TYLin

MEMORANDUM

To:	**Municipality of Clarington** **Regional Municipality of Durham**	**From:**	**TYLin**
CC:	**SGL Planning & Design** **David Kriger Consultants Inc.**	**Date:**	**October 25, 2024**

Re: Soper Springs Secondary Plan
Summary of Impact of Updated Land Use Plan on Transportation Analysis

Introduction

TYLin was retained by SGL Planning & Design Inc., on behalf of the Soper Springs Landowners Group, to prepare a transportation analysis for the Soper Springs Secondary Plan. The Transportation Assessment Report was submitted on May 13th, 2024, in accordance with the land use plan dated December 19th, 2023. Comments on the Secondary Plan study, including the Functional Servicing Report (FSR) and Transportation Assessment were received on August 2nd, 2024. Subsequently, the Soper Springs land use plan was revised by SGL, dated October 3rd, 2024.

This memorandum assesses the scale of impact of land use plan changes on vehicular trip generation to determine if additional traffic modelling is required, or if the conclusions of TYLin's report dated May 13th, 2024, remain appropriate. A comparison of vehicular trip generation has been provided for both land use plans dated December 2023 and October 2024, which are appended to this memo for reference.

Trip Generation Comparison

The transportation study applied appropriate land-use codes from the industry-standard ITE Trip Generation Manual 11th edition to determine the appropriate scale of vehicle trips generated in both the morning and afternoon peak periods from each block of the land use plan. **Table 1** presents the applicable codes in association with the proposed land use designation, utilized to assess the revised land use plan, as was conducted in TYLin's 1st submission report.

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Table 1: Associated ITE Land Use Codes for Proposed Land Use Categories

Land Use Category	ITE Land Use Code	Weekday AM Peak Hour Parameters	Weekday PM Peak Hour Parameters
High-Density / Mixed Used Regional Corridor	231 – Mid-rise Residential with ground-floor commercial	Avg rate: 0.20 39% entering 61% exiting	Avg rate: 0.28 44% entering 56% exiting
Medium Density Local Corridor – Mid-Rise (5-6 Storeys)	221 – Multi-family housing mid rise	Avg rate: 0.37 23% entering 77% exiting	Avg rate: 0.39 61% entering 39% exiting
Medium Density Local Corridor Low Rise (2-4 Storeys)	215 – Multi-family housing (assumed townhouses)	Avg rate: 0.48 25% entering 75% exiting	Avg rate: 0.57 59% entering 41% exiting
Low Density – Singles	210 – Single family detached housing	Avg rate: 0.70 25% entering 75% exiting	Avg rate: 0.94 63% entering 37% exiting
Low Density – Townhouses	215 – Single family attached housing (townhouses)	Avg rate: 0.48 25% entering 75% exiting	Avg rate: 0.57 59% entering 41% exiting
Elementary School	520 – Elementary school	Avg rate: 0.74 54% entering 46% exiting	Avg rate: 0.16 46% entering 54% exiting
Neighborhood Centre	821 – Shopping plaza between 40k – 150k sq. ft., w/o supermarket	Avg rate: 1.73 62% entering 38% exiting	Avg rate: 5.19 49% entering 51% exiting

A comparison of the original and the revised land use densities has been summarized in **Table 2.** It was observed that the Low-Density and Medium-Density areas have increased in the revised plan, dated October 2024.

Table 2: Land Use Density Comparison

Land Use Designation	Soper Springs		
	Previous	New	Difference
Low Density	18.48	20.30	10%
Medium Density	6.84	7.41	8%
Medium Density Local Corridor Mid-Rise/Low-Rise	2.88	2.88	0%
High Density/Mixed Use Regional Corridor	0.00	0.00	0%
Neighborhood Center	2.00	2.00	0%

The Soper Springs land use plan was divided into multiple Traffic Assessment Zones (TAZs) for the purposes of traffic trip generation, distribution and assignment, as indicated in the attached land use plan, dated December 2023.

Section 6.3.1 of TYLin's 1st submission Transportation Assessment Report details the site trip calculations for each TAZ, and the same methodology was applied to calculate the new vehicular trips associated with each TAZ under the revised land use plan, dated October 2024. A high-level comparison of the previous and adjusted vehicular trips generated for the Soper Springs land use plan are presented in **Table 3** below.

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Table 3: Comparison of Site Trips Entering and Exiting the Study Area in each Peak Hour per Traffic Assessment Zone

TAZ	Previous Land Use Trip Generation				New Land Use Trip Generation				Difference of Trips (% Change)			
	AM Peak Hour		PM Peak Hour		AM Peak Hour		PM Peak Hour		AM Peak Hour		PM Peak Hour	
	Exiting	Entering	Exiting	Entering	Exiting	Entering	Exiting	Entering	Exiting	Entering	Exiting	Exiting
1	4	2	2	3	3	1	2	3	-1(-25%)	-1(-50%)	0(0%)	0(0%)
2	21	7	14	23	27	9	18	29	6(29%)	2(29%)	4(29%)	6(26%)
3	0	0	0	0	0	0	0	0	0(0%)	0(0%)	0(0%)	0(0%)
4	10	7	18	21	6	5	12	13	-4(-40%)	-2(-29%)	-6(-33%)	-8(-38%)
5	25	8	17	28	25	8	17	28	0(0%)	0(0%)	0(0%)	0(0%)
6	0	0	0	1	0	0	0	1	0(0%)	0(0%)	0(0%)	0(0%)
7	28	9	19	31	28	9	19	31	0(0%)	0(0%)	0(0%)	0(0%)
8	10	3	7	11	28	10	19	29	18(180%)	7(233%)	12(171%)	18(164%)
9	14	5	9	16	14	5	9	16	0(0%)	0(0%)	0(0%)	0(0%)
10	19	6	13	19	18	6	13	18	-1(-5%)	0(0%)	0(0%)	-1(-5%)
11	62	21	41	68	66	22	43	73	4(6%)	1(5%)	2(5%)	5(7%)
12	61	20	39	61	61	20	39	61	0(0%)	0(0%)	0(0%)	0(0%)
13	43	15	28	44	47	16	32	48	4(9%)	1(7%)	4(14%)	4(9%)
14	14	4	10	15	14	4	10	15	0(0%)	0(0%)	0(0%)	0(0%)
15	75	22	40	63	86	26	46	72	11(15%)	4(18%)	6(15%)	9(14%)
16	11	4	7	10	15	5	9	15	4(36%)	1(25%)	2(29%)	5(50%)
17	3	1	2	3	5	2	3	4	2(67%)	1(100%)	1(50%)	1(33%)
Sum	**400**	**134**	**266**	**417**	**443**	**148**	**291**	**456**	**45(11%)**	**16(10%)**	**27(9%)**	**41(9%)**
								AVERAGE:	**10.5 %**		**9 %**	

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Conclusion

The average overall vehicular site trips generated by the revised land use plan increased by 10.5% in the AM peak hour and 9% in the PM peak hour in comparison to the land use plan assessed in the Transportation Assessment Report dated May 13th, 2024.

It is TYLin's opinion that the impact of this minor increase in vehicle trips generated would have a negligible impact on the conclusions of the traffic analysis or the recommendations for future road network improvements in the Soper Springs study area. This assessment considers the conservative approach to the traffic modelling and analysis effort previously conducted and the available vehicular capacity and acceptable level of service across the study area road network under the study's ultimate horizon year.

Accordingly, additional traffic modelling is not deemed to be required and the conclusions of TYLin's 1st submission report dated May 13th, 2024, remain appropriate in relation to the latest land use plan dated October 3rd, 2024.

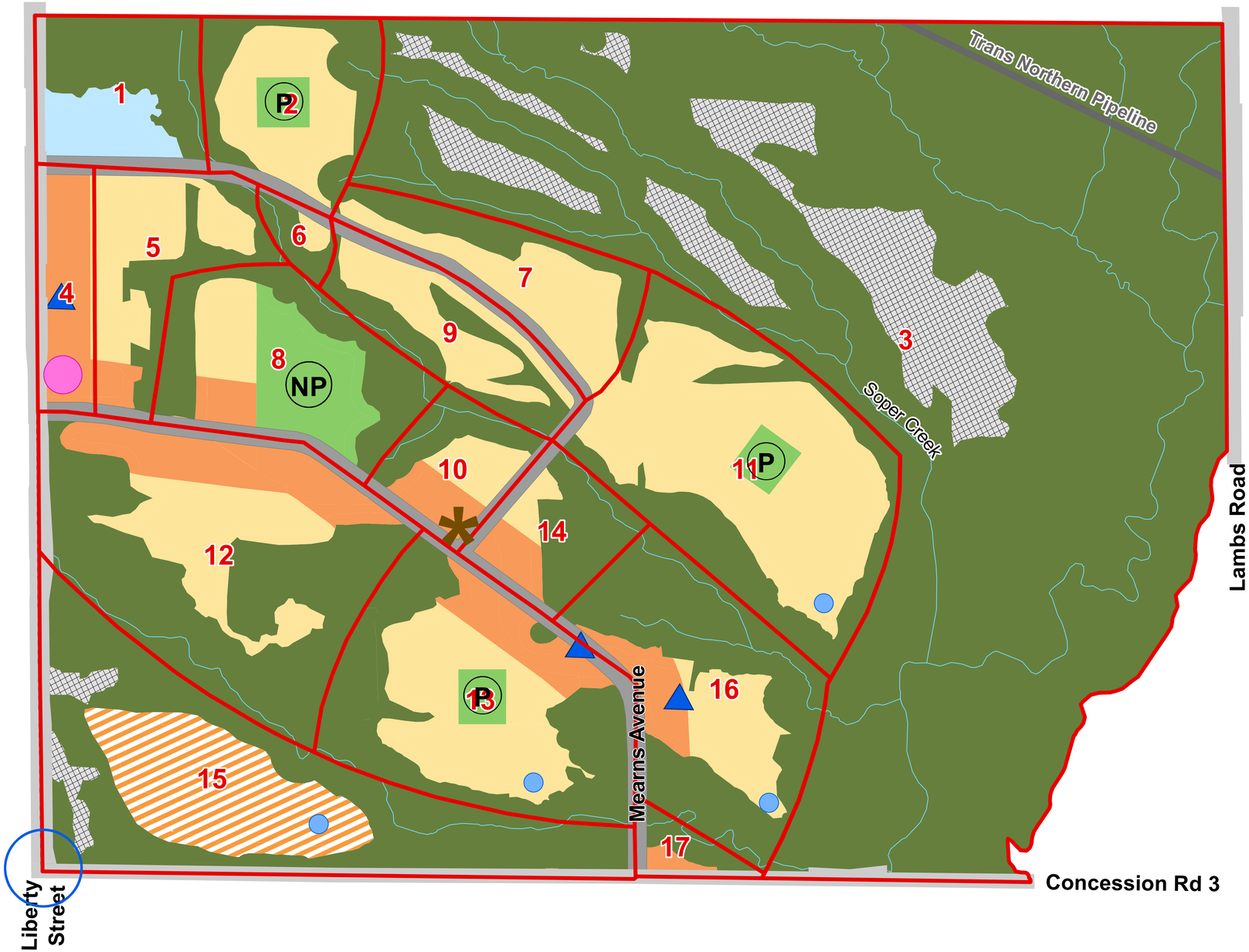
Attachment 1: Soper Springs Land Use Plan dated December 19, 2023

Attachment 2: Soper Springs Land Use Plan dated October 3, 2024

ATTACHMENT 1

Soper Springs Land Use Plan dated December 19, 2023

Original Land Use Plan With TAZs



Legend

- SSSP Boundary
- Medium Density Local Corridor-Mid Rise (5-6 Storeys)
- Medium Density (2-4 Storeys)
- Low Density
- Potential Neighborhood Centre Location
- Utility
- Neighborhood Park
- Parkette
- Stormwater Management Facility (SWF)
- Environmental Protection Areas (EPA)
- Environmental Constraint: Land Use to be Determined
- Watercourse
- Collector Roads
- Potential Cultural Heritage Resources
- Prominent Intersection
- Gateway

N

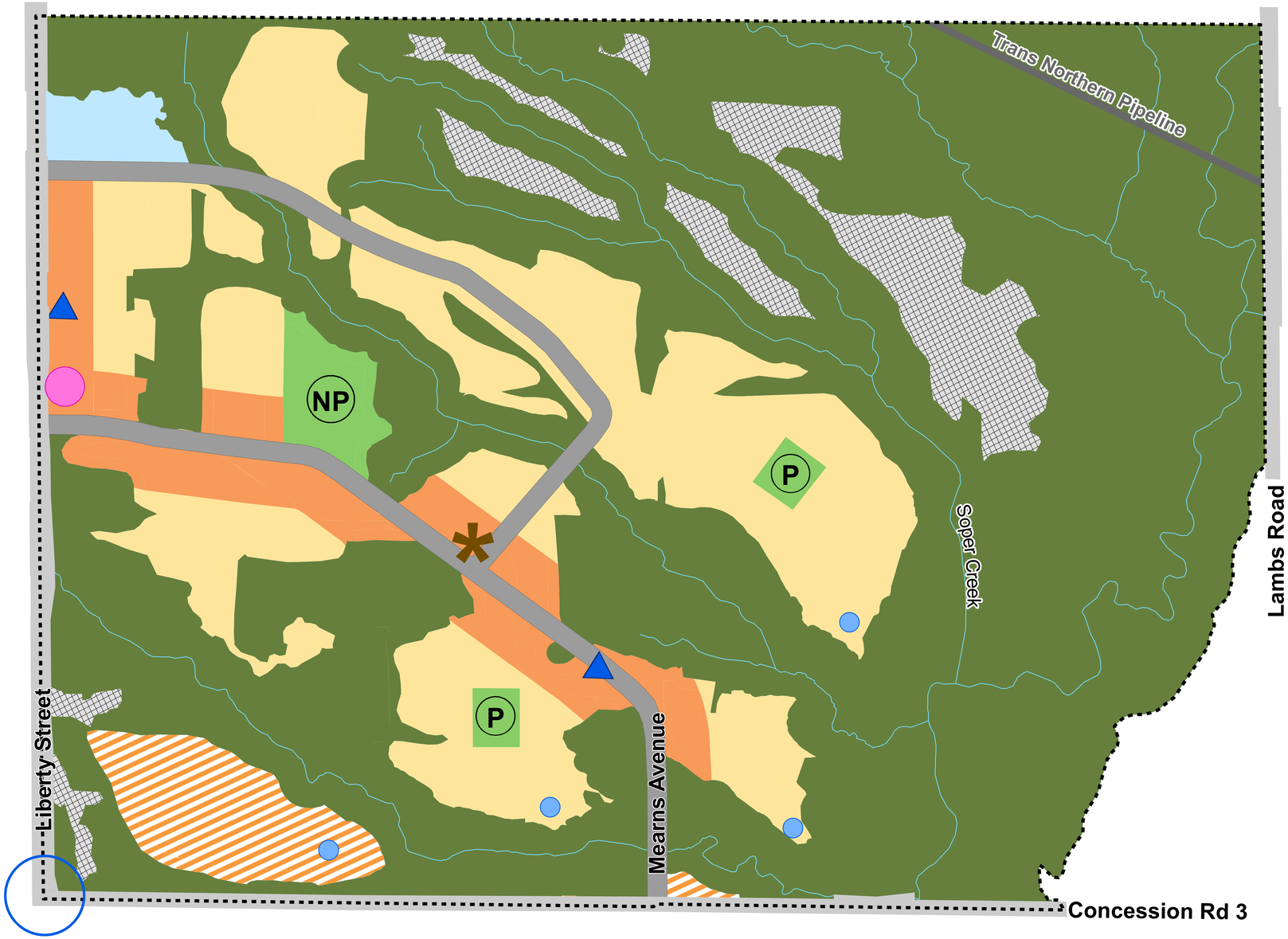
Schedule A - Land Use

- Soper Springs Secondary Plan -

ATTACHMENT 2

Soper Springs Land Use Plan dated October 3, 2024

REVISED PLAN



Legend

- SSSP Boundary
- Medium Density Local Corridor-Mid Rise
- Medium Density
- Low Density
- Potential Neighborhood Centre Location
- Utility
- Neighborhood Park
- Parkette
- Stormwater Management Facility (SWF)
- Environmental Protection Areas (EPA)
- Environmental Constraint: Land Use to be Determined
- Watercourse
- Collector Roads
- Potential Cultural Heritage Resources
- Prominent Intersection
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N

Schedule A - Land Use

- Soper Springs Secondary Plan -



SSSP

Transportation Assessment Report

April 2025 | TYLin Project # 19133
Municipality of Clarington

Clarington | TYLin

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APPENDIX F Future Total Conditions 2033 Synchro Reports

APPENDIX G All-Way-Stop Control Warrant

APPENDIX H Public Consultation

1 INTRODUCTION

The Soper Springs Secondary Plan (SSSP) area is identified as a new development area in the Municipality of Clarington's Official Plan. The SSSP area generally extends from Concession Road 3 north to the Bowmanville Urban Boundary, and from Liberty Street northeast to Lambs Road. The study area is illustrated in **Figure 1-1**.

Figure 1-1: Study Area



While the SSSP area is designated as 'Urban Residential' in the Clarington Official Plan, the type and distribution of land uses through the area have yet to be finalized, and the means by which the planned development will be serviced have not been established.

TYLin was retained by the Municipality of Clarington to prepare a Transportation Assessment Report and Functional Servicing Report for the SSSP area. The two reports have been prepared to demonstrate how the planned SSSP area can be efficiently and sustainably serviced, including transportation, water supply and distribution, wastewater, and stormwater. These reports have been fully integrated with and completed as part of the overall SSSP planning study.

The traffic analysis methodology for this Transportation Assessment Report was developed in

coordination with the Region of Durham and Municipality of Clarington, through the preparation of a Terms of Reference (TOR). The TOR, enclosed in **Appendix A**, summarizes the background growth and network assumptions utilized for both existing and future horizon years, and details the agreed-upon approach to utilize the Durham Region Transportation Planning Model (DRTPM) to assess the macro implications of the proposed growth on the study roadways.

The investigations and analyses completed for the two reports have also been closely coordinated with the separate but parallel Soper Creek Subwatershed Study (SCSWS). The SCSWS examines the entire Soper Creek watershed, including hydrology, hydrogeology, fluvial geomorphology, and aquatic and terrestrial habitat. The overall planning study, SCSWS and other relevant completed and ongoing studies relevant to the SSSP area are described in **Section 2.**

2 BACKGROUND

2.1 Relevant Studies

The SSSP is identified as a new development area in Clarington's Official Plan, and a number of studies have been completed or are underway to support the planning and development of the SSSP. These studies are briefly described in the following sections.

2.1.1 Soper Creek Subwatershed Study (SCSWS)

The overall goal of the SCSWS is development of a management plan that allows sustainable urban growth, while ensuring maximum benefits to the natural and human environments of the corresponding watershed. The subwatershed study is undertaken in three phases as follows:

- Phase 1: Subwatershed Characterization
- Phase 2: Subwatershed Management Strategies
- Phase 3: Implementation and Monitoring Plans

The subwatershed study will satisfy Phases 1 and 2 of the Municipal Class Environmental Assessment process.

Phase 1 of the subwatershed study investigates and inventories the natural resources which could potentially be impacted by future road network and associated urban development. Along with characterization of natural resources this study identified preliminary constraints and opportunities which have been considered in the development of the SSSP. Findings from the Phase 1 study relevant to the SSSP area are summarized in **Section 3**.

2.1.2 Planning Study

A Secondary Plan is a framework for managing new growth and determines where land use designations, such as residential and commercial uses, will be located within the bounds of the Secondary Plan area. It also establishes the general alignments of the major road networks needed to move people and goods within, to and from the area, considering both vehicular and active forms of transportation. Usually, these primary road networks also provide the spine of the water, wastewater and storm drainage systems needed to service the Secondary Plan area.

This Transportation Assessment Report has been prepared in support of the SSSP and has been fully integrated with the planning study underway to establish the land use plan and policies for the SSSP area. The planning study is a four phased process that began in mid-2019 and will ultimately lead to a Secondary Plan, and zoning by-law, for the area. These phases are:

- Phase 1: Public Input and Technical Analyses
- Phase 2: Urban Design and Sustainability Principles, Criteria and Alternative Land Use Plans
- Phase 3: Preferred Land Use Plan
- Phase 4: Final Secondary Plan and Zoning By-Law

This Transportation Assessment Report commenced in Phase 1 of the planning study and has been updated throughout the study. The transportation needs and constraints have been considered in the development and evaluation of alternative land use plans, and the final Transportation Assessment Report presents and justifies the transportation network needed to adequately and efficiently service the preferred land use plan.

2.1.3 Transportation Background Review

Completion of a background review for this Transportation Assessment Report involved the review of studies relevant to the municipal and regional transportation operations. The following studies were reviewed to thoroughly assess the existing and planned transportation network:

- Clarington Transportation Master Plan, December 2016
- Durham Transportation Master Plan, December 2017
- Clarington Official Plan, June 2018
- Smart Mobility 2021 Snapshot, Region of Durham
- SSSP, Phase 2 Draft Summary Report, SGL Planning & Design Inc., December 2022
- Durham Regional DC Background Study and proposed By-law, March 2023

2.1.4 Study Horizon Years

An existing conditions horizon year of 2023 was utilized for this Transportation Assessment Report, following consultation with the Region of Durham's Planning and Economic Development Department. As prescribed in the study Terms of Reference in **Appendix A**, a single future study horizon year of 2033 was selected for the future traffic analysis to align with the Region's 10-year forecast under AM and PM peak conditions. This horizon year assumes a full build-out of the SSSP area, regardless of any delays in actual development timing, to provide the most conservative assessment of the study area road network.

It is noted that the initial Existing Conditions analysis was conducted in 2019 and was subsequently discarded when the study resumed in 2023. This was due to significant changes in the study area's traffic conditions because of the Covid-19 pandemic, rendering historic traffic counts as obsolete. Traffic data was re-collected in 2023 and early 2024 to accurately model the base year conditions and assess the impacts of the proposed future growth on the network.

2.2 Municipal Class Environmental Assessment Process

The planning of major municipal projects or activities is subject to the Ontario Environmental Assessment (EA) Act, R.S.O. 1990, and requires the proponent to complete an Environmental Assessment, including an inventory and description of the existing environment in the area affected by the proposed activity.

The Municipal Class EA process was developed by the Municipal Engineers Association and approved by the Ministry of the Environment, now Ministry of the Environment, Conservation and Parks (MECP), as an alternative method to Individual Environmental Assessments for recurring municipal projects that were similar in nature, usually limited in scale and with predictable ranges of environmental effects which were responsive to mitigating measures. The latest Municipal Class EA document (Municipal Engineers Association, 2023) has been used for this study.

The Municipal Class EA provides for the following designations of projects depending upon potential impacts:

- **Exempt**: Projects are limited in scale, have minimal adverse environmental effects, and include a number of municipal maintenance and operational activities. These projects, which were formerly classified as Schedule A and Schedule A+ projects, are exempt from the requirements of the Environmental Assessment Act.
- **Eligible for Screening to Exempt**: Projects may have the potential for some adverse environmental effects, depending on conditions in the study area. The screening process set out in the Municipal Class EA document can be completed to determine if the project is exempt from the requirements of the Environmental Assessment Act or should proceed as a Schedule B or Schedule C project.
- **Schedule B**: Projects have the potential for some adverse environmental effects. The proponent is required to undertake the first two phases of the assessment process, involving mandatory contact with directly affected public and relevant review agencies, to ensure they are aware of the project and that their concerns are addressed. If there are no outstanding concerns, then the proponent may proceed to implementation.
- **Schedule C**: Projects have the potential for significant environmental effects and must proceed under the full planning and documentation procedures specified in the Municipal Class EA document. Schedule C projects require that an Environmental Study Report be prepared and filed for review by the public and review agencies.

The Municipal Class EA document outlines 5 phases of project planning and implementation. The phases are as follows:

- **Phase 1:** Identify the problem (deficiency) or opportunity.
- **Phase 2:** Identify and evaluate alternative solutions to address the problem or opportunity by taking into consideration the existing environment and establish the preferred solution considering public and review agency input.
- **Phase 3:** Identify and evaluate the design alternatives for implementing the preferred solution by considering the net positive and negative effects of each alternative design concept including mitigation measures.
- **Phase 4:** Prepare the Environmental Study Report (ESR) for review by agencies and the public.
- **Phase 5:** Complete contract drawings and documents and proceed to construction and operation; monitor construction for adherence to environmental provisions and commitments. Where special conditions dictate, also monitor the operation of the completed facility.

The water, wastewater and storm drainage infrastructure needed to service the SSSP area are expected to be classified as Exempt or Schedule B projects, while the major roads proposed in the SSSP area are expected to be classified as Schedule C activities. Schedule B projects must satisfy Phases 1 and 2 before proceeding to construction (Phase 5), while Schedule C projects must satisfy all 4 phases prior to construction. A flow chart describing the Class EA planning and design process is shown in **Figure 2-1**.

This Transportation Assessment Report has been completed as a Master Plan under the Municipal Class EA, generally following Master Plan Modified Approach # 2. It is intended to satisfy Phases 1 & 2 of the Municipal Class EA for the identified Schedule C projects and forms the basis for future studies by others that will satisfy Phases 3 and 4 of the process.

Note that the Transportation Assessment Report is not intended to satisfy the requirements Municipal Class EA for any Schedule B projects related to servicing and transportation in the secondary plan area. Under Ontario Regulation 53/24, Schedule B activities are generally exempt from a Municipal Class EA if the proponent is a private developer. It is expected that such projects will be implemented by private developers and will be implemented following Clarington's approvals process for plans of subdivision and site plans.

2.2.1 Integrated Approach with the Planning Act

There are several points in the Municipal Class EA process where consultation with the public and relevant agencies is required, and the Municipal Class EA document outlines an approach of integrating the Planning and EA processes.

Both the Planning and EA processes may be satisfied at the same time using some of the same

information, studies, and documentation as along as the level of detail and assessment captures the requirements of both processes. The integrated approach can reduce duplication and is best suited for significant geographical areas where interdependent decisions impacting servicing and land use are being made and the range of servicing alternatives needs to be addressed in an integrated manner.

This Transportation Assessment Report has followed the integrated process, where notices and public information centres have satisfied the requirements of both the Municipal Class EA and Planning Act, and the development and evaluation of alternative transportation and functional servicing strategies have been fully with the corresponding alternative land use plans. More information on the stakeholder notifications and consultations can be found in **Section 8**.

2.2.2 Section 16 Orders

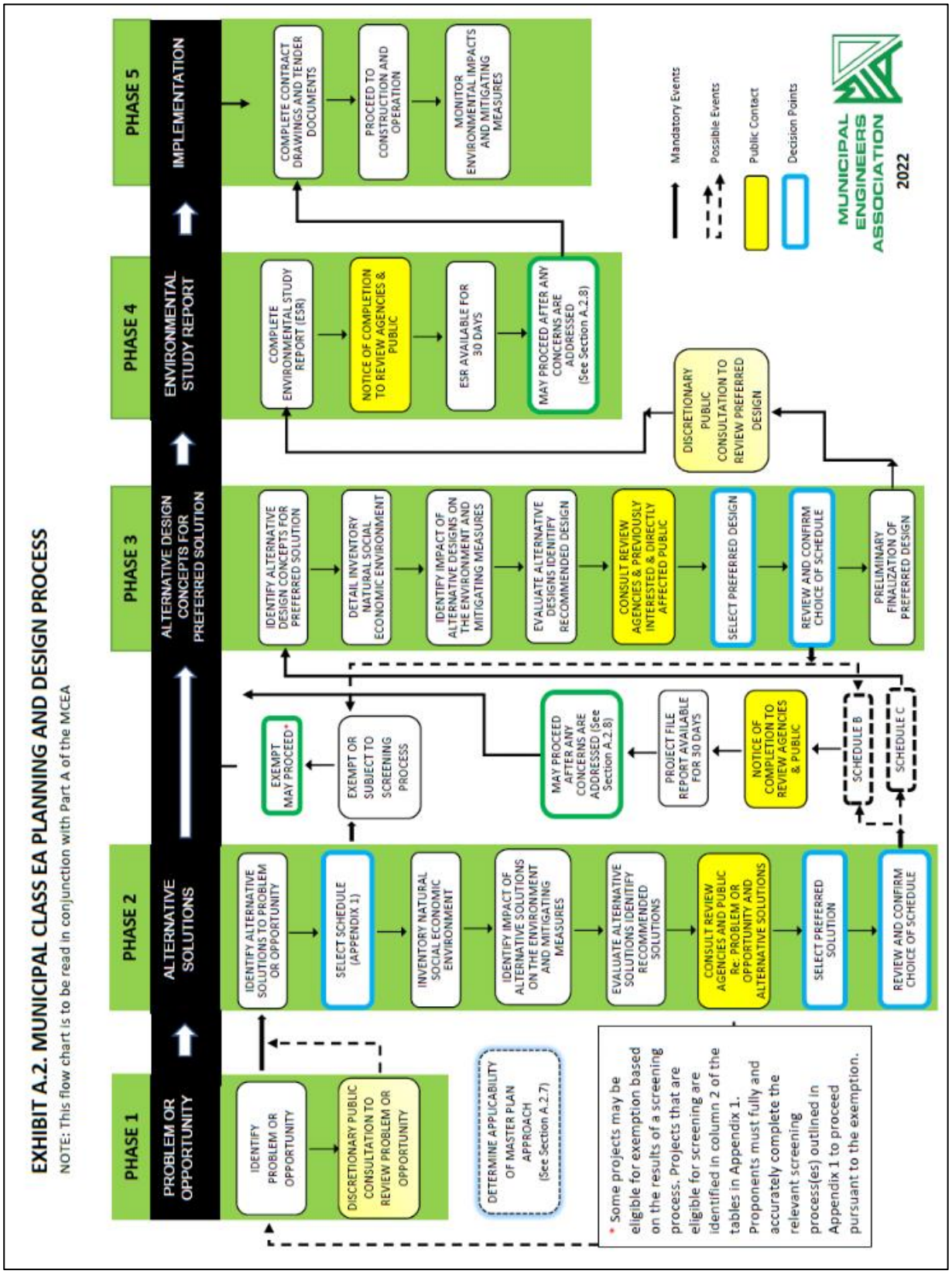
The Class EA process provides an appeal process to change the project status. Under the provisions of the Environmental Assessment Act, there is an opportunity under the Class EA planning process for the Minister to review the status of a project. Members of the public, interest groups and review agencies may request the Minister to require a proponent to comply with Section 16 of the EA Act, before proceeding with a proposed undertaking. This is known as a "Section 16 Order" (formerly called "Bump-Up Request" or 'Part II Order").

Any outstanding concerns are to be directed to the proponent for a response, and in the event there are outstanding concerns regarding potential adverse impacts to constitutionally protected Aboriginal and treaty rights, Section 16 Order requests on those matters may be addressed in writing to the Minister of the Environment, Conservation and Parks and the Director of the Environmental Assessment Branch. The Director will issue a Notice of Proposed Order to the proponent if the Minister is considering an order for the project within 30 days after the conclusion of the comment period on the Notice of Completion. At this time, the Director may request additional information from the proponent. Once the requested information has been received, the Minister will have 30 days within which to make a decision or impose conditions on the project.

The proponent cannot proceed with the project until at least 30 days after the end of the comment period provided for in the Notice of Completion. Further, the proponent may not proceed after this time if:

- A Section 16 Order request has been submitted to the Minister regarding potential adverse impacts to constitutionally protected Aboriginal and treaty rights, or;
- The Director has issued a Notice of Proposed Order regarding the project.

Figure 2-1: Municipal Class EA Planning Flow Chart



2.3 Objectives

The main aim of this study is to establish the preferred road network for the Secondary Plan and evaluate how the expansion and development of the Secondary Plan zone will affect the traffic generated by future growth within the community and along the boundary road network.

The following are some of the key elements within the study:

- Evaluate the existing transportation network including existing traffic conditions (year 2023), existing active transportation and transit infrastructure.
- Develop and evaluate road network alternatives in support of various land use planning alternatives, to inform the Preferred Land Use Plan and transportation network.
- Forecast traffic growth rates for the future horizon year 2033, considering background developments, background growth and future changes to the transportation network. David Kriger Consultants Inc. (DKCI) was retained by TYLin in to undertake the EMME modelling and develop a sub-area model to develop the forecasted growth rate for the future road network.
- Evaluate the impacts of the secondary plan and forecasted traffic growth on future traffic patterns, active transportation, and transit within the study for future horizon year 2033.
- Identify any shortcomings and provide recommendations to handle the future growth. These recommendations include improvements to traffic operations, geometric road design features, active transportation plan, transit plan and transportation demand management.

3 EXISTING CONDITIONS

3.1 Land Use

Land use in the study area is primarily agricultural, with several wooded areas associated with Soper Creek and its tributaries. There are existing residential properties in the study area, with access from Liberty Street, Mearns Avenue and Lambs Road. A telecommunications tower in the south, is located within the study area with access from the north limit of Mearns Avenue. A gas pipeline traverses the north-east corner of the study area.

The lands surrounding the study area are primarily residential and agricultural. Estate residential homes are located off Rebecca Court, Pamela Court and Sydel Court west of Liberty Street, and a newer residential development is located on the south side of Concession Road 3 between Liberty Street and Mearns Avenue. East of Mearns Avenue, the lands south of Concession Road 3 and east of Lambs Road are predominantly agricultural.

The Clarington Official Plan designates the lands in the SSSP area as 'Urban Residential', with significant portions of the study area associated with Soper Creek and its tributaries designated as Environmental Protection Area. A Community Park is also indicated on the Official Plan, located at the north-east corner of Liberty Street and Concession Road 3. The Clarington Official Plan designates Liberty Street, Concession Road 3 and Lambs Road as Type 'B' arterials. It also shows Mearns Avenue extended north and then west to intersect with Liberty Street as a new Type C arterial, and a new east-west Type C arterial road at the north limit of the study area, connecting Bowmanville Avenue to Lambs Road.

