



Regional Municipality of Niagara

# TRANSPORTATION ASSESSMENT

**Glendale Secondary Plan Update**

**Existing Conditions**

## Disclaimer

*This Report represents the work of LEA Consulting Ltd (“LEA”). This Report may not be relied upon for detailed implementation or any other purpose not specifically identified within this Report. This Document is confidential and prepared solely for the use of the Regional Municipality of Niagara. Neither LEA, its sub-consultants nor their respective employees assume any liability for any reason, including, but not limited to, negligence, to any party other than the Regional Municipality of Niagara for any information or representation herein.*

## TABLE OF CONTENTS

1	Introduction .....	1
1.1	Study Area.....	1
1.2	Glendale Secondary Plan.....	2
1.2.1	Transportation Visions and Goals .....	2
1.2.2	Summary of Recommendations.....	3
2	Planning Context.....	4
2.1	Relevant Provincial Plans .....	4
2.1.1	Provincial Policy Statement (2020) .....	4
2.1.2	A Place to Grow - Growth Plan for the Greater Golden Horseshoe (2020) .....	4
2.1.3	Connecting the GGH: A Transportation Plan for the Greater Golden Horseshoe (2022).....	5
2.2	Relevant Regional Plans.....	5
2.2.1	Niagara Region Official Plan (2022) .....	5
2.2.2	Glendale District Plan (2019) .....	6
2.2.2.1	Pedestrian Trip Generators.....	6
2.2.2.2	Vehicle Trip Generators .....	7
2.2.3	Glendale Secondary Plan (2010) .....	8
2.2.4	Niagara Region Transportation Master Plan (2017) .....	9
2.3	Relevant Local Plans.....	10
2.3.1	Town of Niagara-on-the-Lake Official Plan (2017).....	10
2.3.2	Town of Niagara-on-the-Lake Transportation Master Plan (2022) .....	11
3	Existing Transportation Conditions.....	12
3.1	Existing Road Network.....	12
3.1.1	Diverging Diamond Interchange and Glendale Avenue/York Road Roundabout.....	15
3.1.2	Road Network Connectivity Index .....	16
3.2	Existing Transit Network.....	18
3.3	Existing Cycling Network.....	20
3.3.1.1	Cycling Multimodal Level of Service .....	21
3.4	Existing Pedestrian Network.....	23
3.4.1.1	Pedestrian Multimodal Level of Service .....	24
3.4.1.2	Walkshed Analysis.....	25

3.5	Traffic Data Collection .....	28
3.6	Existing Intersection Capacity Analysis .....	29
3.6.1	Weekday AM and PM Peak Hour Analysis .....	30
3.6.1.1	Glendale Avenue at Taylor Road .....	32
3.6.1.2	Taylor Road at Niagara College .....	33
3.6.2	Saturday Peak Hour Analysis .....	34
4	Safety Assessment .....	39
4.1	Review of Collisions in Study Area .....	39
4.2	Summary of Site Visit .....	42
4.3	Review of Collisions at Intersections .....	43
4.3.1	Homer Road & Taylor Road .....	43
4.3.2	Airport Road & York Road .....	43
4.3.3	Townline Road & York Road .....	43
4.3.4	Glendale Avenue & Concession 7 Road .....	43
4.3.5	Glendale Avenue & Homer Road .....	44
4.3.6	Glendale Avenue & Griffiths Gate .....	44
4.3.7	Glendale Avenue & Niagara-on-the-Green Boulevard .....	44
4.3.8	Glendale Avenue & Taylor Avenue .....	44
4.3.9	Glendale Avenue and Lampman Court .....	45
4.4	Review of Collisions Along Midblock Segments .....	45
4.4.1	Glendale Avenue between Lampman Court and Ramp .....	45
4.4.2	Glendale Avenue between Griffiths Gate and Niagara-on-the-Green Boulevard .....	45
4.4.3	Glendale Avenue between Taylor Road and Niagara-on-the-Green Boulevard .....	45
4.4.4	Homer Road between Glendale and Outlet Collection at Niagara W Site Access .....	46
4.4.5	Homer Road between Outlet Collection at Niagara W Site Access and Taylor Road .....	46
4.4.6	Taylor Road between Glendale Avenue and Homer Road .....	46
4.4.7	York Road between Townline Road and Concession 7 Road .....	46
4.4.8	York Road between York Road and Glendale Avenue .....	46
4.5	Summary of Safety Assessment .....	46
5	Existing Roadway Cross-Sections .....	47
5.1	Glendale Avenue .....	47
5.2	Taylor Road .....	48

5.3	York Road/Homer Road .....	49
5.4	Airport Road.....	50
5.5	Queenston Road.....	51
5.6	Townline Road/Concession 7 Road.....	52
5.7	Niagara-on-the-Green Boulevard .....	53
6	Conclusion.....	54

## LIST OF TABLES

Table 3-1:	Summary of Study Area Roadways .....	13
Table 3-2:	Existing Transit Service.....	18
Table 3-3:	Existing Bicycle Level of Service (BLOS) .....	22
Table 3-4:	Existing Pedestrian Level of Service (PLOS) .....	24
Table 3-5:	Calculated Growth Rates .....	28
Table 3-6:	Existing Saturday TMC Data .....	28
Table 3-7:	Lane Capacity by Road Classification .....	30
Table 3-8:	Road Classification and Capacity within the Study Area.....	30
Table 3-9:	Screenline Analysis: Corridor Volume-to-Capacity Ratios .....	31
Table 3-10:	Intersection Capacity Analysis, Existing Conditions – Glendale Avenue at Taylor Road .....	32
Table 3-11:	Turning Movement Counts, Taylor Road at Niagara College.....	33
Table 3-12:	Intersection Capacity Analysis, Existing Conditions – Taylor Road at Niagara College.....	33
Table 3-13:	Taylor Road at Niagara College – Sensitivity Analysis.....	34
Table 3-14:	Intersection Capacity Analysis, Existing Saturday Peak Hour – Signalized Intersections .....	35
Table 3-15:	Intersection Capacity Analysis, Existing Saturday Peak Hour – Unsignalized Intersections.....	37
Table 4-1:	Collisions in the Study Area (Niagara Region, 2017-2021) .....	40
Table 4-2:	Classification and Trend Analysis of Collisions.....	40
Table 4-3:	Comparison of Study Area Collisions vs. Niagara Region Collisions .....	42

## LIST OF FIGURES

Figure 1-1: Glendale Secondary Plan Study Area.....	2
Figure 2-1: Primary and Secondary Pedestrian Trip Generators .....	7
Figure 2-2: Primary and Secondary Vehicle Trip Generators.....	8
Figure 2-3: Niagara Region 2041 Road Network.....	10
Figure 3-1: Existing Road Classification.....	13
Figure 3-2: Existing Road Network and Lane Configuration .....	15
Figure 3-3: Glendale Avenue Road Improvements.....	16
Figure 3-4: Road Network Connectivity Index .....	17
Figure 3-5: Existing Niagara Region Transit Network .....	19
Figure 3-6: Existing Cycling Network.....	21
Figure 3-7: Existing Pedestrian Sidewalk Network .....	23
Figure 3-8: Pedestrian Walkshed Analysis – Planned Transit Hub.....	26
Figure 3-9: Pedestrian Walkshed Analysis – MTO Commuter Lot .....	27
Figure 3-10: Existing Traffic Volumes in the Study Area .....	29
Figure 3-11: Screenline Analysis .....	31
Figure 3-12: Saturday Peak Hour Intersection Operations .....	35
Figure 5-1: Existing Glendale Avenue Cross-Section.....	47
Figure 5-2: Existing Taylor Road Cross-Section .....	48
Figure 5-3: Existing York Road/Homer Road Cross-Section .....	49
Figure 5-4: Existing Airport Road Cross-Section .....	50
Figure 5-5: Existing Queenston Road Cross-Section .....	51
Figure 5-6: Existing Townline Road/Concession 7 Road Cross-Section .....	52
Figure 5-7: Existing Niagara-on-the-Green Boulevard Cross-Section .....	53

## APPENDICES

APPENDIX A	DETAILED MMLOS ANALYSIS
APPENDIX B	REGION 2016 AND 2041 EMME MODEL
APPENDIX C	TMCS & STPS
APPENDIX D	DETAILED GROWTH RATE CALCULATIONS
APPENDIX E	LOS DEFINITIONS
APPENDIX F	ROAD CLASSIFICATION AND LANE CAPACITY EXCERPTS
APPENDIX G	SCREENLINE ANALYSIS
APPENDIX H	INTERSECTION CAPACITY ANALYSIS SYNCHRO RESULTS
APPENDIX I	HISTORICAL COLLISION DATA

## 1 INTRODUCTION

LEA Consulting Ltd. (LEA) has been retained by the Regional Municipality of Niagara to undertake a Transportation Assessment as part of the Glendale Secondary Plan Update in the Town of Niagara-on-the-Lake. By way of background, the original Glendale Secondary Plan was adopted by the Town in 2010 with approval from the Region in 2011. In September 2020, the Glendale Niagara District Plan was endorsed by the Regional Council to develop the vision for growth, key strategies, appropriate land use designations, and associated policies to guide future development of the Glendale lands.

It is understood that Niagara Region, in partnership with Niagara-on-the-Lake is preparing an update to the Glendale Secondary Plan by assessing the Glendale Niagara District Plan land use concept and demonstration plan. The purpose of this Transportation Assessment is to review the existing conditions of the Secondary Plan area from a traffic, pedestrian, cyclist, and transit lens, and further assess the feasibility of the proposed recommendations for the Glendale Secondary Plan area as outlined in the Glendale District Plan. This assessment also identifies transportation demand management (TDM) opportunities and incorporates sustainability and direction for smart cities technologies where possible.

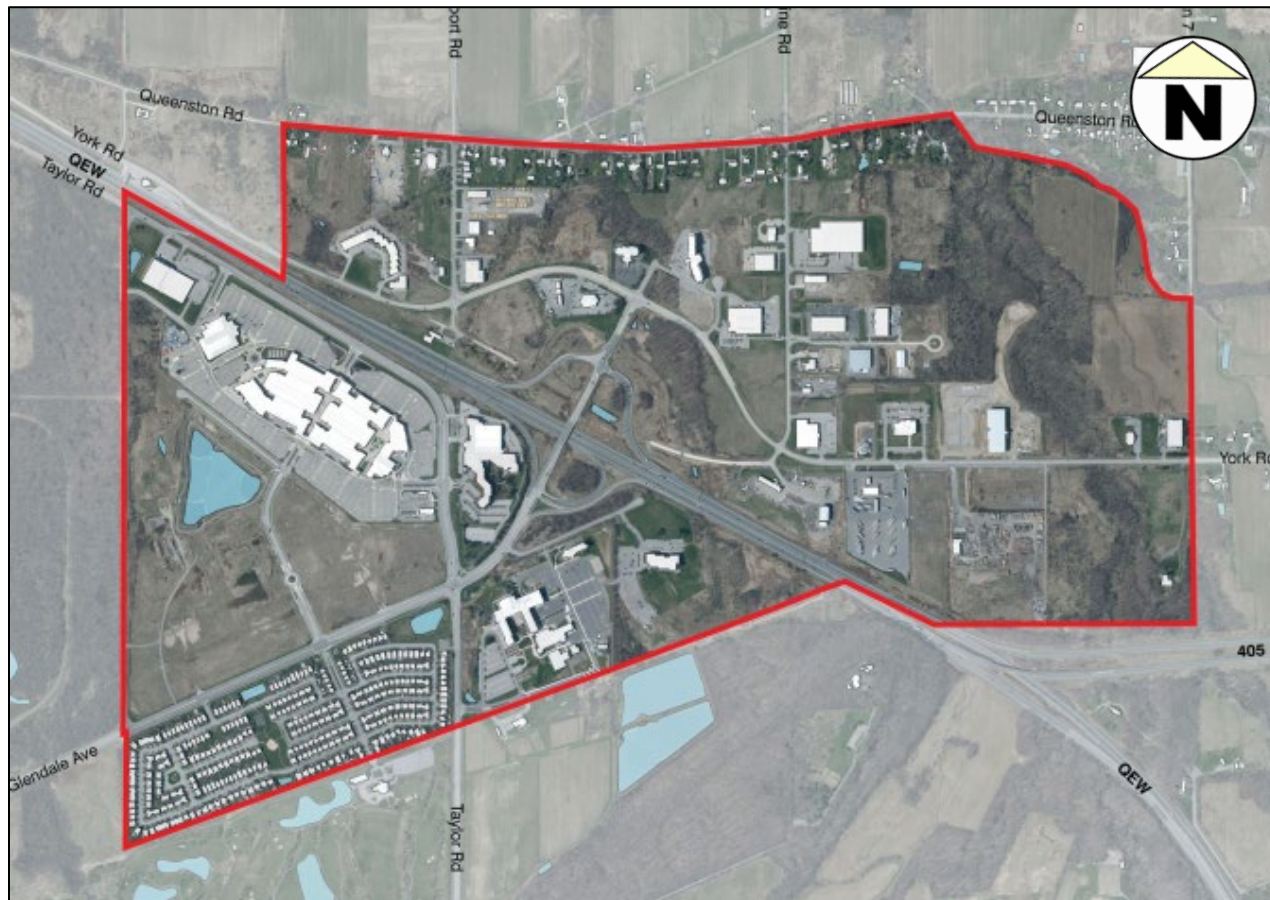
### 1.1 STUDY AREA

The Secondary Plan study area includes all lands bounded by Queenston Road to the north, Concession Road 7 to the east, Homer Road to the west, and the Niagara Escarpment to the south. The Queen Elizabeth Way (QEW) bisects the study area and includes the Glendale Avenue interchange.

Key areas within the study area include: Outlet Collection at Niagara, Niagara College Campus, existing residential developments south of Glendale Avenue, and hospitality uses on both sides of the QEW, providing convenient access from the highway for visitors. The Glendale Secondary Plan area is illustrated in **Figure 1-1**.



Figure 1-1: Glendale Secondary Plan Study Area



## 1.2 GLENDALE SECONDARY PLAN

The original Glendale Secondary Plan was initiated in 2010 to develop policies related to transportation and other urban planning elements including built form, land use, and the public realm for the Glendale community. The Secondary Plan illustrates a long-term vision and plan, sets out Official Plan policies and urban design guidelines for the area, and includes implementation strategies to achieve their overall vision. The following summarizes the transportation goals and recommendations from the original Glendale Secondary Plan.

### 1.2.1 Transportation Visions and Goals

Key transportation directions include a focus on providing an accessible and connected transit system to serve the Glendale area and Niagara Region as well as a well-connected network of roads, trails, and active transportation facilities. An important vision of the original Glendale Secondary Plan is to build safe, attractive streets for pedestrians, cyclists, cars, trucks, and transit. This complete street approach involves creating wider boulevards and reducing pavement widths to enhance the safety and urban realm for all road users. Further, the original Glendale Secondary Plan envisions distinguishing the Glendale community by improving the Glendale Avenue corridor and redeveloping the QEW interchange. Overall, the original

Glendale Secondary Plan aims to incorporate opportunities for multi-modal transportation while preserving the urban character of the existing site.

### 1.2.2 Summary of Recommendations

A Movement Network Plan is included in the original Glendale Secondary Plan to ensure good connectivity within the community and to points beyond. To enhance vehicular movement, the Movement Network Plan proposes an extension to Glendale Avenue. This second link over the QEW would extend from Lampman Court to Townline Road to reduce traffic congestion along Glendale Avenue and provide access to Glendale's employment lands on both sides of the QEW. Other roadway recommendations include minimizing turning movements on major roadways, facilitating safe and convenient access to destinations, and traffic relief by effectively managing future development, new secondary streets, interconnected driveways, and shared access points.

To improve walkability, the original Glendale Secondary Plan recommends a complete street approach. For instance, the Glendale Secondary Plan recommends the reconstruction of York Road between Airport Road and Townline Road to introduce an urban cross-section with access to a commercial street. The proposed corridor is recommended to prioritize pedestrian infrastructure by providing sidewalks and ample boulevard space to ensure pedestrian safety. Further, as the Glendale community transitions into a mixed-use destination, the Secondary Plan recommends Taylor Road to have a pedestrian-friendly urban street to be supported by pedestrian bridges over the QEW, from Airport Road to Taylor Road. In addition, communication between the Province and Niagara Region is recommended to ensure safety for pedestrian and cyclist movement along the Glendale interchange, over the QEW.

The original Glendale Secondary Plan recognizes the lack of cycling amenities within the Glendale community. As such, the Secondary Plan includes recommendations to widen curb lanes or include bike lanes on both sides of the road to accommodate cyclists. Further, bicycle parking facilities are recommended to be provided in all commercial developments to facilitate cycling movement.

To support transit services and transit access, the original Glendale Secondary Plan includes policies to implement an inter-municipal and inter-regional transit system and to establish a transit hub within the Glendale community. Further, a park-and-ride facility is recommended to support the multi-modal transit station.

This Glendale Secondary Plan Update will be informed by the direction of the original Glendale Secondary Plan and Glendale District Plan for the study area to realize its potential and transition to a complete community. The following report will provide an overview of the existing policy context, transportation conditions, as well as a safety assessment of existing roadways to help inform future transportation network recommendations for the Glendale community.

## 2 PLANNING CONTEXT

The Glendale Secondary Plan study area aims to create a vibrant and complete community with a mix of uses that is supported by a robust transportation system connecting areas north and south of the QEW. These goals and objectives have been made apparent in regional and local plans. The following section highlights the key provincial, regional, and local policy documents influencing the study area.

### 2.1 RELEVANT PROVINCIAL PLANS

#### 2.1.1 Provincial Policy Statement (2020)

Ontario's Provincial Policy Statement (PPS) outlines the province's visions and goals for Ontario's land use system with an emphasis on healthy communities, active modes of transportation, a clean environment, and a strong economy. It contains a set of policies that outline a municipality's responsibility regarding transportation infrastructure to create a sustainable and multi-modal network, linked with land use considerations. The PPS includes policies that encourage the safe and efficient movement of people and goods, a multi-modal transportation system to improve connectivity, and land use patterns that aim to increase the use of active transportation and transit over other transportation modes.

The PPS recognizes the importance of building active communities that are connected by safe public streets, publicly accessible open spaces, pedestrian necessities, and active transportation. Climate change impacts and projected needs should be addressed through infrastructure improvements, such as efficient transit services to increase ridership and reduce greenhouse gas emissions. Green space is also recommended to complement transportation infrastructure, providing opportunities for active transportation. Furthermore, the inclusion of high-density mixed-use centres are expected to reduce the length and number of vehicle trips, while supporting the current and future use of transit and active transportation.

#### 2.1.2 A Place to Grow - Growth Plan for the Greater Golden Horseshoe (2020)

A Place to Grow – Growth Plan for the Greater Golden Horseshoe (Growth Plan) guides decisions on a wide range of issues (land use, urban form, housing, environment, resource protection, transportation, and infrastructure) for the Greater Golden Horseshoe, including Niagara Region. The plan encourages the intensification of development through transit-supportive growth and multi-modal transportation systems. Key transportation goals of the Growth Plan include:

- ▶ Integrate transportation and land-use planning to optimize the movement of goods and people, maximizing the potential of existing and new infrastructure;
- ▶ Plan for an integrated public transit and active transportation network; and
- ▶ Design and operate transit infrastructure to shape development and efficient land use patterns.

The Growth Plan recognizes that existing and future transportation networks should provide connectivity, support the use of zero-and low-emission vehicles, and offer multiple transportation choices. Roadways should accommodate vehicles, buses, cyclists, and pedestrians, providing multi-modal mode choices for access to jobs, schools, housing, cultural, and recreational facilities. As part of the Glendale Secondary Plan Update, a complete street approach will be adopted to ensure the needs and safety of all road users are considered. Further, TDM policies within the Niagara Region Official Plan and Niagara-on-the-Lake Official

Plan will be implemented to reduce trip distance and time, increase the modal share of automobile alternatives, prioritize active transportation, transit, and goods movement over single-occupant automobiles, expand infrastructure to support active transportation, and consider the needs of major trip generators.

All transit planning investment decisions should follow the transportation goals within the Growth Plan. This includes supporting the existing and planned higher residential and employment densities to optimize the efficiency and viability of transit service levels. Transit services should be provided to support a mix of residential, office, institutional, and commercial densities while improving linkages between and within municipalities. The municipality should ensure that the transportation network is safe and comfortable for pedestrians, cyclists, transit users, and drivers.

### 2.1.3 Connecting the GGH: A Transportation Plan for the Greater Golden Horseshoe (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 enhanced mobility within and across the Region and Ontario. The Plan aims to reduce gridlock and improve road performance, move people on a connected transit system, support a more sustainable and resilient region, and efficiently move goods. To achieve these objectives, the Plan encourages a mix of solutions including new infrastructure to better connect highways, transit, walking, and cycling paths; better services for more frequent and convenient public transit; and new policies to support new ways of transportation and support new technology.

Specifically, the Plan emphasizes the importance of new infrastructure to support cross-regional transit connectivity including new transit hubs where local and regional services connect. New local services should also be accessible and reliable for users to increase transit use and relieve gridlock which are to be supported with safe and convenient first and last-mile connections between stations and communities. Frequent local transit services during peak periods are recommended throughout urban areas in the GGH including areas within Niagara Region, such as St. Catharines, Niagara Falls, and Port Colborne.

The Plan also highlights the importance of providing a transportation system that is safe and inclusive for all road users. A complete-street approach is recognized to evaluate the needs of all transportation users and to improve safety for active transportation users. Integrating active transportation infrastructure such as sidewalks and bike lanes along transit corridors or surrounding transit stations should be prioritized to expand the transit and active transportation network.

## 2.2 RELEVANT REGIONAL PLANS

### 2.2.1 Niagara Region Official Plan (2022)

The Regional Official Plan, 2022 provides a clear direction for the physical development of Niagara Region to meet the current and future needs of its people. The Regional Official Plan aims to provide an integrated, sustainable, accessible, and efficient multi-modal transportation network while minimizing the impacts on the environment. Key objectives include promoting land use patterns that foster dense development to positively influence economic, environmental, and planning decisions that can be supported by public transit and active transportation until 2051 and beyond.

The Regional Official Plan includes policies that prioritize investments in public transit, as well as the design and construction of complete streets and active transportation facilities. Creating multi-modal

transportation systems with comprehensive active transportation networks, interconnected public transit systems, and efficient movement of goods are vital components in reducing greenhouse gas emissions. With Niagara Region's projected population growth, the Glendale Secondary Plan's transportation infrastructure should support forecasted growth, with measures to mitigate the impacts of climate change.

The Niagara Regional Official Plan also supports the expansion of existing public transit across the region. Transit improvements including a transit and mobility hub will help support residential, commercial, institutional and employment densities, while considering priority transit corridors and improving linkages to major trip generators. Comprehensive active transportation networks with the inclusion of adequate sidewalk and cycling facilities should also be integrated into the transportation network to ensure convenient trips with continuous linkages from neighbourhoods to employment areas, tourist destinations, public service facilities, and post-secondary institutions.

