TOWNSHIP OF ESSA

TRANSPORTATION MASTER PLAN

MAY 2024

TRANSPORTATION MASTER PLAN

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TOWNSHIP OF ESSA

VERSION 2

PROJECT NO.: 221-10569-00
DATE: MAY 31, 2024

WSP

WSP.COM

May 31, 2024

Township of Essa
5786 County Road 21
Utopia, Ontario, L0M1T0

Attention: Michael Mikael

Subject: Township of Essa Transportation and Trails Master Plan

Dear Sir:

WSP is pleased to enclose a final copy of the Transportation and Trails Master Plan for the Township's review.

Through collaboration with the Township and its residents, the outcomes of this project reflect the needs of this community as it grows towards the year 2043. This document will set in place a pathway for the Township to support an increase in travel choices, and a foundation for the next steps in developing supporting policies to respond to the needs of the community.

Yours sincerely,

Brett Sears, MSP, MCIP, RPP
Senior Project Manager and
Principal Transportation Planner
Transportation Planning and Science

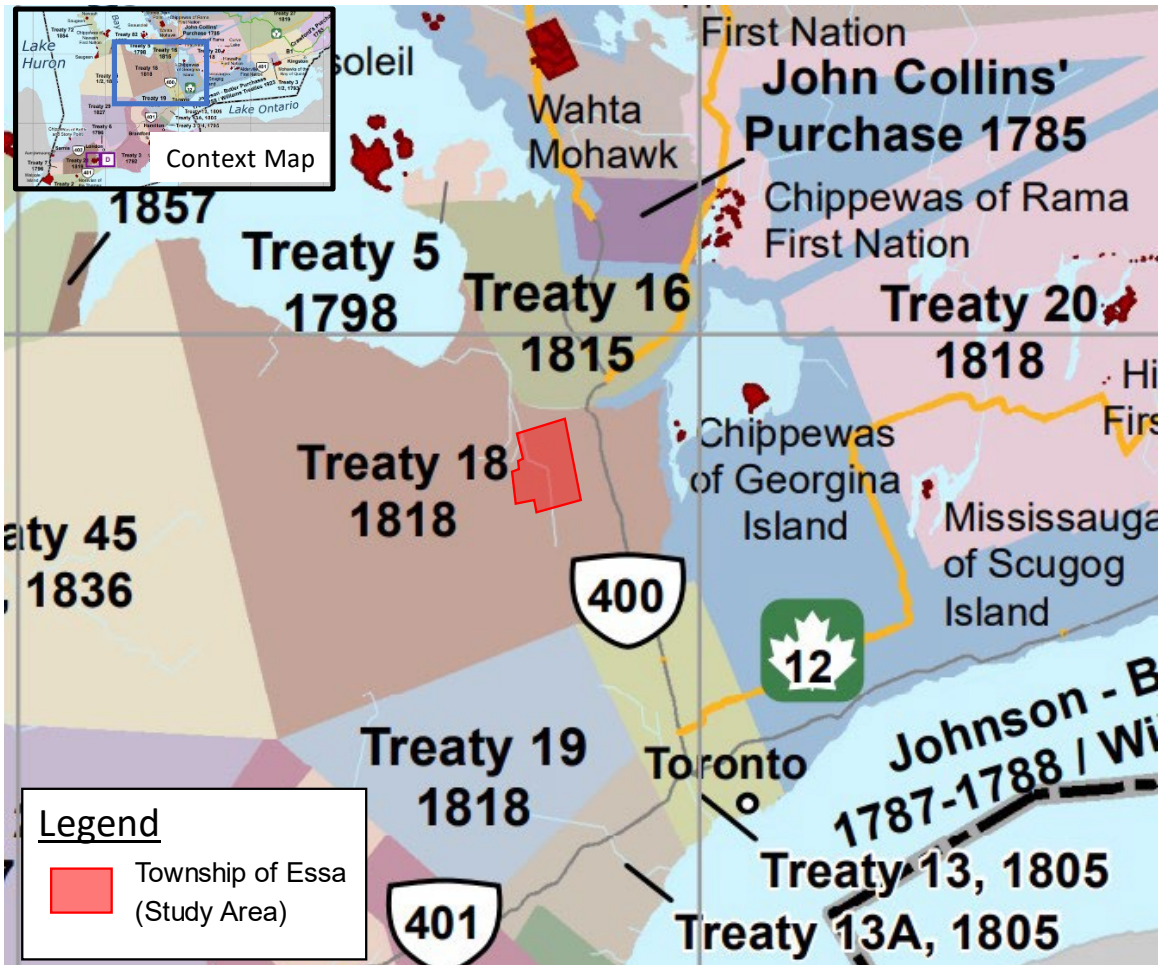
Indigenous Land Acknowledgement

We acknowledge the land that our community safety and well-being planning will take place on is the traditional land of the Anishinaabe People.

The Anishinaabe include the Ojibwe, Odawa, and Potawatomi Nations, collectively known as the Three Fires Confederacy. It should be noted that the Wendat and the Haudenosaunee Nations have also walked on this territory over time.

In times of great change, we recognize more than ever the importance to honour Indigenous history and culture and are committed to moving forward in the spirit of reconciliation, respect and good health with all First Nation, Métis and Inuit people and our community as a whole.

As representatives of the people of the Township of Essa, we are grateful to have the opportunity to work and live on these lands.



Source: Provincial Government of Ontario (2022). First Nations and Treaties.

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WSP

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Executive Summary

The Township of Essa Transportation Master Plan (TMP) provides a future multi-modal network that accommodates the forecasted growth of population and employment in the Township to the year 2043. The TMP was prepared following the Municipal Class Environmental Assessment (MCEA) process for master plans, addressing Phase 1 (problem/opportunity statement), and Phase 2 (assessment of alternatives), and includes two rounds of consultation with various stakeholders and the public.

The vision statement developed for the TMP is:

"To provide a multi-modal network that allows users of all ages and abilities to access all modes of transportation, contributing to a connected and resilient community. The success of the Plan will be based on its ability to accentuate Essa's unique natural and rural areas, while accommodating future travel demands as the community continues to grow. Its success will be based on the implementation of achievable and relevant programming looking to the 20-year planning horizon."

To address Phase 2 of the MCEA process (assessment of alternatives), a travel demand model was prepared to analyze two scenarios for the 2043 horizon year;

- **Alternative 1 Scenario**: 2043 roadway network with the roadway improvements identified by the Township in their approved development charge study from 2018 in addition to recently identified roadway urbanization projects.
- **Alternative 2 Scenario (Preferred)**: Alternative 1 roadway network with additional roadway improvements to address the deficiencies identified in Alternative 1.

Consultation and Engagement

Two rounds of consultation were conducted with the public and interested stakeholders. Meetings were held with the following groups in both rounds of consultation:

- The Public (Residents, Employees, and Visitors);
- Technical Advisory Committee;
- Interested Stakeholders;
- Town Staff; and
- Council.

Public Information Centre #1

- The first round of consultation focused on existing conditions and aspirations for the future to address growth.
- Common themes in the comments heard from the first consultation round included:

- Separate recreational trails from ATV trails;
- Improve connections to trails systems at parks and recreational areas;
- Improve public realm on trails and streets;
- Improve transit, cycling, and pedestrian infrastructure to increase mobility choice;
- Provide more transit options;
- Add more measures and enforcement to reduce speeding;
- Address lack of space near schools to accommodate school pick-up and drop-off; and
- County Road 27 and the proposed widening of this road is a safety concern for people living on the route.

Public Information Centre #2

- The second round of consultation presented draft recommendations for review and comment.
- Common themes in the comments heard from the second consultation round included:
  - Reduce speeds through stronger enforcement, by utilizing cameras or policing.
  - School zones were of notable importance with residents citing concern for vehicles passing stopped school buses during pick-up/drop-offs and requested reducing vehicle speeds.
  - Desire for recreational trails separate from ATV trails.
  - Provide safer connections for cyclists and pedestrians provide cycling and walking facilities such as bike maintenance stations to offer a higher degree of mobility choice in the future.
  - Utilize red-light cameras for enforcement due to vehicles frequently running red lights and threatening the safety of crossing pedestrians.
  - Minimize the impact of proposed improvements on trees and plants.
  - Suggestions for public realm improvements such as the addition of benches around the community to contribute to the vision of equitable and accessible travel for all ages and abilities.
  - Increase connectivity in the transit network to facilitate travel to neighbouring cities, communities, and destinations of interest.

Recommendations

Active Transportation and Trails

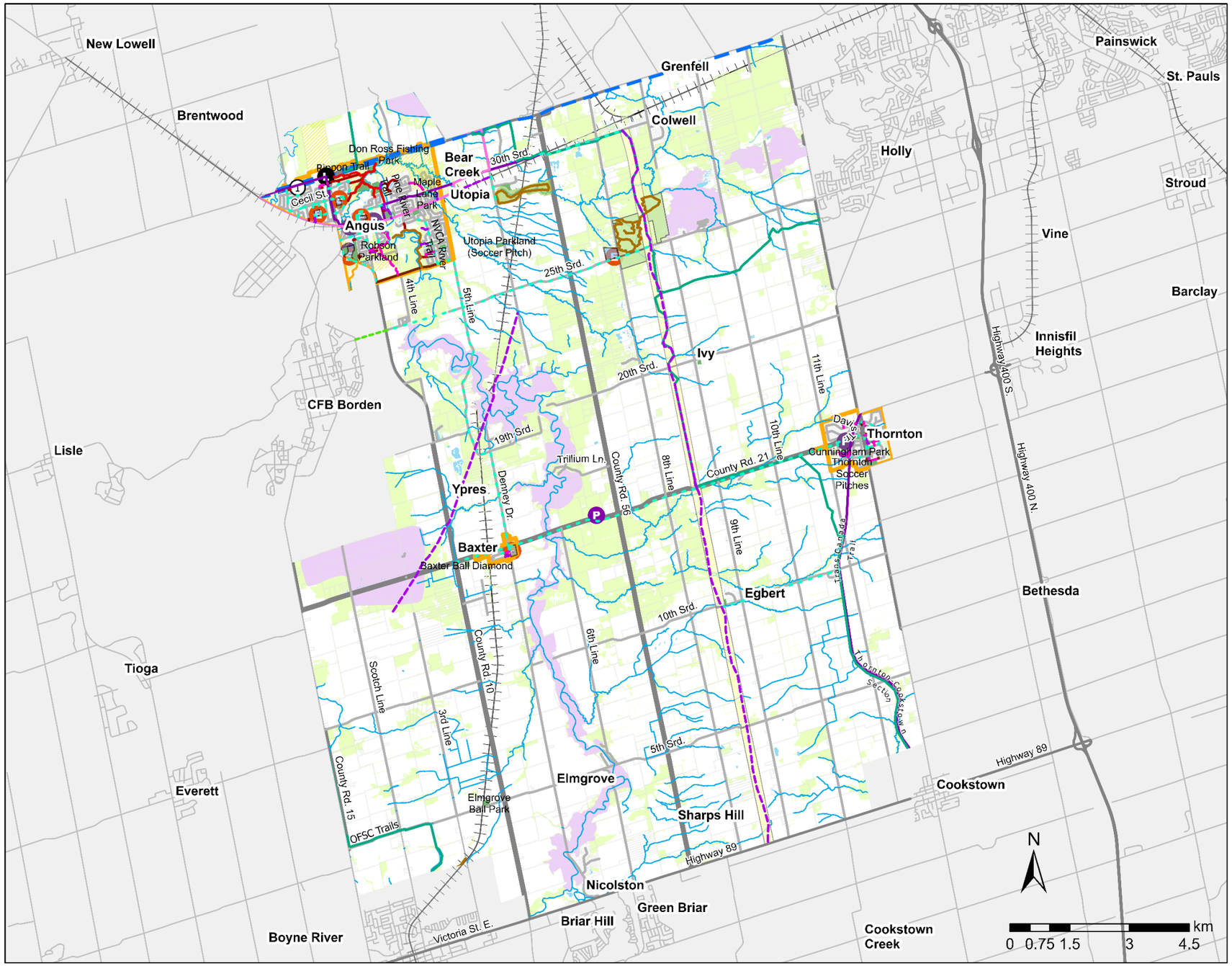
Proposed upgrades to existing trail facilities are presented in **Table ES-1**. The recommended improvements to the active transportation network (walking, cycling, rolling) for rural areas of the Township of Essa can be found in **Figure ES-1.** Proposed candidate trails within Angus are shown in **Figure ES-2** and Baxter and Thornton

communities are shown in **Figure ES-3**. A total of 98.84km of trails are proposed for 2041, in addition to the 18km of existing trail network, for a total of 116+ km.

Table ES-1: Proposed Trail Widths and Lengths by Type

Trail Type		Trail Width	Proposed Length for 2041 Network (Metres)
Primary Trail (Type 1)		3.0	15,201
Secondary Trail (Type 2)		2.6	32,565
Nature Trail (Type 3)		1.5	1,344
Neighbourhood Greenway (Type 4)		2.0	49,725
Total Proposed Trails:			**98,835**

Figure ES-1: Proposed Candidate Trail Network (Angus)



Township of Essa Transportation & Trails Master Plan

RURAL

Proposed Candidate Trail Network

Legend

- Township Boundary
- Community Borders

Canadidate Trail Network

- Primary Trail Network (Type 1)
- Secondary Trail Network (Type 2)
- Neighbourhood Greenway (Type 4)

Transportation Features

- County Road
- Township Road
- Railway
- County Linx Route 2 (Wasaga Beach to Barrie)

Land Use Features

- Streams
- Water
- Parcels
- Area of Natural and Scientific Interest
- Woodlands
- Parks and Recreation
- Conservation Area Lands
- Residential Development Zone
- Points of Interest
- Education Facilities
- Libraries

Existing Trails Network

- OFSC Trails
- Pine River Trail
- Rippon Trail
- Tiffin Conservation Area Trail
- NVCA River Trail
- Utopia CA Trail

Existing Pathways

- User-made Path
- Multi-Use Pathway (MUP)
- Ontario Trail Network
- Ganaraska Trail
- Trans Canada Trail

Figure ES-2: Proposed Candidate Trail Network (Angus)

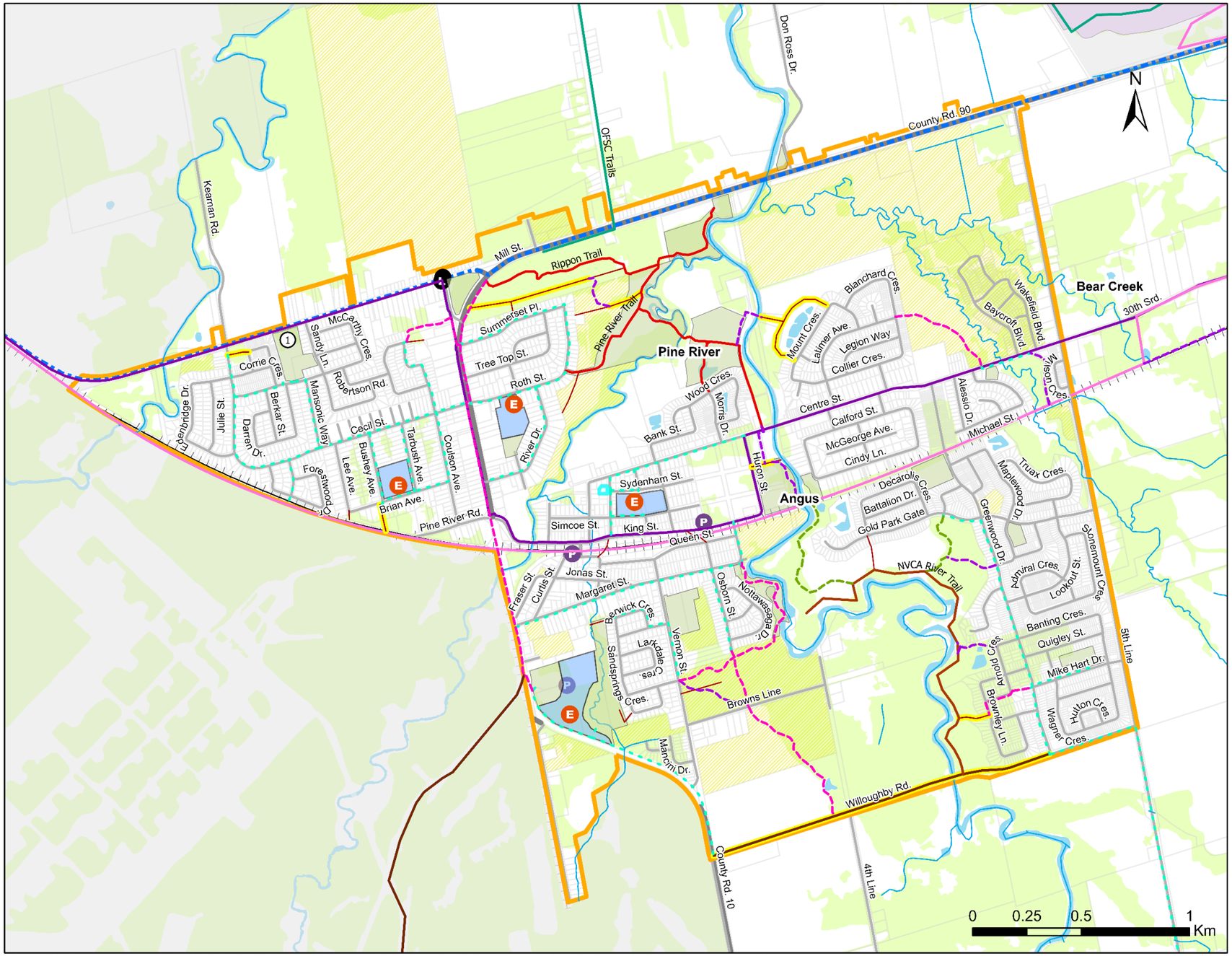


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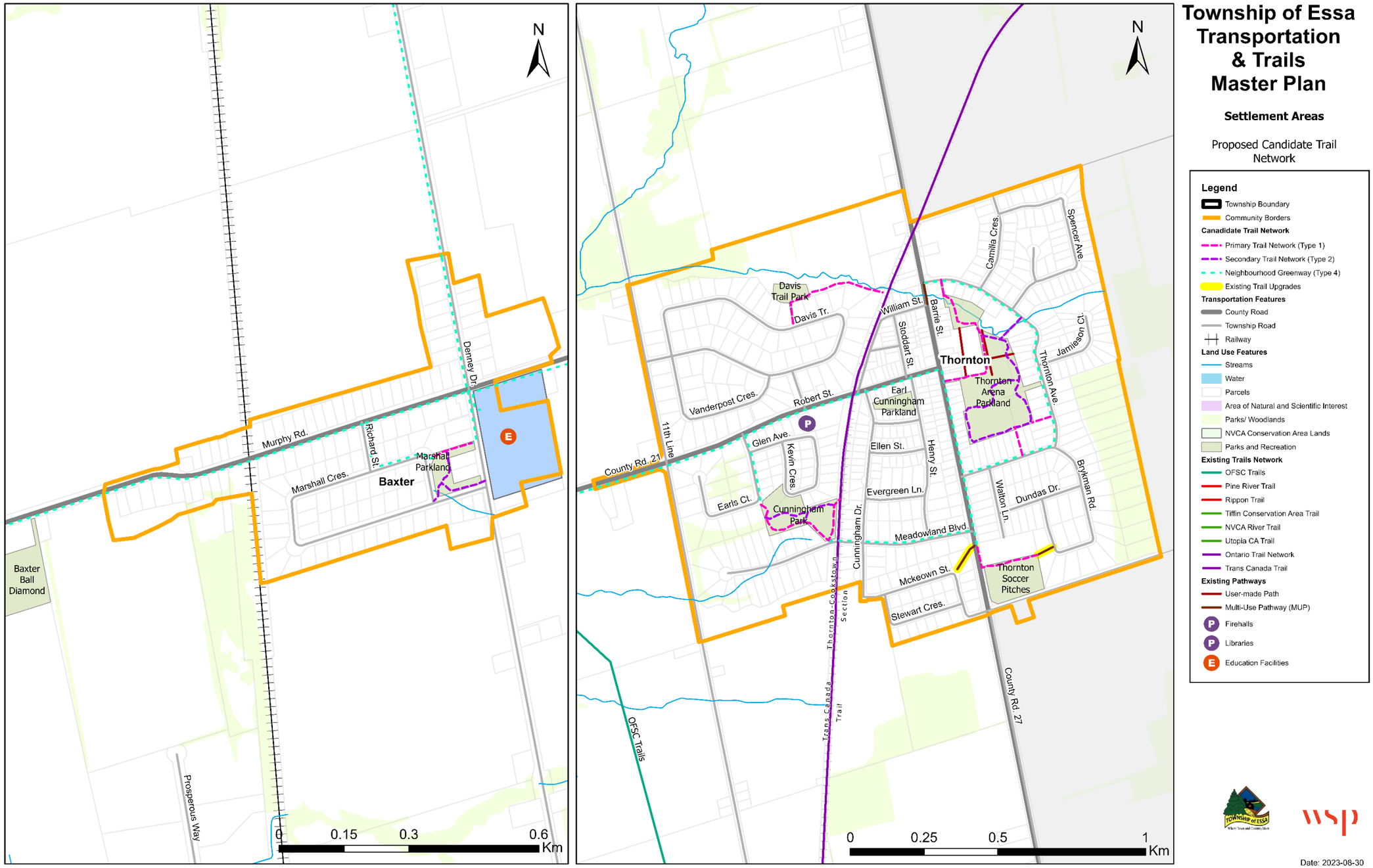
Figure ES-3: Proposed Candidate Trail Network (Baxter and Thornton)



Date: 2023-08-30

Transit

The existing transit service in Essa is limited to one Simcoe County LINX route that operates along County Road 90 and is only convenient to those living or working close to that corridor. As the Township continues to grow, increased transit service, both in terms of frequency and coverage area, will be advantageous to help provide mobility options and viable alternatives to the personal automobile.

The Township should engage in an active role in working with Simcoe County to identify further transit needs in Essa, and work with the County to create an implementation plan that would see increased service frequency and increased coverage area. Additional services and coverage areas could connect:

- CFB Borden and further along Mill Street through the centre of Angus;
- Angus and Baxter with Alliston and the Honda manufacturing plant located;
- Thornton to Barrie and Innisfil; and
- The settlement areas of Angus, Thornton, and Baxter.

Parking Strategy

A parking strategy has been included in the TMP to address ongoing concerns about parking, on residential streets in the urban communities. The Township's parking concerns are centred around the need to address challenges related to access and safety in neighbourhoods, school zones, and community safety zones.

The recommended parking strategy addresses the following key topics:

- Road widths that encourage on-street parking, or that make on-street parking hazardous;
- On-street parking programs to better manage frequent conflicts and visitor vehicle impacts;
- Signage to improve transparency and understanding of the parking limitations;
- Community Safety and School Zones to increase awareness of the impacts of on-street parking in these areas; and
- Support for residents to better utilize their private parking spaces (garage/driveway).

Traffic Calming Policy

The TMP also recommends changes to the Township's traffic calming policy to incorporate recent best practices. Traffic calming measures have been categorized into four types, including speed control, volume control, educational measures, and enforcement.

The revised process also includes three categories to address feedback/requests and concerns for those that travel and live within Essa. The three categories are as follows:

1. Community-wide
2. Request based
3. Collision hotspot

Pedestrian Crossing Policy

The Pedestrian Crossing Policy was developed with the acknowledgement that each site within the road network is unique, and that implementing policies may not be equally applicable in all cases. The main goal of the Pedestrian Crossing Policy is to maximize both driver and pedestrian awareness, and to minimize the conflict between each other.

The policy outlines the framework for how and where pedestrian crossings can be considered, in a transparent manner for the public. It highlights three key criteria to be reviewed during the assessment process:

- Traffic volumes;
- Crossing distance; and
- Pedestrian system connectivity.

Road Network

The analysis of the future year 2043 roadway conditions shows that some of the County Roads and the Township Roads are projected to operate with congested conditions where traffic volumes are expected to exceed the roadway capacity. Therefore, roadway capacity and intersection improvements are needed for optimal performance of the roadway network in the future. **Table ES-2** shows the roadway improvements that are recommended along the Township roads for improving the roadway network performance in the future. **Figure ES-4** illustrates the location of these improvements on a map.

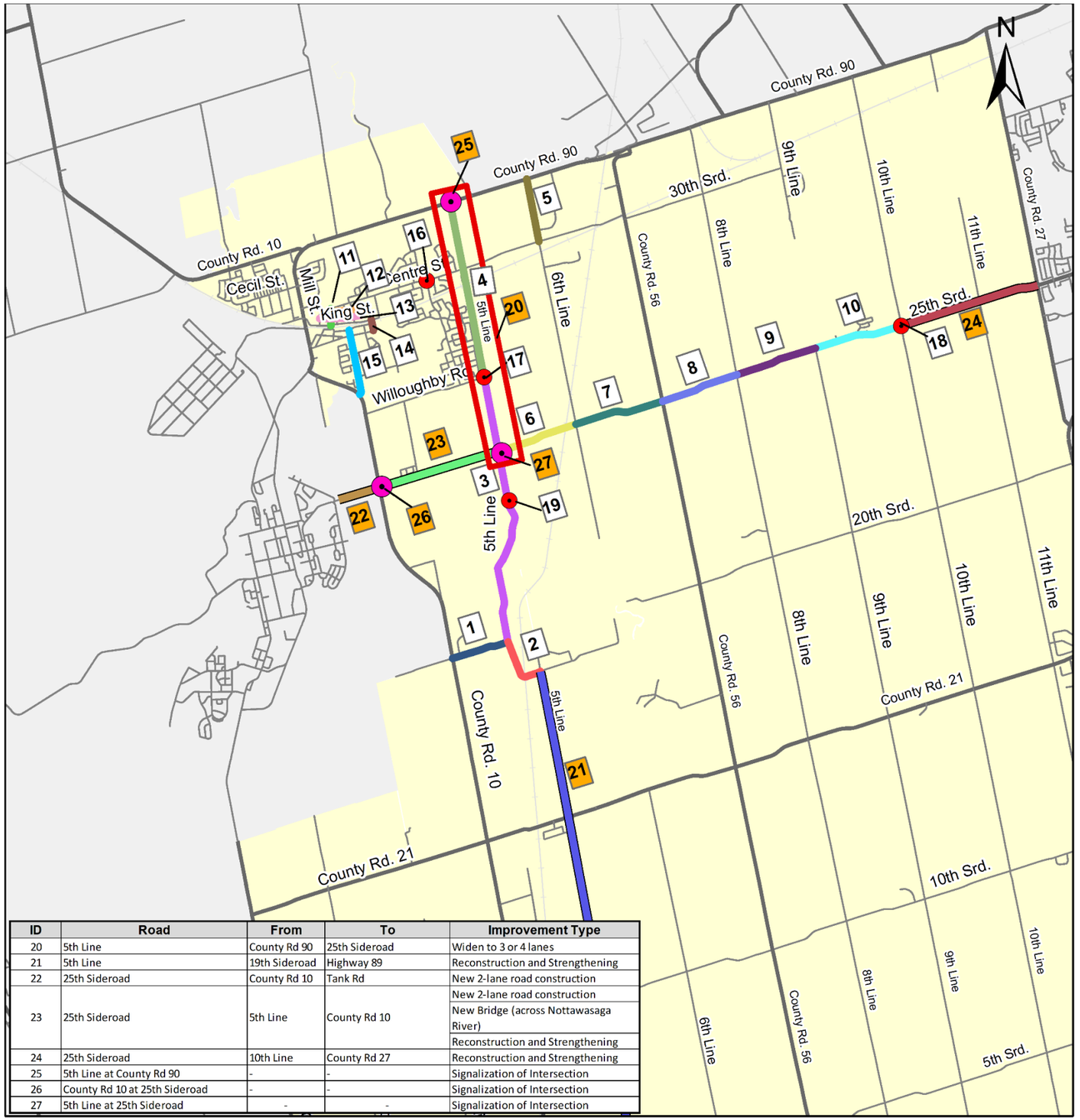
The roadway upgrade projects listed in **Table ES-2** improve the capacity of the roadways by constructing the roadways to engineering standards with standard roadway widths, curb, gutter, and paved shoulders. The urbanization projects listed in **Table ES-2** improve the pavement conditions along with including curb and gutter features. Urbanization improvements are not intended to improve the capacity of the roadway.

Table ES-2. Roadway Improvement Recommendations

ID	Road	From	To	Improvement Type
1	20th Sideroad	5th Line	County Rd 10	Roadway Upgrade
2	5th Line	20th Sideroad	South of 19th Sideroad	Roadway Upgrade
3	5th Line	20th Sideroad	Wiloughby Road	Roadway Upgrade
4	5th Line	County Rd 90	Wiloughby Road	Roadway Upgrade
5	6th Line	30th Sideroad	County Rd 90	Roadway Upgrade
6	25th Sideroad	5th Line	6th Line	Roadway Upgrade
7	25th Sideroad	6th Line	County Rd 56	Roadway Upgrade
8	25th Sideroad	County Rd 56	8th Line	Roadway Upgrade

ID	Road	From	To	Improvement Type
9	25th Sideroad	8th Line	9th Line	Roadway Upgrade
10	25th Sideroad	9th Line	10th Line	Roadway Upgrade
11	Elizabeth St	Centre St	King St	Urbanization
12	Sydenham St	Raglan St	East of Auburn St	Urbanization
13	Simcoe St	Water St	East of Auburn St	Urbanization
14	Alma St	King St	Margaret St	Urbanization
15	Vernon St	Queen St	County Rd 10	Urbanization
16	Centre St at Greenwood Drive	-	-	Signalization of Intersection
17	5th Line at Willoughby Rd	-	-	Intersection Improvement
18	25th Sideroad at 10th Line	-	-	Intersection Improvement
19	Bridge 9 on 5th Line (1.95 km north 20th Sideroad)	-	-	Bridge (replacement and widening)
20	5th Line	County Rd 90	25th Sideroad	Widen to 3 or 4 lanes
21	5th Line	19th Sideroad	Highway 89	Reconstruction and Strengthening
22	25th Sideroad	County Rd 10	Tank Rd	New 2-lane road construction
23	25th Sideroad	5th Line	County Rd 10	New 2-lane road construction
24	25th Sideroad	10th Line	County Rd 27	Reconstruction and Strengthening
25	5th Line at County Rd 90	-	-	Signalization of Intersection
26	County Rd 10 at 25th Sideroad	-	-	Signalization of Intersection
27	5th Line at 25th Sideroad	-	-	Signalization of Intersection

Figure ES-4. 2043 Proposed Road Improvements



ID	Road	From	To	Improvement Type
20	5th Line	County Rd 90	25th Sideroad	Widen to 3 or 4 lanes
21	5th Line	19th Sideroad	Highway 89	Reconstruction and Strengthening
22	25th Sideroad	County Rd 10	Tank Rd	New 2-lane road construction
23	25th Sideroad	5th Line	County Rd 10	New 2-lane road construction New Bridge (across Nottawasaga River) Reconstruction and Strengthening
24	25th Sideroad	10th Line	County Rd 27	Reconstruction and Strengthening
25	5th Line at County Rd 90	-	-	Signalization of Intersection
26	County Rd 10 at 25th Sideroad	-	-	Signalization of Intersection
27	5th Line at 25th Sideroad	-	-	Signalization of Intersection

Township of Essa Transportation & Trails Master Plan

Note: The projects 1-19 are improvements identified as part of Alternative 1. The table shows only the additional improvements identified for Alternative 2.