The Durham Region Official Plan designates Liberty Street, Concession Road 3 and Lambs Road as Type 'B Arterials. Like the Clarington Official Plan, the Durham Official Plan shows the extension of Mearns Avenue northward into the study and then westward to connect to Liberty Street as a future Type C arterial, and a future Type C arterial road across the north limit of the study area from Bowmanville Avenue to Lambs Road. The road designations are further discussed in **Section 3.7**.

3.2 Archaeology and Cultural Heritage

3.2.1 Archaeology

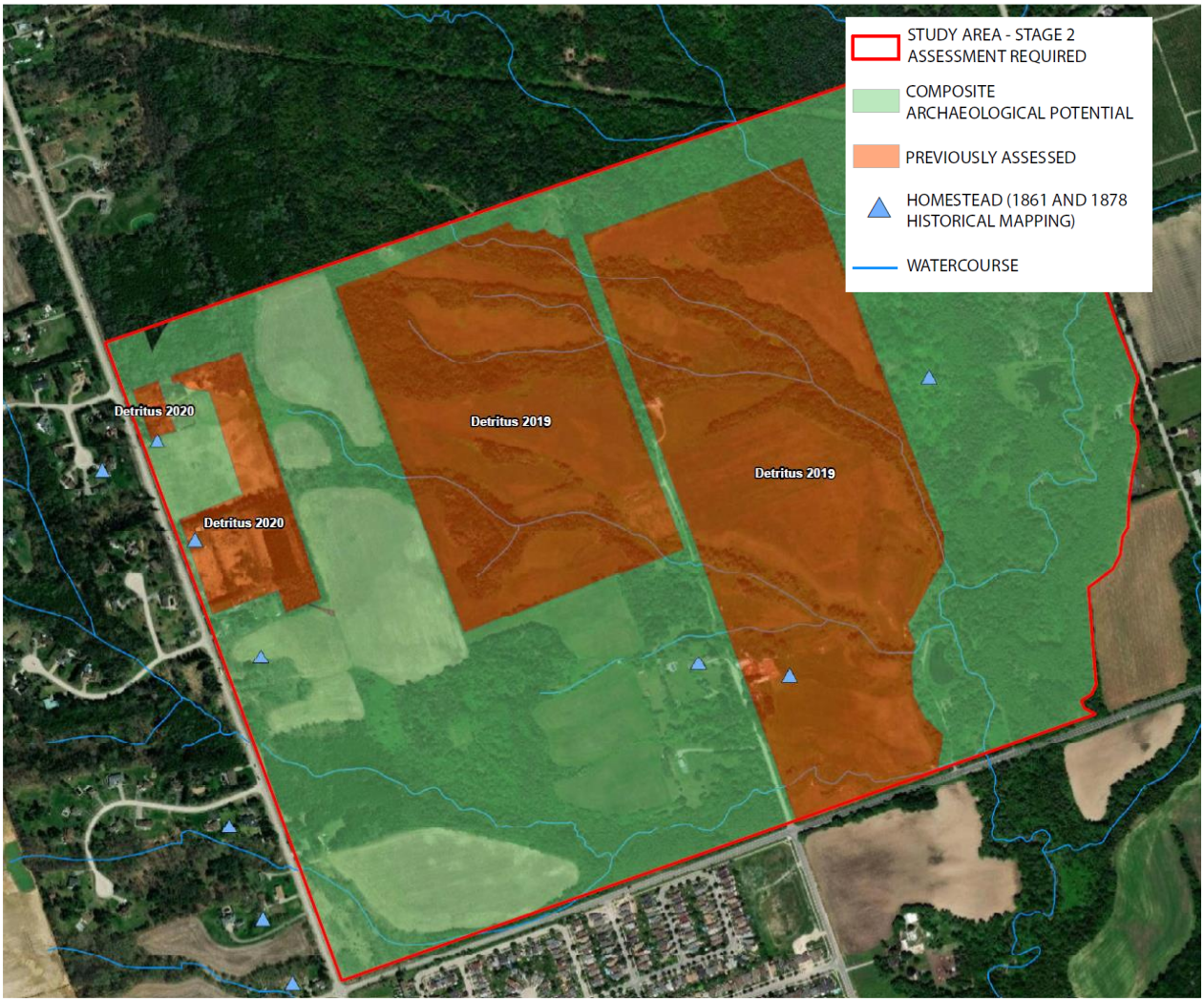
A Stage 1 Archaeological Assessment (AA) was completed for the SSSP study area (ASI, 2020). The background review determined that approximately 38% of the study area is covered by previous Stage 1 and Stage 2 AAs, and the study concluded that almost all of the remaining areas have

potential for Indigenous and/or Euro-Canadian archaeological resources.

Previous archaeological assessments have identified an Early Woodland registered site and 3 Euro-Canadian registered sites within the study area, and 5 additional registered sites within 1 km of the study area. Of the four registered sites within the study area, 2 have been deemed free of further archaeological concern, while Stage 3 investigations have been initiated for the remaining 2 sites.

The Stage 1 AA recommends that Stage 2 AAs be completed prior to development of any of the remaining lands not covered by the previous assessments. **Figure 3-1** illustrates the previously assess areas and areas requiring further Stage 2 assessments within the SSSP area.

Figure 3-1: Composite Archaeological Potential



Source: ASI, 2020

3.3 Topography and Drainage

The study area is located within Soper Main subwatershed of Soper Creek Watershed. Land surface topography of the study area varies from 125 m to 150 m above sea level (masl) and generally slopes from north to southeast.

The main branch of Soper Creek is located within and near the east edge of the SSSP area, generally flowing in a north to south direction. Within the study area, several tributaries flow in a south-easterly direction and join the main branch of Soper Creek. These tributaries convey drainage from the study area as well as external areas to the north and west of the study area.

3.4 Soils and Groundwater

Soil and groundwater conditions through the study area are documented in the Soper Creek Subwatershed Study – Phase 1 Report (Aquafor Beech Limited, 2023). The relevant information is summarized in the following sections.

3.4.1 Surficial Geology

The study area is located within Iroquois Shore physiographic region and is covered by sandy beach deposits which are remnants of Glacial Lake Iroquois. The surficial geology of the study area mainly consists of Glaciolacustrine Sand and Gravel. There is a band of organic deposit wetlands along the banks of a reach of Soper Creek, on the east of the study area. There is also a patch of older fluvial alluvium on the southeast of the study area.

3.4.2 Hydrogeology

There are four main aquifers in the study area as follows:

Blue Mountain Formation Shale aquifer: The Blue Mountain shales may act as a weak aquifer where the upper surface is weathered and fractured, however there is limited water supply potential in this unit.

Thorncliffe and Scarborough sands and silts: This aquifer is the lower aquifer in the study area, is laterally extensive and generally thick under the study area and appears to be fully confined in the study area. Groundwater flow in the aquifer reflects regional flow patterns emanating from the Oak Ridges Moraine.

Oak Ridges Aquifer Complex: This is the upper aquifer in the study area. While this aquifer is thick to the west, it is not entirely present on the east and is only present in some areas. Water levels reflect this variability and suggest that ORAC discharge can significantly support streamflow. ORAC streamflow reflects longer intermediate scale flow paths from the ORM and would likely

appear as cold-water upwelling.

Surficial Aquifer System: Iroquois Beach Sands: This is the surficial aquifer system in the study area. The surficial sands and gravels of the Iroquois Beach deposits provide a significant but seasonally intermittent groundwater resource. The sands likely saturate with spring snowmelt, and locally discharge this water through the remainder of the year.

Within the study area, groundwater flow generally follows the surface topography in a north-west to south-easterly direction. A considerable amount of groundwater from the study area is expected to emerge as groundwater discharge in the main branch of Soper Creek at the east edge of the study area.

3.4.3 Water Budget

A fully distributed hydrologic model was developed for the study area. This model provides estimates of the components of the water budget. The major components of the water budget are shown in **Figure 3-2** through **Figure 3-4**. The maps show the distribution of the key components.

Figure 3-2: Average Annual Actual Evapotranspiration

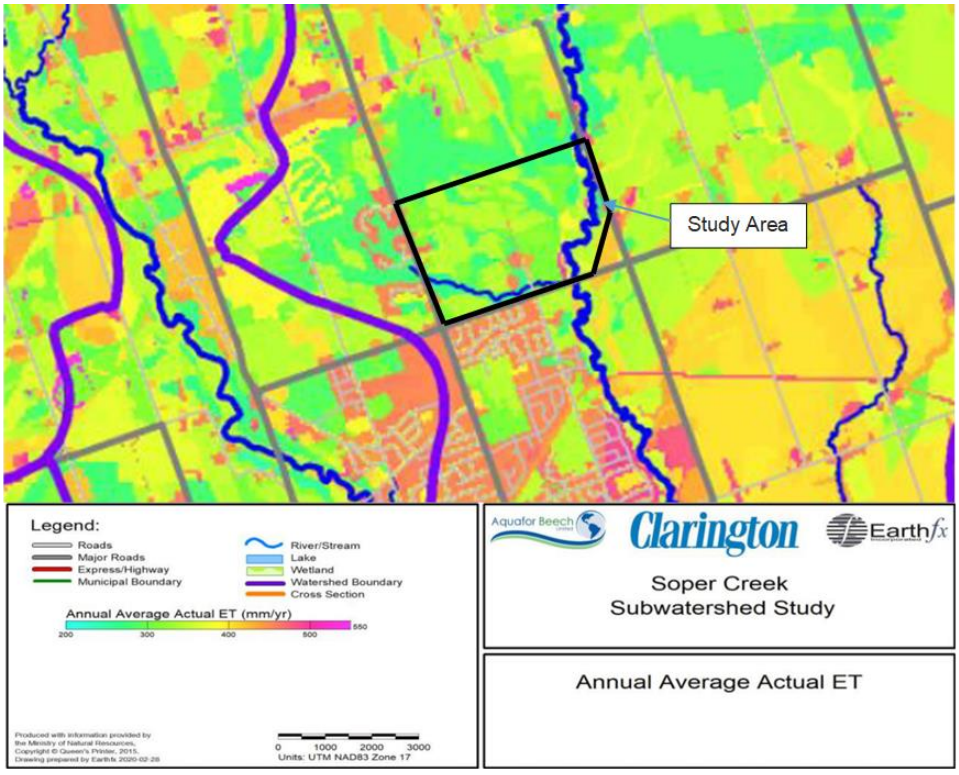


Figure 3-3: Annual Average Runoff

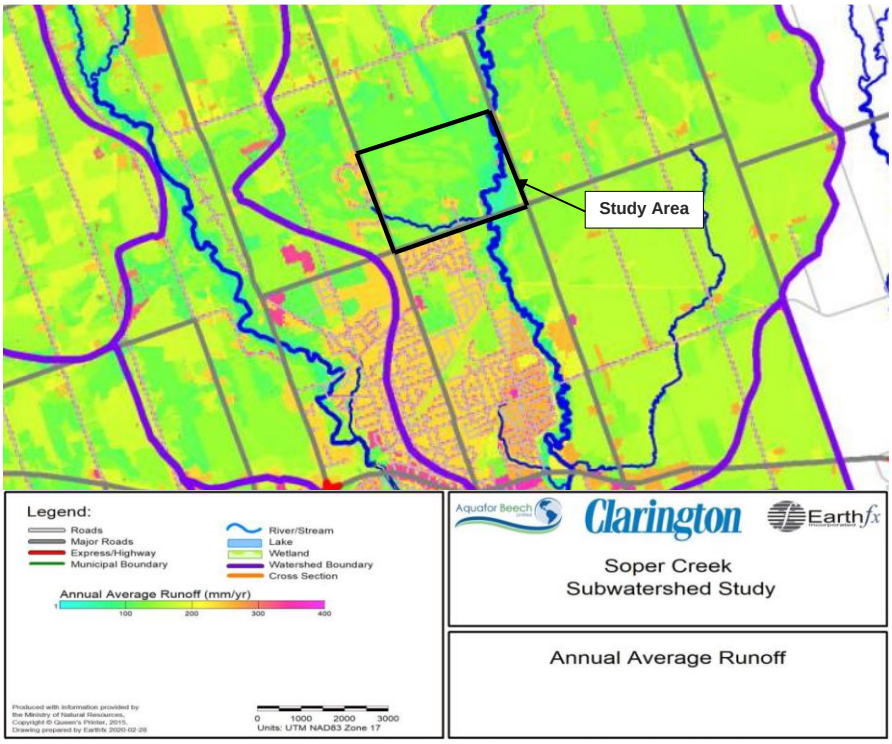
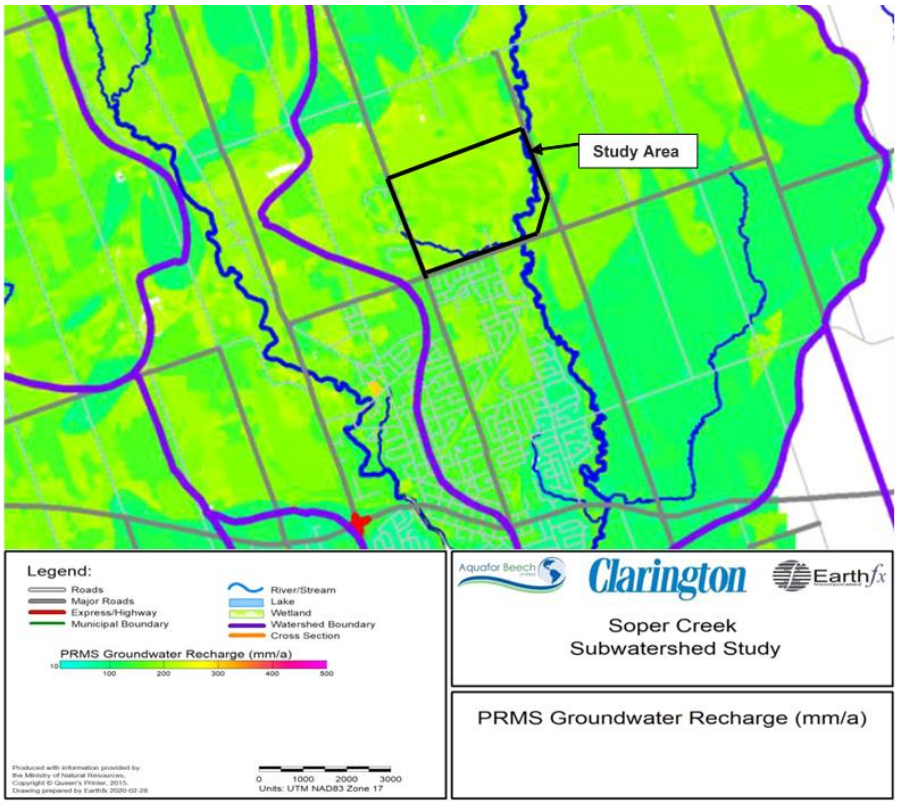


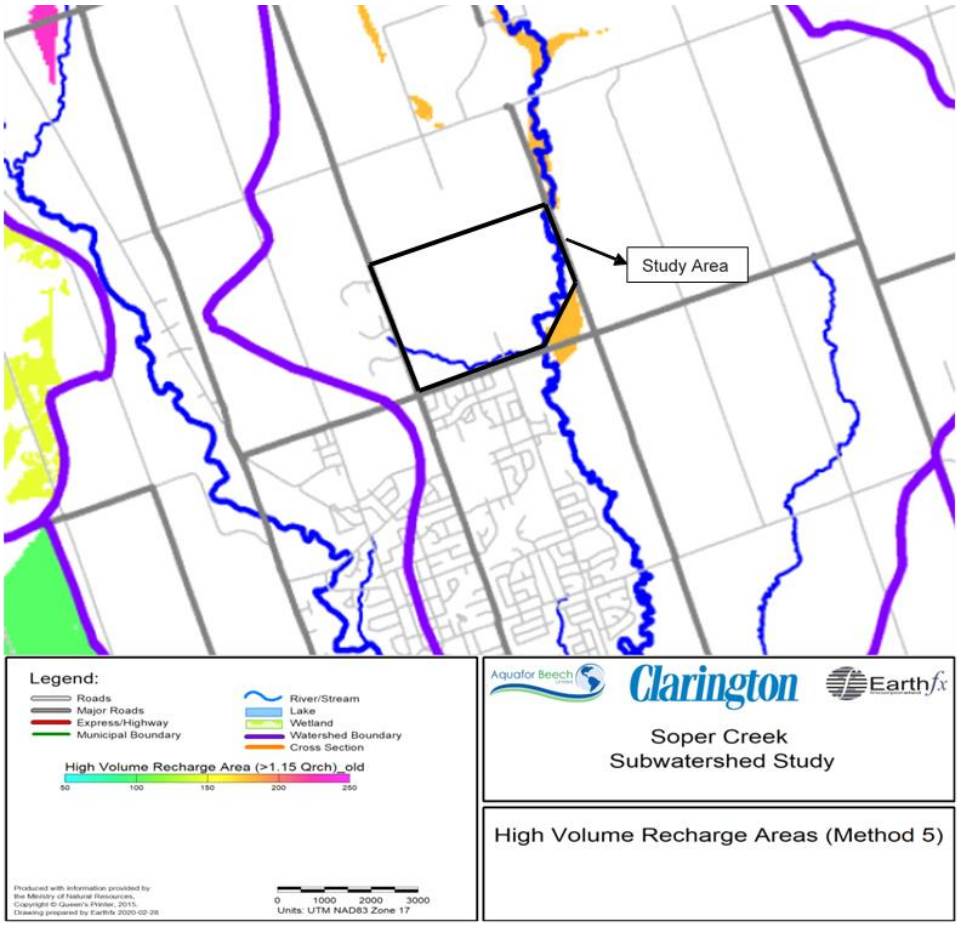
Figure 3-4: Average Annual Groundwater Recharge



3.4.4 High Volume Recharge Areas

The SCSWS included an assessment of high-volume recharge areas in the watershed. Consistent with the approach used for the Source Water Protection Plan, high volume recharge areas are defined as areas where the local recharge estimates exceed 1.15 times the average recharge over the sub-watershed. **Figure 3-5** shows that there are no high-volume recharge areas in the SSSP area, although a high-volume recharge area was identified immediately adjacent the SSSP, between the main branch of Soper Creek and Lambs Road.

Figure 3-5: High Volume Recharge Areas



3.5 Surface Water

The surface drainage systems through the study area are characterized in the Soper Creek Subwatershed Study – Phase 1 Report (Aquafor Beech Limited, 2023). The following sub-sections summarize the findings from the SCSWS related to surface water resources in the SSSP study area. This includes flood and erosion hazard considerations for the streams as well as restoration opportunities.

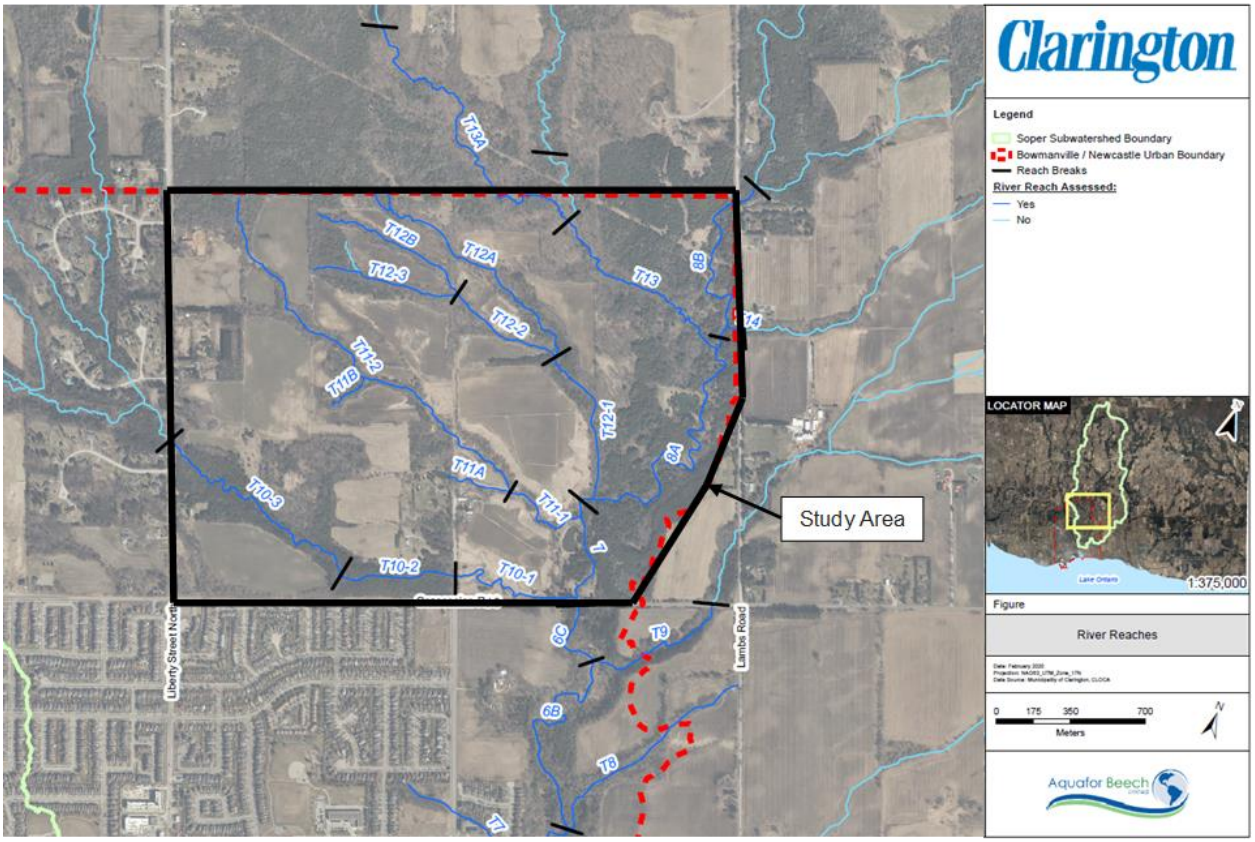
3.5.1 Fluvial Geomorphological Assessment

The fluvial geomorphological investigations completed for the SCSWS included desktop analyses to define stream reaches, followed by field investigations to characterize creek morphology and sediments. These included Rapid Geomorphic Assessments, measurements of channel dimensions and the identification and characterization of erosion sites. The different reaches through the study area are illustrated in **Figure 3-6**.

3.5.1.1 Rapid Geomorphic Assessments

A Rapid Geomorphic Assessments (RGA) is a standardized method to help determine if a watercourse is stable or in adjustment (i.e., eroding or filling with sediment). RGA's were completed the main branch of Soper Creek (Reaches 7 and 8) as well as Tributaries 10 and 13 within the study area. All of the assessed reaches in the study area were classified as being transitional with the dominant adjustment processes being aggradation for the main branch and Tributary 13 and widening for Tributary 10.

Figure 3-6: Geomorphic Assessed Reaches in the Study Area



3.5.1.2 Erosion Sites

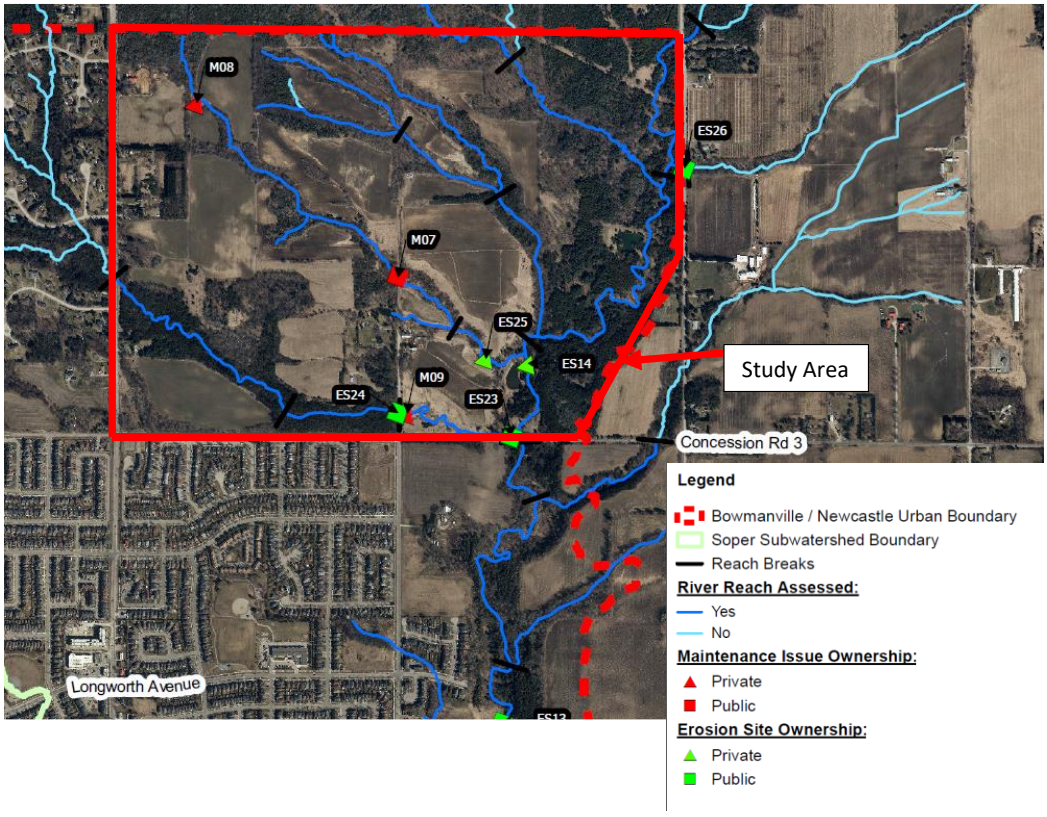
The fluvial geomorphology field investigations identified erosion sites through the study area. These are locations where erosion is threatening infrastructure or public health and may require mitigation. Four erosion sites were identified in the SSSP area, of which two are considered high priority for mitigation. The locations of the erosion sites are shown on **Table 3-1** and the issues are summarized on **Figure 3-7**.

Table 3-1: Soper Creek Erosion Sites

Erosion Site	Channel Reach	Property Ownership	Description of Issue
ES14	7	Private	Grade control structure is causing potential fish passage barrier.
ES23 *	T10-1	Public	Bank erosion is posing risk to guardrail and road
ES24 *	T10-2	Public	Road embankment is failing, culvert inlet is outflanked.
ES25	T11-1	Private	Channel is confined to small culvert

** Priority Erosion Site*

Figure 3-7: Erosion Sites and Maintenance Issues



3.5.1.3 Erosion Hazard Assessment

The erosion hazard limit is established through a combination of a meander belt assessment and a geotechnical slope stability assessment, where warranted.

Meander Belt Assessment: For the SCSWS, meander belt widths were estimated using Procedure 3 from the TRCA Belt Width Delineation Protocol (2004), including a 20% factor of safety to account for future erosion. The results of the meander belt delineation are summarized in **Table 3-2** and illustrated in **Figure 3-8**.

Table 3-2: Meander Belt Delineation

Channel Reach	Preliminary Belt Width (m)	Bankfull Width (m)	Existing Belt Width (m)	Final Belt Width (m)	Slope Hazard Present
7	51	11	113	136	Yes
8A	50	9	109	131	Yes
8B	50	9	109	131	No
T10-1	30	4	64	77	Yes
T10-2	25	4	54	65	Yes
T10-3	20	4	44	53	Yes
T11-1	15	2	32	38	Yes
T11-2	15	2	32	38	No
T11A	-	-	-	30	Yes
T11B	-	-	-	30	No
T12-1	17.5	2	37	44	Yes
T12-2	15	2	32	38	No
T12-3	-	2	-	30	No
T12A	15	2	32	38	No
T12B	-	-	-	30	No
T13-1	17.5	4	39	47	Yes
T13-2	17.5	4	39	47	No

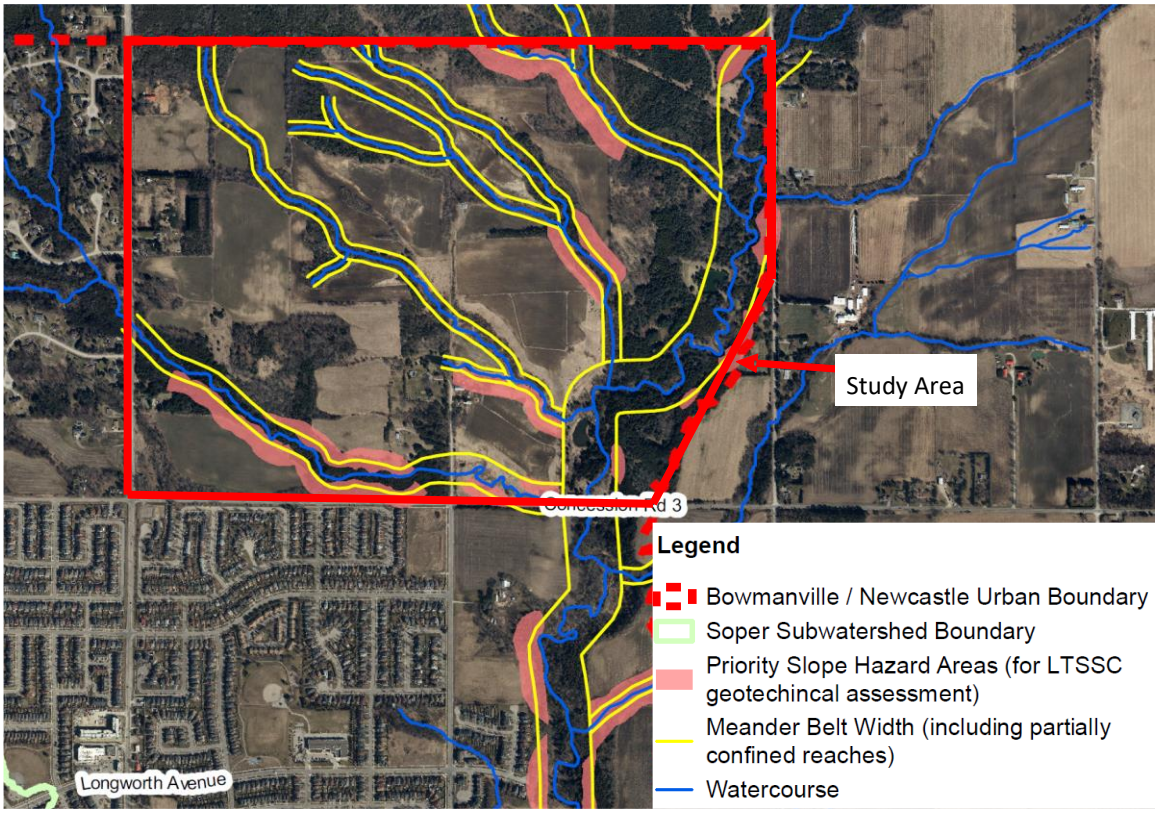
Bankfull width was estimated from aerial imagery
Includes erosion allowance of existing belt width x 1.20.

Erosion Hazard Long-Term Stable Slope Allowance: While the erosion hazards for unconfined systems can be defined based solely on meander belt delineation or similar techniques, confined systems require greater effort to include geotechnical assessments of the valley walls to establish the erosion hazards. The SCSWS did not carry out the detailed geotechnical investigations, but

identified priority stable slope hazard areas where detailed assessments will be required to delineate the final erosion hazard limit as part of future development applications. These are defined by reaches where the channel is within 15 m of the toe of the valley slope for embankments with slopes steeper than 15% and heights greater than 3 metres (MNR, 2002).

The areas where detailed slope stability assessments will be required to establish the erosion hazard limit are illustrated in **Figure 3-8**.

Figure 3-8: Erosion Hazards



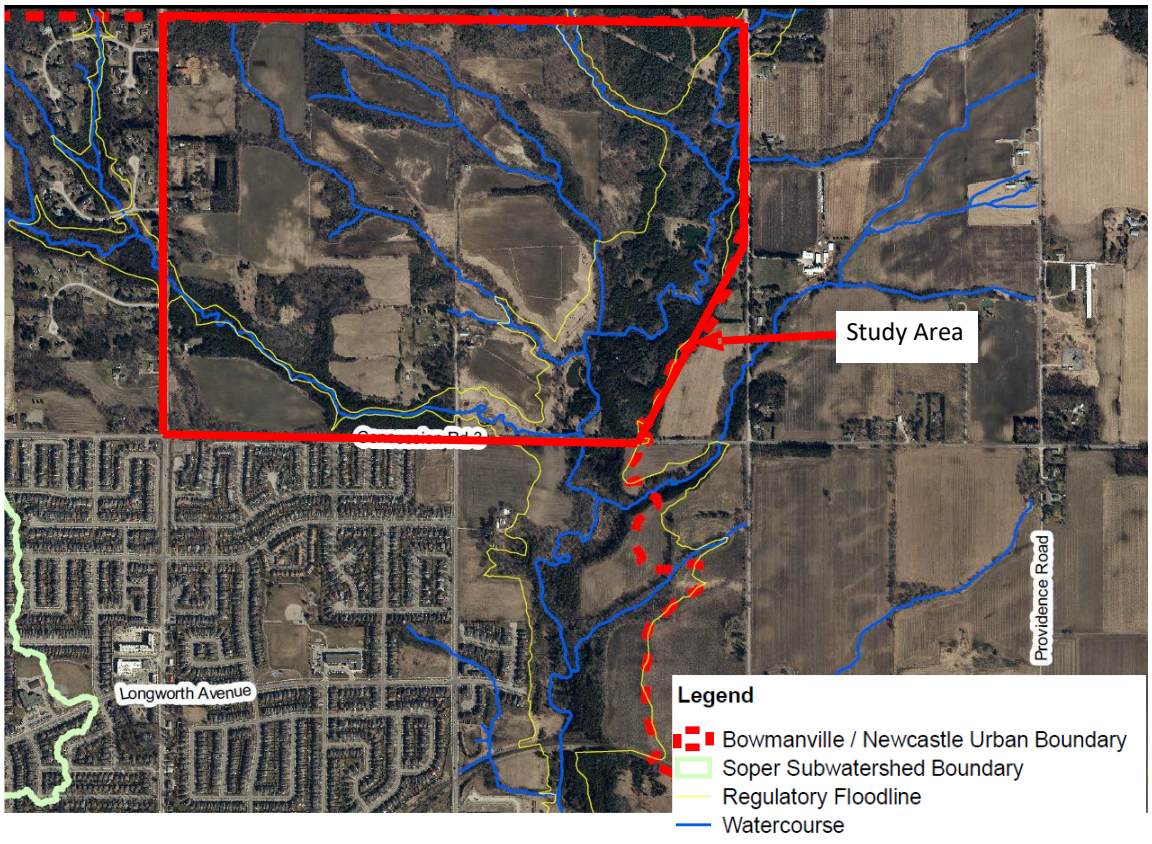
3.5.2 Hydrology, Hydraulics and Flood Plain Mapping

CLOCA maintains hydrologic and hydraulic modelling for the Soper Creek subwatershed, and this modelling was relied upon for the SCSWS existing conditions analyses. The hydrologic modelling was developed by ABL as part of the Bowmanville Creek and Soper Creek Floodplain Mapping Study in 2009, and subsequently refined by CLOCA in 2011. The existing conditions hydrology model simulated using both the 12-hour Chicago and 24-hour SCS storm distributions to establish the flow rates for the 2-year through 100-year return period storm events and using Hurricane Hazel to establish the Regional storm flow rates. The Regional Storm generally produces higher flows than the 1:100-year storm and is used as the regulatory event by CLOCA.