### 2.2.2 Glendale District Plan (2019)

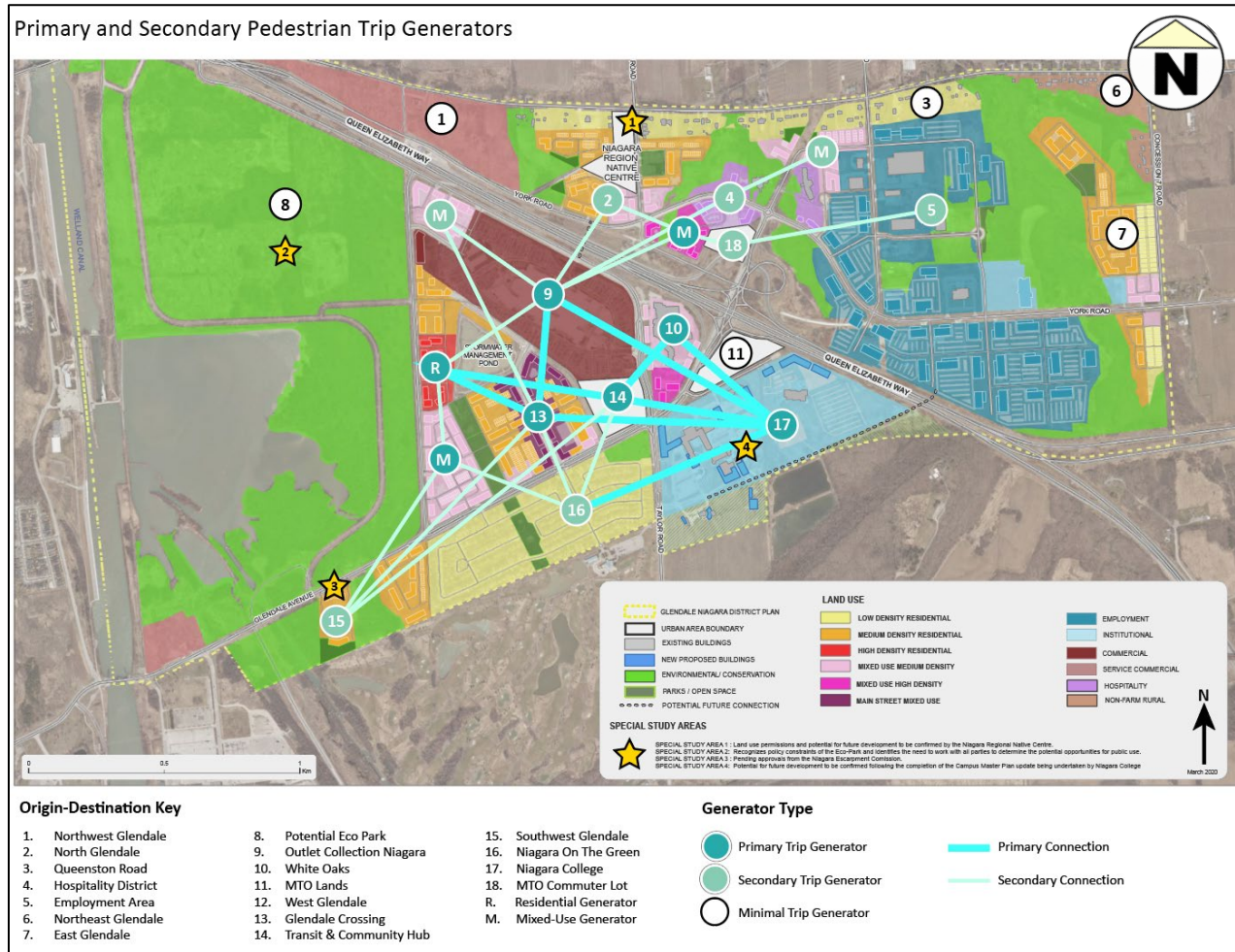
The Glendale District Plan was initiated in May 2018 by Niagara Region in cooperation with the Town of Niagara-on-the-Lake and the City of St. Catharines to develop a framework for the land use, planning, design, and development of the Glendale complete community. Key transportation directions include a focus on providing an accessible and connected transit system to serve the Glendale area and Niagara Region and a well-connected network of trails and active transportation facilities. New grid pattern roadways are proposed within the Glendale District Plan to create walkable block sizes, increase connectivity, and allow for a more permeable pedestrian network including potential future crossings over the QEW. Furthermore, the existing Glendale Avenue interchange will be re-constructed into a Diverging Diamond interchange and the intersection of Glendale Avenue and York Road will be reconstructed into a single-lane roundabout to improve the movement of traffic.

#### 2.2.2.1 Pedestrian Trip Generators

From a transportation perspective, the land use framework set out by the Glendale District Plan will dictate the anticipated trip generators within the Glendale Secondary Plan area. The anticipated primary and secondary pedestrian trip generators based on the planned land uses and densities are shown in **Figure 2-1**. It is expected that the highest levels of pedestrian activity will occur between the higher-density residential and mixed-use areas and the main street mixed-use area planned for central Glendale. Niagara College, the Outlet Collection Mall, and the Transit and Community Hub are also expected to be significant pedestrian trip generators within the community.

Secondary pedestrian trip generators are expected to include the medium and low-density residential areas in Southwest Glendale and Niagara-on-the-Green, as well as the residential, employment, and hospitality uses planned on the northeast side of the QEW. Despite the medium and high densities planned for the north and east, the QEW presents a significant barrier to pedestrian activity to the uses to the south. Limited pedestrian activity to uses within Glendale are anticipated for the East Glendale residential and mixed-use area due to distance from the rest of the District. Additionally, the Northwest and Northeast Glendale commercial areas and MTO Lands are expected to be primarily auto-oriented and the low density planned for the Queenston Road area is not expected to generate significant pedestrian activity.

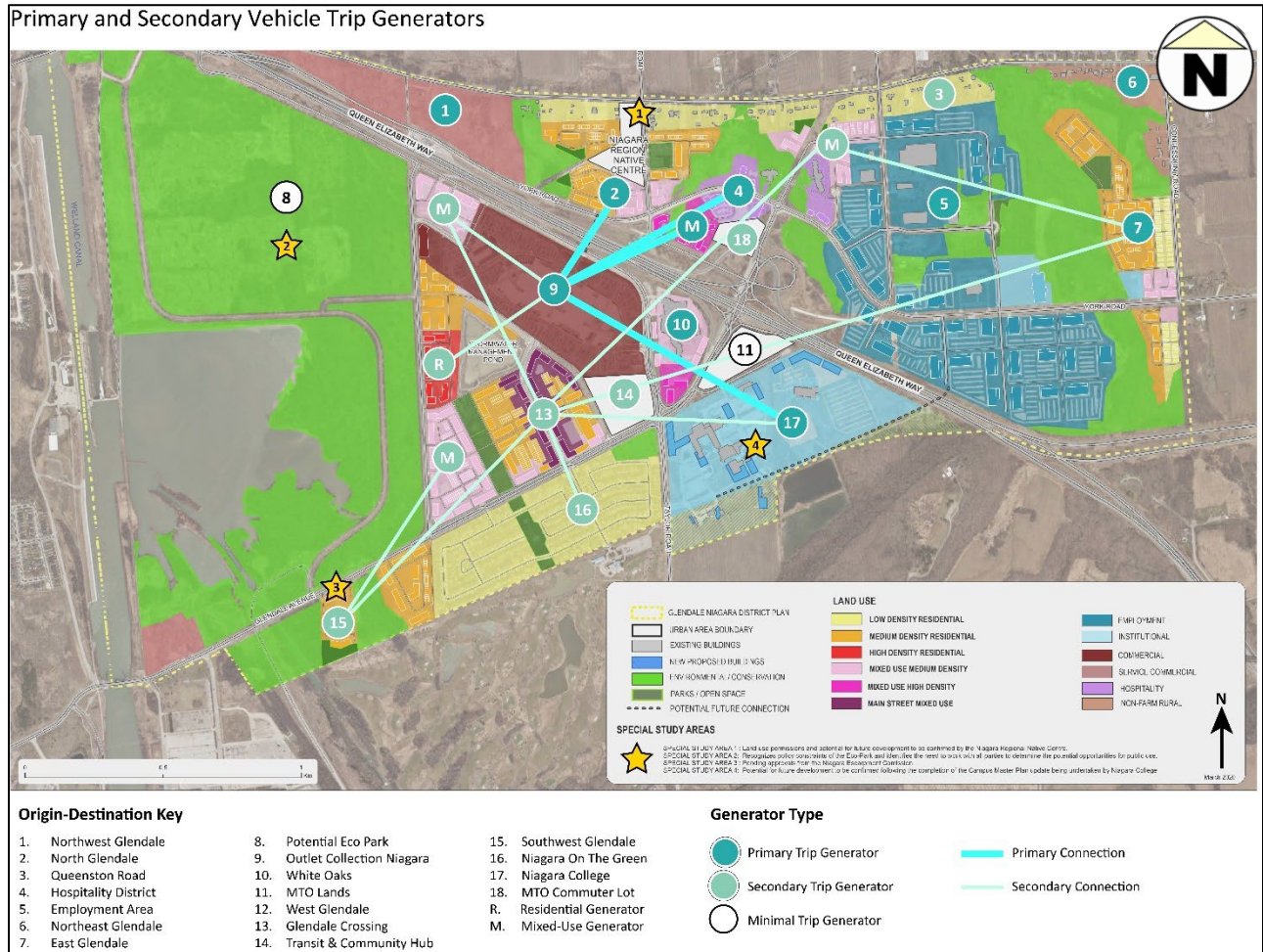
Figure 2-1: Primary and Secondary Pedestrian Trip Generators



### 2.2.2.2 Vehicle Trip Generators

The primary vehicle trip generators are expected to include the North Glendale and Hospitality Districts on the north side of the QEW, as well as the Outlet Collection and Niagara College. The residential and mixed-use areas throughout the District will serve as secondary trip generators within the Glendale Community.

Figure 2-2: Primary and Secondary Vehicle Trip Generators



### 2.2.3 Glendale Secondary Plan (2010)

The Glendale Secondary Plan was initiated in 2010 to develop policies related to transportation and other urban planning elements including built form, land use, and the public realm in Glendale to create a complete community. The Glendale Secondary Plan Update will be informed by the direction of the Glendale District Plan for the study area to realize its potential and transition to a complete community. Key transportation directions include a focus on providing an accessible and connected transit system to serve the Glendale area and Niagara Region as well as a well-connected network of roads, trails, and active transportation facilities.

The Glendale Secondary Plan anticipates urban intensification and changes in land-use over time. As per the Secondary Plan, active transportation, including pedestrian and cyclist movement should be prioritized in residential, commercial, and mixed-use areas. Arterial and collector roads should accommodate cyclists by designing wide curb lanes. In pedestrian-priority areas, provisions for on-street parking facilities should be introduced.

To accommodate for vehicular, cycling, and pedestrian movement, reduced road widths and wider boulevards are recommended to foster an urban street. It is recognized that Airport Road will act as a

transition from an urban environment into agricultural lands beyond Glendale. East of Townline Road, within the employment area, York Road is expected to preserve an urban character with buildings adjacent to the right-of-way and landscaping along the perimeter of both sides of the road. To integrate elements of active transportation, bike lands should be provided on both sides of York Road. West of Taylor Road, Glendale Avenue is recommended to transition into a mixed-use residential development area, as the Niagara-on-the-Green community is built.

#### 2.2.4 Niagara Region Transportation Master Plan (2017)

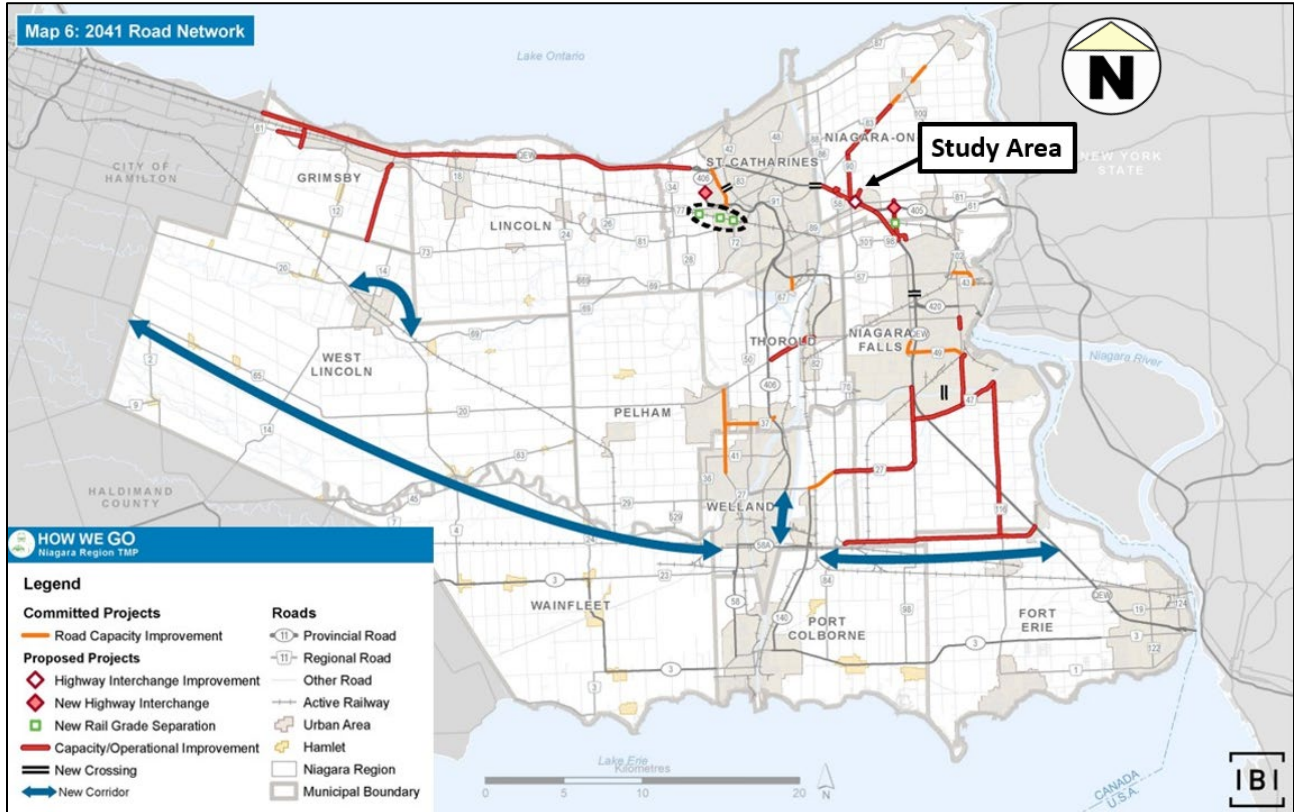
The Niagara Region Transportation Master Plan (TMP) sets a strategic vision for a well-balanced and sustainable transportation system in the Niagara Region. The plan considers a 25-year horizon to the year 2041 and proposes transportation infrastructure solutions to support growth and the changing mobility needs of residents. The Region's TMP aims to create a transportation network that will build, preserve, and enhance livable communities while ensuring seamless connection and more travel options for residents. A key action plan as outlined in the TMP includes working with the MTO to undertake an environmental assessment / detailed design for interchange improvements at Glendale Avenue & the QEW.

The Niagara Region Transportation Master Plan includes recommendations to accommodate the projected 2041 population growth by creating a strategic transportation network. Highway capacity improvements are recommended within the Region TMP to accommodate inter-regional and international trade and tourism demands, including a new trade corridor connecting Niagara to Hamilton and the international border. This trade corridor proposes efficient movement of goods to and from Niagara Region and will increase regional connectivity for the Glendale Secondary Plan area.

As illustrated in **Figure 2-3**, highway capacity and interchange improvements are proposed within the Glendale Secondary Plan area.



Figure 2-3: Niagara Region 2041 Road Network



Source: Niagara Region Transportation Master Plan, 2017

Furthermore, the Region’s TMP outlines transit and active transportation goals to accommodate future intensification. This includes working with local municipalities to develop a mix of fixed-route and demand-responsive transit as well as a strategic cycling network to overcome current infrastructure constraints, including the lack of connectivity. This provides an opportunity for regional and municipal contributions to provide adequate bicycle infrastructure.

## 2.3 RELEVANT LOCAL PLANS

### 2.3.1 Town of Niagara-on-the-Lake Official Plan (2017)

The Town of Niagara-on-the-Lake Official Plan 2017 provides a clear direction for the physical development in the Town of Niagara-on-the-Lake to meet the current and future needs of its people. The Official Plan aims to provide an integrated, sustainable, accessible, and efficient multi-modal transportation network while minimizing the impacts on the environment. Key objectives include promoting land use patterns that foster dense development to positively influence economic, environmental, and planning decisions that can be supported by public transit and active transportation.

The Glendale Secondary Plan area is identified in the Town of Niagara-on-the-Lake Official Plan as a special policy area, recognizing that future development and improvements will contribute to a walkable community that attracts the highest order employment uses and creates a gateway for the Town. The strategic placement of buildings, landscape buffers, and off-street parking will help achieve a walkable community and enhance the pedestrian-oriented environment. Integrating sidewalks on both sides of

major roads and prioritizing pedestrian movement through traffic calming measures will also enhance the walkability of the area. Furthermore, a focus should be placed on reducing the adverse effects of transportation on the natural environment by providing alternative modes of transportation. This can be achieved by optimizing the existing transit network and providing adequate pedestrian facilities near transit facilities.

### 2.3.2 Town of Niagara-on-the-Lake Transportation Master Plan (2022)

The Town of Niagara-on-the-Lake Transportation Master Plan (TMP) is a long-range strategic plan developed to address existing challenges and guide transportation and land use decisions through the year 2031. The Town's TMP builds upon the 2017 Niagara Region Transportation Master Plan as well as the Niagara-on-the-Lake Official Plan 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. Specifically, the Town's TMP recognizes Glendale's densification potential which will warrant increased pedestrian and active transportation connectivity in addition to efficient vehicular movement. Furthermore, roadway safety is prioritized in the Town of Niagara-on-the-Lake Transportation Master Plan. Complete Streets should be considered to address safety concerns and support vehicular, pedestrian, and cyclist movement within the same corridor.

### 3 EXISTING TRANSPORTATION CONDITIONS

This section identifies and assesses the existing transportation conditions within the study area, including the road, transit, cycling, and pedestrian networks. An overview of the existing transportation conditions within the Glendale community is provided to understand the existing challenges and deficiencies surrounding the area for various transportation modes. The study includes the analysis of the following roads and intersections:

- ▶ Taylor Road & Homer Road (Unsignalized);
- ▶ Taylor Road & Outlet Collection at Niagara NW Site Access (Unsignalized);
- ▶ Taylor Road & Outlet Collection at Niagara NE Site Access (Unsignalized);
- ▶ York Road & Airport Road (Signalized);
- ▶ York Road & Townline Road (Unsignalized);
- ▶ York Road & Concession 7 Road (Unsignalized);
- ▶ Taylor Road & Outlet Collection at Niagara E Site Access/White Oaks Site Access (Signalized);
- ▶ Glendale Avenue & Homer Road (Unsignalized);
- ▶ Glendale Avenue & Niagara-on-the-Green Boulevard (Signalized);
- ▶ Glendale Avenue & Taylor Road (Signalized);
- ▶ Glendale Avenue & Lampman Court (Unsignalized); and
- ▶ Taylor Road & Niagara College (Signalized).

To note, the interchange ramps and intersection of York Road at Taylor Road will not be assessed under existing conditions, as construction was ongoing for the diverging diamond intersection and roundabout at the time of preparing this assessment.

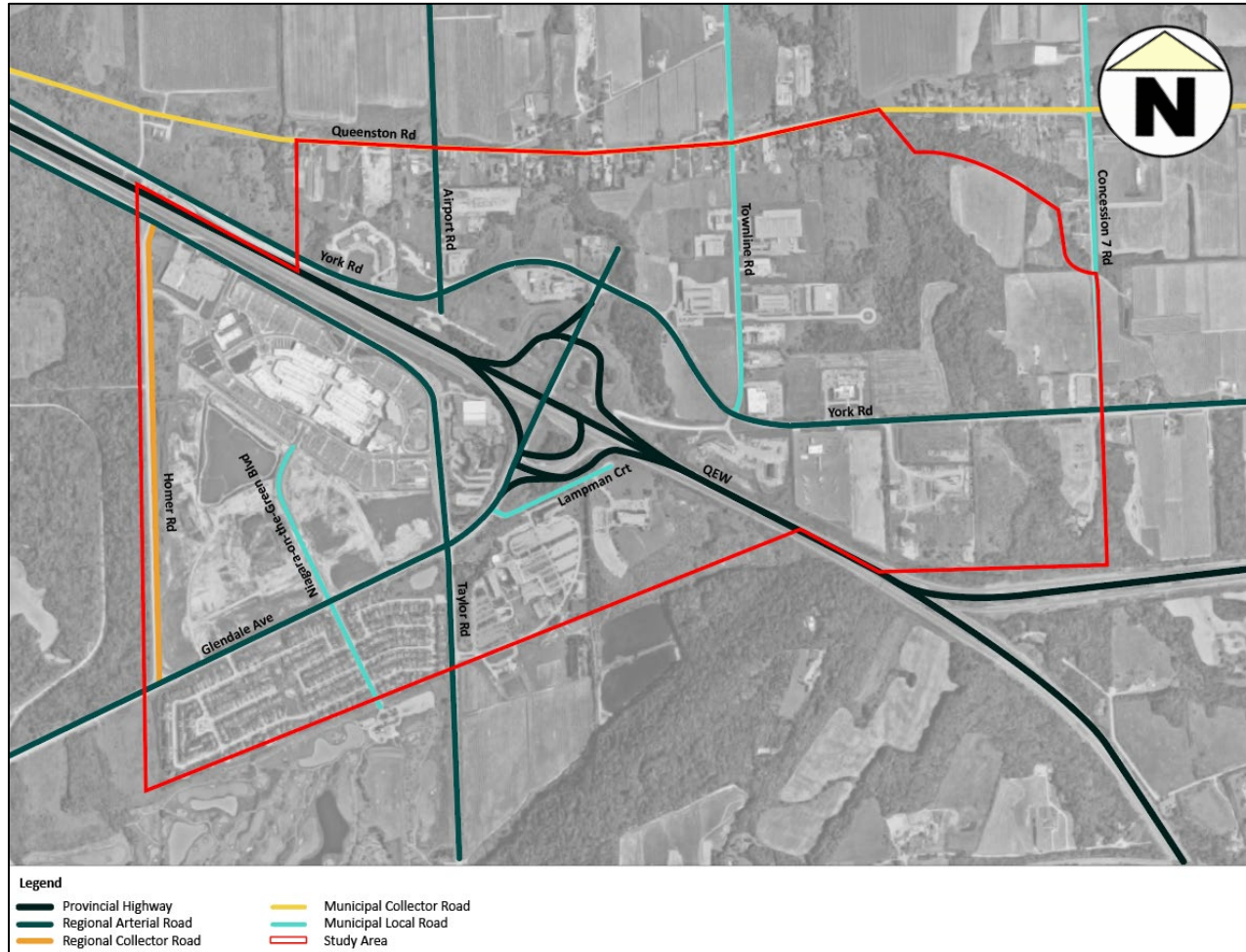
#### 3.1 EXISTING ROAD NETWORK

The Glendale study area is currently serviced by an existing network of Niagara Region and local roads and is generally bounded 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 Queen Elizabeth Way (QEW) bisects the study area and is the only major Provincial highway connecting Glendale to the Greater Toronto Hamilton Area (GTHA) and the international border. The QEW has an existing interchange with Glendale Avenue, which provides signalized westbound on/off ramps and unsignalized eastbound on/off ramps. It is noted that the Glendale Avenue diverging diamond interchange is open as of November 2022. The ramps to and from Toronto are currently detoured with all interchange ramps expected to be open by December 2022. The Glendale Avenue to Airport Road connection will be opened in 2023. Further details of the diverging diamond reconstruction are provided in **Section 3.1.1**.