- Additional Improvement

- Alternative 1 Improvement

0 0.75 1.5 3 4.5 km

Source: Township of Essa DC Project List, WSP

Date: 10/10/23

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1 Setting the Stage: The TMP Context

1.1 What is a TMP?

A Transportation Master Plan (TMP) is a strategic policy document that establishes the Township's vision for transportation and serves as a guide for future transportation decision-making processes. Following the guidance of the community and Township goals, the TMP will examine future generations' needs for transportation services and infrastructure for all modes with respect to active transportation, transit, and road infrastructure. The TMP assesses the existing transportation network conditions and performance, forecasts future demand, and provides actions tailored to address the Township's needs to accommodate growth. **Table 1** illustrates the various roles and purposes of a typical TMP.

Table 1. Purposes of a Transportation Master Plan

Theme	Description
Community Building Asset	A guide to improve community transportation services and infrastructure.
Communication Tool	A tool to help communicate challenges and opportunities to various audiences and groups about key transportation issues.
Partnership Support	An opportunity to improve coordination and collaboration with existing and future partners.
Community Vision	A comprehensive and aspirational vision for the future of transportation that addresses needs of its community members.
Implementation Guide	A guide to support the implementation process of short, medium and long-term goals.
Decision Making Tool	A tool to support present and future decision-making for key stakeholders.
Integrated Multi-Modal Plan	A strategy to integrate facilities and services of multiple modes of transportation.

1.2 Study Purpose

The Township of Essa's TMP serves as a roadmap in improving, planning, and growing the transportation network for the next 20 years to accommodate the forecasted growth in population and employment across the Township. The TMP will build upon the

existing infrastructure, policies, as well as strategies related to transportation planning, including infrastructure and services for walking, cycling, transit, and roads. The role of a TMP is to serve as a decision making-tool to advise on future planning, capital budget decisions, and the Development Charges By-law review. As the population of the Township continues to grow, the Township of Essa will further experience transportation issues. The key themes and topics the TMP will address include:

- Transportation and land use integration;
- Enhancement of the road network;
- Support for public transportation;
- Encouragement of active transportation;
- Efficient people and goods movement approaches;
- Regional linkages; and
- Well-maintained and managed infrastructure.

1.3 Study Objectives

The objectives identified for the Essa TMP include the following:

Building the Active Transportation and Off- Road Trails Network

- Retrofit existing roads by identifying long-term treatments to support active transportation and off-road trails;
- Develop active transportation, trails-supportive, and complete streets policies through the Official Plan update; and
- Programming opportunities to expand cycling culture.

Planning for Better Roads

- Extensions, intersection improvements, new construction, and/or road widening opportunities;
- Road improvements with active transportation and transit to better support growth;
- County network improvements; and
- Network connection opportunities with neighbouring municipalities.

Both Active Transportation and Off-Roads Trails Network as well as Planning for Better Roads requires developing:

- Short-, medium-, and long-term implementation strategy;
- Financial funding strategy; and

- Policy framework objectives for the Official Plan update.

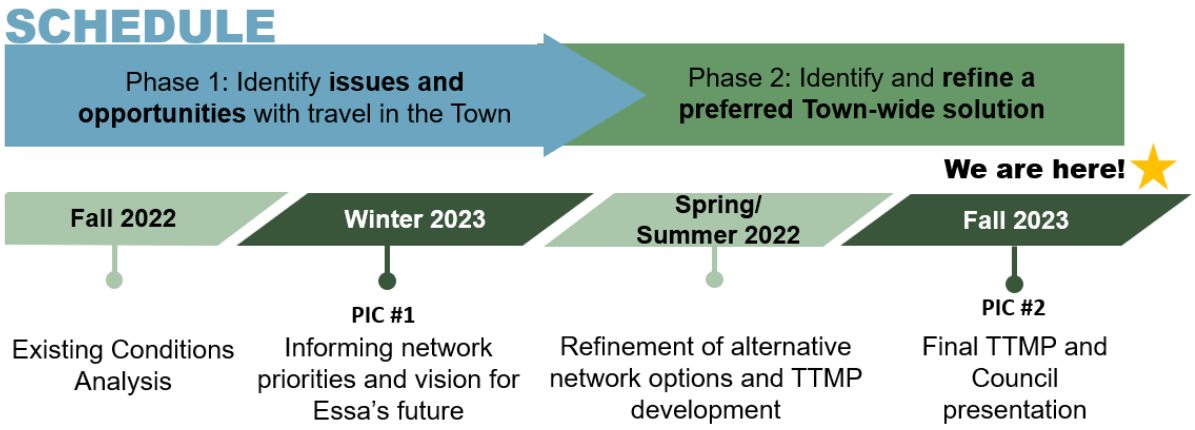
1.4 Municipal Class Environmental Assessment Process

The TMP has been developed in accordance with the Municipal Class Environmental Assessment (MCEA) process. As summarized in **Figure 1**, Master Plans are required to complete Phases 1 and 2 of the five-phased MCEA process, which include:

- **Phase 1**: Development of an opportunity statement, objectives, and an overall TMP vision; and
- **Phase 2**: Alternative scenarios development and evaluation, leading to a preferred alternative.

Consultation with the public and stakeholders is integrated throughout the study, which includes two rounds of consultation. Completion of Phases 1 and 2 allows the Township to move on to implementation of any Schedule B projects (subject to screening), and continue to Phase 3 (Assessment of Design Alternatives) for the recommended projects that fall under Schedule C of the MCEA document. It should be noted that Schedule C projects require further consultation.

Figure 1: TTMP Timeline



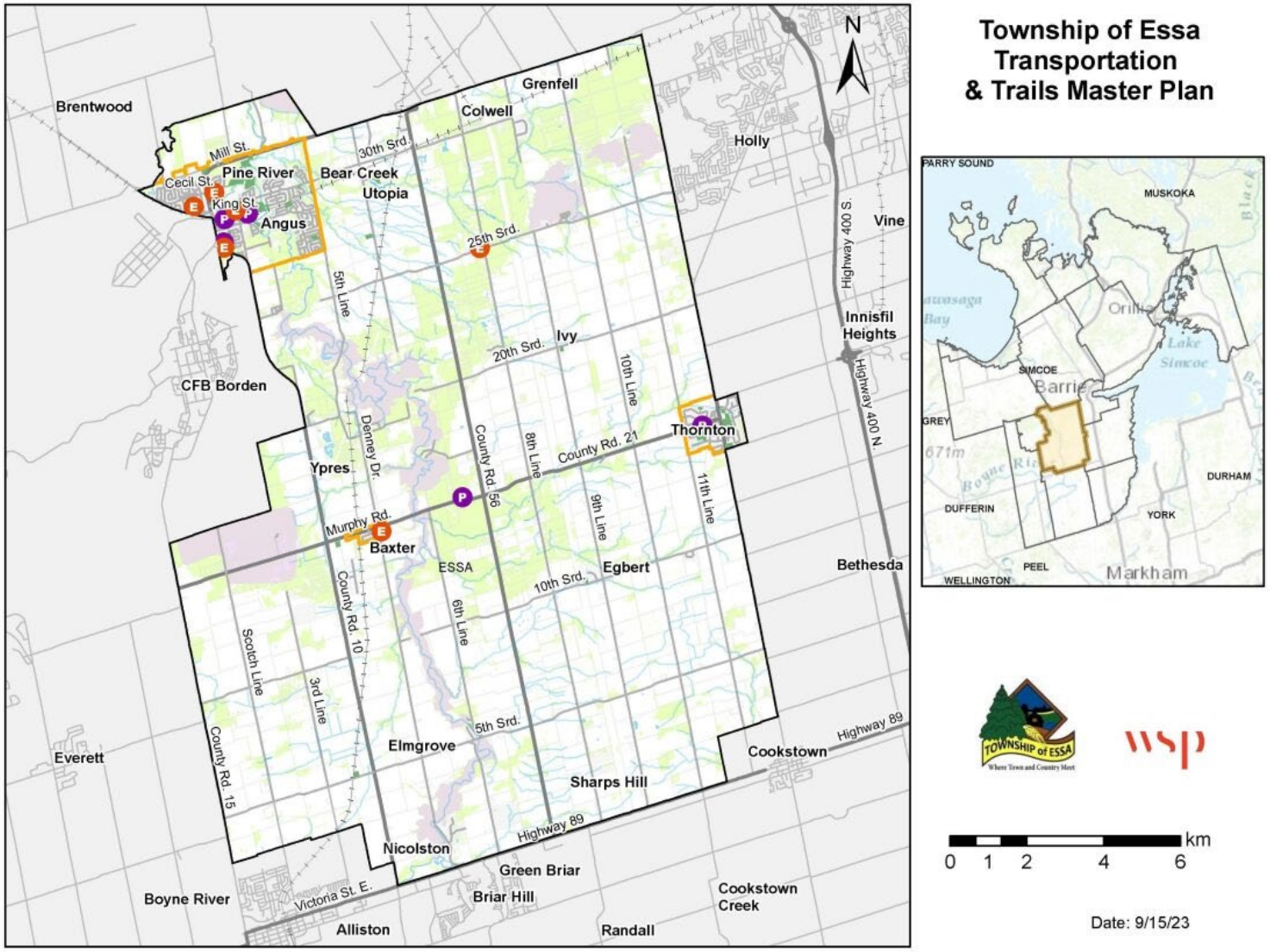
The Township of Essa's TMP study commenced in fall of 2022 and began with a through analysis of the townships existing conditions along with travel patterns. This led to a comprehensive understanding of Essa's challenges and opportunities providing the foundation needed to develop initial alternative network recommendations for the Township. Following the analysis of existing conditions and initial network development was the first public information centre (PIC) which engaged key stakeholders and residents of the Township. The PIC resulted in valuable insight for network priorities and led to the development of the vision for the future of the township. The preliminary analysis, partnered with the engagement process has produced valuable information resulting to refinement of alternative network options and creation of the TMP report. The final TMP report will include network options that will be supportive of the

Townships overarching vision for transportation and play a key role in guiding future transportation decision-making processes.

1.5 Study Area

The Township of Essa is a growing community with changes to both demographics and land uses. Essa embodies the notion of a place “Where Town and Country Meet” and is located in the southern part of Simcoe County as illustrated in **Figure 2**. Essa is bordered by Barrie and Innisfil to the east, Springwater and Clearview to the north, Canadian Forces Base Borden and Adjala-Tosoronto to the west, and New Tecumseth to the south. The Township is served by key transportation routes including Highway 89 and Highway 400, providing easier access to neighbouring municipalities and the broader Greater Toronto Area (GTA). The following section provides further insights into the Township’s current land uses patterns, demographics and travel behaviour trends providing a comprehensive understanding of its dynamics and the evolution of the community.

Figure 2. Map of Township of Essa and Neighbouring Municipalities



1.5.1 Land Use and Key Areas

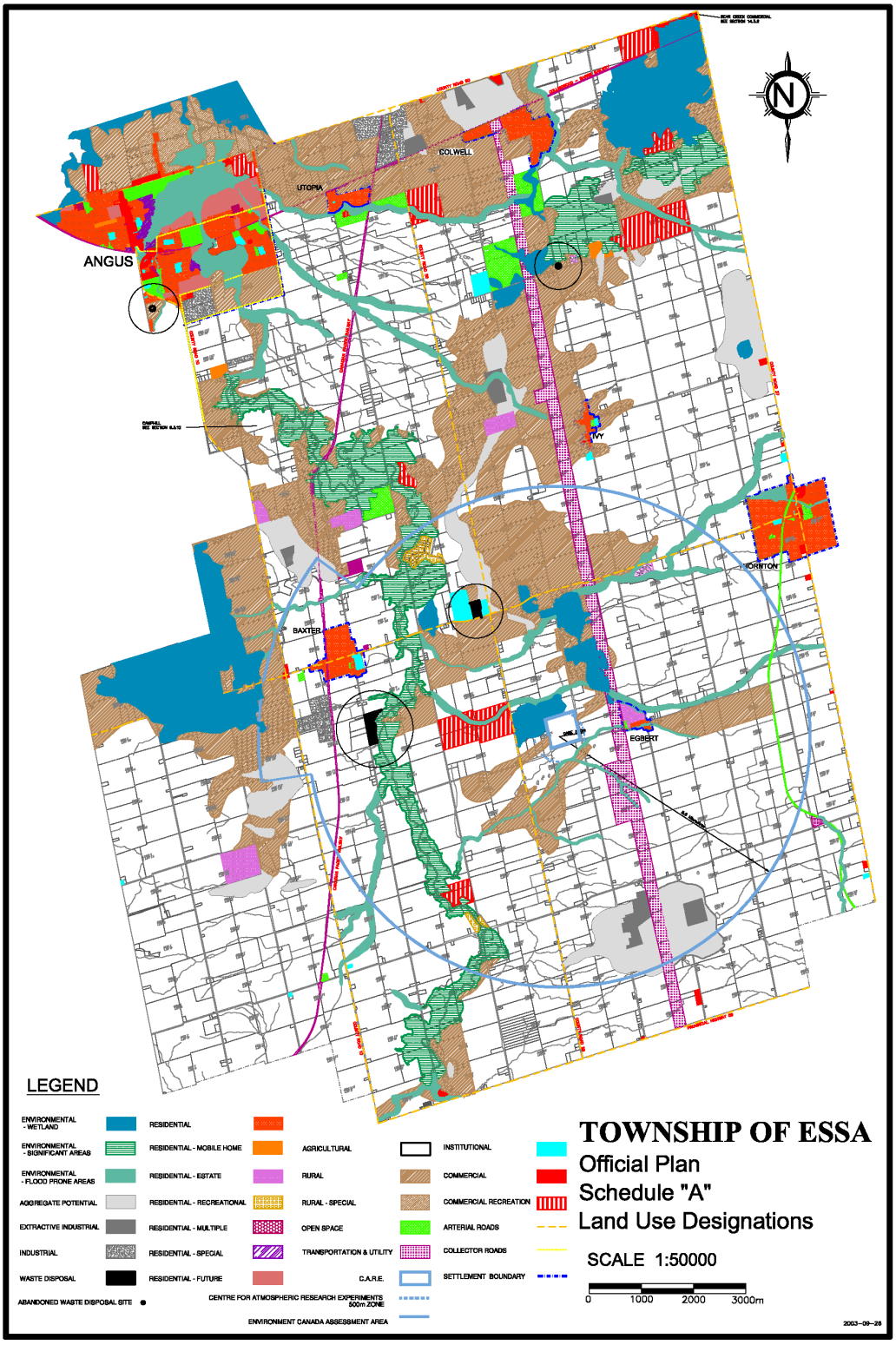
The Township's unique charm provides an opportunity to enjoy living a rural lifestyle with the convenience of urban amenities. The landscape is made up of scenic rivers, picturesque landscapes, and the Town's transportation system provides convenient access to surrounding municipalities.

The Township of Essa has growth directed in the following settlement areas:

- The community of Angus;
- The community of Thornton; and
- The community of Baxter.

According to **Figure 3**, environmentally significant areas are primarily located outside the settlement areas, and are mainly stretched across the west side of the Township as north-south corridors. Institutional areas are evenly spread out in the settlement area of Angus, with at least one institutional area in Baxter and Thornton. Generally, commercial land uses are located in settlement areas only, such as Angus, Baxter, and Thornton.

Figure 3. Township of Essa Land Use Designations

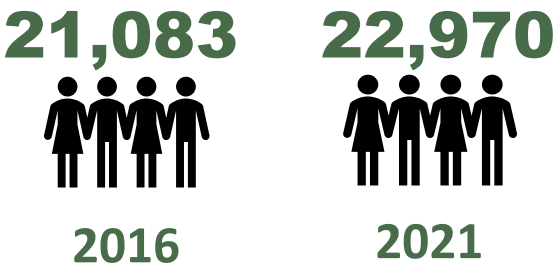


Source: TOWNSHIP OF ESSA, 2003

1.5.2 Population, Median Age, and Employment Trends

Population

The population of the Township of Essa has experienced limited growth over the last decade and is expected to continue its slow increase. According to the Canadian Census data, Essa's population in 2021 was approximately 23,000 persons while the 2016 data indicated the Township's population had been around 21,000 persons (a population increase of roughly 9%).



Statistics Canada 2021 data also provides the breakdown of population by community. The data demonstrates that the community of Angus makes up the majority of the Township's population, followed by Thornton (Baxter data is unavailable). The Township's projected household growth by urban centre is presented in **Table 2**. Angus population had approximately 12,600 people in 2016, around 14,500 people in 2021, and the settlement area of Thornton grew from around 1,020 people in 2016 to roughly 1,050 people in 2021.

Table 2: Township of Essa Projected Household Growth by Urban Centre

Urban Centre	2016	2021
Angus	12,561	14,503
Thornton	1,017	1,046

Note: Baxter data is unavailable.
Source: Statistics Canada, 2021

Hemson Consulting Ltd was retained by the Township to develop a Development Charges Background Study that was published in August 2023. The Study developed population, household, and employment forecasts from 2022 to 2051 and forecasts that the Township would reach a population of approximately 28,100 people by the year 2031 and around 35,800 people by the year 2043. **Table 3** displays the total population in the year 2021, projected growth in population for 2031 and 2043 as well as the net overall increase from 2021 to 2043 with a total population increase of approximately 12,800 (56%) (2.5% annual increase).

Table 3. Township of Essa Overall Projected Population Growth

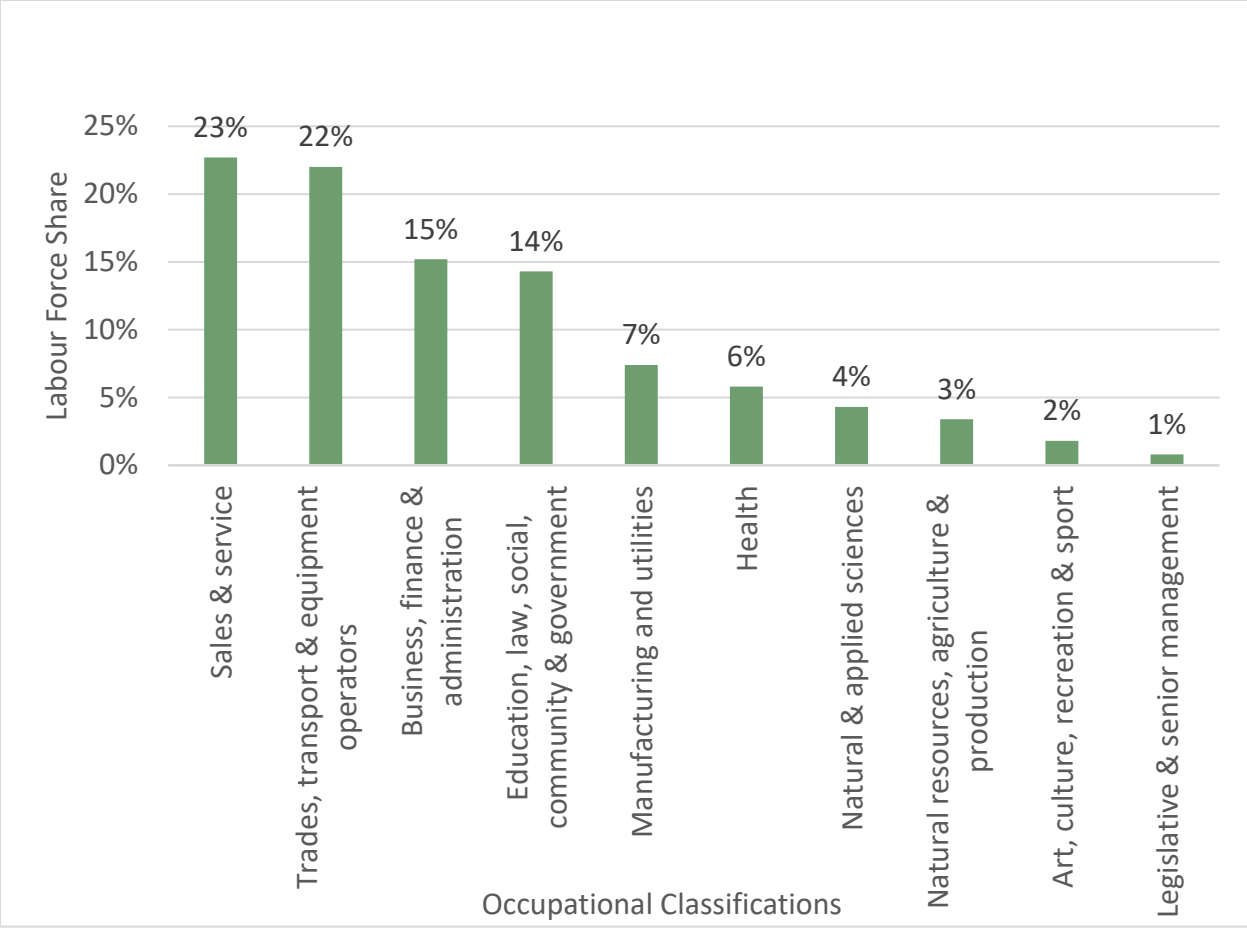
	2021	2031	2043	Net Overall Increase (2021 To 2043)	Annual Increase
Total Population	22,970	28,096	35,779	12,809 (56%)	2.5%

Source: Township of Essa Development Charges Background Study, 2023

Employment

According to the 2021 Census, the Township of Essa has an employment rate of approximately 63%, with a wide and well spread distribution of labour categories. Most common occupations are related to sales and services (23%), trades, transport, equipment operators, and related occupations sector (22%). Other common employed labour force are industries related to business, finance, administration (15%), education, law, social, community, government (14%), as well as manufacturing and utilities (7%). These industries rely on efficient supply-chains and transportation logistics, which demonstrates the importance of ensuring that the transportation network supports their performance. The Township of Essa's top employment industries total employed labour force can be found in **Figure 4.**

Figure 4. Township of Essa Top Employment Industries Total Employed Labour Force



Source: Statistics Canada, 2021

The employment projections provided in the Development Charges Background Study forecast that the Township would reach approximately 8,800 jobs by the year 2021, 10,900 jobs by 2031, and 12,300 jobs by the year 2043. **Table 4** shows the projected employment is expected to be a net overall increase of 40% (approximately 3,500 jobs) from 2021 to 2043, or an annual increase of 1.8%.

Table 4. Township of Essa Overall Projected Employment Growth

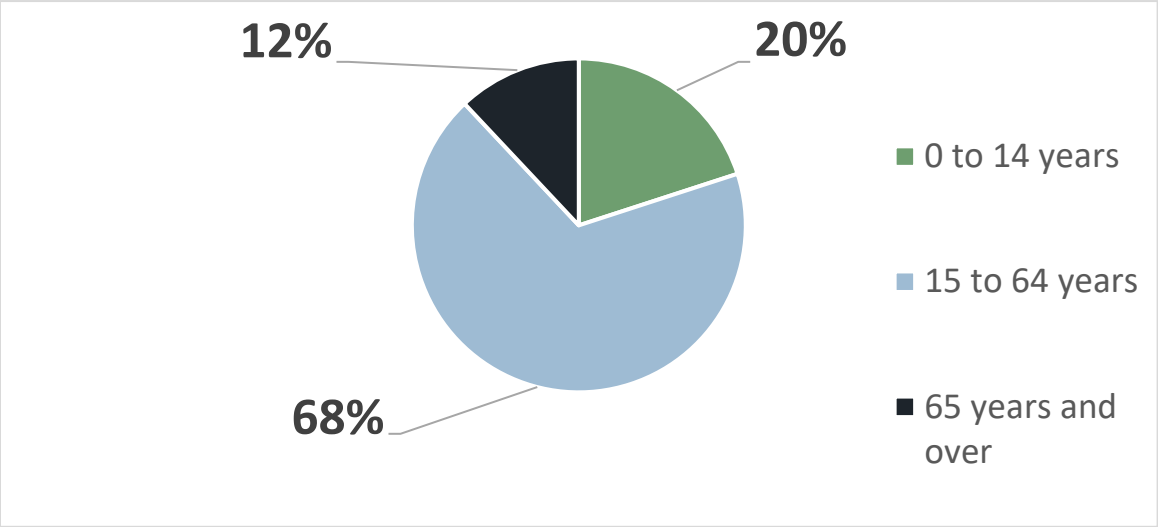
	2021	2031	2043	Net Overall Increase (2021 To 2043)	Annual Increase
Employment (Jobs)	8,810	10,910	12,330	3,520 (40%)	1.82%

Source: Township of Essa Development Charges Background Study, 2023

Median Age

The Township's median age is approximately 38 years old, which is younger than the Ontario average of 42. **Figure 5** shows the age group classifications and breakdown from the 2021 census. The 0 to 14 and 65 and over age groups collectively represent approximately one-third of the population. This is important to acknowledge as these groups tend to experience less mobility and have fewer mobility options. There should be additional consideration brought to the needs of these groups and reflected in the multi-modal transportation network.

Figure 5. Breakdown of Residents by Age



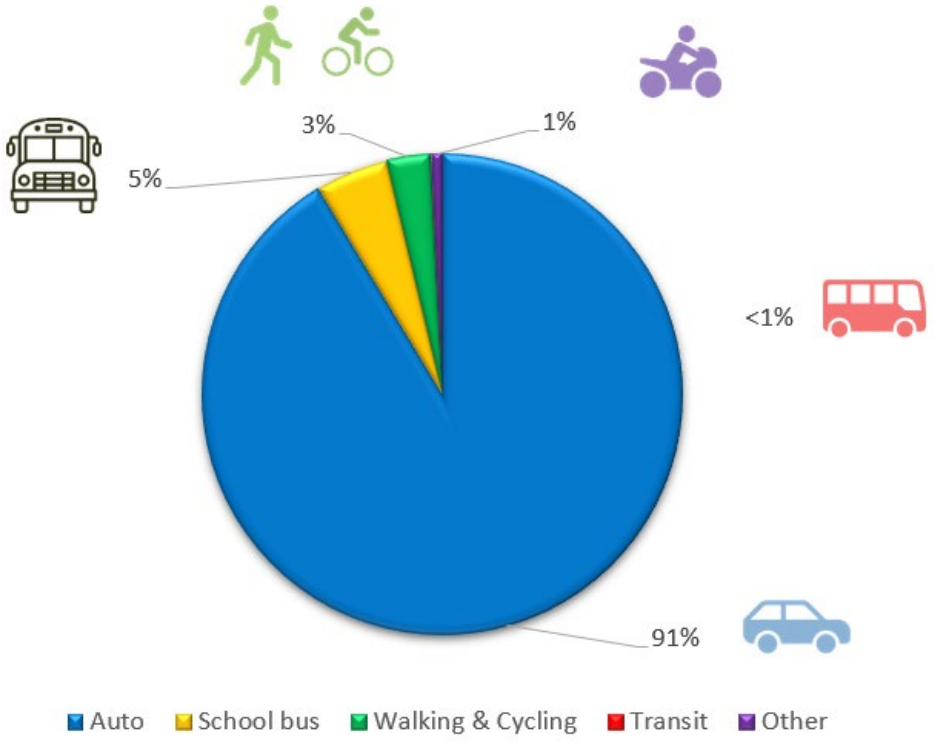
Source: (Statistics Canada, 2021)

1.5.3 Existing Travel Behaviour

The Township of Essa supports a transportation network for various modes of transportation. To analyze the existing travel behaviour, this section presents the summary of the trip data from the year 2016 Transportation Tomorrow Survey (TTS) data. At the time of writing this report, data from the 2021 TTS (which was postponed until 2022 due to the COVID-19 pandemic) has not been published.

The 2016 TTS data showed that most of the trips are conducted by Auto (91%), followed by School bus trips (5%) and Walking/Cycling (3%). The trips by transit and other modes of travel are very low at around 1%. **Figure 6** shows the distribution of trips in Essa by model of travel.

Figure 6. Trip Distribution by Model of Travel



TTS data also shows the commuting destinations of the trips from Essa. As shown in **Table 5**, most of the commuting trips (81%) are destined within Simcoe County, with 30% of trips taking place within Essa and the remaining 51% in the rest of Simcoe County.

The TTS data was also used to extract the trip distribution information across the various locations in the province during the AM peak period from 6:00 – 9:00 AM and PM peak period from 3:00-6:00 PM. **Figure 7** and **Figure 8** shows the number of trips between Essa and various places in the Province during the AM and PM peak periods, respectively. It should be noted that the trips shown in these figures are not the net actual trips and represent the sample data as collected by the TTS survey.