The 2009 ABL study also prepared hydraulic models and flood plain mapping for the Soper Creek

watershed. The hydraulic models and flood plain mapping were developed in accordance with provincial guidelines, and the topographic mapping information was augmented with field measurements of bankfull channel dimensions and bridge and culvert surveys. The resulting Regulatory flood plain through the study area is illustrated in **Figure 3-9**.

Figure 3-9: Regulatory Flood Plain



3.6 Natural Environment

The natural environment conditions through the study area are documented in the Soper Creek Subwatershed Study – Phase 1 Report (Aquafor Beech Limited, 2023).

The natural environment through the Soper Creek watershed was inventoried through a desktop review of available resources, followed by field investigations on lands where permission to access granted.

Aquatic habitat as assessed using standard habitat mapping techniques, fish and benthic sampling and identification of barriers to fish movement.

Botanical inventories were completed to establish the vegetation through the watershed, which were categorized using the Ecological Land Classification (ELC) system. Breeding bird and

amphibian surveys were completed and augmented with incidental sightings to determine wildlife species present in the study area, and potential salamander habitat was established by identification of vernal pools and egg mass surveys.

A summary of the findings is included in the following sections.

3.6.1 Aquatic Habitat

Detailed field investigations were completed at two sites along the southern tributary of Soper Creek within the study area (Tributary T10 on **Figure 3-6**). The tributary was found to have permanent flow, and the presence of rainbow trout in this tributary confirms that it provides habitat for sensitive cold-water species, despite potential barriers to fish passage at Mearns Avenue and Liberty Street.

3.6.2 Vegetation

Vegetation communities through the study area were inventoried and classified using the ELC system. All the ELC communities are considered common and secure. No significant wetlands were observed in the SSSP area.

Most individual species observed are common and secure, although 35 species were observed in the SCSWS study area that are locally significant, and 17 of those are considered rare in Durham Region.

Finally, a few Butternut trees were observed in the study area. Butternut is an endangered species and protected under Species at Risk (SAR) legislation.

3.6.3 Wildlife

Many bird species were recorded during the breeding bird surveys. Most of these species are provincially common, but seven SAR bird species were recorded during the surveys, and an additional two SAR bird species were observed during other ecological fieldwork.

Very low numbers of amphibians were recorded during the calling surveys, which is not surprising given the lack of extensive wetland areas or ponds in the SSSP area.

Other common insect, mammal and amphibian species were observed or were evident in the study area.

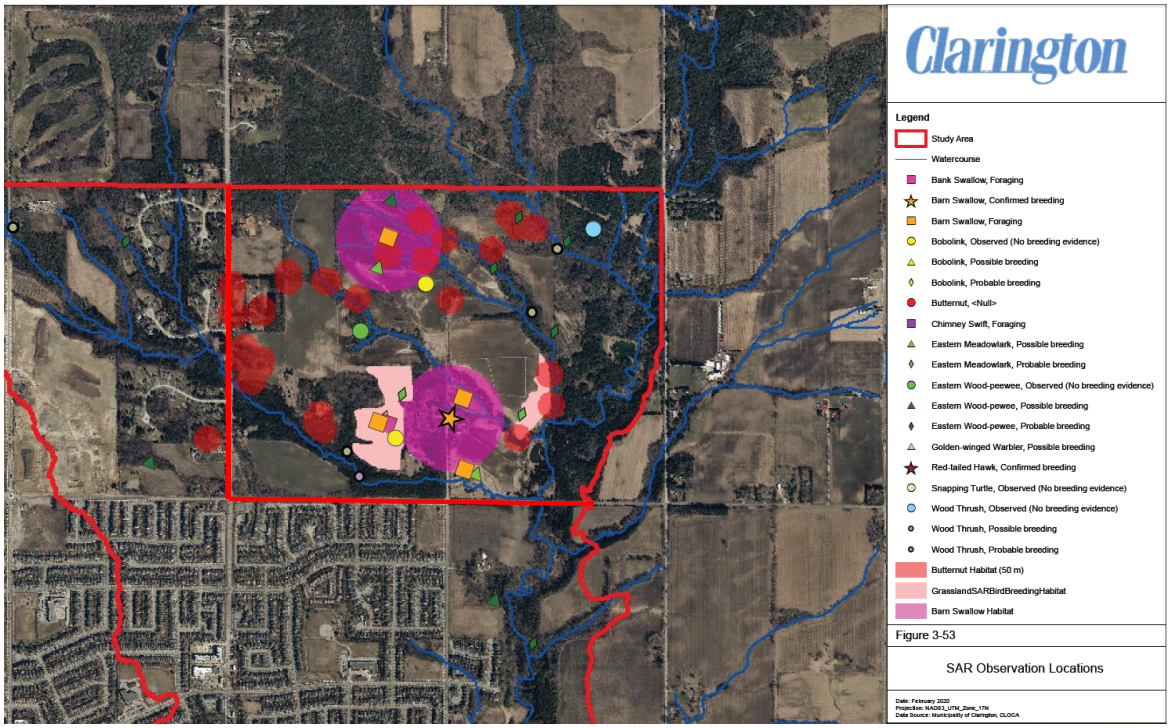
3.6.4 Species at Risk

Several Species at Risk were observed in the SSSP area, as noted in the sections above. The species present or potentially present in the study area are listed in **Table 3-3** and illustrated in **Figure 3-10**.

Table 3-3: Species at Risk

Species	Status
Bank Swallow	Threatened
Barn Swallow	Threatened
Bobolink	Threatened
Eastern Meadowlark	Threatened
Eastern Wood-pewee	Special Concern
Wood Thrush	Special Concern (ESA), Threatened (SARA)
Monarch	Special Concern
Butternut	Endangered

Figure 3-10: SAR Observation Locations



3.6.5 Overall Natural Heritage System

The findings from the background review and field investigations were used to establish the existing Natural Heritage System through the SSSP area. The Natural Heritage System and its components are defined in the Clarington Official Plan, and include natural heritage features, hydrologically sensitive features, and linkages.

The range of features in the study area that meet the criteria for inclusion in the Natural Heritage System are illustrated in **Figure 3-11**. The overall Natural Heritage System, including Vegetation Protection Zones, Linkages and Restoration Opportunities is illustrated in **Figure 3-12**.

Figure 3-11: Natural Heritage Features

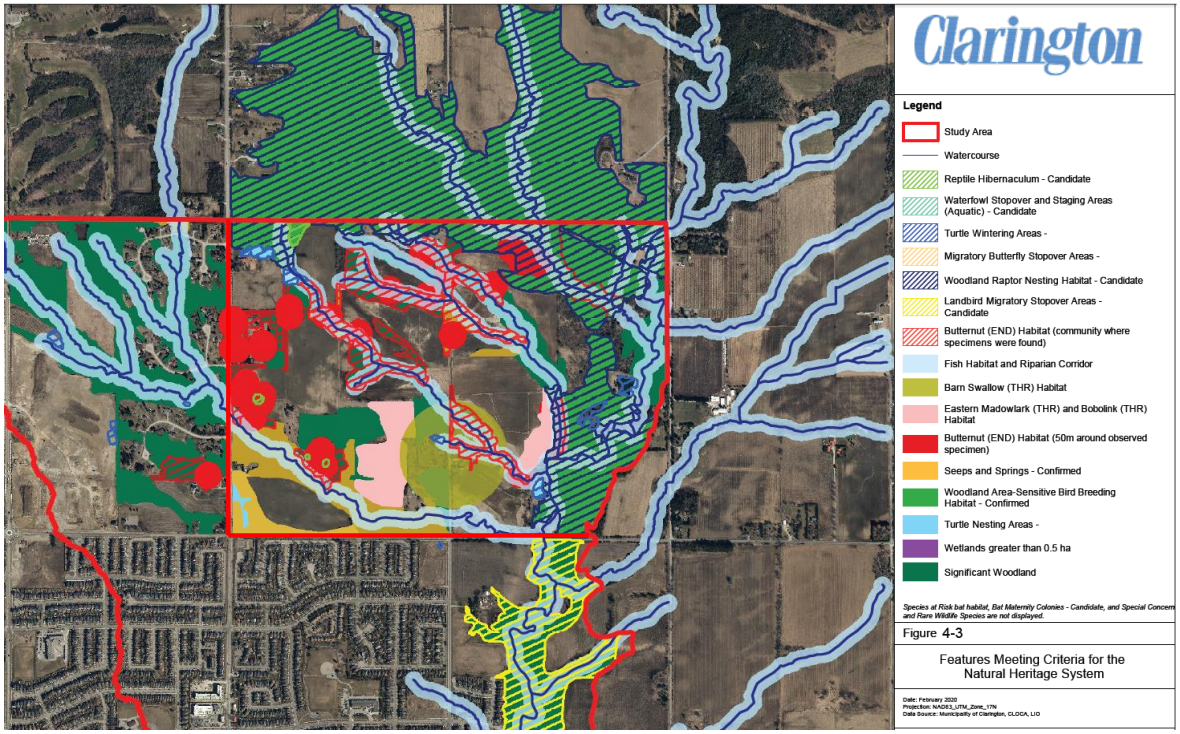
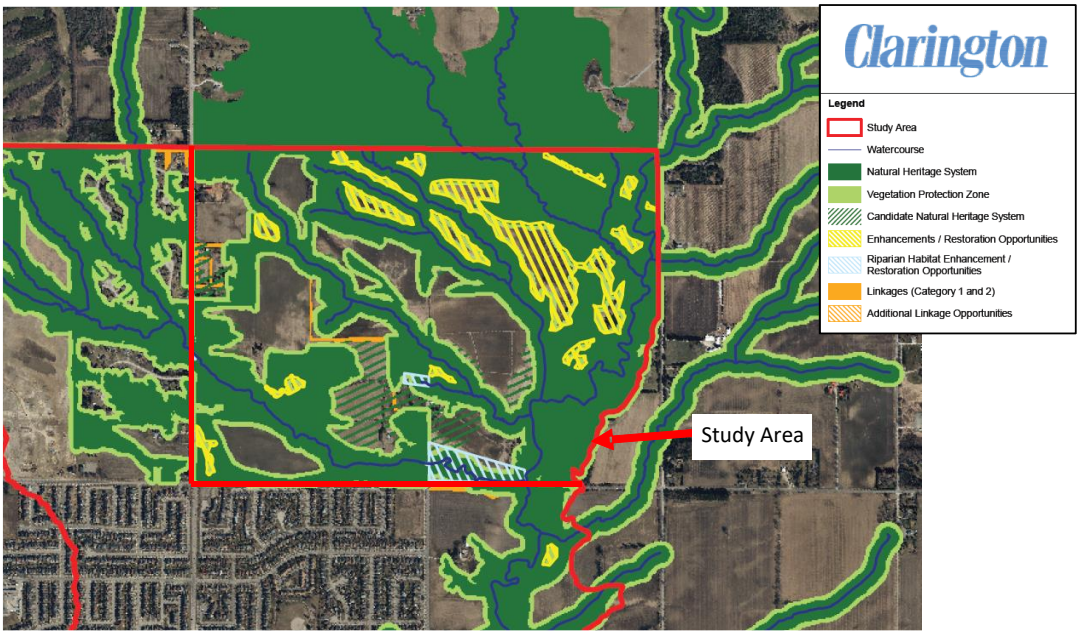


Figure 3-12: Natural Heritage System, Including VPZ's and Linkages



3.7 Transportation Network

The existing transportation network surrounding the SSSP area consists of rural roads which access agricultural lands and large residential frontage properties. It is bordered by the Liberty Street north to the west, Lambs Road to the east, Concession Road 4 to the north and Concession Road 3 to the south. **Figure 3-13** below illustrates the existing road network in the SSSP area.

Figure 3-13: Study Area Road Network



3.7.1 Existing Area Road Network

The existing roadways within the study area boundary are described as follows:

Liberty Street North is an existing north-south rural Type B arterial road with a two-lane cross-section (one lane per direction). No sidewalks or bike lanes are provided along this road. This road is under the Regional Municipality of Durham and has a 50 km/h speed limit south of Rebecca Court, 60 km/h between Rebecca Court and Pamela Court, and 70 km/h north of Pamela Court.

Lambs Road is an existing north-south rural Type B arterial road within the study area that operates with a two-lane cross-section (one lane per direction). The roadway spans from Concession Road 4, terminating slightly north of Highway 401. No sidewalks or bike lanes are provided along this road. This road is under the jurisdiction of the Municipality of Clarington and operates with a posted speed limit of 60 km/hr within the study area.

Concession Road 3 is an existing east-west rural Type B arterial road that operates with a two-lane cross section (one lane per direction) from Bowmanville Avenue to Darlington Clarke Townline. A sidewalk exists along the south side of Concession Road 3, stretching from Mearns Avenue to Elford Drive. This road is under the jurisdiction of the Municipality of Clarington and operates with a posted speed limit of 60 km/hr within the study area.

Mearns Avenue is an existing north-south rural Type C arterial road that operates with a two-lane cross section (one lane per direction). Bike lanes are provided on both side of Mearns Avenue south of Concession Road 3. Mearns Avenue is under the jurisdiction of the Municipality of Clarington and operates with a posted speed limit of 50 km/h within the study area. On the north, it intersects Concession Road 4. That portion of this road is classified as a local road with a posted speed limit of 60 km/hr.

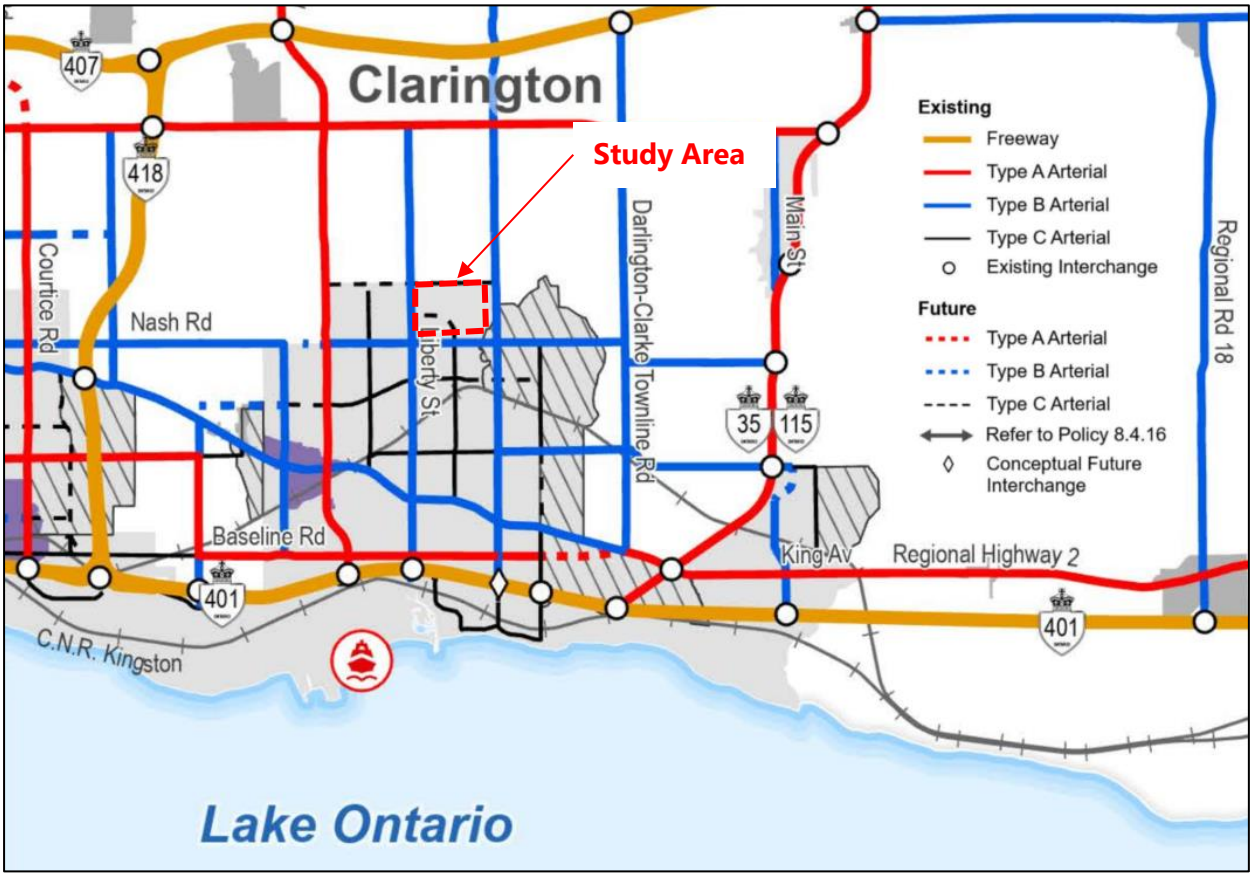
Concession Road 4 is an existing east-west local road that operates with a two-lane cross section (one lane per direction) from Bowmanville Avenue to Lambs Road. No sidewalks or bike lanes are provided along this road. This road is under the jurisdiction of the Municipality of Clarington and operates with a posted speed limit of 50km/hr and 60 km/hr on some segments.

Bethesda Road is an existing north-south local road that operates with a two-lane cross section (one lane per direction) from Concession Road 4 to Concession Road 8 on the north. No sidewalks or bike lanes are provided along this road. This road is under the jurisdiction of the Municipality of Clarington and operates with a posted speed limit of 50km/hr.

Sydel Court, Pamela Court, and Rebecca Court are existing east-west residential streets classified as local roads that operate with a two-lane cross section (one lane per direction). They begin at Liberty Street North and terminate as cul-de-sacs. No sidewalks or bike lanes are provided along these roads. They are under the jurisdiction of the Municipality of Clarington and operates with a designated speed limit of 50 km/hr.

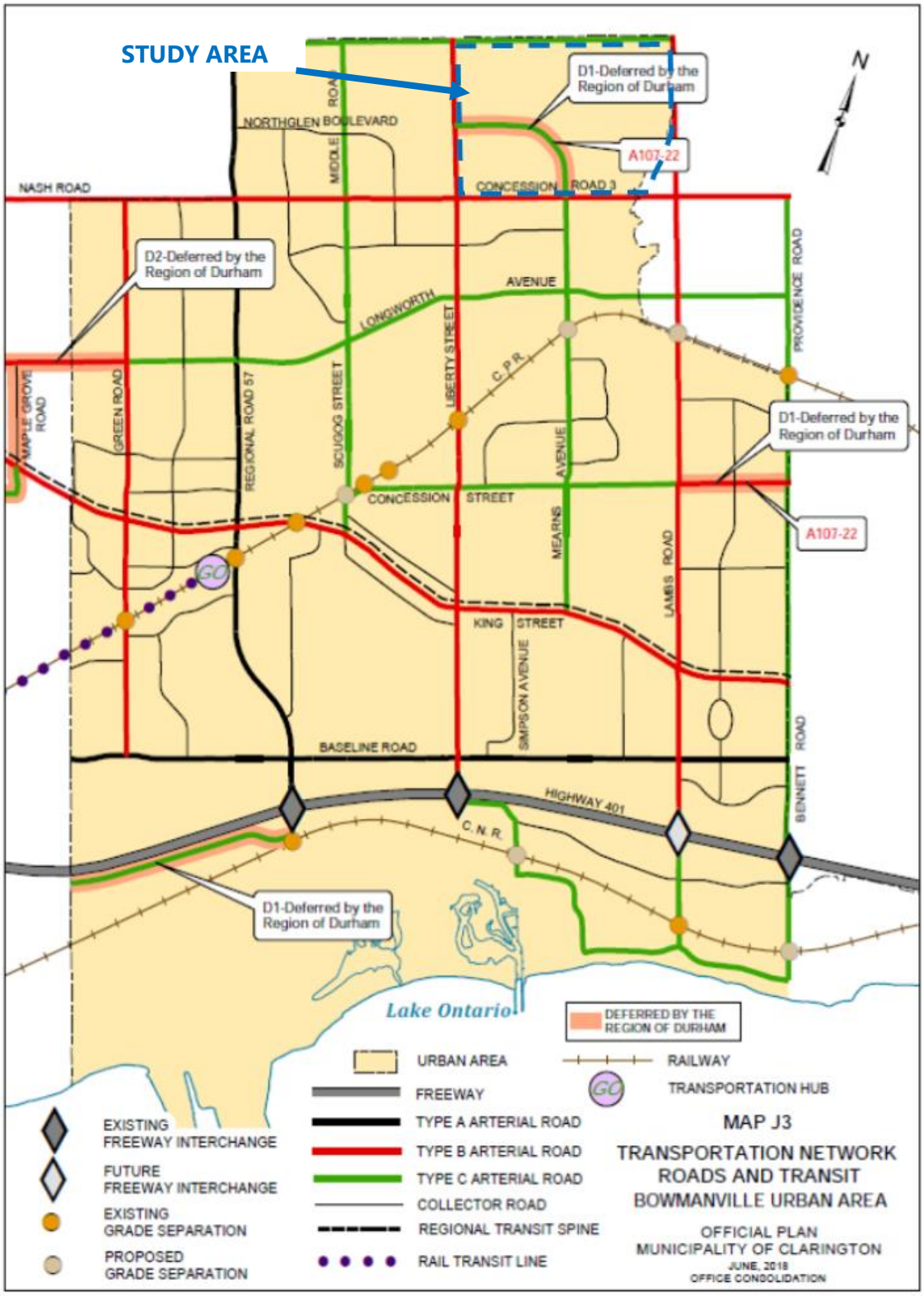
Figure 3-14 and **Figure 3-15** illustrate the existing Road Network classifications, as per the Region of Durham and Municipality of Clarington Official Plans, respectively.

Figure 3-14: Durham Region Official Plan Road Network (Map 3b)



Source: Durham Region Official Plan

Figure 3-15: Municipality of Clarington Official Plan Transportation Network (Map J)



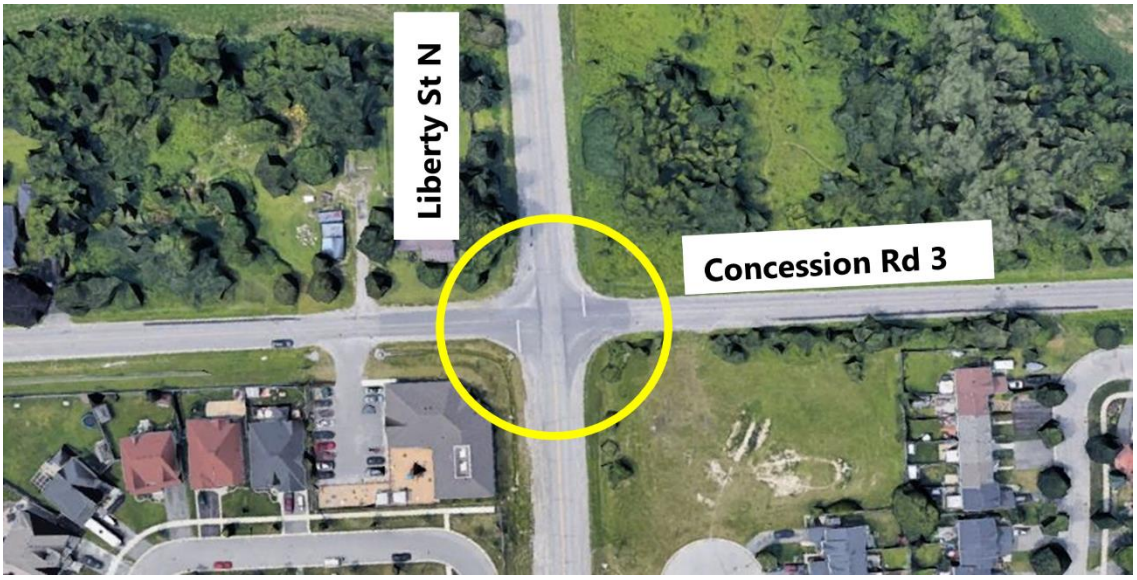
Source: Clarington Official Plan

3.7.2 Existing Area Intersections

The intersections within the study area boundary are described as follows:

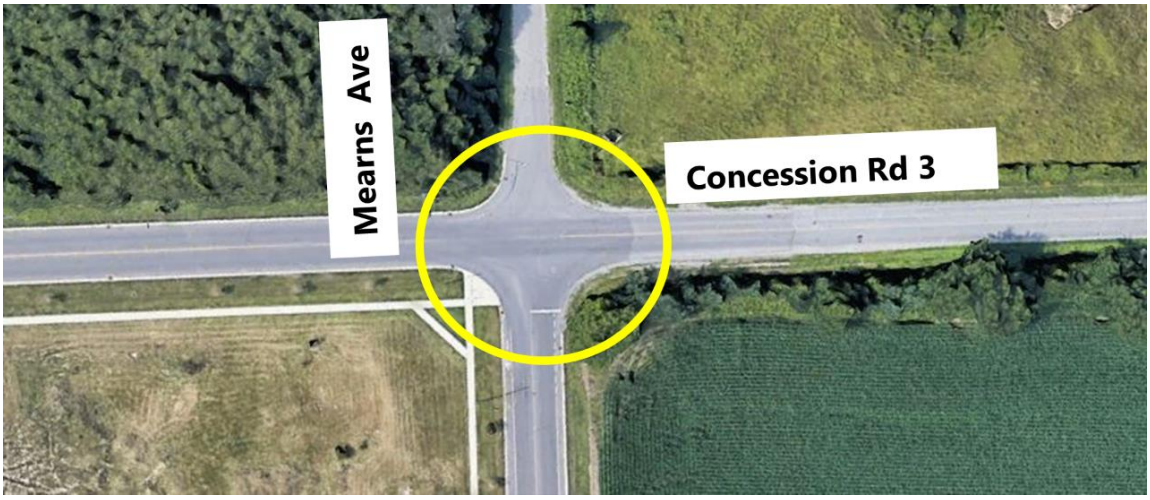
Liberty Street North and Concession Road 3 is a four-way side-street stop-controlled intersection with free flow condition along Liberty Street North. An aerial photo of the intersection is provided in **Figure 3-16.**

Figure 3-16: Liberty Street North and Concession Road 3



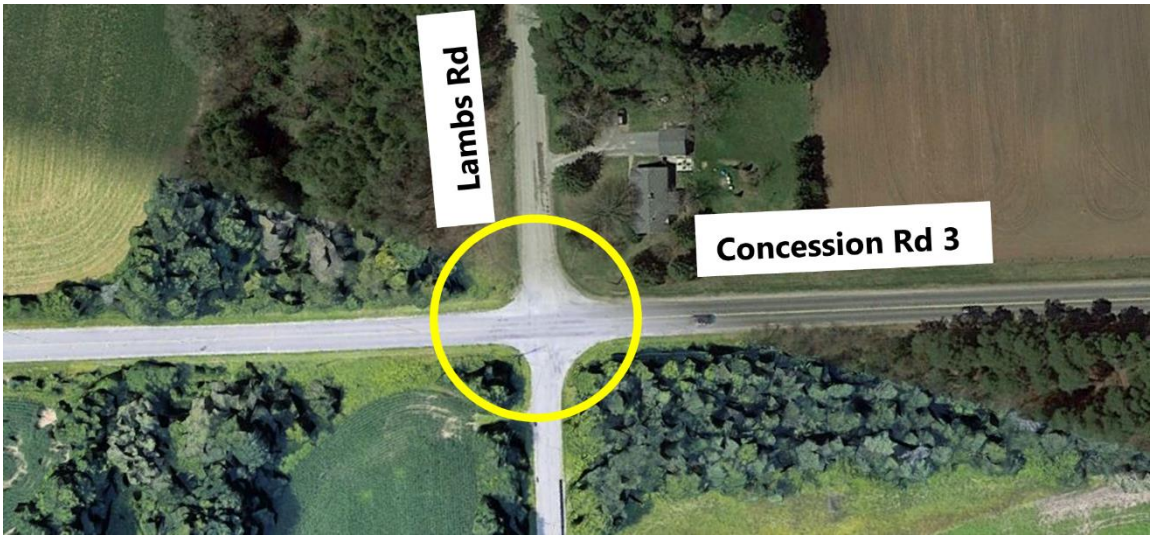
Mearns Avenue and Concession Road 3 is a four-way side-street stop-controlled intersection with free flow condition along Concession Road 3. An aerial photo of the intersection is provided in **Figure 3-17**.

Figure 3-17: Mearns Avenue and Concession Road 3



Lambs Road and Concession Road 3 is a four-way side-street stop-controlled intersection with free flow condition along Concession Road 3. An aerial photo of the intersection is provided in **Figure 3-18**.

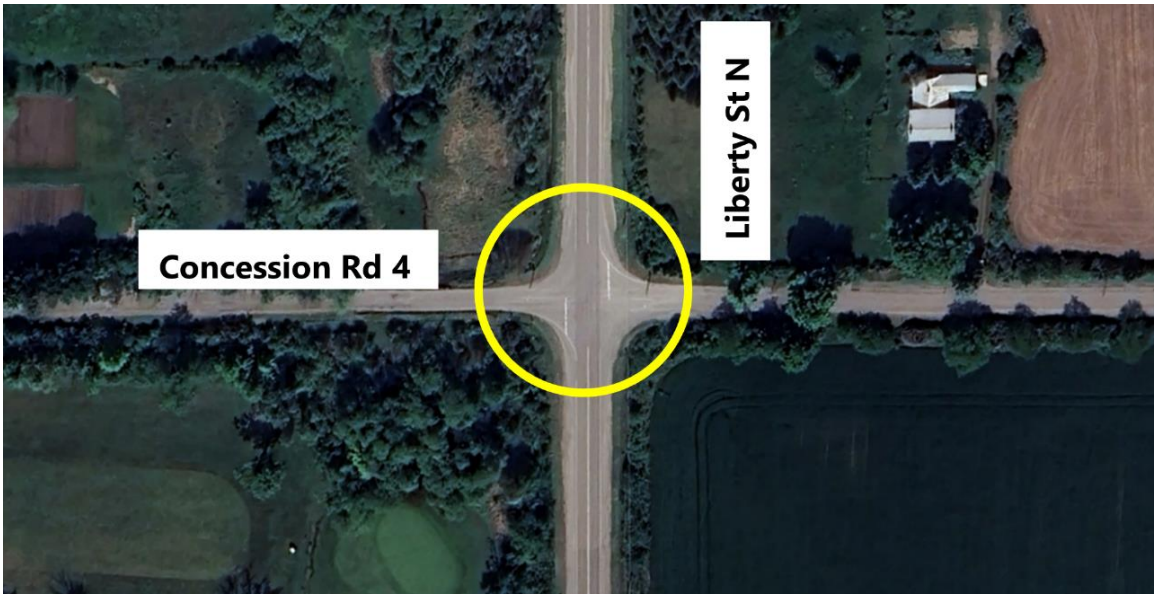
Figure 3-18: Lambs Road and Concession Road 3



Extending beyond the study area, intersections along Concession Road 4 at Liberty Street North, Mearns Avenue North, and Bethesda Road, have been included in the traffic study.

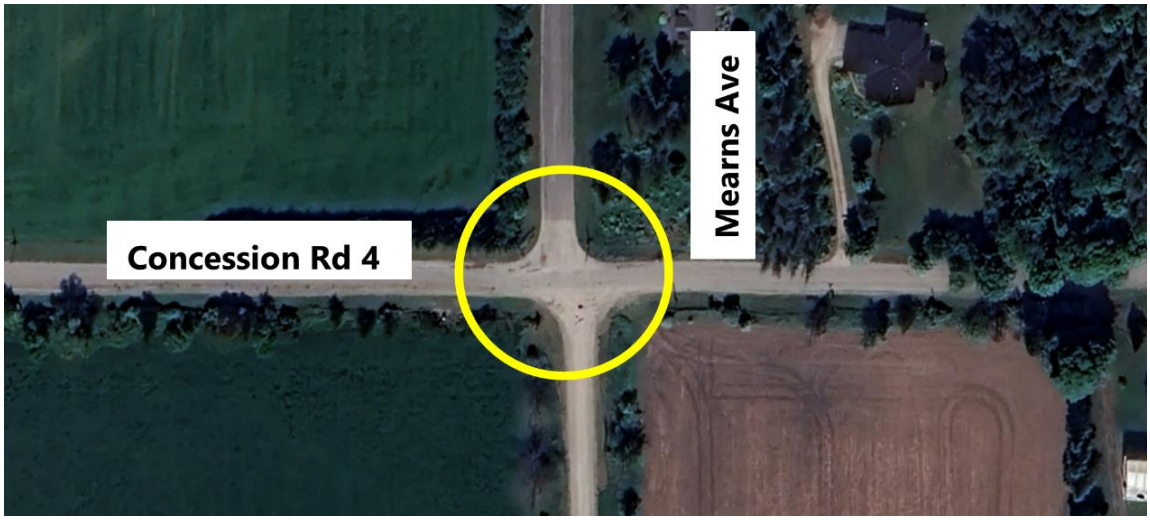
Liberty Street North and Concession Road 4 is a four-way side-street stop-controlled intersection with free flow condition along Liberty Street. An aerial photo of the intersection is provided in **Figure 3-19**.