Within the overall study area, there are five regional roadways: Taylor Road, York Road, Glendale Avenue, and Airport Road are regional arterial roadways. Homer Road is classified as a regional collector. The study area also includes five main municipal roadways: Queenston Road is a municipal collector while Niagara-on-the-Green (Main Street), Lampman Court, Townline Road, and Concession 7 Road are classified as local

roads. The remaining roadways are all local streets. The existing road classification is shown in **Figure 3-1** which is based on the Niagara Region and Niagara-on-the-Lake Official plans.

**Figure 3-1: Existing Road Classification**



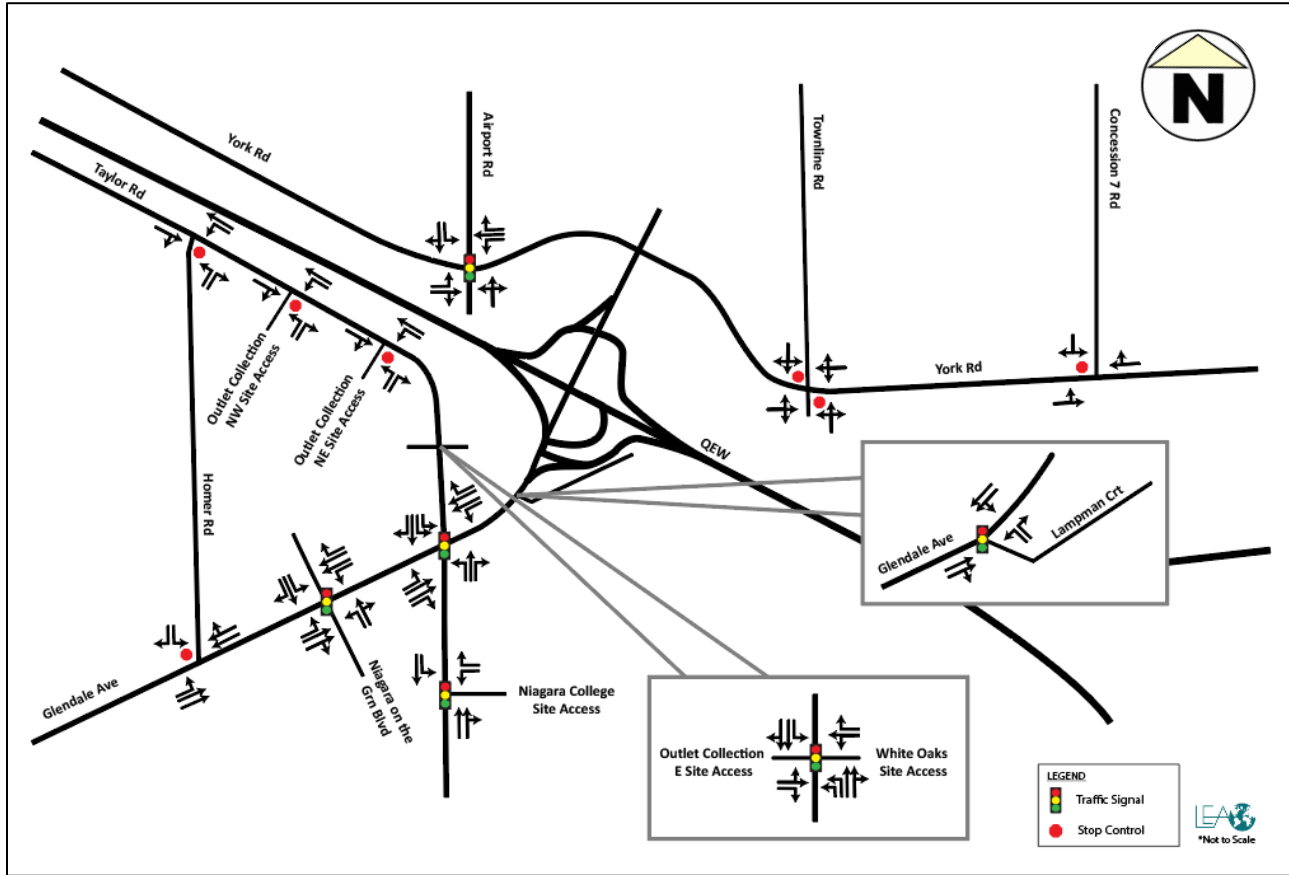
**Table 3-1** includes details on the existing roads within the study area, with the existing intersections and lane configurations illustrated in **Figure 3-2**.

**Table 3-1: Summary of Study Area Roadways**

Roadway	Description	Jurisdiction	Service Function	Regulatory Speed Limit	# of through lanes
Queen Elizabeth Way (QEW)	The QEW is a controlled-access highway and part of the 400-series highway connecting Toronto with the Niagara Peninsula and Buffalo in the United States. The QEW operates under the Ministry of Transportation (MTO) and includes auxiliary lanes for on-and off-ramps. An interchange	Provincial	Freeway	100	6

Roadway	Description	Jurisdiction	Service Function	Regulatory Speed Limit	# of through lanes
	with Glendale Avenue provides access to the QEW for the study area. The QEW is part of the GGH Plan's designated Strategic Goods Movement Network (SGMN).				
Homer Road (Regional Road 58)	Homer Road is a north-south collector roadway extending from Taylor Road in the north to Glendale Avenue in the south	Regional	Collector	80	2
Taylor Road (Regional Road 70)	Taylor Road is an arterial roadway, operating generally in a north-south direction. The roadway extends eastward from York Road to Glendale Avenue before heading southward to Chippawa Creek Road	Regional	Arterial	60	2
York Road (Regional Road 81)	York Road is an east-west arterial roadway extending from Taylor Road in the west to Niagara Parkway in the east	Regional	Arterial	60	2
Glendale Avenue (Regional Road 89)	Glendale Avenue is an east-west arterial roadway extending from Pelham Road in the west to York Road in the east	Regional	Arterial	50	4
Airport Road (Regional Road 90)	Airport Road is a north-south arterial roadway extending from Niagara Stone Road in the North to York Road in the south	Regional	Arterial	60	2
Queenston Street	Queenston Road is an east-west collector roadway extending from Niagara Stone Road in the west to York Road in the east	Municipal	Collector	70	2
Townline Road	Townline Road is a north-south local roadway extending from Line 8 Road in the north to York Road in the south	Municipal	Local	50	2
Niagara-on-the-Green (Main Street)	Niagara-on-the-Green is a north-south local roadway extending from Outlet Collection at Niagara in the north to Wright Crescent in the south	Municipal	Local	50	2
Concession 7 Road	Concession 7 Road is a north-south local roadway extending from Niagara Stone Road in the north to York Road in the south	Municipal	Local	50	2
Lampman Court	Lampman Court is an east-west local roadway extending approximately 360 m west from Glendale Avenue. The roadway mainly services the Niagara Corporate Business Centre	Municipal	Local	50 (unposted)	2

Figure 3-2: Existing Road Network and Lane Configuration



### 3.1.1 Diverging Diamond Interchange and Glendale Avenue/York Road Roundabout

The Glendale Avenue interchange has recently been reconstructed into a Diverging Diamond Interchange (DDI) to reduce gridlock and improve interchange performance by reducing vehicle conflict points and allowing unrestricted turning movements. This is accomplished by reconfiguring the traffic lanes to allow for direct access to all four (4) directional highway ramps. The DDI eliminates the need for motorists to make left turns when entering or exiting the QEW by using a series of interconnected crossover lanes that are traffic signal controlled. The DDI also accommodates active transportation users. A separated facility is provided along the centre of the roadway.

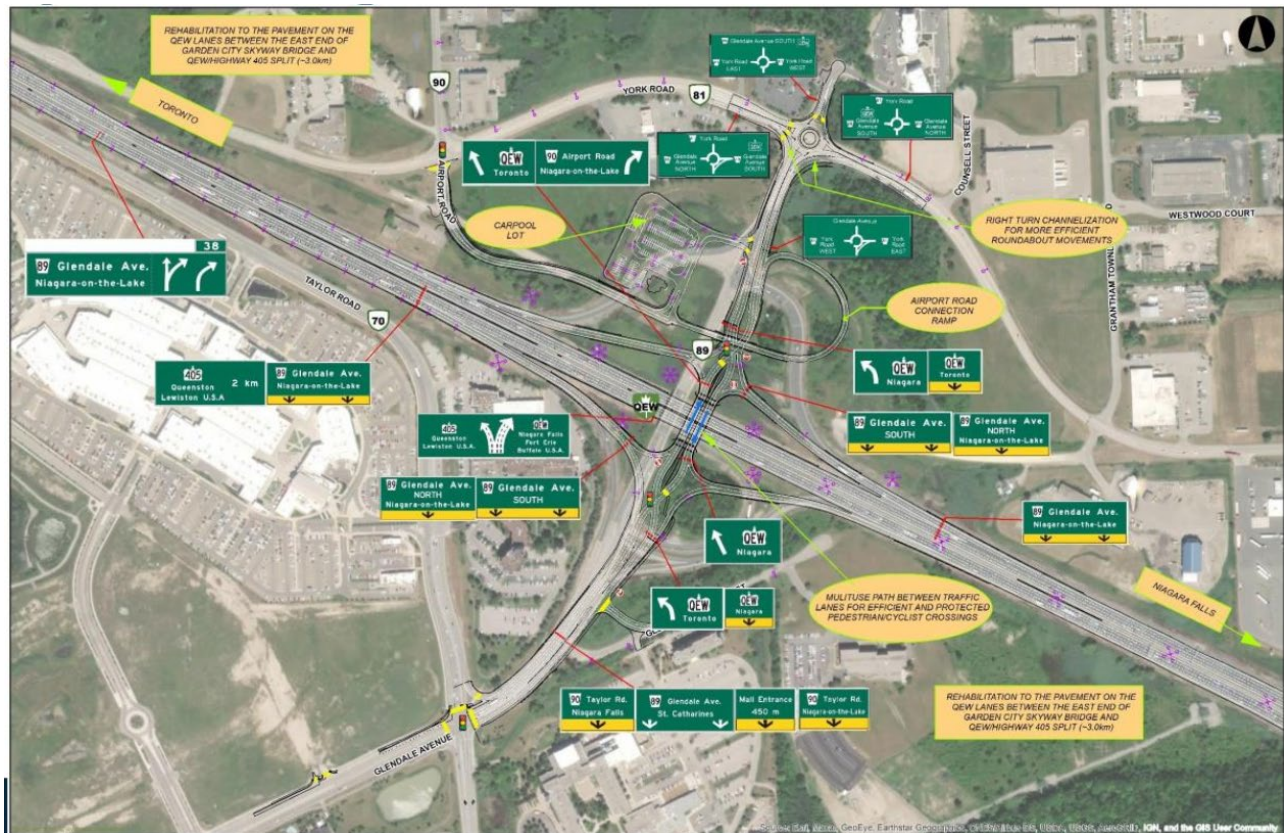
In addition, the Glendale Avenue & York Road intersection will be reconstructed to a single-lane roundabout with channelization in the southwest and southeast quadrants to improve intersection performance and service high-volume turning movements. The roundabout reconfiguration aims to reduce queues related to the westbound and southbound traffic flow by allowing the free flow of all high-volumes movements. Protections are in place for converting the proposed single-lane roundabout to a dual-lane roundabout if the future need arises.

Furthermore, a north to west loop ramp will be constructed on the north side of the QEW to connect Glendale Avenue directly to Airport Road via a new connection. The new connection allows for a direct route to the historic Old Town Niagara-on-the-Lake tourist area by removing the need to navigate through

two (2) intersections. The new connection will also divert some traffic from the Glendale Avenue and York Road intersection.

The future road improvements relating to the Glendale Avenue interchange, Glendale Avenue & York Road roundabout, as well as the future connection between Glendale Avenue and Airport Road is illustrated in **Figure 3-3**. It is noted that as of November 2022, the DDI is open. Ramps to and from Toronto are currently either detoured or in a temporary configuration, with all interchange ramps expected to be open by December 2022. The York Road and Glendale Avenue roundabout and the Glendale Avenue to Airport Road connection will be constructed in 2023.

**Figure 3-3: Glendale Avenue Road Improvements**



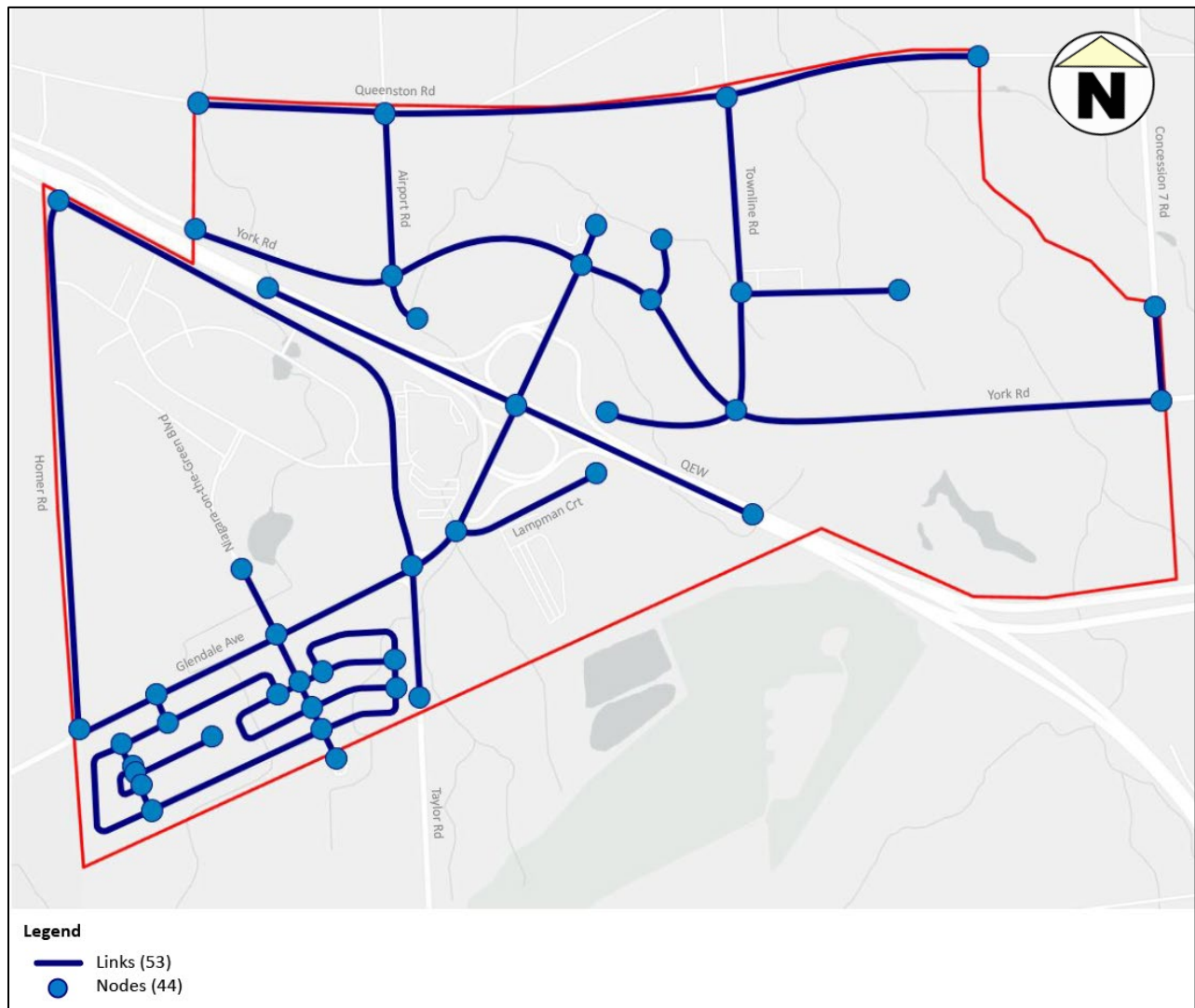
### 3.1.2 Road Network Connectivity Index

To determine the existing level of connectivity for the road network within the study area, a connectivity index was developed. This was achieved by calculating the ratio of nodes (intersections or cul-de-sacs) to street links within a defined area. The index was developed based on *The Calgary Transportation Plan Connectivity Handbook (Draft)*. As noted in the CTP Connectivity Handbook, grid networks are considered to provide the highest levels of connectivity compared to a modified grid and curvilinear networks, which provide fewer direct routes, feature more cul-de-sacs, and generally result in a higher ratio of links to nodes. Grid networks generally achieve higher connectivity indices close to or equal to 2.0 as a result, while curvilinear networks achieve lower indices around 1.3-1.4.

Based on the criteria, the study area includes 53 eligible links and 44 eligible nodes and has a connectivity index of 1.20. A map of the connectivity index and eligible links and nodes is shown in **Figure 3-4**. To note, the existing road network connectivity index analyzes the Glendale Avenue interchange without the newly constructed diverging diamond interchange configuration (DDI). It is understood that the intent of the DDI is to move traffic more efficiently by reducing the number of conflict points and is therefore not expected to impact the connectivity of the area.

The low connectivity index of 1.20 is reflective of current road network which features several links that abruptly discontinue, resulting in a higher ratio of nodes than links. For instance, majority of roadways off York Road lead to cul-de-sacs or dead ends, limiting the connectivity to surrounding roadways. Connectivity is centralized within the residential community south of the Glendale Avenue & Niagara-on-the-Green Boulevard intersection. However, it is recognized that there are lack of intersections (or nodes) and their associated links within the northern portion of the study area.

**Figure 3-4: Road Network Connectivity Index**





Overall, the study area currently exhibits a lack of continuous east-west and north-south roadways. Queenston Road and York Road are the only two continuous east-west arterial or collector roadways. There are no continuous north-south links primarily due to the QEW which creates a significant physical barrier in connecting the north and south areas of Glendale. The only roadway within the study area that crosses the QEW is Glendale Avenue which currently terminates at York Road. The missing link between York Road and Queenston Road limits connectivity north of the QEW. In addition to missing links, it is also noted that connectivity from the Glendale community to the rest of the Niagara Region is limited due to the Niagara Escarpment and environment conservation lands located south and west of the study area.

The study area also exhibits a lack of collector and local road connections resulting in large blocks that are not easily accessible for pedestrians and cyclists. The existing street network is thus auto-oriented with limited connectivity for people traveling by other modes.

There are opportunities to significantly improve road network connectivity for vehicles, pedestrians, and cyclists within the Glendale area through the introduction of new east-west and north-south road links. New connections and shorter links will provide more direct travel between destinations for all travel modes and provide additional crossing locations for pedestrians and cyclists.

### 3.2 EXISTING TRANSIT NETWORK

The Glendale study area is currently serviced by Niagara Region Transit (NRT) through NRT OnDemand where riders can request trips in real-time through an app by selecting a pickup point and destination anywhere within West Niagara or select transit hubs outside of West Niagara. This service is the successor to the former Niagara-on-the-Lake Transit system which offered fixed conventional transit service routes between common destinations. NRT OnDemand operates year-round Monday to Saturday from 7 AM to 10 PM.

In addition to NRT OnDemand service, Glendale and Niagara College Niagara-on-the-Lake Campus has two (2) regular transit service routes operated by NRT that connect St. Catharines Terminal to the Morrison/Dorchester Hub with stops located at Niagara College Glendale Campus and Outlet Collection at Niagara. A regular GO transit route also services the area, connecting Burlington to Niagara-on-the-Lake to Niagara Falls.

The existing NRT network surrounding the study area is illustrated in **Figure 3-5**. **Table 3-2** detail the available services in the area. Furthermore, a transit level of service (TLOS) was not conducted as there are no transit stops located at any of the study area intersections.