Table 5. Essa's Typical Commuting Destinations

Commuting Destinations from Essa	% of Trips
Within Essa	30%
Within Simcoe County	51%
Within Ontario	19%
Out of Ontario	0%

Figure 7. AM Peak Period Trip Distribution

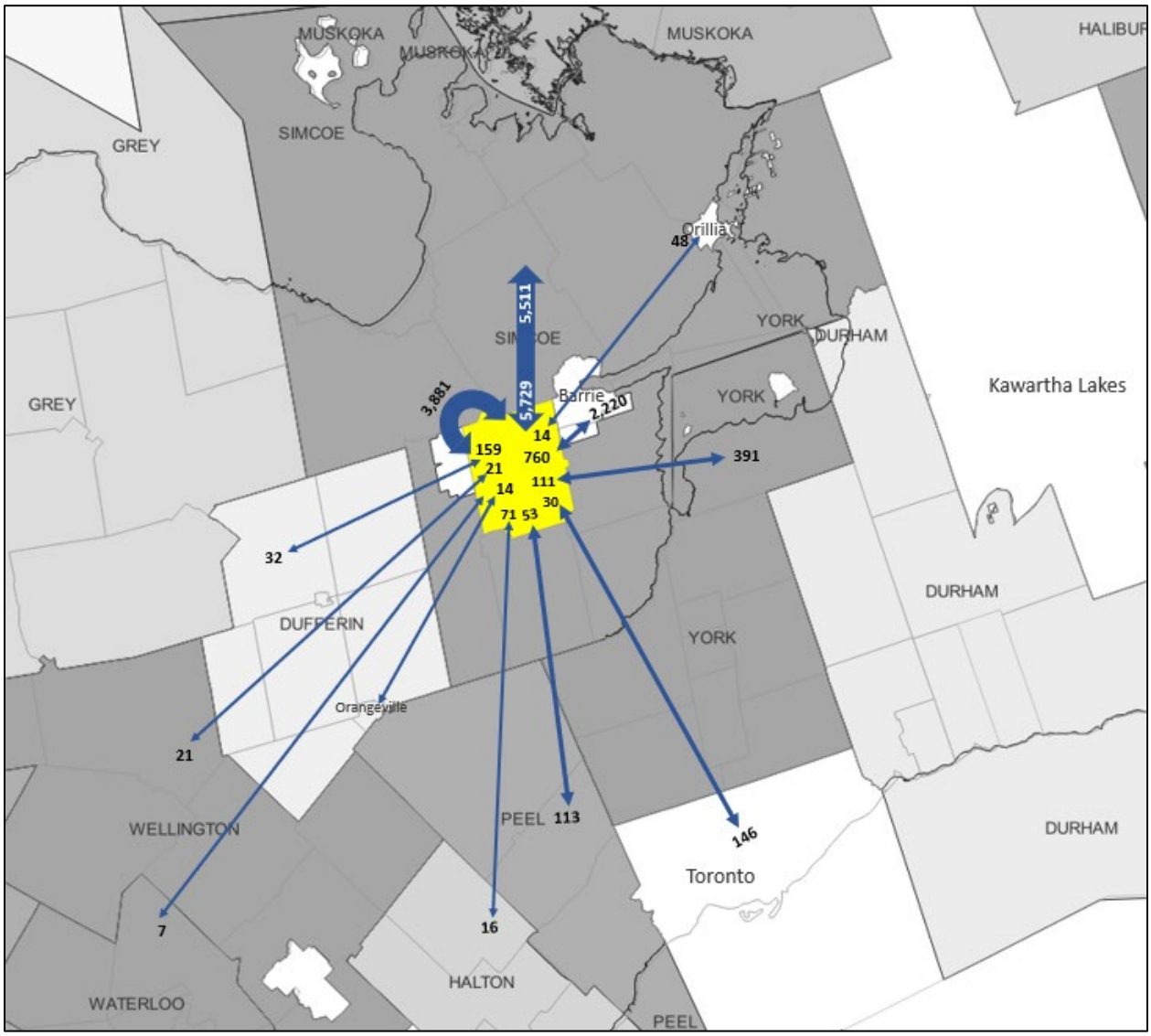
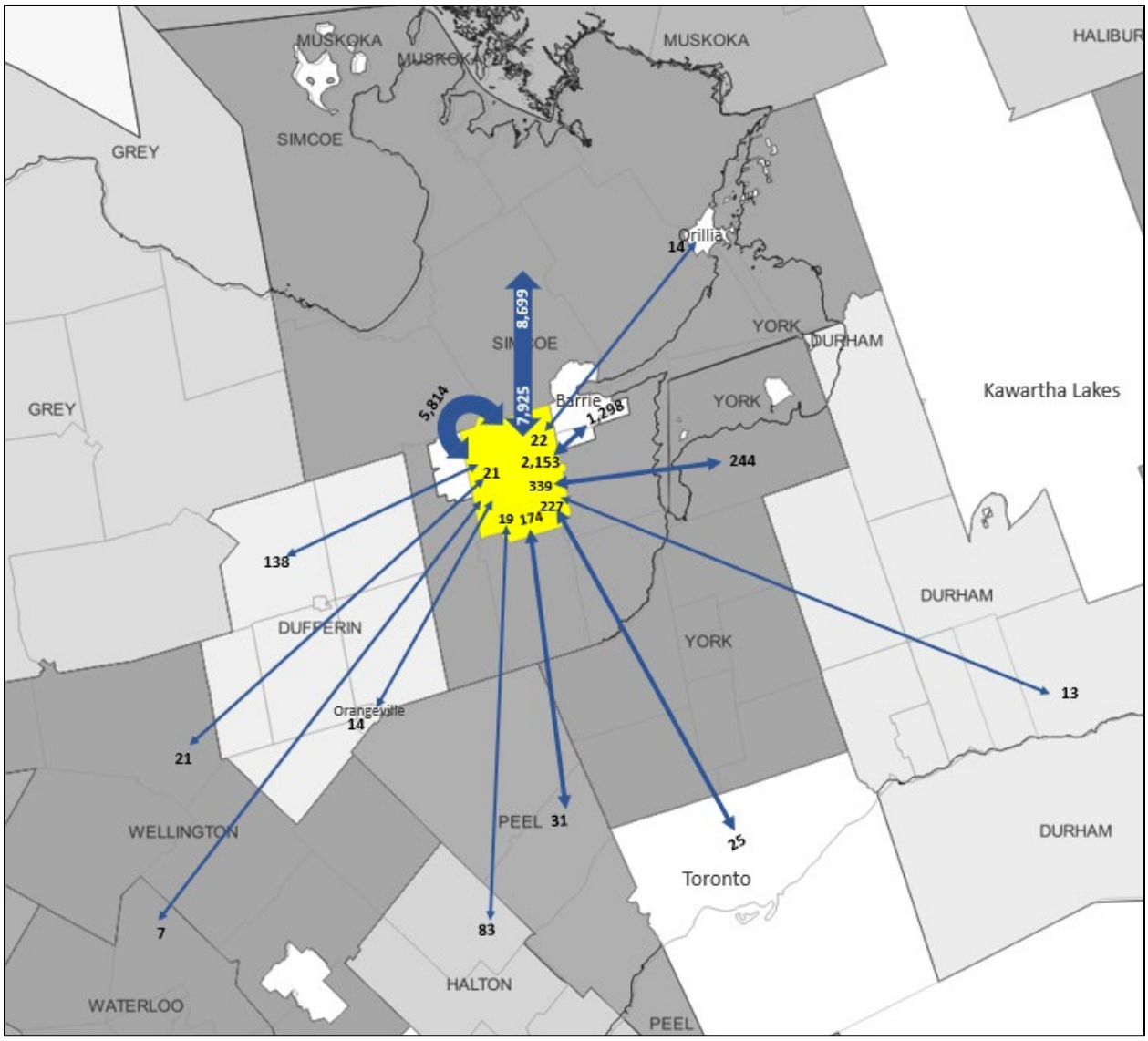


Figure 8: PM Peak Period Trip Distribution



1.6 Vision Statement

The purpose of the TMP is to address the growing mobility needs of the Township due to the forecasted growth in population and employment. A vision statement is prepared to define the overall goal of the TMP and why the TMP is being prepared. The vision statement should align with the over-arching policies of the Township and be mindful and proactive in responding to emerging transportation trends. The draft Vision was presented to key stakeholders and members of the public to ensure it reflects community priorities. The Vision for the TMP is:

> To provide a multi-modal network that allows users of **all ages and abilities** to **access all modes of transportation**, contributing to a **connected** and resilient community. The success of the Plan will be based on its ability to accentuate Essa's unique natural and rural areas, while accommodating future travel demands as the community continues to grow. Its success will be based on the implementation of achievable and relevant programming looking to the 20-year planning horizon.

The Vision Statement also fulfills Phase 1 of the Municipal Class Environmental Assessment process for masterplans which identifies that a problem or opportunity statement was developed and presented for public review so that the public understands the purpose for the study.

2 Policy Framework

The Township's TMP is aligned with a number of policies at the Federal, Provincial, County, and Township levels. This section provides an overview of relevant policies and the role of each policy in supporting the development of the TMP.

2.1 Federal

Federal policies give high-level, over-arching direction on planning matters across the country. In addition to the climate change and sustainability guidance that Federal policies provide, it also includes insight on leading policy on alternative modes of transportation for the Provincial, County/ Regional, and Local level of governments to help implement smaller-scale policies and strategies. Federal transportation policies that have been considered as part of the TMP include:

- **Federal Sustainable Development Act (2008)** provides the Government of Canada the authority to create strategies that affects sustainable development and reducing environmental impacts. The Act is not directly related to Township of Essa's TMP, although it includes a precedent for policy initiatives throughout the country to decrease environmental impacts of public services and the public goods governments administer, which includes transportation services.
- **Strategies for Sustainable Transportation Planning: Review of Practices and Options (2005)** presents strategies that should be considered that reduces environmental impact, especially in the transportation sector. The strategies also focus on sustainable modes of transportation and mixed land uses.
- **Communities in Motion: Bringing Active Transportation to Life Initiative (2008)** supports the use of more sustainable alternative modes of transportation such as transit and active transportation instead of single-occupancy vehicles. There are a number of federal policies that provides specific guidance on transportation design, the guidelines include:
    - **Bikeway Traffic Control Guidelines for Canada (2012);**
    - **Manual of Uniform Traffic Control Devices for Canada (2021); and**
    - **Geometric Design Guide for Canadian Roads (2017).**

2.2 Provincial

Provincial policies provide high-level, strategic direction for growth and development across Ontario. Federal policies act as a precedent for Provincial policies, which includes policies that encourage sustainable and multi-modal travel. Provincial policies allow strategies and policies to be applied to the local context, to ensure the regions across Ontario are consistent in following policies that guide growth and development.

2.2.1 Provincial Policy Statement (PPS) (2020)

The transportation recommendations and policies for the TMP will need to be consistent with the Provincial Policy Statement (PPS). The purpose of the PPS is to set a policy framework stating that transportation systems are an integral planning piece for balanced transportation choices that facilitate pedestrian and cycling mobility and other modes of travel.

Key goals within the PPS include:

1. Building strong, healthy communities;
2. Ensuring the wise use and management of resources;
3. Protection of the natural environment; and
4. Protection of public health and safety.

The evaluation of mobility options for the TMP will be made to align with the PPS and after the consideration of the four key goals.

Specific sections within the PPS related to the transportation system include:

- **"Transportation and Infrastructure Corridor"** calls for the protection of corridors, rights-of-way, and major goods movement facilities used for transportation purposes and transit needs; and
- **"Energy Conservation, Air Quality and Climate Change"** calls for the promotion of active transportation and transit within different land uses and encourages transit supportive development to address congestion.

PPS Key Definitions

Transportation Systems

Provide safe, energy efficient ways to facilitate the movement of people and goods, making efficient use of infrastructure using transportation demand management strategies, as well as provide connectivity as part of the multi-modal system and promote higher density with a mix of uses for land use patterns to reduce lengths of trips.

Long-Term Economic Prosperity

To provide an efficient, cost-effective, reliable multi-modal transportation system that is integrated with adjacent systems with different jurisdictions.

The transportation recommendations and policies for the Township of Essa's TMP conform to the PPS.

2.2.2 A Place to Grow: Growth Plan for the Greater Golden Horseshoe (2020 Consolidation)

The Growth Plan's intent is to guide policy objectives for planning and development of an integrated efficient transportation system, in order to support a vibrant economy and a higher quality of life.

The following summarizes the Growth Plan policies that pertain to the Township of Essa TMP:

- Coordination of transportation system planning, land use planning, and transportation investment;
- A transportation network that supports moving people and goods by a variety of modes;
- Providing a safe and efficient system that reduces greenhouse gas emissions and other negative environmental impacts;
- Ensuring consideration of a balanced and integrated transportation network;
- Ensuring that future transportation corridors are identified and protected to meet current and future needs across travel modes;
- Encouraging development patterns that are oriented toward supporting transit and active transportation;
- Active transportation networks that are integrated into transportation planning to:
    - Providing safe, comfortable travel for pedestrians, cyclists and other users of active transportation within existing communities and new development;
    - Providing linkages between intensification areas, adjacent neighbourhoods, major trip generation and transit stations, including dedicated lane space for cyclists on the major street network where feasible; and
    - Implementing complete streets design principles when refurbishing or reconstructing existing street networks.
- To ensure that goods movement encompasses the following:
    - To link major goods movement facilities and corridors with international gateways as well as employment areas;
    - That there are partnerships between the Province, municipalities, agencies and transportation service providers; and

Transit-Oriented Development (TOD)

As defined by Metrolinx, a TOD encourages transit use by having the following characteristics:

- Mixed-use development;
- Higher density; and
- Connections to transit stations and stops.

- Priority routes will be provided by municipalities to cater to goods movement, where it is applicable. The routes will ensure that there are connections between employment areas, significant commercial activity locations, and include alternate routes to the Provincial network.

The future road and active transportation network of the Township of Essa's transportation policies is consistent with the Growth Plan.

2.2.3 Connecting the GGH: A Transportation Plan for the Greater Golden Horseshoe (MTO) (2022)

The Township of Essa is situated in Simcoe County, which is a part of the Greater Golden Horseshoe (GGH). The intent of the Transportation Plan is to establish the 30-year vision for mobility across the Region and it serves as a guide to align planning and investments by the Province and other transportation providers that will:

- Fight gridlock and improve road performance;
- Get people moving on a connected transit system;
- Support a more sustainable and resilient Region; and
- Efficiently move goods.

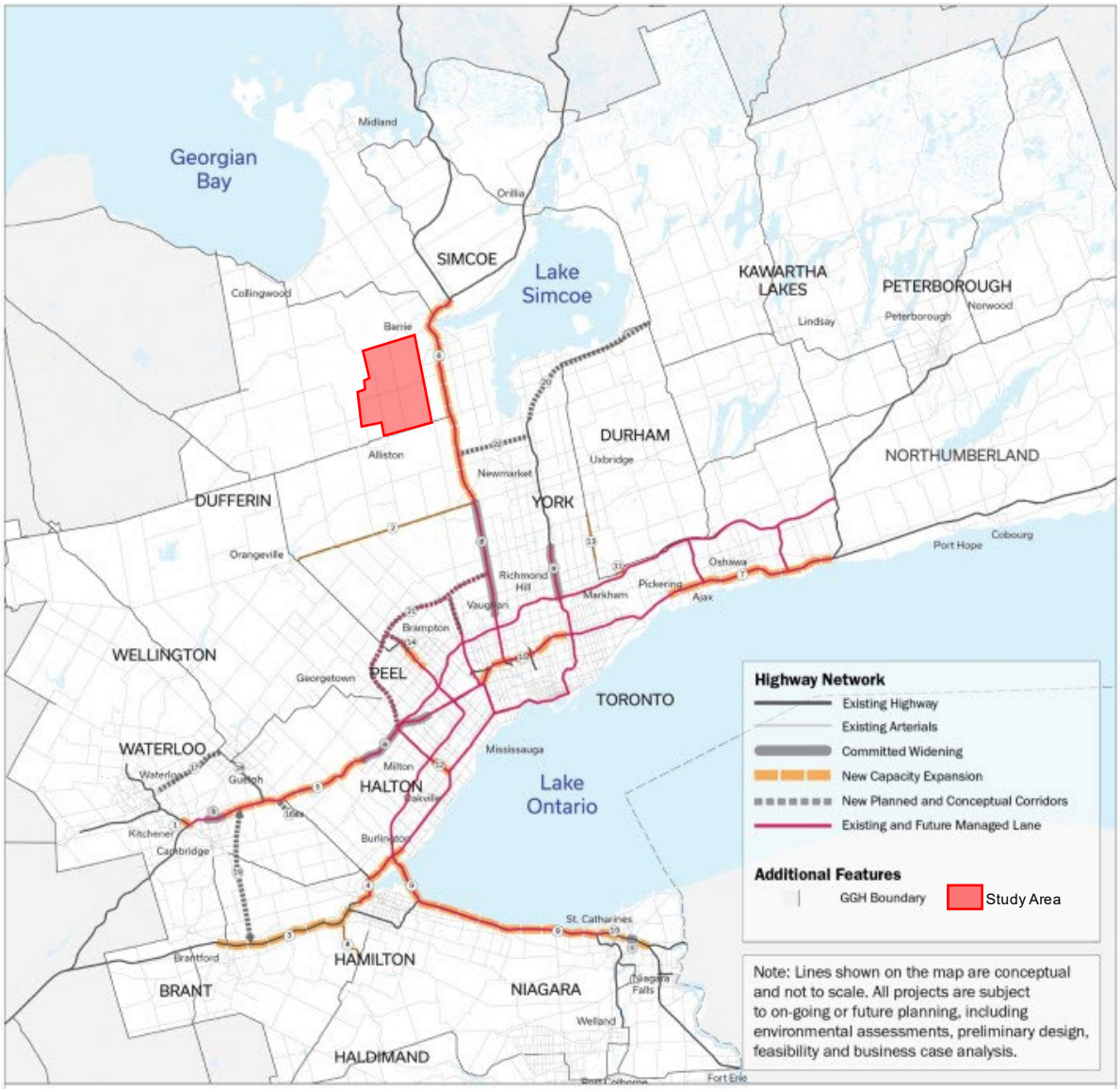
Road Infrastructure

One key infrastructure improvement that is planned for the GGH area is expected to affect the Township. The Highway 400 (Highway 9 to Duckworth Street) is a new north-south capacity expansion project that will increase capacity on Highway 400. Highway 400 is approximately 3.6 km away from Thornton. Many drivers currently use Highway 400 when traveling to and/or from Essa. The location of the Highway 400 expansion is illustrated on **Figure 9.** The map also displays that the expansion has an existing and future managed lane that may include a HOV lane, express toll lane, bus-only lane and truck-only lane.

Transit Infrastructure

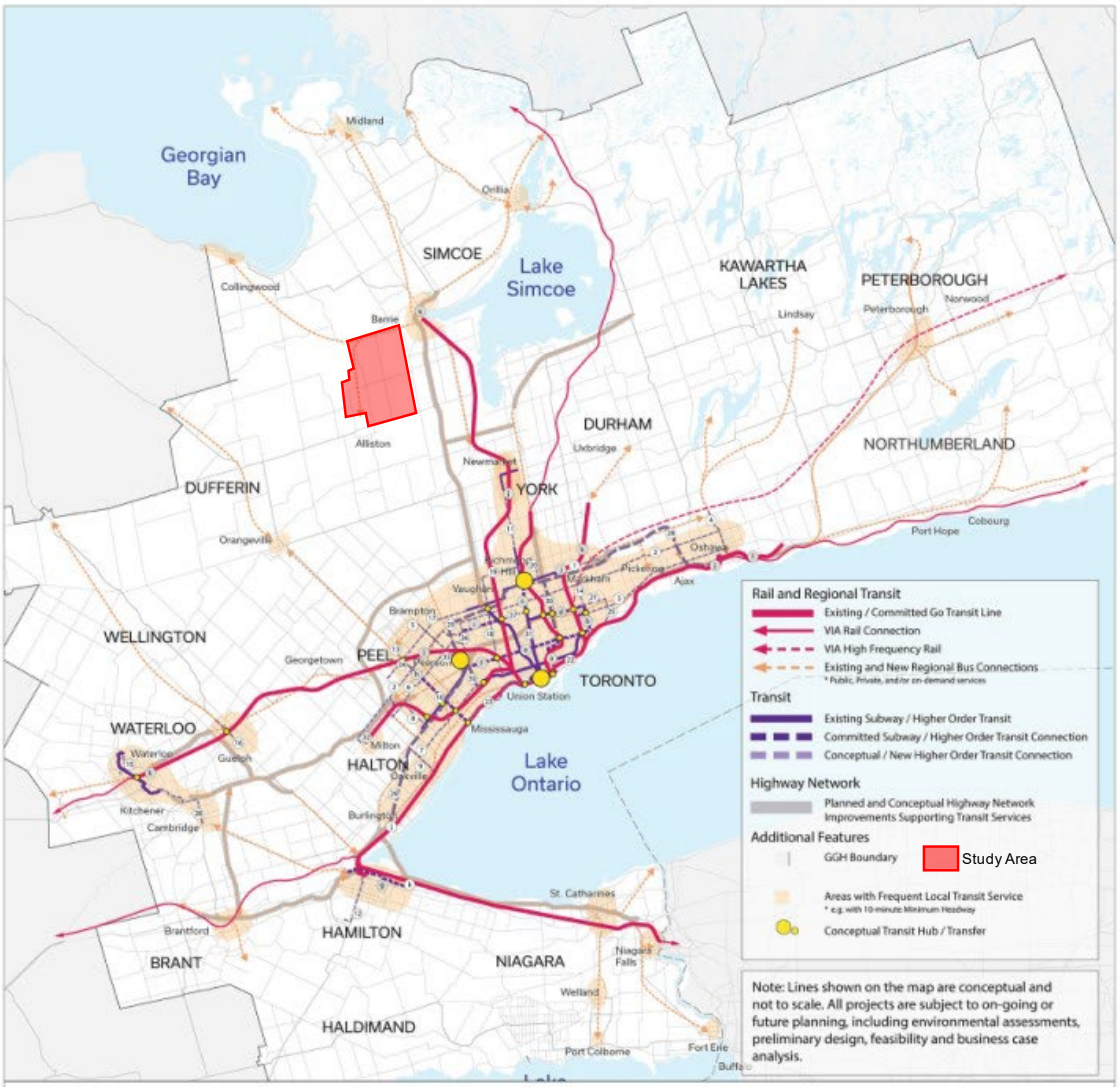
The Transportation Plan outlines existing and planned transit projects throughout the GGH area. There is an existing and new regional bus connection (public, private, and/or on-demand services) that directly passes through the Township of Essa, shown in **Figure 10**, and will be carried out by public, private and/or on-demand operators. Planned new regional bus services will be beneficial in connecting rural areas of the GGH and outer ring municipalities. The GGH Transportation Plan notes the importance of local transit connections to help relieve issues associated with gridlock. Additionally, there are long-term policy directions that support an integrated region-wide transit system in efforts to improve transit user experience.

Figure 9. Current, Planned, and Conceptual Future Road Infrastructure



Source: Map 4, Greater Golden Horseshoe Transportation Plan, February 2022

Figure 10. Current, Planned, and Conceptual Future Transit Infrastructure and Services



Source: Map 5, Greater Golden Horseshoe Transportation Plan, February 2022

2.3 Simcoe County Policies

The County of Simcoe is also bound by the policies at the Provincial and Federal levels and provides further guidance to its lower tier municipalities, including the Township of Essa. The County's supporting policy documents outline the goals and objectives for future planning, growth, and development across the County. The TMP will provide context-specific recommendations for improving and enhancing transportation throughout Essa, in a way that aligns with the broader vision of the County. Existing plans, policies and studies at the County level include:

- Official Plan of the County of Simcoe (2013)
- Simcoe County – Transportation Master Plan (TMP) – Revised Draft Report (2023)
- Simcoe County Transit Feasibility and Implementation Study (2015)
- Simcoe County Trails Strategy (2014)

2.3.1 Simcoe County – Official Plan (2023 Consolidation)

The County of Simcoe Official Plan, Office Consolidation 2023 consolidates six of the amendments to the County Official Plan that have been approved by the Ministry of Municipal Affairs and Housing (MMAH) or Local Planning Appeal Tribunal (LPAT)/Ontario Land Tribunal (OLT). The County of Simcoe Official Plan is designed to assist in growth management in a County that is anticipated to experience strong population growth and urban development over the upcoming 20-year period.

The County's Official Plan provides policy context for land use planning and considers social, economic, and environmental impacts of land use and development decisions. The Official Plan aims to achieve goals outlined in various County plans and documents including the County's Transportation Master Plan. The County's Official Plan includes transportation policies that relate to a comprehensive, accessible, and sustainable transportation network system throughout the County of Simcoe. Transportation policies within the Official Plan pertain to both the road network and alternate transportation infrastructure.

Section 4.8 of the County of Simcoe Official Plan outlines objectives to maintain and improve the County's multi-modal transportation system. The improvements will be achieved through the following:

- Long-term multi-modal transportation system planning;
- Improving roads, intersection, and traffic control devices;
- Constructing new road sections and widening existing road sections;
- Employing traffic management techniques to achieve more efficient use of roads;
- Requiring appropriate conditions of approval for development applications; and
- Considering the needs of pedestrians and cyclists in road design, where feasible.

2.3.2 Simcoe County Transportation Master Plan (TMP) – Revised Draft Report (2023)

The Simcoe County Transportation Master Plan (TMP) is a long-term plan that will guide the County of Simcoe's development, expansion and management of its multi-modal transportation system. The County of Simcoe is currently updating their TMP to outline transportation needs and priorities to 2051. The TMP update has undergone three phases to date: Phase 1 – Needs and Opportunities, Phase 2 – Transportation Network Development and Phase 3 – Strategies and Policies to Support the Recommended Network. Phase 4 – Transportation Master Plan Summary Report has not been released by the County of Simcoe as of the writing of this Township of Essa TMP report. The overall vision set out for the TMP update is to create a safe, accessible, and efficient multi-modal transportation system that will support communities within the County as well as its broad geography and growing population.

Phase 3 of the Simcoe County TMP presented actions that should be taken. One of the recommended actions stated in the report is for Metrolinx, MTO, Town of Collingwood, Township of Clearview and Township of Essa to work collaboratively and review the potential to develop Transit-Oriented Communities along the Barrie-Collingwood Railway in the future.

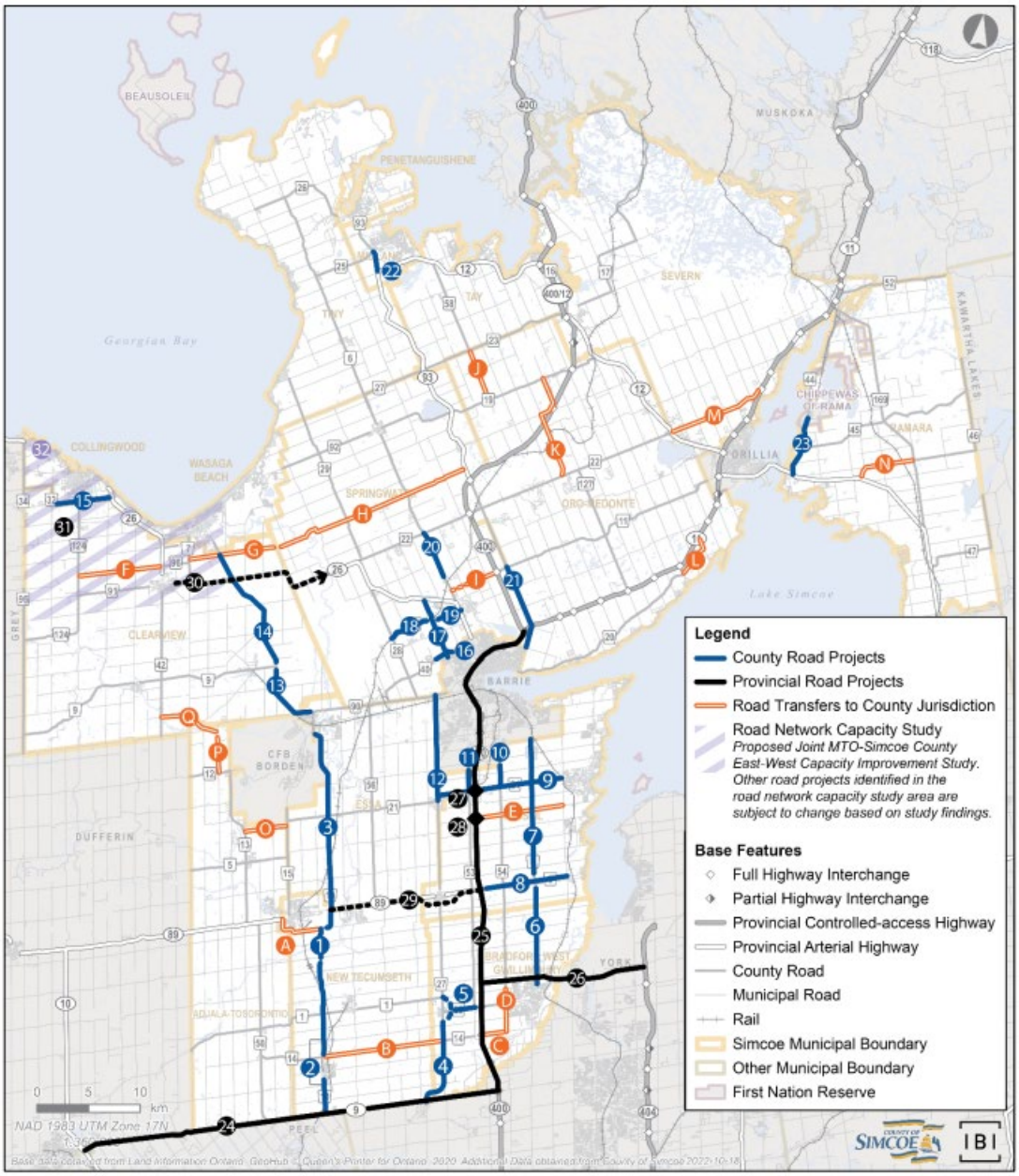
The TMP touches on the provision of active transportation infrastructure. Phase two of the TMP had developed an active transportation network which focused on infrastructure improvements. A variety of routes had been recommended with two off-road routes that run through Essa, an on-road route and a priority route running along part of the Town's northern boarder. **Figure 11** presents these recommended routes.

Figure 11: Simcoe County Recommended Priority and Ultimate Cycling Networks

Source: County of Simcoe Transportation Master Plan Phase III: Strategies and Policies to Support the Recommended Network, 2023

Furthermore, the TMP outlines a long list of projects regarding road network improvements. The projects were identified based on factors including the 2014 TMP update, road network model outputs and the Municipal Advisory Committee. One of the projects identified in Essa is County Road 10, the portion running between County Road 90 and Highway 89. The improvements look to widen the road to 4 lanes, which assists in addressing capacity concerns. **Figure 12** presents location of road improvements in the County including the proposed improvement running through Essa.