Figure 3-19: Liberty Street North and Concession Road 4



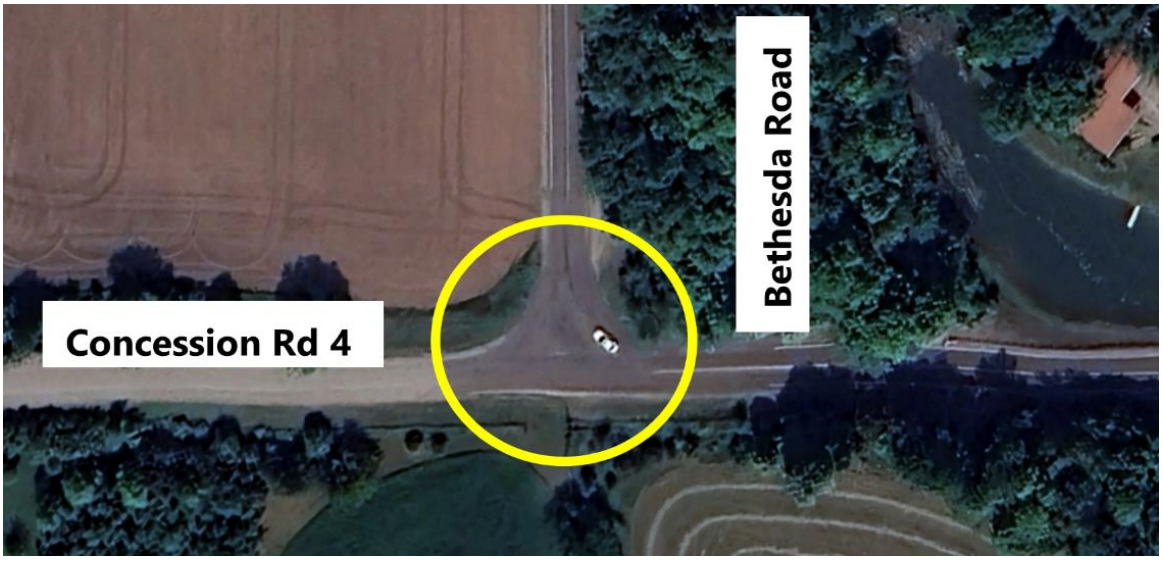
Mearns Avenue and Concession Road 4 is a four-way side-street stop-controlled intersection with free flow condition along Concession Road 4. An aerial photo of the intersection is provided in **Figure 3-20**.

Figure 3-20: Mearns Avenue and Concession Road 4



Bethesda Road and Concession Road 4 is a three-way side-street stop-controlled intersection with free flow condition along Concession Road 4. An aerial photo of the intersection is provided in **Figure 3-21**.

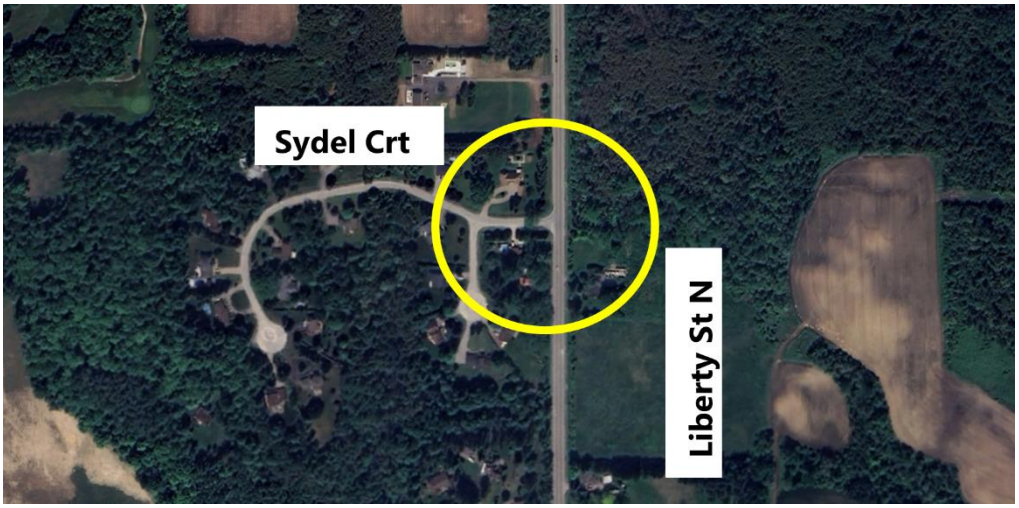
Figure 3-21: Bethesda Road and Concession Road 4



In addition to the above, there are three smaller intersections where Sydel Court, Pamela Court and Rebecca Court meet Liberty Street North.

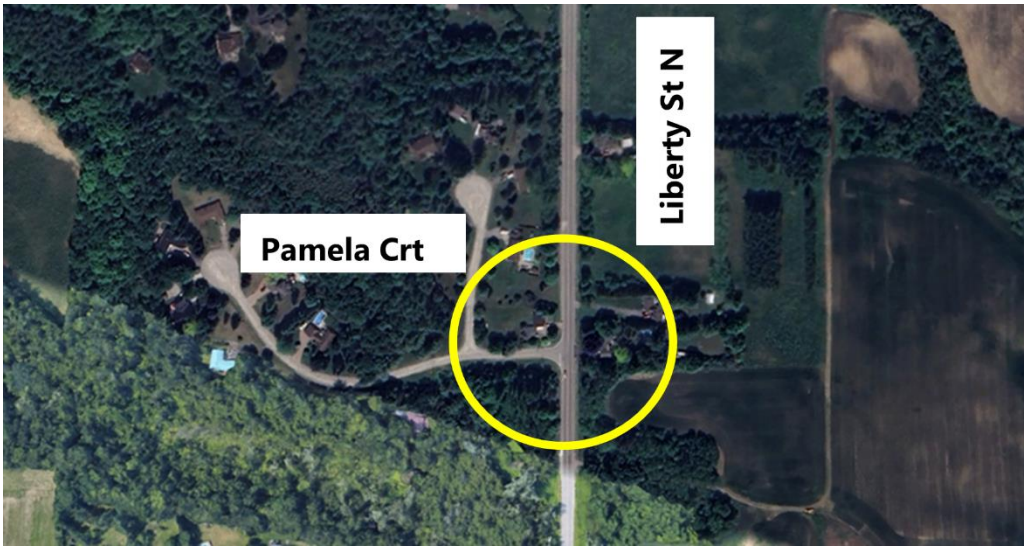
Sydel Court and Liberty Street North is a three-way side-street stop-controlled intersection with free flow condition along Liberty Street North. An aerial photo of the intersection is provided in **Figure 3-22**.

Figure 3-22: Sydel Court and Liberty Street North



Pamela Court and Liberty Street North is a three-way side-street stop-controlled intersection with free flow condition along Liberty Street North. An aerial photo of the intersection is provided in **Figure 3-23**.

Figure 3-23: Pamela Court and Liberty Street North



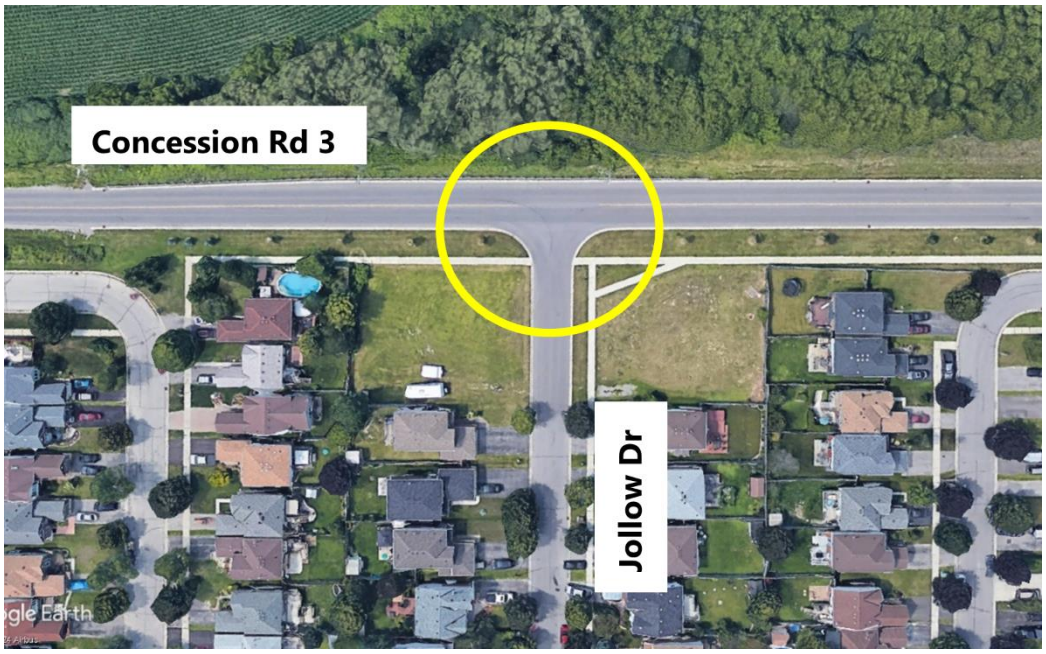
Rebecca Court and Liberty Street North is a three-way side-street stop-controlled intersection with free flow condition along Liberty Street North An aerial photo of the intersection is provided in **Figure 3-24.**

Figure 3-24: Rebecca Court and Liberty Street North



Concession Road 3 and Jollow Drive is a small three-way side-street stop-controlled intersection with free flow condition along Concession Road 3. An aerial photo of the intersection is provided in **Figure 3-25.**

Figure 3-25: Concession Road 3 and Jollow Drive



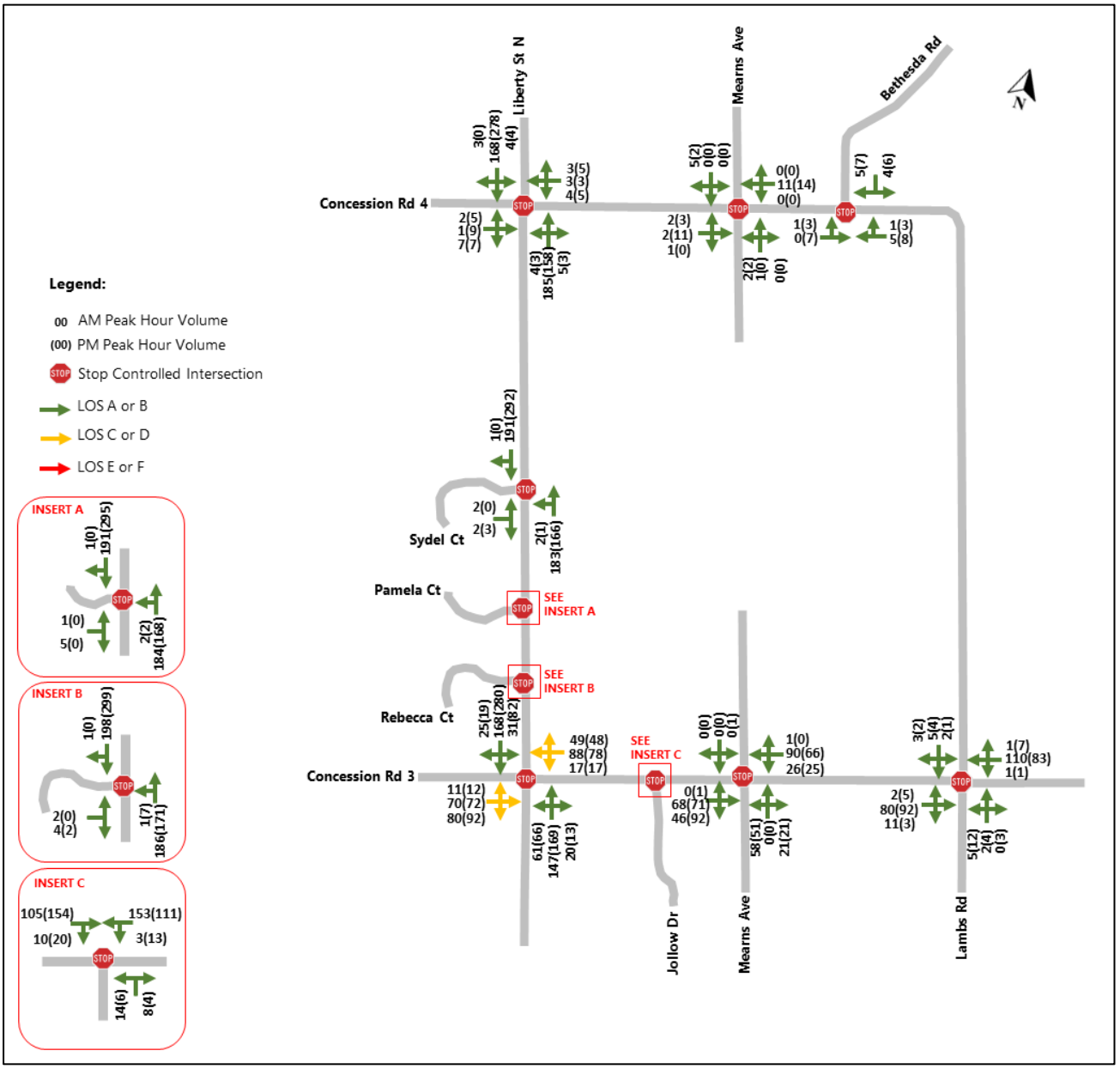
3.7.3 Existing Traffic Volumes

The base year to evaluate existing traffic conditions for the Secondary Plan study is 2023. Existing traffic conditions have been reviewed for all the intersections in the study area as shown in **Table 3-4**. Turning movement counts (TMCs) were obtained from the Region of Durham's online traffic data portal for one intersection – Liberty Street North and Concession Road 3 from the year 2023. New TMCs were obtained in January 2024 for the remaining intersections. Counts were obtained for weekday A.M. and P.M. peak periods for each of the study intersections. The existing traffic data is included in **Appendix B.**

Table 3-4: Existing Conditions Traffic Data

Intersection Name	Intersection Type	Date Counted
Concession Road 4 & Liberty Street North	4-way, stop controlled	17-Jan-2024
Concession Road 4 & Mearns Avenue	4-way, stop controlled	17-Jan-2024
Concession Road 4 & Bethesda Road	3-way, stop controlled	17-Jan-2024
Sydel Court & Liberty Street North	3-way, stop controlled	17-Jan-2024
Pamela Court & Liberty Street North	3-way, stop controlled	17-Jan-2024
Rebecca Court & Liberty Street North	3-way, stop controlled	17-Jan-2024
Concession Road 3 & Liberty Street North	4-way, stop controlled	20-Sep-2023
Concession Road 3 & Jollow Drive	3-way, stop controlled	17-Jan-2024
Concession Road 3 & Lambs Road	4-way, stop controlled	17-Jan-2024
Concession Road 3 & Mearns Avenue	4-way, stop controlled	17-Jan-2024

Figure 3-26: Existing Conditions Traffic Volumes



3.7.4 Existing Intersection Analysis

The effectiveness of an intersection's operations is measured in terms of average vehicular delay, the volume to capacity ratio (v/c), and vehicle queuing, generally distilled down to a Level-of-Service (LOS), ranging from LOS 'A' to LOS 'F'. LOS 'A' is the 'best' level of operation for an intersection representing little or no delay and generally free flow conditions where the general level of comfort and convenience experienced by motorists is excellent. At the other end of the spectrum, LOS 'F' represents an at-capacity condition usually associated with heavy congestion, and occasionally severe peak period delays and queuing. It should be noted that operations measured as LOS 'A' up to and including LOS 'E' are considered 'acceptable' in most urban (and in many rural) environments.

According to "The Municipality of Clarington Traffic Impact Study Guidelines", it is the planning policy of the Municipality to operate the intersections within the urban road network at LOS D or better and individual turning movements at LOS E or better. It also states that rural free flow road sections are expected to operate at LOS C or better.

Volume to capacity (v/c) ratios express an individual performance metric of how specific movements (as well as overall signalized intersections) are operating in relation to their theoretically calculated capacity. A ratio of 1.00 represents an at-capacity condition (demand = capacity) and could have characteristics similar to those described above for LOS 'F'. Anything better than (i.e., below) a v/c ratio of 0.90 is typically considered to be acceptable and even ratios between 0.90 and 1.00, can be acceptable to drivers in many circumstances.

Measures and estimates of vehicle queuing provides yet another layer of information with which to assess traffic operations. In areas where there is tight spacing of intersections or otherwise limited space, even though acceptable LOS or v/c ratios might be reported, vehicle queuing might suggest operational problems (or vice versa) in the local context. Queuing results, and the way in which they are interpreted, are therefore very case sensitive and should be viewed specific to road network context.

Intersection capacity analysis was undertaken at the study intersections throughout the study area using the Synchro/Simtraffic software package with methodology outlined in the Highway Capacity Manual 2000.

Table 3-5 summarizes the analysis results for the study intersections during the weekday AM and PM peak period hour during baseline 2023 conditions.

Detailed synchro reports are provided in **Appendix C**.

Table 3-5: Existing Conditions Traffic Analysis - Year 2023

Intersection	Movement	Weekday AM Peak Hour			Weekday PM Peak Hour		
		v/c	Delay (s)	LOS	v/c	Delay (s)	LOS
Liberty Street N & Concession Road 4 (Stop-controlled	*EBLTR*	0.02	10	B	0.04	12	B
	WBLTR	0.02	12	B	0.02	12	B
	NBLTR	0	0	A	0	0	A
	SBLTR	0	0	A	0	0	A
Concession Road 4 & Mearns Avenue (Stop-controlled)	*EBLTR*	0	3	A	0	2	A
	WBLTR	0	0	A	0	0	A
	NBLTR	0.01	9	A	0	9	A
	SBLTR	0.01	9	A	0	8	A
Concession Road 4 & Bethesda Road (Stop-controlled)	*EBLT*	0	8	A	0	2	A
	WBTR	0	0	A	0.01	0	A
	SBLR	0.01	9	A	0.02	9	A
Liberty Street North & Sydel Court (Stop-controlled)	*EBLR*	0.01	11	B	0	11	B
	NBLT	0	0	A	0	0	A
	SBTR	0.14	0	A	0.18	0	A
Liberty Street North & Pamela Court (Stop-controlled)	*EBLR*	0.01	10	A	0	0	A
	NBLT	0.0	0	A	0	0	A
	SBTR	0.14	0	A	0.19	0	A
Liberty Street North & Rebecca Court (Stop-controlled)	*EBLR*	0.01	10	B	0	10	B
	NBLT	0	0	A	0.01	0	A
	SBLR	0.15	0	A	0.19	0	A

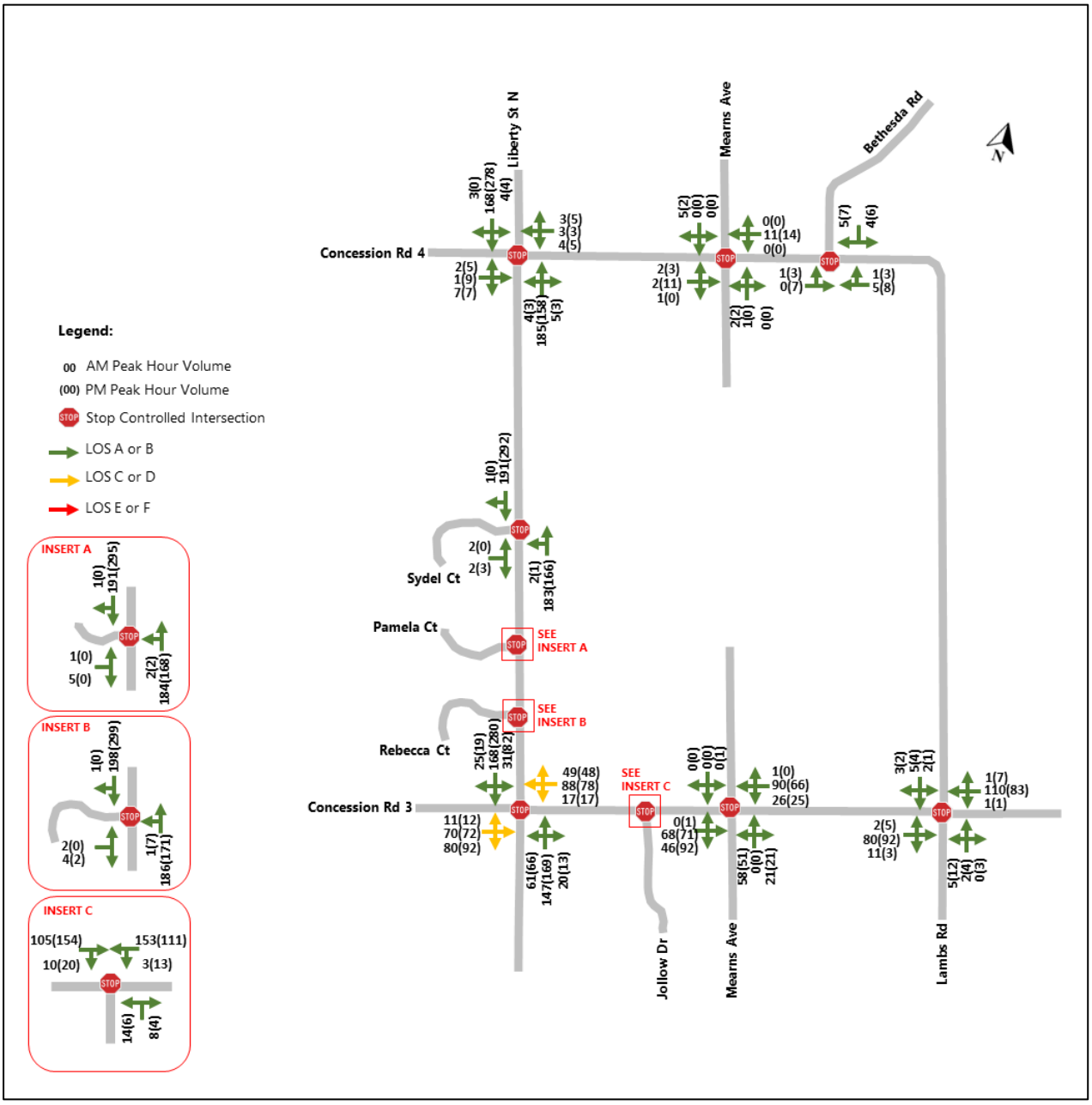
Liberty Street North & Concession Road 3 (Stop-controlled)	*EBLTR*	0.38	16.7	C	0.46	22	C
	WBLTR	0.42	19.7	C	0.46	25	D
	NBLTR	0.05	2.4	A	0.05	3	A
	SBLTR	0.03	1.3	A	0.06	2	A
Concession Road 3 & Jollow Drive (Stop-controlled)	*EBTR*	0.09	0	A	0.12	0	A
	WBLT	0	0.2	A	0.01	1	A
	NBLR	0.04	10.3	B	0.02	10	B
Concession Road 3 & Lambs Road (Stop-controlled)	*EBLTR*	0	0.2	A	0	0	A
	WBLTR	0	0.1	A	0	0	A
	NBLTR	0.02	10.5	B	0.03	10	B
	SBLTR	0.02	10.2	B	0.01	10	B
Concession Road 3 & Mearns Avenue (Stop-controlled)	*EBLTR*	0	0	A	0	0	A
	WBLTR	0.02	1.8	A	0.02	2	A
	NBLTR	0.15	11.1	B	0.11	11	B
	SBLTR	0	0	A	0	11	B

Per the above analysis, most intersections in the road network operate at a good LOS of A or B. The eastbound (EB) movements at Liberty Street North and Concession Road 3 intersection operates at LOS of C and experiences a delay of 16.7 seconds in the AM and 22 seconds in the PM peak periods. The westbound (WB) movement operates at a LOS of C and experiences a delay of 19.7 seconds in the AM peak period and operates at LOS D and experiences a delay of 25 seconds in the PM peak period. The EB AND WB movements have a v/c ratio of 0.46 which is the highest v/c ratio in this road network's peak hour traffic analysis.

Overall, the road network operates under acceptable levels of service of D or better, with all individual movements experiencing minor delays and low v/c ratios less than 1.

Figure 3-27 illustrates the traffic analysis for 2023 existing conditions.

Figure 3-27: Existing Conditions 2023 Traffic Analysis Summary

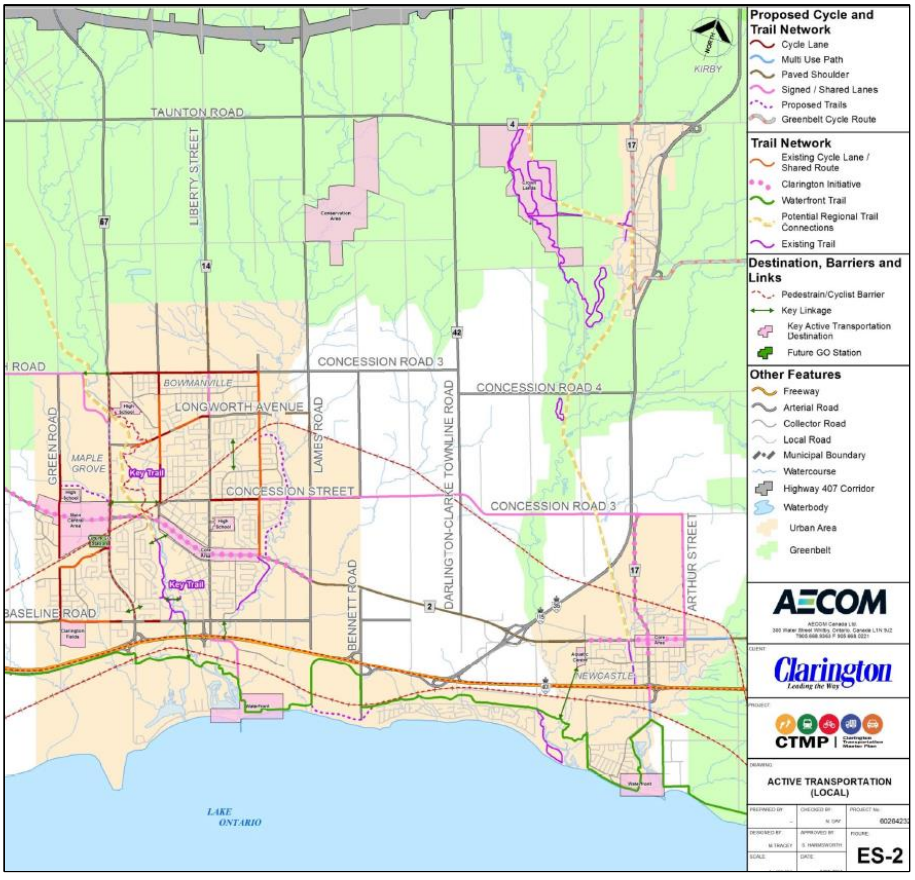


3.7.5 Existing Active Transportation

The Region of Durham's Regional Cycling Plan (2021) and Municipality of Clarington's Transportation Master Plan outline a series of recommendations for a region-wide cycling network and implementation strategy. Within the hierarchy of facilities identified in the plan, there are Primary Cycling Network (Spines), Regional Trail Network (Trails), and Secondary Cycling Network (Local Routes). "Spines" are routes which are planned to connect major centres, inter-modal facilities and key destinations which are typically located within arterial road corridors. "Trails" are regional scale multi-use routes typically located off-road and used for recreational purposes. "Local routes" connect neighbourhoods enabling short distance trips and provide access from neighbourhoods to the Primary Cycling Network.

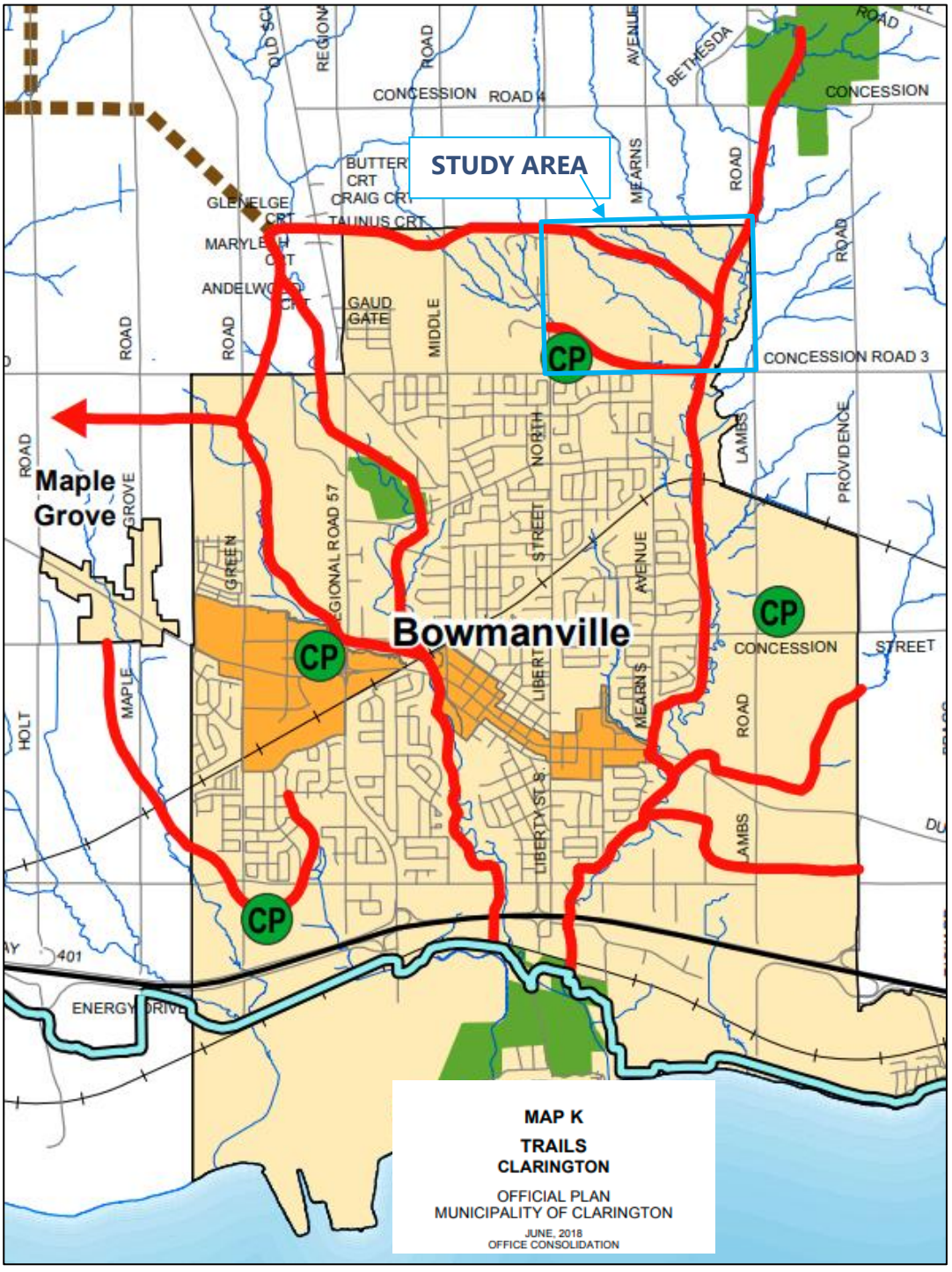
Figure 3-28 maps the existing and proposed cycling and trail routes around the Region of Durham in the vicinity of the study area. **Figure 3-29** presents Schedule K from the Clarington Official Plan which illustrates an updated snapshot of the existing and planned trail system in Clarington since the TMP, including new trail connections within the SSSP study area.

Figure 3-28: Existing and Planned Cycle and Trail Network



Source: Clarington Transportation Master Plan

Figure 3-29: Existing and Planned Trail Network



Source: Clarington Official Plan

3.7.6 Existing Transit Services

The Municipality of Clarington Official Plan designates King Street/Regional Highway 2 as a Regional Transit Spine, through the Bowmanville Urban Area and terminating at Highway 35/115. Accordingly, several local and regional transit routes feed and connect to Regional Highway 2, within the vicinity of the study area. These routes were impacted by changes in transit ridership during the Covid-19 pandemic. While some Durham Region Transit services are no longer in effect in 2024, the potential for a return to pre-pandemic service remains, based on trends in transit service expansions around the region. Therefore, pre-pandemic transit realities are also described below.