**Table 3-2: Existing Transit Service**

Transit System	Route	Description	Frequency
Niagara Regional Transit	NRT OnDemand	Non-fixed route (Monday to Saturday)	-
	Route 40	Niagara Falls to St. Catharines (Monday to Saturday)	60 minutes
	Route 40A	Niagara Falls to Niagara College (NOTL) - Express (Monday to Friday)	15 minutes
	Route 40B	Niagara College (NOTL) to St. Catharines - Express (Monday to Friday)	15 minutes
	Route 45	St. Catharines to Niagara Falls (Monday to Saturday)	60 minutes
	Route 45A	Niagara College (NOTL) to Niagara Falls -	15 minutes

Transit System	Route	Description	Frequency
		Express (Monday to Friday)	
	Route 45B	St. Catharines to Niagara College (NOTL) - Express (Monday to Friday)	15 minutes
GO Transit	Route 12	Burlington to Niagara Falls (Monday to Sunday)	60 minutes

Figure 3-5: Existing Niagara Region Transit Network



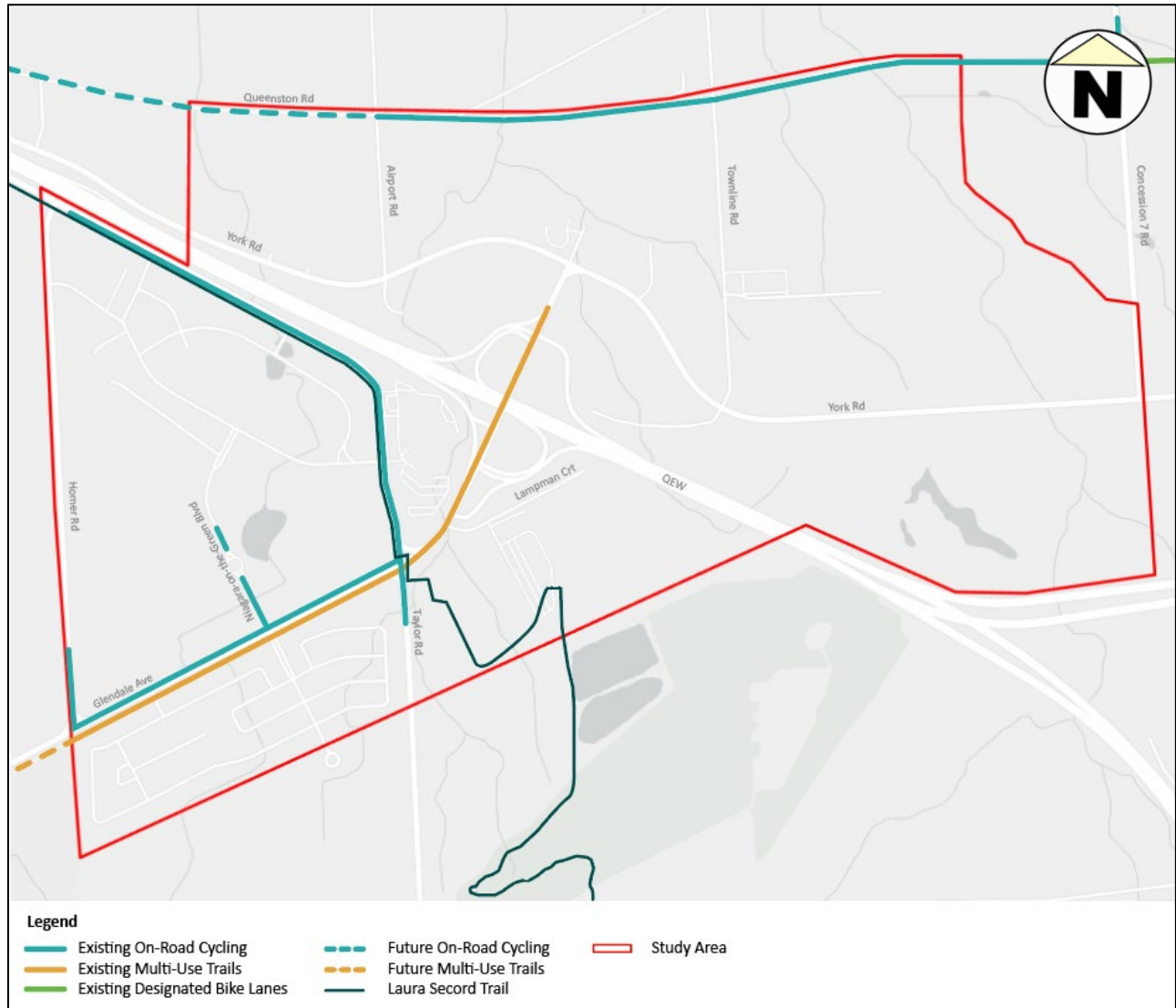
Source: Niagara Region Transit, September 2022

While there are limited transit services currently available in the study area, the Region has obtained approval to integrate local and inter-municipal transit services to the municipalities of St. Catharines, Niagara Falls, and Welland as part of the Moving Transit Forward initiative. The plan is to create a connected region where residents, visitors, and travelers can easily access public transportation to reach employment, recreation, and travel opportunities. Furthermore, the proposed multi-modal transit hub at Glendale Avenue & Taylor Road aims to provide inter-regional transit, GO transit, tourism buses, and terminal facilities to create a safe and convenient transit experience within the Glendale community.

### 3.3 EXISTING CYCLING NETWORK

Due to the current car-dependent nature of the study area, there are a limited number of buffered or protected cycling facilities. The majority of infrastructure is provided through on-road cycling facilities and off-road cycling trails. This network includes on-road cycling facilities along Taylor Road, Glendale Avenue, Queenston Road, and along short segments of Homer Road and Niagara-on-the-Green Boulevard. Furthermore, a multi-use trail is provided along Glendale Avenue to facilitate active transportation activity between the residential neighbourhood south of Glendale to major commercial areas. Major off-road cycling trails include the Laura Secord Trail which span 32 km from the Laura Secord Homestead in Niagara-on-the-Lake to DeCew House in Thorold, traversing through the Glendale study area. **Figure 3-6** illustrates the existing cycling facilities within the study area.

Figure 3-6: Existing Cycling Network



The existing cycling environment is constrained primarily due to the QEW which creates a significant physical barrier in connecting the north and south areas of Glendale. The Glendale Avenue interchange is currently the only major crossing of the QEW within the study area. Through the construction of the DDI, a multi-use path extends from Homer Road to the north side of the DDI, providing access for pedestrians and cyclists.

### 3.3.1.1 Cycling Multimodal Level of Service

An analysis of the multimodal level of service (MMLOS) for the cycling network in the study area was undertaken to provide a baseline biking level of service in the study area. The cycling network has been evaluated in accordance with the *City of Ottawa Multi-Modal Level of Service (MMLOS) Guidelines*. The bicycle level of service (BLOS) was conducted for the worst section of the segments within the study area.

The BLOS for the study area roadway segments is summarized in **Table 3-3**. Detailed MMLOS analysis is provided in **Appendix A**.

**Table 3-3: Existing Bicycle Level of Service (BLOS)**

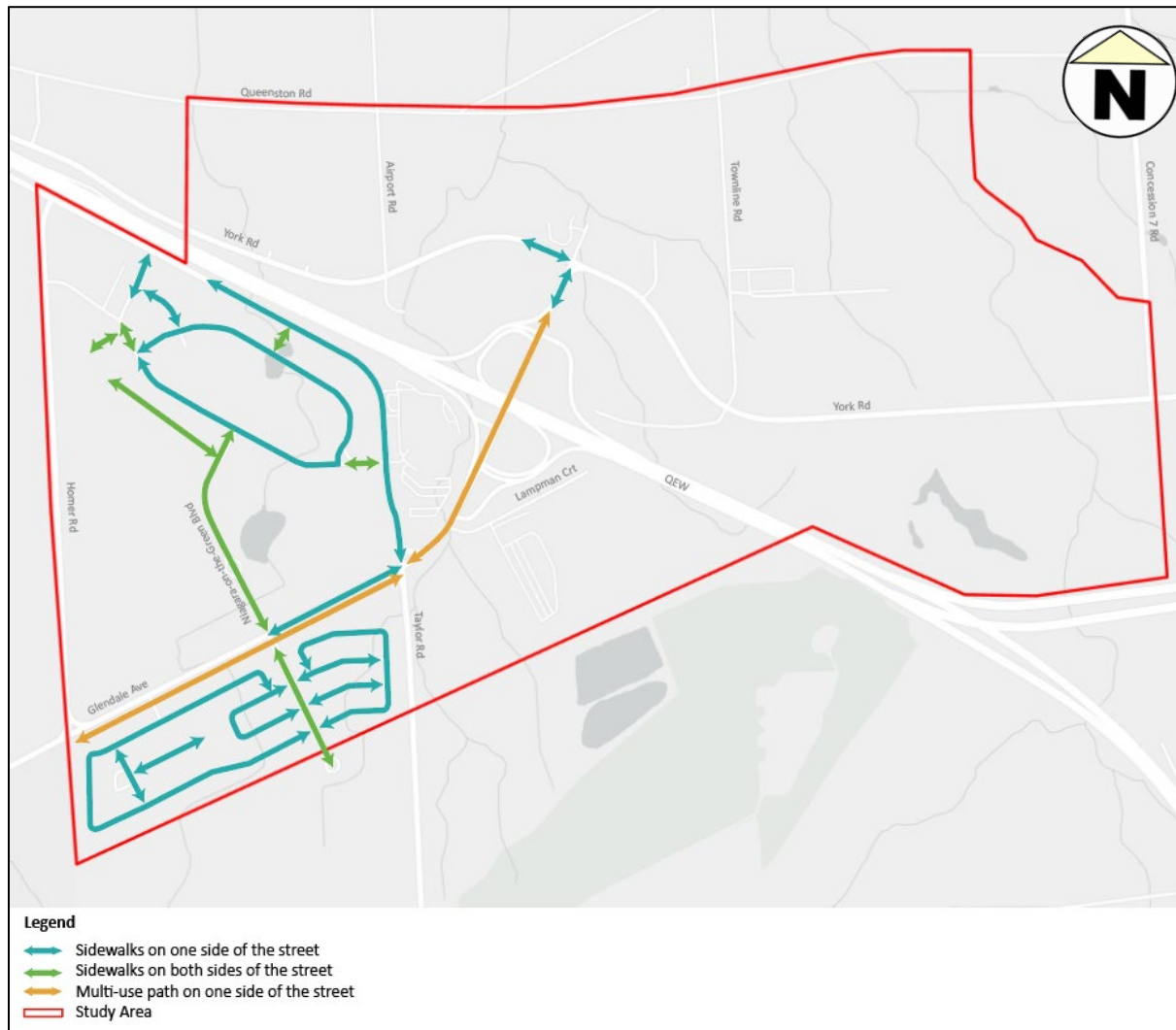
Segment	From	To	Side	Segment BLOS
Homer Road	Taylor Road	Outlet at Niagara Collection W Access	East	F
			West	F
Homer Road	Outlet at Niagara Collection W Access	Glendale Avenue	East	F
			West	F
Taylor Road	Homer Road	Outlet at Niagara Collection NW Access	North	F
			South	F
Taylor Road	Outlet at Niagara Collection NW Access	Outlet at Niagara Collection NE Access	North	F
			South	F
Taylor Road	Outlet at Niagara Collection NE Access	Outlet at Niagara Collection E Access	North	F
			South	F
Taylor Road	Outlet at Niagara Collection E Access	Glendale Avenue	East	B
			West	B
Taylor Road	Glendale Avenue	Niagara College Site Access	East	F
			West	F
Outlet at Niagara Collection NW Access	Taylor Road	Outlet At Niagara Collection	East	E
			West	E
Outlet at Niagara Collection NE Access	Taylor Road	Outlet At Niagara Collection	East	E
			West	E
Outlet at Niagara Collection E Access	Taylor Road	Outlet At Niagara Collection	North	E
			South	E
Glendale Avenue	Homer Road	Niagara-on-the-Green Boulevard	North	C
			South	C
Glendale Avenue	Niagara-on-the-Green Boulevard	Taylor Road	North	C
			South	C
Glendale Avenue	Taylor Road	Lampman Court	East	E
			West	E
Lampman Court	Glendale Avenue	Niagara College	North	D
			South	D
Niagara-on-the-Green Boulevard	Glendale Avenue	Outlet At Niagara Collection	East	D
			West	D
Niagara-on-the-Green Boulevard	Glendale Avenue	Young Crescent/Stevens Drive	East	D
			West	D
York Road	Airport Road	Glendale Avenue	North	F
			South	F
York Road	Glendale Avenue	Townline Road	North	F
			South	F
York Road	Townline Road	Concession 7 Road	North	F
			South	F
Airport Road	York Road	Queenston Road	East	F
			West	F
Townline Road	York Road	Queenston Road	East	D
			West	D
Concession 7 Road	York Road	Queenston Road	East	F
			West	F
Niagara College Site Access	Taylor Road	Niagara College	North	D
			South	D

Overall, the study area displays a BLOS of 'C' to 'F'. This is largely due to the lack of dedicated cycling facilities along a majority of roads within the study area. The highest BLOS in the study area is Glendale Avenue between Homer Road to Taylor Road, where a dedicated cycling facility is provided. However, as further discussed in **Section 4**, the facility is adjacent to high-speed high-volume lanes along Glendale Avenue. It is noted that multi-use paths within the study area are not assessed as part of the BLOS, and instead assessed as part of the PLOS.

### 3.4 EXISTING PEDESTRIAN NETWORK

The study area currently exhibits poor connectivity in the pedestrian network which is attributed to the lack of collector/local streets, discontinuous sidewalks, and the presence of physical barriers including the QEW that transects the study area. A review of the existing pedestrian sidewalk network indicates that while some roadways have sidewalks on either side of the street, most streets have no sidewalks at all. **Figure 3-7** illustrates the existing pedestrian sidewalk network.

**Figure 3-7: Existing Pedestrian Sidewalk Network**



Sidewalks are available on both sides of Niagara-on-the-Green Boulevard and within the area surrounding the Outlet Collection at Niagara. Sidewalks are only available along one side of Glendale Avenue and Taylor Road; however, these facilities are discontinuous and are only provided on a portion of the road segment. The residential development south of Glendale have sidewalks on at least one side of all roadways within the neighbourhood. The remaining study area roadways have no continuous sidewalks.

Based on a field visit conducted on Thursday, October 13<sup>th</sup>, 2022, it was noted that an informal connection to the White Oaks path at the northeast quadrant of Glendale Avenue & Taylor Road exists; however, the connection cuts off shortly before reaching the path and pedestrians are expected to cross over the patch of grass. Additionally, all pedestrians observed at the intersection were travelling to and from Niagara College via informal routes along Glendale Avenue and Taylor Road. These routes are currently unpaved, near the intersection of Glendale Avenue at Taylor Road. No pedestrians walked down to the Niagara College Site Access at Taylor Road.

### 3.4.1.1 Pedestrian Multimodal Level of Service

An analysis of the multimodal level of service (MMLOS) for the pedestrian network in the study area was undertaken to provide a baseline pedestrian level of service in the study area. The pedestrian network has been evaluated in accordance with the *City of Ottawa Multi-Modal Level of Service (MMLOS) Guidelines*. The pedestrian level of service (PLOS) was conducted for the worst section of the segments within the study area.

The PLOS for the study area roadway segments is summarized in **Table 3-4**. Detailed MMLOS analysis is provided in **Appendix A**.

**Table 3-4: Existing Pedestrian Level of Service (PLOS)**

Segment	From	To	Side	Segment PLOS
Homer Road	Taylor Road	Outlet at Niagara Collection W Access	East	F
			West	F
Homer Road	Outlet at Niagara Collection W Access	Glendale Avenue	East	F
			West	F
Taylor Road	Homer Road	Outlet at Niagara Collection NW Access	North	F
			South	F
Taylor Road	Outlet at Niagara Collection NW Access	Outlet at Niagara Collection NE Access	North	F
			South	D
Taylor Road	Outlet at Niagara Collection NE Access	Outlet at Niagara Collection E Access	North/East	F
			South/West	C
Taylor Road	Outlet at Niagara Collection E Access	Glendale Avenue	East	F
			West	D
Taylor Road	Glendale Avenue	Niagara College Site Access	East	F
			West	F
Outlet at Niagara Collection NW Access	Taylor Road	Outlet At Niagara Collection	East	B
			West	F
Outlet at Niagara Collection NE Access	Taylor Road	Outlet At Niagara Collection	East	C
			West	C
Outlet at Niagara Collection E Access	Taylor Road	Outlet At Niagara Collection	North	C
			South	C
Glendale Avenue	Homer Road	Niagara-on-the-Green Boulevard	North	F
			South	D
Glendale Avenue	Niagara-on-the-Green	Taylor Road	North	C

Segment	From	To	Side	Segment PLOS
	Boulevard		South	C
Glendale Avenue	Taylor Road	Lampman Court	East	D
			West	F
Glendale Avenue	Lampman Court	York Road	East/West	B/C
Lampman Court	Glendale Avenue	Niagara College	North	F
			South	F
Niagara-on-the-Green Boulevard	Glendale Avenue	Outlet At Niagara Collection	East	B
			West	B
Niagara-on-the-Green Boulevard	Glendale Avenue	Young Crescent/Stevens Drive	East	C
			West	C
York Road	Airport Road	Glendale Avenue	North	F
			South	F
York Road	Glendale Avenue	Townline Road	North	F
			South	F
York Road	Townline Road	Concession 7 Road	North	F
			South	F
Airport Road	York Road	Queenston Road	East	F
			West	F
Townline Road	York Road	Queenston Road	East	F
			West	F
Concession 7 Road	York Road	Queenston Road	East	F
			West	F
Niagara College Site Access	Taylor Road	Niagara College	North	F
			South	F

Pedestrian facilities are provided along the main corridors near the Outlet Collection at Niagara with some separation from vehicles; however, conditions are somewhat impacted by the vehicle volumes and speeds. No pedestrian facilities are provided in the north or west of the study area.

There are critical gaps in the sidewalk network as majority of the study area roadways have either no sidewalks or discontinuous sidewalks on one side of the street. These existing gaps in the pedestrian network provide opportunities to add new sidewalks or infill gaps and thereby improve connectivity for pedestrians through the redevelopment of properties along arterial roads and identifying streets to be considered for future sidewalk-improvement initiatives. Providing these active transportation connections are important in creating a complete community for the Glendale area.

### 3.4.1.2 Walkshed Analysis

A transit hub is planned at the corner of Taylor Road & Glendale Avenue, which provides an opportunity to address the missing sidewalk links and enhance the active transportation experience at the intersection of Glendale Avenue & Taylor Road to better support safe pedestrian and transit activity. Additionally, while not expected to be as significant of a pedestrian trip generator, the MTO Commuter Lot on the north side of the QEW provides an additional opportunity to improve the last-mile experience for commuter accessing the lot as pedestrians.

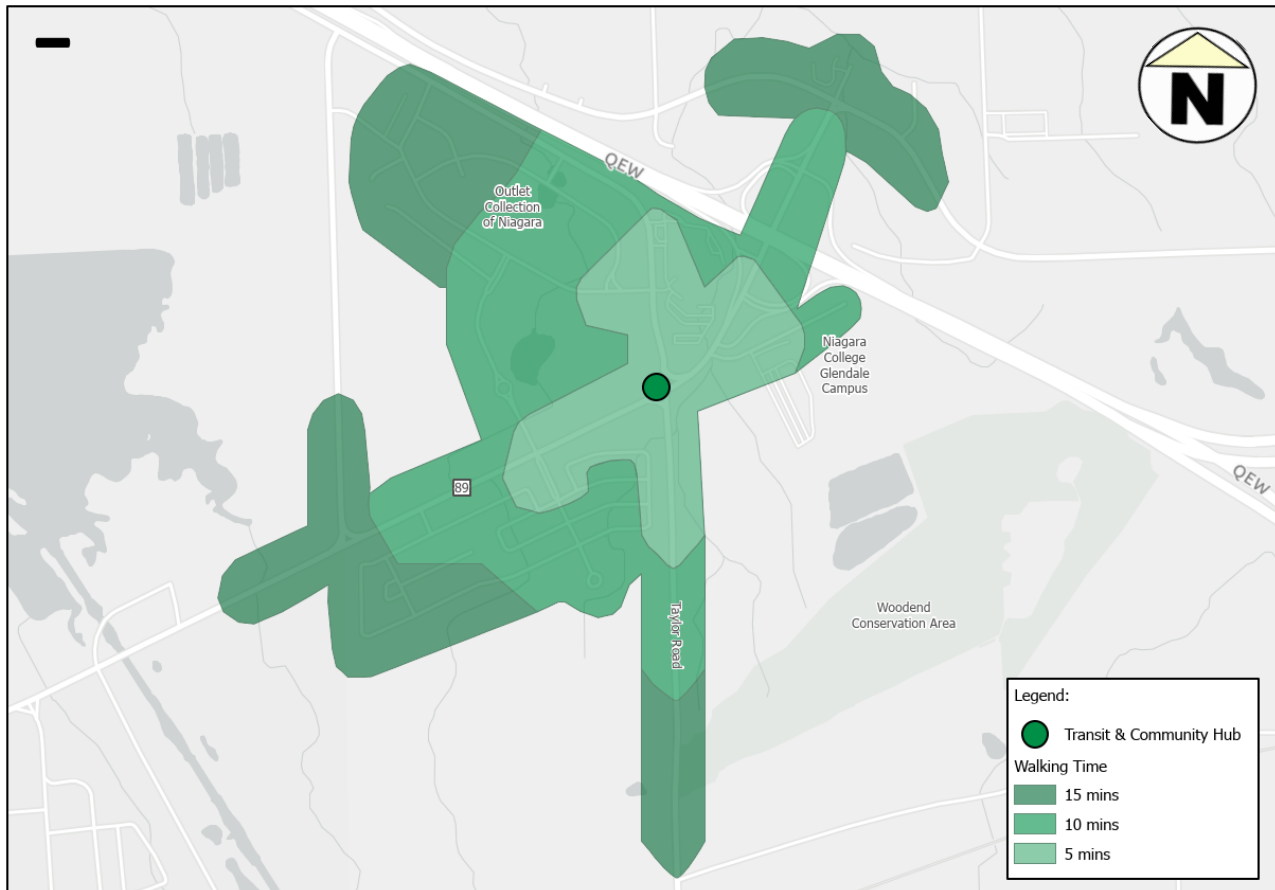
As such, a walkshed analysis has been conducted to identify areas within a 5-, 10-, and 15-minute walking distance of the planned transit hub (**Figure 3-8**) and existing commuter lot (**Figure 3-9**) via the existing sidewalk network.



As shown in **Figure 3-8**, the planned Transit Hub is within a 5-minute walking distance of the Niagara College Campus, the southern edge of the Outlet Collection at Niagara, and existing residential uses in the southwest quadrant of Glendale Avenue and Taylor Road. The planned Main Street area and mixed-use area adjacent to the Hub, as per the Glendale District Plan, are also accessible within this distance. When extending to 10- and 15-minutes, the Glendale Avenue and York Road intersection can be reached, extending access to existing and planned hospitality and mixed-use development. Due to the lack of existing roadway connections, this is the only intersection on the other side of the QEW that would be within walking distance of the Hub.

The majority of the existing uses south of the QEW are within walking distance of the Hub, and opportunities to extend access can be achieved through extension of the existing roadway and pedestrian-specific network throughout the study area.

