Phase 1 characterization is underway, and an initial background review and mapping exercise has been completed. Desktop analysis is being completed for the District Plan Area, while detailed, field verified analysis is only occurring within the Secondary Plan Area. The stream morphology fieldwork and subsequent analysis will commence in late summer and fall of 2022, and will be completed through the spring of 2023, which will inform the characterization and evaluation of watercourse and HDF reaches.

The current characterization and analysis are still in the preliminary stages, at the desktop level, and includes all mapped surface water features within the District Plan Area, as well as additional features digitized from current aerial imagery. The preliminary characterization includes identification of watercourses and potential HDFs, potential constraint rankings from a stream morphology perspective, and preliminary delineation of erosion hazards (i.e., meander belts and stable top of slope). As such, feature types, extents, constraints, and erosion hazards may be modified as the Phase 1 characterization continues, and as fieldwork confirms/updates findings.

Prior to mapping potential constraints for the study area, features were first identified from current mapping and aerial imagery as watercourses or HDFs. The following definitions were applied in the preliminary constraints assessment. The drainage area of 50 ha noted in the definitions is based upon findings from recent work by the Study Team in the Township of West Lincoln. This drainage area identifies watercourse reaches conservatively. Feature types are subject to revision pending the outcome of the Subwatershed Study fieldwork and consultation with the TAC.

Watercourses:
Permanently to intermittent flowing drainage features with defined bed and banks. They exhibit clear evidence of active channel process including planform, profile, and material sorting, with evidence of a balance between erosion and deposition throughout the reach. They are often second-order or greater but may be first order when verified by the practitioner(s). Watercourses are currently identified as regulated features by the CA, and fish are typically found within these features. The contributing drainage area generally exceeds 50 ha.

Headwater Drainage Features (HDFs):
Non-permanently flowing drainage features that may not have defined bed or banks have been designated as HDFs. The presence of bed and bank definition within these features may be attributed to anthropogenic intervention (e.g., cutting a drainage feature into the surface), or seasonally as spring freshet concentrates flows in depressions, causing channel development into surfaces lacking vegetated cover. HDFs are first order intermittent and ephemeral channels, swales and connected headwater wetland, but do not include rills or furrows. They are currently not identified as a regulated feature, and fish may or may not be found within the feature. The contributing drainage area is less than 50ha.

Approach and Preliminary Constraints

Potential constraint rankings and preliminary erosion hazard limits have been developed for watercourses to inform this memorandum and identify potential limiting factors to development around these natural surface water features. As previously noted, the potential constraint rankings and preliminary erosion hazard limits will, to varying degrees, require refinement through current and future stages of the SWS as the stream morphology fieldwork and detailed analyses are completed. The table on the previous page briefly lists background information utilized in this high-level constraints assessment.

The proposed approach to characterizing watercourses and HDFs and establishing management recommendations and opportunities makes use of a classification approach that was used in Niagara Region during the Smithville Subwatershed Study (SWS) and by the SWS

Team for other SWSs in Southern Ontario (such as the South Milton Urban Expansion Area SWS). The classification provides a comprehensive and integrated approach to defining watercourses and HDFs and determining appropriate management recommendations based on feature form and function. This approach combines a constraint ranking for watercourses with the management recommendations from the HDF assessment protocol (TRCA 2014) into one system. The methodology presented in Table FG-1 (attached) will be applied to area watercourses and HDFs as Phase 1 progresses, and consensus will be required for management recommendations on a feature-by-feature (reach scale) basis.

For the purpose of this memorandum, a more general approach was taken than what is presented in Table FG-1, whereby potential geomorphic constraint rankings were applied to watercourse features using the following definitions:

- **Potential High Constraint:** High Constraint rankings were assigned to features that likely prohibit development. They are generally deemed high-quality systems that can not be relocated and replicated in a post-development scenario. They include watercourse features within defined valleys or well-developed floodplains, and their erosion hazard setbacks. Presence and limits of features has been prepared using available mapping; confirmation and / or refinement of limits will be required through future planning stages, as additional analysis is completed.
- **Potential Moderate Constraint:** Moderate (or Medium) Constraint has been assigned to watercourse reaches that are typically not located in defined valleys, and often have been directly impacted by historic modifications and land use practices. These reaches and associated erosion hazard setbacks must remain on the landscape and are subject to regulation. However, realignment may be acceptable when deemed appropriate to enhance the form and function of the feature in support of development.
- **Potential Low Constraint:** Based on desktop screening of available data, these are likely headwater drainage features (HDFs), which, in general are not regulated. These features do not require erosion hazard setbacks, however certain attributes may require setbacks or buffers to address policy considerations such as flood hazards, or ecological functions and habitat. Most of these features tend to be of little significance to development and may be removed entirely from the surface with no environmental impact or removed with mitigation considerations to maintain downstream contributions or linkage functions. In some cases, these features will need to be retained on the surface, either protected in place, or subject to realignment or enhancement. It is these latter management considerations which may require regulation and/or setbacks/buffers. The following items briefly describe the four management categories that will be applied for HDFs in the study area through the remainder of Phase 1 and into later stages:
  - **Protection -** Protect in place, only minor enhancements. Determine appropriate buffers as applicable.
  - **Conservation -** Maintain, relocate, or enhance feature and riparian corridor. Maintain Linkages.
  - **Mitigation -** Maintain, replicate, or enhance feature functions, and downstream contributions to receiving features.
  - **No Management Required -** May be removed. Surface features (e.g., swales) or LIDs can mitigate issues relating to a loss of sediment supply and flow.

Additional HDFs may be identified through ArcHydro analysis and fieldwork during Phase 1.

Potential Constraints – Watercourses

Drawing FG-1 presents potential watercourse locations and constraints. These results are subject to confirmation of the feature classification, function, and their ultimate constraint rankings and management recommendations are to be finalized through Phases 1, 2, and 3 of the SWS. Several reaches are under review to determine if they are best classified as HDFs or as watercourses (Low

constraint features). Drawing FG-1 also includes preliminary erosion hazard mapping for potential high- and medium-constraint watercourses.

Watercourse Identification and Potential Geomorphic Constraints:

- Within the study area, features were screened as watercourses when drainage area generally exceeded 50 ha. Drainage areas were confirmed using the Ontario Flow Assessment Tool. Within the study area, watercourse reaches of Six Mile Creek, Eight Mile Creek, and tributaries to Six Mile Creek are present. Most of these reaches have a mapped Regulated Floodplain. The NPCA regulates floodplains for features draining 125 ha or greater.
- Potential geomorphic constraints were applied to watercourse segments (Drawing FG-1), and correspond to the high, medium, and low categories as summarized in Section 3.4.1. Note that potential Low Constraint features may be HDFs.
- A tributary to Six Mile Creek, adjacent to 235 Taylor Road has a drainage area exceeding 50ha at the upstream end, however, NPCA do not consider this a regulated watercourse (ref. correspondence between Nicholas Godfrey of NPCA, and Brendan Graham of LandX Developments, October 14, 2021). Therefore, a potential watercourse constraint has not been mapped for this feature.

Preliminary Erosion Hazard Delineation:

- Preliminary erosion hazards were delineated for features identified as high and medium constraint watercourses.
- The study area contains unconfined, partially confined (valley slopes restrict migration in some parts of the reach) and confined reaches (valley slope restrict migration throughout the reach).
- Preliminary erosion hazard limits were delineated using existing data, and through the general application of the TRCA Belt Width Delineation Procedures (2004) for unconfined reaches, and the MNRF's technical guidelines (River and Stream Systems: Erosion Hazard Limit, 2002) for confined reaches. This will be refined as detailed assessments continue through the Phase 1 characterization. The current mapping was completed at a higher level and is relatively coarse.
- Preliminary meander belt widths were delineated based on the existing channel planform as observed on the 2018 ortho photograph or based on empirical methods as appropriate. The apparent top of valley slope was delineated using the 1.0 m contour data and Top of Slope Features mapping from the NPCA. In areas with an apparent valley (confined systems), the top of slope mapping was used to define the stable top of slope wherever valley slopes were 3:1 (H:V) or more. The NPCA top of slope mapping was updated to capture additional topographic details. A 6 m erosion access allowance was added to the stable top of slope per provincial guidelines (MNR 2002). Toe erosion allowances will be included as appropriate following the completion of the stream morphology fieldwork which will include characterization of substrates.
- Final erosion hazard setbacks, including 100-year erosion rates, will be determined through the Phase 1 Characterization, based on Provincial Policy. As such, all erosion hazard mapping information shown in Drawing FG-1 should be treated as preliminary and may change as more detailed mapping is completed.
- Note that medium constraint watercourse reaches may be subject to realignment and therefore erosion setbacks would need to be developed accordingly. Should these reaches be relocated, the corridor width (meander belt width/erosion hazard corridor) associated with each reach must, at a minimum, be maintained. Further detail on the management of medium constraint watercourses is included in Table FG-1 (attached) and will be provided through Phases 2 and 3 of the SWS.

A piped reach that connects two potentially high-constraint watercourses upstream and downstream has been identified as having a medium constraint at this time, and meander belts have been determined empirically based

on drainage area. The purpose of delineating the meander belt is to illustrate that an open corridor should exist if/when the reach is daylighted and restored.

A tributary to Six Mile Creek, adjacent to 235 Taylor Road has a drainage area exceeding 50ha at the upstream end, however, NPCA do not consider this a regulated watercourse (ref. correspondence between Nicholas Godfrey of NPCA, and Brendan Graham of LandX Developments, October 14, 2021). Therefore, an erosion hazard setback has not been delineated for this feature.

Preliminary setbacks were delineated along the smaller canal features in the southwest portion of the study area based on empirical methods. Setback requirements along the Welland Canal will be considered through the Phase 1 Characterization, in consultation with the SWS team.

Potential Constraints – Headwater Drainage Features

- Two watercourse mapping datasets were reviewed along with the 2018 orthophoto. The map sets are the "Watercourse Mapping (Glendale)" and the "2k Hydrography mapping." Both were developed by or sourced from the NPCA. The table opposite provides additional details on each map set.
  - The 2k Hydrography was based on hydrological modeling, and linework appears to include smaller features and extend further upstream than the Watercourse Mapping Glendale.
  - The Watercourse Mapping (Glendale) shapefile appears to have screened out some smaller surface water features that appear in the 2k hydrography mapping. Mapped features are classified by feature type (e.g., agricultural drainage, swale, stream/creek), channel type (e.g., natural, constructed - open) and permanency (e.g., intermittent, ephemeral, permanent). The information contained in the attribute table appears to be like the Contemporary Watercourse Mapping, which is an open-source dataset from the NPCA.
  - Features classified in the Watercourse Mapping (Glendale) as agricultural drainage, ditch – agricultural, headwaters, rural drainage or swales were assumed to be HDFs. A breakdown of how feature types were classified is provided in the table on the following page.
  - In later stages of Phase 1, additional potential HDF features may be identified by overlaying the two map sets and selecting the features that had been screened out of the Watercourse Mapping (Glendale).
- In this study, and others on Southern Ontario, HDFs are considered to generally have a drainage area of 50 ha or less, while features with drainage areas over 50 ha are categorized as watercourses. The drainage area is utilized as a tool for screening features and their field requirements. Feature type must be confirmed through additional desktop and field analyses.
  - All surface water features with less than 50 ha drainage area were screened as potential HDFs.
  - The drainage network will be further characterized by completing an ArcHydro assessment of the Niagara Peninsula Conservation Authority 2020 Digital Terrain Model (DTM). This will identify features with drainage areas under 25 ha.
  - Features near the preliminary HDF/ watercourse boundary may be reclassified in later stages of the study based on field observations.
- The list of potential HDFs will be verified in the field during field visits in late summer or fall of 2022, and through Spring of 2023.
- Preliminary observation from the desk assessment:
  - Much of the District Plan Area has been developed, and many surface water features (watercourse and potential HDFs) within the study area have been modified.
  - Common modifications to surface water features include straightening, channelization into ditches, and piping through conduits. Watercourse features have been particularly

Name	Description	Source
Watercourse Mapping Glendale shapefile	This dataset appears to have been sourced from the NPCA and contains similar information as the NPCA's Contemporary Watercourse Mapping. The objective of the Contemporary Watercourse Mapping is to provide a large scale (1:2000) inventory of hydrographic mapping of sufficient detail to support hydrology characterization work at a level that accounts for the influences of significant watercourse features, such as tile drains, municipal drains, roads and culverts, which exert a controlling influence on overland and near sub-surface flows. The Contemporary Mapping of Watercourses feature class is developed from hydrologically coded break lines (select point density) from a photogrammetric digital terrain model (2010 and 2013) that collectively provide a detailed representation of the drainage of the landscape. Date Updated: October 4, 2021	Client supplied
2k Hydrography watercourse shapefile	The Hydroline feature class is the working virtual flow product based on the source Hydrography_2K_NPCA dataset that will form the spatial framework for the NPCA's 1:2000 water resources base. It contains all of the linear linework required as an exhaustive inventory to create the surface water network at the 1:2000 scale. Info Updated: January 18, 2021	NPCA open source

Table of Available Watercourse Mapping, Glendale Study Area

Screening	Feature Type
HDF	Agricultural drainage Ditch- Agricultural Headwater Rural Drainage Swale
Watercourse	Stream/Creek Waterbody/River
Other	Culvert Conduit Ditch – Other; Ditch - Roadside Island Open Storm Channel Pipe Inlet/Outlet/Outfall Pond – Agricultural; Pond – Other; Pond - Stormwater Reservoir Retaining Wall

Table of Watercourse Mapping – Preliminary HDF Screening by Feature Type

modified in the vicinity of the highway interchange in the central portion of the District Plan Area.

- Flows to several features are derived from stormwater.
- The study area contains confined, partially confined, and unconfined watercourse reaches. Watercourses in the east and north-central parts of the District Plan Area flow through defined valleys.
- The District Plan Area intersects the Welland Canal to the west and contains the Welland Canal Lock 3 pond. Several smaller canals are present in the southwest portion of the District Plan Area. These constructed waterways represent significant historical hydrological alteration within the study area.

Using available mapping and current aerial imagery, potential watercourses and headwater drainage features (HDFs) were identified within the District Plan Area. For the purpose of this memorandum, potential geomorphic constraint rankings were applied to watercourse features and HDFs using coarse definitions, which are provided earlier in this section. The resulting potential constraints are presented in Drawing FG-1. Over the course of Phase 1 these potential constraints will be revised per the detailed definitions provided in Table FG-1 (attached). Preliminary erosion hazard limits were also defined for potential high- and medium-constraint watercourses. The potential constraints, feature types (watercourse versus HDF) and preliminary erosion hazard limits will be refined and established through the course of the SWS through additional stream network delineation, fieldwork, and consultation with the TAC.

Hydrogeology

The overall objective of the groundwater scope of work for the subwatershed study is to characterize the groundwater flow system and identify water quality and quantity constraints associated with groundwater and surface water features within, and adjacent to, the study area. The characterization includes groundwater-surface water interactions and associated ecological and hydrologic functions. The goal is to maintain these functions of groundwater in supporting habitat during and following development.