Durham Region Transit – Pre-Pandemic Services

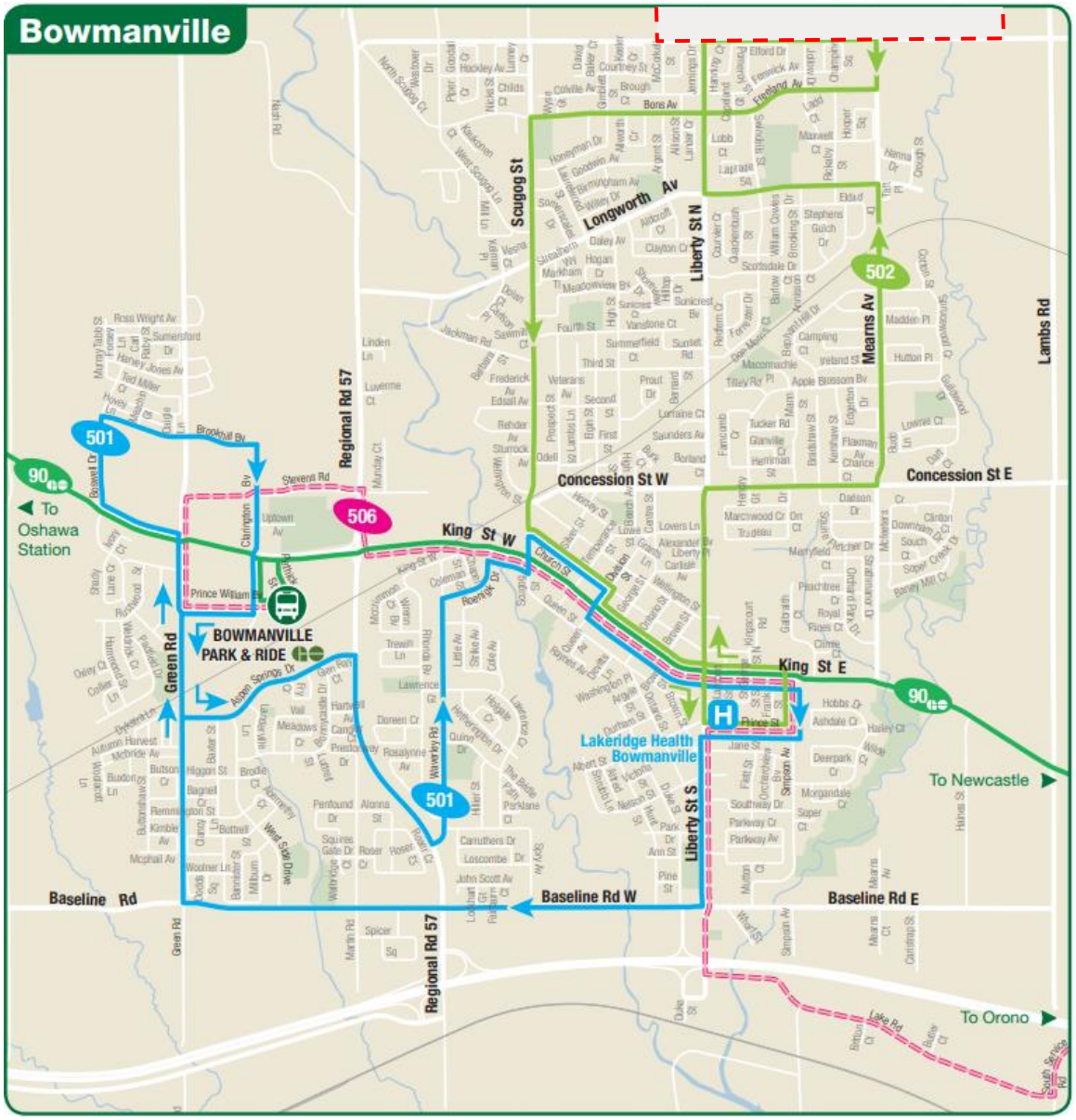
Before the Covid-19 pandemic, Durham Region Transit services were provided in the vicinity of the site via Routes 501, 502 and 506, with the nearest cluster of bus stops located at the intersections of Freeland Avenue and Jollow Drive, approximately 275 m from the subject site, and at Freeland Avenue/Bons Avenue and Liberty Street North, approximately 350 m from the intersection at Concession Road 3 and Liberty Street North. **Figure 3-30** maps the routes of these Durham Region Transit bus services, located south of the subject site.

- **Route 501** bus route provided primarily east-west service along a series of local and main roads. Route 501 connected west to the Bowmanville Park & Ride GO Transit facility, serving the Bowmanville community located south of Regional Highway 2, and connected to the regional network. Route 501 operates approximately every 30 minutes on weekdays between 6:30 am to 7:00 pm and every hour on weekends from 8:00 am to 6:00 pm on Saturdays and 10:00 am to 5:00 pm on Sundays.
- **Route 502** bus route provided north-south service along a series of local and main roads. Route 502 used to run north of Regional Highway 2, serving residential communities up to Concession Road 3 where it also loops back around to Regional Highway 2. Route 502 operates approximately every 30 minutes on weekdays between 6:34 am to 7:34 pm and every hour on weekends between 7:47 am to 6:47 pm on Saturdays and 9:47 am to 5:47pm on Sundays.
- **Route 506** bus route provided east-west service along a series of local and main roads. Route 506 used to run from the Bowmanville Park & Ride, along Regional Highway 2 before turning south, crossing Highway 401, and continuing east to Newcastle and north to Orono. In Newcastle, Route 506 connected with the terminal stop for GO Transit's Route 90 and Route 91 bus services. Route 506 operated only on weekdays with only two stops at 11:50 pm and 3:50 pm going westbound from Bowmanville GO Park & Ride.

While Route 506 did not service the subject site, riders transferring from Route 502 could have benefitted from the easterly connections to and from Newcastle via this route.

All Durham Region Transit buses are designated *accessible* with low-floor access as well as priority and courtesy seating. Buses are also equipped with bike racks. Durham Region Transit also offers 2-hour transfers, providing unlimited travel in any direction, including return trips, and are automatically added to Presto cards. Specialized services including on demand services are available.

Figure 3-30: Durham Region Transit Bus Operations (Pre-Covid-19)



Durham Region Transit – 2024 Services

Under existing **2024** conditions, Durham Region Transit services have changed and are provided in the vicinity of the secondary plan area via **Route 502, 507, and 902**, with the nearest cluster of bus stops located at the intersection of King Street East and Simpson Avenue, approximately 1.5 kilometres from the intersection at Regional Highway 2 and Lambs Road.

Route 502 runs north of Regional Highway 2, serving residential communities up to Concession Road 3 where it also loops back around to Regional Highway 2. **Route 507** runs from King St E and Liberty St S turning south towards Baseline Rd E, turning east towards Bennett Rd and Liberty St S before terminating service. It crosses Highway 2, which is identified as the spine. **Route 902** follows the same route as in pre-pandemic service, providing east-west service along King Street, connecting Clarington to Oshawa. Existing transit services are illustrated in **Figure 3-31**.

Figure 3-31: Durham Region Transit bus routes in 2024



Source: Durham Region Transit System Map, effective February 19th, 2024

On Demand service is offered by Durham Region transit which uses smaller vehicles and routing options where and when scheduled bus routes are not operation. This is a door-to-door service available for customers who often have disabilities and are unable to access the scheduled services for their trips. These services are available through the DRT On Demand app which provides residents information about the rides available in their area. Alternatively, trips can be booked by calling an agent. The service is frequent and is provided 24 hours a day and seven days a week, with service from 6 a.m. until midnight on weekdays and 7 a.m. until 9 p.m. on weekends. Trips can be scheduled up to seven days in advance.

GO Transit

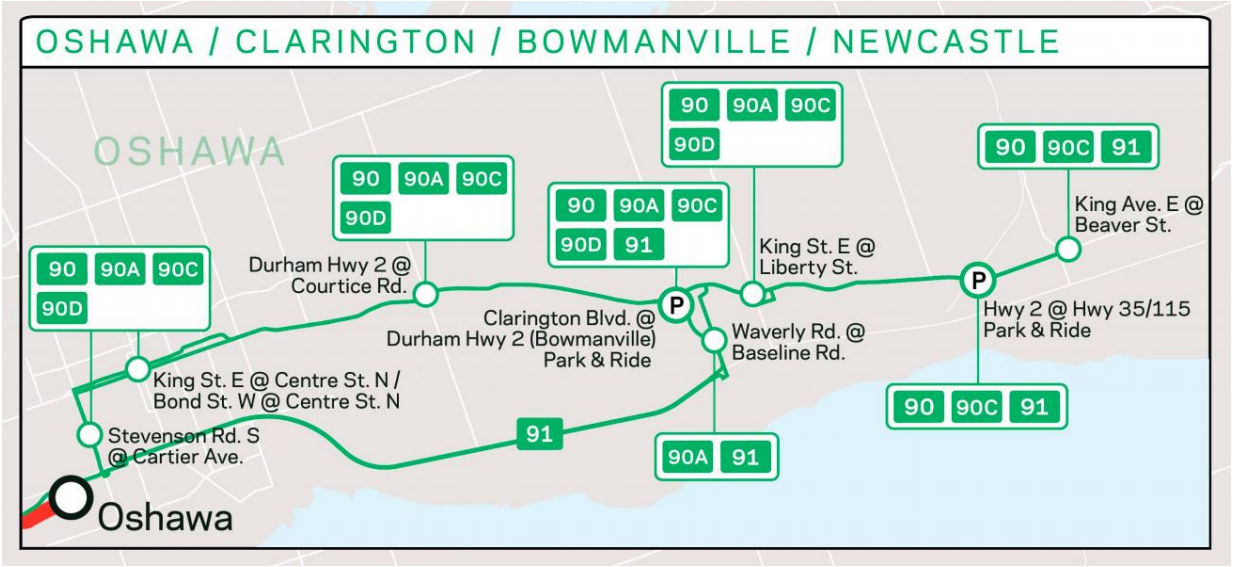
Similar to local transit services, the Covid-19 pandemic has impacted regional transit operations within the study area. However, in accordance with service improvement trends around the region, both pre-pandemic and existing services are described below.

Pre-pandemic, there were GO Bus operations in the vicinity of the site. The existing Bowmanville Park-and-Ride GO Station is located approximately 5 kilometres from the intersection of Concession Road 3 and Liberty Street North. There were transit services provided by GO Bus lines via Route 88 (Oshawa to Pickering), Lakeshore East Route 90 (Newcastle to Oshawa) and Route 91 (Newcastle to Oshawa Express, with the nearest bus stops for all routes located 250 metres or less from the intersection at Regional Highway 2 and Mearns Avenue as well as at Regional Highway 2 and Simpson Avenue. **Figure 3-32** and **Figure 3-33** show the locations of existing GO Transit bus stops along Regional Highway 2.

Due to Durham Region Transit service changes, detailed above, service to GO Bus Route 90 was reduced to avoid duplication of transit along King Street. On weekdays, service used to run hourly during the rush hours and every two hours in the midday and evening on weekdays. On weekends, service used to run every two hours.

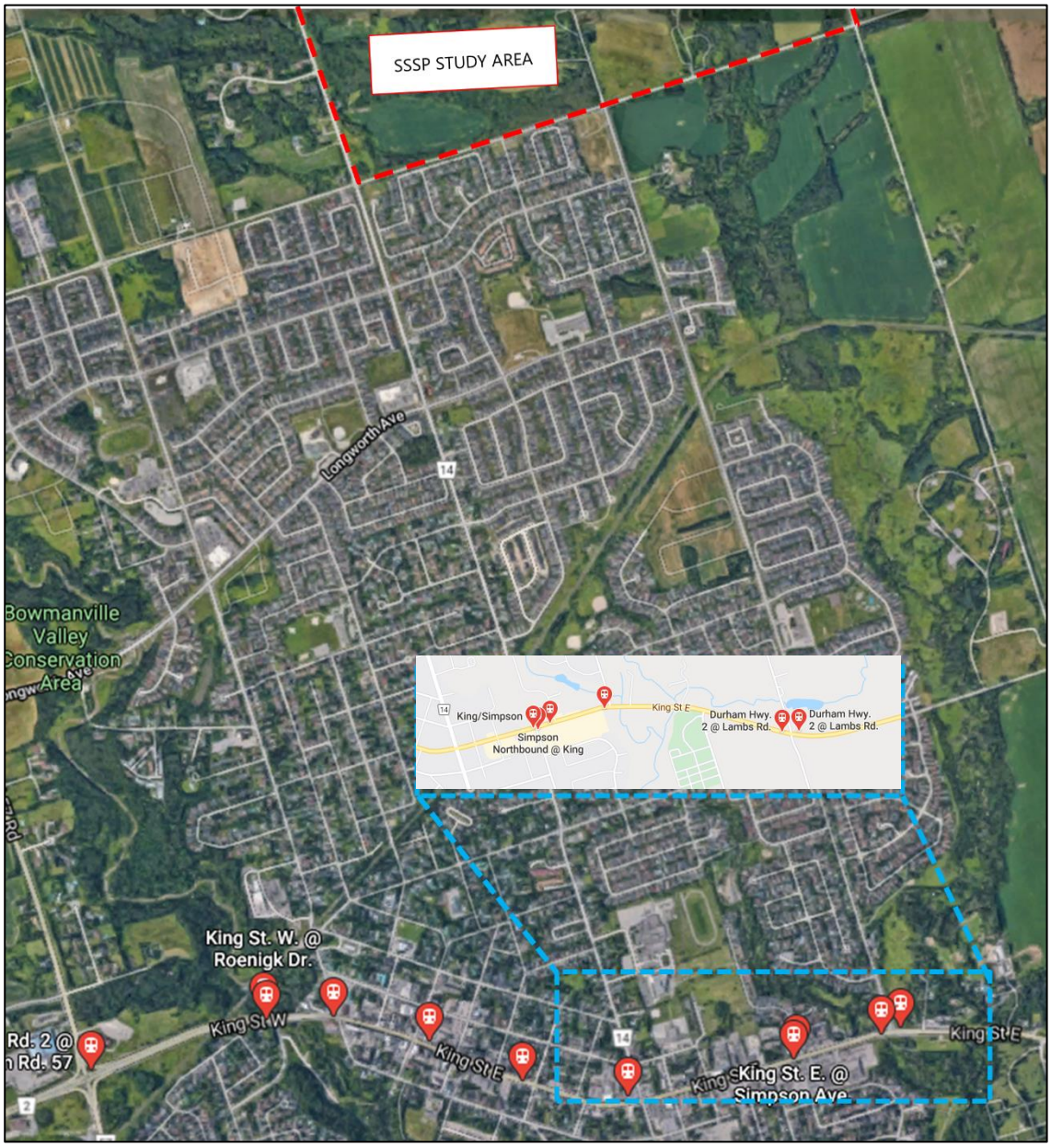
All GO Transit Buses are designated *accessible* with low-floor access as well as priority and courtesy seating. All GO Transit Trains have a Customer Service Ambassador located in the middle of the train, where all trains are designed *accessible* with a ramped mini platform for boarding and exiting, as well as priority seating.

Figure 3-32: Pre-pandemic GO Transit Bus Operations – Lakeshore East Routes



Source: GO Transit Schedules

Figure 3-33: Pre-pandemic GO Transit Bus Operations



Currently, GO Bus Route 88 (Peterborough/Oshawa) serves Bowmanville along King Street. **Figure 3-34** illustrates this bus route amended bus route between Durham College Oshawa GO station and Trend University GO Bus Stop.

Figure 3-34: GO Bus Amended Route



Source: GO Transit Schedules

4 LAND USE PLAN

4.1 Land Use and Transportation Alternatives

Three land use alternatives were developed based on the work done in Phase 1, with input from public stakeholders, background review, and consideration of relevant policies and standards. **Section 8** provides information regarding the Public Consultation process. Additionally, some baseline assumptions were also made to determine the land use types included in the Study Area. Some of these assumptions include:

- Providing a minimum gross density of 50 residents and jobs per hectare as required by Clarington Official Plan policy (23.3.9.a) with very similar overall densities provided in each of the land use designations,
- Reflecting the delineation of Concession Road 3 as the Local Corridor as in the Clarington Official Plan,
- The Secondary Plan is planned to be a primarily residential community,
- Existing roads are all identified as a Type B Arterial Road and the extension of Mearns Avenue is identified as Type C Arterial. New collector roads are illustrated in different configurations in the land use alternatives.

The land use alternatives are prepared for discussion purposes and to help inform the development of a preliminary preferred land use plan. This section summarizes the land use areas and the rationale for the location within the Study Area for each of the land use alternatives. More information regarding the development and evaluation of the land use alternatives can be found in Soper Springs Phase 2 Summary Report (SGL Planning & Design Inc., 2022).

The land use alternative plans for the project area were developed with a common set of land use categories as listed in **Table 4-1** along with their associated parameters for densities and built forms. These categories are compiled in accordance with the project area's designation in the Clarington Official Plan.

Table 4-1: Assumed density of planned land uses in SSSP

	Height (floors)	Assumed Density (units per hectare)	Built Forms & Proportions
Medium Density Local Corridor – Mid Rise	5-6	150	Mixed use buildings, apartments, townhouses. Approximately 20% of Local Corridor.
Medium Density Local Corridor – Low Rise	2-4	60	Mixed use buildings, apartments, townhouses.
Low Density – Town House	1-3	52	Townhouses. Approximately 10-12% of overall Low Density.
Low Density – Singles	1-3	27	Semi-detached dwellings, detached dwellings.
Neighbourhood Centre	-	-	Retail and service uses, including mixed use.

4.1.1 Land Use Alternative 1

Alternative 1 was designed with higher densities focused along Concession Road 3 and the southern part of Liberty Street. Areas within the local corridor, are planned for medium density land uses like mixed-use building, apartments, and townhouses and those outside the local corridor are planned for low-density land uses such as semi-detached and detached houses. The collector road has one NHS crossing near the south of the site. Utility uses are proposed at the northwest corner of the Study Area where a regional reservoir is located.

This alternative extends Mearns Avenue to the north-west, towards and intersecting with Liberty Street as shown in **Figure 4-1**. The Mearns Avenue extension branches off with two connections to a parallel collection road that connects to a neighbourhood park. The collector road network crosses Soper Creek at the south end and intersects with Liberty Street Road at one location. There are two collector road crossings of the Soper Creek tributaries. Local roads will be added through the development process and will provide access to isolated areas. Two connection points for local roads are provided in this Alternative. In this alternative, the neighbourhood park and neighbourhood centre can be accessed through proposed collector, in addition to a series of multi-use and municipal off-road trail networks through the natural environment.

Figure 4-1: Land use Alternative 1



4.1.2 Land use Alternative 2

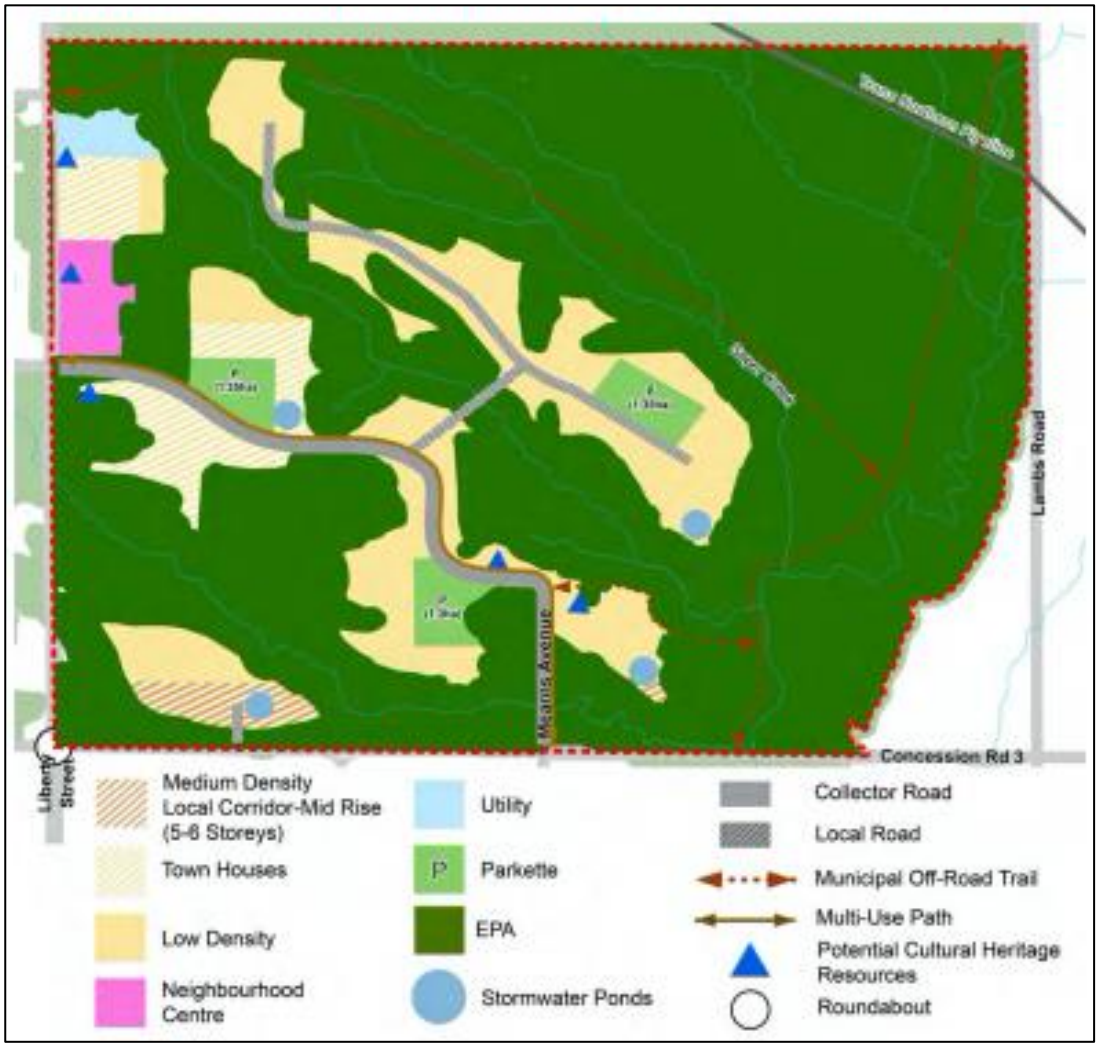
Alternative 2 was designed with density focused on the western edge of the Study Area along Liberty Street North. Like Alternative 1, areas within the local corridor, are planned for medium density land uses and those outside the local corridor are planned for low-density land uses. Utility uses are also proposed at the northwest corner of the Study Area where a regional reservoir is located.

This alternative also includes a Neighbourhood Centre located along Liberty Street North, and a collector road with a cluster of townhouses to the north and east of the Neighbourhood Centre. This alternative also extends Mearns Avenue to the north-west, towards Liberty Street as shown in **Figure 4-2**. The extension of Mearns Avenue will align with Pamela Court, west of the Study

Area, with a single crossing of the NHS in the south end. Additionally, local roads will be added through the development process, giving access to isolated development areas. One connection point for a local road to the central development area is provided in this Alternative. It is recognized that the central development area is a relatively large area to be serviced with a single road connect.

Furthermore, this alternative includes three parkettes that are centrally located in the neighbourhoods which can be accessed via proposed collector and local road networks, in addition to a series trail networks through the natural environment. The multi-use trail is proposed to run along Mearns Avenue and the municipal off-road trails are proposed to follow the trails identified in Schedule K of the Official Plan connecting parks, collector and local roads, and the natural heritage system.

Figure 4-2: Land use Alternative 2

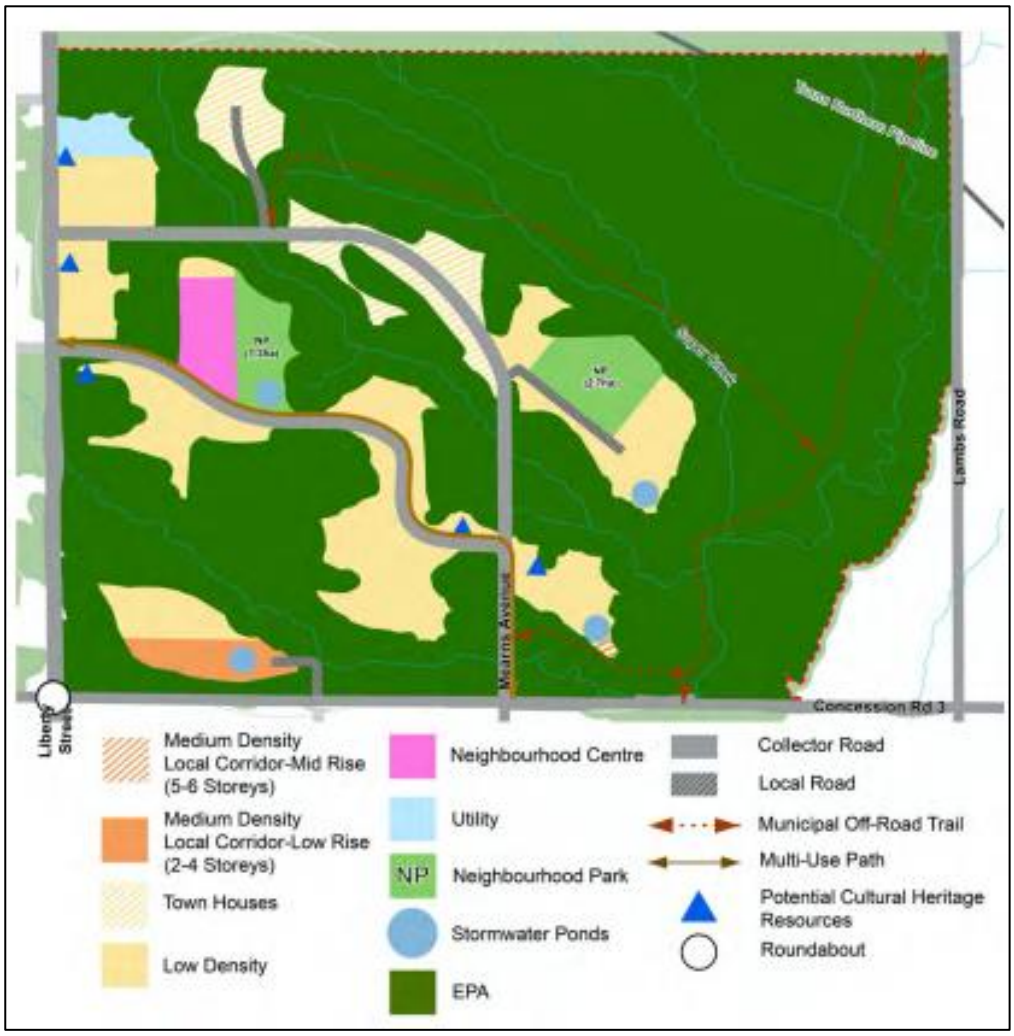


4.1.3 Land use Alternative 3

Alternative 3 is designed with two collector road extensions of Mearns Avenue. One collector road extension intersects with Pamela Court, and the other connects to Liberty Street North between Pamela Court and Sydel Court. Unlike the previous alternatives, some areas within the local corridor, are planned for medium density land uses and some are planned for low-density land uses. Utility uses are also proposed at the northwest corner of the Study Area where a regional reservoir is located. The collector roads will cross the NHS in three locations with this alternative and provides full access to the central developable lands.

This alternative proposes a neighbourhood centre on the north side of the southern-most collector road extension that intersects with Pamela Court as shown in **Figure 4-3**. It also includes two neighbourhood parks that can be accessed through local and collector roads in addition to a network of trails.

Figure 4-3: Land use Alternative 3



4.2 Evaluation of Alternatives

The evaluation criteria were organized under a broad range of key themes. The principle of the transportation and mobility theme of the evaluation matrix presented in the Soper Springs Phase 2 Summary Report (SGL Planning & Design Inc., 2022) is to reduce dependence on personal vehicles and prioritize active transportation modes of travel by creating a network that encourages walking and cycling and improve overall health for the residents and community.

The alternatives proposed above were evaluated using a set of criteria and measures to identify the preferred land use alternative. The criteria and measures reflect the findings of the background reports, requirements of official plan policies, and consideration of guidelines and best practices. They were used to determine what elements of each alternative are preferred and should be included in the preferred land use plan and Secondary Plan. An evaluation matrix was prepared to summarize the evaluation of the three land use alternatives against all the criteria and measures. The evaluation matrix for the transportation and mobility aspects are summarized below.

4.2.1 Criteria 1: Provide sufficient capacity and connectivity for all travel modes – vehicular, future transit, active transportation.

To ensure that the criteria is met, the following measures were considered for each of the alternatives. **Table 4-2** summarizes the evaluation matrix for criteria 1.

Table 4-2: Summary of Evaluation matrix for Criteria 1

Measure	Alternative 1	Alternative 2	Alternative 3
Sufficient network capacity provided by proposed collector road network	The proposed network was assumed to be sufficient based on the road network alignment. However, it is dependant on the configuration of the local roads connecting the central block of developable land. It should be noted that with the absence of a traffic model for the three alternatives, it is not possible to	The proposed network is assumed to be somewhat sufficient based upon the road network alignment, due to the bottleneck created by a singular local road connecting the central block of developable land to the collector road. It should be noted that with the absence of a traffic model for the three alternatives, it is not possible to	The proposed network is assumed to be sufficient based upon the road network alignment connecting most of the developable land. With the absence of a traffic model for the three alternatives, it is not possible to accurately guage the network capacity. It should be noted that with the absence of a traffic model for

	accurately guage the network capacity. **Evaluation:** Moderately Preferred	accurately guage the network capacity. **Evaluation:** Least Preferred	the three alternatives, it is not possible to accurately guage the network capacity. **Evaluation:** Most Preferred
Opportunity for an efficient transit system through the secondary plan area provided by proposed collector road network	Yes, but connectivity to the central block of developable land is limited by the design of local roads. **Evaluation:** Moderately Preferred	Yes, but connectivity to the central block of developable land is limited by the singular proposed local road. **Evaluation:** Least Preferred	Yes, future routes can alternate between both collector roads through the Secondary Plan area, ensuring all lands are efficiently served by transit. **Evaluation:** Most Preferred
Active transportation spine for the community connecting all parts of the secondary plan area including the residential enclaves (COP 19.5.4) provided by proposed collector road network	Mostly yes, however, connectivity to the central block will be dependent on the configuration of local roads. **Evaluation:** Moderately Preferred	Somewhat yes, because the connectivity to the central block will be limited by the singular load road which will generally increase travel distances to the residential enclaves. **Evaluation:** Least Preferred	Yes, the proposed road network will create an active transportation grid for the Secondary Plan area, ensuring all lands are efficiently connected to the surrounding community. **Evaluation:** Most Preferred
Ability of proposed land use alternative to connect new trails to existing and planned trails in the Municipality's trail plans.	There is potential to connect new facilities to surrounding trails along arterial roads and the Environmental Protection Area. **Evaluation:** Moderately Preferred	There is potential to connect new facilities to surrounding trails along arterial roads and the Environmental Protection Area. **Evaluation:** Moderately Preferred	There is potential to connect new facilities to surrounding trails along arterial roads and the Environmental Protection Area. **Evaluation:** Moderately Preferred

4.2.2 Criteria 2: Minimize impact of the Road network on the Environmental Protection Areas (EPA)

To ensure that the criteria is met, the following measures were considered for each of the alternatives. **Table 4-3** summarizes the evaluation matrix for criteria 2.

Table 4-3: Summary of Evaluation matrix for Criteria 2

Measure	Alternative 1	Alternative 2	Alternative 3
Limitation to crossings over watercourses and through the EPA (number of stream crossings and length of roads in EPA) from the proposed collector road network	One existing crossing across Soper Creek along Mearns Ave includes a culvert under the road. 416 m of collector roads cross over the EPA in Alternative 1. Two additional local road crossings of the NHS will be required to access the central area. **Evaluation:** Most Preferred	One existing crossing across Soper Creek along Mearns Ave includes a culvert under the road. 480 m of roads cross over the EPA in Alternative 2. One additional local road crossing of the NHS will be required to access the central area. **Evaluation:** Moderately Preferred	One existing crossing and three proposed crossings are proposed across Soper Creek. The existing crossing includes a culvert under the road. 1,054 m of roads cross over the EPA in Alternative 3. **Evaluation:** Least Preferred
EPA crossings located to minimize impact to the EPA, such as at the least sensitive areas	Some crossings for Alternative 1 are sited at narrow points or existing breaks but others are not. May have greater conflicts associated with noted Butternut tree locations at western end of proposed Mearns Avenue. **Evaluation:** Moderately Preferred	Alternative 2 places all road crossings at narrowest points and/or make use in existing breaks in vegetation. **Evaluation:** Most Preferred	Two of the proposed Alternative 3 road crossings are located across swaths of EPA, affecting the largest areas of intact woodland or habitat complexes as compared to other alternatives. **Evaluation:** Least Preferred

4.2.3 Criteria 3: Ability to create a network of Collector Roads serving transportation and active transportation needs.

To ensure that the criteria is met, the following measures were considered for each of the alternatives. **Table 4-4** summarizes the evaluation matrix for criteria 3.

Table 4-4: Summary of Evaluation matrix for Criteria 3

Measure	Alternative 1	Alternative 2	Alternative 3
Minimum intersection spacing requirements met by proposed collector road network	Mostly yes, however the intersection spacing between the proposed collector road and Pamela Court at Liberty Street may be too close. **Evaluation:** Moderately Preferred	Yes, the collector road will meet all intersection spacing requirements, as it connects to existing intersections with Pamela Court at Liberty Street, and Mearns Avenue at Concession Road 3. **Evaluation:** Most Preferred	Mostly yes, however the intersection spacing between the two collector roads connecting to Liberty Street may be too close and require further study. **Evaluation:** Moderately Preferred
Connections to arterial roads maximized by collector roads network	Yes, the collector road is well connected to the boundary arterial roads. A secondary connection to Liberty Street would improve and maximize network options. **Evaluation:** Moderately Preferred	Yes, the collector road is well connected to the boundary arterial roads. A secondary connection to Liberty Street would improve and maximize network options. **Evaluation:** Moderately Preferred	Yes, the collector roads create a network which maximizes connections to the boundary arterial roads. **Evaluation:** Most Preferred
Potential for an integrated active transportation network maximized by proposed collector road network	Mostly yes, however, the potential for integration to the central block will be dependent on the configuration of local roads. Multiple local roads connecting to the collector road will	Somewhat yes, however, connectivity to the central block will be limited by the singular load road which will generally increase walking and cycling distances to the residential	Yes. The proposed road network will create active transportation spines for the Secondary Plan area, ensuring all blocks are efficiently integrated into the active transportation

	provide options to connect residential enclaves to the network. **Evaluation:** Moderately Preferred	enclaves. **Evaluation:** Least Preferred	network. **Evaluation:** Most Preferred

4.2.4 Criteria 4: Conserve cultural heritage resources in proximity to the Soper Hills Study

The locations of potential cultural heritage resources were documented in **Section 3.2**, and the locations of potential cultural heritage resources are illustrated on the land use alternatives presented in **Section 4.1**. It is evident that all three alternatives provide opportunities for heritage buildings to be integrated into new development and for appropriate interfaces to be created. There is essentially no difference between three land use alternatives with respect to cultural heritage.