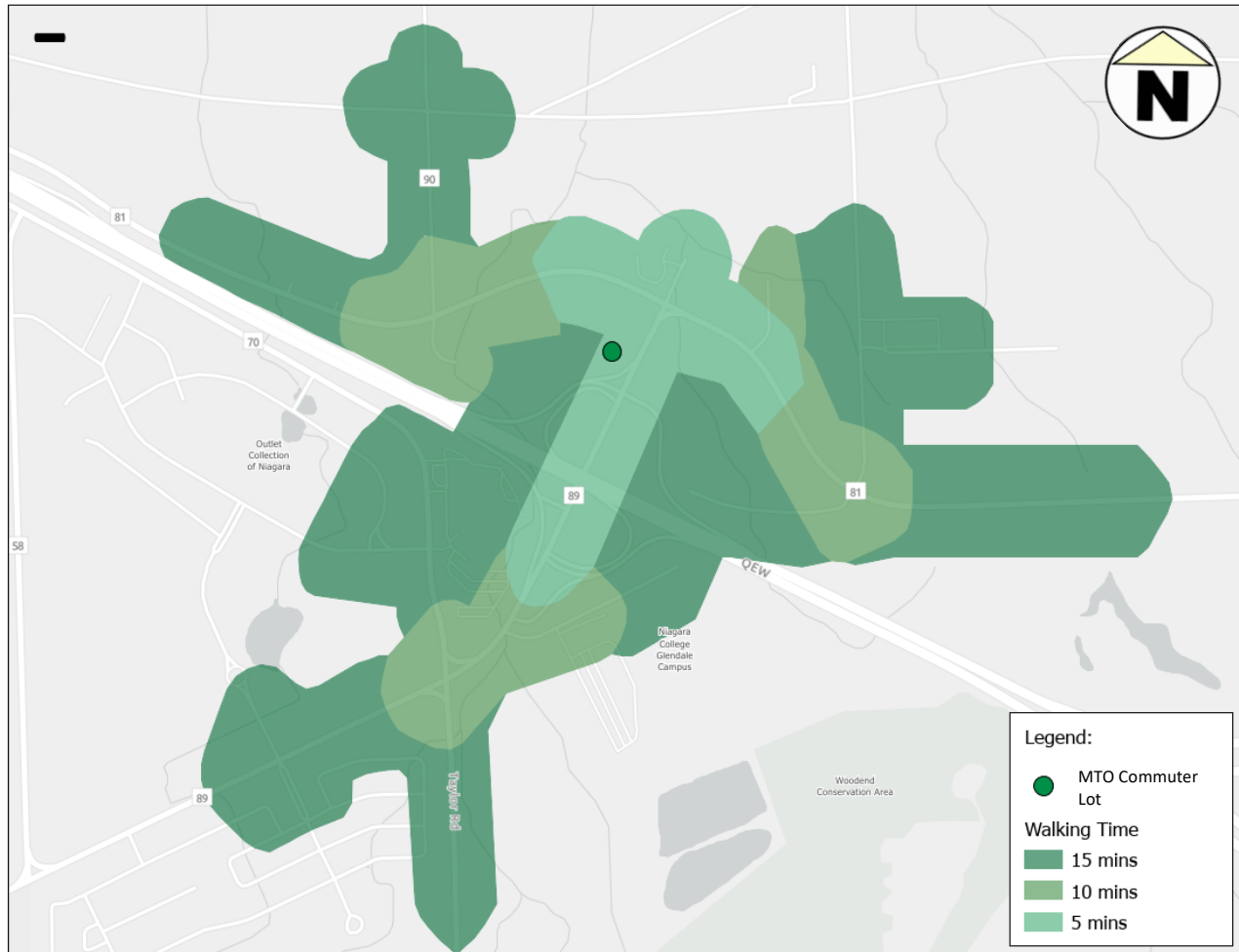
**Figure 3-8: Pedestrian Walkshed Analysis – Planned Transit Hub**



As shown in **Figure 3-9**, the existing MTO Commuter Lot is located on the north side of the QEW and provides the closest access to the existing and planned hospitality uses and employment uses to the east of the lot. The majority of the existing commercial and employment uses to the north of the QEW are also captured within a 10- to 15-minute walking distance of the commuter lot. These uses are expected to be the primary pedestrian trip generators for the commuter lot due to both proximity and the nature of these uses. The MTO Commuter Lot primarily serves commuters travelling to and from the Glendale area via the QEW and, therefore, is not expected to be a primary pedestrian trip generator. It is expected that some

residents, employees, and visitors would access the lot as a pedestrian to complete the first and/or last mile of their trip. While a number of uses south of the QEW are within a 10- to 15-minute walking distance of the lot, these uses are not expected to access the lot as pedestrians on a regular a basis.

**Figure 3-9: Pedestrian Walkshed Analysis – MTO Commuter Lot**



### 3.5 TRAFFIC DATA COLLECTION

The existing weekday AM and PM peak hour data was extracted from the 2016 EMME model provided by the Region and can be found in **Appendix B**. This data was grown based on the annual average growth rate calculated from the 2041 EMME model. **Table 3-5** summarizes the calculated growth rates for corridors in the study area. These growth rates were applied to the 2016 EMME model volumes extracted to forecast the 2022 volumes as part of the existing conditions screenline analysis. Detailed growth rate calculations are provided in **Appendix D**.

**Table 3-5: Calculated Growth Rates**

Corridor	Annual Growth Rate
Taylor Road	1.50%
Glendale Avenue	1.10%

The EMME models did not assess a Saturday peak hour scenario. As such, LEA collected turning movement counts on Saturday, July 2<sup>nd</sup>, 2022, and July 30<sup>th</sup>, 2022, for the Saturday midday peak period. It is noted that the new counts were not collected at the intersection of Glendale Avenue & Lampman Court, due to the proximity of the intersection to construction for the diverging diamond interchange. Furthermore, counts were collected at Taylor Road & Niagara College on Saturday, September 10<sup>th</sup>, 2022, when school was in session and the highest volumes were expected. **Table 3-6** summaries the existing TMC data for the Saturday peak hour. Signal timing plans at the signalized intersections were obtained from the Region. Detailed traffic counts and signal timing plans are available in **Appendix C**.

**Table 3-6: Existing Saturday TMC Data**

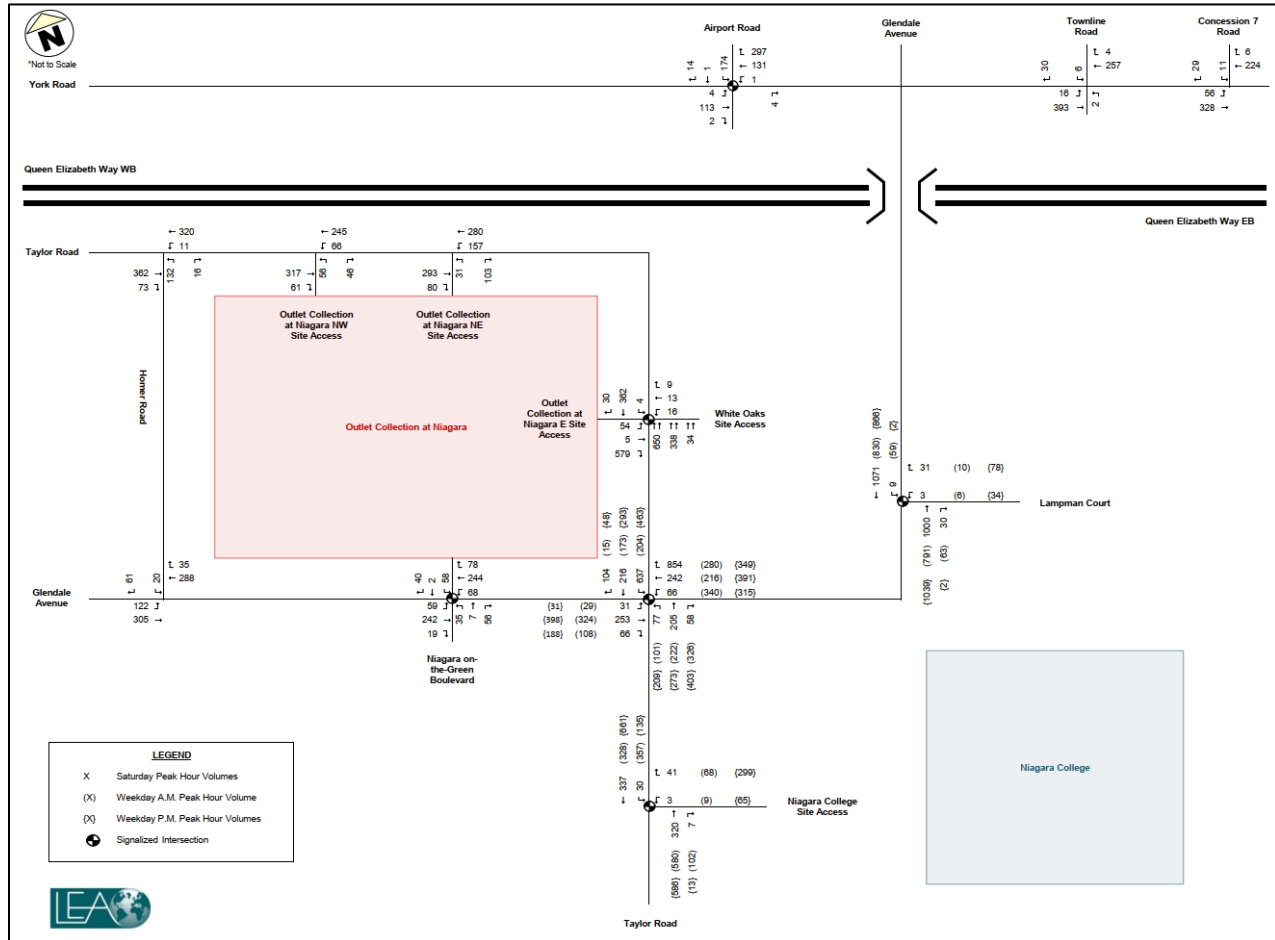
Intersection	TMC Date	Source	
Taylor Road and Homer Road	July 2, 2022	LEA Consulting	
Taylor Road and Outlet Collection at Niagara NW Site Access	July 30, 2022		
Taylor Road and Outlet Collection at Niagara NE Site Access			
York Road and Airport Road			
York Road and Townline Road			
York Road and Concession 7 Road			
Taylor Road and Outlet Collection at Niagara E Site Access/White Oaks Site Access	July 2, 2022		
Glendale Avenue and Homer Road			
Glendale Avenue and Niagara-on-the-Green Boulevard			
Glendale Avenue and Taylor Road			
Glendale Avenue and Lampman Court	January 7, 2020		CIMA
Taylor Road and Niagara College	October 17, 2019		Niagara Region
	September 10, 2022		LEA Consulting

It is noted that as per direction of the Niagara Region, no COVID adjustments were performed on the counts collected. Furthermore, volume balancing was applied to any movements where adjacent intersections had discrepancies greater than 10%.

### 3.6 EXISTING INTERSECTION CAPACITY ANALYSIS

The existing volumes in the study area are summarized in **Figure 3-10**.

**Figure 3-10: Existing Traffic Volumes in the Study Area**



A screenline analysis was performed for the weekday AM and PM peak hours. The Saturday peak hour was assessed in Synchro 11.0. For all analysis, critical movements were identified under the following criteria:

- ▶ At signalized intersections, through and/or through-right and/or right-turn movements with a V/C ratio greater than 0.85 deemed to be critical in terms of operations. Dedicated left-turn movements with a V/C ratio greater than 0.90 deemed to be critical in terms of operations.
- ▶ At unsignalized intersections, movements with a LOS of “D” or worse and/or where the estimated 95<sup>th</sup> percentile queue length for an individual movement exceeds the available queuing space deemed to be critical.

A summary of the LOS definitions is provided in **Appendix E**.

### 3.6.1 Weekday AM and PM Peak Hour Analysis

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. The analysis considered the total inbound and outbound flows of traffic in the study area boundaries in each direction. It also considered two destination points within the study area: The Outlet Collection at Niagara and Niagara College. The assumed capacity of each corridor was based on the road classification and lane capacity provided in the *Town of Niagara-on-the-Lake Transportation Master Plan* dated March 2022 and the *Glendale District Plan* dated June 2020 and is summarized in **Table 3-7**. The road classification and capacity of the corridors within the study area is summarized in **Table 3-8**. Excerpts of the road classification and lane capacity is provided in **Appendix F**.

**Table 3-7: Lane Capacity by Road Classification**

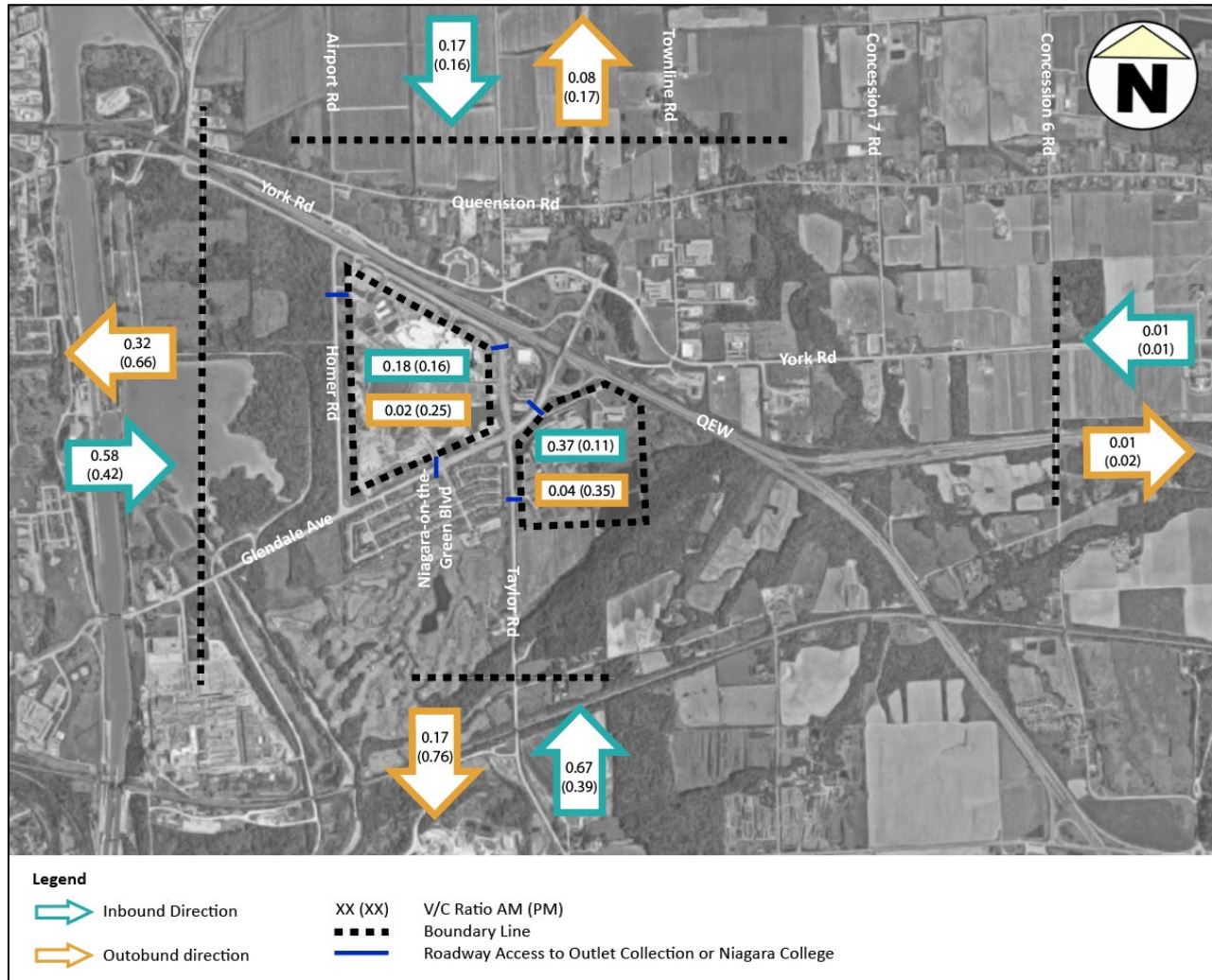
Road Classification	Lane Capacity (vehicles per lane per hour)
Local	300
Collector	500
Arterial	800
County	800
Highway	1800

**Table 3-8: Road Classification and Capacity within the Study Area**

Corridor	Service Function	Road Classification	Division	Speed Limit (km/h)	Lanes (per direction)	Typical Capacity (veh/hr/lane)	Capacity (veh/hr)
Homer Road	Rural	Collector	Undivided	80	1	500	500
Taylor Road	Urban	Arterial	Undivided	60	1	800	800
Airport Road	Rural	Arterial	Undivided	60	1	800	800
Townline Road	Rural	Local	Undivided	50	1	300	300
Concession Road 7	Rural	Local	Undivided	50	1	300	300
Niagara-on-the-Green Boulevard	Urban	Local	Undivided	50	1	300	300
York Road	Rural	Arterial	Undivided	60	1	800	800
Taylor Road	Urban	Arterial	Undivided	60	1	800	800
Glendale Avenue	Urban	Arterial	Divided	50	2	800	1600

The screenline analysis results and boundaries in the study area are illustrated in **Figure 3-11**.

Figure 3-11: Screenline Analysis



The screenline analysis is summarized in **Table 3-9**. Full detailed screenline analysis is provided in **Appendix G**.

**Table 3-9: Screenline Analysis: Corridor Volume-to-Capacity Ratios**

Screenline Boundary	Screenline Roads Included	Total Capacity (veh/hr)	Flow to/from Subject Site	Existing (V/C)	
				AM	PM
Outlet Collection at Niagara	Homer Road, Taylor Road, and Glendale Avenue	2900	Inbound	0.18	0.16
			Outbound	0.02	0.25
Niagara College	Taylor Road & Glendale Road	2400	Inbound	0.37	0.11
			Outbound	0.04	0.35
Northern Boundary	Airport Road, Townline Road, and Concession 7 Road	1400	Inbound	0.17	0.16
			Outbound	0.08	0.17
Southern Boundary	Taylor Road	800	Inbound	0.67	0.39
			Outbound	0.17	0.76
Eastern Boundary	York Road	800	Inbound	0.01	0.01
			Outbound	0.01	0.02

Screenline Boundary	Screenline Roads Included	Total Capacity (veh/hr)	Flow to/from Subject Site	Existing (V/C)	
				AM	PM
Western Boundary	York Road and Glendale Avenue	2400	Inbound	0.58	0.42
			Outbound	0.32	0.66

Under existing conditions, there is capacity for traffic to enter and exit the study area and key destinations under existing weekday AM and PM peak hour conditions. The highest V/C ratio observed in the study area is along Taylor Road, with a V/C of 0.67 for inbound volumes during the AM peak hour and a V/C of 0.76 for outbound volumes during the PM peak hour.

Overall, it is expected that traffic can generally enter and exit the area surrounding the study area via any route preferred within minimal delays.

### 3.6.1.1 Glendale Avenue at Taylor Road

As the busiest intersection in the study area, Glendale Avenue at Taylor Road is of particular interest, due to the proposed transit hub located on the northwest corner of the intersection. It is anticipated that the intersection will experience an influx of pedestrians under future conditions, for passengers alighting at the transit hub and walking to Niagara College. As such, the intersection was assessed in Synchro under all peak hours, as summarized in **Table 3-10**. Full synchro results are provided in **Appendix H**.

Turning movement counts for the intersection were provided by the Niagara Region for the weekday AM and PM peak hour analysis. The counts were collected on Tuesday, October 8<sup>th</sup>, 2019. Counts collected by LEA as discussed in **Section 3.5** were used for the Saturday peak hour.

**Table 3-10: Intersection Capacity Analysis, Existing Conditions – Glendale Avenue at Taylor Road**

Mvmt	AM Peak Hour					PM Peak Hour					Saturday Peak Hour				
	Vol	V/C	Delay (s)	LOS	95th Queue	Vol	V/C	Delay (s)	LOS	95th Queue	Vol	V/C	Delay (s)	LOS	95th Queue
<b>Overall</b>	-	<b>0.73</b>	<b>34</b>	<b>C</b>	-	-	<b>0.81</b>	<b>43</b>	<b>D</b>	-	-	<b>0.71</b>	<b>38</b>	<b>D</b>	-
EBL	29	0.10	28	C	10	31	0.12	33	C	11	31	0.10	26	C	11
EBT	324	0.42	35	D	60	398	0.55	43	D	74	253	0.29	31	C	40
EBR	108	0.08	31	C	16	188	0.15	38	D	22	66	0.05	29	C	2
WBL	340	0.72	24	C	89	315	0.75	31	C	84	66	0.19	23	C	20
WBT	216	0.17	20	B	31	391	0.32	27	C	57	242	0.26	29	C	37
WBR	280	0.20	21	C	19	349	0.24	26	C	21	854	0.76	45	D	129
NBL	101	0.57	48	D	46	209	0.76	58	E	<b>84</b>	77	0.55	49	D	33
NBT	222	0.76	51	D	89	<b>273</b>	<b>0.86</b>	<b>65</b>	<b>E</b>	<b>127</b>	205	0.64	42	D	69
NBR	326	0.28	37	D	29	403	0.34	42	D	36	58	0.04	34	C	0
SBL	204	0.56	46	D	41	463	0.79	53	D	84	637	0.79	41	D	104
SBT	173	0.59	42	D	71	293	0.81	56	E	136	216	0.35	25	C	62
SBR	15	0.01	35	D	0	48	0.03	37	D	0	104	0.07	22	C	10

During the weekday AM and PM peak hours, the intersection operates with available capacity. The northbound through movement is critical during the PM peak hour with a V/C ratio of 0.86. However, delays are minimal and there are no queuing constraints. The NBL movement experiences some queuing constraints, with an 85 m storage length required to accommodate the 95<sup>th</sup> percentile queue during the PM peak hour compared to the existing storage length of 70 m.

### 3.6.1.2 Taylor Road at Niagara College

The Taylor Road at Niagara College intersection was also assessed for operations during all peak hours. It is noted that based on a meeting with Niagara College, high queuing volumes were reported for the southbound left-turn movement into the College. Several turning movement counts were received for the intersection, as summarized in **Table 3-11**.

**Table 3-11: Turning Movement Counts, Taylor Road at Niagara College**

TMC Source	Weekday AM Peak Hour	Weekday PM Peak Hour	Saturday Midday Peak Hour
Niagara Region	Thursday, October 17 <sup>th</sup> , 2019	Thursday, October 17 <sup>th</sup> , 2019	-
CIMA+ on behalf of Niagara College	Tuesday, January 7 <sup>th</sup> , 2020	Tuesday, January 7 <sup>th</sup> , 2020	-
LEA Consulting Ltd.	-	-	Saturday, September 10 <sup>th</sup> , 2022

LEA reviewed the counts for the weekday peak hours and used the counts with the highest volumes to be conservative and assess the “worst case scenario” observed. The intersection was assessed in Synchro under all peak hours, as summarized in **Table 3-12**. Full synchro results are provided in **Appendix H**.

**Table 3-12: Intersection Capacity Analysis, Existing Conditions – Taylor Road at Niagara College**

Mvmt	AM Peak Hour					PM Peak Hour					Saturday Peak Hour				
	Vol	V/C	Delay (s)	LOS	95th Queue	Vol	V/C	Delay (s)	LOS	95th Queue	Vol	V/C	Delay (s)	LOS	95th Queue
<b>Overall</b>	-	<b>0.62</b>	<b>10</b>	<b>B</b>	-	-	<b>0.52</b>	<b>14</b>	<b>B</b>	-	-	<b>0.25</b>	<b>6</b>	<b>A</b>	-
WBL	9	0.08	39	D	7	65	0.36	39	D	25	3	0.03	43	D	3
WBR	68	0.06	39	D	13	299	0.22	38	D	25	41	0.04	44	D	10
NBTR	682	0.42	12	B	72	599	0.31	9	A	45	327	0.14	4	A	18
SBL	357	0.65	7	A	28	135	0.26	4	A	13	30	0.05	2	A	3
SBT	328	0.29	4	A	30	661	0.52	7	A	89	337	0.25	3	A	27

During the weekday peak hours, the intersection operates with available capacity and experiences a LOS of ‘B’. No individual movements operate with critical capacity, with minimal delays and no queuing constraints.