Background Information Review

Relevant groundwater sources of information that have been provided or compiled for the groundwater characterization to date include the following key sources:

NPCA Source Water Protection - Updated Assessment Report, Niagara Peninsula Source Protection Area

The assessment report (NPSPA 2013) provides an overview of the regional characterization of surface water resources, the physiography, surficial and bedrock geology, bedrock topography, aquifer and aquitard units, water table and groundwater flow, recharge areas and potential groundwater discharge. The report assesses and provides mapping of Highly Vulnerable Aquifers (HVAs) and Significant Groundwater Recharge Areas (SGRAs).

Niagara-On-The-Lake Watershed Study

This watershed study presents a recommended plan for the watershed and implementation strategy that considers the needs of both the agricultural community and watershed's natural resources (Aquafor Beech 2008). The report includes background information on surficial geology and groundwater resources, as well as issues, opportunities, and constraints to meeting watershed goals.

The Ministry of Environment, Conservation, and Parks (MECP) Water Well Information System (WWIS)

This provincial database includes water well records that provide information about subsurface lithology, groundwater levels, and well capacity,

among other information. In total, 72 water well records are available within the District Plan Area.

The Ministry of Environment, Conservation, and Parks (MECP) Permit To Take Water (PTTW) Database

This provincial database includes the locations, magnitudes, and sources of permitted water takings within the study area. These PTTWs were reviewed and 1 surface water permit was found within the District Plan Area for power production. Within 1 km of the District Plan Area, 5 surface water and groundwater takings related to a golf course irrigation permit and 1 surface water taking related to cooling water were found.

Mapping from the Ontario Geological Survey (OGS)

The OGS provides geological mapping of the study area, including spatial datasets of physiography, surficial geology, and bedrock geology.

Geotechnical Investigations

Geotechnical information from 14 studies (e.g., development and infrastructure projects) were provided to the project team as part of the background data transfer. The information contained in these reports contain relatively shallow information (e.g., usually boreholes completed less than 10 m bgs), such as overburden stratigraphy and groundwater levels. This data will be combined with similar data in the WWIS to develop a conceptual characterization of the subsurface.

Class Environmental Assessment Reports

A transportation environmental study report (AECOM 2018) and design and construction report (MH 2021) related to the Class Environmental Assessment of the Queen Elizabeth Way/Glendale Avenue interchange reconstruction were provided as part of the background data transfer. These reports provide information on existing conditions, as well as potential impacts and mitigation measures with respect to groundwater.

Preliminary Mapping

Drawing GW-1 shows the study area and areas of low potential constraints based on existing mapping. Additional mapping of geological unit thicknesses and cross-sections, depth to groundwater and groundwater flow directions, groundwater discharge will be completed as the characterization is completed. The following sections describe the preliminary characterization and constraints mapping.

Preliminary Characterization

The following summarizes the preliminary geological and hydrogeological characteristics of the District Plan Area. These characteristics will be further assessed, refined, and presented with additional graphics in the detailed characterization report. Interpretations of groundwater-surface water interactions will also be refined using data from the groundwater field program, which includes a 1-year (3 season) spot baseflow monitoring program to evaluate areas of groundwater discharge to streams or leakage from streams to groundwater within the Secondary Plan Area. Evaluating changes in baseflow will support the assessment of potential groundwater contributions supporting aquatic habitat. The groundwater function in support aquatic habitat and other linkages will ultimately be integrated with the other subwatershed study components.

- The surficial geology consists primarily of the silt and clay Halton Till in the western portion of the District Plan Area, and glaciolacustrine silt and clay in the eastern portion of the District Plan Area. A small area of glaciolacustrine sand and gravel is mapped in the northwestern corner of the District Plan Area.
- The subcropping bedrock geology in the District Plan Area consists primarily of the red Queenston Formation shale, except for the southeastern part of the area, which is comprised of shales, dolostones, and sandstones of the Clinton-Cataract Group.
- Surficial geology mapping suggests bedrock is present at surface in a small portion of the southeastern part of District Plan Area, along the edge of the escarpment where it meets Queen Elizabeth Way. However, water well records suggest a thicker overburden and deeper bedrock in the District Plan Area between 14.6 to 51.8 m bgs below the (north

of) escarpment. Bedrock topography is interpreted to slope from a high in the south, to a low in the north, toward Lake Ontario (NPSPA 2013). The spatial distribution of overburden thickness/depth to bedrock will be characterized further through cross-sectional analysis of the available data during the detailed characterization phase.

- Preliminary review of a selection of the water well records in the District Plan Area describe some conditions where deposits of clay are present from ground surface to bedrock, while other well records describe thick sand and gravel deposits (some greater than 20 m thick) below a surficial clay layer and on top of bedrock. Further cross-sectional evaluation of the available borehole data will provide further insights on the spatial distribution, continuity, and thickness of potential sand and gravel deposits within the finer grained overburden and overlying bedrock.
- The predominant groundwater flow pathway within the clay overburden is interpreted within the fractures of the weathered (i.e., oxidized) upper 3 to 6 m. Fractures tend to decrease with depth in this zone and vertical movement of water within this zone is understood to be more dominant than horizontal movement. Where the overburden is unoxidized, the fracture frequency is substantially reduced although roots can provide additional hydraulic pathways.
- The main regionally significant aquifer in the District Plan Area is interpreted to be contact-zone aquifers, where basal sand and gravel deposits lie on fractured bedrock at the overburden-bedrock contact. These aquifers are generally considered to be confined beneath the clays and silts (NPSPA 2013). Horizontal groundwater flow pathways are considered to be the dominant pathways within the contact-zone aquifers than vertical pathways. The Queenston Formation is also known to be a source of some groundwater supply; however, the water quality may be poor.
- On a regional scale, shallow and deep groundwater (i.e., from wells completed less than and greater than 15 m bgs) is interpreted to flow from south to north toward Lake Ontario (NPSPA 2013). On a local scale, shallow flow may be directed to local water courses and support groundwater discharge to surface water. Fracture orientation of the bedrock may also control local groundwater flow directions. Potential flow toward and discharge to local water courses will be further evaluated as part of assessment of available local groundwater level data and spot baseflow monitoring to be conducted as part of further characterization.
- Infiltration and subsequent groundwater recharge are generally lower across the District Plan Area (i.e., less than 53 mm/year; NPSPA 2013) as a result of the predominant clay and silt deposits. However, infiltration and contaminant susceptibility are greater where the overburden is very thin, where bedrock is exposed, or where deposits of sand and gravel may be found near surface. The surficial sand and gravel glaciolacustrine deposits mapped in the northwestern corner of the District Plan Area, for example, are interpreted to be part of the unconfined Iroquois Sand Plain surficial overburden aquifer (NPSPA 2013). Infiltration and aquifer recharge in these areas are expected to be locally greater.
- On a regional scale, groundwater discharge may occur in low-lying areas such as within water bodies and wetlands, and along water courses, especially where those features cut into coarser-grained overburden or shallow fractured bedrock. It may also occur in areas of topographic relief, such as along the face and base of the Niagara Escarpment (NPSPA 2013).

Preliminary Constraint Analysis

Based on the preliminary characterization and the project team's experience in similar settings, the hydrogeological sensitivity within and adjacent to the study area is interpreted to be related to the thickness and stratigraphy of the overburden, including the thickness of the surficial fine-grained clay and silt sediments, as well as the occurrence and spatial extent of more permeable sand/gravel units within the fine-grained overburden.

Vulnerable areas delineated as part of the Source Water Protection Program are areas

where groundwater quantity and quality may be protected through specific policies applied to activities occurring within those areas and may be considered potential constraints. Both the HVAs and SGRAs are types of vulnerable areas found within the study area that base their criteria to a greater extent, directly or indirectly, on the permeable nature of the overburden material and thickness of overburden. These characteristics are related to the potential for greater transmittal of water and/or migration of contaminants from the surface to the underlying overburden and bedrock aquifers.

The following items are currently considered "Low Potential Constraints" related to groundwater based on a preliminary assessment of the data evaluated to date. These constraints are expected to be refined through the Subwatershed Study Phase 1 Characterization, as well as more detailed characterization studies at future planning stages:

- Significant Groundwater Recharge Area (SGRA) – These areas are identified through the Source Water Protection program as important for providing groundwater recharge to the aquifer system. According to spatial mapping provided as part of this project, SGRAs are mapped within the eastern portion of the Secondary Plan Area (Drawing GW-1); these areas are associated with either glaciolacustrine clays and silts, or bedrock mapped at surface. While this SGRA is suitable as a low preliminary constraint, the hydrogeologic sensitivity of this area may be refined with the collection of additional data through future planning stages. As SGRA delineation is based on a regional analysis of available data using numerical modelling tools, further local-scale work may be required to apply the findings to a specific property. As a result, the interpreted local occurrence and distribution of SGRAs in the area may be refined in the future, but they would still be considered low constraints.
- Highly Vulnerable Aquifer (HVA) – An HVA refers to groundwater aquifers which are highly susceptible to contamination from both human and natural sources and usually correlates with areas where the water table is close to ground surface, and/or overburden units are thin and permeable, and/or potential anthropogenic pathways are present that could allow contaminants to quickly migrate from ground surface to subsurface aquifers. According to spatial mapping provided as part of this project, small areas of HVAs are mapped within both the District Plan Area and Secondary Plan Area (Drawing GW-1). While this HVA designation is suitable as a low preliminary constraint, the hydrogeologic sensitivity of this area may be refined through future planning stages. Similar to the SGRAs, HVA delineation is based on a regional analysis of data (e.g., regional hydrostratigraphic interpretations) and more detailed local-scale work may be needed to apply the findings to a specific property. As a result, the interpreted local occurrence and distribution of HVAs may be locally refined in the future, but they would still be considered low constraints.

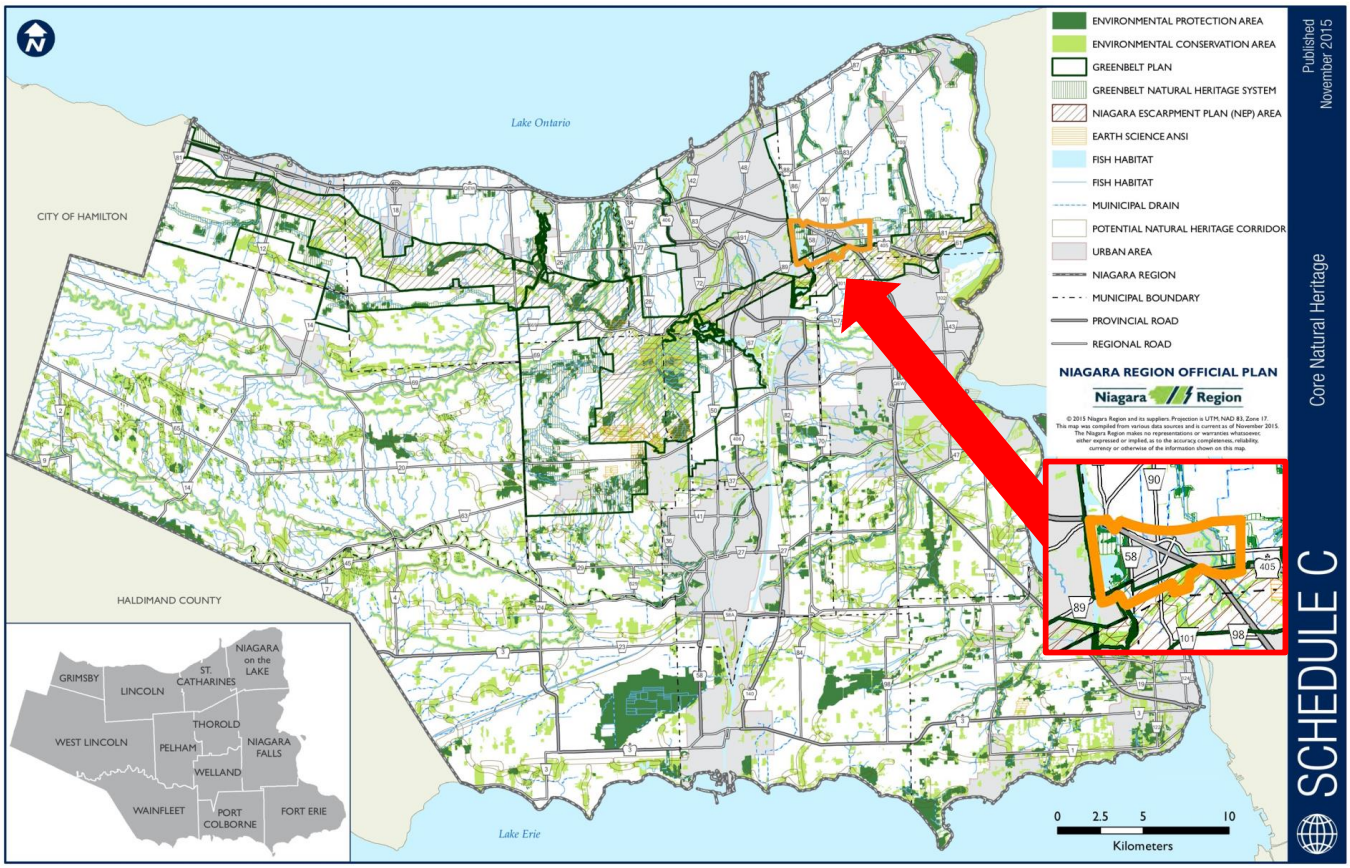
The following are additional potential constraints that will be assessed through the Phase 1 characterization:

- Overburden thickness and interpreted spatial extent of sand and gravel lenses
- Areas of functional groundwater discharge (e.g., Provincially Significant Wetlands).
- The capacity to infiltrate stormwater