4.3 Preferred Land Use Plan

The preferred land use plan builds upon the three (3) alternatives with further consideration given to a straighter road alignment of the Mearns Avenue extension. Reducing roadway curvature along this alignment allows for longer sightlines, improved circulation and is generally safer for making turns onto intersecting roads. Additionally, the preferred plan also embraces higher densities along Mearns Avenue and in the area adjacent to Concession Road 3, while providing lower density developments in the remaining zones.

The preferred plan expands the active transportation network as presented in the three (3) draft alternative. Within this plan, the multi-use path is proposed along both extensions of Mearns Avenue, providing multi-modal connectivity between the two boundary roadways. Furthermore, the preferred plan also extends the multi-use path network to encapsulate the north-east quadrant of development to promote further connectivity amongst development areas.

This preferred land use plan also achieves significant conformity with the evaluation criteria as listed in the previous section. With respect to Criteria 1: Provide sufficient capacity and connectivity for all travel modes – vehicular, future transit, active transportation:

- The preferred plan includes extension of Mearns Ave as a collector road, connecting to Liberty Street mid-block with a second collector road branching off and intersecting Liberty further north. This configuration provides the opportunity for connecting most of the developable lands and an alignment connecting to most of the developable lands, which affords greater network capacity and improved access to transit. The preferred plan also avoids the issues of a bottleneck and reliance on the configuration of the local roads to provide access. The preferred collector road pattern reduces travel times and creates an active transportation grid for the Secondary Plan area.

With respect to Criteria 2: Minimize impact of the Road network on the Environmental Protection Areas (EPA):

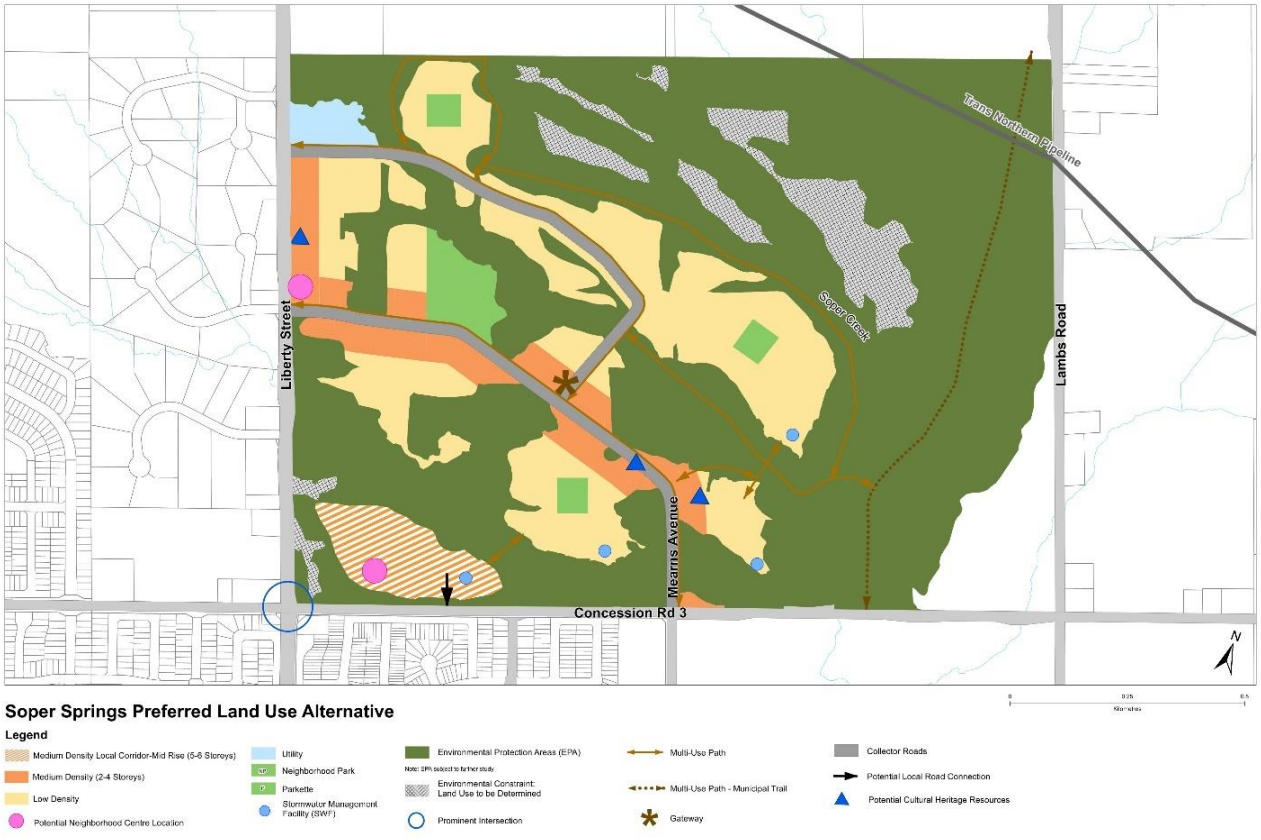
- The preferred plan includes extension of Mearns Ave as a collector road, connecting to Liberty Street mid-block with a second collector road branching off and intersecting Liberty further north. However, for all alternatives under consideration, at least one local road connection would be required to access the central development area, and two road connections to the central development are essential to provide the necessary network capacity and provide appropriate emergency access into and out of the central area, as demonstrated by the other evaluation criteria. The preferred alternative locates the new crossings of the NHS at relatively narrow locations and avoids the very long crossing of the NHS along the northward extension of Mearns Avenue included in Alternative 3. Mitigation of the impacts created from these crossings will be addressed through future studies and detailed designs.

With respect to Criteria 3: Ability to create a network of Collector Roads serving transportation and active transportation needs:

- The preferred plan includes the extension of Mearns Ave as a collector road, connecting to Liberty Street mid-block with a second collector road branching off and intersecting Liberty further north. This maximizes connections to boundary arterial roads and allows for active transportation spines connecting all development areas. The more northerly alignment of the northern collector road alleviates the concerns for intersection spacing associated with Alternative 3.

As noted in **Section 4.2.4**, neither the preferred alternative or any of the initial alternative land use plans have any unacceptable impacts on cultural heritage resources, and there are no significant differences between the alternatives relative to the potential to integrate and interface with potential cultural heritage resources in the study area.

Figure 4-4: Preferred Land Use Plan



5 FUTURE BACKGROUND CONDITIONS

The Clarington Transportation Master Plan (CTMP) indicates the expansion of roadway and active transportation facilities to the areas north of Concession Road 3, including the study area, which are highlighted as growth areas in the plan. Additionally, improvements to the existing road network in Town of Bowmanville are suggested within the CTMP, the Region of Durham TMP, and the Durham Regional Development Charges (DC) Background Study, which are proposed for implementation prior to 2033. The Region's Planning and Economic Development Department has updated their macro-level transportation forecasting model with the improvements described below and provided it to David Kriger Consultants Inc. (DKCI) to develop the sub-area model.

5.1 Regional Road Improvements

The Region of Durham's TMP and Durham Regional Development Charges Background Study do not identify specific improvements to the boundary road network around the study area, however, road widenings are planned on Liberty Street, Regional Road 57, and Regional Highway 2. West of the study area, Regional Road 57 is marked for road widening from 2 to 4 lanes between Baseline Road to Nash Road. As this road restructuring is expected within the 10-year horizon, the Region has coded this improvement into their 2033 horizon transportation model. Furthermore, the Liberty Street North and Concession Road 3 intersection is planned to be reconstructed as a roundabout to improve local operations and has been considered as part of this report's future traffic modelling.

The stretch of Liberty Street between Regional Road 57 to Regional Highway 2 is marked for road widening from 2 to 3 lanes in both the TMP and DC Study, however, this upgrade was not coded into the Region's latest update to the DRTPM, likely indicating a delayed development timeline. Regional Highway 2 is similarly marked for road widening between Mearns Avenue and Highway 35/115 from 2 to 4 lanes beyond 2031. As a result of ongoing discussions between the Regional and Municipal planning teams on this widening, this improvement was not modelled within the Region's model for the 10-year horizon period.

Planned improvements along Highway 401 have been accounted for within the Region's transportation model. Specifically, the changes include road widening from the existing 3 lanes per direction configuration into 5 lanes per direction west of the Liberty interchange, and 4 lanes per direction from Liberty to the Highway 35/115 interchange. Furthermore, planned upgrades to the Harmony Road interchange, which includes a replacement of the Bloor Street underpass and reconfigured eastbound on and off-ramps, has been coded into the Region's model.

5.2 Municipal Road Improvements

The CTMP also recommends improvements for the broader area within the Town of Bowmanville. Notably, the widening of Longworth Avenue from Scugog Road to Regional Road 57 is recommended in addition to a westward extension. Alternatives of the exact length of this extension are proposed, with a shorter extension towards Maple Grove Road or a longer extension towards Holt Road. Of the two alternatives, municipal staff have indicated the longer extension as the likely future outcome, which has been modelled into the DRTPM. Road widening on Holt Road from Baseline Road towards Highway 401 is proposed within the CTMP and is accordingly coded into the Region's model. Additionally, the closure of the North Scugog Court connection to Regional Road 57 and the construction of the Northglen Boulevard collector road have both been coded into the Region's model.

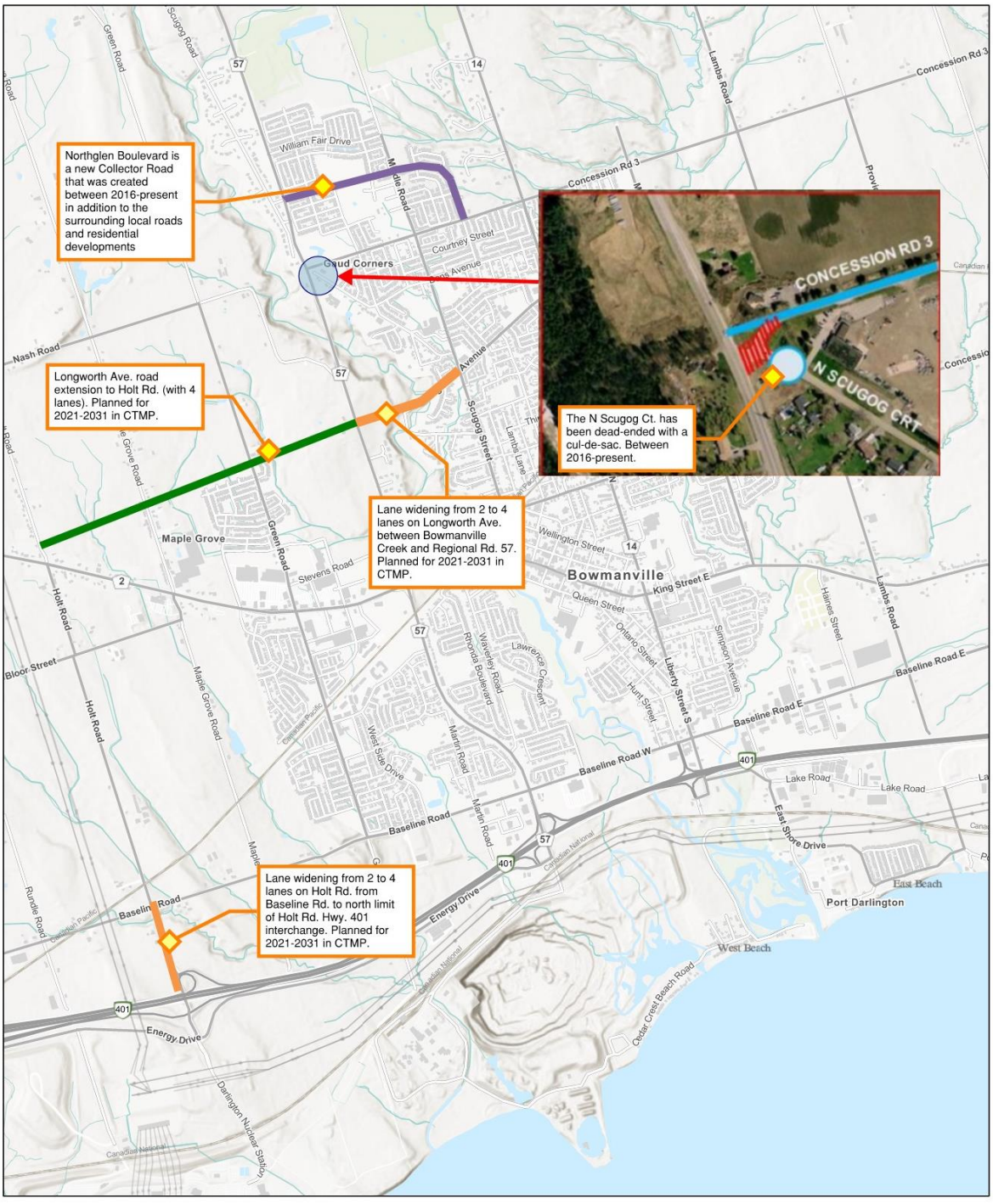
Along Highway 401, The CTMP also indicates a closure of the existing Liberty Street and Bennett Road interchanges in favor or a new Highway 401 interchange at Lambs Road. Municipal staff have indicated a likely longer-term implementation horizon for these infrastructure changes to be actualized, hence, these changes have not been implemented into the Region's model.

Additionally, as part of the SSSP, a new connection is proposed from Concession Road 3, through the study area and left towards Liberty Street North. This proposed extension of Mearns Avenue, per the Municipality of Clarington's Official Plan, will cross multiple natural features and will be assessed in detail for the most appropriate location through the study area.

An east-west Type C Arterial road has also been planned along the north boundary of the study area. But there are no collector or arterial roads connecting to this future road. However, the planned developable area north of Road A can connect to this future roadway using local road connections not identified by the Secondary Plan study.

Municipal network improvements planned and recently constructed in the vicinity of the SSSP are presented in **Figure 5-1** below.

Figure 5-1: Future Road improvements in Town of Bowmanville



5.3 Active Transportation Network Improvements

The Durham TMP and Clarington TMP also propose plans to implement infrastructure to promote active modes of transportation. These include expanding the Regional Cycling Plan network to include Liberty Street North, connecting to the existing municipal cycling facilities along other Municipal roads. Additional cycling network connections will be made to the Greenbelt Cycling Route, as it passes in proximity to the study area. According to the Regional Cycling Plan (2021), project implementation phasing is planned to take between 0 to 10 years for short term projects and 10+ years for long term routes that will require more discussion and consideration to identify the best-case solutions.

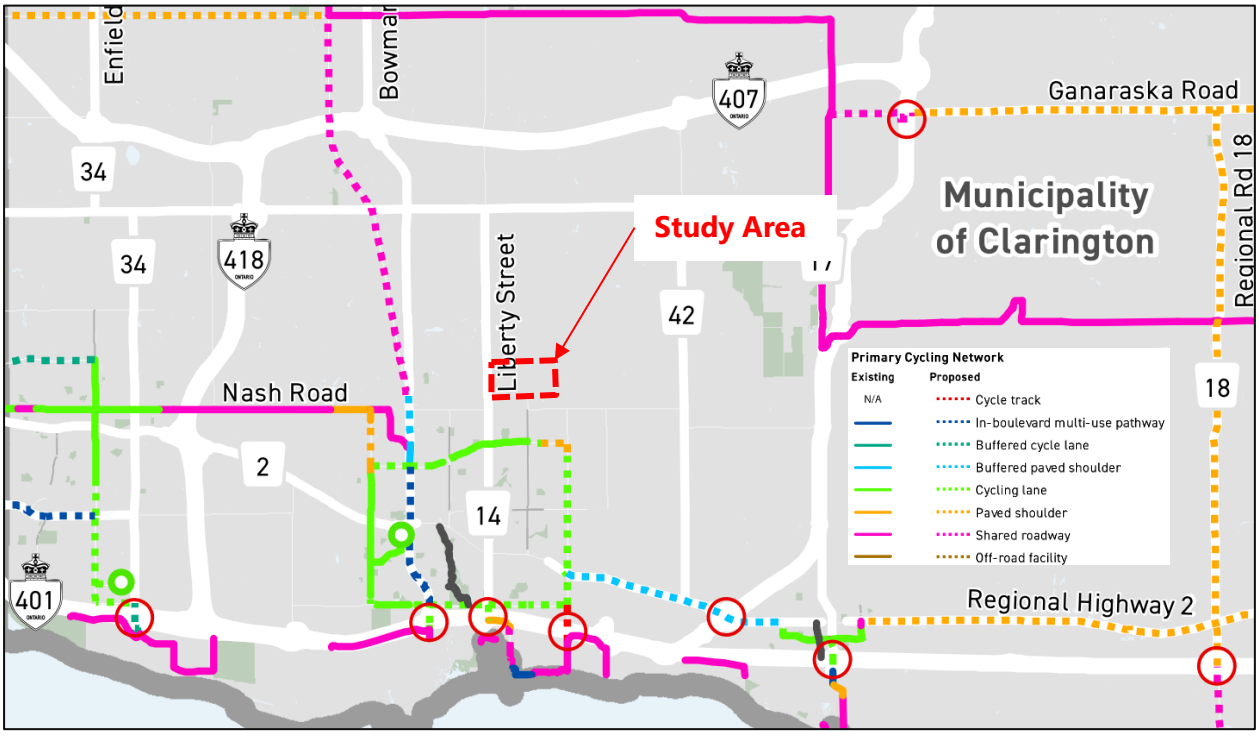
The Durham Region aims to achieve significant growth in active transportation levels by improving the access of walking and cycling routes. In this way, residents of all ages and abilities will be able to move within the neighbourhoods without relying on automobiles for movement. The Region outlines that they want to support and facilitate access to GO stations by facilitating the "first and last mile" demands (i.e., a person's initial and final segments of a journey) away from congested roads, feeder buses, and park-and-ride lots. First mile refers to the initial segment of a journey, typically from the traveler's starting point (like home or work) to the transportation hub (such as a bus stop, train station, or airport). Last mile refers to the final segment of the journey from the transportation hub to the traveler's ultimate destination.

Accordingly, cycling routes that improve municipal connectivity and enhance the Regional cycling routes will be prioritized. GO transit also plans to extend the GO rail service to the Bowmanville area and should incorporate design elements that support walking and cycling routes.

The study area lacks sidewalks on most roads, and the Clarington TMP does not indicate any planned facilities, however cycle lanes and shared routes are present along Concession Road 3. It's advisable to extend these trails in the study area to provide AT facilities for the expanding population in the future.

Finally, as per the Region of Durham's Regional Cycling Plan (2021) in **Figure 5-2**, the primary cycling network exists along Longworth Avenue, in close proximity to the SSSP boundary. Expansion of this network is planned along Lambs Road, Old Scugog Road and Regional Road 57. It is recommended that these routes be extended into the study area, so that future residents have access to cycling routes and have opportunities to make active transportation a part of their lifestyle.

Figure 5-2: Region of Durham's Primary Cycling Network (PCN) Routes



Source: Regional Cycling Plan 2021

5.4 Regional Transit Expansion

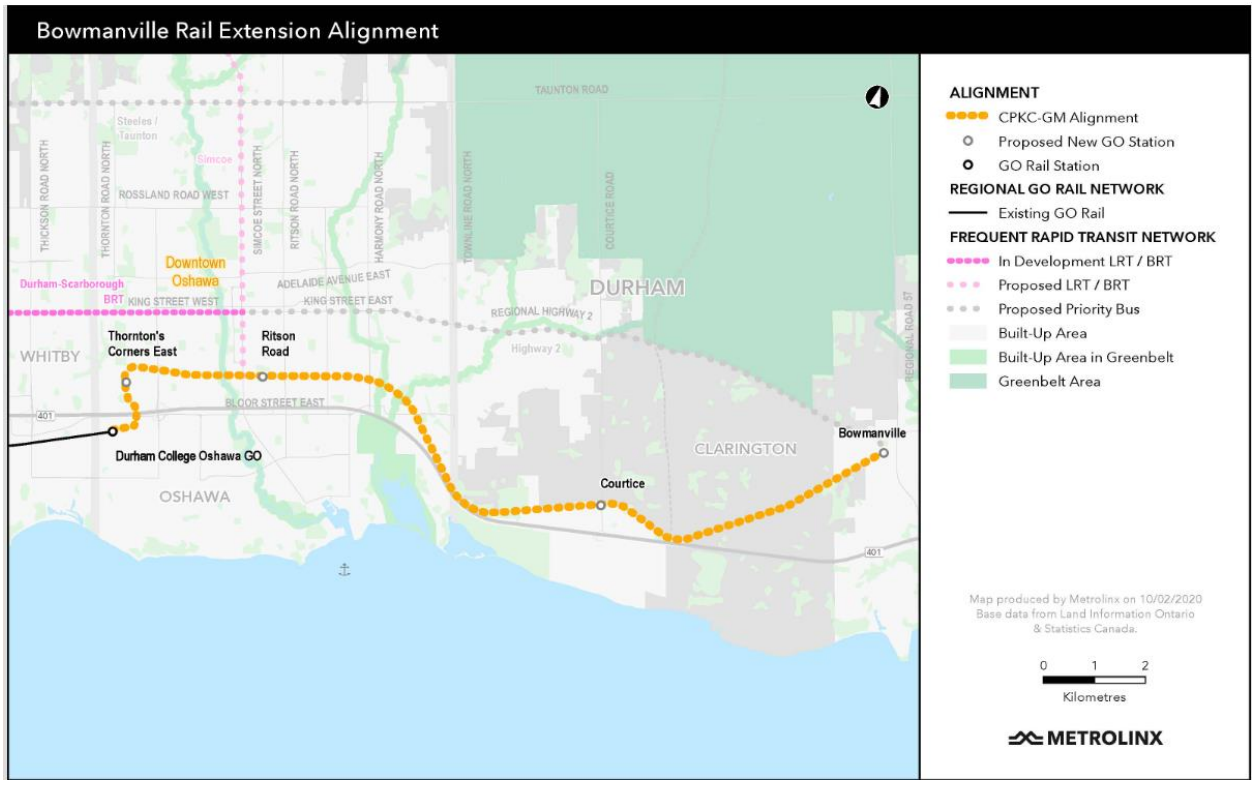
Metrolinx's 2041 Regional Transportation Plan (RTP) guides long-term planning for transportation initiatives in the GTHA through 2041. One of the major improvements that has been planned is the GO Lakeshore East Rail Extension to Bowmanville, providing regular rush-hour service. The new GO Lakeshore East Rail Extension and the Durham BRT are currently on Metrolinx's roster of projects in development. They are expected to be developed by 2031. A 20 km GO Transit rail expansion east of Oshawa to Bowmanville Avenue in Bowmanville is also planned.

The GO Rail extension into Bowmanville is a good opportunity for the Municipality to develop healthy and complete communities that support and encourage the usage of transit, walking, and cycling modes. Durham Region Transit (DRT) is also planning to work in collaboration with Metrolinx to integrate their services with the extension of the Lakeshore East line. They have also committed to Local Area Transit Plans (LATP) to extend transit service into the Region as communities continue to develop and aim to provide residents with transit services as the area matures. They will work with local municipalities, residents, and businesses to develop this program, and will extend it into Bowmanville and other communities in Clarington. This service expansion would provide Durham Region with more direct connections to downtown Toronto and the larger GO Transit network through a proposed two-way all-day service to Bowmanville.

The rail expansion was initially scheduled to run rush-hour service only but has since been revised by the Province of Ontario, which may considerably enhance access to and from the SSSP area and the Greater Toronto Area region.

Figure 5-3 depicts the route which has been considered for this expansion.

Figure 5-3: Future GO Transit Rail Expansion, Option 2 Alignment



Source: Metrolinx

As of 2022, an update by Metrolinx has been issued confirming that the expanded rail service to Bowmanville is taking its next step forward. Once the Preliminary Design Business Case (PBDC) is issued and the required infrastructure is complete, customers will benefit express peak service every half an hour between Union Station and Pickering GO. The train will make all stops between Pickering and Bowmanville. In the off-peak timings, GO trains will make hourly stops between Bowmanville and Union Station, and every two hours on weekends. In 2023, Metrolinx announced Bowmanville Construction Partners (BCP) as the construction partners to help inform the detailed design of the project. All the stations along the Bowmanville extension will be pursued through Metrolinx and the Province's Transit Oriented Communities (TOC) program. This extension aims to provide Durham Region with more direct connections to the GO Transit Network and help to reduce congestion while connection people to more job and education opportunities.

5.5 Future Background Traffic Conditions

David Kriger Consultants Inc. (DKCI) was retained by TYLin to conduct macro-simulation traffic modelling and to determine the applicable corridor growth rates for the study area roadways by building a sub-area application using the DRTPM.

The high-level growth forecasts for the SSSP land area that was previously included within the Region's 2016 sub-area model were removed and replaced with the appropriate employment and population forecasts determined by the Preferred Land Use Plan (see **Section 4)**. The network was developed with applicable municipal and regional road improvements for both existing 2023 and the future 2033 horizon years and applying relevant regional growth forecast parameters, as detailed in the transportation Terms of Reference enclosed in **Appendix A**.

As part of the future background conditions' traffic modelling, the SSSP area is analyzed for the future 2033 horizon year and considered to not have any internal development at this stage. All new trips added to the network in this scenario are associated to background traffic growth and growth associated to trips generated by a full build-out of the synchronous Soper Hills Secondary Plan area.

The population, employment, roadway, and other transportation characteristics associated with the full-build-out of the SSSP area's preferred land use plan were modelled and corridor rates were extracted to subsequently inform the Future Total traffic analysis enclosed in **Section 6** of this report.

5.5.1 Development of the Sub-Area Model

The sub-area model is an extract of the DRTPM. The model was used [a] to account for the proposed land use for the two communities, which differs from that assumed by the Durham Region model for its 2033 forecasts, and [b] to develop a detailed road network for the two communities to examine the impacts of the proposed land use.

The modelling approach was reviewed with and approved by Durham Region's modelers, as recorded in the study terms of reference. Two key specifications were:

- The requirement to model both AM and PM peak hours.
- The requirement that growth factors were to be developed from the forecasts and applied to existing intersection counts (as opposed to using the forecast turning movements directly). For intersections that do not exist today, factors were developed from link (road section) forecasts. In all cases, the growth factors were reviewed for consistency and reasonableness, recognizing that some anomalies can result in the modelling process.

The Region supplied:

- Base road and highway networks for the AM and PM peak hours for 2022 and 2033.
- Vehicle trip matrices for these hours for four modes: auto vehicle-trips, and light, medium and heavy trucks. Note that autos are by far the dominant mode, of the order of 90% of all trips in each peak hour across the sub-area, though representing more than 99% of all trips in the vicinity of the two communities. The four matrices are important for the model's multi-class trip assignment procedure, to ensure that the appropriate congestion levels were taken into account by the model's route choice algorithms. This approach also enables a direct comparison with the Region's 2022 base.

Five scenarios were examined for each of the AM and PM peak hours:

- **Base 2023 conditions**. This is an update of the 2022 auto vehicle-trip tables supplied by the Region, to reflect the 2023 base year. To do this, the consultant first reviewed the 2022 trip tables to ensure their reasonableness relative to available counts. Next, the consultant reviewed available traffic counts in and around the study area and determined an average growth factor of 4%. It should be noted that counts were available only for selected durations and locations.
- **Base 2033 background**. This scenario uses the base 2033 auto vehicle-trip tables supplied by the Region as is, with the exception of retaining the 2023 trips to and from Soper Springs and Soper Hills. This scenario represents the base background traffic growth.
- **Base 2033 background + Soper Springs Secondary Plan**. This scenario adds the proposed Soper Springs build-out to the 2033 background, net of the 2023 Soper Springs base. Soper Hills is assumed to be at 2023 conditions.
- **Base 2033 background + Soper Hills Secondary Plan**. This scenario adds the proposed Soper Hills build-out to the 2033 background, net of the 2023 Soper Hills base. Soper Springs is assumed to be at 2023 conditions.
- **Base 2033 background + Soper Springs + Soper Hills (buildout).** This scenario comprises the full build-out scenario for both Soper Springs and Soper Hills, combined with the 2033 background.

It should be noted that, apart from the addition of the 4% growth factors to develop a 2023 base, the three truck matrices were used as supplied. In other words, a review of truck trip origins, destinations, and assignments in the vicinity of the two communities revealed only marginal numbers of truck trips in these mainly residential areas – i.e., the areas of interest are largely bypassed by truck traffic.

For each study intersection, modelled turning movement volumes were output from the model for each of the two sets of scenarios (five scenarios each for the AM and PM peak hours). From these, growth factors were developed, as noted. For new intersections, link volumes were used for

the same purpose.

A report was prepared by DKCI which details the process of creating the sub-area transportation model and its outputs, and is enclosed in **Appendix D**.

5.5.2 Deriving Future Traffic Volume Growth

As part of the future transportation modelling for the SSSP, the future background conditions have been considered. Future background traffic associated with, and generated by, the synchronous Soper Hills Secondary Plan is factored into the traffic modelling. Traffic studies for both developments have been conducted in parallel and were added to the Region's sub-area model, informing growth rates which are subsequently utilized for the Future Total analysis. Furthermore, concurrent regional and municipal planned modifications to the transportation road network (including future active transportation and future transit alterations) have also been considered.

Three separate dataset outputs were extracted from the EMME model. The first set of outputs represents traffic volumes for the base year scenario (2023) through the application of regional growth parameters onto the previous version of the Region's transportation model. This base year scenario does not consider any new developments within the project area. The second set of outputs relates to the future background scenario which considers background growth over a 10-year horizon and the Soper Hills Secondary Plan as a background development. The final set represents the future total scenario where the full development within the SSSP is also treated as a traffic generating zone in addition to the background growth and background development.

The base values and future background volumes from the first two data sets were compared to calculate an annual growth rate that represents the future background growth rate. This growth rate was then applied to the existing turning movement counts over a 10-year horizon to get future background traffic volumes for year 2033. Furthermore, to minimize variances in individual intersection growth parameters, an average growth rate was calculated for the four key boundary roads which surround the study area. All of the existing study intersections are located along these four surrounding study area roadways (Liberty Street North, Concession Road 3, Concession Road 4 and Lambs Road). The calculated growth rates are presented in **Table 5-1**.

Table 5-1: Future Background Growth Rates

Corridor	AM Annual Growth Rate Applied	PM Annual Growth Rate Applied
Liberty Street Corridor	3.05%	1.72%
Lambs Road	2.65%	1.57%
Concession Road 4	2.65%	1.57%
Concession Road 3	7.58%	5.60%

Where existing traffic counts were zero, and for new intersections, growth rates couldn't be applied. For those movements, traffic volumes from the EMME future background data set were used as a guide with comprehensive engineering judgement applied to the model.

5.5.3 Future Background Conditions Traffic Analysis

The traffic analysis results for the study intersections during the weekday AM and PM peak hour periods during 2033 Future Background conditions are summarized below in **Table 5-2**. Detailed synchro reports are provided in **Appendix E**.