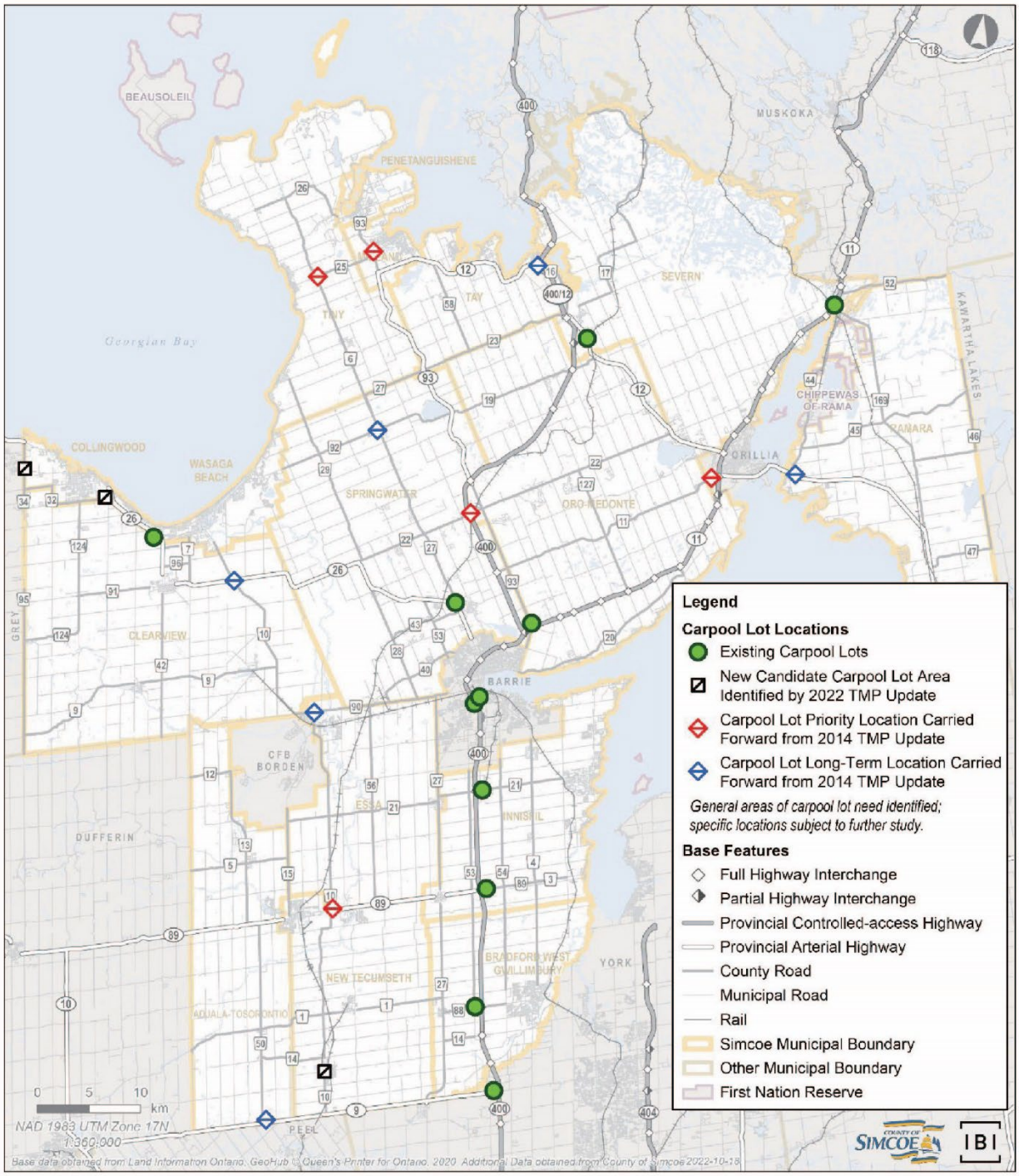
Figure 12: County of Simcoe Recommended Road Projects by 2051



Source: County of Simcoe Transportation Master Plan Phase II: Transportation Network Development Roads, Transit and Active Transportation, 2023

Six additional carpool lot locations had been identified in the 2014 TMP update for longer term implementation. An action identified by the TMP is to install EV charging infrastructure at carpool lot locations in efforts to support County residents as more of them are making the switch to electric vehicles. One of the long-term carpool lot locations is in Essa, specifically Angus on County Road 90 and County Road 10. **Figure 13** presents the recommended carpool lots in Simcoe County.

Figure 13: Map of Areas Recommended for Carpool Lots in Simcoe County



Source: County of Simcoe Transportation Master Plan Phase III: Strategies and Policies to Support the Recommended Network, 2023

2.3.3 Simcoe County Transit Feasibility & Implementation Study (2015)

The Simcoe County Transit Feasibility and Implementation Study built upon the 2014 Transportation Master Plan and focused on the feasibility of a range of transit partnerships, service options, delivery methods as well as provided a staged implementation and monitoring strategy. The study provides the County with an opportunity to respond to challenges of supporting transit initiatives among smaller the County's smaller urban communities and larger centres. The study has determined that there is a dispersed pattern of trip origins and destinations throughout the County, therefore, to serve residents' and their travel needs a broad network of transit service across the County is needed. Future stages of the study will aid in determining the County's transit network elements, timing, and phasing.

As an outcome of this study, Simcoe County launched its Linx transit service.

2.3.4 Simcoe County Trails Strategy

The Simcoe County Trails Strategy was created to assist the development of a County-wide network of passive use trails. The document focuses on how the County can play a strong role regarding aspects of trail development and management. The vision of the Trails Strategy is "To create a world class network of multi-purpose passive use trails that connects the County's communities while providing linkages to natural, cultural, and tourism assets to increase visitation, recreational and active transportation opportunities, thereby improving the quality of life for County residents and visitors." This vision looks to be achieved through the following five goals:

- Support a variety of passive trail uses through an accessible, connected trail network that links communities and places of interest.
- Maximize trail investments.
- Enhance trail-user experience.
- Collaborate with stakeholders.
- Promote awareness of Simcoe County trails.

The Trail Strategy recognizes that trails are becoming more popular in recent years as they provide safe, walkable transportation routes that connect and links communities. The Township of Essa has five (5) trails within its boundaries that are owned and maintained by the County of Simcoe, Conservation Authority or the Ganaraska Hiking Trail Association. The following list of trails and their respective overseeing entities are as follows:

- Baxter Tract of Simcoe County Forest – The County of Simcoe
- Foster Tract of Simcoe County Forest – The County of Simcoe
- Utopia Conservation Area Trails – Nottawasaga Valley Conservation Authority
- Tiffin Conservation Area (Tiffin Centre Loop Trail) – Tiffin Centre for Conservation
- Ganaraska Hiking Trail (Mad River Section) – Ganaraska Hiking Trail Association

Refer to Figure 1 and Figure 4 in Section 1 of the Trails Master Plan for maps outlining the location of these trails within Simcoe County and Essa. For Township specific trails please refer to section 3.2.

2.4 Township of Essa Policies

Along with policy directions from the County of Simcoe, the Township of Essa also has a set of existing planning policies and strategies that establish a vision for the Township and help to guide what the transportation system will look like in the future. Some of the relevant policies and plans at the local level include:

- Township of Essa – Official Plan (2001)
- Township of Essa – Growth Strategy (2013)
- Township of Essa – Strategic Plan (2019 – 2022)

2.4.1 Township of Essa - Official Plan (2001)

The Essa Official Plan (OP) provides a policy framework that serves as a guide for the Township's growth and development over the next 20 years. The OP is to assist in making decisions for the physical development of Essa while considering relevant social, economic, and environmental matters. The OP incorporates a section for transportation policies that seeks to encourage and provide the safe and efficient movement of goods and people. The transportation policy section includes objectives regarding the improvement of the existing road network to meet the long-term needs of Essa and its residents and to satisfy regional transportation network requirements. The Township of Essa is currently conducting an Official Plan Review for the Official Plan 2001, which has been in effect since its adoption on July 6, 2001. The Official Plan Review will assist in bringing Essa's Official Plan in conformity with Provincial Policy and Growth Plan directions. The updated Official Plan will seek to address planning policy areas including:

- Promoting sustainable transport
- Making effective use of land
- Achieving sustainable development
- Delivering a sufficient supply of homes
- Building a strong and competitive local economy
- Ensuring the vitality of settlement areas and promoting healthy and safe communities
- Supporting high quality communications
- Achieving well-designed places
- Conserving and enhancing the natural environment
- Conserving and enhancing the historic environment
- Meeting the challenge of climate change

The Official Plan Review commenced in fall of 2020 and is currently on hold as the Town engages with Provincial and Upper-tier Municipal stakeholders regarding ongoing

legislative changes, the County of Simcoe Municipal Comprehensive Review and water and sewer capacity allocation.

2.4.2 Township of Essa – Growth Strategy (2013)

The Township of Essa Growth Strategy 2013 was completed as an alternative to a full-scale Growth Management Study required under the County of Simcoe's Official Plan 2012. The purpose of the Township of Essa Growth Strategy 2013 is to assess development potential of Essa's Settlement Areas in terms of population, employment allocations, density, land availability, intensification targets and future directions of growth.

The growth strategy for Essa had found that the Angus Settlement Area is considered to be a complete community as it is fully serviced and provides a range and mix of housing, employment opportunities, community services, facilities, open space and commercial services. Major development will be directed to the Angus settlement areas while minor development is expected to occur in settlement areas including Thornton and Baxter with infilling in Utopia, Colwell and Ivy.

As stated in the Growth Strategy 2013, development opportunities within the Angus settlement can accommodate Township growth to at least 2023. Given that the Angus settlement area is a priority area, development there should consider incorporation of active transportation facilities such as trails, cycling facilities and separation of vehicular and pedestrian routes as stated within the Growth Management Strategy section of the report.

2.4.3 Township of Essa – Strategic Plan (2019-2022)

The Township of Essa Strategic Plan was developed through a strategic planning session involving Council and senior Township staff on April 2, 2019. This process allowed the Township to think about how to ensure the future success of Essa and create a strategic plan with a vision, mission, and goals to achieve the desired outcomes. One of the goals identified in the strategic plan is "Good and safe roads and transportation". The Township has come up with the following desired outcomes to satisfy the goal:

- Public Transportation helping with affordability and social issues (isolation).
- Good roads, road safety and improvements – desired to have roads which are safe for motorists and pedestrians/improved infrastructure.
- An improved transportation network with linkages.
- Support for active transportation to provide for choice in mode of transportation.
- To improve on the transportation system including coordination with County roads.

The Township has set out actions to assist in meeting these goals which include implementing an active transportation strategy and plan, road improvements including crosswalks and traffic calming measures.

3 Existing Conditions and Future Performance

The existing multi-modal transportation conditions are reviewed in this section to establish a baseline of infrastructure and capacity in current conditions. This will provide the opportunity to compare the existing conditions with the future conditions analysis and make infrastructure and policy decisions to address mobility needs of future growth.

This section will also highlight the capacity of infrastructure in the future should no further improvements be identified beyond those already approved, and the forecasted growth occurs.

3.1 Existing Conditions

3.1.1 Active Transportation

Active Transportation (AT) refers to any form of human-powered transportation including walking, cycling, using a wheelchair, in line-skating, scootering, and skateboarding. Active transportation is an integral component of a multi-modal transportation system that enhances mobility options and accessibility for people of all ages and abilities.

Efficient trail network development relies on optimizing existing infrastructure and encouraging active transportation and recreation. The Trails Master Plan focuses on both formal and informal off-road ('recreational') trails, with on-road facilities strategically placed to enhance connectivity.

In addition to the existing County and Conservation Authority trails that form part of Essa's existing trail network, the following trails are owned and maintained by the Township:

- Pine River Trail – Township of Essa
- Rippon Trail – Township of Essa
- Thornton Cookstown Trail – Township of Essa

Refer to section 1, Figure 1 – Figure 3 to view the existing trail network maps in the Trails Master Plan.

A high-level set of recommendations for the active transportation network can be found in **Section 5.2** of this TMP. For a thorough understanding of investment priorities aligned with existing facilities and diverse user needs along with a detailed analysis consult the Trails Master Plan.

3.1.2 Transit

The Township of Essa is solely serviced by the County of Simcoe's LINX transit service. The service route within Essa is Route 2, which provides service for passengers on

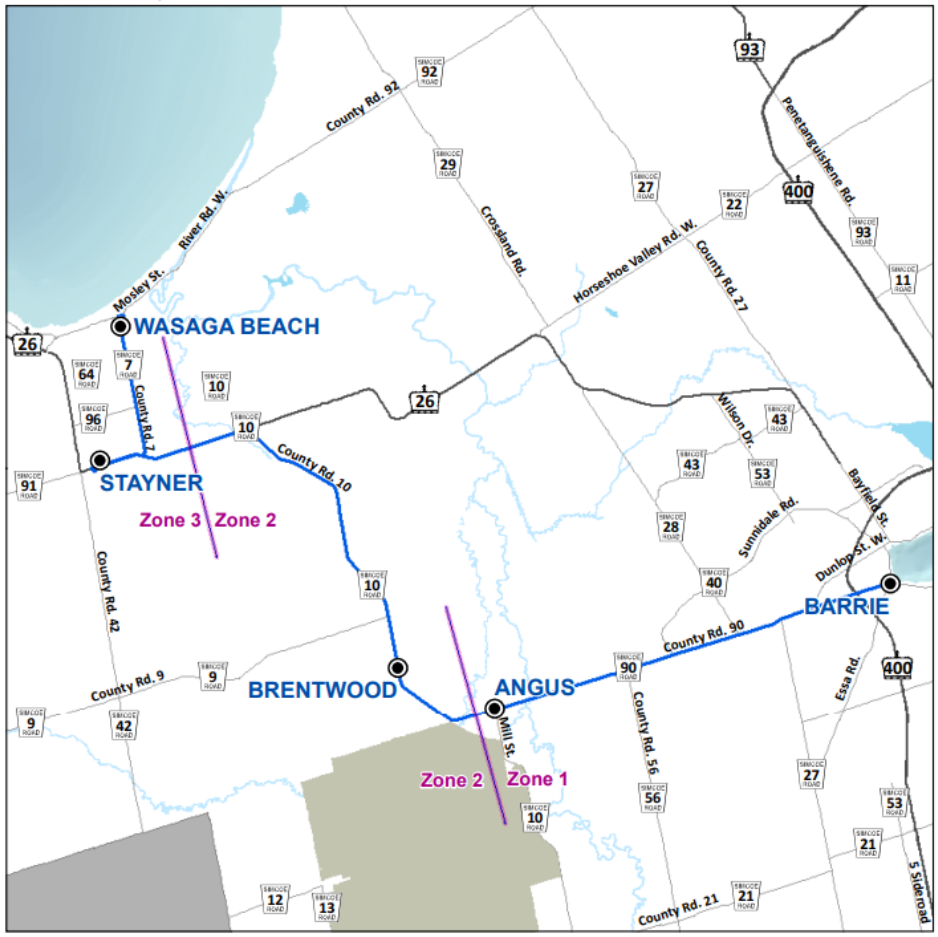
from Wasaga Beach to Barrie, Mondays to Fridays (at a frequency of every 60 minutes) from 5:30am till 6:30pm. There is no service available on Saturdays, Sundays or Statutory Holidays. **Figure 14** illustrates the map for Route 2 transit service, it shows that the route travels across the northern portion of the Township, servicing the Angus area, but there is no service to communities in the southern portion of the Township, such as Thornton or Baxter.

Simcoe County also operates the LINX PLUS+ service for those who cannot readily access the conventional LINX transit. LINX PLUS+ provides pre-arranged, door-to-door public service and/or service to and from conventional transit (LINX) for registered users that are within one kilometre of the LINX operating route (along County Road 90 / Mill Street in Essa). Eligibility for this service is considered on a case-by-case basis and is not based on a particular disability.

Figure 14. Route 2 Map

SIMCOE LINX

Route Map



Fare Structure

Route 2 is divided into three Fare Zones and rates are based on distance travelled. Children 5 years and younger ride for free.

ZONE	LOCATION
Zone 1	Barrie, Allandale Waterfront Station
Zone 1	Angus, Commerce Road
Zone 2	Brentwood, Community Centre
Zone 3	Stayner, Clearview Administration Center
Zone 3	Wasaga Beach, 45th St. S. and Knox Road W.
Zone 3	Wasaga Beach, 25 45th St. S.

From/To	Zone 1	Zone 2	Zone 3
Zone 1	$2.00	$4.00	$6.00
Zone 2	$4.00	$2.00	$4.00
Zone 3	$6.00	$4.00	$2.00

Use Our Fare Calculator at linx.simcoe.ca

Smoking is strictly prohibited on LINX buses and at bus stops

Holiday Service
There is no service on statutory holidays.

Lost and Found
Please call Customer Service at 1-800-263-3199 Monday to Friday between 8 a.m. and 5 p.m. for assistance.

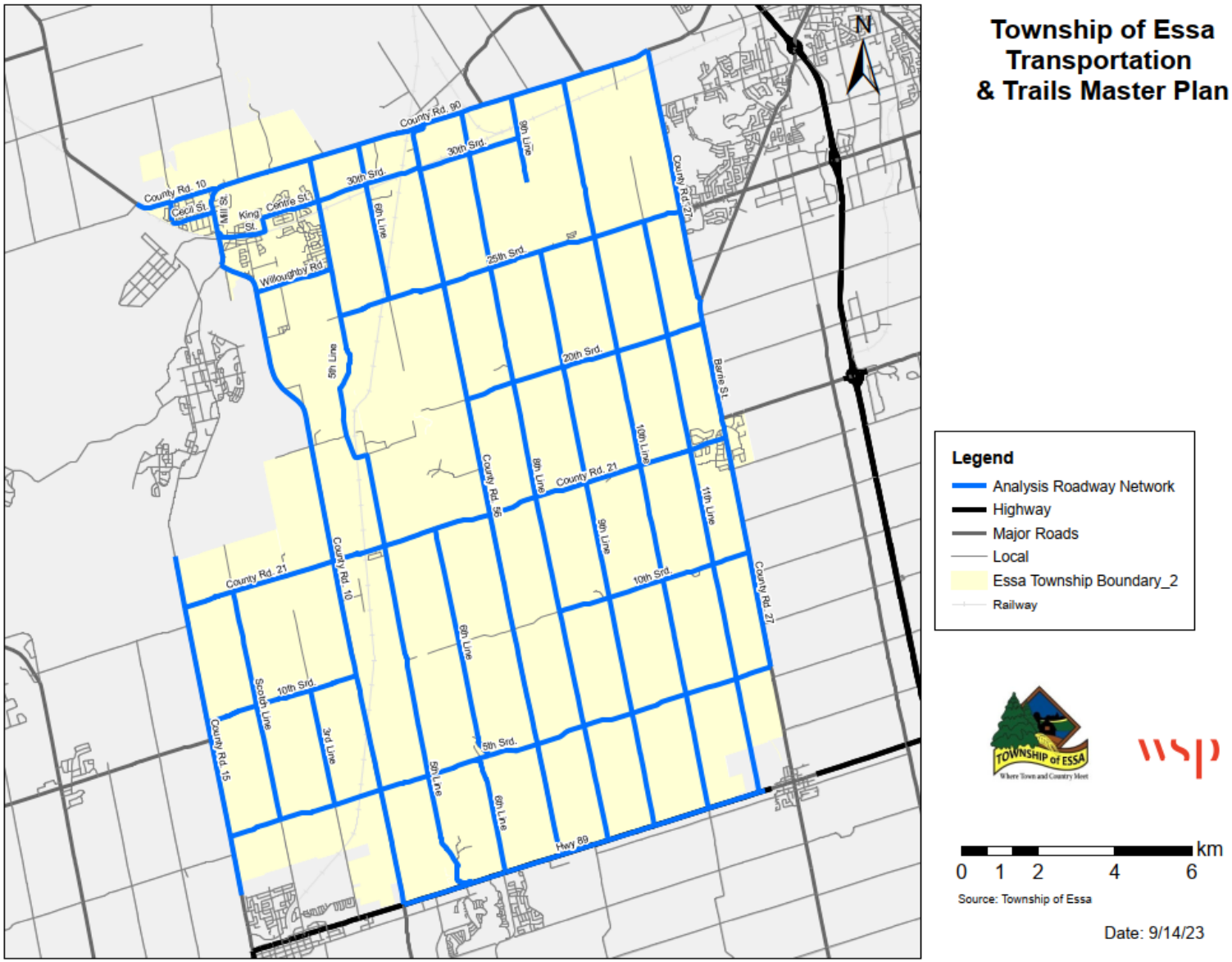
Source: County of Simcoe

3.1.3 Road Network

The transportation network in the Township of Essa supports a variety of transportation modes. The road network within the Township includes Provincial Highways, Simcoe County roads and Township roads. The current road network in the Township consists of approximately 1,850 kilometres of both urban and rural roads. This includes 90 kilometres of provincial highways, 315 kilometres of County roads owned and maintained by the County, and 1,445 kilometres of local road network owned and maintained by the Township. **Figure 15** presents the existing road network and provides additional information on roads within the Township.

The street network performance is evaluated by analyzing the volume to capacity (V/C) ratio on various roadway links in the study area using an excel spreadsheet tool for both the existing and future conditions. As shown in the figure, the study roadway network consists of all the County Roads and major Township roads in the study area including the Provincial Highway 89 in the south. The following sections describes the analysis methodology for assessing the traffic conditions in the study area.

Figure 15. Study Roadway Network



Document Path: \\corp.pbwan.net\IN\IN_BLR_Projects\70130996-221-10569-00-Essa TTMP\Transportation Planning\3 Design and Analysis\T06-Analysis and Calculations\GIS\Figure 9_230208-PC-2043 Study Road Network_v1.mxd

3.1.4 Existing Conditions Analysis

This section describes traffic volume development for the existing conditions (2023) and the results of the roadway network performance evaluation.

3.1.4.1 DEVELOPMENT OF THE SPREADSHEET MODEL

The spreadsheet model for analyzing the v/c ratio to evaluate the operation conditions of the roadway links was developed using the Microsoft Excel software. The spreadsheet model has all the study roadway network links with following roadway characteristics that include:

- Number of Lanes
- Lane Capacity
- Speed Limits
- Roadway Class
- Traffic Counts
- Directional Distribution of Traffic (D-factor)
- Peak Hour Volume Factor (K-factor)
- Annual Traffic Growth Rates

Other columns of data include estimated AM and PM peak hour volumes for horizon analysis years, future development volumes, and the computed volume to capacity ratios for future analysis years.

The future development volumes on the roadway links were based on trip generation, trip distribution, and its assignment onto the study roadway links. The spreadsheet model is used to analyse the roadway network performance by calculating the volume to capacity ratios for the following analysis scenarios:

- Existing Conditions (Year 2023),
- Year 2043 Base Conditions, and
- Year 2043 Alternative Scenarios (Alternative 1 and 2, described in section 6.4.4)

The following sections describe the methodology for existing and future traffic volume development and the performance of the study roadway network for the analysis scenarios.

3.1.4.2 EXISTING CONDITIONS TRAFFIC VOLUME DEVELOPMENT

Existing traffic volume data for the roadway links was obtained from the Township of Essa, Simcoe County and MTO. The Township of Essa had provided average daily traffic counts for the Township roads for the years 2019, 2021 and 2022. Year 2022 link annual average daily traffic (AADT) for the County roads was obtained using the Simcoe County AADT maps available on their website. Year 2016 AADT count for Highway 89 was obtained from the counts available online on MTO website. Based on the data obtained it is generally observed that the for the north-south roadways, the peak direction is southbound during the AM peak period and northbound during the PM

peak period. For the east-west roadways, eastbound is the peak direction during the AM peak period and westbound during the PM peak period.

Year 2023 Traffic Volume Development:

The year 2023 traffic volumes for analyzing the existing conditions were developed based on the following:

1. The counts on the County roads are grown to year 2023 based on the historic growth rates observed on the respective county roads.
2. The counts on Highway 89 are grown by applying 1% annual growth rate, since the historic counts showed negative growth.
3. A 1% growth rate was applied to the counts on Township roads based on the growth from the Transportation Tomorrow Survey (TTS) data.
4. The directional distribution factor (D-factor) for the County Roads was obtained from the hourly traffic count data, while the directional distribution on township roads and Highway 89 used a 55%:45% split, based on the average value observed across all the County Roads in the study area.
5. The peak hour (K-factor) for the County roads was obtained from the hourly traffic count data for both the AM and PM peak periods. An average of the K-factors from all the County roads was applied to the Township roads and Highway 89 corridor.

The final 2023 AM and PM peak hour volumes were developed by multiplying the average daily traffic volumes with the directional distribution and peak hour factors of the respective AM and PM peak hours. **Figure 16** and **Figure 17**, show the estimated AM and PM peak hour volumes for the year 2023.

Figure 16. Existing AM Peak Hour Traffic Volumes

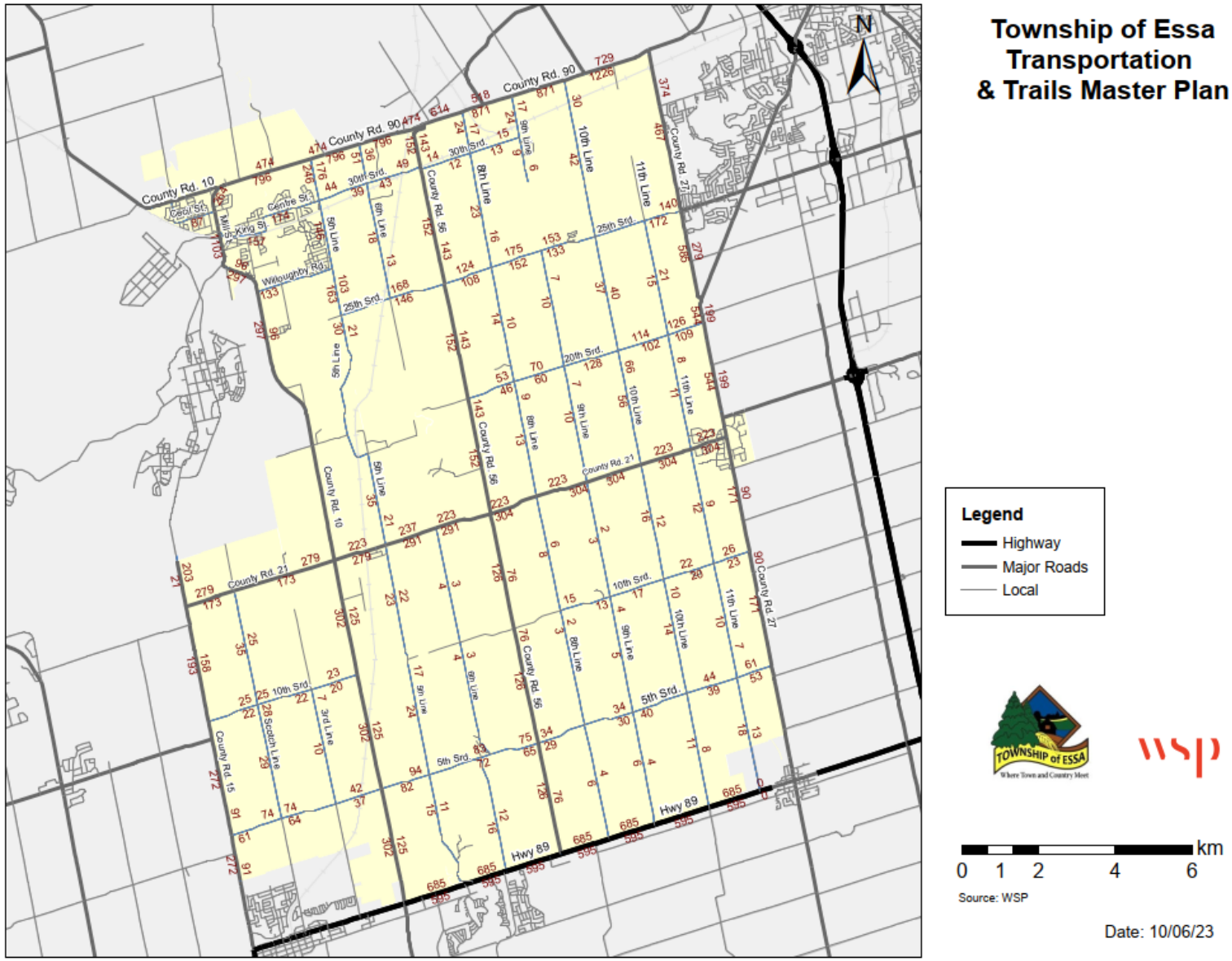
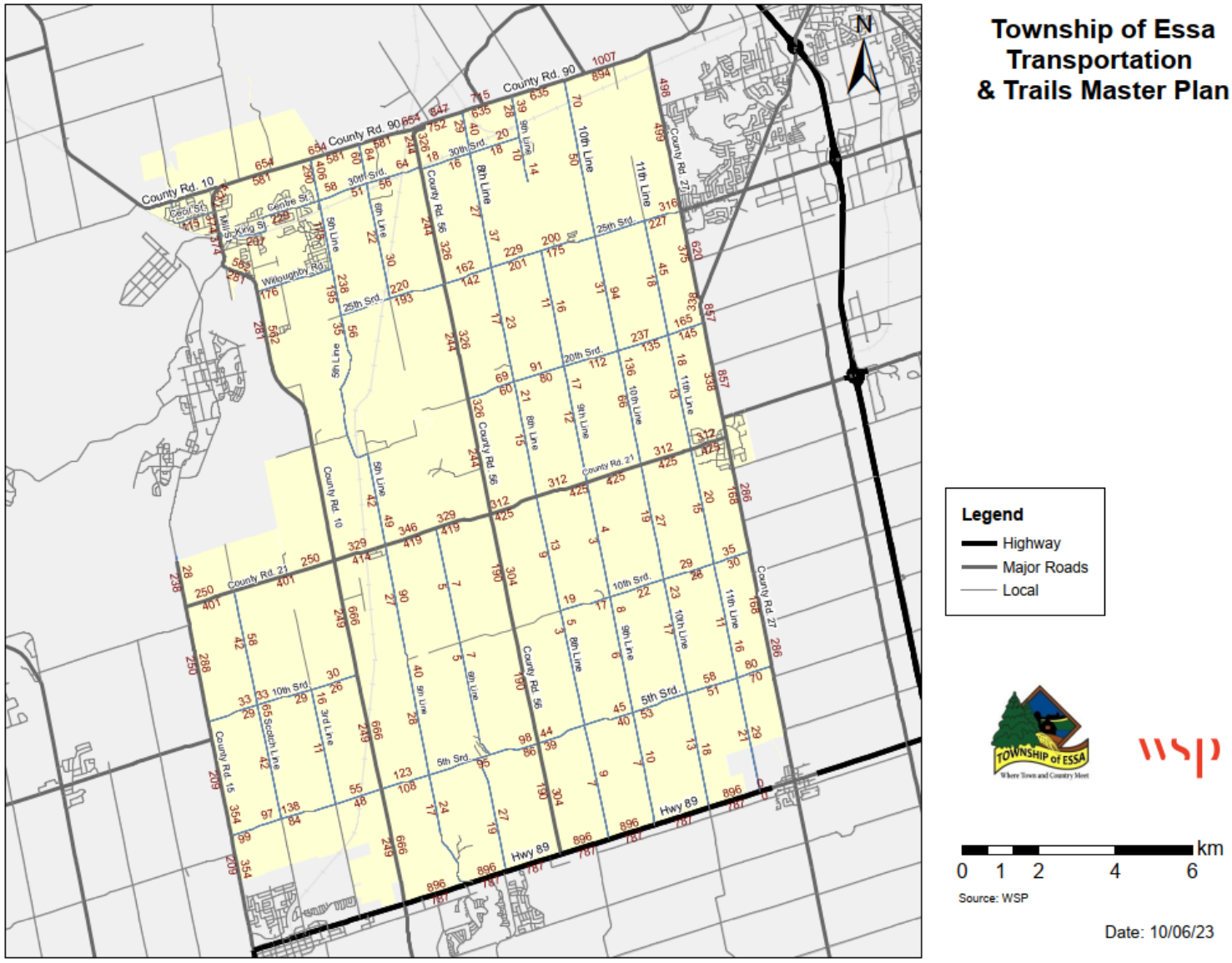


Figure 17. Existing PM Peak Hour Traffic Volumes



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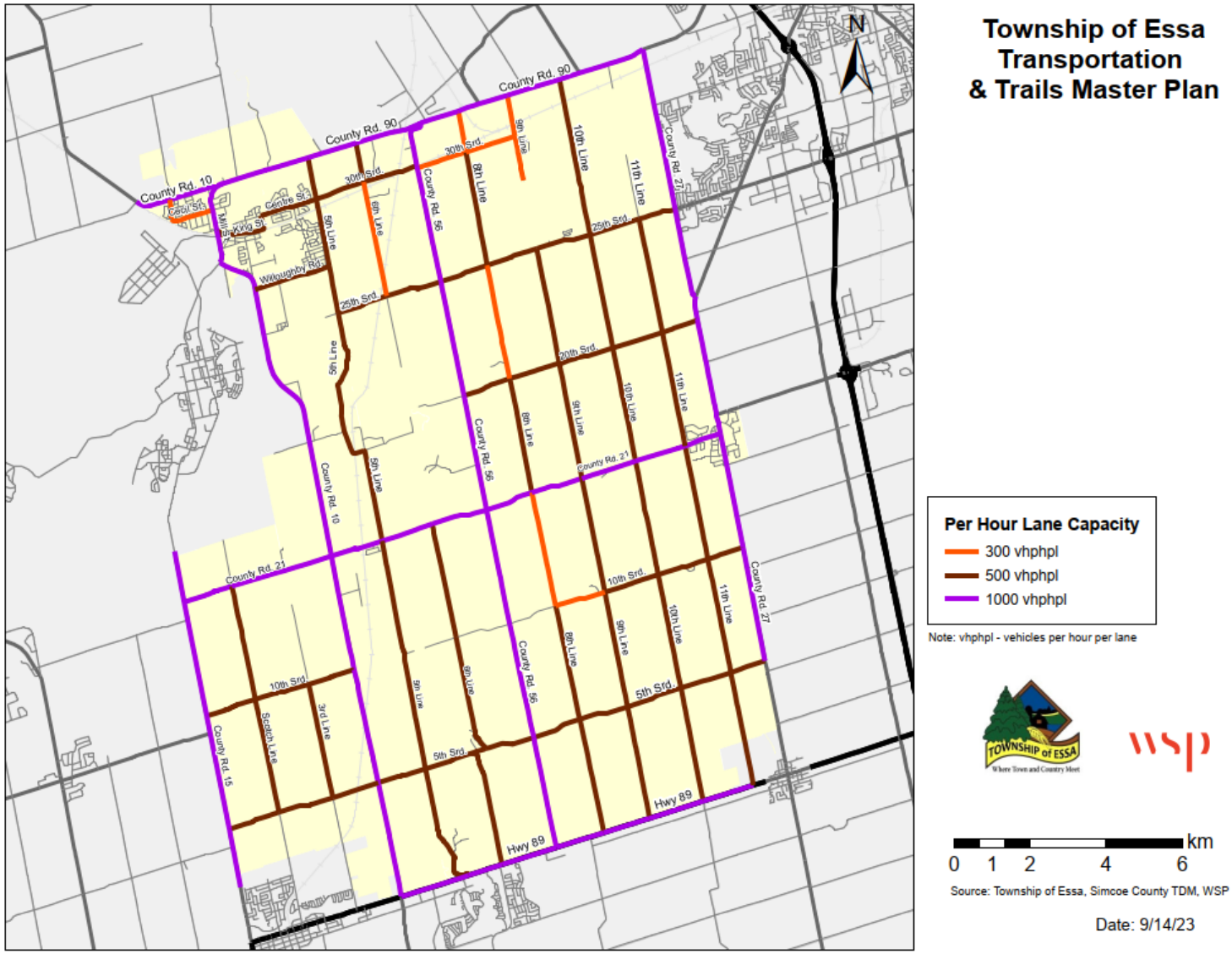
3.1.4.3 ROADWAY CAPACITIES

The roadway capacities for the study road network links are based on the number of lanes and the functional class of the roadways. All the County roads and Highway 89 in the study area are considered as major arterials with a capacity of 1000 vehicles (per hour, per lane) (1000 vphpl)). The capacity for the Township roads were based on the road classes used by the Township, which is determined by both the speed limit and volumes on the roadway. Based on this, the Township roadways in the study network are classified into roadway classes 3, 4, & 5. The roadways belonging to roadway classes 3 & 4 function like minor collector roadways with a peak hour capacity of 500 vphpl and the roads with class 5 function like local roads with a capacity of 300 vphpl. It is to be noted that the roadway capacities are consistent with the capacities coded in the Simcoe County model, except for some Township roads that are classified as local roads. **Figure 18** shows the peak hour roadway capacities for the study roadway network.