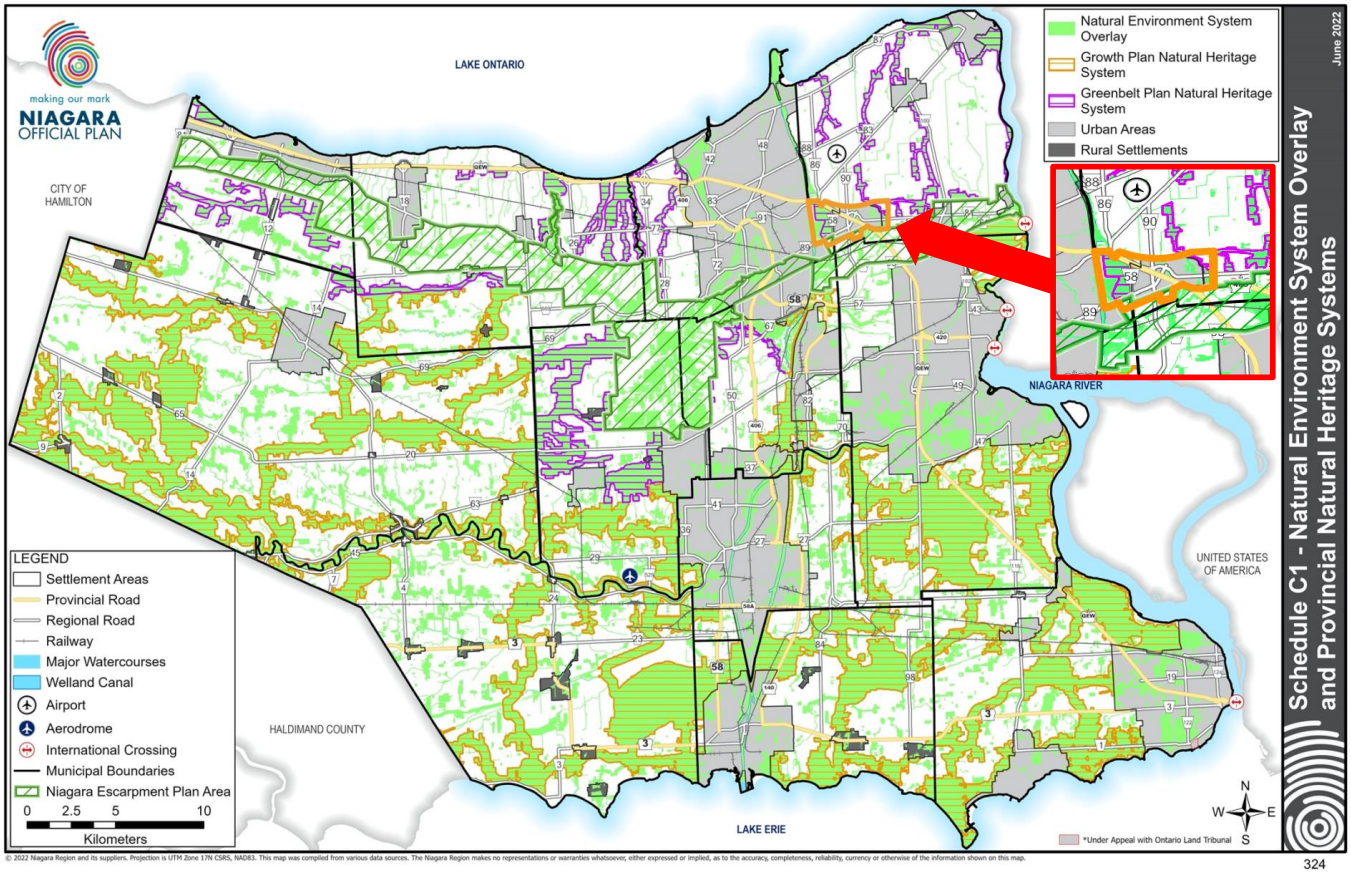
Conclusions & Next Steps

The foregoing sections and accompanying figures and drawings summarize the preliminary characterization and preliminary constraint rankings for existing environmental features and systems within the study area. The preliminary characterization and constraint rankings presented herein have been established primarily based upon a desktop review of background information provided for use in this study. The preliminary characterization and constraint rankings will be refined as part of the Phase 1 Characterization for the Subwatershed Study, based upon detailed analyses and assessment of the 2022 and 2023 field investigations data once completed. Of particular note, an integrated assessment of the natural features and systems will be completed as part of the Phase 1 reporting; this will include an integrated constraint ranking for the area watercourses, based upon the findings from each discipline, to establish a "net" constraint ranking for the area watercourses.

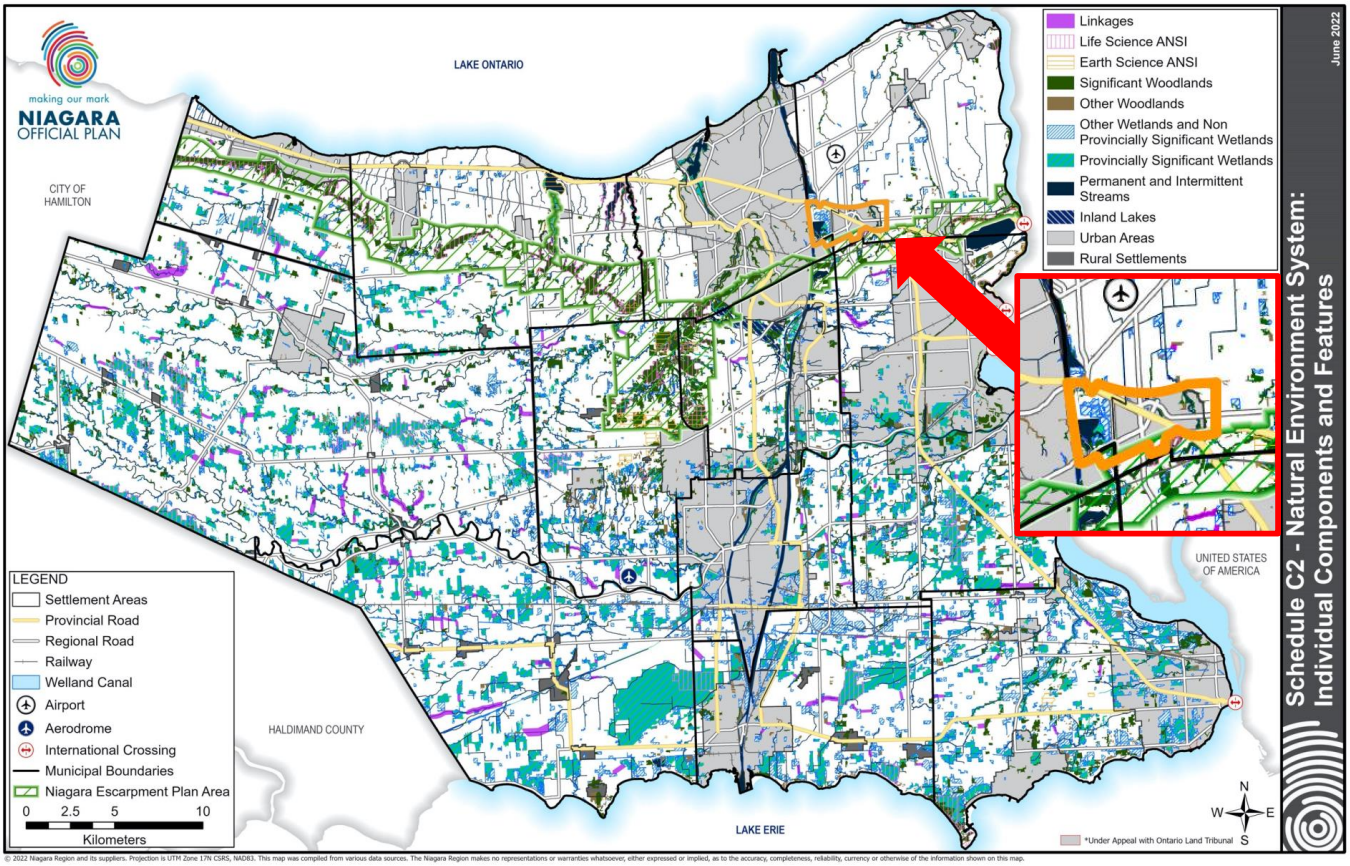
An updated characterization and constraint ranking will be provided in the Phase 1 Characterization Report, to further inform developing a preferred land use alternative. As part of this characterization, constraint rankings will be provided for the area watercourses, integrating the findings from the various study disciplines to establish "net" constraint rankings for the various reaches. In addition, an integrated assessment of the terrestrial features will be completed, based upon information available from the various study disciplines at that time. The constraint rankings will be finalized as part of the Phase 1 Characterization for the Subwatershed Study, and will be used to develop management alternatives as part of the subsequent phases of the Subwatershed Study.



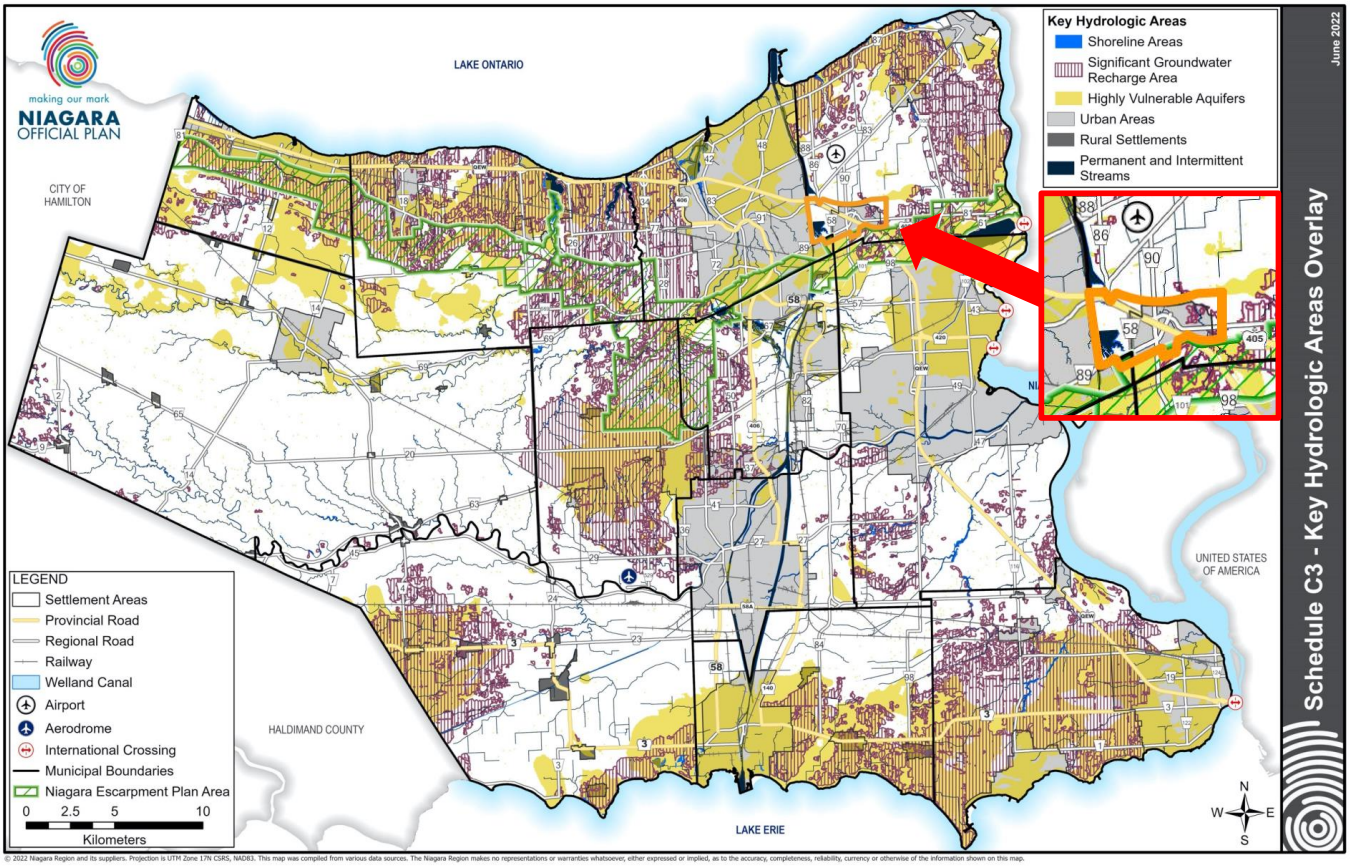
Niagara Region Official Plan 2014 – Schedule C: Core Natural Heritage



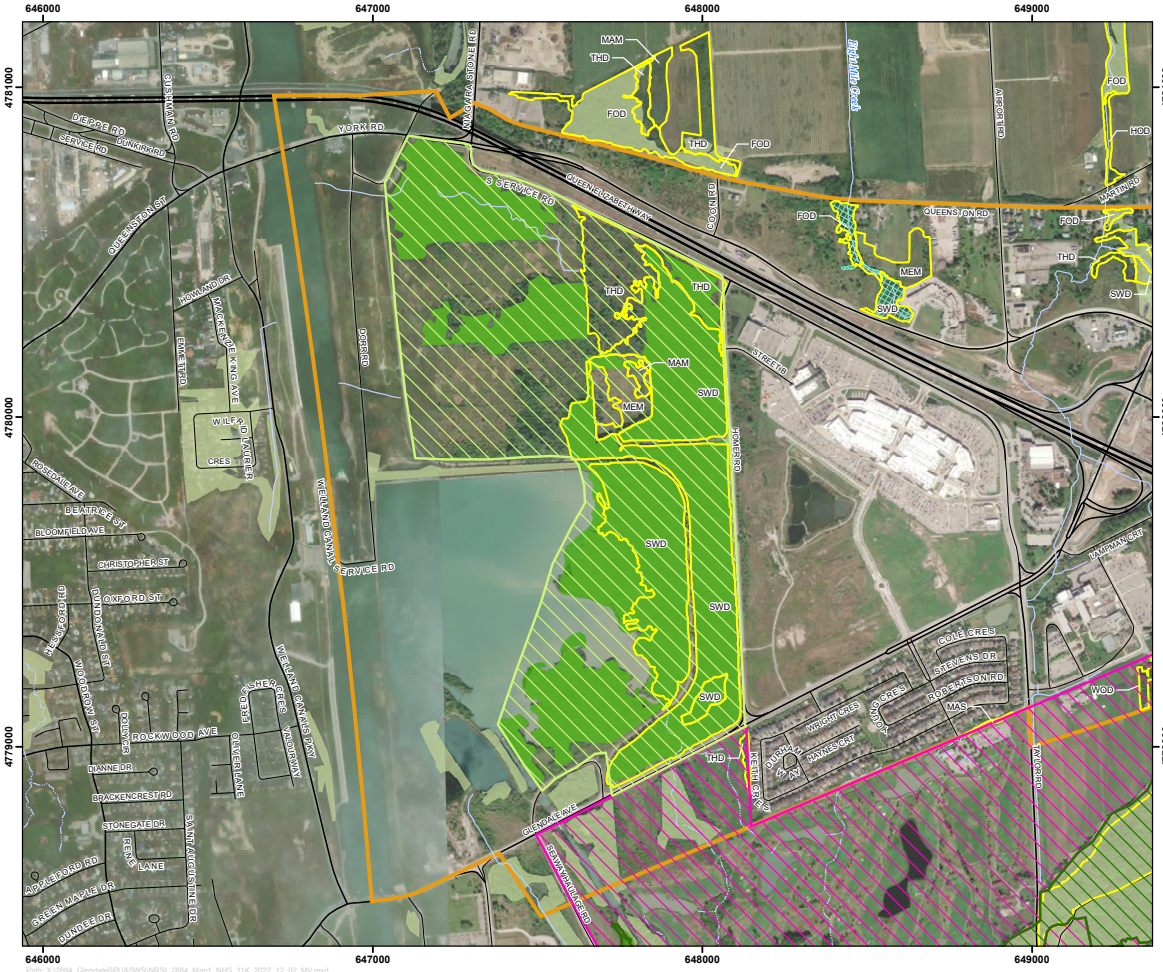
Niagara Region Official Plan 2022 – Schedule C1: Natural Environment System Overlay and Provincial Natural Heritage Systems