To further examine potential constraints of traffic causing delays and long queues for the southbound left-turn movement, a sensitivity analysis was conducted for the AM peak hour, where the highest volume of vehicles is expected to enter the College. This analysis explored the lane utilization factor limits of the northbound through traffic before significant impacts on intersection operations is modelled. It is noted that a lane utilization survey was not conducted, as the ongoing construction of the interchange and detour routes caused disruptions to typical traffic patterns. **Table 3-13** summarizes the sensitivity analysis. Full Synchro results are provided in **Appendix H**.



**Table 3-13: Taylor Road at Niagara College – Sensitivity Analysis**

Mvmt	0.95 NBT Lane Utilization Factor (Default)					0.59 NBT Lane Utilization Factor				
	Vol	V/C	Delay (s)	LOS	95th Queue	Vol	V/C	Delay (s)	LOS	95th Queue
Overall	-	0.62	10	B	-	-	0.81	20	C	-
WBL	9	0.08	39	D	7	9	0.08	39	D	7
WBR	68	0.06	39	D	13	68	0.06	39	D	13
NBTR	682	0.42	12	B	72	682	0.71	20	B	177
SBL	357	0.65	7	A	28	357	0.85	32	C	70
SBT	328	0.29	4	A	30	328	0.29	4	A	30

The maximum lane utilization factor theoretically possible for the northbound through movement is 0.59, representing all of the through traffic using the left-lane, and only right-turning traffic using the right-lane. With this lane utilization factor, the southbound left-turn movement operates with a higher V/C ratio, however there are minimal delays that are less than that of the allocated timing, allowing for vehicles to make the turn in a single cycle length. The northbound through movement experiences some long queues, however no adjacent intersections are affected. Furthermore, 95<sup>th</sup> percentile queues for the southbound left-turn movement can be accommodated within the storage length.

### 3.6.2 Saturday Peak Hour Analysis

As the EMME models provided by the Region did not have a Saturday scenario, LEA collected counts for the Saturday peak period to assess the Saturday peak hour. The intersection capacity analysis for the study area was undertaken using Synchro version 11.0, which is based on the Highway Capacity Manual 2000 methodology.

The results for the signalized and unsignalized intersections in the Saturday peak hour are summarized in **Table 3-14** and **Table 3-15**, respectively. The length of delay for all studied intersections is illustrated in **Figure 3-12**. Full synchro results are provided in **Appendix H**.

Figure 3-12: Saturday Peak Hour Intersection Operations

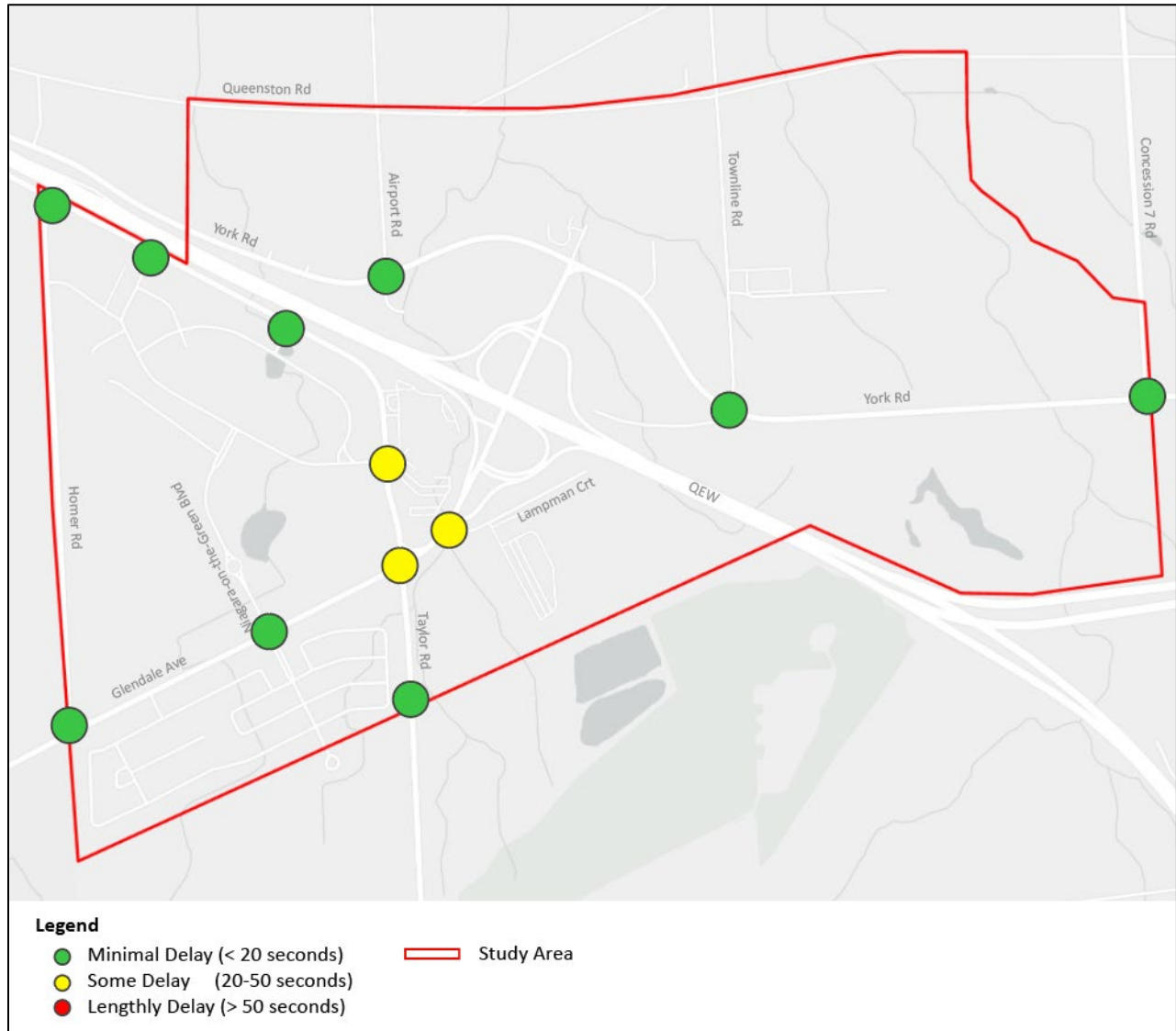


Table 3-14: Intersection Capacity Analysis, Existing Saturday Peak Hour – Signalized Intersections

York Road & Airport Road								
Mvmt	Vol	V/C	Delay (s)	LOS	50th Queue	95th Queue	Storage Lane Required (m)	Existing Turn Lane Length (m)
<b>Overall</b>	-	<b>0.28</b>	<b>13</b>	<b>B</b>	-	-	-	-
EBL	4	0.01	9	A	0	2	15	66
EBTR	115	0.12	10	A	8	16	20	-
WBL	1	0.00	9	A	0	1	15	94
WBT	131	0.15	10	B	9	18	20	-
WBR	297	0.18	10	B	0	11	15	-
NBTR	4	0.00	17	B	0	0	15	-
SBL	174	0.46	20	C	18	35	35	44

SBTR	15	0.01	17	B	0	4	15	-
<b>Taylor Road &amp; Outlet Collection at Niagara E Site Access/White Oaks Site Access</b>								
Mvmt	Vol	V/C	Delay (s)	LOS	50th Queue	95th Queue	Storage Lane Required	Existing Turn Lane Length (m)
<b>Overall</b>	-	<b>0.56</b>	<b>42</b>	<b>D</b>	-	-	-	-
EBLT	59	0.44	50	D	14	29	30	-
EBR	579	0.65	57	E	9	39	40	-
WBL	16	0.10	41	D	4	9	15	-
WBTR	22	0.06	41	D	3	10	15	-
<b>NBL</b>	<b>650</b>	<b>0.91</b>	<b>56</b>	<b>E</b>	<b>81</b>	<b>115</b>	115	133
NBTR	372	0.20	9	A	14	38	40	-
SBL	4	0.28	66	E	1	5	15	91
SBTR	392	0.34	25	C	38	58	60	-
<b>Glendale Avenue &amp; Niagara-on-the-Green Boulevard</b>								
Mvmt	Vol	V/C	Delay (s)	LOS	50th Queue	95th Queue	Storage Lane Required	Existing Turn Lane Length (m)
<b>Overall</b>	-	<b>0.21</b>	<b>15</b>	<b>B</b>	-	-	-	-
EBL	59	0.11	7	A	4	9	15	97
EBTR	261	0.18	11	B	15	24	25	-
WBL	68	0.13	7	A	5	10	15	51
WBT	244	0.17	11	B	15	23	25	-
WBR	78	0.06	10	A	0	5	15	79
NBL	35	0.21	33	C	5	12	15	41
NBTR	63	0.11	36	D	1	12	15	-
SBL	58	0.29	30	C	9	18	20	107
SBT	2	0.01	34	C	0	2	15	-
SBR	40	0.03	34	C	0	0	15	107
<b>Glendale Avenue &amp; Taylor Road</b>								
Mvmt	Vol	V/C	Delay (s)	LOS	50th Queue	95th Queue	Storage Lane Required	Existing Turn Lane Length (m)
<b>Overall</b>	-	<b>0.71</b>	<b>38</b>	<b>D</b>	-	-	-	-
EBL	31	0.10	26	C	4	11	15	99
EBT	253	0.29	31	C	24	40	40	-
EBR	66	0.05	29	C	0	2	15	58
WBL	66	0.19	23	C	9	20	20	109
WBT	242	0.26	29	C	22	37	40	-
WBR	854	0.76	45	D	20	129	130	-
NBL	77	0.55	49	D	16	33	35	70
NBT	205	0.64	42	D	43	69	70	-
NBR	58	0.04	34	C	0	0	15	-
SBL	637	0.79	41	D	66	104	105	106
SBT	216	0.35	25	C	36	62	65	-
SBR	104	0.07	22	C	0	10	15	67
<b>Taylor Road &amp; Niagara College Site Access</b>								
Mvmt	Vol	V/C	Delay (s)	LOS	50th Queue	95th Queue	Storage Lane Required	Existing Turn Lane Length (m)
<b>Overall</b>	-	<b>0.25</b>	<b>6</b>	<b>A</b>	-	-	-	-
WBL	3	0.03	43	D	1	3	15	-
WBR	41	0.04	44	D	0	10	15	-

NBTR	327	0.14	4	A	12	18	20	136
SBL	30	0.05	2	A	1	3	15	219
SBT	337	0.25	3	A	17	27	30	-

Under existing conditions, the signalized intersections in the study area operate within capacity with an overall V/C ratio of less than 1.00. One critical movement was identified at the intersection of Taylor Road and the Outlet Collection at Niagara E Site Access/White Oaks Site access, where the northbound left-turn movement operates with a V/C of 0.91 and LOS of E. However, the 95<sup>th</sup> percentile queue is expected to be accommodated within the available storage, and queues are able to dissipate within one cycle based on the signal timing of the intersection. All other movements operate under acceptable conditions with 95<sup>th</sup> percentile queue lengths that can be accommodated within the available storage.

**Table 3-15: Intersection Capacity Analysis, Existing Saturday Peak Hour – Unsignalized Intersections**

Taylor Road & Homer Road					
Mvmt	Vol	V/C	Delay (s)	LOS	95th Queue
EBTR	458	0.27	0	-	0
WBL	12	0.01	8	A	0
WBT	337	0.20	0	-	0
NBL	139	0.39	21	C	14
NBR	17	0.03	11	B	1
Taylor Road & Outlet Collection at Niagara NW Site Access					
Mvmt	Vol	V/C	Delay (s)	LOS	95th Queue
EBTR	407	0.24	0	-	0
WBL	71	0.06	8	A	2
WBT	263	0.15	0	-	0
NBL	60	0.17	18	C	5
NBR	49	0.07	11	B	2
Taylor Road & Outlet Collection at Niagara NE Site Access					
Mvmt	Vol	V/C	Delay (s)	LOS	95th Queue
EBT	329	0.19	0	-	0
EBR	90	0.05	0	-	0
WBL	176	0.15	9	A	4
WBT	315	0.19	0	-	0
NBL	35	0.15	23	C	4
NBR	116	0.16	11	B	5
York Road & Townline Road					
Mvmt	Vol	V/C	Delay (s)	LOS	95th Queue
EBLTR	16	0.01	0	A	0
WBLTR	0	0.00	0	-	0
NBLTR	2	0.01	19	C	0
SBLTR	37	0.06	11	B	2
York Road & Concession 7 Road					
Mvmt	Vol	V/C	Delay (s)	LOS	95th Queue
EBLT	60	0.05	2	A	1
WBTR	247	0.15	0	-	0
SBLR	43	0.07	11	B	2

Glendale Avenue & Homer Road					
Mvmt	Vol	V/C	Delay (s)	LOS	95th Queue
EBL	154	0.13	9	A	4
EBT	193	0.11	0	-	0
WBT	243	0.14	0	-	0
WBTR	166	0.10	0	-	0
SBL	25	0.10	22	C	3
SBR	77	0.10	10	A	3
Glendale Avenue & Lampman Court					
Mvmt	Vol	V/C	Delay (s)	LOS	95th Queue
<b>WBL</b>	<b>3</b>	<b>0.03</b>	<b>44</b>	<b>E</b>	<b>1</b>
WBR	33	0.06	12	B	2
NBT	702	0.41	0	-	0
NBTR	383	0.23	0	-	0
SBLT	9	0.01	0	A	0
SBT	751	0.44	0	-	0

Under existing Saturday peak hour conditions, the unsignalized intersections in the study area operate within capacity with an overall V/C ratio of less than 1.00. All movements have a V/C below 1.00 and experience LOS of 'C' or better, with the exception of the westbound left-turn movement at the intersection of Glendale Avenue & Lampman Court, which experiences a LOS of E. It is noted that only 3 vehicles were identified at that movement, and no capacity or queuing constraints were identified. The 95<sup>th</sup> percentile queue lengths for all movements are expected to be accommodated within the available storage.

## 4 SAFETY ASSESSMENT

A safety review of the existing road network within the study area was conducted to determine high-level recommendations to mitigate any potential safety concerns. The safety review included collision data collected over a five-year period beginning from 2017 to 2021, as provided by the Niagara Region, and included a summary for each intersection and midblock segment for all collisions within the study area. The historical collection data is provided in **Appendix I**. Collision diagrams were also provided for the intersections within the study area. The following intersections and midblock segments were included in LEA's safety assessment:

### Intersections

- ▶ Homer Road & Taylor Road
- ▶ Airport Road & York Road
- ▶ Townline Road & York Road
- ▶ Glendale Avenue & Concession 7 Road
- ▶ Glendale Avenue & Homer Road
- ▶ Glendale Avenue & Griffiths Gate
- ▶ Glendale Avenue & Niagara-on-the-Green Boulevard
- ▶ Glendale Avenue & Taylor Avenue
- ▶ Glendale Avenue & Lampman Court
- ▶ Glendale Avenue & QEW South Ramp
- ▶ Glendale Avenue & QEW North Ramp
- ▶ Glendale Avenue & York Road

### Midblock Segments

- ▶ Glendale Avenue between Lampman Court and Ramp
- ▶ Glendale Avenue between Griffiths Gate and Niagara-on-the-Green Boulevard
- ▶ Glendale Avenue between Taylor Road and Niagara-on-the-Green Boulevard
- ▶ Homer Road between Glendale and Outlet Collection at Niagara W Site Access
- ▶ Homer Road between Outlet Collection at Niagara W Site Access and Taylor Road
- ▶ Taylor Road between Glendale Avenue and Homer Road
- ▶ York Road between Townline Road and Concession 7 Road
- ▶ York Road between York Road and Glendale Avenue

### 4.1 REVIEW OF COLLISIONS IN STUDY AREA

A summary of the collisions within the study area between 2017-2021 is provided in **Table 4-1**. It is noted that the QEW Ramps at the Glendale Avenue interchange and the intersection of Glendale Avenue

at York Road were not assessed, as the diverging diamond interchange and roundabout construction is expected to cause significant change the characteristics of the interchange/intersection.

**Table 4-1: Collisions in the Study Area (Niagara Region, 2017-2021)**

Intersection	AADT <sup>1</sup>	5 Year Total	Collisions per AADT (1000 veh)
Homer Road & Taylor Road	8,500	8	0.94
Airport Road & York Road	7,410	8	1.08
Townline Road and York Road	7,080	4	0.56
Glendale Avenue & Concession 7 Road	6,540	4	0.61
Glendale Avenue & Homer Road	8,310	5	0.60
Glendale Avenue & Griffiths Gate	-	4	-
Glendale Avenue & Niagara-on-the-Green Boulevard	9,080	10	1.10
Glendale Avenue & Taylor Avenue	24,890	65	2.61
Glendale Avenue & Lampman Court	21,440	3	0.14
Glendale Avenue & QEW South Ramp	-	11	-
Glendale Avenue & QEW North Ramp	-	39	-
Glendale Avenue & York Road	-	41	-
<b>Intersection Total</b>	-	<b>202</b>	-
Midblock Segment	AADT <sup>1</sup>	5 Year Total	Collisions per AADT (1000 veh)
Glendale Avenue between Lampman Court and Ramp	20,710	1	0.05
Glendale Avenue between Griffiths Gate and Niagara-on-the-Green Boulevard	4,860	1	0.21
Glendale Avenue between Taylor Road and Niagara-on-the-Green Boulevard	4,950	6	1.21
Homer Road between Glendale and Outlet Collection at Niagara W Site Access	810	2	2.47
Homer Road between Outlet Collection at Niagara W Site Access and Taylor Road	1,450	2	1.38
Taylor Road between Glendale Avenue and Homer Road	7,000	7	1.00
York Road between Townline Road and Concession 7 Road	6,500	3	0.46
York Road between York Road and Glendale Avenue	-	4	-
<b>Midblock Segment Total</b>	-	<b>26</b>	-
<b>Total</b>	-	<b>228</b>	-

Note: (1) – Due to limited data, AADTs were calculated by assuming the Saturday peak period represents 10% of the AADT

Out of 228 collisions reported in the study area, there were 202 collisions reported at intersections (representing 88.6% of collisions in the study area) and 26 collisions reported at midblock segments (representing 11.4% of collisions in the study area). Glendale Avenue at Taylor Road was identified to have the most collisions in the study area, with 65 collisions, equating to 2.61 collisions/1000 vehicles. Along the midblock segments in the study area, Homer Road between Glendale Avenue and the Outlet Collection at Niagara W Site Access had the highest collisions per 1000 vehicles, at 2.47. However, it is noted that this equates to only 2 collisions in a five-year period.

LEA reviewed the collisions by type, including classification and impact type, as well as other factors such as the environment condition, light, and time of the accident to identify any trends for collisions within the study area. A summary of the trend assessment is provided in **Table 4-2**.

**Table 4-2: Classification and Trend Analysis of Collisions**

Classification of Accident

02 - Non-fatal injury	23	10%
03 - P.D. only	150	66%
04 - Non-reportable	17	7%
Not defined	38	17%
Killed or Seriously Injured	0	0%
<b>Total</b>	<b>228</b>	<b>100%</b>
<b>Initial Impact Type</b>		
01 - Approaching	2	1%
02 - Angle	24	11%
03 - Rear end	109	48%
04 - Sideswipe	37	16%
05 - Turning movement	25	11%
07 - SMV other	24	11%
99 - Other	7	3%
<b>Total</b>	<b>228</b>	<b>100%</b>
<b>Environment Condition</b>		
01 - Clear	191	84%
02 - Rain	8	4%
03 - Snow	23	10%
04 - Freezing Rain	1	0%
05 - Drifting Snow	1	0%
07 - Fog, mist, smoke, dust	3	1%
99 - Other	1	0%
<b>Total</b>	<b>228</b>	<b>100%</b>
<b>Light</b>		
01 - Daylight	155	68%
03 - Dawn	3	1%
05 - Dusk	7	3%
06 - Dusk, artificial	1	0%
07 - Dark	45	20%
08 - Dark, artificial	16	7%
99 - Other	1	0%
<b>Total</b>	<b>228</b>	<b>100%</b>
<b>Accident Time</b>		
Day (07:00-22:59)	199	87%
Night (23:00-06.59)	29	13%
<b>Total</b>	<b>228</b>	<b>100%</b>
<b>Accident Period</b>		
Weekday AM Peak Period (6:00AM-9:00AM)	13	6%
Weekday Mid Peak Period (9:00AM-3:00PM)	58	25%
Weekday PM Peak Period (3:00PM-6:00PM)	50	22%
Weekday Off Peak Period	58	25%
Weekend	49	21%
<b>Total</b>	<b>228</b>	<b>100%</b>

The following conclusions were made based on the classification and trend assessment:

- ▶ 10% of the collisions within the five-year period resulted in non-fatal injuries. No collision was classified as killed or seriously injured (KSI) collisions



- ▶ Almost 50% of the collisions are rear-end collisions, which are largely attributed to driver error. Other possible causes include improper inter-green time, skewed intersections restricting sightlines, pedestrian crossings, multiple or closely spaced driveway accesses, a high number of turning movements, signage/traffic control visibility, and slippery road conditions<sup>1</sup>. These factors were all assessed for each intersection and midblock segment in the study area in **Section 4.3**.
- ▶ 84% of collisions occurred under clear conditions, meaning causes are more likely due to driver error or infrastructure issues
- ▶ Single motor vehicle (SMV) collisions may include collisions with pedestrians, cyclists, animals, roadside objects, or debris on the road right-of-way. The collision data provided does not identify what the vehicle collided with
- ▶ Over 50% of collisions occurred during the weekday off-peak period, indicating that the accidents most likely happened when there were fewer vehicles on the road

To compare the occurrence of collisions in the study area to the overall region, LEA reviewed the Niagara Annual Road Safety Report (2015-2019), as summarized in **Table 4-3**.