Figure 18. Peak Hour Roadway Capacities



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3.1.4.4 EXISTING CONDITIONS ROADWAY NETWORK PERFORMANCE

The performance of the study roadway network was evaluated by calculating the volume to capacity (V/C) ratios using the thresholds followed in the Simcoe County TMP (2014). The roadways operating at V/C ratios less than 0.6 are assumed to be operating under free-flow conditions, the roadways with V/C ratios between 0.6 and 0.9 are operating with moderate congestion, and the roadways with V/C ratios greater than 0.9 are experiencing high congestion with traffic volumes approaching the roadway capacity. **Table 6** shows the V/C ratios and the level of service interpretation.

Table 6: V/C Ratios and Level of Service

V/C Ratios	Level Of Service
0.00-0.6	Free-Flow Condition (Low Congestion)
0.6-0.9	Reaching Capacity (Moderate Congestion)
>0.9	At/Over Capacity (High Congestion)

Figure 19 and **Figure 20** show the AM and PM peak hour roadway network performance. As shown in the figures, most of the study roadway network is operating at free-flow conditions with low congestion levels during both the AM and PM peak hour periods, except for a few County roads and Highway 89 that operate under moderately congested conditions in the peak direction of travel. It is to be also noted that 5th Line experiences congestion between County Road 90 and 30th Sideroad in the northbound direction during the PM peak condition only.

Figure 19. Existing AM Peak Hour Volume to Capacity Ratios

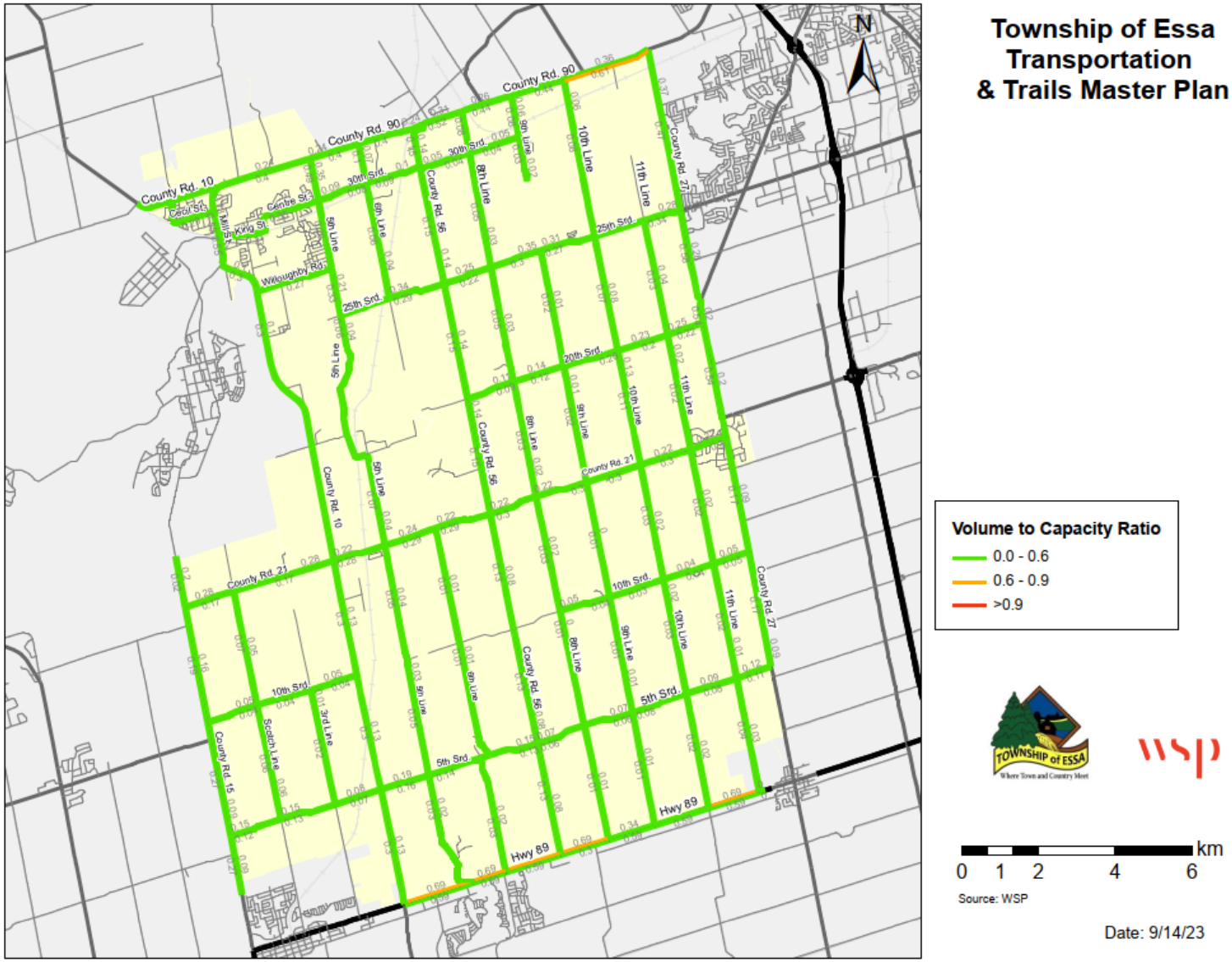

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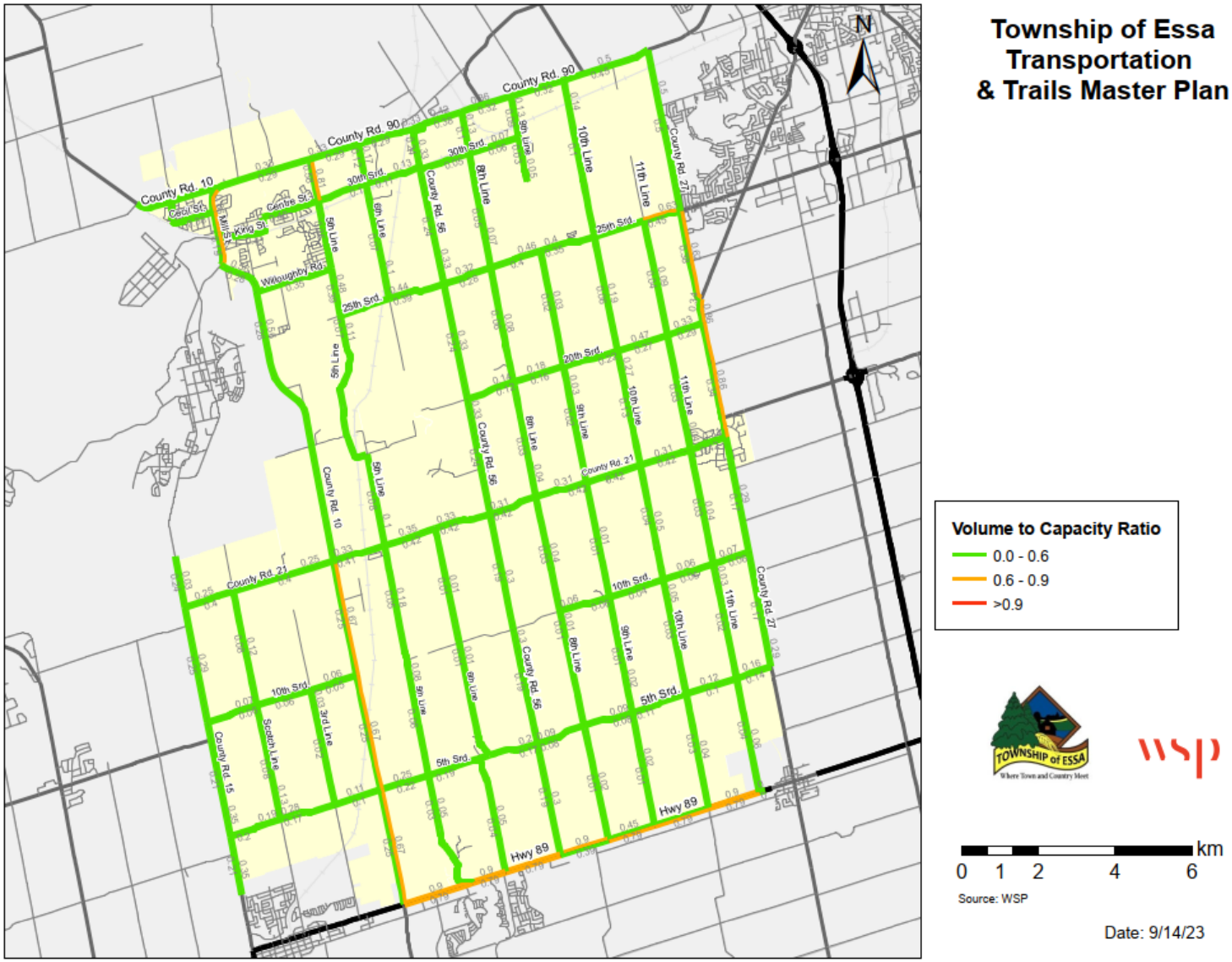
Figure 20. Existing PM Peak Hour Volume to Capacity Ratios



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3.1.5 Intersection Analysis

Intersection performance was evaluated at the following Township intersections for the existing conditions (2023):

- 5th Line and 25th Sideroad;
- 11th Line and 25th Sideroad;
- 10th Line and 20th Sideroad;
- 5th Line and County Road 21; and
- Scotch Line and 5th Sideroad.

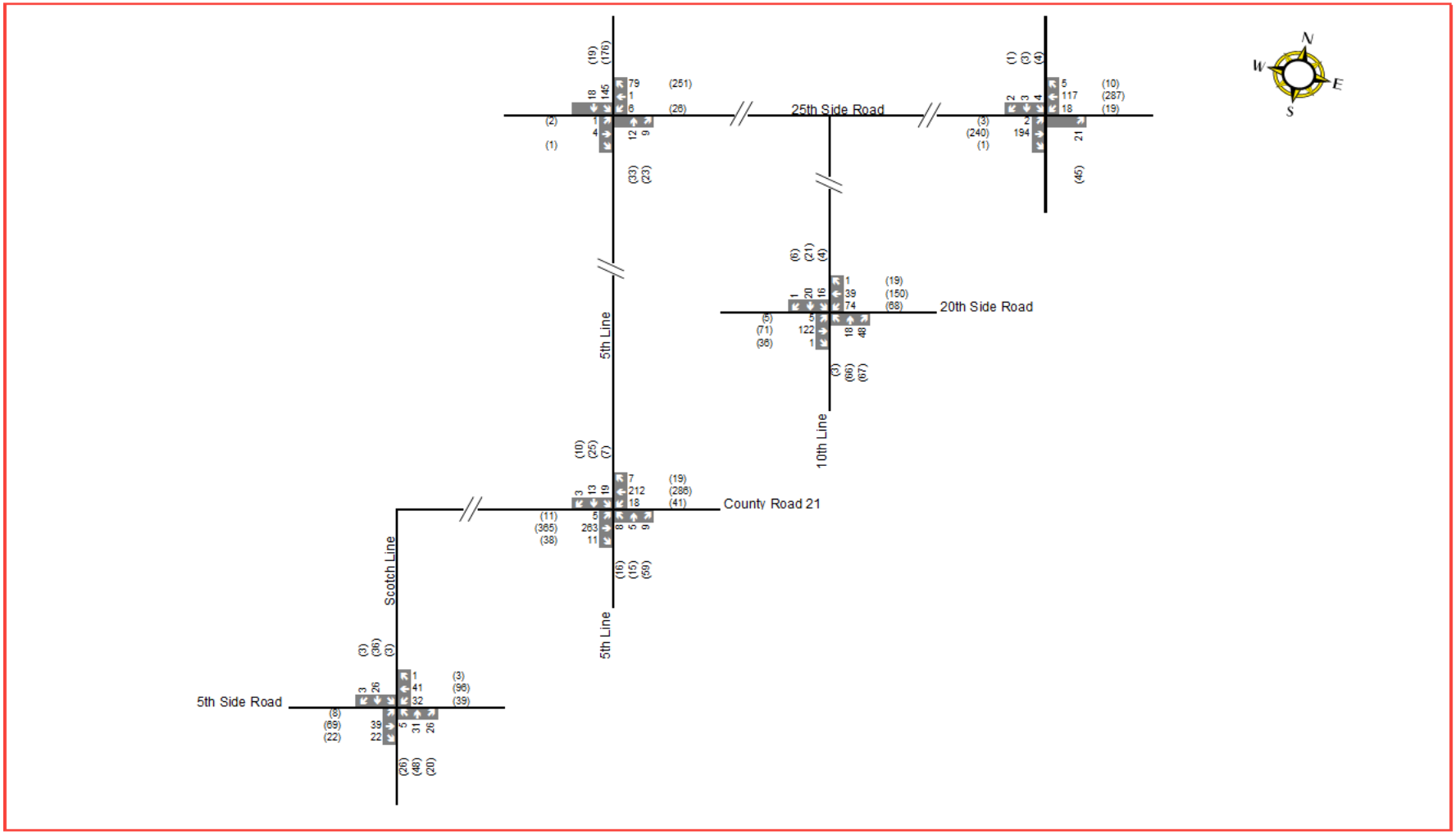
All of the above study intersections are stop controlled intersections on the minor street with shared left, through, and right approaches. **Table 7** shows the summary of the intersection TMC collection dates along with 11the observed AM and PM peak hour periods. **Figure 21** shows the existing turning movement counts at the above study intersections.

Table 7. Intersection Turning Movement Count Details

No.	Intersection	TMC Count Date	AM Peak Hour	PM Peak Hour
1	5th Line & 25th Sideroad	June 27, 2023	7:45-8:45	4:15-5:15
2	11th Line & 25th Sideroad	June 27, 2023	7:15-8:15	4:00-5:00
3	10th Line & 20th Sideroad	June 27, 2023	7:00-8:00	4:00-5:00
4	5th Line & County Road 21	June 27, 2023	7:15-8:15	4:00-5:00
5	Scotch Line & 5th Sideroad	June 27, 2023	7:45-8:45	4:00-5:00

The traffic operational analysis was conducted using the Synchro version 11 software. The intersection capacity analysis is based on volume-to-capacity (v/c) ratios and level of service (LOS). LOS is a measure of driver discomfort and frustration, fuel consumption, and lost travel time defined in terms of delay. The LOS categories and delay criteria for signalized and unsignalized intersections are summarized in **Table 8.**

Figure 21. Existing Turning Movement Counts at Study Intersections



Most of the study intersections are two way stop controlled intersections, whose overall intersection LOS is defined by the LOS of the stop controlled minor street approach based on the delays shown under unsignalized column in **Table 8**.

Table 8. Level of Service Criteria (based on Synchro Methodology)

Level of Service	Average Control Delay (Seconds per Vehicle)	
	Signalized	Unsignalized
A	≤ 10	≤ 10
B	> 10 and ≤ 20	> 10 and ≤ 15
C	> 20 and ≤ 35	> 15 and ≤ 25
D	> 35 and ≤ 55	> 25 and ≤ 35
E	> 55 and ≤ 80	> 35 and ≤ 50
F	> 80	> 50

Table 9 shows the summary of intersection analysis. The table include the LOS and delay of the intersection, along with v/c ratio of the respective movement; detailed Synchro output sheets (HCM 2000) for the existing conditions are provided in **Appendix A**. All intersections are performing at an acceptable LOS of C or better.

Table 9. Intersection Capacity Analysis – Existing Conditions

Intersection	Control Type	AM Peak Hour		PM Peak Hour	
		LOS (Delay in Seconds)	Approach (V/C ratio)	LOS (Delay in Seconds)	Approach (V/C ratio)
5th Line & 25th Sideroad	TWSC (Stop Control on 25th Sideroad - E/W)	B (13)	EBLTR (0.01) WBLTR (0.11) NBLTR (0.0) SBLTR (0.11)	C (17)	EBLTR (0.01) WBLTR (0.34) NBLTR (0.00) SBLTR (0.13)
11th Line & 25th Sideroad	TWSC (Stop Control on 11th Line – N/S)	B (12)	EBLTR (0.00) WBLTR (0.02) NBLTR (0.03) SBLTR (0.02)	B (15)	EBLTR (0.0) WBLTR (0.02) NBLTR (0.06) SBLTR (0.02)
10th Line & 20th Sideroad	TWSC (Stop Control on 10th Line-N/S)	B (12)	EBLTR (0.0) WBLTR (0.06) NBLTR (0.09) SBLTR (0.08)	B (14)	EBLTR (0.01) WBLTR (0.06) NBLTR (0.32) SBLTR (0.10)
5th Line & County Road 21	TWSC (Stop Control on 5th Line – N/S)	B (14)	EBLTR (0.00) WBLTR (0.02) NBLTR (0.04) SBLTR (0.09)	C (24)	EBLTR (0.01) WBLTR (0.05) NBLTR (0.31) SBLTR (0.21)
Scotch Line & 5th Sideroad	AWSC	A (8)	EBLTR (0.07) WBLTR (0.10) NBLTR (0.08) SBLTR (0.04)	A (9)	EBLTR (0.16) WBLTR (0.22) NBLTR (0.16) SBLTR (0.07)

AWSC – All Way Stop Control; TWSC – Two Way Stop Control; LOS for TWSC intersection has been provided for the minor street approach with maximum delay. NB = northbound; SB = southbound; EB = eastbound; WB = westbound; L= left; T = through; R = right

3.1.6 Collision Analysis

A 5-year collision data from January 1, 2018 to November 30, 2022, was obtained from Ontario Provincial Police Motor Vehicle Collision (OPP-MVC) division. The data consisted of information on the collision report number, date and time of collision, location of the collision with a reference to the cross street of occurrence, type of the incident and primary cause of the collision. The collision data received had no latitude and longitude information of the collision occurrence location, as such the collision location was tied to the intersection based on street and its cross streets information to identify and quantify the incident types at the intersections. Therefore, it is to be noted that the intersection reference of the collision is only approximate identification of the location for the purpose of analysis, and one must refer to the actual collision report for more accurate information of the collision.

A total of 1,387 collisions were reported in the study area during the 5-year period. **Table 10** shows the number of collisions occurred in the study area by year and the type of collision. As shown in the table, the number of collisions had decreased during the COVID-19 period in the years 2020 and 2021. The collisions in the year 2022 were similar to the pre COVID-19 period. Based on the data, the property damage collisions constituted most of the collisions with 83% of total collisions, about 16.5% were the injury collisions (including fatal collisions) and the remaining were collisions that were categorized as other types.

Table 10. Yearly Distribution and Type of Collisions (Between 2018-2022)

Year	Incident Type				
	Property Damage Only	Injury	Fatal Injury	Other	Total
2018	254	59		2	315
2019	270	47	4	1	322
2020	187	45	1		233
2021	193	34			227
2022	250	39	1		290
Total	**1154**	**224**	**6**	**3**	**1387**

It is to be noted that there were six fatal collisions during the five-year period in the study area. **Table 11** shows the date of fatal collisions along with the location and primary cause of the collision. As shown in the above table, four out of six fatal collisions (66%) occurred in the year 2019. Three out of six fatal collisions (50%) occurred along Mill Street. There was one pedestrian involved fatal collision at Mill Street and others related to vehicles losing control, failing to yield and excessive speeds as the primary causes of these fatal collisions. The cause of the two fatal collisions is mentioned as “other” without much information.

Table 11. Fatal Injury Collisions (Between 2018-2022)

Date	Location	Primary Cause
17-Jun-19	County Road 56 & Sideroad 30	Other
09-Nov-19	Mill Street & Cecil Street	Pedestrian
12-Nov-19	9th Line & County Road 21	Lost control
25-Dec-19	Roth Street & Mill Street	Other
04-Jun-20	Elizabeth Street & Simcoe Street	Failed to yield right of way
24-Apr-22	Mill Street & Summerset Place	Speed too fast for conditions

Note: The location of the collision is approximate as inferred from the provided collision information

The collision data was also analysed to identify the pedestrian collisions. There were a total of 11 collisions involving pedestrians as the primary cause of the collision. **Table 12** summarizes the year of the pedestrian involved collision along with the location, and the incident type. As shown in the table, of the 11 pedestrian collisions one collision resulted in a fatality, while the rest were injury collisions and five out of 11 collisions (45%) occurred along Mill Street.

Table 12. Pedestrian Collisions (Between 2018-2022)

Year	Location	Incident Type
2018	Brentwood Road & Commerce Road	Non-Fatal Injury
2018	County Road 10 & Willoughby Road	Non-Fatal Injury
2018	Mill Street & River Drive	Non-Fatal Injury
2019	Roth Street & Mill Street	Non-Fatal Injury
2019	King Street & Mill Street	Non-Fatal Injury
2019	Mill Street & Cecil Street	Fatal Injury
2021	Mill Street & Tree Top Street	Non-Fatal Injury
2021	Greenwood Drive & Lookout Street	Non-Fatal Injury
2021	5th Line & Marshall Crescent	Non-Fatal Injury
2022	Centre Street & Duckworth Street	Non-Fatal Injury
2022	King Street & Elizabeth Street	Non-Fatal Injury

Note: The location of the collision is approximate as inferred from the provided collision information.

Table 13 shows the primary cause of the collisions in the study area. To identify the major contributing factors for the collisions. As shown in the table, failure to yield the right-of-way is the most predominant cause (15%) of all the collisions in the study area followed by losing control (13%), Animal (12%), Inattentive Driver (11%) and Excessive Speeds (10%).

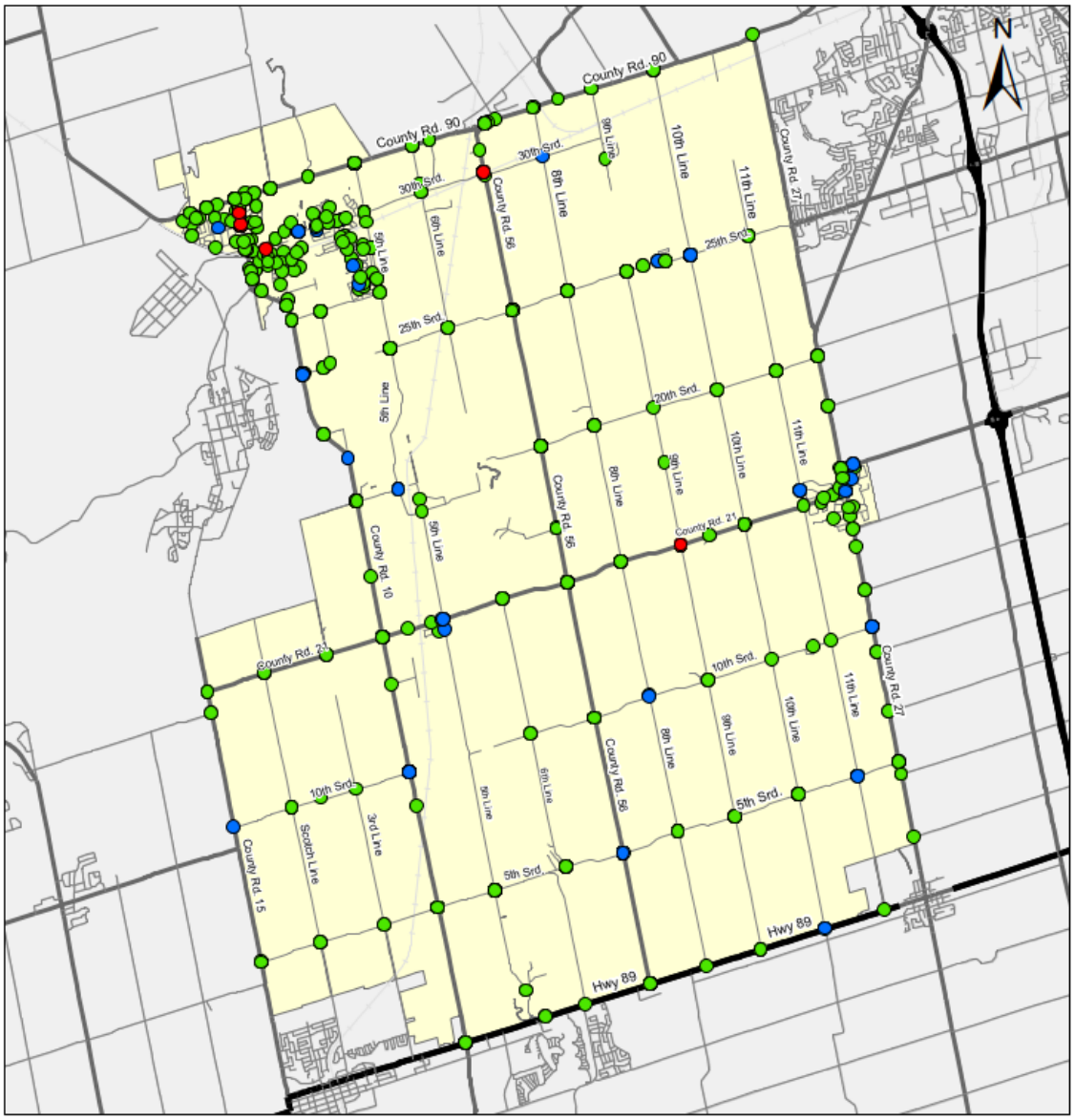
Table 13. Primary Cause of Collisions (Between 2018-2022)

Primary Cause	No. of Collisions	Percentage
Failed to yield right-of-way	213	15%
Lost control	181	13%
Animal - Wild or Domestic	164	12%
Other	162	12%
Inattentive driver	149	11%
Speed -- too fast for conditions	139	10%
Following too closely	100	7%
Unknown	99	7%
Improper turn	85	6%
Disobeyed traffic control	45	3%
Ability Impaired Alcohol/Drugs	39	3%
Pedestrian	11	1%
Grand Total	**1387**	**100%**

3.1.6.1 SPATIAL DISTRIBUTION OF COLLISIONS

The collision data was plotted in GIS to identify the hot spot locations or high collision incidence locations. It is found that around 180 incidences of the collision data did not have the intersection information nor proper location description, these collisions were not included in the spatial analysis of the collisions. **Figure 22** below shows the collision locations along with the incident type. As shown in the figure the collisions are generally concentrated in the populated areas of Angus and Thornton. **Figure 23** shows the locations of the collisions that involved pedestrians.