Niagara Region Official Plan 2022 – Schedule C2: Natural Environment System: Individual Components and Features



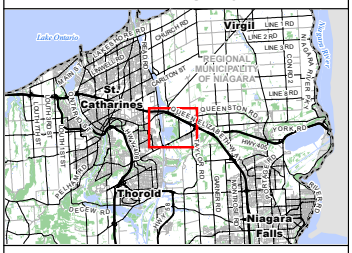
Niagara Region Official Plan 2022 – Schedule C3: Key Hydrologic Areas Overlay



Map 1a

Glendale Secondary Plan Update and SWS

Natural Heritage System



Legend

- Study Area
- Highway
- Primary Road
- Secondary Road
- Permanent Watercourse
- Intermittent Watercourse
- Conservation (NOTL OP) (outside Regional NHS)

Regional Core Natural Heritage Overlay (2014 OP)

- Environmental Protection Area (EPA)
- Environmental Conservation Area (ECA)

Natural Heritage System (NHS)

- Escarpment Natural Area
- Escarpment Protection Area
- Greenbelt NHS

Niagara Region Ecological Land Classification

- (FOD) Deciduous Forest
- (HOD) Deciduous Hedgerow
- (MAM) Meadow Marsh
- (MAS) Shallow Marsh
- (MEM) Mixed Meadow
- (SWD) Deciduous Swamp
- (THD) Deciduous Thicket
- (WOD) Deciduous Woodland

NATURAL RESOURCE SOLUTIONS INC.
Aquatic, Terrestrial and Wetland Biologists

Project: 2884
Date: December 2, 2022

NAD83 - UTM Zone 17
Size: 11x17"
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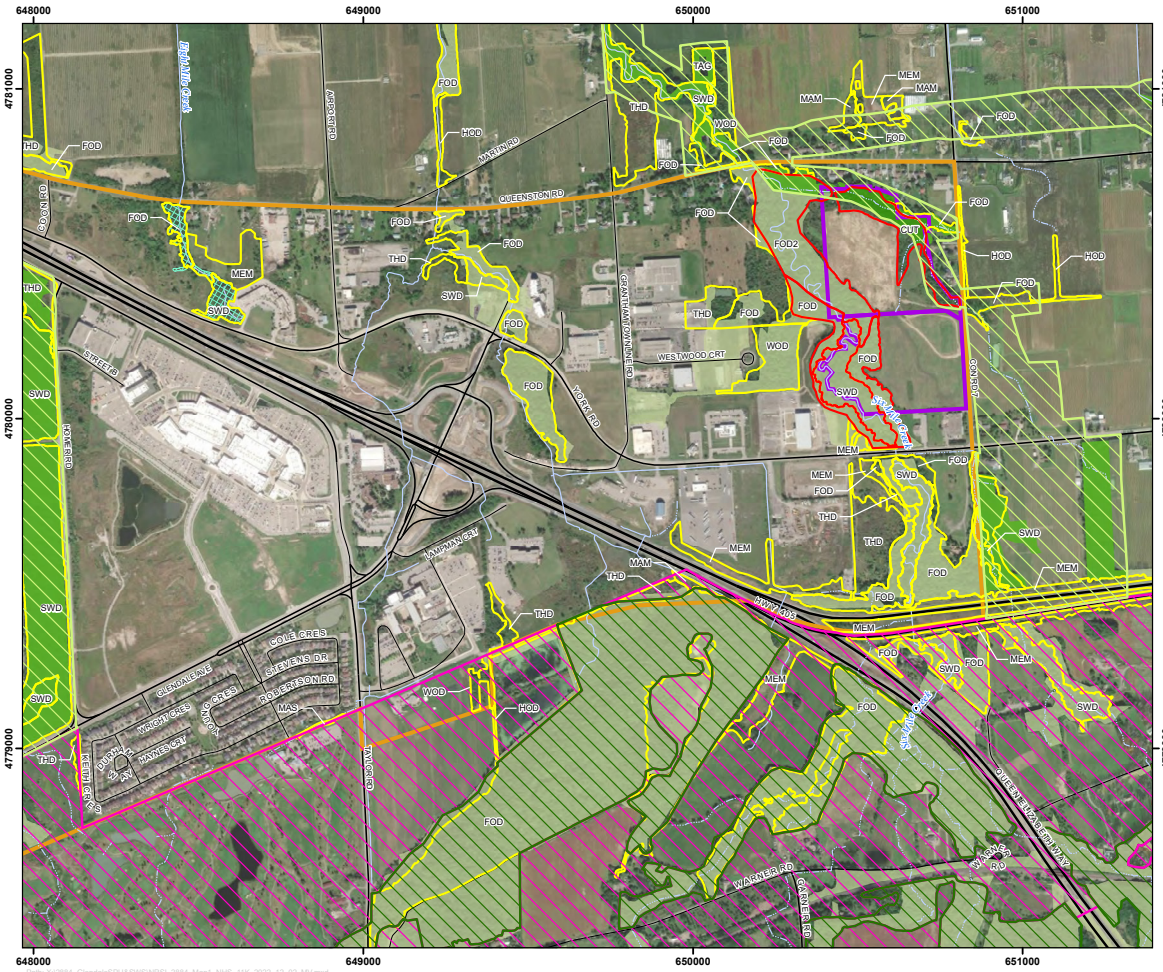
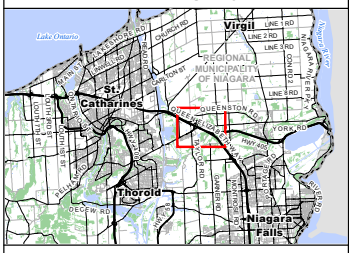


Map 1b

Glendale Secondary Plan Update and SWS

Natural Heritage System



Legend

- Study Area
- Modero Estates Lands
- Highway
- Primary Road
- Secondary Road
- Permanent Watercourse
- Intermittent Watercourse
- Conservation (NOTL OP) (outside Regional NHS)

Regional Core Natural Heritage Overlay (2014 OP)

- Environmental Protection Area (EPA)
- Environmental Conservation Area (ECA)

Natural Heritage System (NHS)

- Escarpment Natural Area
- Escarpment Protection Area
- Greenbelt NHS

Niagara Region Ecological Land Classification

- (CUT) Cultural Thicket
- (FOD) Deciduous Forest
- (FOD2) Dry - Fresh Oak - Maple - Deciduous Forest Ecosite
- (FOM) Mixed Forest
- (HOD) Deciduous Hedgerow
- (MAM) Meadow Marsh
- (MAS) Shallow Marsh
- (MEM) Mixed Meadow
- (SWD) Deciduous Swamp
- (TAG) Treed Agriculture
- (THD) Deciduous Thicket
- (WOD) Deciduous Woodland
- Modero Estates EIS Ecological Land Classification

NATURAL RESOURCE SOLUTIONS INC.
Aquatic, Terrestrial and Wetland Biologists

Project: 2884
Date: December 2, 2022

NAD83 - UTM Zone 17
Size: 11x17"
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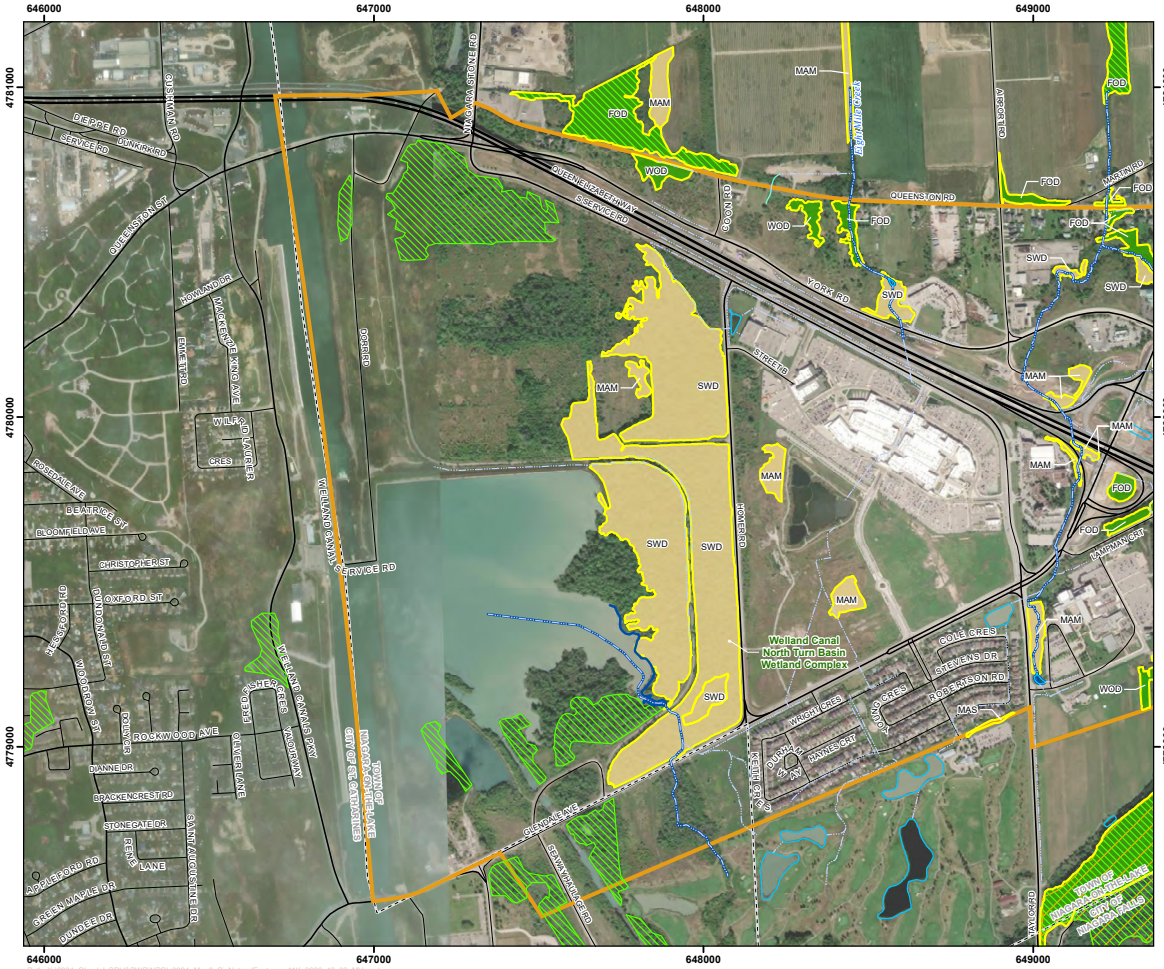
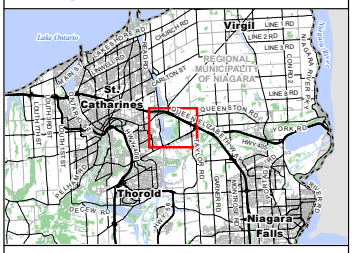


Map 2a

Glendale Secondary Plan Update and SWS

Significant Natural Features



Legend

- Study Area
- Lower Tier Municipality
- Highway
- Primary Road
- Secondary Road
- Provincially Significant Wetland (PSW)
- Other Wetland
- Terrestrial Woodland
- Significant Woodland (2022 ROP; approximated)
- ANSI, Life Science

NPCA Watercourses

- Ephemeral or Intermittent Watercourse
- Headwater
- Pond
- Important Fish Habitat
- Niagara Region Ecological Land Classification
- (FOD) Deciduous Forest
- (MAM) Meadow Marsh
- (MAS) Shallow Marsh
- (SWD) Deciduous Swamp
- (WOD) Deciduous Woodland

NATURAL RESOURCE SOLUTIONS INC.
Aquatic, Terrestrial and Wetland Biologists

Project: 2884
Date: December 2, 2022

NAD83 - UTM Zone 17
Size: 11x17"
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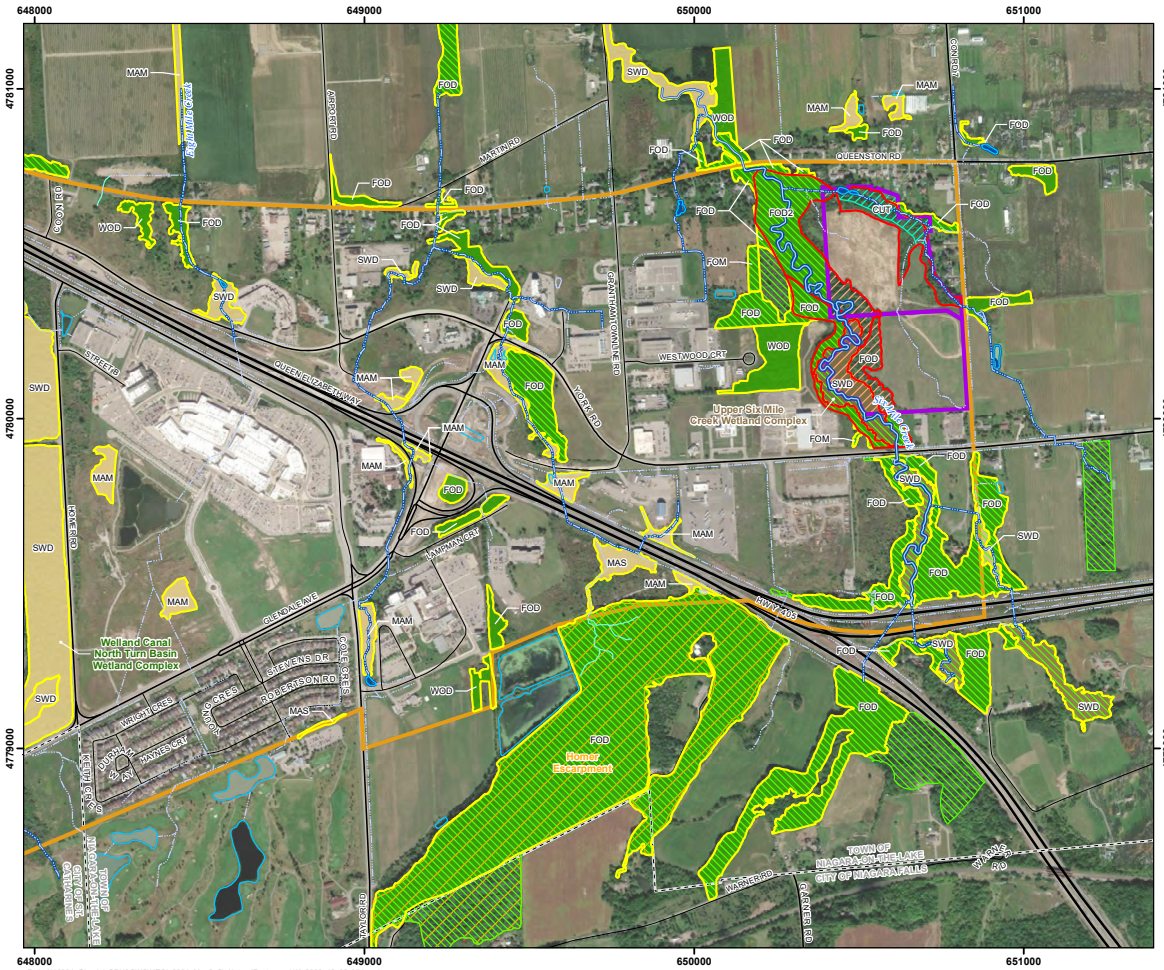
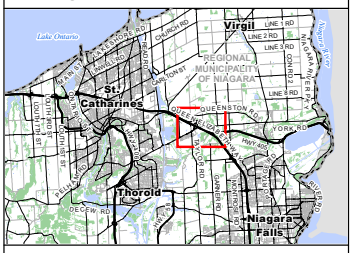