**Table 4-3: Comparison of Study Area Collisions vs. Niagara Region Collisions**

Comparison	Niagara Annual Road Safety Report	Glendale Study Area
5-Year Period Assessed	2015-2019	2017-2021
Average Number of Collisions Reported Per Year	5,695 collisions	46 collisions
Number of Injury Collisions Over a 5-Year Period	722 injury collisions	23 injury collisions
Number of Fatal Collisions Over a 5-Year Period	13 fatal collisions	0 fatal collisions
Time of Day Most Collisions Occurred	Peak periods during weekdays	Peak periods during weekdays
Percentage of Collisions at Intersections	50.6%	86.6%

## 4.2 SUMMARY OF SITE VISIT

LEA conducted a site visit on Thursday, October 13<sup>th</sup>, 2022, to observe any potential safety concerns within the study area. The following observations were noted as part of the site visit:

- ▶ At the intersection of Taylor Road and Glendale Avenue, speeding was observed on the west leg between Niagara-on-the-Green Boulevard and Taylor Road
- ▶ On Taylor Road between Glendale Avenue and the Outlet Collection at Niagara E Site Access/White Oaks Site Access, weaving was observed for vehicles heading from the Outlets to the QEW.
- ▶ Pedestrian crossing pavement markings are fading on the north and east legs of the intersection of Taylor Road and Glendale Avenue

<sup>1</sup> Hsu, T. & Wen. K. (2017). Collision Types of Motorcycle Accidents and Countermeasures. Institute of Civil Engineering, National Taiwan University. Retrieved from [https://avestia.com/CSEE2018\\_Proceedings/files/paper/ICTE/ICTE\\_115.pdf](https://avestia.com/CSEE2018_Proceedings/files/paper/ICTE/ICTE_115.pdf) & HDR (2019).Town of New Tecumseth Multi-Modal Active Transportation Master Plan. Retried from [https://www.newtecumseth.ca/en/business-and-development/resources/Engineering/TMP/D\\_CollisionMemo.pdf](https://www.newtecumseth.ca/en/business-and-development/resources/Engineering/TMP/D_CollisionMemo.pdf)

- ▶ At Homer Road, approaching Glendale Avenue, no sightline issues were observed

## 4.3 REVIEW OF COLLISIONS AT INTERSECTIONS

### 4.3.1 Homer Road & Taylor Road

In the five-year period, there were eight (8) collisions at the intersection of Homer Road & Taylor Road. None resulted in injuries and were all classified as property damage only. Three (3) were classified as rear-end collisions. One (1) took place in snowy conditions, at night. This could be a result of the vehicle not being prepared for winter conditions or could potentially be a result of the streets not being properly cleared after heavy snowfall. One (1) collision was classified as an approaching collision during “dawn” at 7:20 in the morning. The vehicle is shown going eastbound, which indicates that the driver’s vision may have been obstructed by the sunrise, resulting in the collision. It should be noted that one (1) rear-end collision is shown coming from the north-leg despite there not being one. After a review of the aerial, there is a connection to the QEW that is being blocked by “no entry” barriers. No trends or patterns have been identified, and there are no major safety concerns for the intersection.

### 4.3.2 Airport Road & York Road

In the five-year period, there were eight (8) collisions at the intersection of Airport Road & York Road. One (1) resulted in a non-fatal injury. The collision was classified as a single motor vehicle and took place at night. One (1) rear-end collision took place in snowy conditions, which could be a result of the vehicle not being prepared for winter conditions or a result of the streets not being properly cleared after heavy snowfall. 50% of the collisions at the intersection were single motor vehicle collisions. One (1) in each direction. The causes of the accidents are unclear. Collisions may include collisions with pedestrians, cyclists, animals, roadside objects, or debris on the road right-of-way (HDR, 2019). Upon inspection, there are no permanent obstructions or roadside objects that might be a factor. There are no major safety concerns for the intersection.

### 4.3.3 Townline Road & York Road

In the five-year period, there were four (4) collisions at the intersection of Townline Road & York Road. None resulted in injuries and were all classified as property damage only. Two (2) were classified as rear-end collisions and the other two (2) were classified as sideswipe collisions. Both sideswipe collisions were going eastbound. As the eastbound lane is quite wide and there is no dedicated left-turning lane, it can be assumed that the vehicles heading eastbound through on York Road were trying to by-pass vehicles making an eastbound left at the intersection and did not have enough room to do so. There are no major safety concerns for the intersection.

### 4.3.4 Glendale Avenue & Concession 7 Road

In the five-year period, there were four (4) collisions at the intersection of Townline Road and Concession 7 Road. None resulted in injuries and were all classified as property damage only. One (1) rear-end collision took place in snowy conditions, which could be a result of the vehicle not being prepared for winter conditions or a result of the streets not being properly cleared after heavy snowfall. As there are only a small number of collisions that occurred at this intersection, no trends or patterns could be identified. There are no major safety concerns for the intersection.

#### 4.3.5 Glendale Avenue & Homer Road

In the five-year period, there were five (5) collisions at the intersection of Glendale Avenue & Homer Road. One (1) angle collision, which involved a vehicle making a southbound left movement, resulted in a non-fatal injury. As there has been only one collision like this in the five-year period, it is likely that the accident was a result of driver error. The other four (4) collisions were rear end collisions, which were also likely caused by driver error. There is no indication that sightlines or visibility constraints are a factor in the collision. It can be said that there are no major safety concerns for the intersection.

#### 4.3.6 Glendale Avenue & Griffiths Gate

In the five-year period, there were four (4) collisions at the intersection of Glendale Avenue & Griffiths Gate, which is between Homer Road and Niagara-on-the-Green Boulevard. None resulted in injuries and were all classified as property damage only. Three (3) were classified as single motor vehicle collisions and one (1) was classified as an angle collision. Although three quarters were single motor vehicle collisions travelling eastbound or westbound, the causes of the accidents are unclear. Collisions may include collisions with pedestrians, cyclists, animals, roadside objects, or debris on the road right-of-way (HDR, 2019). Upon inspection, there are no permanent obstructions or roadside objects that might be a factor. As a result, no patterns or trends can be identified. There are no major safety concerns for the intersection.

#### 4.3.7 Glendale Avenue & Niagara-on-the-Green Boulevard

In the five-year period, there were ten (10) collisions at the intersection of Glendale Avenue & Niagara-on-the-Green Boulevard. Two (2) resulted in a non-fatal injury. This included a sideswipe collision, and a rear end collision. Two (2) collisions that only resulted in property damage happened in snowy conditions, which could be a result of improper winter road maintenance, or the vehicle not being prepared for winter conditions. One (1) rear end collision was most likely caused by foggy conditions. There are four (4) rear-end collisions reported going eastbound. It is likely that this is since this is the first traffic light in over 1.4 km and there is no signage indicating that a traffic light is ahead. No other trends or patterns have been identified. As a result, there are no major safety concerns for the intersection.

#### 4.3.8 Glendale Avenue & Taylor Avenue

In the five-year period, there were 65 collisions at the intersection of Glendale Avenue & Taylor Road. Seven (7) or 11% resulted in a non-fatal injury. Three (3) of these non-fatal injury collisions were rear end collisions, two (2) were turning movement collisions, one (1) was a sideswipe collision, and one (1) was an angle collision. Of the total 65 collisions, 57% were rear end collisions, 17% were turning movement collisions, and 15% were sideswipe movements. More than half of the rear end collisions happened to vehicles travelling northbound or southbound. Turning movement collisions were distributed evenly among all travel direction. Most of the sideswipe collisions occurred to vehicles travelling southbound, which is most likely due to vehicles trying to get into the left-turning lanes to go to the QEW. 15% of collisions occurred in snowy conditions, which is likely a result of the roadways not being cleared after a heavy snowfall, or the vehicle not being prepared for winter conditions. Rear end and sideswipe collisions tend to be caused by driver error. However, rear end collisions may also be caused by a high number of turning movements (HDR, 2019) and the restriction of road user's sight angle due to the skew of the intersection (Hsu & Wen, 2017). Turning movement collisions may be caused by insufficient vehicle clearance intervals or obstruction of sightlines.

It is noted that the intersection is skewed at an angle with a curve for the north leg of the intersection. From a review of the historical alignment of Taylor Road it appears that this is due to the introduction of the signalized intersection at the White Oaks/Niagara Outlets Accesses. Furthermore, it has been observed that many vehicles exiting the Outlets travel to the QEW, causing weaving in that segment of Taylor Road. These issues will be taken into consideration with any future road network improvements within the study area.

#### 4.3.9 Glendale Avenue and Lampman Court

In the five-year period, there were three (3) collisions at the intersection of Glendale Avenue and Lampman Road. One (1) angle collision resulted in a non-fatal injury. As there has been only one collision like this in the five-year period, it is likely that the accident was a result of driver error. There is no indication that sightlines or visibility constraints are a factor of the collision. One (1) is a sideswipe collision going southbound which could be a result of incoming traffic from the highway changing lanes to the left and traffic wanting to turn right onto Taylor Avenue changing lanes to the right. As there are only a small number of collisions that occurred at this intersection, no trends or patterns could be identified. It can be said that there are no major safety concerns for the intersection.

### 4.4 REVIEW OF COLLISIONS ALONG MIDBLOCK SEGMENTS

#### 4.4.1 Glendale Avenue between Lampman Court and Ramp

In the five-year period, there was one (1) collision on Glendale Avenue between Lampman Court and the QEW Ramp. It was a rear-end collision that resulted in property damage only. It is noted that this segment of Glendale Avenue is being reconstructed as part of the diverging diamond interchange construction.

#### 4.4.2 Glendale Avenue between Griffiths Gate and Niagara-on-the-Green Boulevard

In the five-year period, there was one (1) collision on Glendale Avenue between Griffiths Gate and Niagara-on-the-Green Boulevard. It was an angle collision that resulted in property damage only.

It is noted that there are bicycle lanes present along Glendale Avenue starting at Taylor Road in the east, terminating to the west of the study area past Griffiths Gate. These bicycle lanes are 1.5 m in width and are adjacent to traffic heading east and west along Glendale Avenue. The speed limit along Glendale Avenue is posted at 70 km/h, with a reduction to 50 km/h starting at Griffiths Gate along the Niagara-on-the-Green community; however, speeding has been observed along this stretch of the roadway. While there have not been any reported collisions between vehicles and cyclists, the bicycle lanes along Glendale Avenue are a potential safety issue for cyclists given the high-speed nature of the roadway. Furthermore, the multi-use path on the south side of Glendale Avenue provides an opportunity for cyclists to travel along Glendale with separation from vehicles. The cycling movements along Glendale Avenue will be reviewed and recommendations will be provided as part of future road network improvements.

#### 4.4.3 Glendale Avenue between Taylor Road and Niagara-on-the-Green Boulevard

In the five-year period, there were six (6) collisions on Glendale Avenue between Taylor Road and Niagara-on-the-Green Boulevard. None resulted in injuries and were all classified as property damage only. As there is no information on the direction of travel, no trends or patterns could be identified.

#### 4.4.4 Homer Road between Glendale and Outlet Collection at Niagara W Site Access

In the five-year period, there were two (2) collisions on Homer Road between Glendale Avenue and the Outlet Collection at Niagara W Site Access. None resulted in injuries and were all classified as property damage only. One (1) was a sideswipe collision that was likely due to the snowy conditions at the time of the accident.

#### 4.4.5 Homer Road between Outlet Collection at Niagara W Site Access and Taylor Road

In the five-year period, there were two (2) collisions on Homer Road between the Outlet Collection at Niagara W Site Access and Taylor Road. None resulted in injuries and were all classified as property damage only. One (1) was a single motor vehicle collision that was likely due to the foggy conditions at the time of the accident.

#### 4.4.6 Taylor Road between Glendale Avenue and Homer Road

In the five-year period, there were seven (7) collisions on Taylor Road between Glendale Avenue and Homer Road. One (1) single motor vehicle collision resulted in injury. Another single motor vehicle collision and approaching collision were likely due to the freezing rain and snowy conditions, respectively. As there is no information on the direction of travel, no trends or patterns could be identified.

#### 4.4.7 York Road between Townline Road and Concession 7 Road

In the five-year period, there were three (3) collisions on York Road between Townline Road and Concession 7 Road. None resulted in injuries and were classified as property damage only or non-reportable. As there is no information on the direction of travel, no trends or patterns could be identified.

#### 4.4.8 York Road between York Road and Glendale Avenue

In the five-year period, there were four (4) collisions on York Road between York Road and Glendale Avenue. One (1) sideswipe collision resulted in injury. As there is no information on the direction of travel, no trends or patterns could be identified.

### 4.5 SUMMARY OF SAFETY ASSESSMENT

The safety assessment reviewed historical collision data over a five-year period for intersections and road segments within the study area. Based on the review and a field visit, the following conclusions are made:

- ▶ The intersection of Glendale Avenue at Taylor Road is the busiest intersection in the study area, with the most collisions reported. While some of the collisions can be attributed to driver error, there are also potential safety concerns regarding the curve and weaving along the north leg of the intersection, and skew of the intersection. These concerns will be further reviewed with recommendations provided as part of future road network improvements.
- ▶ A potential safety concern is observed for Glendale Avenue, west of Taylor Road due to the high speeds of vehicles along Glendale, combined with the narrow bicycle lanes adjacent to the laneways. Recommendations will be made as part of future road network improvements to increase the separation between cyclists and vehicles and reduce speeds along Glendale Avenue.

## 5 EXISTING ROADWAY CROSS-SECTIONS

The following section summarizes the existing cross-section and design elements for all relevant arterial, collector, and local roadways within the study area. As previously mentioned, there are five regional roadways within the study area: Taylor Road, York Road, Glendale Avenue, and Airport Road are classified as regional arterial roadways while Homer Road is classified as a regional collector. The study area also includes five main municipal roadways: Queenston Street is a municipal collector while Niagara-on-the-Green (Main Street), Lampman Court, Townline Road, and Concession 7 Road are classified as local roads.

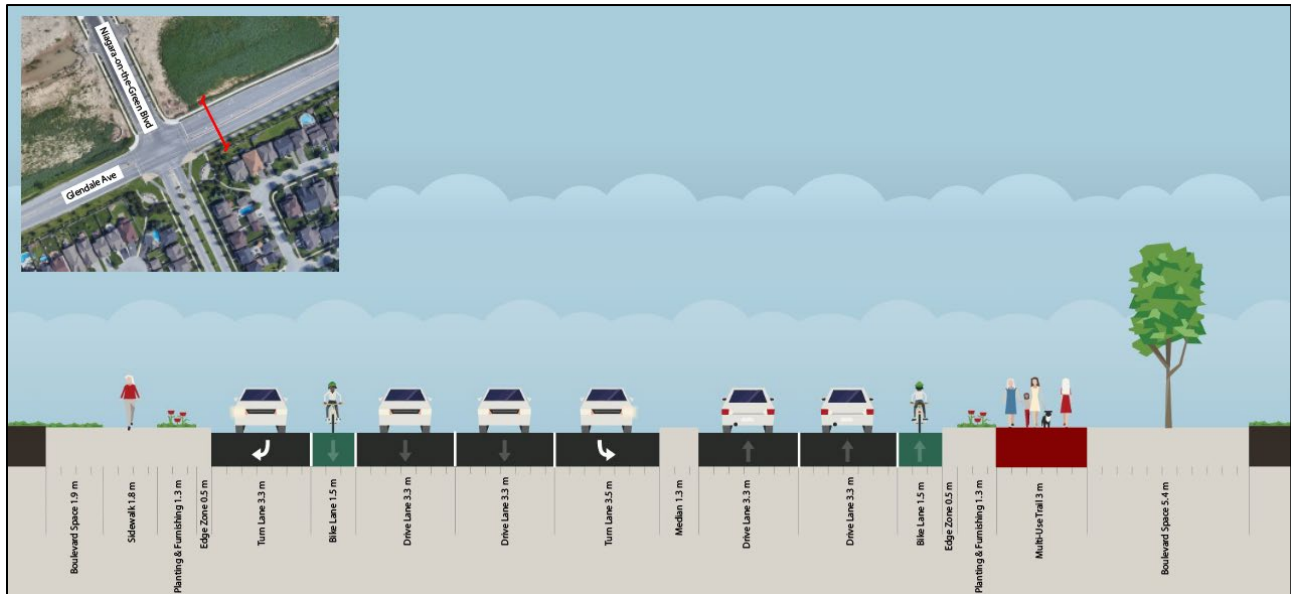
### 5.1 GLENDALE AVENUE

**Figure 5-1** illustrates the typical existing cross-section for Glendale Avenue. In general, Glendale Avenue in the study area includes the following cross-section elements:

- ▶ 4 travel lanes (2 in each direction) with auxiliary turn lanes at major intersections
- ▶ Pedestrian sidewalks on both sides of the roadway
- ▶ On-road bike lanes on both sides of the roadway
- ▶ Multi-use path on the south side of the roadway

The ROW width for Glendale Avenue currently ranges between 32 m and 40 m. The multi-use trail provided along the south side of the roadway facilitates pedestrian movement and provides a connection for the residential community south of Glendale Avenue to access major commercial destinations. While 1.5 m bike lanes are provided on both sides of the roadway, the narrow and unprotected cycling facilities create undesirable conditions for cyclists traveling east-west on an arterial road. The provision of buffered or protected cycle tracks along with pedestrian-scale street furniture and planting would enhance the active transportation realm along Glendale Avenue.

**Figure 5-1: Existing Glendale Avenue Cross-Section**



Note: (1) – widths estimated based on Google Street view and Niagara Region Navigator web application

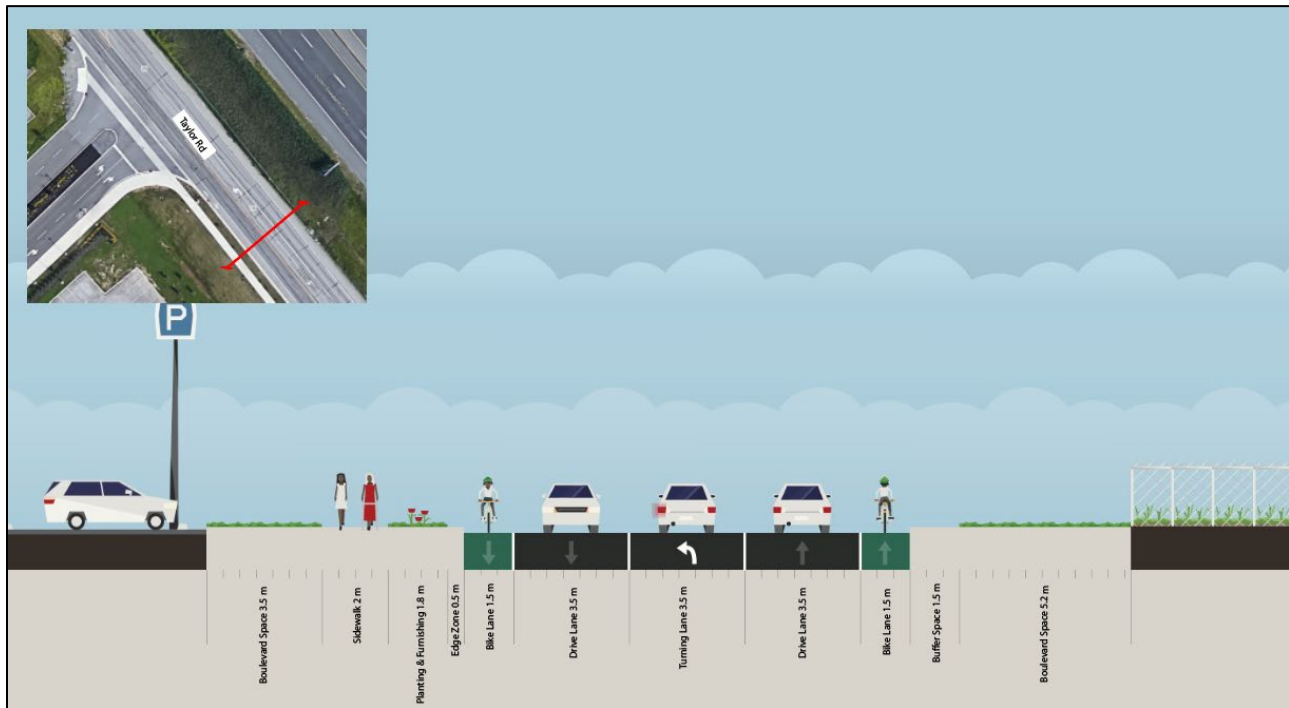
## 5.2 TAYLOR ROAD

**Figure 5-2** illustrates the typical existing cross-section for Taylor Road. In general, Taylor Road in the study area includes the following cross-section elements:

- ▶ 2 travel lanes (1 in each direction) with auxiliary turn lanes at major intersections
- ▶ Pedestrian sidewalks on one side of the roadway
- ▶ On-road bike lanes on both sides of the roadway

The ROW width for Taylor Road currently ranges between 28 m and 32 m. Between Glendale Avenue and the White Oaks Resort site access, the roadway accommodates 4 travel lanes (2 in each direction). West of the White Oaks Resort site access, the roadway accommodates 2 travel lanes (1 in each direction) with auxiliary turn lanes at the Outlet Collection at Niagara northeast and northwest site accesses. While 1.5 m bike lanes are provided on both sides of the roadway, the narrow and unprotected cycling facilities create undesirable conditions for cyclists traveling along the arterial road. The provision of buffered or protected cycle tracks along with pedestrian-scale street furniture and planting would enhance the active transportation realm along Taylor Road.

**Figure 5-2: Existing Taylor Road Cross-Section**



Note: (1) – widths estimated based on Google Street view and Niagara Region Navigator web application

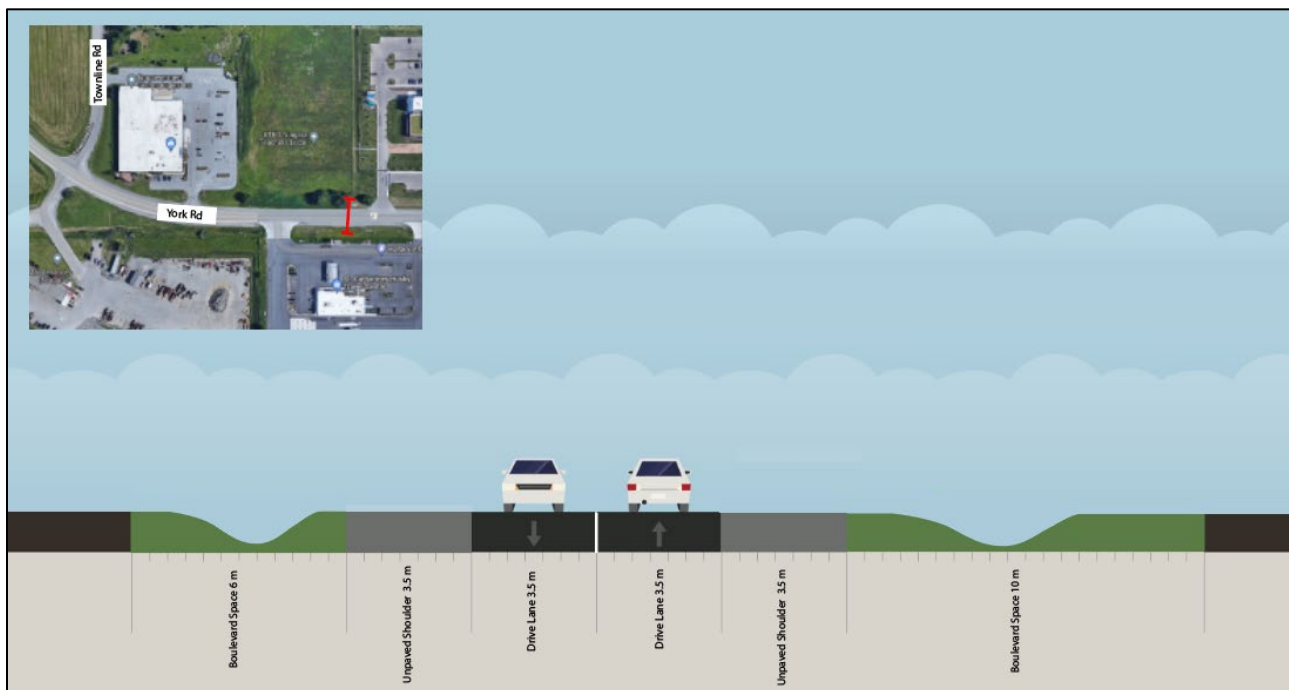
### 5.3 YORK ROAD/HOMER ROAD

**Figure 5-3** illustrates the typical existing cross-section of York Road and Homer Road. In general, both roadways in the study area include the following cross-section elements:

- ▶ 2 travel lanes (1 in each direction) with auxiliary turn lanes at major intersections
- ▶ Unpaved, gravel shoulders on both sides of the roadway
- ▶ Large boulevard space between the roadway and property lines

The ROW width for York Road and Homer Road currently ranges between 26 m and 30 m. The lack of pedestrian and cycling facilities create unsafe conditions for active transportation users. To accommodate future employment and hospitality uses along York Road and residential uses along Homer Road, both roadways would benefit from an enhanced pedestrian realm including landscaped boulevard space and pedestrian scale lighting. The provision of sidewalks on both sides of the roadway and buffered or protected cycle tracks would improve the safety of active transportation users and encourage travel by other alternative modes to the automobile.