Figure 22. Collision Locations (Between 2018-2022)



Township of Essa Transportation & Trails Master Plan

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Incident Type
- Fatal Injury
- Non-Fatal Injury
- Other
- Property Damage Only

Note:
1. The collision locations are approximate.
2. Collisions with same location overlap one on othe

km
0 1 2 4 6

Source: WSP

Date: 9/14/23

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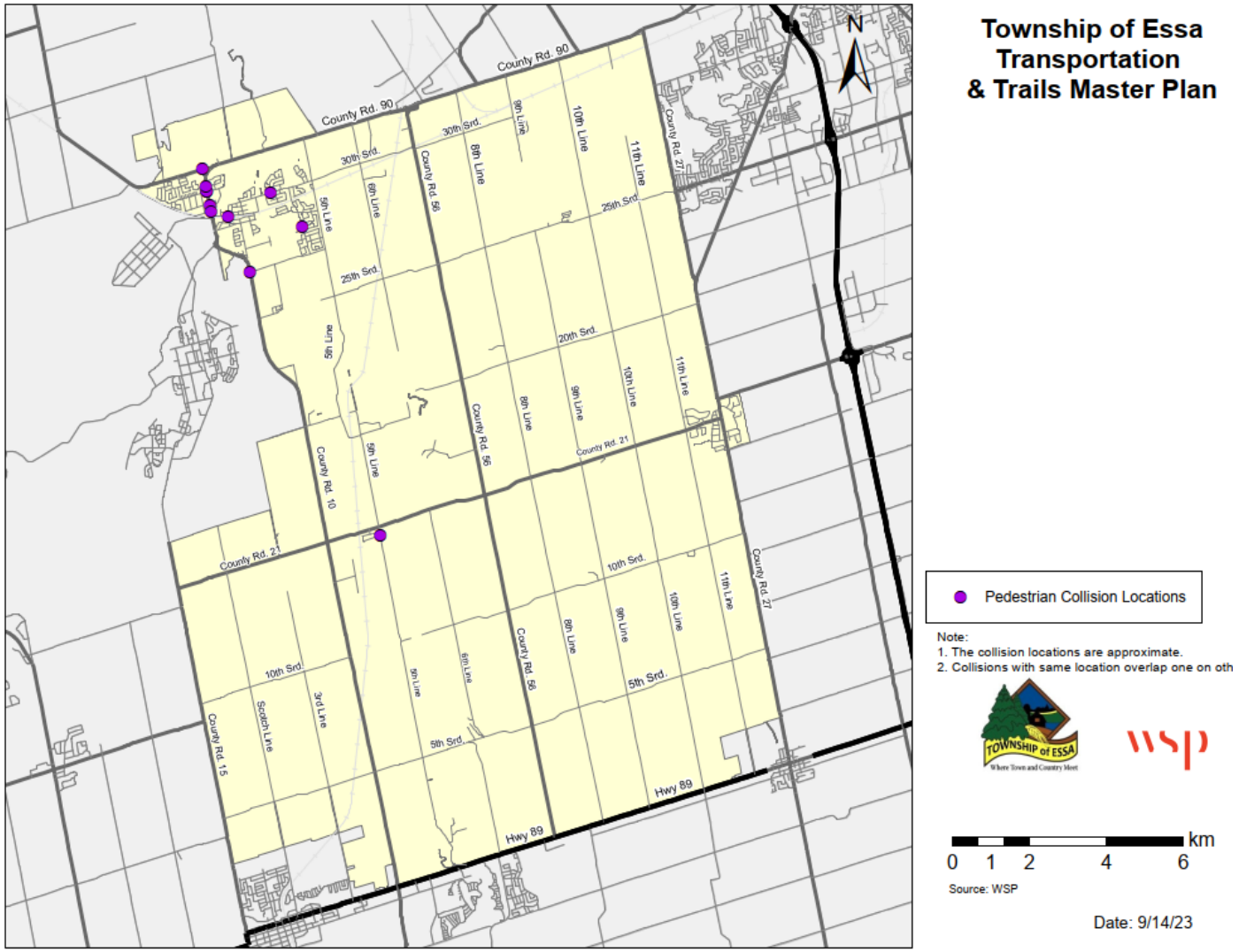
Figure 23. Pedestrian Involving Collision Locations (Between 2018-2022)



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3.1.6.2 HOT SPOT COLLISION ANALYSIS

The collision data was also analyzed to identify the locations with highest number of collisions. **Table 14** shows the locations with 10 or more collisions over the five-year period along with the number of collisions by incident types. As mentioned before, the collision locations summarized are referenced as intersections and does not necessarily mean that they are all intersection related collisions. As shown in the table there are 32 locations which had 10 or more collisions during the five-year period. These locations are also shown in **Figure 24.**

Table 14. High Collision Locations (Between 2018-2022)

S.No.	Location	Property Damage Only	Non-Fatal Injury	Fatal Injury	Other	Total Collisions
1	County Road 21 & County Road 56	45	8	0	0	53
2	County Road 21 & County Road 10	37	9	0	0	46
3	**County Road 56 & 25th Sideroad**	26	15	0	0	41
4	County Road 90 & County Road 10/Brentwood Road	37	3	0	0	40
5	**County Road 90 & 5th Line**	33	5	0	0	38
6	**County Road 90 & King Street**	28	10	0	0	38
7	**5th Sideroad & County Road 56**	29	7	0	0	36
8	**25th Sideroad & 8th Line**	17	8	0	0	25
9	**County Road 56 & 20th Sideroad**	17	6	0	0	23
10	**5th Sideroad & County Road 10**	15	8	0	0	23
11	**Mill St & Cecil St/Roth St**	15	4	2	0	21
12	**5th Line & Centre St/30th Sideroad**	20	1	0	0	21
13	**25th Sideroad & 10th Line**	16	5	0	0	21
14	**10th Sideroad &**	15	4	0	1	20

S.No.	Location	Property Damage Only	Non-Fatal Injury	Fatal Injury	Other	Total Collisions
	County Road 10					
15	**Brentwood Dr & Commerce Rd**	15	5	0	0	20
16	**County Road 27 & County Innisfil Beach Road**	19	1	0	0	20
17	County Rd 90 & County Rd 56	14	4	0	0	18
18	County Road 21 & County Road 27	15	3	0	0	18
19	**County Rd 56 & 10th Sideroad**	16	2	0	0	18
20	Highway 89 & County Rd 56	14	2	0	0	16
21	**County Rd 10 & 25th Sideroad**	12	2	0	0	14
22	**5th Line & 5th Sideroad**	10	4	0	0	14
23	**Mill St & Summerset Pl**	9	2	1	1	13
24	**5th Line & 25th Sideroad**	12	0	0	0	12
25	**Mill St & Commerce Rd**	10	2	0	0	12
26	**County Rd 56 & 30th Sideroad**	6	5	1	0	12
27	**County Rd 10 & 20th Sideroad**	9	2	0	0	11
28	Highway 89 & County Rd 10	10	1	0	0	11

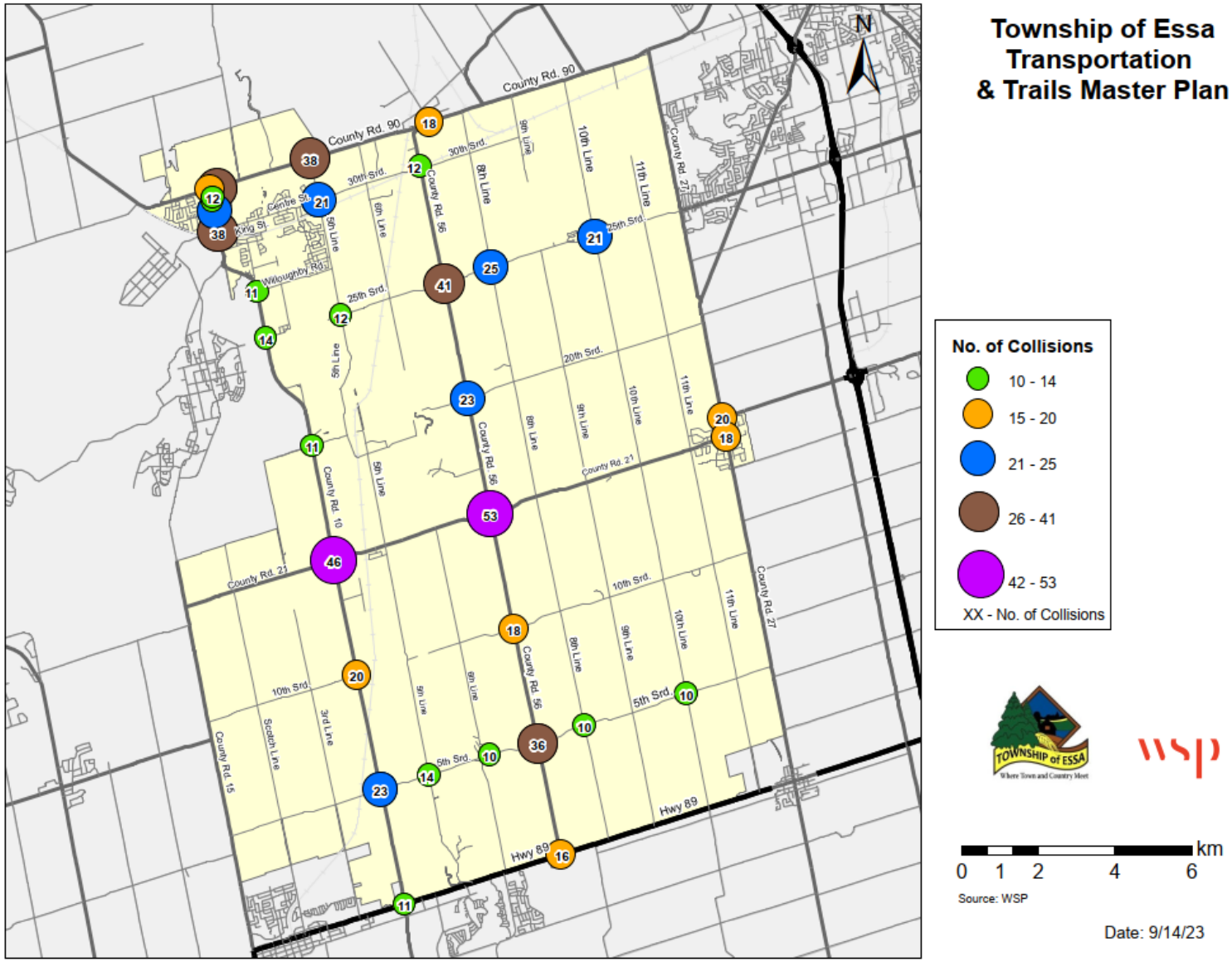
S.No.	Location	Property Damage Only	Non-Fatal Injury	Fatal Injury	Other	Total Collisions
29	**County Rd 10 & Willoughby Rd**	10	1	0	0	11
30	**10th Line & 5th Sideroad**	6	4	0	0	10
31	**6th Line & 5th Sideroad**	7	3	0	0	10
32	**8th Line & 5th Sideroad**	9	1	0	0	10

Note: The **bold** letters indicate that one or both the streets of the intersection belong to Essa Township

The following section presents the detailed analysis based on the available collision data at various hot spot locations with 25 or more collisions over the study period.

- **County Road 21 & County Road 56:** There are a total of 53 reported collisions at this location. According to the collision data there were a total of 45 property damage only collisions and 8 injury collisions at this location. Failure to yield the right-of-way was the primary cause of the collisions in about 28% of the collisions followed by collisions with animals (24.5%). Currently, County Road 21 and County Road 56 is a two-way stop-controlled intersection with stop signs on County Road 56. There is also a flashing orange beacon installed at this intersection. The posted speed limits on County Road 21 and County Road 56 are both 80 kmph. To mitigate the occurrence of collisions at this intersection, it is suggested to review a change in the type of intersection control, approach speeds on County Road 56, and take measures to increase the compliance of the traffic control through education and enforcement.
- **County Road 21 & County Road 10:** There are a total of 46 reported collisions at this location. According to the collision data there were a total of 37 property damage collisions and nine injury collisions at this location. Failure to yield the right-of-way was the primary cause of the collisions in about 24% of the collisions followed by excessive speeds (13%). Currently, County Road 21 and County Road 10 is a signalized intersection. The posted speed limits on County Road 21 and County Road 56 are both 80 kmph except for the County Road 21 east of County Road 10. To mitigate the occurrence of collisions at this intersection, it is suggested to review the approach speeds and signal timing at this intersection.

Figure 24. Hot Spot Collisions (Between 2018-2022)



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- **County Road 56 & 25th Sideroad:** There are a total of 41 reported collisions at this location. According to the collision data there were a total of 26 property damage only collisions and 15 injury collisions at this location. Losing Control of the motor vehicle (29%) and failure to yield the right-of-way (27%) were the primary causes of the collisions at this intersection. Currently, County Road 56 and 25th Sideroad is a two-way stop-controlled intersection with 25th Sideroad stop controlled. The posted speed limits on County Road 21 and County Road 56 are both 80 kmph except for the County Road 21 east of County Road 10. To mitigate the occurrence of collisions at this intersection, it is recommended to review the approach speeds and roadway geometry at the intersection. Installation of flashing yellow light beacons will also caution the drivers to cross the intersection cautiously. The field conditions need to be reviewed for identifying any geometrical deficiencies.
- **County Road 90 & County Road 10/Brentwood Road:** There are a total of 40 reported collisions at this location. According to the collision data there were a total of 37 property damage only collisions and three injury collisions at this location. Following too close to another vehicle (20%) was the primary cause of the collisions at this intersection. Currently, County Road 10 and County Road 90 is a signalized intersection. Recommended for signal timing review and speed review, and field review to identify any geometrical deficiencies at the intersection.

- **County Road 90 & 5th Line:** There are a total of 38 reported collisions at this location. According to the collision data there were a total of 33 property damage only collisions and five injury collisions at this location. Following too close to another vehicle (26%) was the primary cause of the collisions at this intersection. Currently, County Road 90 and 5th Line is a signalized intersection. This intersection is recommended for speed review, and field review to identify any geometrical deficiencies at the intersection.

- **County Road 90 & King Street:** There are a total of 38 reported collisions at this location. According to the collision data there were a total of 28 property damage only collisions and ten injury collisions at this location. Failure to yield the right-of-way (31%) followed by improper turn (24%) were the two primary causes of the collisions at this intersection. Currently, County Road 90 and King Street is a signalized intersection. The collision types indicate that a review of signal timing may be needed to mitigate the occurrences of collisions at this intersection. The field conditions may also be reviewed for any geometrical deficiencies.

- **County Road 56 & 5th Sideroad:** There are a total of 36 reported collisions at this location. According to the collision data there were a total of 29 property damage only collisions and seven injury collisions at this location. Failure to yield the right-of-way (28%) was the primary cause of the collisions at this intersection along with losing control of the vehicle (22%) and animal related collisions (22%). Currently, County Road 56 and 5th Sideroad is a two-way stop-controlled intersection with 5th Sideroad stop controlled. The collision types indicate that a

flashing yellow beacon would help to encourage the drivers to cautiously drive through the intersection and yield to the conflicting traffic. The field conditions may also be reviewed for identifying any geometrical deficiencies.

- **25th Sideroad & 8th Line:** There are a total of 25 reported collisions at this location. According to the collision data there were a total of 17 property damage only collisions and eight injury collisions at this location. Failure to yield the right-of-way (56%) was the primary cause of the collisions at this intersection. Currently, 25th Sideroad and 8th Line is a two-way stop-controlled intersection with 25th Sideroad stop controlled. The collision types indicate that a flashing yellow beacon could improve safety to draw attention to drivers on the intersection controls and yield to the conflicting traffic. Also, a detailed study needs to be undertaken to see if the stop signs are to be placed on 8th Line instead of 25th Sideroad.
- **Mill Street between King Street and Brentwood Road/County Road 10:** The 1.2 KM segment of Mill Street corridor between Brentwood Road and King Street is a segment with highest number of collisions. This is the main activity corridor in Angus with 2-lanes in each direction and functioning like a highway through the community, although there are four signalized intersections with pedestrian crosswalks. The posted speed limit is 50 kmph in this roadway segment. In this short stretch of the roadway, there were 124 collisions in the 5-year period, of which there were three reported fatal injury collisions along with three pedestrian involved collisions. Failure to yield the right-of-way (22%), and improper turn (17%) were reported as the primary cause of collisions in this segment. It is to be noted that this stretch of the roadway has four signalized intersections and three unsignalized intersections along with multiple driveways from the abutting developments. A detailed corridor study is recommended along this roadway segment to understand the operation conditions, identify contributing factors of these collisions, consider additional controlled pedestrian crossing locations, reconsider if the number of lanes available are required (road diet to reduce the number of lanes and foster a stronger community environment), and to identify mitigation measures along the corridor.

3.1.7 Goods Movement

Goods movement is important to businesses in the Township, as it allows products, such as agricultural products from numerous farming businesses, to get to market and allows materials and machinery to get to the farms and other types of businesses. The County Road network is designated as the primary goods movement network, however some trucks and heavy equipment will need to use Township roads when accessing origins and destinations.

The Township enacted By-law 2009-42 to set spring load restrictions on a number of Township roads. The by-law is in effect from March 1st through May 15th for each year for the roads indicated in the by-law. The by-law was enacted to protect Township roads during the spring thaw from rutting or cracking due to use by heavy vehicles.

3.2 Future Performance

3.2.1 Population And Employment Projections

The future performance/conditions for transportation infrastructure in Essa are substantially impacted by the future population and employment projections of the Township. The Township had developed a growth strategy in the year 2013, which included employment and population projections up to the year 2031. The document identifies Angus as the primary settlement area in the Township along with some development occurring in areas such as Baxter and Thornton. This study builds upon the previous study and projects population and employment in the study area for the year 2043 based on projected annual growth rates of population and employment along with the planned developments information available at the time of this study. The annual growth rate of population was calculated to be 2% based on the 2021 Census population of 22,970 and the 2031 population estimate of 28,096. The employment is projected to grow from 7,710 in the year 2011 to 9,000 in the year 2031, an annual growth rate of 0.78%. The **Table 15** shows the future year population and employment projections.

Table 15. Projected Horizon Year Population and Employment

Year	Population	Employment
2021	22,970	8,810
2031	28,096	9,000
2043	35,779	9,876

Source: 2021 Canadian Census, Township of Essa Growth Strategy, 2013

3.2.2 Planned Developments in the Study Area

The Township provided information on the planned developments in the study area. The below planned developments are in the Angus settlement area. **Table 16** shows the details of the planned developments in the study area.

Table 16. Planned Developments in the Study Area

Area	Development Name	Development/Land Use Type	Land use (Unit/Area Statement)
Angus	6275 County Rd 90	Residential	194
Angus	68 Gold Park Gate	Residential	30
Angus	305 Mill St	Residential	200
Angus	6537 Browns Line	Residential	587
Angus	9078 McKinnon Road	Residential	241
Angus	170 Mill St	Hotel	60
Angus	Block 142/143	Residential	133
Angus	3 Massey St	Residential	69
Angus	58 Vernon street	Residential	32
Angus	34 Mill St	Residential	148
Angus	Cablebridge	Residential	133
Angus	County Rd 90	Residential	*NA*
Angus	325 Centre Street	Residential	145
Angus	365 Centre Street	Residential	*NA*
Angus	Alset	Residential	*NA*
Angus	2 Alma St	Residential	*NA*
Angus	24 Vernon St	Residential	*NA*

Source: Township of Essa

As shown in the table there are total of 1,912 residential units and a 60-room hotel planned in Angus settlement area. The anticipated building permit submission for these developments are between year 2023 and 2025. For this study, the developments are assumed to be constructed in the next 5-years by year 2028. Based on the year 2043 Township's population estimate (35,779) and existing average household size of 2.9, it is estimated that there will be a requirement of 4,091 additional residential units in the study area, of which there is development information for 1,912 residential units. It is anticipated that the Baxter area will be attracting an additional 2,000 population in the future or about 690 housing units. The remaining 1,490 residential units are anticipated to be built in the Angus and Thornton settlement areas. Based on the 2013 Essa

Growth Strategy document, most of these houses, about 1,461 will be built in Angus**.** **Table 17** shows the number of houses projected to be built in the Township by the year 2043 along with an estimate of additional population in these areas.

Table 17. Projected Housing Units and Population by Settlement Area

Settlement Area	Houses	Additional Population
Baxter	690	2,001
Angus	3,373	9,782
Thornton	29	85

3.2.3 Trip Generation from Planned Developments

Trip generation for the planned and future estimated development was estimated using the rates outlined in the Institute of Transportation Engineers Trip Generation Manual, 11th Edition. As per the existing distribution of housing, it is assumed that 93% of the residential units will be single family dwelling units and 7% will be multi family dwelling units. Since a detailed employment information is not available the trips from employment are not included in the trip generation. However, as a conservative approach the calculated vehicle trips from the residential developments did not include any reduction for non-auto modes or transit modes. The trip generation summary is provided in **Table 18.**

Table 18. Estimated Trip Generation for Future Residential Developments

Land Use	Parameter	AM Peak Hour		PM Peak Hour	
		Inbound	Outbound	Inbound	Outbound
Single Detached Residential LUC 210 3,778 Units	Directional Distribution	25%	75%	63%	37%
	Trip Rate Equation	Ln(T) = 0.91 Ln(X) + 0.12		Ln(T) = 0.94 Ln(X) + 0.27	
	Trips	677	1,970	2,258	1,340
Multi-Family Housing (Low-Rise) LUC 220 285 Units	Directional Distribution	24%	76%	63%	37%
	Trip Rate Equation	T = 0.31(X) + 22.85		T = 0.43(X) + 20.55	
	Trips	71	217	206	121
Total Vehicle Trips		748	2,187	2,464	1,461

Source: ITE Trip Generation Manual, 11th Edition.

3.2.4 Trip Distribution and Assignment

The trips from the planned developments are distributed within the study area and external to the study area according to the trip distribution obtained from the year 2016 Transportation Tomorrow Survey (TTS) data. **Table 19** shows the trip distribution percentages for the inbound and outbound direction during the AM and PM peak periods to and from Essa Township. As noted in section 6.4.3.2, most of the

developments are projected to concentrate in Angus and Baxter area. Therefore, the trips are distributed according to the trip distribution data obtained for Angus and Baxter TAZs. **Table 20** and **Table 21** shows the trip distribution data for the Angus and Baxter respectively for the trips that are external to the Essa Township.

Table 19. External Trip Distribution for Township of Essa

Location	AM Peak Hour		PM Peak Hour	
	Inbound	Outbound	Inbound	Outbound
Toronto	1.7%	0.4%	0.2%	2.1%
Durham	-	-	0.1%	-
York	4.6%	1.6%	2.3%	3.1%
Peel	1.3%	0.8%	0.3%	1.6%
Halton	0.2%	1.0%	0.8%	0.2%
Waterloo	0.1%	-	0.3%	0.1%
Wellington	0.3%	0.3%	0.3%	0.3%
Orangeville	-	0.2%	0.1%	-
Barrie	26.0%	11.0%	12.2%	19.6%
Simcoe	64.6%	82.1%	81.7%	72.3%
Orillia	0.6%	0.2%	0.1%	0.2%
Dufferin	0.4%	2.3%	1.3%	-
External	0.4%	0.1%	0.2%	0.6%
Total	**100%**	**100%**	**100%**	**100%**

Source: Year 2016 TTS Data.

Table 20. External Trip Distribution for Angus

Location	AM Peak Hour		PM Peak Hour	
	Inbound	Outbound	Inbound	Outbound
Toronto	0.0%	0.5%	0.0%	0.3%
Durham	-	-	0.0%	-
York	5.4%	0.0%	4.1%	6.4%
Peel	0.0%	-	0.0%	4.6%
Halton	0.0%	-	0.8%	0.9%
Waterloo	-	-	2.1%	0.0%
Wellington	0.0%	0.0%	0.8%	0.6%
Barrie	63.9%	23.0%	22.3%	46.8%
Dufferin	1.9%	4.3%	0.8%	-
External	2.2%	-	1.2%	1.7%
Innisfil	4.3%	11.3%	1.5%	2.5%
Bradford-West Gwillimbury	0.0%	-	3.2%	0.7%
New Tecumseth	5.0%	2.4%	19.4%	19.7%
Adjala-Tosorontio	3.3%	2.4%	2.1%	2.9%
Clearview	12.1%	19.2%	17.4%	6.4%
Springwater	1.1%	25.6%	9.3%	0.9%
Oro-Medonte	0.0%	0.0%	0.0%	0.9%
Orillia	0.8%	0.0%	0.0%	0.6%

Location	AM Peak Hour		PM Peak Hour	
	Inbound	Outbound	Inbound	Outbound
Wasaga Beach	-	9.1%	5.1%	1.1%
Tay	-	2.4%	-	-
Tiny	-	-	9.8%	-
Midland	-	-	0.0%	3.1%
Total	**100%**	**100%**	**100%**	**100%**

Source: Year 2016 TTS Data.

Table 21. External Trip Distribution for Baxter

Location	AM Peak Hour		PM Peak Hour	
	Inbound	Outbound	Inbound	Outbound
Toronto	9.8%	0.0%	0.0%	1.5%
York	9.8%	8.7%	4.7%	4.8%
Peel	0.9%	-	0.0%	0.0%
Barrie	16.3%	35.0%	19.1%	25.4%
Dufferin	0.0%	2.8%	1.5%	-
External	0.0%	-	0.0%	3.5%
Innisfil	10.9%	12.7%	14.2%	16.7%
Bradford-West Gwillimbury	3.6%	-	0.0%	3.9%
New Tecumseth	35.6%	27.9%	52.0%	34.1%
Adjala-Tosorontio	4.0%	9.6%	6.6%	4.4%
Clearview	5.9%	0.0%	0.0%	4.6%
Oro-Medonte	1.8%	0.0%	0.0%	0.0%
Orillia	1.2%	0.0%	0.0%	1.3%
Wasaga Beach	-	3.4%	1.9%	0.0%
Total	**100%**	**100%**	**100%**	**100%**

Source: Year 2016 TTS Data.

There are also trips that originate and end within the Township of Essa. As per the 2016 TTS data the Essa Township is divided into five zones. The zone 8554 covers the Angus settlement area, zone 8551 consists of Baxter settlement area, zone 8591 consists of Thornton settlement area and zones 8552 and 8619 cover the Base Borden area. **Table 22** shows the trip percentages between the various zones within Essa.

Table 22. Township of Essa Internal Trip Distribution

AM Peak Period						
From Zone	To Zone					Total
	8551	**8552**	**8554**	**8591**	**8619**	
8551	49%	0%	25%	12%	13%	100%
8552	-	-	-	-	-	-
8554	4%	2%	58%	2%	34%	100%
8591	31%	3%	36%	10%	19%	100%
8619	0%	0%	12%	2%	86%	100%

PM Peak Period						
From Zone	To Zone					Total
	8551	8552	8554	8591	8619	
8551	19%	-	30%	48%	3%	100%
8552	0%	-	75%	25%	0%	100%
8554	3%	-	75%	8%	15%	100%
8591	17%	-	39%	44%	0%	100%
8619	2%	-	51%	2%	45%	100%

Note: The percentages shown are the percent of the total trips from each zone that are destined within Essa Township.

The trips generated from the developments are assigned to the roadway network by identifying the routes for various destinations and origins and the travel distance by using Google maps.

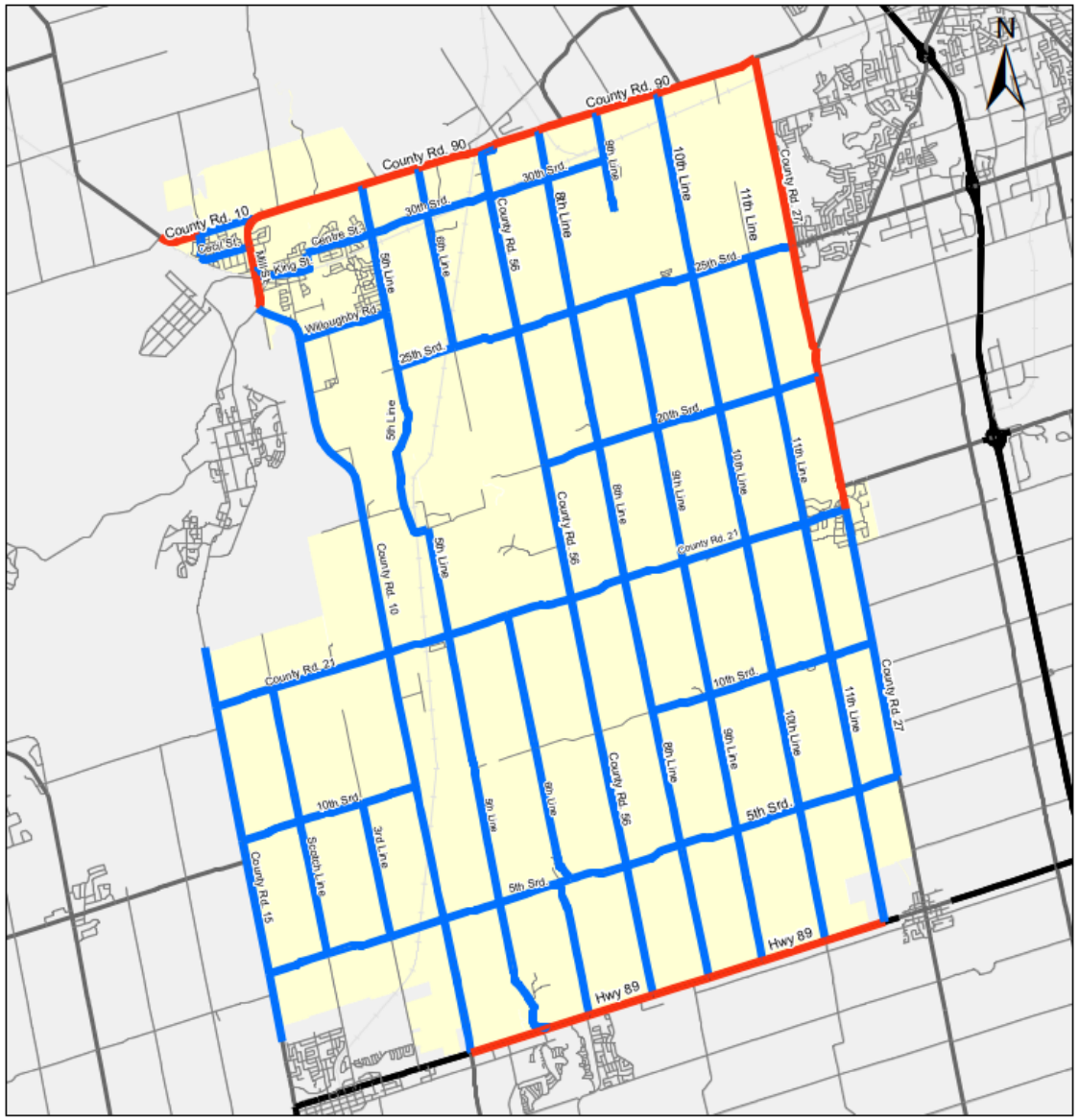
3.2.5 Future Conditions Volume Development

The future conditions volumes are developed by adding the development trips to the background trips. The County roads are regional roadways and hence carry some trips that are not destined or originated in the study area. To properly account for the background growth on the County roads, if the net growth in trips using the annual growth rate is more than the development trips and 1% annual growth, then the net growth in traffic is added to the base year (2023) traffic volumes to obtain the final total traffic for future conditions. Otherwise, a sum of 1% annual growth in traffic and development trips is added to the base year (2023) traffic volumes to obtain the future traffic volumes. This process will avoid the double counting of trips from the planned developments and at the same time accounting for the background growth in the regional trips.

3.2.6 Planned Roadway Improvements

Simcoe County has planned for a 4-lane roadway on County Road 27 from County Road 90 to County Road 21 in their preferred roadway network developed in the 2014 Simcoe County Transportation Master Plan Update. The preferred roadway network also included a 4-lane Highway 89 roadway through the study area. There are no other planned roadway network improvements in the study area in the future. These roadway network improvements are included as base roadway network improvements for the year 2043 roadway network analysis. **Figure 25** shows the year 2043 roadway network.