Map 2b

Glendale Secondary Plan Update and SWS

Significant Natural Features



Legend

- Study Area
- Modero Estates Lands
- Lower Tier Municipality
- Highway
- Primary Road
- Secondary Road
- Evaluated, Non-PSW Wetland
- Other Wetland
- Terrestrial Woodland
- Significant Woodland (2022 ROP; approximated)
- ANSI, Life Science

Regional Core Natural Heritage Overlay (2014 OP)

- Environmental Protection Area (EPA)
- Environmental Conservation Area (ECA)

NPCA Watercourses

- Permanent or Intermittent Watercourse
- Ephemeral or Intermittent Watercourse
- Headwater
- Pond
- Important Fish Habitat
- Niagara Region Ecological Land Classification
- (CUT) Cultural Thicket
- (FOD) Deciduous Forest
- (FOD2) Dry - Fresh Oak - Maple - Deciduous Forest Ecosite
- (FOM) Mixed Forest
- (MAM) Meadow Marsh
- (MAS) Shallow Marsh
- (SWD) Deciduous Swamp
- (WOD) Deciduous Woodland
- Modero Estates EIS Ecological Land Classification

NATURAL RESOURCE SOLUTIONS INC.
Aquatic, Terrestrial and Wetland Biologists

Project: 2884
Date: December 2, 2022

NAD83 - UTM Zone 17
Size: 11x17"
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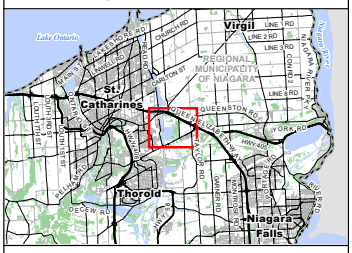
Map 3a

Glendale Secondary Plan Update and SWS

Known Significant Habitat Features



Legend

- Study Area
- Lower Tier Municipality
- Highway
- Primary Road
- Secondary Road
- Deer Wintering Congregation Area SWH (MNRF-mapped)

NPCA Watercourses

- Ephemeral or Intermittent Watercourse
- Headwater
- Pond
- Important Fish Habitat

Project: 2884
Date: September 7, 2022

NAD83 - UTM Zone 17
Size: 11x17"
1:11,000

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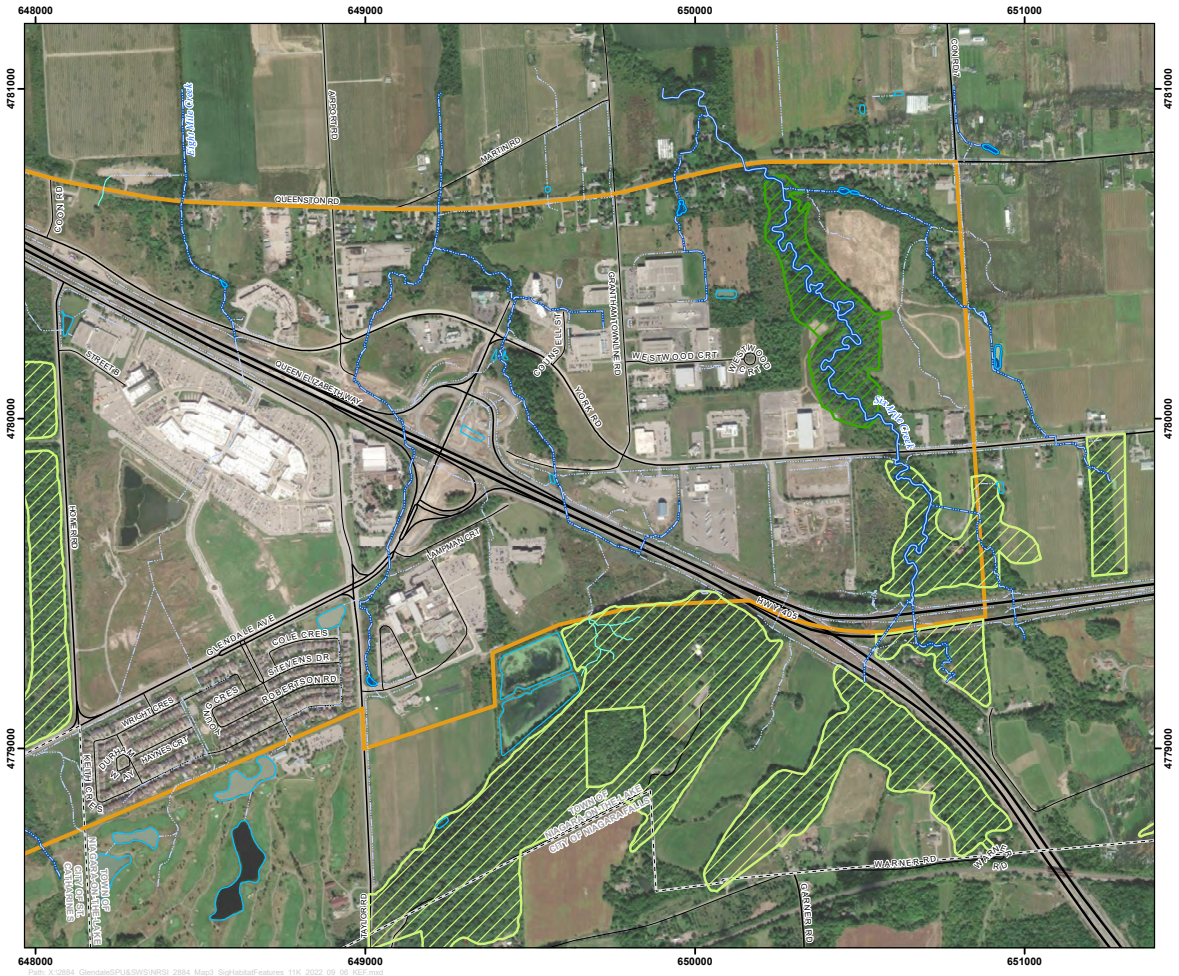
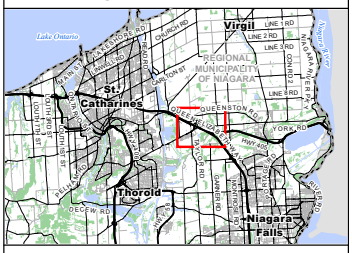


Map 3b

Glendale Secondary Plan Update and SWS

Known Significant Habitat Features



Legend

- Study Area
- Lower Tier Municipality
- Highway
- Primary Road
- Secondary Road
- Deer Wintering Congregation Area SWH (MNRF-mapped)
- Potential Deer Wintering Congregation Area SWH

NPCA Watercourses

- Permanent or Intermittent Watercourse
- Ephemeral or Intermittent Watercourse
- Headwater
- Pond
- Important Fish Habitat

Project: 2884
Date: September 7, 2022

NAD83 - UTM Zone 17
Size: 11x17"
1:11,000

0 100 200 300 400 500 600 700 Metres

N

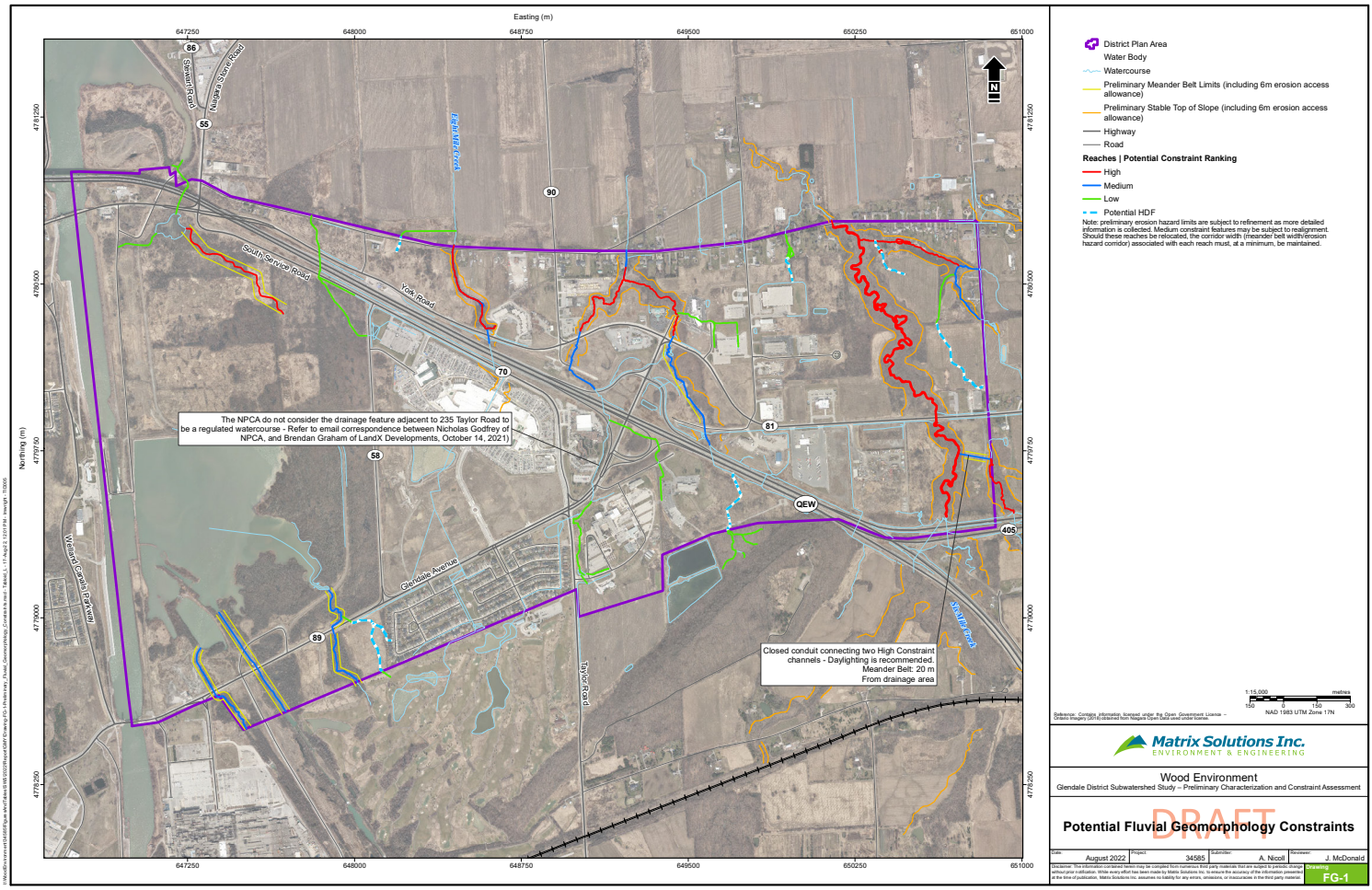


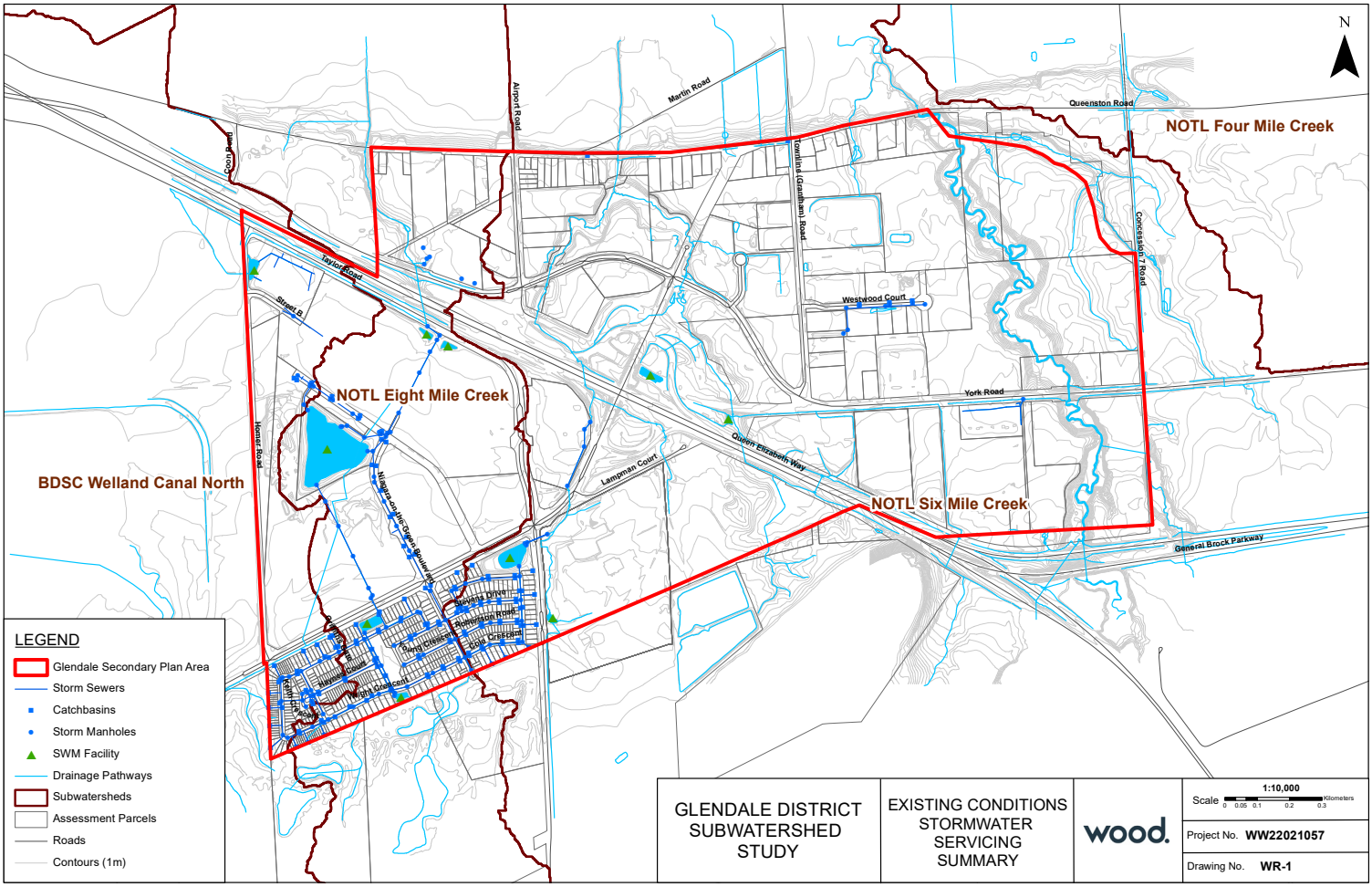
Table FG-1: Watercourse and Headwater Drainage Feature Classification