**Figure 5-3: Existing York Road/Homer Road Cross-Section**



Note: (1) – widths estimated based on Google Street view and Niagara Region Navigator web application



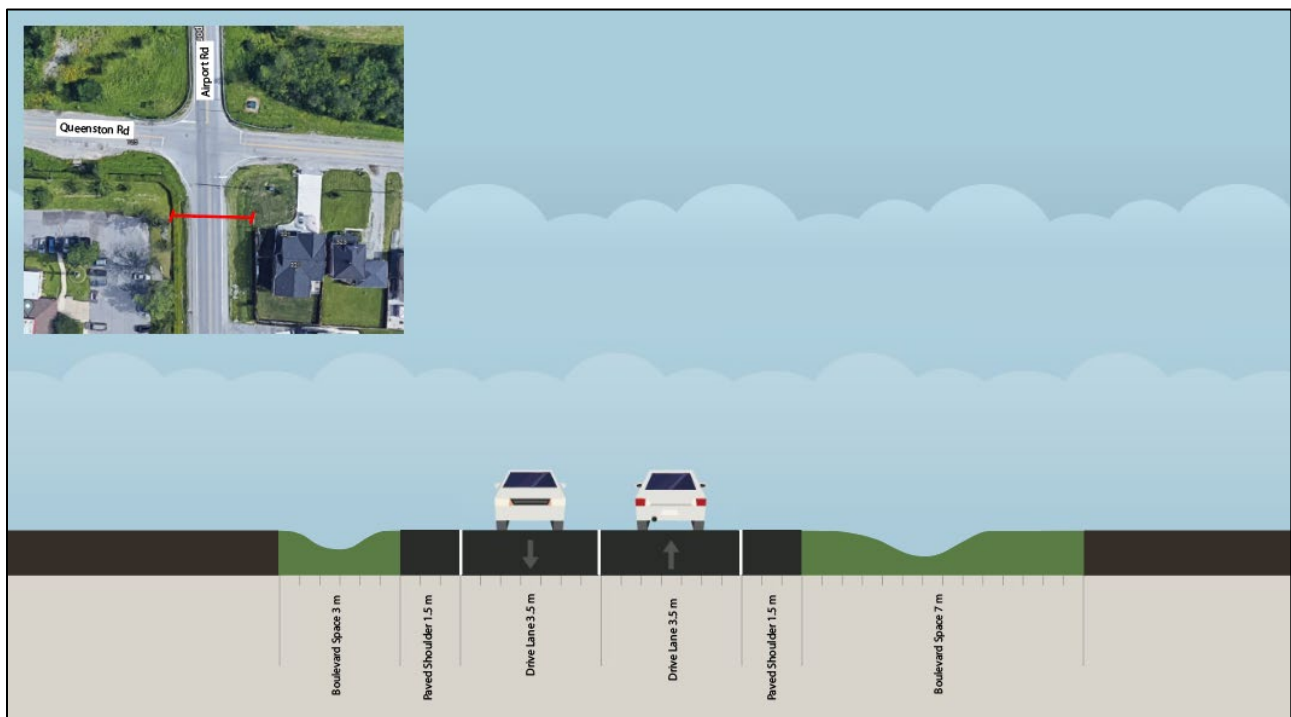
## 5.4 AIRPORT ROAD

**Figure 5-4** illustrates the typical existing cross-section of Airport Road. In general, Airport Road in the study area include the following cross-section elements:

- ▶ 2 travel lanes (1 in each direction)
- ▶ Paved shoulders on both sides of the roadway
- ▶ Large boulevard space between the roadway and property lines.

The ROW width for Airport Road currently ranges between 20 m and 24 m. The lack of pedestrian facilities and narrow paved shoulders create unsafe conditions for active transportation users. To accommodate future residential uses along Airport Road, the roadway would benefit from an enhanced pedestrian realm including landscaped boulevard space. The provision of sidewalks on both sides of the roadway and buffered or protected cycle tracks would improve the safety of active transportation users and encourage travel by other alternative modes to the automobile.

**Figure 5-4: Existing Airport Road Cross-Section**



Note: (1) – widths estimated based on Google Street view and Niagara Region Navigator web application

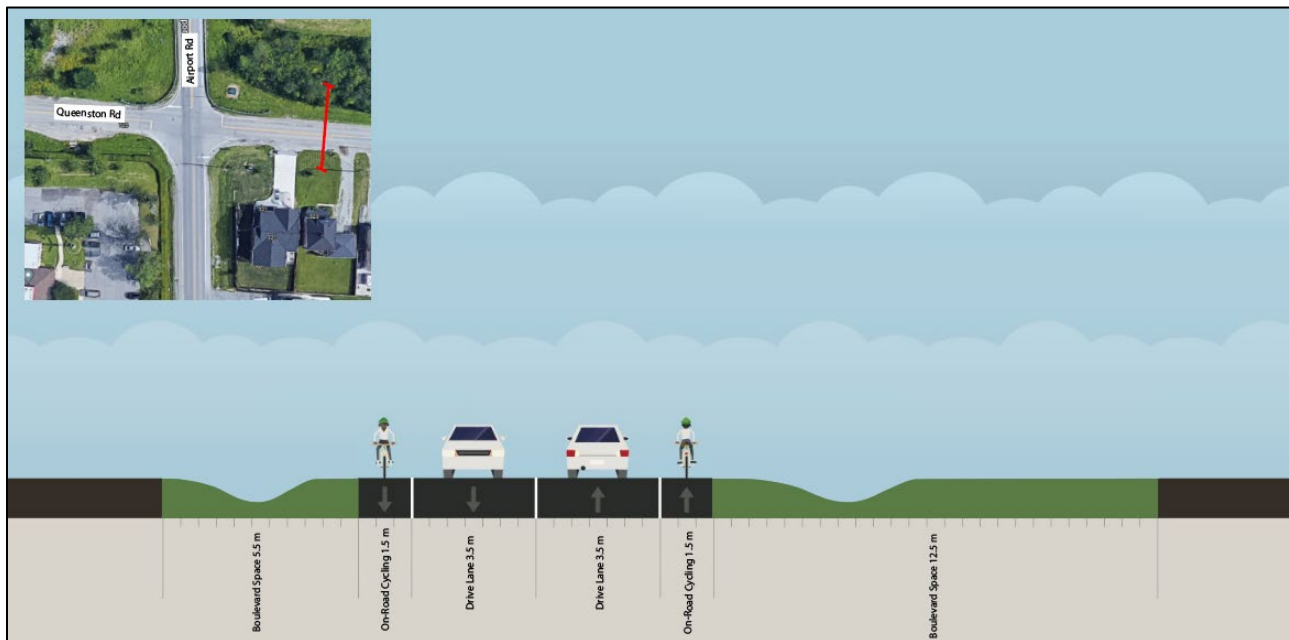
## 5.5 QUEENSTON ROAD

**Figure 5-5** illustrates the typical existing cross-section of Queenston Road. In general, Queenston Road in the study area include the following cross-section elements:

- ▶ 2 travel lanes (1 in each direction)
- ▶ On-road bike lanes on both sides of the roadway
- ▶ Large boulevard space between the roadway and property lines.

The ROW width for Queenston Road currently ranges between 22 m and 28 m. The lack of pedestrian facilities and narrow cycling lanes create unsafe conditions for active transportation users. To accommodate future residential uses along Queenston Road, the roadway would benefit from an enhanced pedestrian realm including landscaped boulevard space. The provision of sidewalks on both sides of the roadway and buffered or protected cycle tracks would improve the safety of active transportation users and encourage travel by other alternative modes to the automobile.

**Figure 5-5: Existing Queenston Road Cross-Section**



Note: (1) – widths estimated based on Google Street view and Niagara Region Navigator web application

## 5.6 TOWNLINE ROAD/CONCESSION 7 ROAD

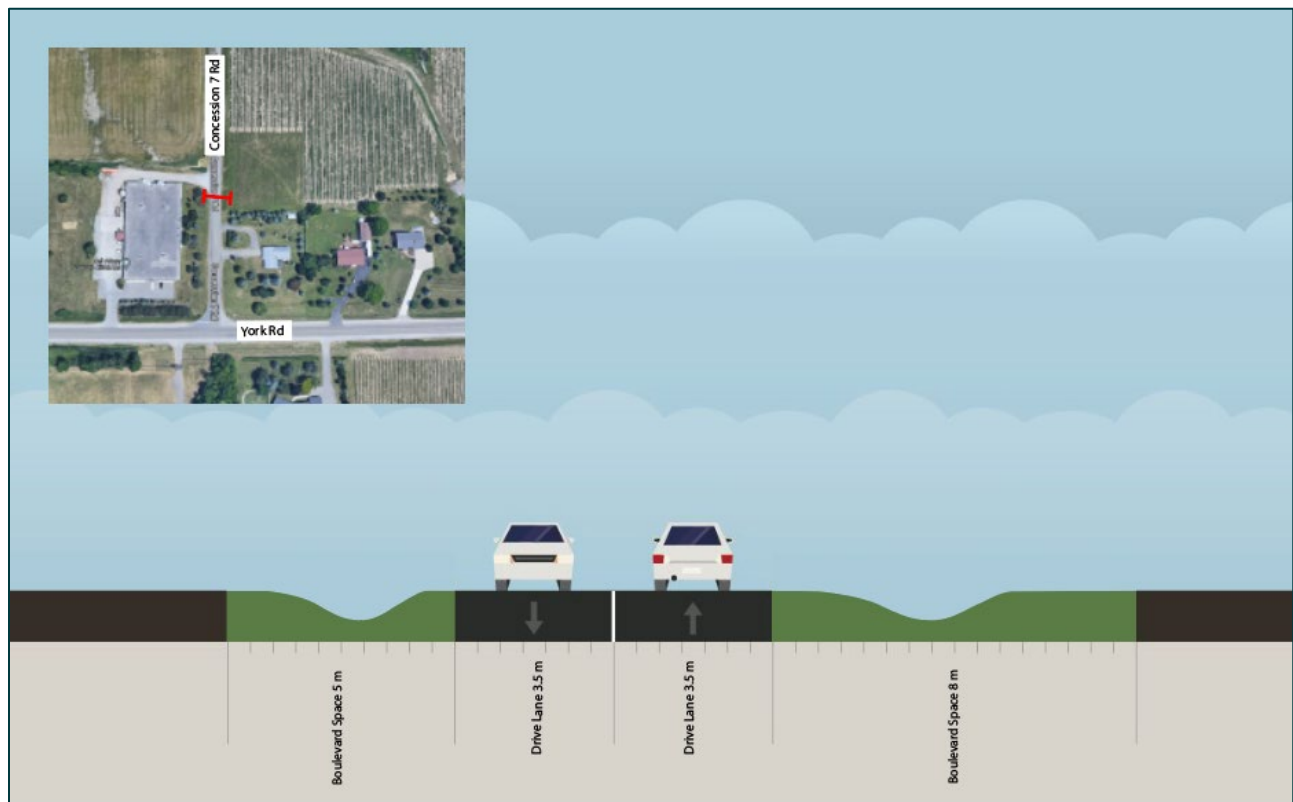
**Figure 5-6** illustrates the typical existing cross-section of the local roads, Townline Road and Concession 7 Road. In general, both roadways in the study area include the following cross-section elements:

- ▶ 2 travel lanes (1 in each direction)
- ▶ Large boulevard space between the roadway and property lines.

The ROW width for Townline Road and Concession 7 Road is currently 20 m. No buffers are provided between the roadway and the boulevard space. Furthermore, the lack of pedestrian and cycling facilities create unsafe conditions for active transportation users. Given low traffic volumes along local streets, Concession 7 Road should be redesigned to include sidewalks on one or both sides of the street. Cycling facilities (i.e., painted bike lanes or signed bicycle routes) and pedestrian-scale lighting should be considered to improve the pedestrian realm and support future residential uses along Concession 7 Road.

As per the demonstration plan in Glendale District Plan, Townline Road will serve the main employment area north of the QEW. The roadway should be redesigned with lane widths appropriately sized for large trucks to support higher volumes of heavy vehicles. Furthermore, the provision of sidewalks on both sides of the roadway and buffered or protected cycle tracks would improve the safety of active transportation users and encourage travel by other alternative modes to the automobile.

**Figure 5-6: Existing Townline Road/Concession 7 Road Cross-Section**



Note: (1) – widths estimated based on Google Street view and Niagara Region Navigator web application

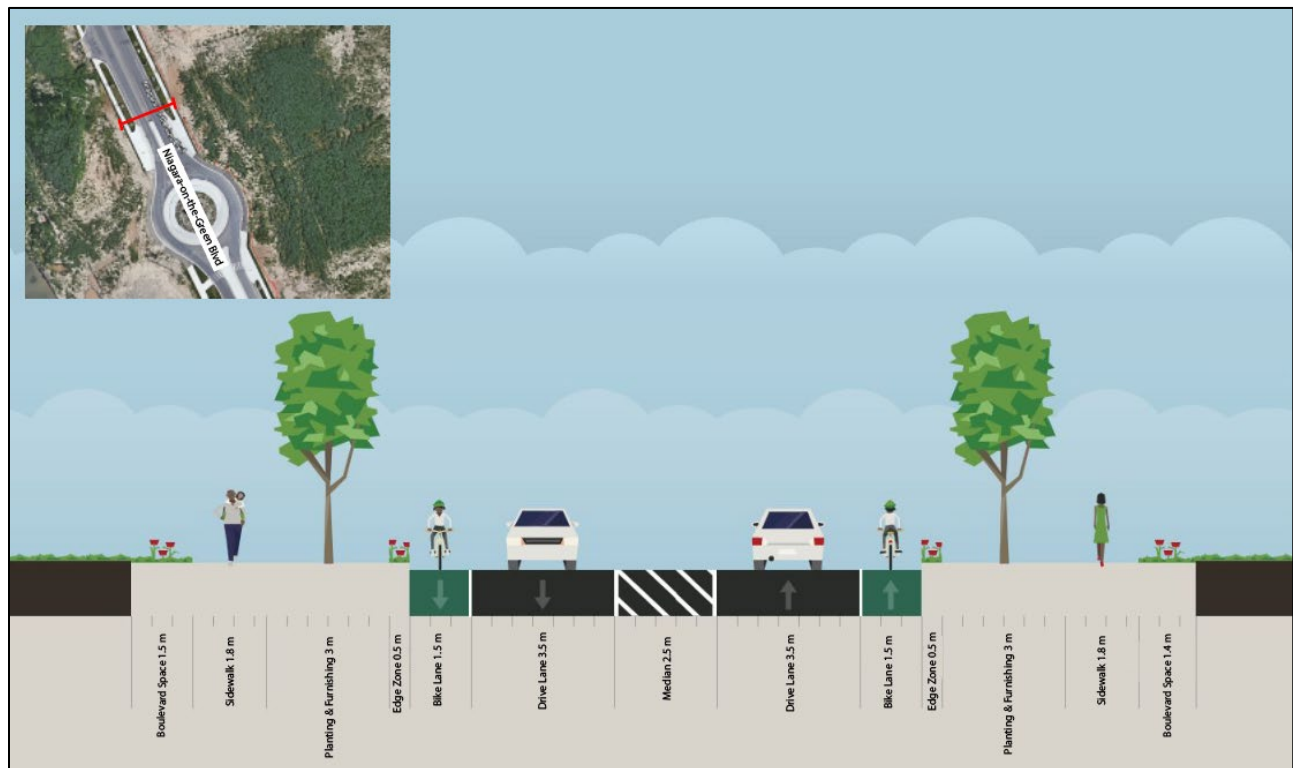
## 5.7 NIAGARA-ON-THE-GREEN BOULEVARD

**Figure 5-7** illustrates the typical existing cross-section of Niagara-on-the-Green Boulevard. In general, Niagara-on-the-Green Boulevard in the study area includes the following cross-section elements:

- ▶ 2 travel lanes (1 in each direction) with auxiliary turn lanes at major intersections
- ▶ Pedestrian sidewalks on both sides of the roadway
- ▶ On-road bike lanes on both sides of the roadway
- ▶ Landscaped buffer space between the roadway and sidewalks

The ROW width for Niagara-on-the-Green Boulevard currently ranges between 26 m and 30 m. The roadway includes continuous sidewalks on both sides of the road which facilitates pedestrian movement and provides a connection for the residential community south of Glendale Avenue to access major commercial destinations. While 1.5 m bike lanes are provided on both sides of the roadway, the narrow and unprotected cycling facilities create undesirable conditions for cyclists traveling east-west on an arterial road. The provision of buffered or protected cycle tracks along with pedestrian-scale street furniture and planting would enhance the active transportation realm along Niagara-on-the-Green Boulevard.

**Figure 5-7: Existing Niagara-on-the-Green Boulevard Cross-Section**



Note: (1) – widths estimated based on Google Street view and Niagara Region Navigator web application

## 6 CONCLUSION

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 in order to understand the existing transportation context and further assess the feasibility of the proposed recommendations for the area as outlined in the Glendale District Plan.

### PLANNING CONTEXT

The goals and objectives for the Glendale Secondary Plan study are influenced by policy documents at the provincial, regional, and local levels.

#### Relevant Provincial Plans

- ▶ A review has been undertaken of the *Provincial Policy Statement (2020)* and *A Place to Grow – Growth Plan for the Greater Golden Horseshoe (2020)*.
- ▶ From a transportation perspective, these documents encourage 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.

#### Relevant Regional Plans

- ▶ A review has been undertaken of the *Niagara Region Official Plan (2022)*, *Glendale District Plan (2019)*, *Glendale Secondary Plan (2010)*, and *Niagara Region Transportation Master Plan (2017)*.
- ▶ These plans identify the land use and transportation objectives for the region, as well as the Glendale Secondary Plan area specifically. Core objectives include supporting the expansion of public transit improvements and comprehensive active transportation networks in the Region.
- ▶ Within Glendale specifically, the Glendale District Plan provides the land use, planning, and design framework for the Secondary Plan area. The District Plan will inform the anticipated trip generators within the area, with pedestrian trips within Glendale anticipated to be concentrated to the south and west of the QEW, where higher densities, a mixture of uses, and a main street area are planned. With respect to vehicle trips, it is expected that the primary trip generators will comprise the Niagara College Campus, Outlet Mall, and Hospitality District.

#### Relevant Local Plans

- ▶ A review has been undertaken of the *Town of Niagara-on-the-Lake Official Plan (2017)* and *Town of Niagara-on-the-Lake Transportation Master Plan (2022)*.
- ▶ These plans provide the direction for the physical development and transportation strategy for the Town of Niagara-on-the-Lake and, by extension, the Glendale Secondary Plan area.
- ▶ From a land use perspective, key objectives include promoting land use patterns that foster dense development to positively influence economic, environmental, and planning decisions that can be supported by public transit and active transportation.

- ▶ From a transportation perspective, the TMP 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.

## EXISTING TRANSPORTATION CONDITIONS

The existing transportation network has been reviewed, including the road, cyclist, and pedestrian networks.

### *Road Network and Connectivity*

- ▶ The Glendale study area is intersected by the QEW, a provincial highway. There are also five regional roadways and five municipal roadways comprising the arterial, collector, and local road network in the study area.
- ▶ The connectivity index for the Glendale Secondary Plan area was found to be 2.18. Despite the relatively high ratio for the area, it was found that several links abruptly discontinue, resulting in a higher ratio of links to nodes that are not captured by the index.
- ▶ 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, Route 40 and Route 45, 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 also been prepared and approved to integrate local and inter-municipal transit services between St. Catharines, Niagara Falls, and Welland. A multi-modal transit hub is proposed at Glendale Avenue and Taylor Road as part of this initiative, and will help to improve transit connectivity within the Region.

### *Cycling Network and 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 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 and 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 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 and Level of Service*

- ▶ Traffic data was obtained from the 2016 EMME 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.

#### **SAFETY ASSESSMENT**

A safety review was conducted using collision data collected between 2017 and 2021 and provided by Niagara Region. The majority of collisions during this time period were found to occur at intersections (202 collisions) compared to mid-block locations (26 collisions).

- ▶ No collision was classified as a killed or seriously injured (KSI) intersection, with 10% of collisions resulting in non-fatal injuries.
- ▶ Based on the results of the safety assessment, it was found that most collisions occurred under clear conditions and during the weekday off-peak period, and nearly 50% were classified as rear-end collisions. This indicates that most collisions seem to be attributed to driver error or infrastructure issues when there are fewer vehicles on the road.

- ▶ A site visit to the study area was conducted to observe any potential safety concerns that might not be captured by the collision review. It was noted that vehicle speeding on the approach to the Taylor Road and Glendale Avenue intersection, weaving for vehicles heading from the Outlet Collection, and fading pedestrian crossing pavement markings at the Taylor Road and Glendale Avenue intersection present potential safety issues as the area develops.

#### ROADWAY CROSS SECTIONS

- ▶ Cross-sections of existing roadways were created to illustrate the current roadway design elements for all relevant arterial, collector, and local streets.
- ▶ Glendale Avenue, Taylor Road, Niagara-on-the-Green Boulevard, and Queenston Road currently include on-road cycling facilities. However, the narrow and unprotected bike lanes create undesirable conditions for cyclists traveling along the arterial and collector roads. Protected or buffered cycling facilities and pedestrian-scale lighting and planting should be considered as part of future roadway improvements.
- ▶ Townline Road, Concession 7 Road, Homer Road, Airport Road, and Queenston Road lack adequate pedestrian and/or cyclist infrastructure creating unsafe and undesirable conditions for all active transportation users. Sidewalks on both sides of the roadway, buffered/protected bike lanes, and pedestrian-scale lighting and planting should be considered as part of future roadway improvements.