Figure 25. 2043 - Roadway Network



Township of Essa Transportation & Trails Master Plan

Note:
1. The per lane capacity remain same as existing conditions
2. County Rd 27 is widened to 4-lanes between County Rd 90 and County Rd 21 (source: Simcoe County TDM Model)
3. Highway 89 is widened to 4-lanes through study area (source: Simcoe County TDM Mod

No. of Lanes by Direction
- 1
- 2

km
0 1 2 4 6

Source: WSP

Date: 9/14/23

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3.2.7 Future Conditions Roadway Network Performance

The future roadway network conditions were evaluated based on the future traffic volumes and the network capacity improvements from the planned roadway improvements. **Figure 26** shows the year 2043 base conditions roadway network. Thus, a future no build conditions analysis was conducted for the year 2043 conditions. **Figure 26** and **Figure 27** shows the roadway network performance for the year 2043 conditions under no-build conditions for the AM and PM peak periods. As shown in the figures, the following roadway segments are projected to operate under high congestion with a volume to capacity ratio >0.9 in the study area:

- Eastbound County Road 90 from 10th Line to County Road 27 during the AM peak period.
- Eastbound 25th Sideroad from 10th Line to County Road 27 during the AM peak period.
- Willoughby Road between County Road 10 and 5th Line in both the directions during the AM peak period and in the westbound direction only during the PM peak period.
- Northbound 5th Line between Willoughby Road and County Road 90 during the AM peak period and in both directions during the PM peak period.
- 5th Line between County Road 90 and 30th Sideroad during both the AM and PM peak periods.
- Southbound Mill Street (County Road 90) between Cecil Street and King Street during the AM peak period.
- Centre Street (both directions) and eastbound King Street during the PM peak period.
- Eastbound Cecil Street between Edenbridge Drive and Mill Street (County Road 90) during the PM peak period.
- Northbound County Road between Highway 89 and County Road 21 during the PM peak period.
- Both directions of County Road 10 between Mill Street (County Road 90) and Willoughby Road during the PM peak period.

Figure 26. 2043 – No Build Conditions AM peak hour volume to capacity ratios

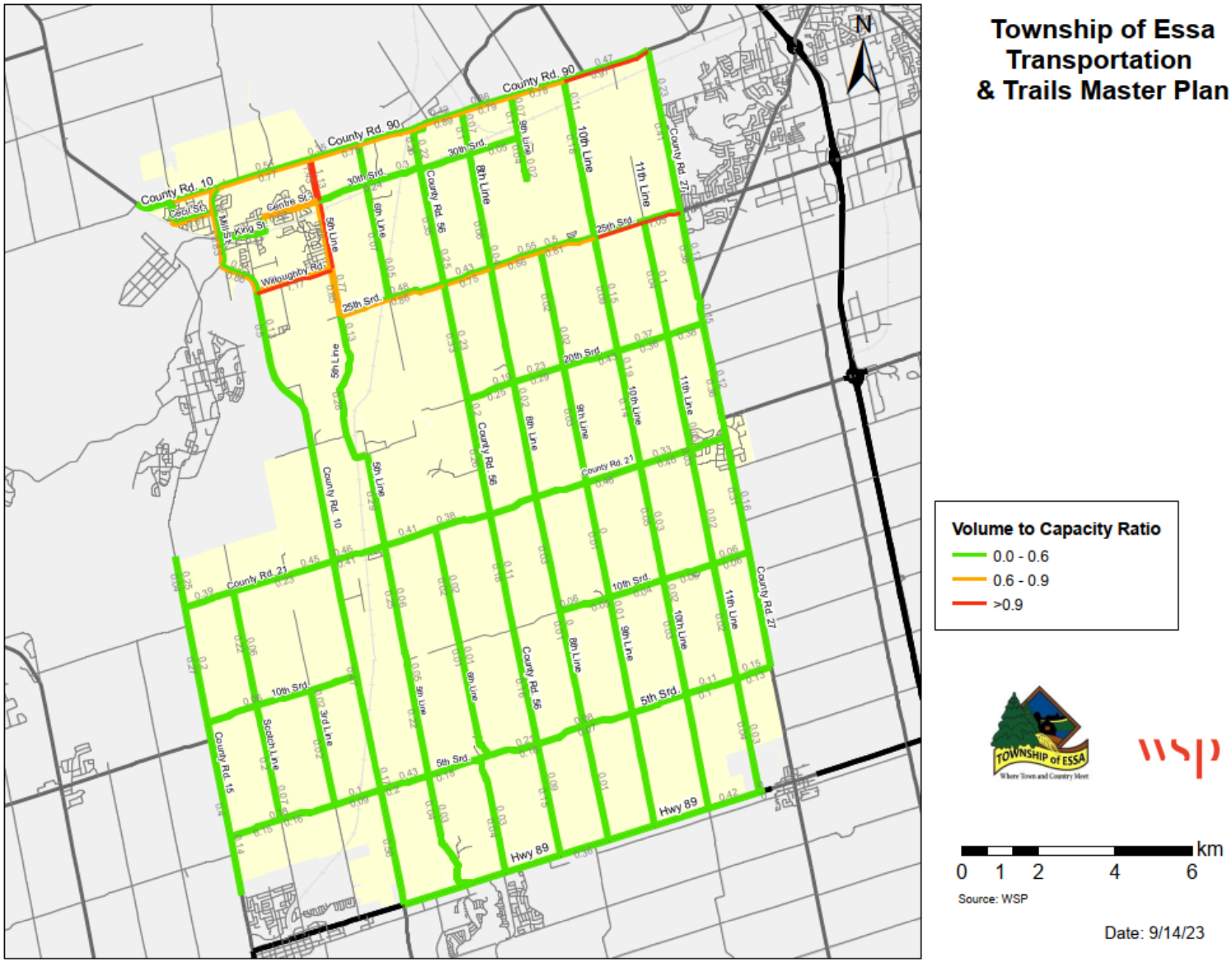

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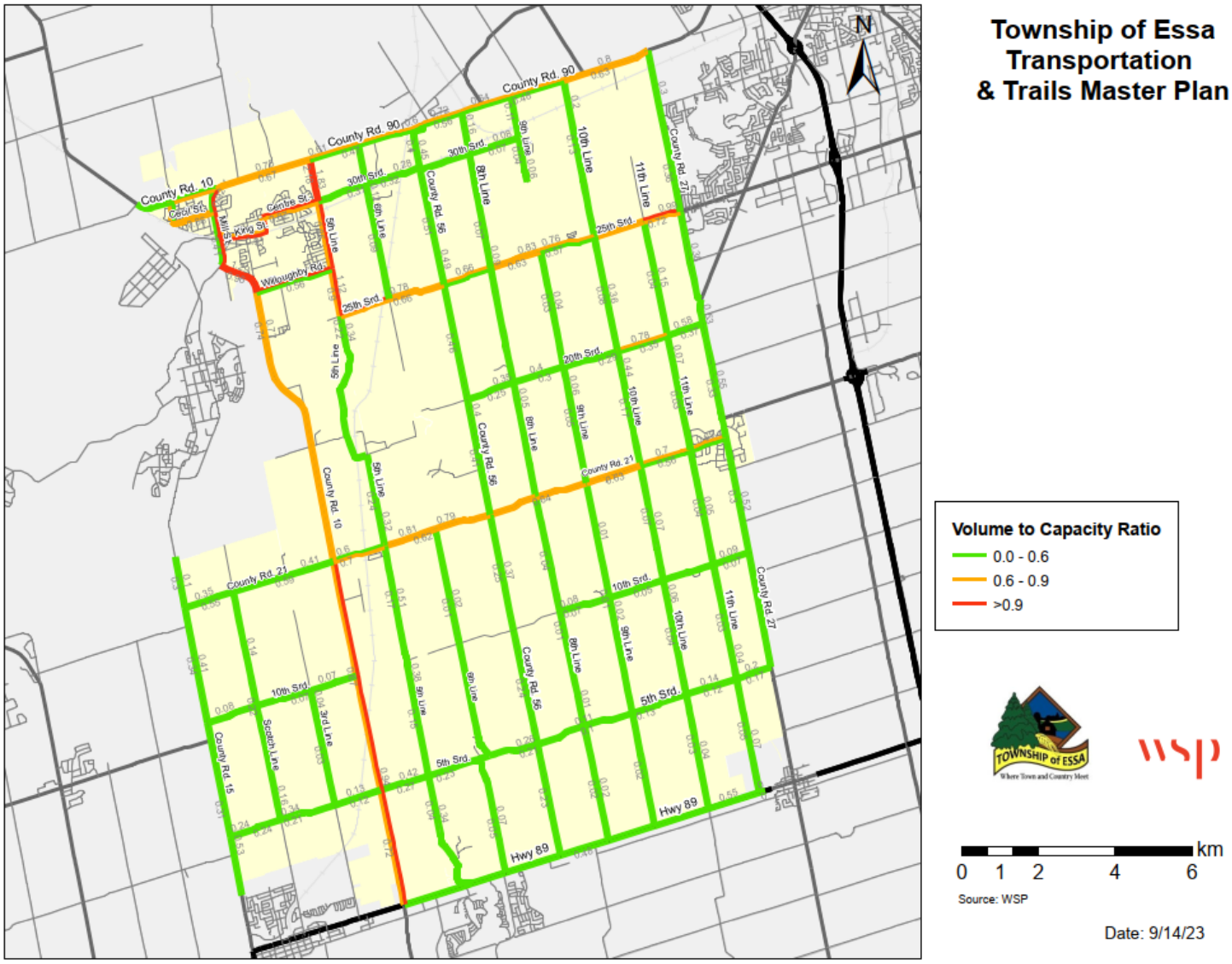
Figure 27. 2043- No Build Conditions PM peak hour volume to capacity ratios



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4 Stakeholder and Public Engagement

Consultation with stakeholders and the public is one of the key elements of the TMP and is a requirement in the MCEA process. Consultation and engagement sessions were held in-person and the TMP was publicized on the Township of Essa's consultation website, that asked participants to contact the project team with any comments or questions via email at EssaTTMP@publicinput.com.

4.1 Who was Consulted?

The consultation and engagement program was designed with the intention of exchanging ideas with key stakeholders:

- **Residents, Employees, and Visitors:** people who live and/or work in, commute to, and visit the Township of Essa.
- **Technical Advisory Committee:** representatives from adjacent municipalities, Simcoe County, conservation authorities, provincial agencies, and utility companies who share and have interests in the municipal right-of-way and transportation-related issues in the Township of Essa.
- **Interested Stakeholders**: representatives from groups and advisory committees who have interest in transportation related decisions within the Township or who would have a role in supporting the Township in future promotion and outreach initiatives as well as implementation of critical links. Stakeholders included representatives from the Township Healthy, Accessible Community and Parks Committee (HACP), Traffic Advisory Committee (TAC), and other stakeholders.
- **Town Staff**: Township staff are responsible for the implementation, execution, monitoring, assessment, and reporting of the TMP.
- **Council**: Councillors are responsible for endorsement and oversight.

4.2 Phase 1 Consultation Summary

There were two attendance options for residents to participate in, both in-person and virtual options for attending and providing feedback was made available.

The first in-person Public Open House was held from 2:00 – 5:00 pm on February 23, 2023, at the Gymnasium in the Angus Recreation Centre (8529 County Road. 10, Angus). It was a "Drop-In" style session, with no formal presentations. Attendees were encouraged to ask questions to the project team and provide feedback at their own pace. Approximately 30 people attended the PIC, and a number of tools were also made available on the project website to solicit feedback and increase access to information.

The first round of public engagement activities provided the Project Team with a deeper understanding of existing conditions and potential opportunities for improving active transportation, transit, and the road network in Township of Essa. Several key ideas and common themes emerged from consultation that were used to guide the development of the TMP and set priorities for the Township. A few of the key themes are summarized in the following:

Active Transportation

- Community members emphasized a desire to have **recreational trails separate from ATV trails**, but there was interest in exploring how snowmobile access to local trails in winter months could serve as a complementary use for those routes.
- There is a desire to see improved connections to trail systems at parks and recreational areas throughout Essa. Additionally, some residents would like to see better connections between urban and rural parts of the Township.
- Residents are making it clear that they would like to see public realm improvements to trails and streets in Essa – some suggestions included adding more benches for people to sit and creating facilities that are more stroller-friendly for parents with young children.
- Most people find that it is easy to drive in Essa, but do not feel that it is easy to bike or walk. Overall, roads are well maintained, and the road network makes getting places by car fairly efficient. Residents would like to see improvements to transit, cycling, and walking infrastructure to provide a higher degree of mobility choice in the future.

Transit

- Residents would like to **see more transit options** available for getting around Essa, as well as to nearby communities and key destinations.

Road Network/ Right-of-Way

- Speed is a major and growing concern on many Township roads. Residents would like to see **more measures and enforcement to reduce speeding**.
- A common concern among community members is that there is a lack of space near schools to accommodate school pick-up and drop-off. Many residents noted concerns over adding parking on streets that are already quite narrow. It was suggested that these roads may need to be widened in order to provide enough space for all facilities, which could create additional concerns related to vehicle speeds in those areas.
- Multiple concerns were raised regarding the County of Simcoe's plans to develop County Road 27 into a 4-lane cross-section. Residents already feel that the speeds and volumes on County Road 27 make the corridor unsafe for people living along the route and expressed concerns about the impact of widening on the speeds, volumes and safety for their families.

A virtual option for participation was also made available between February 23, 2023, to March 1, 2023. A short presentation was posted on the Project Website for viewing and commenting. The boards presented during this PIC are included in **Appendix B**.

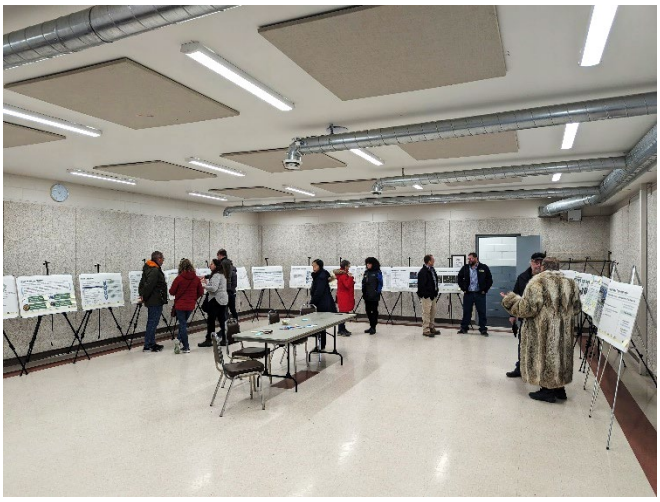
4.3 Phase 2 Consultation Summary

The second PIC was held on March 19, 2024, at the Thornton Community Centre from 5:00 PM to 7:00 PM. Approximately 30 people attended and participated in the PIC event. A notice to promote the PIC event was issued through the project webpage and emailing list. Feedback was also able to be provided through the Town's engagement platform (*PublicInput*) until the end of the consultation period (April 9, 2024). On February 1, 2024, the local newspaper Barrie Today featured an article that highlighted the status of the TMP and the upcoming PIC event. The article included insights from WSP's Project Manager and discussed the objectives and details of the second public open house event. Through this article, the community was informed and encouraged to participate in shaping the future of transportation and trails in Essa.

The purpose of the second PIC was to:

- Provide an overview of the Transportation and Trails Master Plan (TTMP) study process;
- Present proposed recommendations for roads, active transportation, trails, and parks;
- Discuss recommended strategies for pedestrian crossover locations, traffic calming measures, and parking in the Township; and
- Gather feedback to finalize and complete the TTMP.

The boards presented during this PIC are included in **Appendix B**.



The below sections summarize the feedback received during the consultation period.

General Comments

- Protection of vegetation (marsh marigolds) during the reconstruction of 25th Sideroad for roadway upgrades;
- Support for the addition of a Lynx bus route between Thornton and the Barrie area; and
- Further education is required on the proposed time restricted parking zones, and how they will be monitored.

Active Transportation

- Support for bike pump/maintenance stations and benches installed at key locations; and
- Concerns about cyclist and pedestrian safety on 9th Line.

Parks and Trails

- Residents would like to see more parking at trail entrances;
- Would like to know whether Secondary Trails have ATV and snowmobile access due to concerns over current ATV and snowmobile usage impacting adjacent farmlands; and
- Support for the Secondary Trail to Utopia being prioritized.

Road Improvements and Traffic Calming

- Support for the pedestrian crossover at the intersection of Robert Street and Kallen Boulevard;

- Perception that speed bumps in subdivisions are pushing local traffic to County Road 27 that already experiences congestion;
- Stronger enforcement is required for speed reduction, particularly east of County Road 56;
- Strict enforcement for a speed of 40km/hr is necessary for speed reduction in Thornton;
- Requests for the installation of additional Stop signs at the intersection of 10th Line and 25th Sideroad to make it an all-way stop;
- Concerns over the impact of speed bumps on residential/subdivision streets;
- Recommend flashing signals be considered as a prewarning before a red signal in Community Safety Zones;
- Suggests the use of a full set of lights at high traffic areas; and
- Suggests the installation of automated speed enforcement high above the ground to prevent vandalism.

Specific Street Improvements

- Enforcement is required at the intersection of Robert Street and Kallen Boulevard to monitor rolling stops;
- Support for flashing radar speed signs on County Rd 10 near Brentwood;
- Red light cameras should be installed on Barrie Street/County Road 21 and Robert Street/Cunningham Drive;
- Support for photo radar at 25th Sideroad and 20th Sideroad;
- Speed limit should be changed to 60km/hr on County Road 21;
- Speed limit should be lowered to 40km/hr on Barrie Street;
- Speed limit should be reduced from 80km/hr to 60km/hr on 9th Line;
- Separation of snowmobilers and walkers on trails, particularly near Simcoe County forest; and
- Provide a connection parallel to rail to keep pedestrians safe between Baxter to 19th Sideroad or north to Angus.

Proposed Alternatives

During the PIC, the benefits and impacts of Alternative 3 were outlined, and residents provided specific feedback relating to the preferred alternative as presented.

- Alternative 1 - encompasses major road improvements proposed by Simcoe County on County roads with no infrastructure investments at the local level;

- Alternative 2 - includes previously recommended improvements identified in the 2018 Development Charges Road Improvement Program; and
- Alternative 3 - encompasses a combination of Alternative 2 as well as additional projects that will address residual challenges to the mobility network.

Safety

- Concerned for the safety of children, particularly where school areas are bounded by arterial roads; and
- Concerned about cars passing stopped school buses during pick-up and drop-off by the firehall on Robert Street.

Traffic Calming

Some of the types of measures that residents are interested in exploring further include:

- Speed bumps/humps;
- Directional closures;
- Speed tables;
- Radar speed display sign; and
- Automated speed enforcement.

5 Recommended Future Multi-Modal Network

As the Township of Essa continues to experience moderate growth, the TMP recommends a comprehensive multi-modal network that is responsive to forecasted growth. Technical analysis and consultation with the public and stakeholders have been conducted to identify options and select preferred solutions for the multi-modal transportation network. This chapter addresses the complete street approach, active transportation, transit, and street network providing details of the technical analyses and the recommendations for infrastructure improvements.

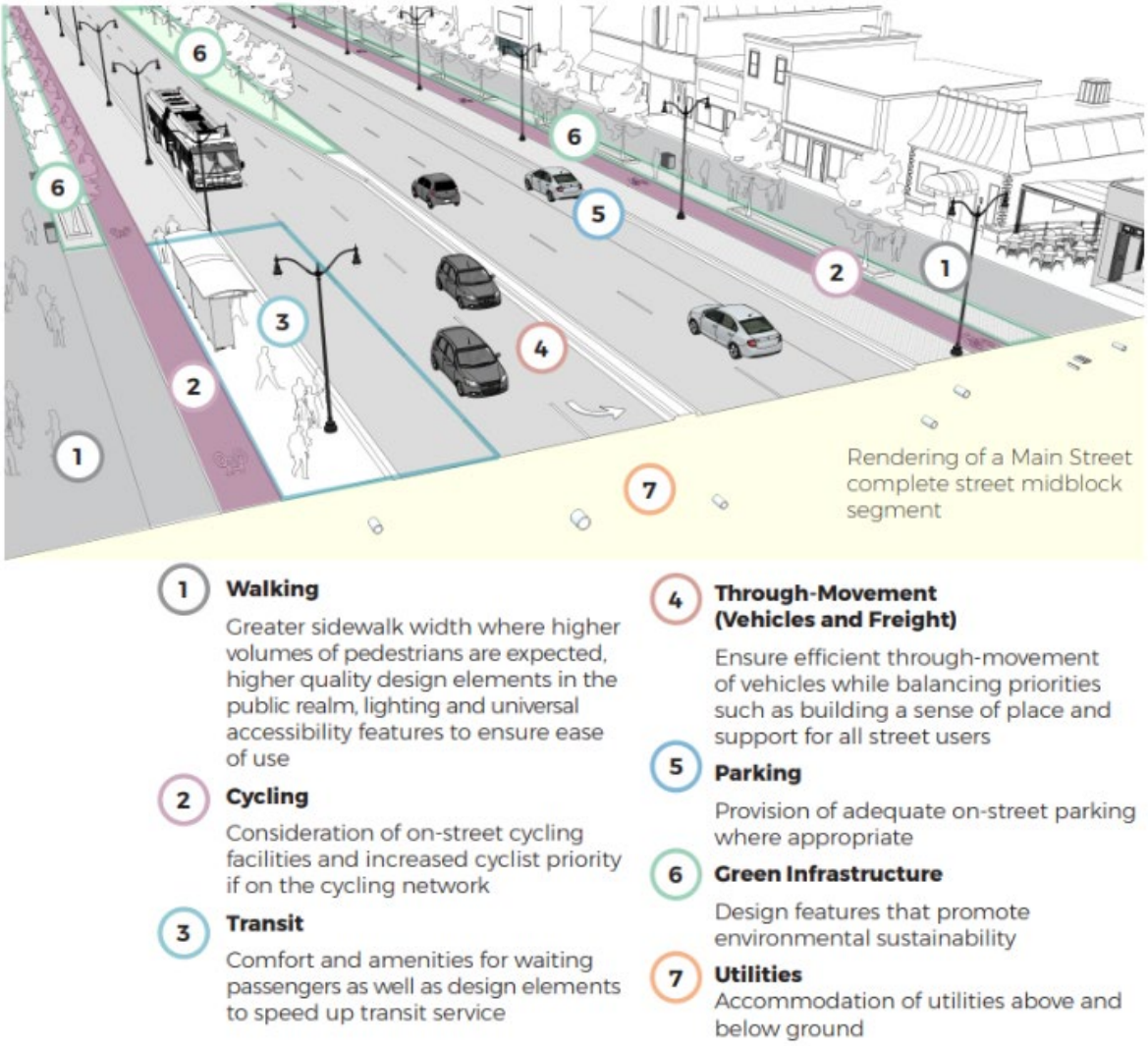
5.1 The Complete Streets Approach

The TMP utilizes a Complete Streets approach to transportation network planning, meaning that it considers all modes of transportation and all types of users. The approach focuses on the most vulnerable users first (pedestrians and cyclists). With this mentality, active transportation improvements are presented first, followed by transit, and then the road network.

Complete Streets are not necessarily roads/streets that have facilities/elements to cater for every road user, rather that each road is purposefully and thoughtfully considered throughout the design process. Local roads for example, will not usually require a dedicated cycling facility due to the lower vehicle speeds and volumes. Compared to arterial roads, where cyclist/pedestrian facilities are preferred to be separated from vehicle lanes.

The concept of Complete Streets focuses on the needs of pedestrians, cyclists, transit riders, motorists, and creating streets that are balanced in meeting the needs of all modes and prioritizing road safety. In addition, Complete Streets prioritizes “placemaking”, which refers to the elements of streets that contribute to healthy ecosystems, social inclusion, and vibrant business activity. These needs should be balanced in order to accommodate efficient maintenance and operations. An example of a Complete Street is shown in **Figure 28**.

Figure 28. Rendering of a Main Street Complete Street Midblock Segment



Source: London Complete Streets Design Manual, 2018

Complete Streets for Canada defines ten “action elements” that act as a model of best practices in the development of a comprehensive Complete Streets Policy. The ten action elements are listed in **Table 23**, which could potentially be applied to road networks within the Township of Essa.

Table 23. Complete Street Action Elements

Embodies Community Vision	Adopted by All Agencies
States Essa's community vision and intent of how and why Complete Streets elements will be implemented.	Conveys an approach that can be adoptable and understood by all Township departments and/or agencies that may be involved in the process.
Defines All Users and Modes	**Utilizes Latest Design Guidelines**
Gives equal consideration to different users regardless of age or ability, especially those who walk, cycle, and ride transit.	Draws from the use of the latest and best design criteria and guidelines to stimulate interaction between users of different modes and the built or natural environment.
Applies to All New & Retrofit Projects	**Acknowledges Context Sensitive Solutions**
Recognizes opportunities of application to new and retrofit transportation projects as well as existing maintenance operations.	Concedes that solutions will be context-sensitive to Essa's different urban, suburban and rural environments.
Identifies Exceptions	**Defines Performance Standards**
Accounts for any appropriate exemptions due to legislative, topographical, technical, cost-benefit limitations or others.	Establishes qualitative or quantitative performance indicators to evaluate and monitor policy impacts over time.
Encourages Connectivity & Integration	**Proposes Specific Implementation Steps**
Promotes continuous integration, and connectivity throughout Essa's street network and between modes.	Lists specific steps for implementation strategy according to a set time scope.

Source: Complete Street Canada, 2019

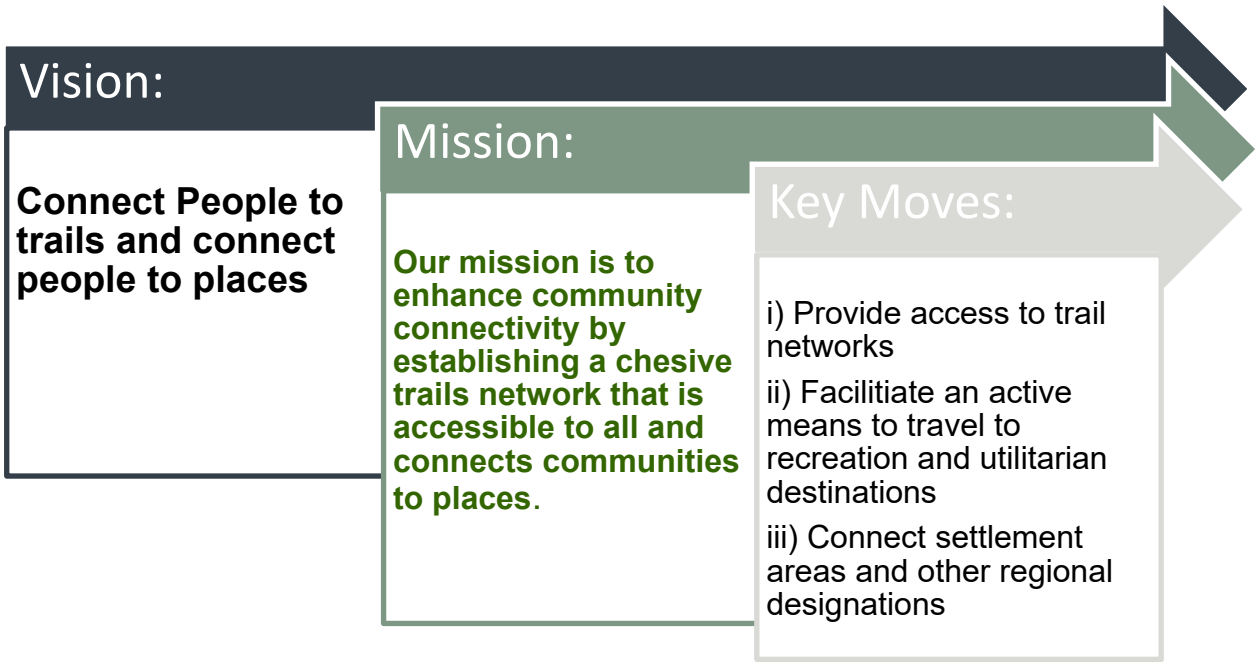
5.2 Active Transportation Network

The TMP was prepared in coordination with a Trails Master Plan. The development of recommendations for the future active transportation network is described in detail in the Trails Master Plan (**Appendix F**), as the active transportation facilities within the road right-of-way are leveraged with off-road trails to create a connected and comprehensive network for active transportation.

This section reviews the development approach and process taken to identify proposed trail connections and highlights the recommendations for the development of a connected active transportation network in Essa. Full details including all influencing factors that informed the proposed network and recommendations are provided in the Trails Master Plan (**Appendix F**).

5.2.1 Developing the Active Transportation Network

The approach to developing network recommendations focused on specific actions to improve connectivity and access, while identifying opportunities to improve and broaden user experiences. The following process was used to guide the development of the Trails Master Plan.



The proposed trail network acknowledges that recreation and mobility can complement each other and aims to utilize road networks to improve connectivity and expand accessibility options for users. The approach ensures people can access trails by other modes of transportation (and supporting decreased vehicular dependency) while providing a means to get people to the trails and through the system in an active way.

By identifying priorities for the trails to ensure a consistent proposed system, a network development approach was prioritized with 5-key focus areas that were identified and applied in developing the proposed trails network and improvement recommendations. These priorities and their associated key focus areas are detailed within the **Table 24.**

Table 24. Trail Priorities and Focus Areas to Complete a Network Development Approach

	Priorities	Focus Areas
1	Identify ways to improve access and the experience within the existing trail network.	Review of potential barriers to accessing the existing network and identify infrastructure and amenities to improve/broaden user experiences.
2	Identify 'low effort' gaps in the trail network that will facilitate connectivity and access.	Review of the location of existing trails and potential desire lines to community destinations to extend existing trails or infill between trail segments.
3	Explore road corridors for multi-use pathways (MUPs) to create connectivity.	Begin with a core network of off-road trails within Angus, whose alignments prioritize using existing municipal lands, unopened road allowances and public lands which connect to existing trail facilities and key destinations. Fill in sections where land is otherwise restricted or unavailable with MUPs along nearby road corridors.
4	Identify neighbourhood greenways.	Where unfeasible to provide separated trail facilities, such as MUPs or other trail types, consider low volume largely residential streets which could operate as shared "neighbourhood greenway" facilities.
5	Identify alignments to connect communities.	Review property parcel data to identify ideal alignments to construct facilities between sparse destinations (i.e., connection between Angus, Baxter, and Thornton and Rural Essa to neighbouring communities i.e.: New Tecumseth, Barrie, Creemore, Stayner).

5.2.2 Integrating Active Transportation into a Multi-Modal Transportation Strategy

When selecting routes and facility types to create a network that is considered safe, equitable and accessible, it is important to integrate the infrastructure into the multi-modal strategy. The following summarizes strategies and other elements that support an active transportation network within the overall transportation network:

- Building infrastructure to form the transportation network;
- Educating, promoting, and conducting outreach to bring awareness to active transportation routes and the benefits, such as through active and safe routes to school programs;
- Integrating the existing and planned active transportation network with existing and future transit infrastructure;
- Providing bike parking and other active transportation-supportive infrastructure; and
- Reviewing micromobility and understanding its implications.