Table 5-2: Future Background Conditions Traffic Analysis - Year 2033

Intersection	Movement	Weekday AM Peak Hour			Weekday PM Peak Hour		
		v/c	Delay (s)	LOS	v/c	Delay (s)	LOS
Liberty Street N & Concession Road 4 (Stop-controlled)	*EBLTR*	0.03	13	B	0.08	16	C
	WBLTR	0.04	16	C	0.05	15	B
	NBLTR	0.01	0	A	0	0	A
	SBLTR	0.01	0	A	0.01	0	A
Mearns Avenue & Concession Road 4 (Stop-controlled)	*EBLTR*	0	3	A	0	2	A
	WBLTR	0	0	A	0	0	A
	NBLTR	0.01	9	A	0	9	A
	SBLTR	0.01	8	A	0	8	A
Concession Road 4 & Bethesda Road (Stop-controlled)	*EBLT*	0	7	A	0	2	A
	WBTR	0.01	0	A	0.01	0	A
	SBLR	0.01	9	A	0.02	9	A
Liberty Street North & Sydel Court (Stop-controlled)	*EBLR*	0.01	13	B	0.01	11	B
	NBLT	0	0	A	0	0	A
	SBTR	0.2	0	A	0.26	0	A
Liberty Street North & Road B/Pamela Court (Stop-controlled)	*EBLTR*	0.02	11	B	0.01	16	C
	WBLTR	0.09	11	B	0.02	12	B
	NBLTR	0	0	A	0	0	A

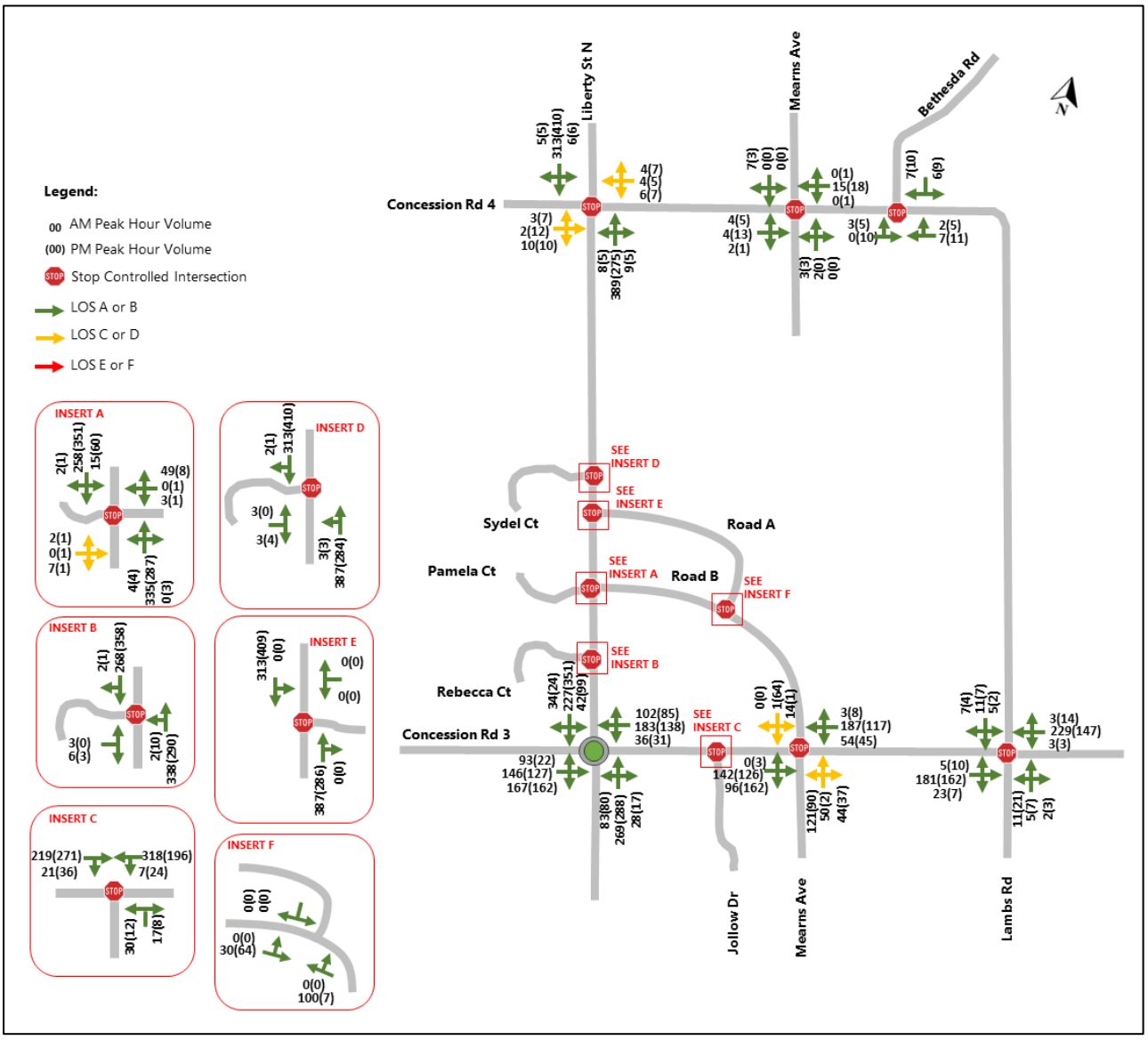
	SBLTR	0.01	1	A	0.05	2	A
Liberty Street North & Rebecca Court (Stop-controlled)	*EBLR*	0.02	11	B	0	11	B
	NBLT	0	0	A	0.01	0	A
	SBTR	0.17	0	A	0.23	0	A
Liberty Street North & Concession Road 3 (Roundabout)	*EBLTR*	0.528	12	B	0.487	13	B
	WBLTR	0.49	13	B	0.363	10	A
	NBLTR	0.48	11	B	0.471	10	B
	SBLTR	0.39	9	A	0.581	13	B
Jollow Drive & Concession Road 3 (Stop-controlled)	*EBTR*	0.15	0	A	0.2	0	A
	WBLT	0.01	0	A	0.02	1	A
	NBLR	0.1	13	B	0.04	12	B
Concession Road 3 & Lambs Road (Stop-controlled)	*EBLTR*	0	0	A	0.01	1	A
	WBLTR	0	0	A	0	0	A
	NBLTR	0.04	13	B	0.06	12	B
	SBLTR	0.05	12	B	0.02	11	B
Concession Road 3 & Mearns Avenue (Stop-controlled)	*EBLTR*	0	0	A	0	0	A
	WBLTR	0.05	2	A	0.04	2	A
	NBLTR	0.48	19	C	0.29	16	C
	SBLTR	0.05	16	C	0.17	15	C
Liberty Street North & Road A (Stop-controlled)	*WBLR*	0	0	A	0	0	A
	NBTR	0.25	0	A	0.18	0	A
	SBLT	0	0	A	0	0	A
Mearns Avenue/Road B & Road A (Stop-controlled)	*EBLT*	0.04	7	A	0.08	7	A
	WBTR	0.12	8	A	0.01	7	A
	SBLR	0	7	A	0	0	A

As per the analysis results, all intersections in the road network operate at an acceptable LOS of C or better. Correspondingly, the road network operates under acceptable levels of service with all individual movements experiencing minor delays and with v/c ratios less than 1.

The Liberty Street North & Concession Road 3 intersection is planned to be converted to a roundabout as part of future conditions and has been modelled as such. It should be noted that the Synchro software was used to analyze traffic operations per the Study Terms of Reference and, although it is not the most precise for roundabout modelling, it provided an adequate evaluation of traffic performance, following the HCM 2010 methodology. Traffic analysis software that is more specialized in analyzing roundabout operations require inputs relating to the detailed geometric design of the roundabout, which is not a part of this study.

Traffic volumes for each intersection movement are illustrated in **Figure 5-4**.

Figure 5-4: Future Background Conditions Traffic Volumes and Operations



**Lane arrows are not representative of proposed lane configuration*

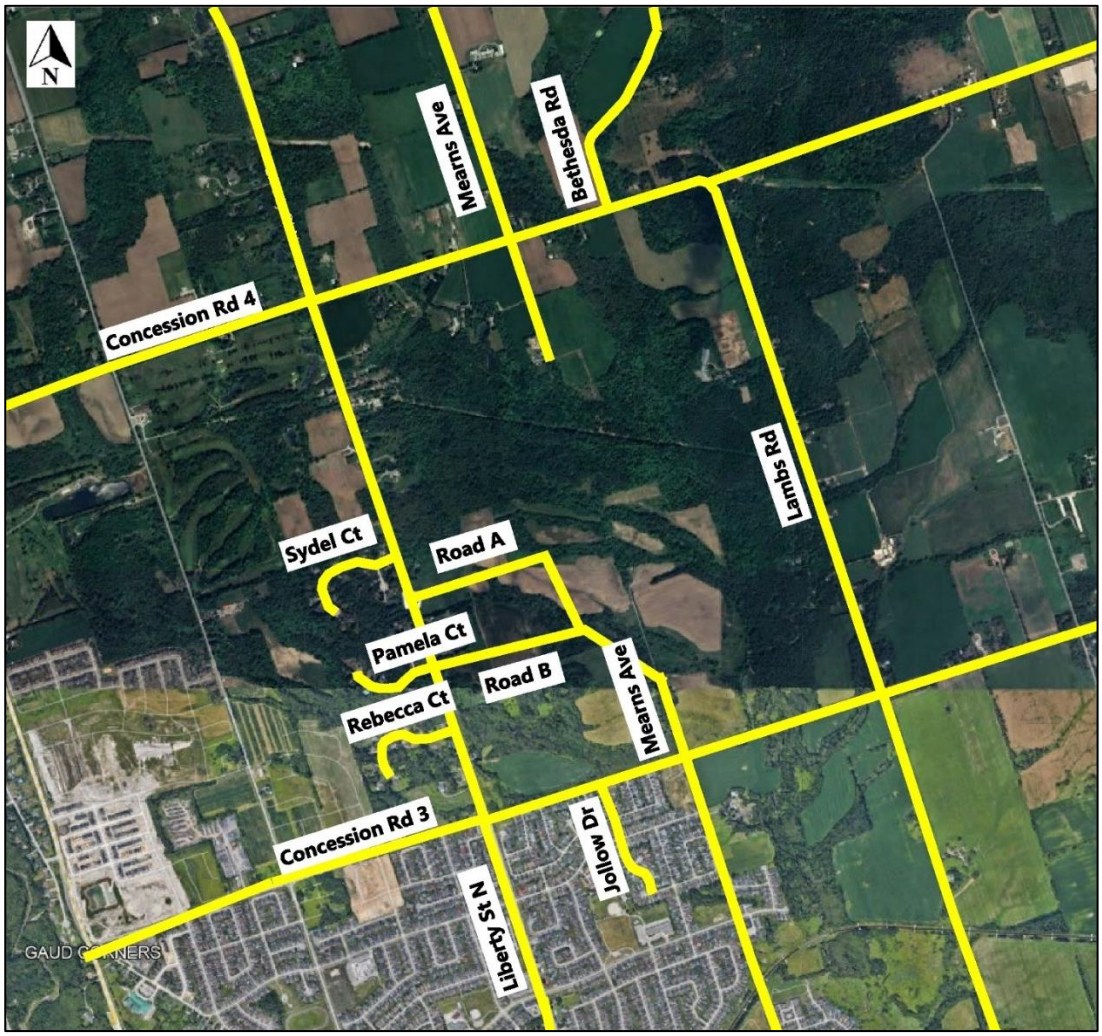
6 FUTURE TRAFFIC CONDITIONS

6.1 Future Road Network

The future study area road network is illustrated in **Figure 6-1**. Mearns Avenue extends to Liberty Street, labeled as Road B in the model figure below. Road A branches off from Mearns Avenue/Road B and connects to Liberty Street, south of Sydel Court.

For the future traffic analysis, it was assumed that these corridors are two-way collector roads with a posted speed limit of 50 km/hr. In the future horizon, the existing intersection of Liberty Street and Concession Road 3 is upgraded from a stop-controlled intersection to a roundabout.

Figure 6-1: Future Conditions Road Network



6.2 Future Study Area Intersections

The 2033 future conditions traffic analysis contains additional internal roadways and intersections within the SSSP area. Synchro traffic analysis of the 2033 future conditions scenario consisted of all intersections as listed in **Table 6-1**. Traffic volumes at each intersection were calculated by applying methodologies discussed in **Section 5.5** for both the AM and PM peak periods.

Table 6-1: Future Conditions Road Intersections

Intersection Name	Control Type
Liberty Street North & Concession Road 4	4-way, stop controlled
Concession Road 4 & Mearns Avenue	4-way, stop controlled
Concession Road 4 & Bethesda Road	3-way, stop controlled
Liberty Street North & Sydel Court	3-way, stop controlled
Liberty Street North & Rebecca Court	3-way, stop controlled
Liberty Street North & Concession Road 3	Roundabout
Concession Road 3 & Jollow Drive	3-way, stop controlled
Concession Road 3 & Lambs Road	4-way, stop controlled
Concession Road 3 & Mearns Avenue	4-way, stop controlled
Liberty Street & Road A/Pamela Court	4-way, stop controlled
Liberty Street & Road B	3-way, stop controlled
Mearns Avenue/Road B & Road A	3-way, stop controlled

6.3 Future Total Traffic Conditions

6.3.1 Determining Internal Study Intersection Volumes

The traffic volumes for the 2033 Future Total scenario were obtained by applying growth rates developed from the sub-area model to the Future Background volumes. These trips were a result of and validated against site trips generated by the proposed Preferred Land Use Plan, using engineering judgement.

Site trips were generated using ITE's Trip Generation Manual 11th Edition. As the preferred land use plan proposes a variety of land use categories for the study area. These categories have been matched with most related land use codes as specified in by ITE and indicated in **Table 6-2**. The proposed study area developments have been categorized into residential, institutional, and retail

land uses to match the corresponding ITE Land Use Codes (LUC's).

Table 6-2: Associated ITE Land Use Codes for Proposed Land Use Categories

Land Use Category	ITE Land Use Code	Independent variable for trip generation	Weekday AMPH Parameters (vehicle-trips)	Weekday PMPH Parameters (vehicle-trips)
Medium density local corridor – mid rise (5-6 storeys)	221 – Multi-family housing mid rise	Dwelling units	Avg rate: 0.37 23% entering 77% exiting	Avg rate: 0.39 61% entering 39% exiting
Medium density local corridor low rise (2-4 storeys)	215 – Multi-family housing (assumed townhouses, per SGL direction, April 10, 2024)	Dwelling units	Avg rate: 0.48 25% entering 75% exiting	Avg rate: 0.57 59% entering 41% exiting
Low density – singles	210 – Single family detached housing	Dwelling units	Avg rate: 0.70 25% entering 75% exiting	Avg rate: 0.94 63% entering 37% exiting
Low density – townhouses	215 – Single family attached housing (townhouses)	Dwelling units	Avg rate: 0.48 25% entering 75% exiting	Avg rate: 0.57 59% entering 41% exiting
Elementary school	520 – Elementary school	Students	Avg rate: 0.74 54% entering 46% exiting	Avg rate: 0.16 46% entering 54% exiting
Neighbourhood centre	821 – Shopping plaza between 40k – 150k sq. ft., w/o supermarket	1,000 square feet	Avg rate: 1.73 62% entering 38% exiting	Avg rate: 5.19 49% entering 51% exiting

Site trips, as presented in **Table 6-3**, were calculated to reflect the density and development type associated to each Traffic Assessment Zone (TAZ) within the SSSP area.

Table 6-3: ITE Trip Generation Traffic Volumes for SSSP TAZs

TAZ	AM Peak Hour		PM Peak Hour	
	Exiting Secondary Plan Area	Entering Secondary Plan Area	Exiting Secondary Plan Area	Entering Secondary Plan Area
1	3	1	2	3
2	18	6	12	20
3	0	0	0	0
4	39	54	133	130
5	23	8	15	25
6	0	0	0	1
7	25	8	17	28
8	9	3	6	10
9	13	4	9	14
10	17	6	11	17
11	56	19	37	61
12	55	18	36	55
13	39	13	25	40
14	14	5	9	13
15	67	20	36	56
16	9	3	6	9
17	2	1	2	2
SUM	**391**	**169**	**355**	**484**

These site trips were distributed throughout the network within the study area according to local trip distribution patterns and using engineering judgement. The future total volumes were obtained at each intersection by adding site trips to the future background volumes. These values were cross-referenced with the future total values obtained from the EMME model to ensure that the obtained volumes and applied distribution is reasonable.

6.3.2 Future Total Traffic Analysis

The following improvements were modelled in the future road network for this scenario and accounted for within the traffic analysis:

- All-way stop control at Concession Road 3 & Mearns Avenue intersection.
- A dedicated left-turn lane added on the north and south leg Concession Road 3 & Mearns Avenue intersection. Both lanes have a storage length of 55 metres. Correspondingly, this improvement necessitates a road widening to facilitate the left turn lanes along the two approaches.
- A dedicated left turn lane added on the east leg of Liberty Street North & Road B/Pamela Court intersection. This lane has a storage length of 55 metres.

As per the sub-area model, 1 to 2 percent of traffic is heavy vehicle traffic. Therefore, a heavy vehicle percentage of 2 percent was assumed in the model. The traffic analysis results for the study intersections during the weekday AM and PM peak hour periods during future total conditions are summarized below in **Table 6-4**. The individual movements operating at LOS of 'E' or worse are bolded and highlighted to indicate near-capacity conditions. Detailed synchro reports are provided in **Appendix F**.

Table 6-4: Future Total Conditions Traffic Analysis - Year 2033

Intersection	Movement	Weekday AM Peak Hour			Weekday PM Peak Hour		
		v/c	Delay (s)	LOS	v/c	Delay (s)	LOS
Liberty Street N & Concession Road 4 (Stop-controlled)	*EBLTR*	0.03	13	B	0.09	16	C
	WBLTR	0.05	16	C	0.06	15	C
	NBLTR	0.01	0	A	0	0	A
	SBLTR	0.01	0	A	0.01	0	A
Concession Road 4 & Mearns Avenue (Stop-controlled)	*EBLTR*	0	3	A	0	2	A
	WBLTR	0	0	A	0	0	A
	NBLTR	0.01	9	A	0	9	A
	SBLTR	0.01	9	A	0	8	A
Concession Road 4 & Bethesda Road (Stop-controlled)	*EBLT*	0	7	A	0	3	A
	WBTR	0.01	0	A	0.01	0	A
	SBLR	0.01	9	A	0.02	9	A
Liberty Street North & Sydel Court	*EBLR*	0.01	13	B	0.01	11	B
	NBLT	0	0	A	0	0	A
	SBTR	0.22	0	A	0.27	0	A

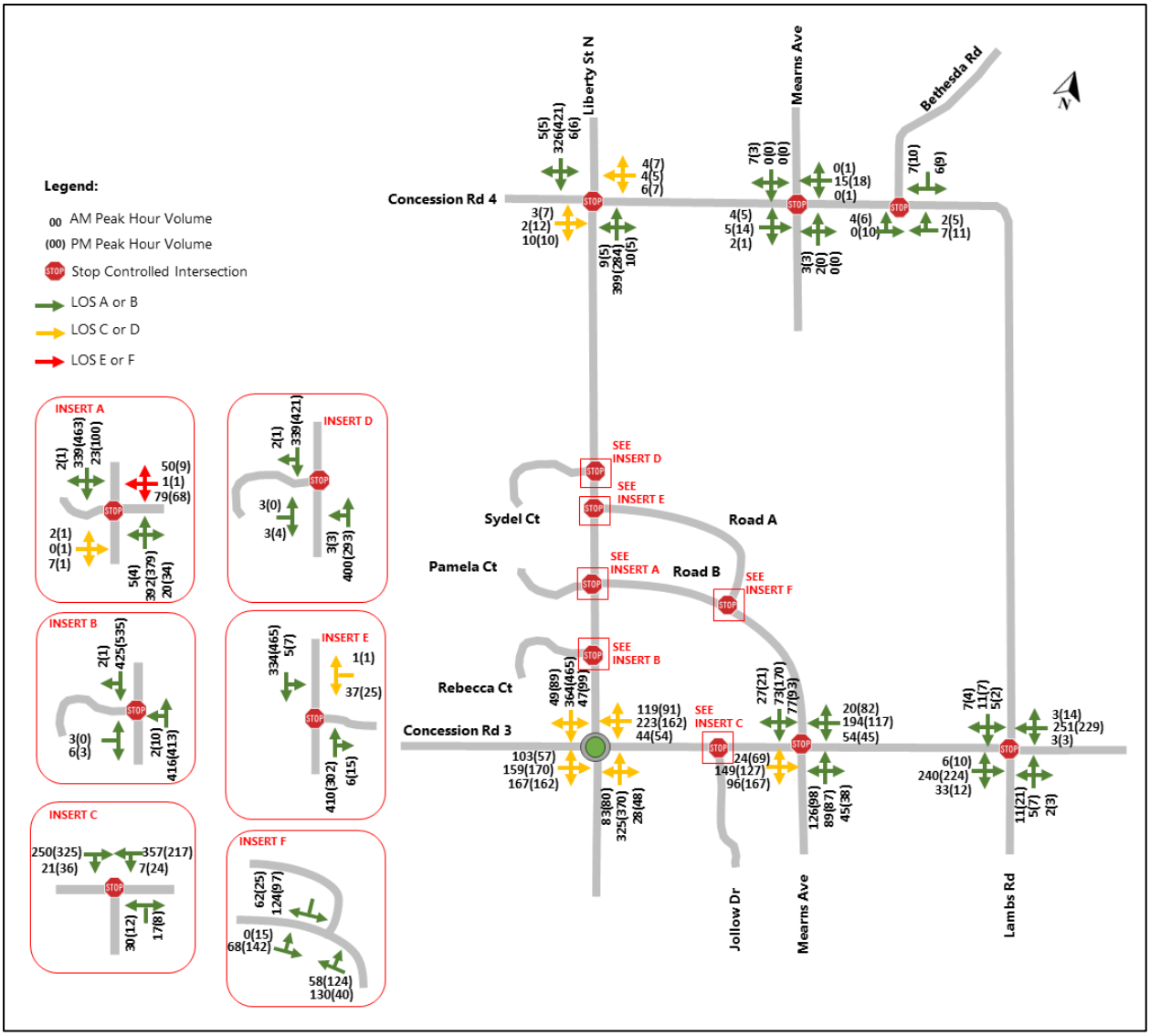
(Stop-controlled)							
Liberty Street North & Road B/Pamela Court (Stop-controlled)	*EBLTR*	0.02	13	B	0.01	22	C
	WBL	0.33	25	D	0.47	47	**E**
	WBTR	0.09	12	B	0.02	12	B
	NBLTR	0	0	A	0	0	A
	SBLTR	0.02	1	A	0.1	3	A
Liberty Street North & Rebecca Court (Stop-controlled)	*EBLR*	0.02	13	B	0.01	12	B
	NBLT	0	0	A	0.01	0	A
	SBTR	0.27	0	A	0.34	0	A
Liberty Street North & Concession Road 3 (Roundabout)	*EBLTR*	0.65	18	C	0.70	23	C
	WBLTR	0.62	18	C	0.49	13	B
	NBLTR	0.57	13	B	0.66	16	C
	SBLT	0.62	16	C	0.84	27	D
Jollow Drive & Concession Road 3 (Stop-controlled)	*EBTR*	0.17	0	A	0.23	0	A
	WBLT	0.01	0	A	0.02	1	A
	NBLR	0.10	13	B	0.04	13	B
Concession Road 3 & Lambs Road (Stop-controlled)	*EBLTR*	0.01	0	A	0.01	0	A
	WBLTR	0	0	A	0	0	A
	NBLTR	0.04	14	B	0.07	14	B
	SBLTR	0.05	13	B	0.03	12	B
Concession Road 3 & Mearns Avenue (Stop-controlled)	*EBLTR*	0.46	14	B	0.66	20	C
	WBLTR	0.48	14	B	0.47	15	B
	NBL	0.27	11	B	0.23	12	B
	NBTR	0.26	10	B	0.27	12	B
	SBL	0.17	11	B	0.22	12	B
	SBTR	0.2	10	B	0.41	14	B
Liberty Street North & Road A (Stop-controlled)	*WBLR*	0.12	17	C	0.08	17	C
	NBTR	0.27	0	A	0.20	0	A
	SBLT	0	0	A	0.01	0	A
Mearns Avenue/Road B & Road A (Stop-controlled)	*EBLT*	0.1	8	A	0.21	9	A
	WBTR	0.25	9	A	0.20	8	A
	SBLR	0.25	9	A	0.17	9	A

As per the analysis results, all intersections in the road network operate at an acceptable LOS of D or better with the exception of one movement that has a LOS E. The least optimal traffic movement in

the network is the westbound left (WBL) movement at Liberty Street North and Road B/Pamela Court intersection. It operates at LOS of E and experiences a delay of 47 seconds with a v/c ratio of 0.47 in the PM peak period. The road network operates under acceptable levels of service of E or better, with all individual movements experiencing minor delays and low v/c ratios less than 1.

Traffic volumes and the LOS for each intersection approach are illustrated in **Figure 6-2**.

Figure 6-2: Future Total Conditions Traffic Volumes and Operations



**Lane arrows are not representative of proposed lane configuration*

6.3.3 All-Way-Stop-Control Warrant Analysis

An all-way stop control (AWSC) warrant was conducted under future total conditions for the Concession Road 3 & Mearns Avenue intersection based on the volume warrant analysis methodology outlined by the OTM Book 5 "Regulatory Signs" (2021). The volume warrant analysis is based on the following criteria/inputs:

- Total vehicle volume on all intersection approaches over the highest eight or four hours (depending on the road classification);
- Combined vehicle and pedestrian volume on the minor street; and,
- Volume split of the major and minor legs.

The OTM lists three different volume-related criteria that, when all are met, indicate that all-way stop control may be considered depending on the road types involved. The criteria are summarized in **Table 6-5.**

Table 6-5: OTM Book 5 AWSC Volume Warrant Criteria

Criteria	Collectors and Rural Arterials
Total Volumes for Highest Hours Each Day	>375 vehicles per hour for each of the highest 8 hours
Combined Minor Street Vehicle and Pedestrian Volumes	(i) >150 units (vehicles plus pedestrians) for each of the same hours as total volume, or; (ii) >120 units for the each of the same hours as total volume with average minor street delay >30 seconds
Major-Minor Volume Split	Volume split does not exceed 70/30 (i.e minor street must be >30% of intersection volume), or 75/25 for three-legged intersections

The rural arterials warrant criteria applies to this intersection as Concession Road 3 is classified as a rural Type B arterial road. This AWSC Volume Warrant was conducted by following a modified approach to determining the peak 8-hour future traffic volumes which included the use of travel data from the 2016 Transportation Tomorrow Survey (TTS). By analyzing existing travel demands in areas adjacent to the SSSP area (TTS zones: 1256, 1258, 1259), the traffic volume distribution for a period of 8 non-continuous peak hours was determined. This distribution was then applied to the singular peak AM and PM traffic volumes under future total conditions to determine the corresponding 8-hour traffic volumes.

By using this methodology, it is determined that the Concession Road 3 & Mearns Avenue intersection meets all three criteria in warranting an AWSC under the future total scenario. The detailed AWSC Volume Warrant analysis is included in **Appendix G**.

7 FUTURE TRANSPORTATION NETWORK

7.1 Traffic Conditions Summary

Network improvements along roads that exist within and bound the SSSP area are recommended to facilitate acceptable traffic operations. The future conditions traffic analysis indicates acceptable vehicular delays and volume-to-capacity ratios for the through moving volumes along Liberty Street North and Concession Road 3, in accordance with Municipal traffic impact study guidelines. No additional lanes are recommended along these two key roadways as the future volumes can be facilitated within their existing capacity.

The internal study area road network constitutes the Mearns Avenue extension and the inclusion of Road A and Road B collector roads. Traffic results indicate acceptable conditions at the Mearns Avenue/Road B intersection with Road A which has been modeled with a two-way stop-control configuration and with one traffic lane along each travel direction.

The Mearns Avenue intersection with Concession Road 3 is shown to be operating at unacceptable LOS for the northbound/southbound approaches prior to the implementation of any improvements. This intersection is recommended to be upgraded to an all-way-stop control design to facilitate acceptable traffic operations and better accommodate the large traffic volumes entering and exiting the study area.

Additionally, it should be noted that the westbound left movement at the Liberty Street North and Pamela Court/Road B intersection will be approaching at-capacity conditions under future scenarios, and it is recommended to monitor this intersection following the development of the Secondary Plan area.

It is recommended that the Region and Municipality also consider the implementation of a roundabout as an alternative to the AWSC measure at the intersection of Mearns Avenue & Concession Road 3. Roundabouts can reduce vehicle delay, improve traffic flow, and lower long-term maintenance costs. Their implementation can also reduce the likelihood and severity of collisions by eliminating conflict points associated with left turns and perpendicular movements. An Intersection Control Study (ICS) should be considered for this intersection as well as at Road A/Road B & Mearns Avenue and Liberty Street/Road B & Pamela Court intersections to determine the optimal intersection control prior to implementation.

7.2 Future Intersection Spacing

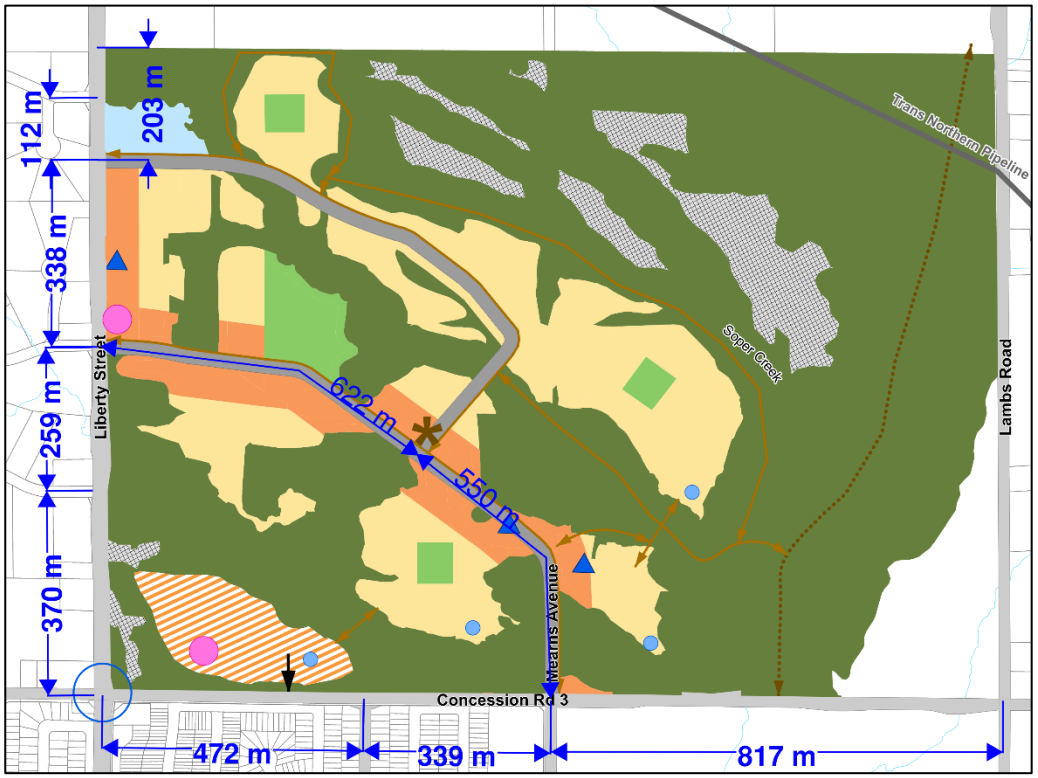
The approximate intersection spacing between existing intersections and the future intersections with Mearns Avenue (as labeled in **Figure 7-1**) were compared to the intersection spacing guidelines described in Table 5 of the Regional Offical Plan. These guidelines provide suggested major intersection spacing lengths to help optimize traffic flow and progression along Type A and B arterial roads .

For intersections along east-west Type B arterial roads (Concession Road 3), an alternative spacing of 300 metres and 500 metres is suggested in the regional guidelines. The intersection of Mearns Avenue with Concession Road 3 is currently located approximately 800 metres between Liberty Street to the west and Lambs Road to the east, and therefore, it maintains acceptable intersection spacing. The intersection of Concession Road 3 with Jollow Drive is a 3-leg, stop-controlled intersection and does not necessarily need to meet the arterial intersection spacing guidelines as the intersection is not signalized and Jollow Drive is not a Major Road.

For intersections along north-south Type B arterial roads, a major intersection spacing of 525 metres is suggested. The future intersections of Liberty Street at Road A, and Liberty Street at Road B, are spaced approximately 338 metres apart. However, as all the study intersections along Liberty Street are stop-controlled, the guidelines do not apply. Furthermore, the intersections spacing from the Mearns Avenue/Road B and Pamela Court intersection towards Concession Road 3 is more than the minimum distance, therefore it is acceptable.

The Transportation Association of Canada (TAC) Manual Chapter 9 was also considered in parallel with regional guidelines. It is stated that for arterial roads with a traffic progression speed of 50 km/h, the designed spacing between signalized intersections is approximately 400 metres. A typical minimum spacing of 200 metres along arterial roads is also specified. The intersections of Road A/Sydel Court with Liberty Street fail to meet the suggested guideline, yet the distance between them is acceptable, considering that Sydel Court, being a local residential street granting access to 20 detached homes, experiences minimal traffic flow. The remaining study intersections surpass this minimum intersection spacing requirement of 200 metres.

Figure 7-1: Approximate Road Network Intersection Spacing



7.3 Internal Network

The design of internal roadways within the Soper Hills Secondary Plan area is influenced by requirements of the forecasted traffic volumes, regional and municipal design standards, and the goal of providing appropriate pedestrian infrastructure. A roadway corridor typically refers to the space between buildings, it encompasses the road surface, the area between the curb and property line and the space within the property set back area. Consisting of a significant portion of the study area, it's clear that developing the appropriate internal roadway network plays a role in shaping the identity of the area. Its design can aid in navigation for pedestrians and vehicles alike, offering clearly delineated roadway characteristics for efficient travel.

7.3.1 Arterial Roads

The existing boundary roads that surround the SSSP are all rural, bi-directional arterial roads providing 1 lane of travel in each direction. Under the current Regional Official Plan, Type B Arterial Roads (Liberty Street North, Concession Road 3 and Lambs Road) are to have a minimum of 30 m right-of-way. The right-of-way designs of these roads are currently appropriate for the existing land use due to the minimal development in the area, as such, they do not currently facilitate active modes of transportation. Specifically, Lambs Road is a narrow, paved road with no existing

roadside shoulders. **Figure 7-2** shows the existing cross-section of Lambs Road and Providence Road along the study area boundary. Sidewalks or cycling facilities are not provided in the existing road rights-of-ways.

Figure 7-2: Existing Lambs Road and Concession Road 4 ROW Cross-sections



The vehicle access points into the SSSP are located along Liberty Street North and along Concession Road 3. These roadways have wider lane widths and Liberty Street North also has roadside shoulders. **Figure 7-3** shows the existing cross-section of Lambs Road and Providence Road along the study area boundary.