Discipline	Definition	Management Strategy
Red Stream Classification (solid red lines). These features are high constraint watercourses that have attributes (e.g. floodplains, unstable banks) that attract NPCA regulations. They must remain open and protected in their present condition and location, with the exception of select locations where rehabilitation may be of benefit to the system.		
Surface Water	These corridors contain a well-defined channel within a well-defined and established valley system, with large contributing drainage areas (i.e. 200 ha or more).	Watercourse and corridor to be protected in current form and location, with applicable regulatory setbacks and ecological buffers.
Geomorphology	These corridors contain a defined active channel with well-developed channel morphology (i.e., riffle-pool), material sorting, floodplain development, and/or a well-defined valley. These corridors offer both form and function and have been identified as 'no touch' reaches that must be maintained undisturbed in their present condition, except for select locations where rehabilitation may be of benefit to the system. They have usually been deemed high-quality systems that could not be re-located and replicated in a post-development scenario.	Watercourse to be protected with meander belt in current form and location. Minor modification through rehabilitation/enhancement may be acceptable in select location where it is a benefit to the system. Options • Do nothing: Corridors must remain where they are in the landscape. Delineate meander belt or erosion hazard corridor depending on valley classification. Determine additional regulatory setbacks as required. • Channel adjustments may be permitted at select locations given sufficient rationale (e.g. addressing an immediate high-risk erosion hazard, or an essential infrastructure for servicing issue such as road crossings or channel lowering). Natural channel design to be implemented for any adjustments. • Degraded (channelized and straightened) portions may by realigned using natural channel design, if realignment does not negatively impact rehabilitation.
Fisheries	Permanently wetted (flowing or standing water over most of watercourse length) that is generally associated with continuous or seasonal groundwater discharge, or with wetland storage and/or pond flows. Fish community (or the potential for) is present and natural habitat is	Watercourse to be protected/enhanced in current form and location. Minor modification through rehabilitation/enhancement may be acceptable in select location where it is a benefit to the system. Options

Discipline	Definition	Management Strategy
	usually fully developed. Either habitat and/or flow source characteristics may be difficult to replicate or maintain. -and/or- Habitat occupied by species at risk.	• Preserve the existing drainage feature and groundwater discharge or wetland in-situ. Key features of this are: 1) Maintain existing water source: e.g. incorporation of shallow groundwater and base flow protection techniques such as infiltration treatment; examine need to incorporate groundwater flows through infiltration measures (i.e. third pipes, etc.) to ensure no net loss or, if appropriate, potential gain. 2) Drainage feature must connect to downstream watercourse/habitat. 3) Stormwater management (e.g. extended detention outfalls) are to be designed and located to avoid and/or minimize impacts (i.e. sediment, temperature) to fish habitat. • Channel adjustments may be permitted at select locations given sufficient rationale (e.g. addressing an immediate high-risk erosion hazard, or a critical servicing issue), and habitat features can be restored. Natural channel design to be implemented for any adjustments. • Degraded (channelized and straightened) portions may by realigned using natural channel design if realignment does not negatively impact rehabilitation potential. For example, a more rigorous investigation may be required to ensure realignment does not result in a reduction in groundwater inputs.
Terrestrial	The watercourse segments that are within terrestrial features that are of high ecological quality; are determined to be provincially, regionally, and/or locally significant; and/or are determined to provide critical habitat functions for wildlife (e.g. consistent with criteria for Significant Wildlife Habitat).	Watercourse to be protected/enhanced in current form and location.
	Red HDF Classification (dashed red-white lines). These features, classed as [1]Protection, must remain open and, in general, remain protected in their present condition and location. They may have attributes that attract NPCA regulations.	
Surface Water	These are drainage features for which the application of the HDF Guidelines (TRCA/CVC, 2014) result in a "Protection" management strategy.	For drainage features in this category, follow the HDF management guidelines for "Protection".
Geomorphology	same as above	same as above
Fisheries	same as above	same as above
Terrestrial	The drainage feature reach segments that are within terrestrial features that are of high ecological quality; are determined to be provincially, regionally, locally significant, and/or are determined to provide critical habitat functions for wildlife (e.g. consistent with criteria for Significant Wildlife Habitat).	Drainage feature to be protected/enhanced in current form and location.
Blue Stream Classification (solid blue lines). These features are medium constraint watercourses that have attributes (e.g. floodplains, unstable banks) that attract NPCA regulations. They must remain open but they can be realigned using natural channel design.		
Surface Water	These reaches have relatively smaller contributing drainage areas (i.e. between 50 ha and 200 ha), and typically are not located within defined valley corridors.	Watercourse to remain open. Realignment may be acceptable. Reconstructed watercourse and corridor would be protected by applicable regulatory setbacks and ecological buffers.
Geomorphology	These reaches have well-defined morphology (defined bed and banks, evidence of erosion/sedimentation, and sorted substrate). These reaches maintain geomorphic function and have potential for rehabilitation. In many cases, these reaches are presently exhibiting evidence of geomorphic instability or environmental degradation due to historic modifications and land use practices.	Watercourse to be protected with applicable meander belt and setbacks. Realignment may be acceptable when deemed appropriate for restoration and enhancement or to address an essential infrastructure for servicing issue. Options • Do nothing: Leave the corridors in their present condition and develop outside of their boundaries: Delineate appropriate meander belt or erosion hazard

Discipline	Definition	Management Strategy
		corridor depending on valley classification. Determine additional regulatory setbacks as required. • Enhance existing conditions: maintain the present location of the corridor but enhance the existing conditions (e.g. bank stabilization, re-establish a meandering planform, connect channel to functioning floodplain). Natural channel design to be implemented for any adjustments. Channel adjustments may be permitted for essential infrastructure for servicing (e.g. road crossings or channel lowering). All proposed works are to include sufficient rationale and be approved by regulatory agencies. • Re-locate and enhance existing conditions: many of the reaches within the study area have undergone extensive straightening and modification for agricultural drainage purposes. As such, they are not as sensitive to re-location and would benefit from enhancements such as the re-establishment of a meandering planform with functioning floodplain and development of a riffle-pool morphology (i.e. natural channel design). In the event that these reaches are re-located, the corridor width (meander belt width/hazard corridor) associated with each reach must, at a minimum, be maintained. For reaches that have been straightened, appropriate surrogate reaches or empirical methods should be applied to determine the meander belt corridor. Natural channel design to be implemented for any realignment or adjustments. • For features with realignment opportunities around roads, consideration should be made to select appropriate locations for realignment with respect to the road location, and to reduce the number of road crossings, where appropriate. This should reduce overall environmental impacts from roads Such changes require approval by regulatory agencies
Fisheries	Seasonally wetted (flowing or standing water) that is generally associated with seasonally high groundwater discharge or seasonally extended contributions from wetlands/ponds (no perennial flow). May provide an extended seasonal migration route for fish. Fish community (or the potential for) is present for an extended seasonal period. Potential permanent refuge fish habitat may be provided by naturally occurring storage features such as channel pools, wetlands, and other water bodies.	Watercourse to remain open. Realignment may be acceptable if habitat features and/or flow source can be maintained, replicated, or enhanced. Options • Watercourse remains open and in place, while maintaining (or replicating if appropriate) existing flow source from seasonal groundwater, surface or wetland flows. • Watercourse may be realigned using natural channel design techniques to provide habitat features to maintain or enhance overall fish productivity of the reach. Existing seasonal groundwater, surface, or wetland flows must be maintained (or replicated if appropriate), and drainage feature must connect to downstream habitat.
Terrestrial	Watercourse segment that is within terrestrial features that are determined to be of low or moderate ecological quality; are determined to be not provincially, regionally, and/or locally significant; and/or are determined to not provide critical habitat functions for wildlife (e.g. consistent with criteria for Significant Wildlife Habitat). -and/or- Watercourse segment that is determined to provide significant linkage function for wildlife (as per Significant Wildlife Habitat).	Follow management strategies outlined for fisheries and fluvial, and ensure that the corridor is sufficiently wide and has appropriate restored habitat that supports movement of wildlife.

Discipline	Definition	Management Strategy
Yellow Classification (solid yellow lines). These features are HDFs classed as [1]Conservation, must remain open but can be realigned using natural channel design. They do not have attributes that attract NPCA regulations. The classification and management of terrestrial functions will result from being classed [1]Maintain or Replicate Terrestrial Functions.		
Surface Water	These are HDFs for which the application of the HDF Guidelines (TRCA/CVC, 2014) result in a "Conservation" management strategy.	For HDFs in this category, follow the HDF management guidelines for "Conservation".
Geomorphology	same as above	same as above
Fisheries	same as above HDFs classed as "Conservation" may provide an ephemeral aquatic linkage2 that flows for a very short period (typically in the early spring) that may provide a migration route for fish to move upstream to a valued permanent water storage feature, over a period of hours to a few days. 2An ephemeral aquatic linkage does not provide habitat in which fish may take up residence, though fish may become trapped in minor features and persist for a while until they perish.	same as above
Terrestrial	HDF classification guidelines result in a "Maintain Terrestrial Linkage – Terrestrial Functions" management strategy.	Follow HDF management guidelines for "Maintain Terrestrial Linkage – Terrestrial Functions"
Green Classification (solid green lines). These features are HDFs classed as [1]Mitigation, and do not have attributes that attract NPCA regulations. They need not remain open, but their function to the watershed system must be maintained or replicated.		
Surface Water	These are HDFs for which the application of the HDF Guidelines (TRCA/CVC, 2014) result in a "Mitigation" management strategy.	For HDFs in this category, follow the HDF management guidelines for "Mitigation".
Geomorphology	same as above	same as above
Fisheries	same as above	same as above
Terrestrial	HDF classification guidelines result in a "Replicate Terrestrial Linkage – Terrestrial Functions" management strategy.	Follow HDF management guidelines for "Replicate Terrestrial Linkage – Terrestrial Functions"
Green Classification (dashed green lines). These are HDFs classed as [1]No Management Required.		
Surface Water	These are HDFs for which the application of the HDF Guidelines (TRCA/CVC, 2014) result in "No Management Required".	For HDFs in this category, follow the HDF management guidelines for "No Management Required".
Geomorphology	same as above	same as above
Fisheries	same as above	same as above
Terrestrial	same as above	same as above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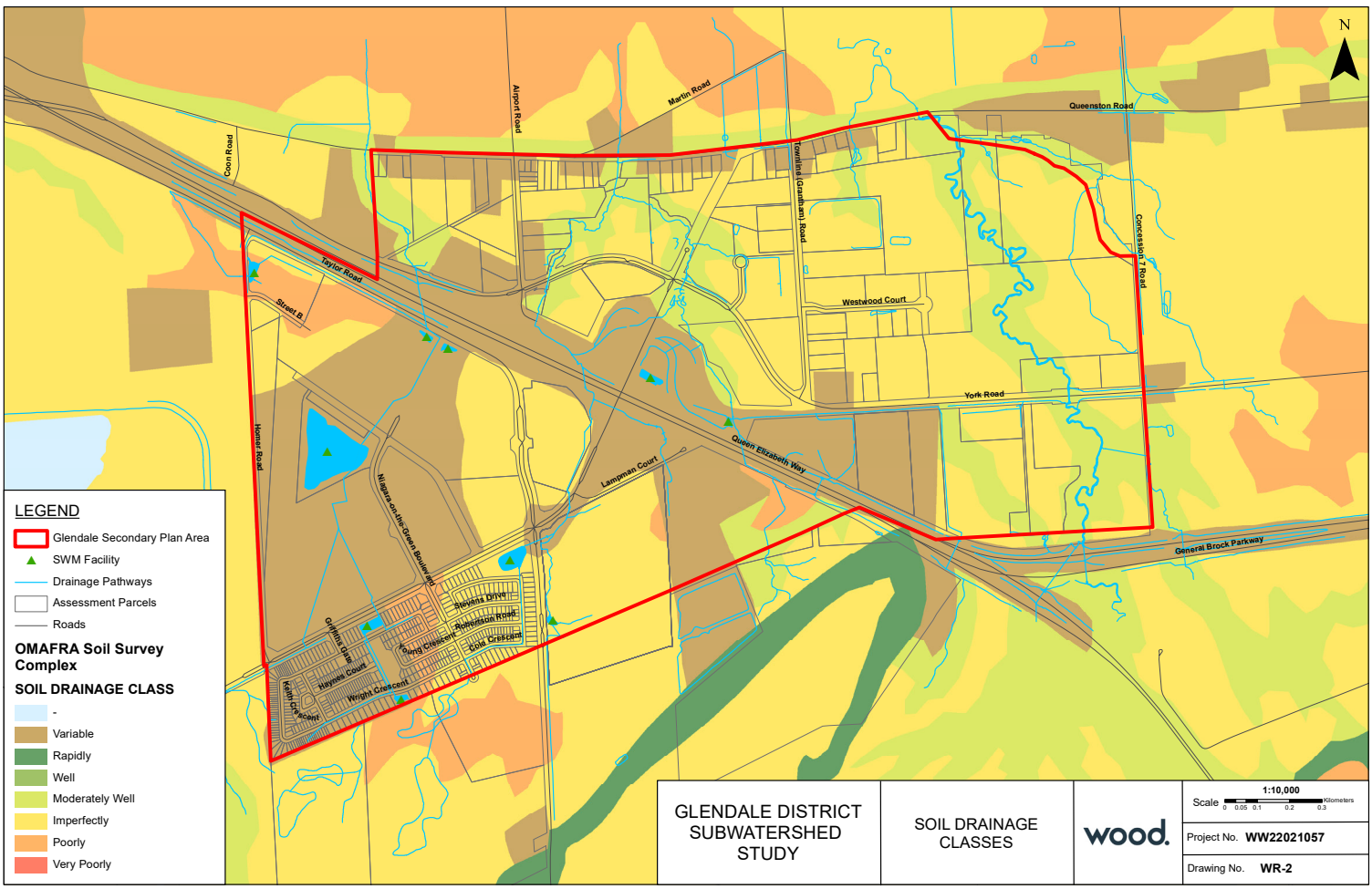
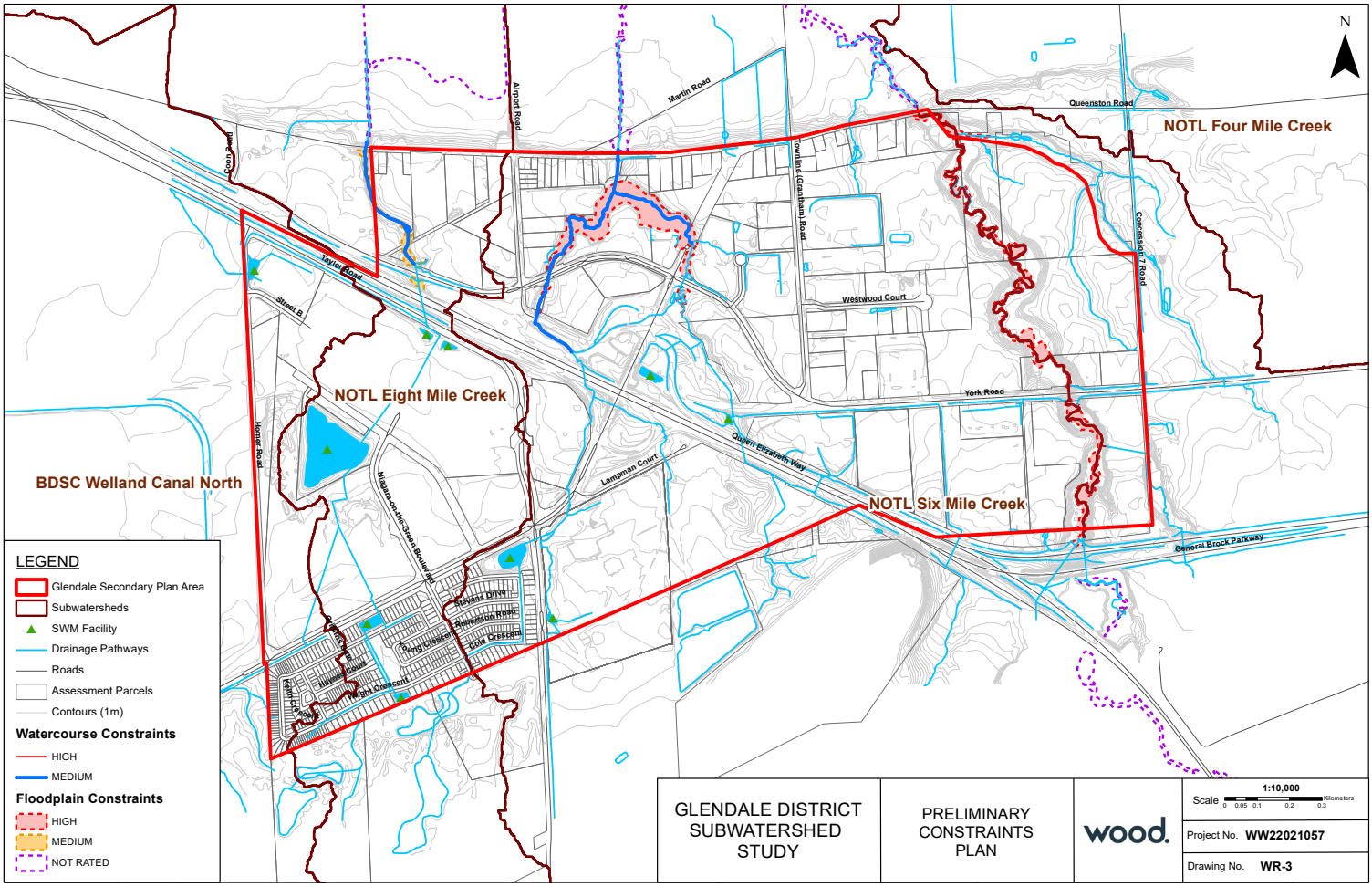
NOTL Four Mile Creek
NOTL Eight Mile Creek
NOTL Six Mile Creek
BDSC Welland Canal North
Airport Road
Martin Road
Queenston Road
Townline (Grantham) Road
Concession 7 Road
Coon Road
Taylor Road
Street B
Homer Road
Westwood Court
York Road
Queen Elizabeth Way
Lampman Court
General Brock Parkway
Niagara-on-the-Green Boulevard
Stevens Drive
Robertson Road
Cole Crescent
Young Crescent
Griffiths Drive
Haynes Court
Wright Crescent
Keith Crescent
LEGEND
Glendale Secondary Plan Area
Storm Sewers
Catchbasins
Storm Manholes
SWM Facility
Drainage Pathways
Subwatersheds
Assessment Parcels
Roads
Contours (1m)
GLENDALE DISTRICT SUBWATERSHED STUDY
EXISTING CONDITIONS STORMWATER SERVICING SUMMARY
wood.
Scale 1:10,000
Project No. WW22021057
Drawing No. WR-1