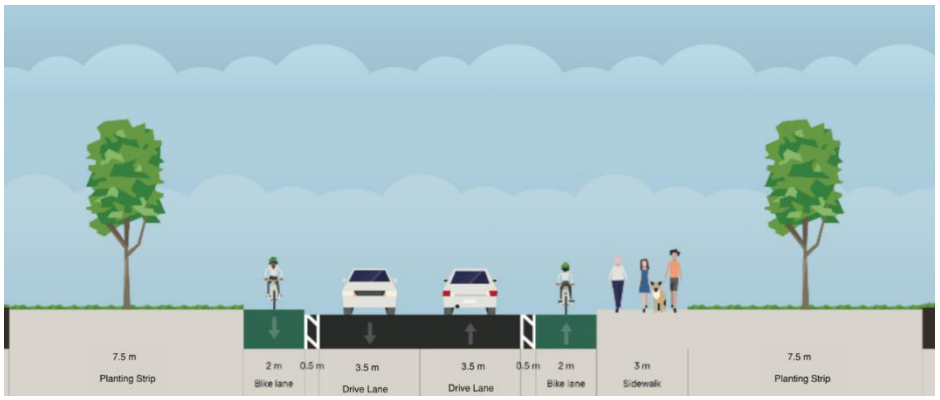
Figure 7-3: Existing Liberty Street North and Concession Road 3 ROW Cross-sections



Traffic analysis results indicate that additional lanes along any existing roadway surrounding the study area are not required as the current traffic operations are acceptable under Municipal guidelines. However, it is recommended to provide active transportation facilities along the Liberty

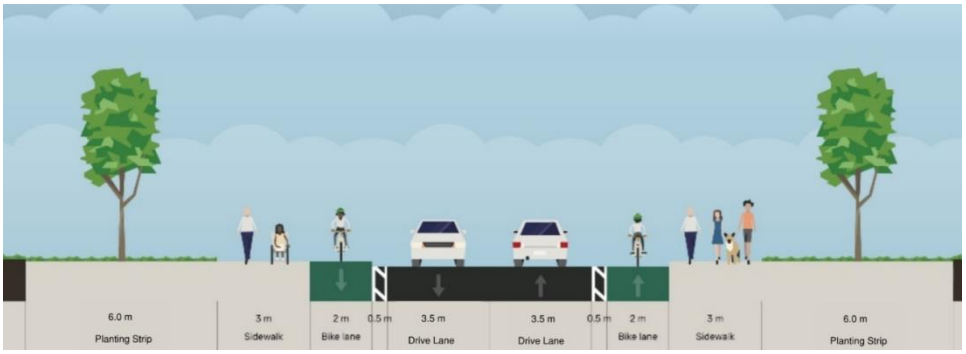
Street North and Concession Road 3 adjacent to the study boundary. Sidewalks are recommended along Liberty Street North to facilitate pedestrian movement along this corridor and to provide sufficient pedestrian access to the medium/low-density development which abut the roadway. Bicycle lanes of a minimum width of 1.8 metres are also recommended on both sides of the road. A separation buffer which is 0.3 to 1 metre wide should be provided to separate bike lanes and drive lanes. More information and options on separation of cycling facilities from vehicular traffic can be found in OTM Book 18, Section 4.3.1. **Figure 7-4** Illustrates the recommended right-of-way cross-section of the Liberty Street North. The Regional Cycling Plan does not include any It is recommended any dedicated cycling facilities along Liberty Street North in the study area. It is recommended that the proposed buffered bike lanes, as shown below, be considered for addition to the Primary Cycling Network as part of the future RCP update.

Figure 7-4: Recommended Cross-section for Liberty Street North



Sidewalks are also recommended along Concession Road 3 on both sides of the road wherever feasible to facilitate pedestrian movement along this corridor. Between Liberty Street North and Mearns Avenue, a sidewalk path should be provided at least on the north side of the road. Similar to Liberty Street North, buffered bike lanes are recommended on both sides of the road. **Figure 7-5** illustrates the recommended right-of-way cross-section of the roadway Concession Street 3. The roadway and pedestrian facility widths are recommend based on the TAC and OTM Book 18 guidelines.

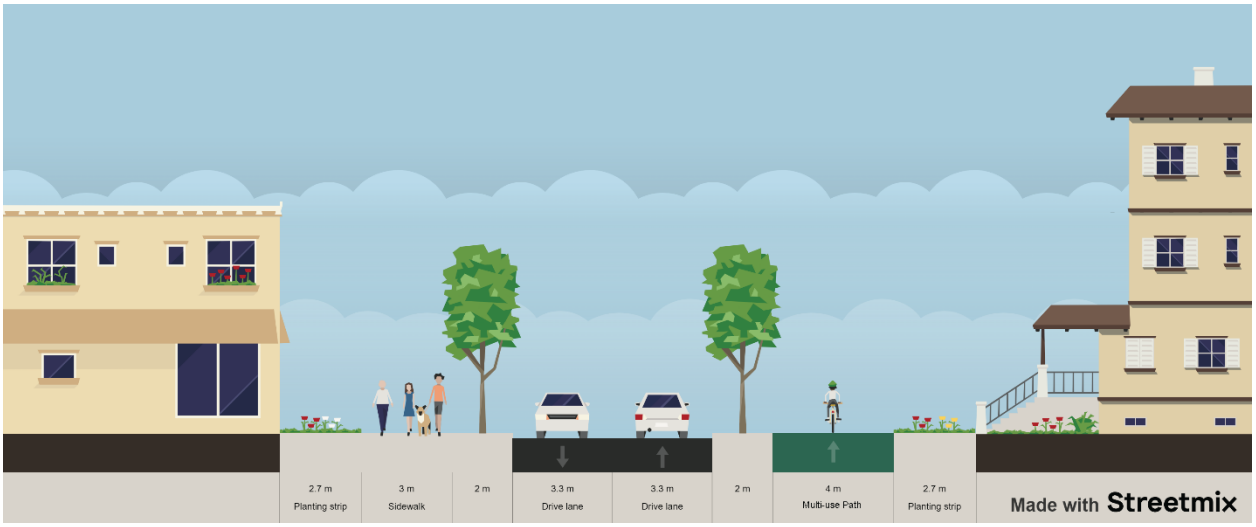
Figure 7-5: Recommended Cross-section for Concession Road 3



7.3.2 Collector Roads

Collector roads are recommended to be designed with vehicular travel lanes sufficiently wide enough to accommodate larger vehicles such as transit buses, while also improving safety and accessibility for vulnerable road users. The roadways should be designed with street trees and pedestrian-oriented lighting and separated active transportation facilities. Along Road A and Road B which signifies the Mearns Avenue extensions, a continuous multi-use path with a width of 4 metres is recommend on one side of the road. Sidewalks are recommended to be present on all collector roads within the study area, prioritizing areas around schools and other key destinations to improve accessibility and connectivity. **Figure 7-6** illustrates a typical cross-section for collector roadways.

Figure 7-6: Proposed Typical Cross-Section for Collector Roads



7.3.2.1 Mearns Avenue Extension

It is recommended that the planned extension of Mearns Avenue (Road B) and the proposed Road A be reclassified from Arterial Type 'C' to Collector Roads within the Regional Official Plan.

This recommendation is based on both the functional role these roads are anticipated to serve within the community and their alignment with the established roadway hierarchy.

Under Durham Region's typical roadway hierarchy, local roads provide direct access to individual properties and primarily serve short-distance, low-speed travel. These roads connect to collector roads, which serve as intermediate links that distribute traffic between local streets and the arterial network. Arterial roads function as the primary corridors for higher-capacity, longer-distance travel across communities and regions. Within this framework, Mearns Avenue is expected to serve more as a collector, facilitating internal neighbourhood circulation and access to surrounding local roads, rather than acting as a high-capacity thoroughfare.

The Mearns Avenue extension is planned to connect Liberty Street and Concession Road 3, both of which are designated arterial roads. Within the secondary plan area, however, Mearns Avenue will primarily serve medium-density residential development and a future neighbourhood park. The road will intersect with and provide access to multiple local roads. Given its planned land use context, a collector classification would more accurately reflect its expected function and would assist in discouraging non-local traffic from using the corridor as a cut-through route.

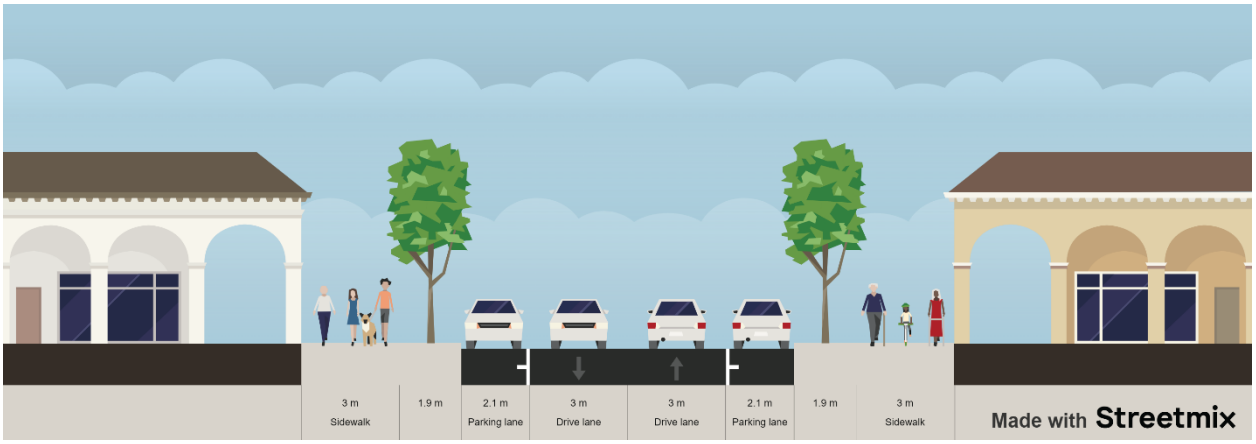
The reclassification of Mearns Avenue to a collector road will also facilitate the implementation of lower speed limits, in conjunction with its curvilinear alignment, which will help to ensure a safer environment for all road users and ensure that non-auto alternatives are safe and attractive within the Soper Springs community. Finally, based on the enclosed traffic analysis, the full build-out of the Soper Springs Secondary Plan will direct a relatively lower number of vehicle trips to Mearns Avenue, in comparison to surrounding arterial roadways, and within a threshold that can be optimally supported by a two-lane collector roadway.

Official Plan amendments would be necessary to accommodate this road designation reclassifcation.

7.3.3 Local Roads

Local road lane widths are recommended to be narrowed to help limit vehicular speeds and pedestrian crossing distances at local intersections. On-street parking is recommended to be interspersed with trees to provide a shaded canopy and improved traffic calming while maintaining local parking supply. Sidewalks are recommended to be present on all local roads within the area, prioritizing key destinations to improve walking networks. **Figure 7-7** illustrates a typical proposed cross-section for local roadways.

Figure 7-7: Proposed Typical Cross-Section for Local Roads



7.3.4 Active Transportation Facilities

Multi-Use Paths and Municipal Off-Road Trails

There are two forms of active transportation trails identified in the Soper Springs Preferred Land Use Plan: multi-use paths (MUP's) and municipal off-road trails. MUP's are pathways that are separate from vehicular traffic and accommodate for pedestrian and cycling routes. They are typically wider than sidewalks and provide for two-way travel. They are shared between cyclists and pedestrians. The municipal off-road trails are either paved or unpaved and provide access to environmental areas such as the EPA. They are created to make sure users follow a designated path to minimize disruption to minimize disruption to the surrounding landscape.

Within the Soper Springs preferred plan, a total of six MUP's are proposed to connect pedestrians and cyclists around the area as indicated by the brown lines in **Figure 4-4.** The main facilities follow the planned collector roadways such as Mearns Avenue from Concession Road 3 to Liberty Street, and additional links are proposed to connect residential zones to these primary routes. Municipal Trails are also proposed along the study area boundaries, namely Concession Road 3 and Lambs Road, to connect the secondary plan facilities to broader municipal infrastructure.

7.3.5 Sight Distance Requirements

A review of the Transportation Association of Canada (TAC) Geometric Design Guide for Canadian Roads Chapter 9 indicates the appropriate sight distance requirements for the new road intersections within the SSSP Area. The Mearns Avenue/Road B & Road A intersection has a two-way stop control configuration with the stop sign on the minor approach (Road A). The TAC manual analyzes this type of intersection configuration under Case B to determine the minimum sight distance for left and right turning movement from the minor road onto the major road. **Table 7-1** presents the sight distance requirement for both turning movements from Road A onto Mearns Avenue/Road B.

It should be noted that intersection sight distances have not been calculated in detail as the intersection locations are subject to change through future study.

Table 7-1: TAC Sight Distance Requirement

Case B	Major Road Speed (km/h)	Minor Road Grade	Design Intersection Sight Distance (m)
Left Turn from Stop	50	1-3%	105
Right Turn from Minor Road		1-3%	95
Left Turn from Stop	60	1-3%	130
Right Turn from Minor Road		1-3%	110
Left Turn from Stop	70	1-3%	150
Right Turn from Minor Road		1-3%	130

Decision sight distance is the distance that allows drivers to safely assess and instantaneously respond to complex driving situations. It provides drivers with the visibility needed to interpret warning signals and make informed decisions about their next action, such as adjusting speed or maneuvering around obstacles in areas with unique or complex conditions. As a result, decision sight distance is greater than stopping sight distance for the same design speed. The decision sight distance for a design speed of 70 km/hr for avoidance maneuvers A-E is shown in **Table 7-2**.

Avoidance maneuver A represents the scenario where vehicles stop on a rural road with a response time of 3 seconds and avoidance maneuver B represents the scenario of stopping on an urban road with a response time of 9.1 seconds. Liberty Street North is currently a rural roadway and therefore, future intersections along this road which present a high level of complexity to drivers are recommended to maintain a spacing of 125 meters. As presented in **Figure 7-1**, the future road network will maintain this spacing apart from the length of road between Sydel Court and Road A.

Table 7-2: Decision Sight Distance

Design Speed (km/h)	Decision Sight Distance for Avoidance Maneuver (m)				
	A	B	C	D	E
70	125	250	200	240	275

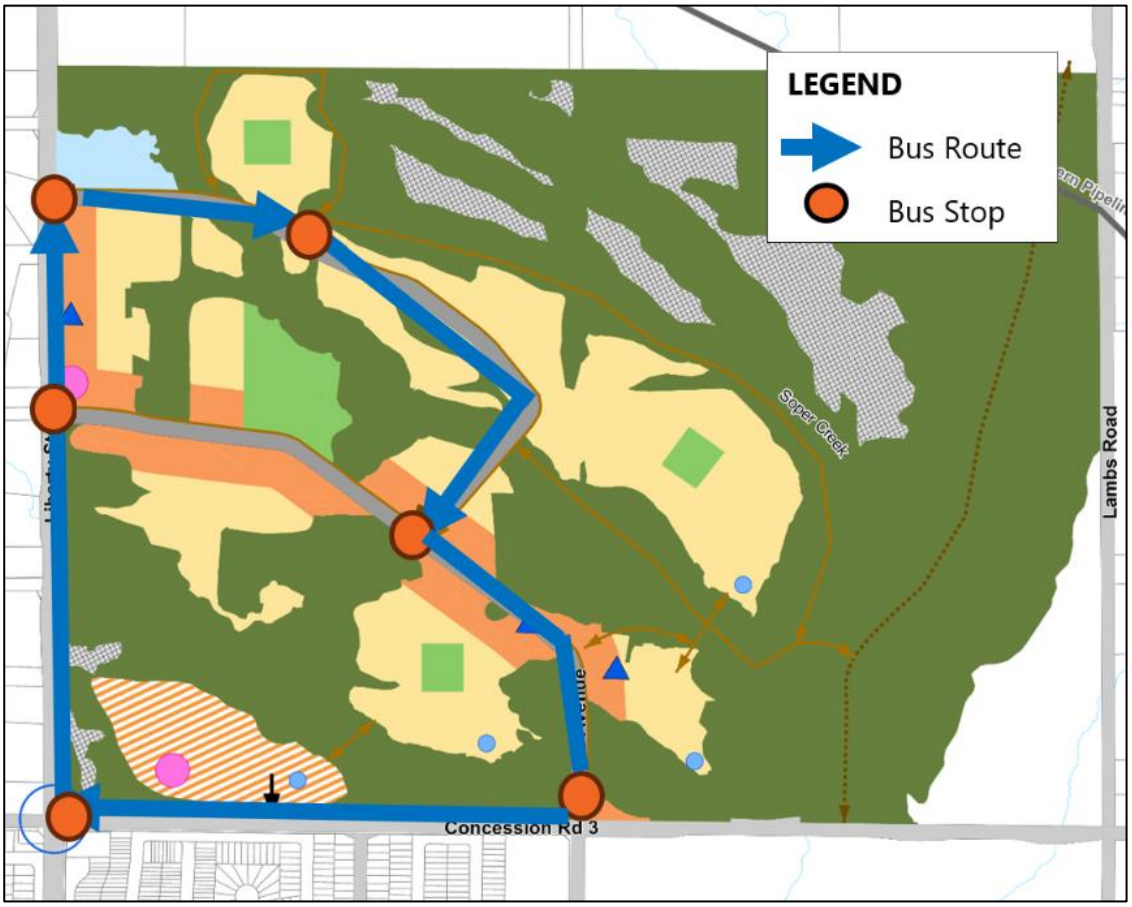
Source: TAC Manual 2017 Chapter 2

It is believed that achieving stopping sight distance would be applicable to all study intersection as intersections with a high level of complexity would not be expected to be constructed along the future study area road network. Stopping sight distance is sufficient for simple scenarios where a driver only needs to come to a halt at intersections with ordinary geometric design and minimal visibility concerns.

7.4 Transit Network

To enhance community accessibility, it would be beneficial to introduce bus services that link directly to the GO Station and the study area. Given the recent changes in bus routes near the study area, there is currently inadequate bus service as the community expands. The recommended route for Bus 502 extending into the SSSP area, along Liberty Street, Concession Road 3, and Mearns Avenue is illustrated in **Figure 7-8**. Bus stops are placed in a way that there is an approximate distance of about 400 metres (about a 10-minute walking distance) between each stop which allows for more service from community parks and surrounding communities. Accordingly, all three main intersections in the study area will be well connected to transit.

Figure 7-8: Proposed transit route for bus 502 extending into the study area



7.5 Transportation Demand Management

Transportation Demand Management (TDM) involves the strategic use of methods to regulate how people travel. Instead of only focusing on expanding infrastructure, TDM offers a nuanced approach to optimizing transportation systems. TDM has the potential to generate various benefits including promoting environmental sustainability, enhancing public health, easing traffic congestion, and contributing to the overall enhancement of quality of life.

TDM programs aim to reduce the number of single-occupancy vehicle trips by making alternative and sustainable modes of transportation such as walking, cycling, and transit more attractive for users. TDM encompasses a range of strategies, comprising policies, programs, services, and investments designed to offer transportation alternatives. TDM encourages individuals to minimize unnecessary trips, for example, by teleworking, traveling during off-peak hours, opting for less congested routes, and utilizing modes like walking, cycling, and public transit. The advantages of TDM may involve:

- Alleviating traffic congestion

- Promoting higher levels of physical activity
- Mitigating greenhouse gas emissions and enhancing air quality
- Optimizing the utilization of current transportation infrastructure

7.5.1 Existing TDM Measures

The Region of Durham has come up with three programs under the Smart Mobility Durham TDM program. These include:

1) **Smart Commute Durham (SCD):** This initiative offers individuals access to resources, events, online utilities, and action planning aimed at promoting sustainable travel behavior change in workplace settings.
2) **Cycle Durham:** This program encourages residents in the Durham Region to use active transportation facilities by provided awareness campaigns, events, and other initiatives.
3) **Active and Sustainable School Travel (ASST) Program:** Programs that involve stakeholders throughout Durham to enhance safety in school zones and promote increased walking, cycling, and bus usage among students.

Amongst the ones stated above, other campaigns and initiatives were rolled out that targeted students and workplace members in the region include:

- **Step It Up!** is a walking challenge that motivated employees at SCD workplaces to achieve 10,000 steps or more per day. Participants collectively logged over 7 million steps.
- Durham Region revamped its **Bike Month** branding this year, featuring activities such as the Bike and Buy campaign, the Bike Month Pledge, and a cycling safety communications initiative.
- **Walk and Roll to School Week:** A fresh annual challenge for schools across Durham Region held in October. Participating schools record active transportation trips on a trip tracking poster and vie for prizes and trophies.

Each year, the ASST Program initiates collaboration with a new set of schools to develop school travel plans, while also providing ongoing support to schools already in the process of implementing their plans.

These programs have achieved considerable success within the Region. Smart Mobility Durham prioritized initiatives aimed at enhancing opportunities to advocate for active and sustainable transportation modes, catering to both recreational and commuting needs, while also broadening the range of resources and choices to engage with previously underserved demographics.

Notable accomplishments of the program include:

- 45,000 employees engaged through workplace events.

- 6,100 students positively impacted by the ASST Program.
- 25,164 cycling trips were made in Durham during Bike Month, amongst others.

Above all, a new app called SmartCommute.ca was launched to help connect users with a GTHA-wide network to connect with carpool partners, plan their trips, and discover options for transportation. The app was also beneficial for several reasons:

- It lets users measure their environmental impact.
- Allows them to track how much money they save by commuting.
- find transportation options that save time.
- feel rewarded as they could earn points for sustainable commuting.

Similarly, another initiative that was planned was the School Travel Planning (STP) program. STP represents a cooperative approach aimed at enhancing active and sustainable school travel. This method involves uniting community stakeholders to gather data, identify obstacles, and formulate an action strategy. Adopting school travel plans can benefit educational institutions by:

- Enhancing student health and academic performance
- Mitigating the risk of accidents around school premises
- Minimizing environmental impacts

As of a report in 2023 from the Region of Durham, Bike Month stands as one of Cycle Durham's most esteemed events and forms a component of the Region's Smart Mobility Durham transportation demand management (TDM) initiative, aimed at encouraging the adoption of active and sustainable transportation modes. With over 40,000 social media impressions and 221 participants this year, Bike Month 2023 garnered significant community engagement, fostering new relationships between Regional and local municipal staff and various cycling advocacy groups and individuals. The triumph of Bike Month was made possible through the unwavering support of its numerous municipalities in the Region of Durham and Cycle Durham.

7.5.2 Introducing Alternative Travel Modes

The introduction of new modes of travel to current single-occupant vehicle drivers can be conducted through a variety of communication and marketing strategies. The Region of Durham already has several strategies in place; however, these can be promoted to residents to encourage and educate them about the programs and services that are offered.

7.5.2.1 Information Package

Developers, with assistance form the Region of Durham and Municipality of Clarington, should

provide content and materials for inclusion into an information package for residents that illustrate new trails, cycling facilities, new bus routes, and promote the Smart Commute Durham program. This information package should include details about local car share and bike share programs as well as details on how to register and mention the fees for the services. This information can be provided to residents via mail or social media.

7.5.2.2 Marketing Materials

It is important to keep residents informed about any changes to public transit or bike paths, such as posting updates in residential areas in lobbies/elevators/community centres, or public transit. People who bike for fun could be encouraged to consider biking to work or school, especially if they are already familiar with the city's cycling routes. For those who have not tried biking, a map showing bike-friendly routes and tips could be shared regularly, perhaps during tenant meetings. Short-distance commuters could be encouraged to walk or bike for the benefits it brings, like saving money and staying healthy, with practical tips given throughout the year, like how to choose a good route or maintain a bike in different weather conditions.

7.5.2.3 TDM Outreach Events

It is recommended that an outreach event to promote these services be hosted for residents of the area. Staff from the Region of Durham and the Municipality of Clarington must be invited to attend the event and answer questions from residents and provide information on existing infrastructure and planned improvements. Future events can be planned to promote any new TDM measures and facilities. These will encourage residents to utilize the services provided and make it known that these improvements are planned for their community's growth. Programs such as Cycle Durham, Bike Month, and the ASST programs should be promoted during such events, and the Region could potentially come up with incentives so residents can track their progress and be rewarded.

7.5.3 Commuter Information/Assistance

Alongside marketing efforts, it is crucial to educate residents about available alternative travel options. This helps those wanting to switch their travel habits by providing the necessary tools. Details about the transit system should be easily accessible for anyone commuting to and from the area. Making information about alternative modes more accessible would also boost residents' willingness to make the switch.

7.5.3.1 Carpooling and Networking

Encourage the use of carpooling platforms such as www.smartcommute.ca and organize carpool networking events. These platforms offer a safe and convenient way for residents to connect with

other long-distance commuters for carpooling.

At outreach events, representatives from the Region should be present to share information about car share and bike share options in the area. These options reduce the need for personal vehicles, while bike share systems offer a flexible travel option for occasional trips.

7.5.3.2 Microtransit

A potential benefit for future residents is the emergence of microtransit, a middle-ground option between private cars and public transport. This flexible form of local transit is gaining popularity in areas like San Francisco and New York, and it could have a transformative impact on the Region of Durham as the subject site develops in the future.

Some Greater Toronto Area (GTA) municipalities, such as Toronto and Mississauga, are exploring e-scooter, e-bike, and bike-share options to meet local transportation needs, with the Province of Ontario backing pilot programs for the next five years.

Microtransit providers could eventually serve as feeders to main public transit routes, improving accessibility for residents and reducing the need for custom local routes, thereby supporting the car-free lifestyle embraced by younger generations. Though still a niche service, microtransit shows promise as a future Transportation Demand Management (TDM) strategy.

7.5.3.3 Real-Time Information

Displaying real-time transit information and weather updates in a digital application can help commuters choose the best mode for their trips. Another way of getting this information could be texting a number and the bus route to know the estimated time of arrival of your mode of transit, similar to the program adopted by the TTC. These can be provided at transit stations.

7.5.4 TDM Measures for Implementation

The availability of high-frequency transit, reliable network connections, carpool alternatives, and the flexibility to adapt to future transportation services supports the Region's goal for an integrated transportation network. While these provisions are largely subject to the Region's decision-making and funding allocations, the proposed development can support a strong TDM strategy through infrastructure and promotion.

Additionally, site specific measures for individual developments should be determined by developers during the site plan stage of development. Alongside these measures, physical infrastructure is necessary to support transit and active transit modes. This infrastructure should be developed and improved for the Secondary Plan area as well as for the broader region for cohesiveness within the system. Some examples of supportive infrastructure include:

7.5.4.1 Bicycle Parking

Bicycle parking spaces will help encourage residents and visitors to adopt cycling as a transportation choice for short and medium-length trips. Parking stations can be placed in parks, around planned trails, multi-use paths, schools, etc.

7.5.4.2 Bicycle Repair Station

It is recommended that bicycle repair stations be provided in a secure location of the proposed development to aid and support residents choosing cycling as their mode of transportation, whether for daily commuting or recreational purposes.

7.5.4.3 Active Transportation Infrastructure

The Secondary Plan area should provide pedestrians and cyclists with adequate infrastructure to access pedestrian and cycling facilities. These routes should be well-lit and signed to enhance mobility at all hours and support wayfinding around the community.

Such investments will support current and future TDM objectives and strategies to reduce the reliance on private vehicular travel and promote shifts to active transportation and transit travel modes.

7.5.5 TDM Monitoring and Measures of Success

7.5.5.1 Transportation Survey

Future updates to the Transportation Tomorrow Survey (TTS) can capture the evolving transportation trends in the Soper Springs Study Area once the community is developed and residents have developed usual travel patterns. Accompanied with additional surveys for municipal and region TMP updates, future travel data will help identify the demand for sustainable transportation options. Monitoring changes to travel patterns can also guide measures for reducing car trips, such as a potential neighbourhood carpooling program.

7.6 Road Network Phasing

The phasing of development for transportation infrastructure within the study area is currently being coordinated with other development studies as part of the overall Secondary Plan. The following principles will guide the phasing of development within the Soper Springs area.

- Infrastructure and development shall be phased to ensure that growth occurs in a logical and fiscally sustainable manner.
- Development will occur in a manner that does not place unnecessary costs on new or

existing residents and the municipality.

- Development should occur in tandem with the extension of infrastructure.

The phasing for development of the road network in the study area is expected to expand through a sequence of five phases:

- Extension of Mearns Avenue from Concession Road 3 to Liberty Street North.
- Road widening on the north and south legs of the Concession Road 3 & Mearns Avenue intersection to facilitate a dedicated left turn lane in both directions.
- Construction of the local road network, multi-use paths and municipal off-road trails.
- Implementation of recommended all-way-stop control at the Concession Road 3 & Mearns Avenue intersection.
- Reconstruction of the rights-of-ways along Liberty Street North and Concession Road 3 to provide active transportation facilities.

Infrastructure expansion is recommended to commence with the extension of Mearns Avenue and the construction of Road A and Road B. This should be coordinated with the simultaneous expansion of servicing and sanitary infrastructure within the study area to allow for the construction of abutting development. Local roads should then be constructed, stemming from the internal collector roads to allow for the construction of the remaining residential development. The final phase will include the implementation of all-way-stop control at the intersection of Concession Road 3 & Mearns Avenue.

Ideally, the extension of Mearns Avenue to Liberty Street would be completed as part of the first phase of development in the Secondary Plan. This would also align with the servicing strategy, as all sanitary drainage from the study area will be collected in a primary sewer on the Mearns Avenue extension, connecting into the existing sanitary sewer on Mearns Avenue south of Concession Road 3. If the extension to Mearns Avenue to Liberty Street cannot be feasibly implemented for the first phase of development due to non-participating landowners or other constraints, additional transportation analyses would need to be undertaken to ensure that a partial road extension would meet all the objectives established by this Transportation Assessment Report.

8 PUBLIC CONSULTATION

8.1 Consultation Approach

As outlined in **Section 2.2.12.1.3**, this study has followed the 'Integrated Approach' from the Municipal Class EA, where study notices and public consultation have satisfied the requirements of both the Municipal Class EA and the Planning Act.

8.2 Notice of Commencement

A combined Notice of Commencement and Notice of Public Information Centre (PIC) #1 was advertised in Clarington This Week for 2 consecutive weeks, first issued on February 20, 2019. The notice was also mailed to residents in and near the study area and relevant agencies and posted on the Municipality of Clarington website.

8.3 Public Information Centre #1

PIC#1 took place on March 6, 2019, at the Garnet B. Rickard Recreation Complex in Bowmanville. The meeting was drop-in format, where attendees could view information boards and ask questions of municipal staff and the consulting team. Information was presented regarding the study area and the processes for both the Secondary Plan and Municipal Class EA.

A total of 27 attendees were recorded on the sign-in sheet. Feedback was solicited from attendees through interactive display boards. Most of the feedback received pertained to the type and form of land use desired in the study area, but some comments were received regarding transportation and connectivity. Preference was given to trails, bike lanes and sidewalks, and travel by bus was not preferred by attendees. Naturalized and landscaped streets were also preferred by attendees.

More information on PIC # 1 can be found in **Appendix H**.

8.4 Public Information Centre #2

The second PIC was held on June 22, 2022, in an online format. The information regarding the Study Area and the processes for both the Secondary Plan and Municipal Class EA were presented to the attendees in a presentation format. Attendees were also able to ask questions regarding the municipal staff and the consulting team regarding the Secondary Plan and EA process.

More information on PIC # 2 can be found in **Appendix H**.

8.5 Public Information Centre #3

PIC#3 took place on December 6, 2023. The land use alternatives, evaluation criteria, and preliminary preferred land use plan were presented to the public. The Attendees were also able to provide input and ask questions regarding the Study.

More information on PIC#3 can be found in **Appendix H**.

8.6 Notice of Study Completion

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To be completed

8.7 Consultation with Indigenous Communities

…

To be completed

8.8 Other Stakeholder Consultation

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To be completed

9 CONCLUSION

The full build-out of the SSSP includes the new development of a primarily residential community in the north-east quadrant of the Town of Bowmanville. Planned development in this area includes the construction of low, medium, and high-density residential dwelling units in addition to the inclusion of community amenity areas. Following a review of 2023 existing conditions and the completion of a traffic modelling exercise for Future Background and Future Total conditions at the study horizon year of 2033, a road network plan has been curated to meet the needs of the community while ensuring acceptable traffic operations throughout the network. This internal road network layout is delineated by the curvilinear extension of Mearns Avenue and the subsequent connection to the new collector and local roads within the study area, requiring few external roadway improvements to accommodate the proposed growth.

9.1 Network Recommendations

Road network improvements are recommended within the study area to ensure acceptable traffic operations under the Municipality of Clarington's Traffic Impact Study guidelines. The intersection of Concession Road 3 and Mearns Avenue is a key gateway into the Secondary Plan area and to accommodate acceptable traffic conditions, it is recommended to be upgraded to an all-way-stop control intersection. To further improve condition at this intersection, an additional dedicated left turn lane with a fitting storage length is also recommended along both north and south intersection approaches. It is forecasted that the increase in northbound and southbound trips caused by vehicles entering and existing the Secondary Plan area will lead to travel delays for those movements, requiring sufficient turn-lane storage capacity. The rest of the internal road network should be designed with a two-lane cross section with one lane in each direction, apart from the Liberty Street North and Road B intersection where an additional left turn lane is recommended.

It is noted that from a traffic operations perspective, no additional improvements are required NB or SB along Liberty Street, with the study's Future Total traffic analysis confirming that all NB and SB movements operate at an LOS of 'A'. However, in consideration of the safety of turning vehicles, a Left Turn Warrant analysis was conducted for all the intersections along Liberty Street. Accordingly, NB and SB left turn lanes are recommended at Liberty Street and Pamela Court/Road B intersection. A NB left turn lane is also recommended on Liberty Street and Rebecca Court intersection for consideration by the Region of Durham. These are subject to right-of-way permissions and future detailed design considerations, beyond the scope of this review. The detailed Left Turn Warrant analysis for these two intersections is included in **Appendix G**. Left turn lanes are not warranted at any other NB and SB approaches of intersections on Liberty Street.

To ensure sustainable circulation to and from the community, it is recommended that transit services be expanded to service the Secondary Plan area as the development is built. It is recommended that DRT Route 502 be extended along Liberty Street, Mearns Avenue and Concession Road 3, ultimately connecting the Secondary Plan area to the broader network and Bowmanville GO Station. Bus stops are strategically placed to maximize coverage and facilitate short walking distances between stops and destinations such as community parks and homes.

Finally, it is recommended that the community be designed with accessible, separated, and connected pedestrian and cycling facilities to promote active mobility for utilitarian and recreational purposes. Multi-use paths and municipal off-road trails are positioned in desirable locations within the Secondary Plan area, to connect residents to destinations and environmental areas for healthy living. All local roads should be outfitted with sidewalks on both sides of the road, and internal collector roadways should be designed with both a sidewalk and a grade-separated multi-use pathway to provide safe, connected, and all-ages cycling network. Finally, the proposed active transportation facilities within the Secondary Plan area should be extended along the boundary roadways through right-of-way improvements along Liberty Street and Concession Road 3 to connect the community with broader municipal infrastructure.