N
Airport Road
Martin Road
Queenston Road
Townline (Grantham) Road
Concession 7 Road
Coon Road
Taylor Road
Street B
Homer Road
Westwood Court
York Road
Queen Elizabeth Way
Lampman Court
General Brock Parkway
Niagara-on-the-Green Boulevard
Stevens Drive
Robertson Road
Cole Crescent
Young Crescent
Griffiths Drive
Haynes Court
Wright Crescent
Keith Crescent
LEGEND
Glendale Secondary Plan Area
SWM Facility
Drainage Pathways
Assessment Parcels
Roads
OMAFRA Soil Survey Complex
SOIL DRAINAGE CLASS
-
Variable
Rapidly
Well
Moderately Well
Imperfectly
Poorly
Very Poorly
GLENDALE DISTRICT SUBWATERSHED STUDY
SOIL DRAINAGE CLASSES
wood.
Scale 1:10,000
Project No. WW22021057
Drawing No. WR-2


N
NOTL Four Mile Creek
NOTL Eight Mile Creek
NOTL Six Mile Creek
BDSC Welland Canal North
Queenston Road
Martin Road
Airport Road
Taylor Road
Street B
Westwood Court
York Road
Queen Elizabeth Way
Lampman Court
General Brock Parkway
Townline (Grantham) Road
Concession 7 Road
Honsar Road
Niagara-on-the-Green Boulevard
Regency Court
Twelve Crescent
Kenny Place
Thirteen Drive
Fifteenth Road
Eighth Crescent
LEGEND
Glendale Secondary Plan Area
Subwatersheds
SWM Facility
Drainage Pathways
Roads
Assessment Parcels
Contours (1m)
Watercourse Constraints
HIGH
MEDIUM
Floodplain Constraints
HIGH
MEDIUM
NOT RATED
GLENDALE DISTRICT SUBWATERSHED STUDY
PRELIMINARY CONSTRAINTS PLAN
wood.
Scale 1:10,000
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Project No. WW22021057
Drawing No. WR-3

4 Servicing

Introduction

GM BluePlan Engineering Limited (GMBP) has been retained to complete the water, wastewater and stormwater Area Servicing Plan 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 will identify and evaluate water, wastewater and stormwater servicing alternatives and recommend a servicing strategy for the preferred Secondary Plan land use option. The ASP will utilize the background information, consultation and input from the Glendale District Plan process.

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

- Develop a comprehensive servicing strategy to meet the requirements of the Glendale Secondary Plan that can cost-effectively be 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.

Study Background

The Town of the 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 will refine the Secondary Plan based on updated technical studies, including the Water, Wastewater and Stormwater Area Servicing Plan.

Study Area

The Glendale Secondary Plan Update study area is approximately 370 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 that the District Plan boundaries as the Secondary Plan will focus only on the urban area of Glendale. The QEW runs through the study area and the Glendale Avenue interchange, with an interchange currently under construction.

Approach

The water, wastewater and stormwater servicing analysis will build on the Infrastructure Strategies identified in the Glendale District Plan. The Servicing Analysis will include the development of alternative servicing strategies, evaluation, and selection of a preferred servicing strategy to meet the needs of planned development and align 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 in the Town and Region's current and ongoing master servicing plans.

Extensive collaboration with the Town and Region will be required 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, 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.

Background

Area Servicing Plan Terms of Reference

It is anticipated that the following servicing reports will be prepared and submitted as part of the Glendale Secondary Plan Update Servicing Analysis:

1. Background / Opportunities and Constraints Report (this report); and,

2. Final Servicing Analysis and Area Servicing Plan.

This Background report is focused on summarizing the existing conditions and planned Region and Town infrastructure for the area, considerations for servicing in support of the development of the land use alternatives for the Secondary Plan area.

The Final Servicing Analysis and ASP will be prepared based on the preferred land use plan for the Study Area. Alternatives will be evaluated, and a preferred water, wastewater and stormwater servicing solution will be recommended as part of the final report.

The Final ASP will consider the flexibility for buildout of the preferred water and wastewater servicing to service specific development areas within the study area. Phasing will consider development interests and provision for servicing that can be effectively and cost efficiently front-ended by developers throughout the area.

Cost estimates will be prepared based on unit costs and methodologies developed by GMBP and aligned with work completed for the current Region-wide Water and Wastewater Master Plan Update. The cost estimate methodology and calculation process will be detailed in an appendix of the final report.

Relevant Documents and Studies

The following ongoing studies will be the primary references for the development of the water and wastewater servicing strategies. Where possible, reference to the updated plans will be 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 reference to any changes as part of the ongoing studies.

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

Glendale Secondary Plan (2010)

The initial Glendale Secondary Plan was completed in 2010. The Secondary Plan had 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 should 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 are consolidated, located and designed to maximize efficiencies and create open space features that enhance development.

Niagara Region Water and Wastewater Master Plan Update

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

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

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

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 Region 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 include the current system including recent expansions and new, updated (and decommissioned) facilities (including capacities and controls) as well as proposed growth scenarios to 2051 and recommended capital projects.

The Region's updated wastewater model includes:

- All existing and planned Regional facilities and downstream sewer network (including all Region and LAM-owned sewer mains) up to the wastewater treatment plants (WWTP) headworks; and,
- Existing domestic flows based on water billing records and proposed demands based on Region MCR planned growth scenarios to 2051, calibrated wet weather flow scenarios; and,
- All pipes greater than 300mm diameter, including Region and LAM-owned sewer mains, and associated downstream network.

The wastewater model has also been updated to include the current system including recent expansions and new, updated (and decommissioned) facilities (including capacities and controls) as well as proposed growth scenarios to 2051 and recommended capital projects.

The draft capital program including recommended DC shares has been submitted to the Region for review. It is anticipated that the Water and Wastewater Master Plan Update will be completed in 2023.

Town of Niagara on the Lake Pollution Prevention Control Plan

GMBP has been retained by the Town of Niagara-on-the-Lake to complete the Town's existing 2012 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 I&I, and MECP F-5-5 / F-5-1 analysis and builds on the Town's existing 2012 Pollution Control Plan (PCP), including updates on implementation of approved recommendations, validation source and quantification of impacts on the system and remaining/existing areas of concern.

The Town's wastewater model will be updated with collection system and facilities update, SCADA and water billing data to update existing 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.

The development of the draft capital program is scheduled for September 2023.

Development Applications Information

Current Development Applications Information has been provided by the Region and Town for review and incorporation into the Area Servicing Plan. Development Applications' proposed water demands, wastewater and 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.

Land Use & Planning Projections

High-level land use and planning projections for the Study Area are available as part of the Region's Municipal Comprehensive Review (MCR) planned growth and have been utilized to inform the ongoing Region Water and Wastewater MP Update. The Glendale District Plan noted that the capacity range for the sanitary sewer system servicing 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, existing and future).

Ultimately, detailed land use and planning projections will be developed as part of the Secondary Plan Update and the ASP will compare the planning estimates compared to MP Update (and Town PPCP) projections to ensure sufficient capacity of Region recommended infrastructure upgrades.

The Glendale Secondary Plan lands growth projections will be considered within the associated Region MP water pressure districts and Region MP and Town PPCP wastewater catchment areas. The recommended servicing will determine if the updated growth projections will increase projected water demands, and wastewater flows beyond what was considered as part of the Region's current planning work. When determining impact to existing and future Region water and wastewater infrastructure, growth projections for the Glendale Secondary Plan lands will be considered in combination all approved and anticipated growth within the pressure district and catchment areas.

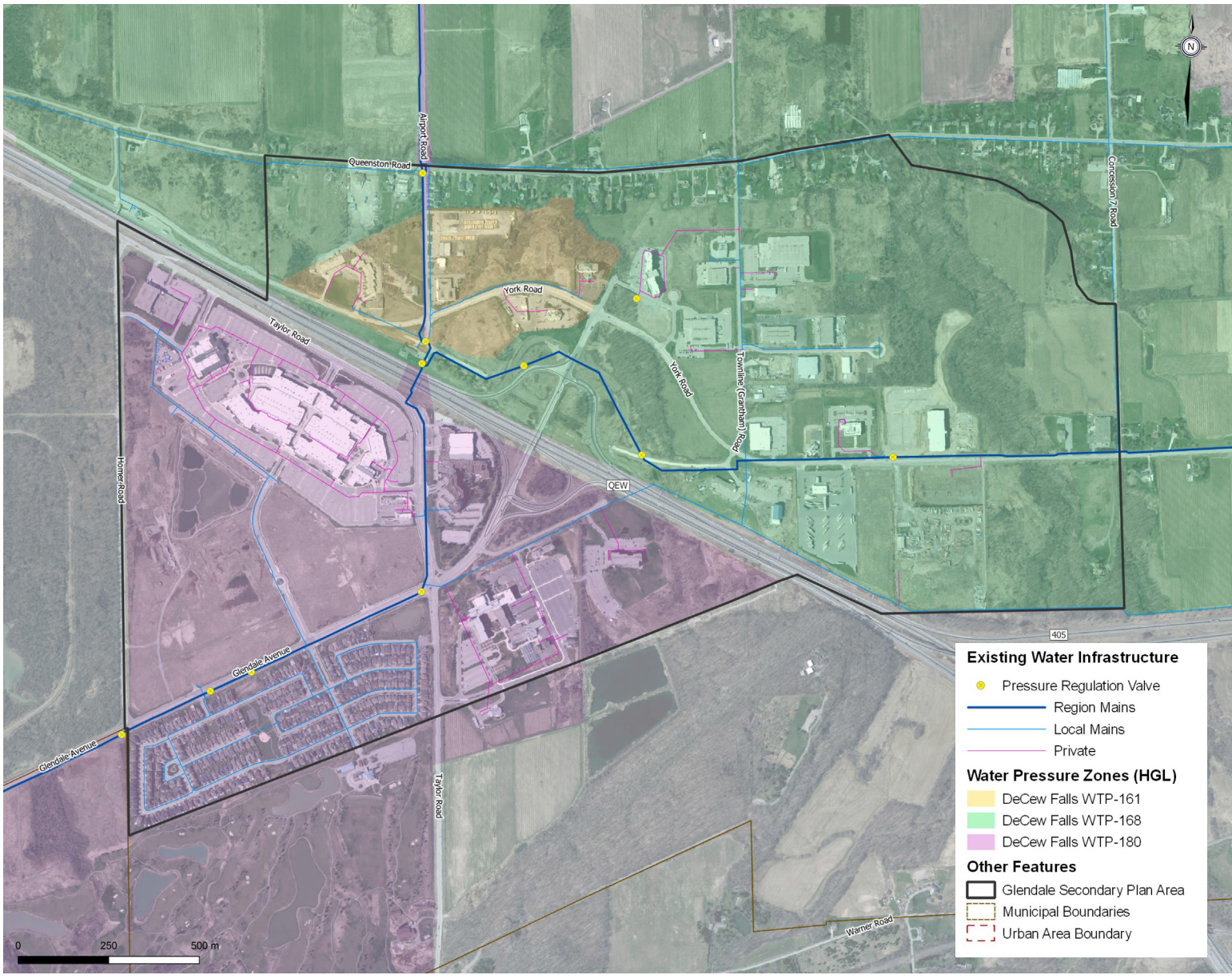
Consideration for growth projections for the area will be focused on the impacts related to Glendale Secondary Plan lands and phasing of development to meet the planned and anticipated timelines. Long-term servicing for the larger area is concurrently being addressed as part of the Region's Water and Wastewater Master Plan Update.

Existing Conditions

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 is an existing distribution network throughout the Study Area. The existing water system for the Study Area is shown below.

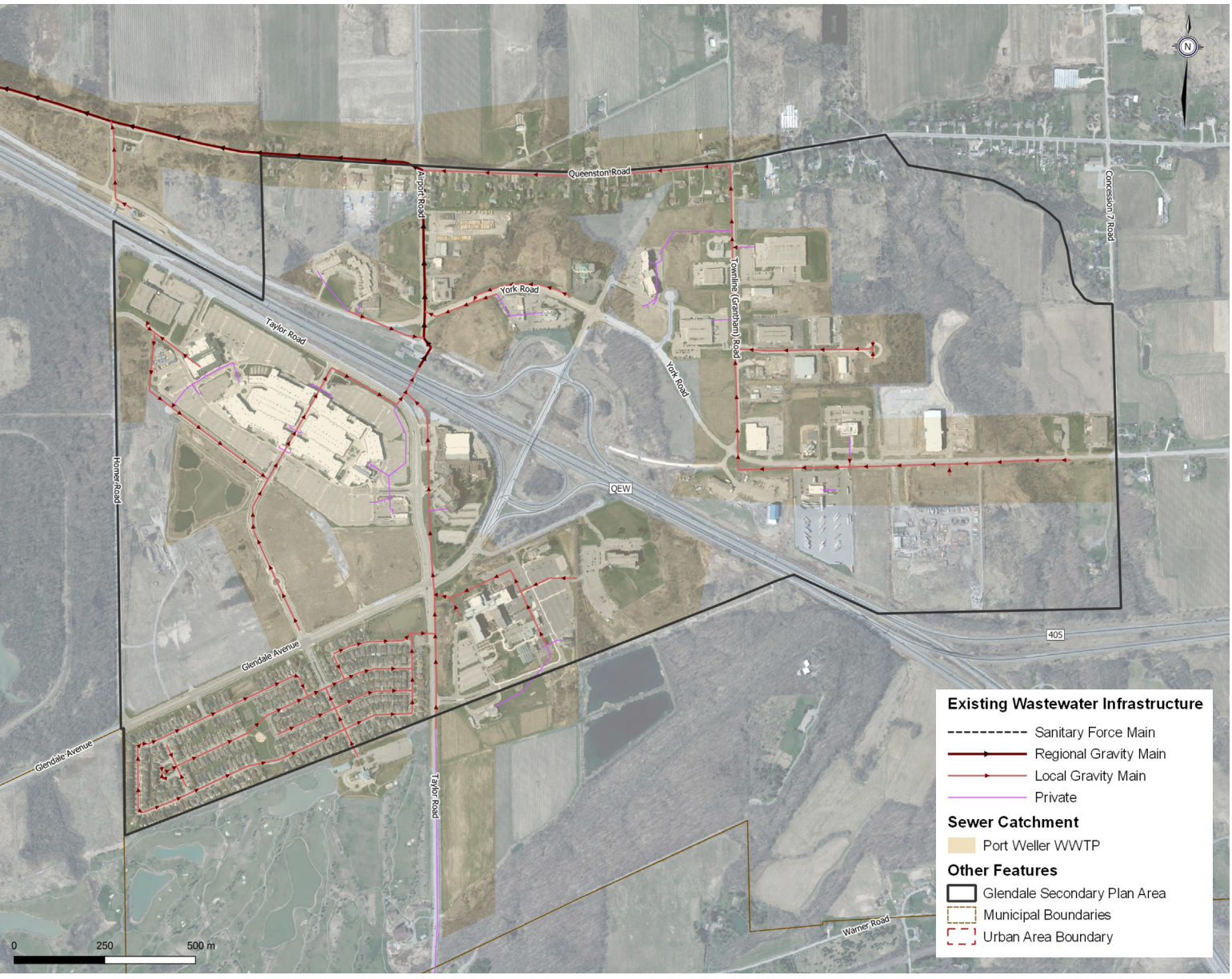


Wastewater

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). Sewers within the Glendale Secondary Plan drain entirely by gravity sewer (no downstream sewage pumping stations (SPS)) to the Port Weller WWTP. The existing sewers in the Study Area are shown below.

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 BDSC Welland Canal North subwatershed. The Study Area is located within the jurisdiction of the Niagara Peninsula Conservation Authority (NPCA). The Study Area contains several hydrologic features, regulated wetlands, linkages, and woodlots, which the Subwatershed Study consultant will incorporate into their study and the subsequent recommendations for the proposed concept plan.

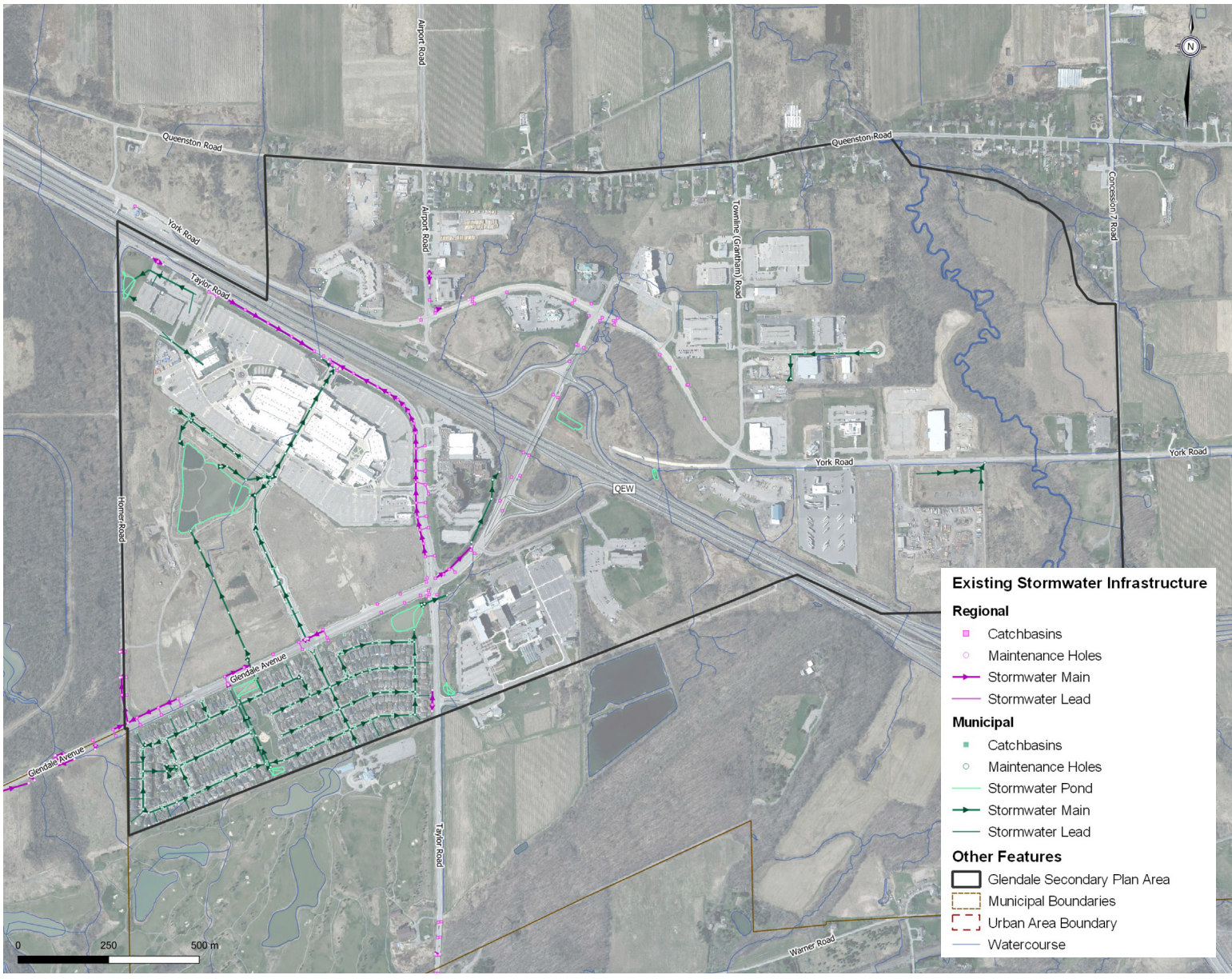


Service Policy Review

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

The objectives of the MP 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 Master Servicing Plan Update;
- Ensuring appropriate design and costing criteria are utilized for developing and evaluating servicing strategies for the Water and Wastewater Master Plan Update;
- Setting policies that are reasonably implemented; and,



- Setting policies that are robust and sustainable

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

Water

Water service policy for the Study Area, including for the Region models to be used for evaluation, includes:

1. Water Demand Projection Methodology

- Utilize starting point methodology
- Starting point based on local billing meter records from last 3 years of data
- Growth demands applied to starting point using design criteria

2. Water System Criteria

- Generally operate 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
- Plant and facility expansion complete before 90% capacity reached

3. Water Consumption Criteria for Growth

- 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
- Peak hour residential and employment factor 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
- Fire flow and duration for system storage calculation is based on Ministry of Environment, Conservation and Parks (MECP) recommendation and methodology

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

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 and included in current Region water and wastewater models. Region and Town Engineering Design Guidelines will be referenced for conceptual design of wastewater servicing. Wastewater criteria developed in support of the Region Master Plan 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
- 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 complete before 90% capacity reached

- 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 between 1 m/s and 2 m/s

3. Wastewater Criteria for Growth

- Residential criteria 275 L/cap/day
- Employment criteria 275 L/emp/day
- Peaking factor based on Harmon formula with values between 2.0 and 4.0 with consideration to the catchment area performance
- 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 conceptual design of wastewater servicing.

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. Proposed Policy Amendments require the following key considerations for 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 recommendation 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 be only allowed where it can be shown that pumping is a more cost effective and feasible option than gravity;
- 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 bylaw if Regional DC criteria are met.

Stormwater

Stormwater servicing policy will be included as part of the Subwatershed Study works with Region, Town and Niagara Peninsula Conservation Authority (NPCA) Engineering Design Guidelines to be referenced for conceptual design of stormwater servicing.

Opportunities and Constraints

Water

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

The Study Area experience 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 Town of Niagara-on-the-Lake 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. Increase 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 Niagara-on-the-Lake an/or an increase from St. Catharines and Thorold (and/or Niagara Falls) is required to address storage future Niagara-on-the-Lake needs from 2041.

Planned System Improvements

A new trunk 600mm diameter feedermain from South Niagara-on-the-Lake 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 Niagara-on-the-Lake system (combined with growth within the "upstream" St. Catharines system) from 2032.

Additionally, a new elevated tank in Virgil to support additional buildout growth within Niagara-on-the-Lake is anticipated to be required from 2042.

Region recommended capital program projects are summarized in the table below. Development charges share for planned projects is currently under review by the Region. The table will be updated with DC share upon confirmation from the Region's MP Update team.

Wastewater

The Port Weller Wastewater Treatment Plant (WWTP) has surplus capacity within the 2041 planning horizon; and treatment capacity is not anticipated to constrain development within the Secondary Plan area.

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 MP 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, considering the planned ultimate buildout population of 21,500 population equivalents. In 2018, Region Water and Wastewater Planning identified the hydraulic capacity range for the

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**

Region Planned System Improvements Impacting Glendale Secondary Plan Area

sanitary sewer system servicing 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.

The proposed wastewater servicing for the Glendale Secondary Plan will consider the available capacity of the downstream siphon and trunk sewer compared to phasing and ultimate buildout to identify potential for capacity constraints.

Existing elevations across the Study Area vary and local pumping stations may be required to support areas of the Secondary Plan Study Area. The need for localized sewage pumping stations will be reviewed as part of the development of the preferred land use concept with consideration for potential contributing developments, anticipated development timing, required pumping station size and associated costs. Any recommendations related to sewage pumping stations will be aligned with the Region's Sewage Pumping Stations and Forcemains Policy.

Recent development applications have incorporated proposed pumping solutions, including the Functional Servicing Design for the Modero Estates development (a 384-unit residential subdivision development located west of Concession 7 and south of Queenston Road). Proposed servicing plans completed in support of Development Applications will be considered as part of the broader wastewater servicing strategy alternatives evaluation and will include consultation with developers and Town and Region Development Engineering /Approvals Staff.

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.

Stormwater

The stormwater management component of the Subwatershed Study will specify the location, size, and contributing drainage area to each stormwater management (SWM) facility. Municipal stormwater servicing will build on the findings and recommendations of the Subwatershed Study to develop stormwater servicing that aligns with the proposed drainage design and meets the requirements of the Conservation Authority, the expectations of the Town, and can be effectively constructed to align with the water and wastewater infrastructure.

The proposed storm drainage plan will be defined as part of the Subwatershed Study, including the conceptual design of stormwater management facilities. The storm sewers will be designed to align with water and wastewater servicing upgrades to ensure efficient municipal corridor design.

Conclusion

It is anticipated that servicing of the Glendale Secondary Plan can generally be achieved utilizing the existing water, wastewater and stormwater systems with localized infrastructure upgrades required for new developments. Projected development within the study area is unlikely to trigger upgrades to the Region's water and wastewater systems and this will be confirmed through development of the ASP. Stormwater management for the area can be improved through policy enhancements that continue to restrict runoff.

GM BluePlan will continue to work closely with the project team, Town and Region to develop a detailed and effective servicing plan for the Glendale Secondary Plan area.

5 Transportation

Introduction

LEA has undertaken a Transportation Assessment to review the existing conditions of the Glendale Secondary Plan area from a traffic, pedestrian, cyclist, and transit lens to understand the existing transportation context and assess the feasibility of the recommendations for the area.

The Transportation Assessment is a separate report.

Niagara Region

The Planning Partnership

GM Blue Plan
Wood
with NCSI and Matrix
LEA Consulting
urbanMetrics