5.2.3 Trail Hierarchy

The TMP centers around establishing a comprehensive trails network to ensure a secure and enjoyable experience for users throughout the Township. Acknowledging that users often perceive no distinction between on-road and recreation-focused trails, it is vital that all networks being accessed through the TMP are designed as one integrated system.

Beyond determining optimal routes for trail expansions, it is crucial to designate each route with an appropriate facility type using a formalized trail hierarchy. This hierarchy serves as a valuable guide for practitioners involved in designing and maintaining trail facilities, offering clarity for interested users as well. Publicly labeling trail facilities under a consistent and readable hierarchy sets expectations regarding difficulty and accessibility. This ensures a more predictable and inclusive travel experience for a diverse user base across all segments of the network.

The following four (4) trail facility types have been identified to create a trail hierarchy for Essa:

- Type 1 – Primary Trails
- Type 2 – Secondary Trails
- Type 3 – Nature Trails
- Type 4 – Neighbourhood Greenway

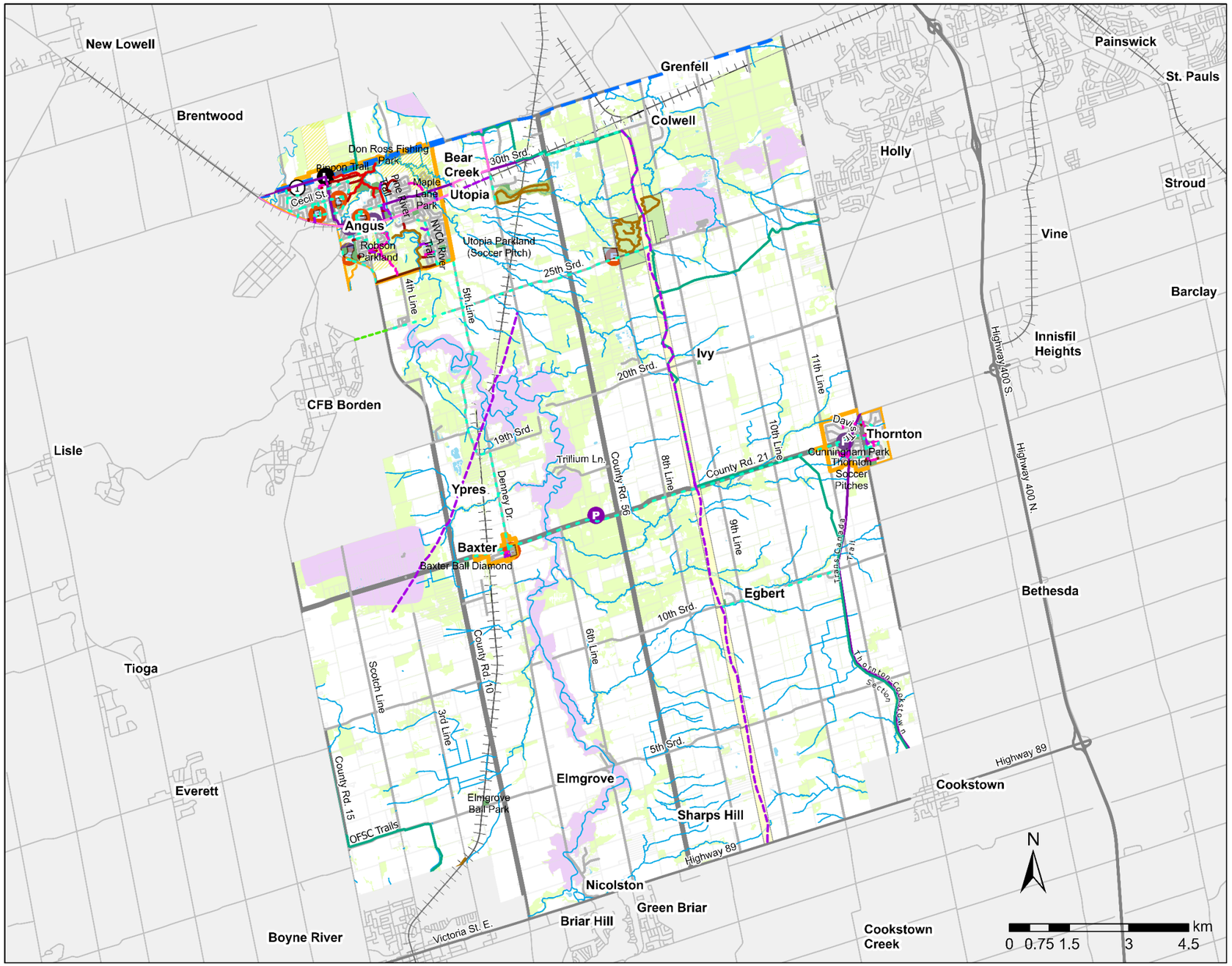
The Trails Master Plan explores these in greater detail, including underlying considerations that informed the proposed network, key aspects of the trail hierarchy, design standards for each facility type, and application to the existing and future trails. Refer to Section 3 in the Trails Master Plan which also outlines Trail Operation and Maintenance considerations.

5.2.4 Active Transportation Recommendations

The proposed trail network aims to enhance the community's recreational opportunities, promote active transportation, and connect key destinations throughout the area. The network is designed to be inclusive, providing safe and accessible routes for all users, including pedestrians, cyclists, and individuals with disabilities. Through a comprehensive analysis of the existing trail system and an evaluation of community needs and preferences, the following proposed trail network will serve as a valuable asset to the community, promoting health, well-being, and a stronger sense of place.

The following **Figure 29, Figure 30** and **Figure 31** proposed trail maps showcase the proposed trail network. These trails connect to existing parks and open space, educational facilities, and existing trail segments.

Figure 29. Rural Essa - Proposed Candidate Trail



Township of Essa Transportation & Trails Master Plan

RURAL

Proposed Candidate Trail Network

Legend

- Township Boundary
- Community Borders

Canadidate Trail Network

- Primary Trail Network (Type 1)
- Secondary Trail Network (Type 2)
- Neighbourhood Greenway (Type 4)

Transportation Features

- County Road
- Township Road
- Railway
- County Linx Route 2 (Wasaga Beach to Barrie)

Land Use Features

- Streams
- Water
- Parcels
- Area of Natural and Scientific Interest
- Woodlands
- Parks and Recreation
- Conservation Area Lands
- Residential Development Zone
- Points of Interest
- Education Facilities
- Libraries

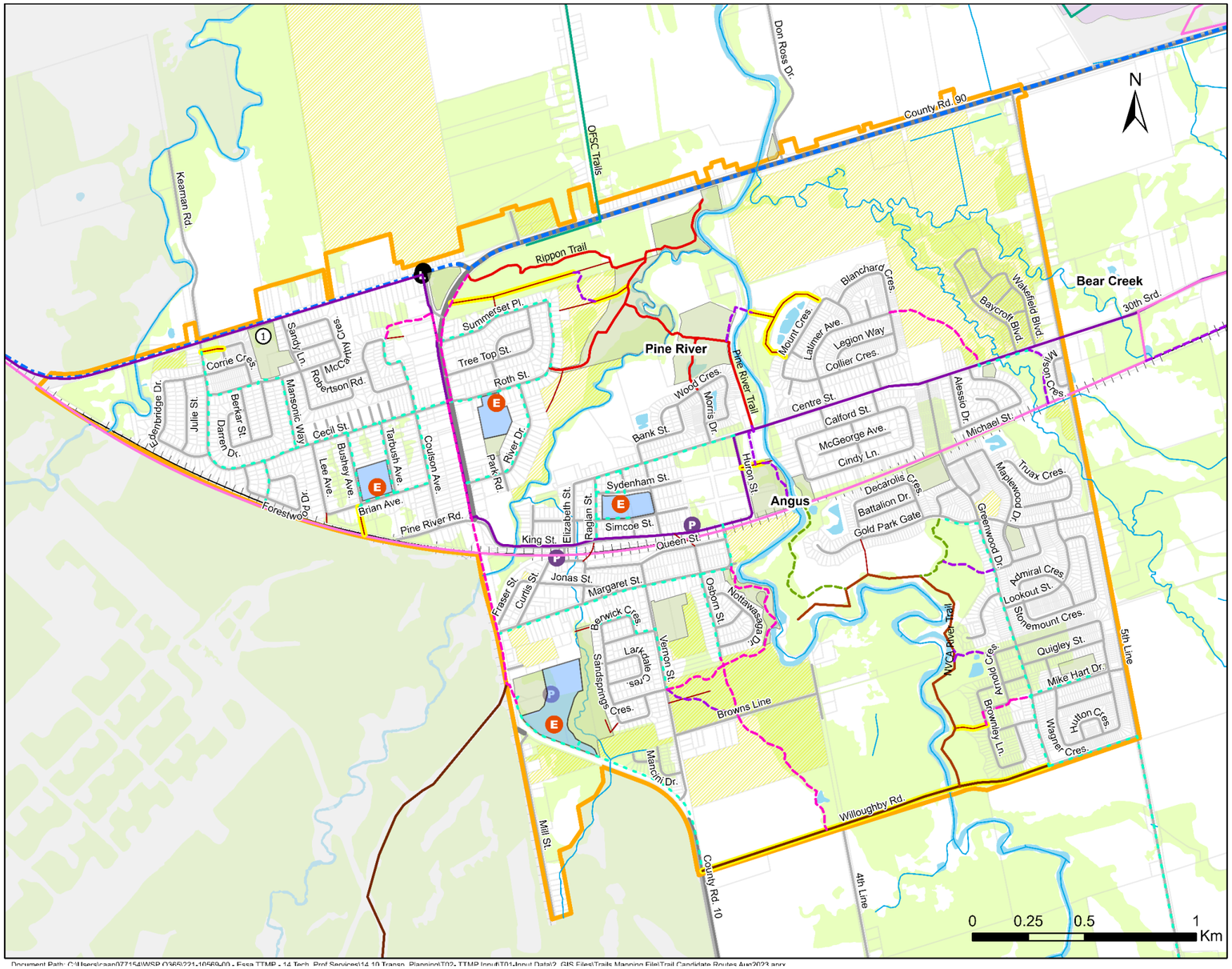
Existing Trails Network

- OFSC Trails
- Pine River Trail
- Rippon Trail
- Tiffin Conservation Area Trail
- NVCA River Trail
- Utopia CA Trail

Existing Pathways

- User-made Path
- Multi-Use Pathway (MUP)
- Ontario Trail Network
- Ganaraska Trail
- Trans Canada Trail

Figure 30. Angus - Proposed Candidate Trail Network



Document Path: C:\Users\caan077154\WSP O365\221-10569-00 - Essa TTMP - 14 Tech. Prof Services\14.10 Transp. Planning\T02- TTMP Input\T01-Input Data\2. GIS Files\Trails Mapping File\Trail Candidate Routes Aug2023.aprx

Township of Essa Transportation & Trails Master Plan

ANGUS
Proposed Candidate Trail Network

Legend

- Township Boundary
- Community Borders

Canadidate Trail Network

- Primary Trail Network (Type 1)
- Secondary Trail Network (Type 2)
- Nature Trail Network (Type 3)
- Neighbourhood Greenway (Type 4)
- Existing Trail Upgrades

Transportation Features

- County Road
- Township Road
- Railway
- County Linx Route 2 (Wasaga Beach to Barrie)

Land Use Features

- Streams
- Parks and Recreation
- NVCA Conservation Area Lands
- Water
- Parcels
- Residential Development Zone
- Points of Interest
- Education Facilities

Existing Trails Network

- OFSC Trails
- Pine River Trail
- Rippon Trail
- Tiffin Conservation Area Trail
- NVCA River Trail
- Utopia CA Trail
- Ganaraska Trail
- Trans Canada Trail

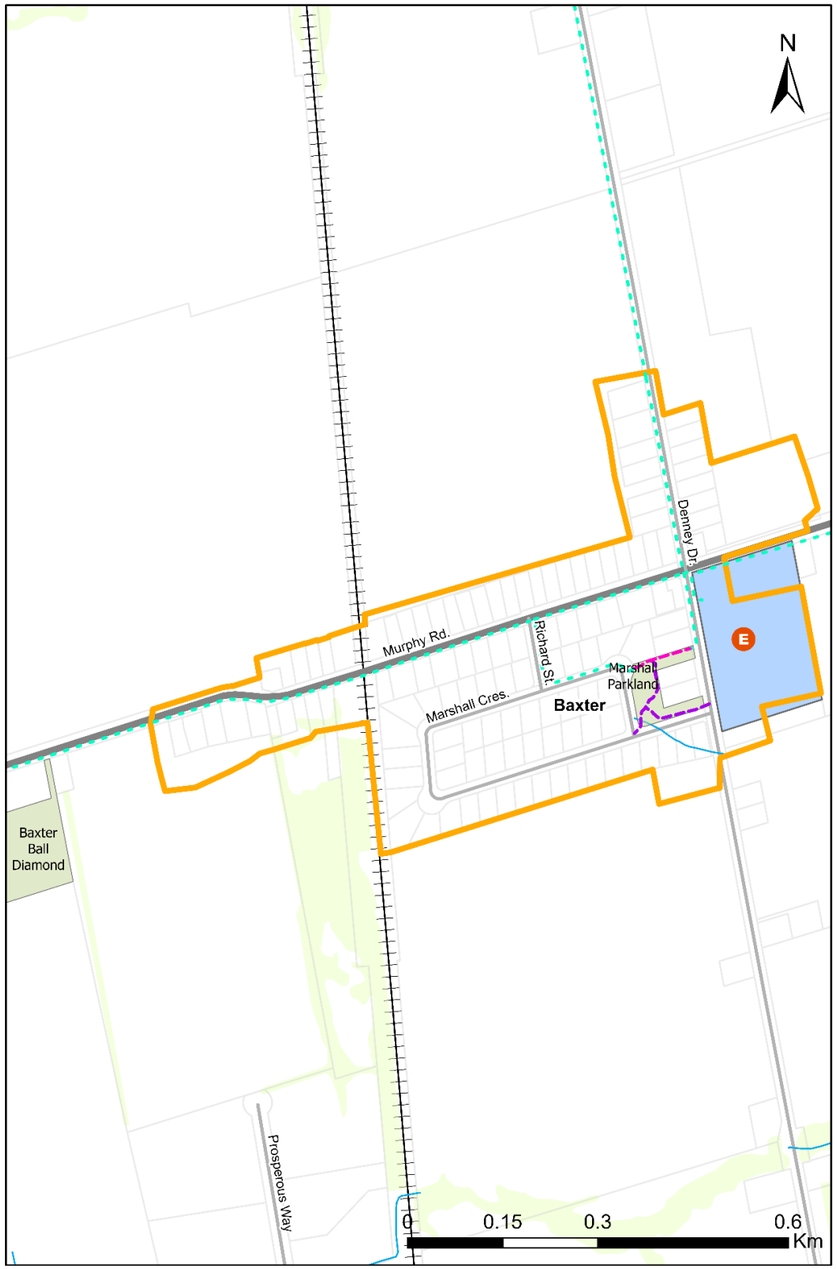
Existing Pathways

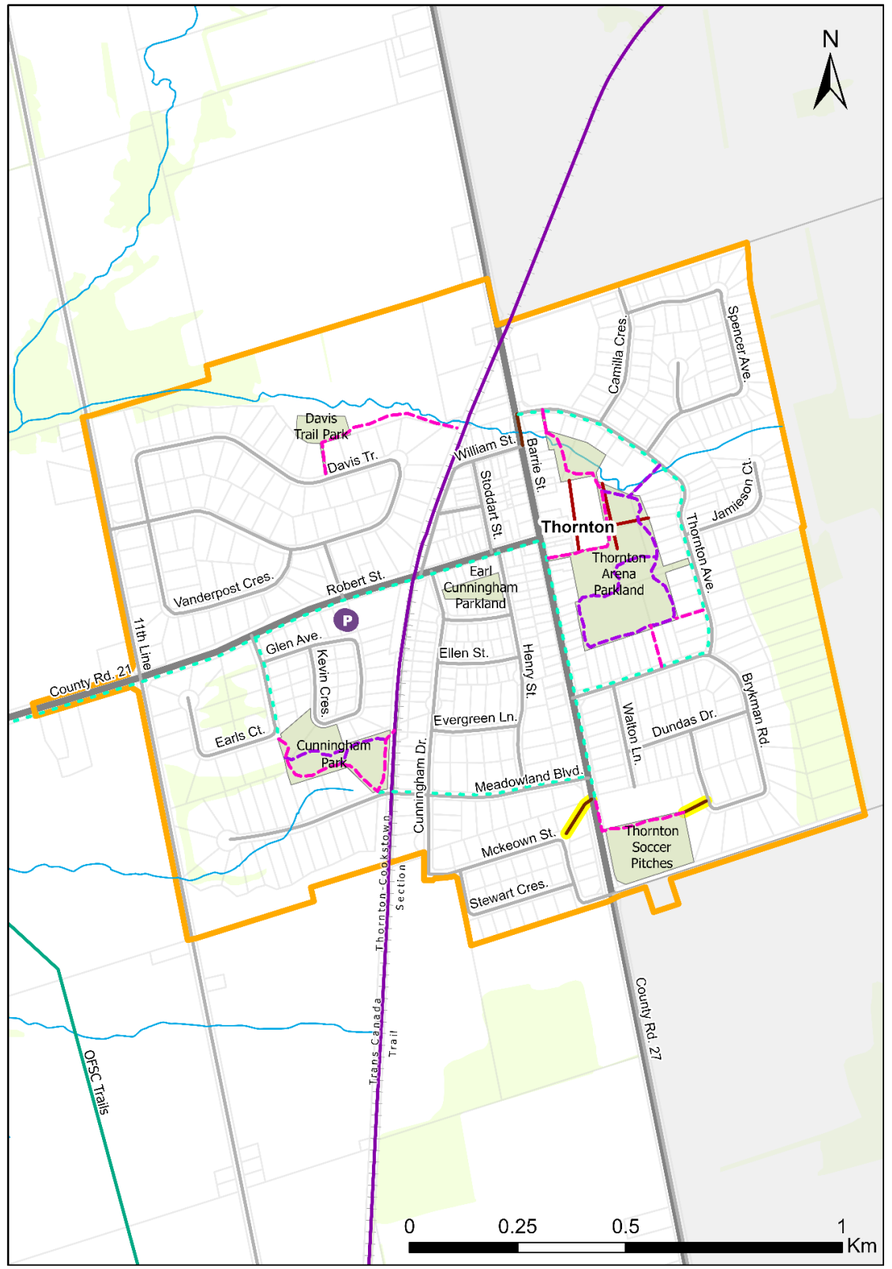
- User-made Path
- Multi-Use Pathway (MUP)

TOWNSHIP of ESSA
Where Town and Country Meet

Date: 2023-08-30

Figure 31. Baxter & Thornton - Proposed Candidate Trail Network





Township of Essa Transportation & Trails Master Plan

Settlement Areas

Proposed Candidate Trail Network

Legend

- Township Boundary
- Community Borders

Canadidate Trail Network

- Primary Trail Network (Type 1)
- Secondary Trail Network (Type 2)
- Neighbourhood Greenway (Type 4)
- Existing Trail Upgrades

Transportation Features

- County Road
- Township Road
- Railway

Land Use Features

- Streams
- Water
- Parcels
- Area of Natural and Scientific Interest
- Parks/ Woodlands
- NVCA Conservation Area Lands
- Parks and Recreation

Existing Trails Network

- OFSC Trails
- Pine River Trail
- Rippon Trail
- Tiffin Conservation Area Trail
- NVCA River Trail
- Utopia CA Trail
- Ontario Trail Network
- Trans Canada Trail

Existing Pathways

- User-made Path
- Multi-Use Pathway (MUP)
- Firehalls
- Libraries
- Education Facilities

Date: 2023-08-30

5.3 Transit Network

The existing transit service in Essa is limited to one Simcoe County LINX route that operates along County Road 90 and is only convenient to those living or working close to that corridor. As the Township continues to grow, increased transit service, both in terms of frequency and coverage area, will be advantageous to help provide mobility options and viable alternatives to the personal automobile.

5.3.1 Transit Recommendations

Play an active role in working with Simcoe County to identify further transit needs in Essa Township and work with the County to create an implementation plan that would see increased service frequency and increased coverage area. Additional service and coverage area is desirable that connects:

- CFB Borden and further along Mill Street through the centre of Angus;
- Angus and Baxter with Alliston and the Honda manufacturing plant located there;
- Thornton to Barrie and Innisfil; and
- The settlement areas of Angus, Thornton, and Baxter.

5.4 Street Network

This section describes the future traffic volume development for the year 2043 conditions and the results of the roadway network performance evaluation.

5.4.1 Transportation Scenario Analysis – Alternative Strategies

The study conducted two alternative scenarios to address the congested roadway conditions for the year 2043 no build conditions. The following are the two scenarios analysed:

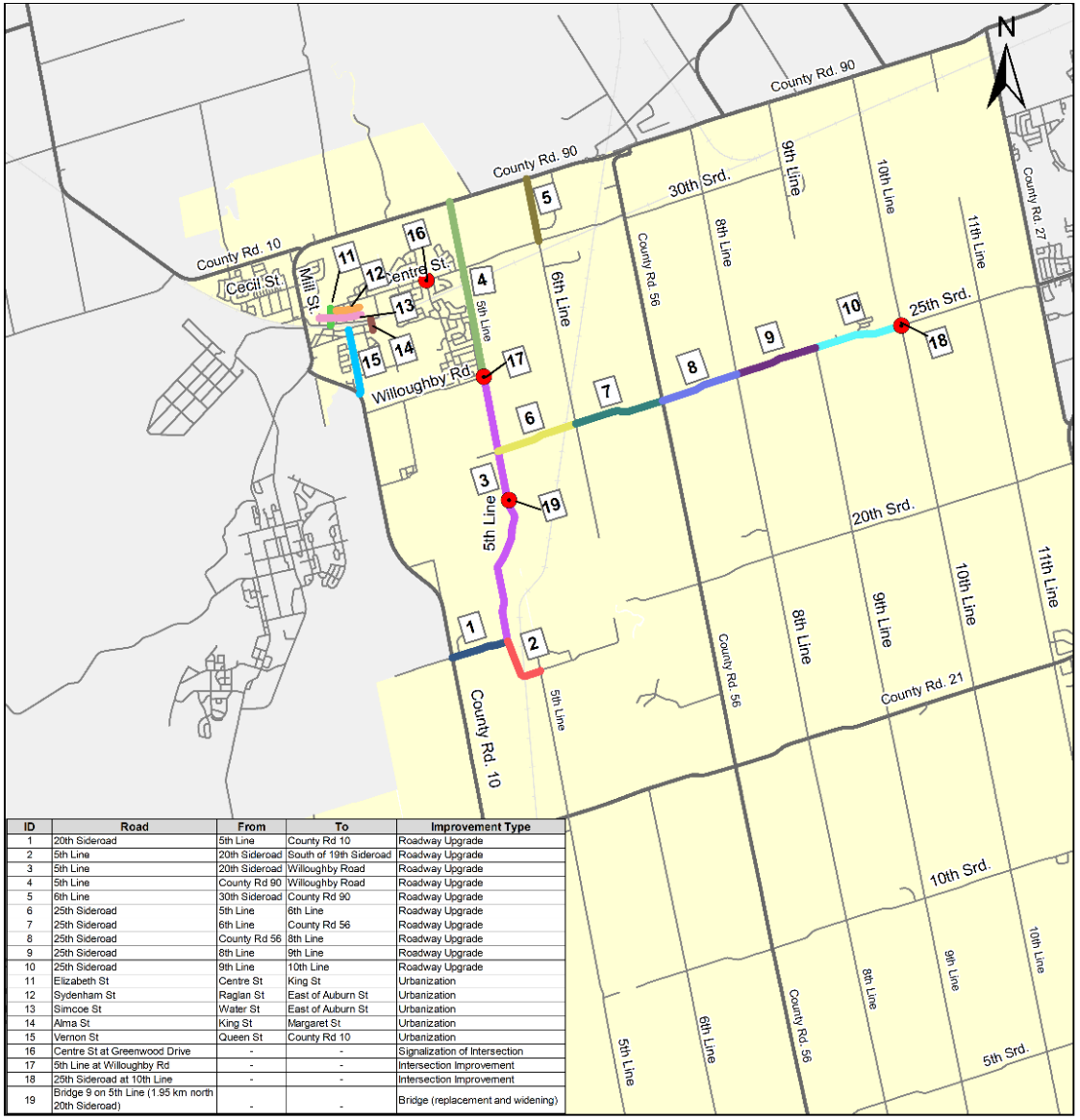
- **Alternative 1:** 2043 no build roadway network with the roadway improvements identified by the Township in their development charge study of the year 2018 and some recently identified roadway urbanization projects.
- **Alternative 2 (Preferred):** Alternative 1 roadway network with additional roadway improvements to address the deficiencies identified in Alternative 1.

Alternative 1 Scenario Analysis:

Figure 32 shows the roadway improvements identified for this scenario. The roadway upgrade projects improve the capacity of the roadways by constructing the roadways to engineering standards with standard roadway widths, curb, gutter, and paved shoulders. The urbanization projects improve the pavement conditions along with including curb and gutter features. Urbanization improvements are not intended to improve the capacity of the roadway. **Figure 33** and **Figure 34** shows the volume to

capacity ratios of the resultant network with roadway network improvements for the AM and PM peak periods. As shown in the figures, some of the roadways continue to operate under congested conditions like under the no build conditions.

Figure 32. Alternative 1 Roadway Network Improvements



ID	Road	From	To	Improvement Type
1	20th Sideroad	5th Line	County Rd 10	Roadway Upgrade
2	5th Line	20th Sideroad	South of 19th Sideroad	Roadway Upgrade
3	5th Line	20th Sideroad	Willoughby Road	Roadway Upgrade
4	5th Line	County Rd 90	Willoughby Road	Roadway Upgrade
5	6th Line	30th Sideroad	County Rd 90	Roadway Upgrade
6	25th Sideroad	5th Line	6th Line	Roadway Upgrade
7	25th Sideroad	6th Line	County Rd 56	Roadway Upgrade
8	25th Sideroad	County Rd 56	8th Line	Roadway Upgrade
9	25th Sideroad	8th Line	9th Line	Roadway Upgrade
10	25th Sideroad	9th Line	10th Line	Roadway Upgrade
11	Elizabeth St	Centre St	King St	Urbanization
12	Sydenham St	Raglan St	East of Auburn St	Urbanization
13	Simcoe St	Water St	East of Auburn St	Urbanization
14	Alma St	King St	Margaret St	Urbanization
15	Vernon St	Queen St	County Rd 10	Urbanization
16	Centre St at Greenwood Drive	-	-	Signalization of Intersection
17	5th Line at Willoughby Rd	-	-	Intersection Improvement
18	25th Sideroad at 10th Line	-	-	Intersection Improvement
19	Bridge 9 on 5th Line (1.95 km north 20th Sideroad)	-	-	Bridge (replacement and widening)

Township of Essa Transportation & Trails Master Plan

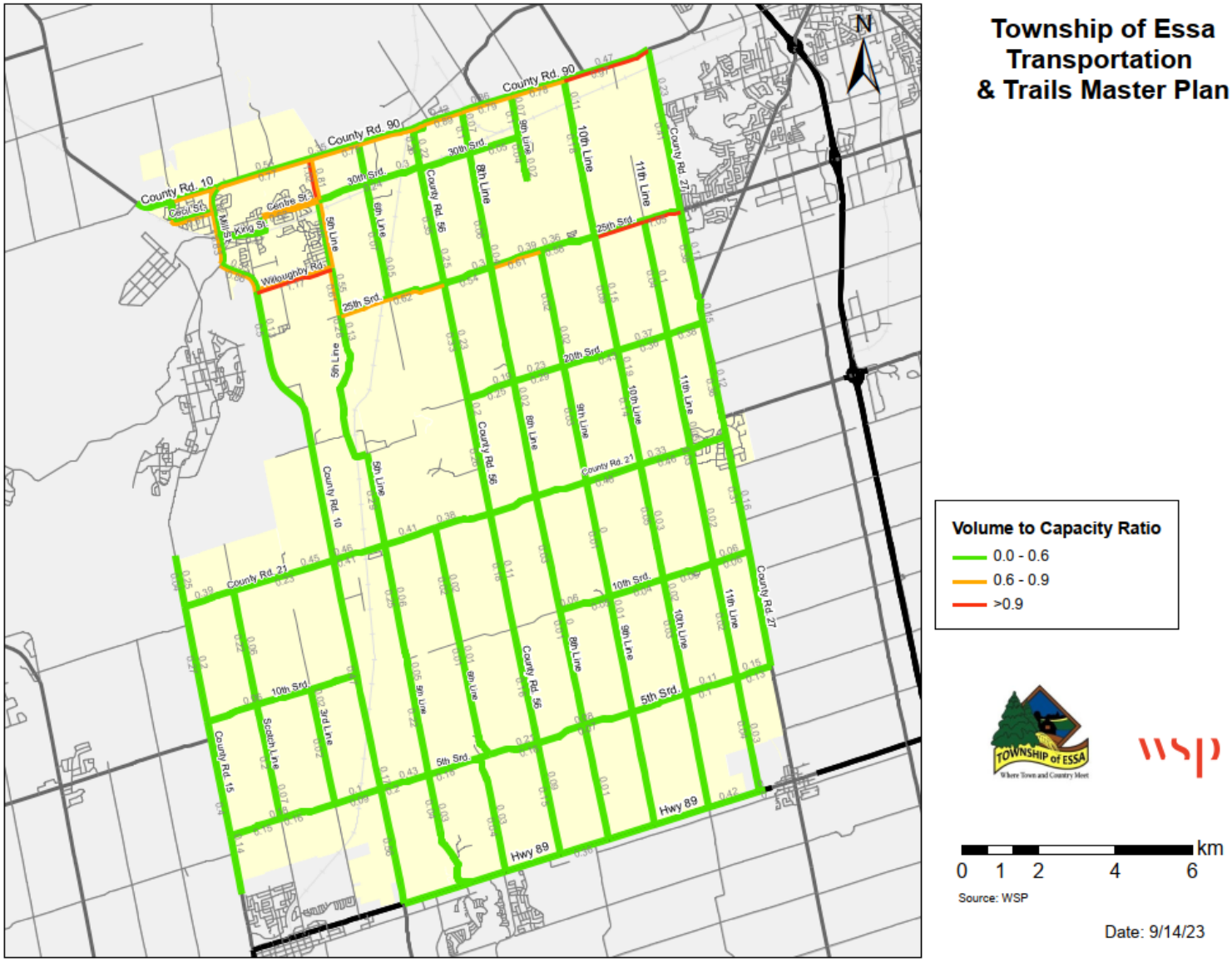
km
0 0.75 1.5 3 4.5

Source: Township of Essa DC Project List, WSP

Date: 10/10/23

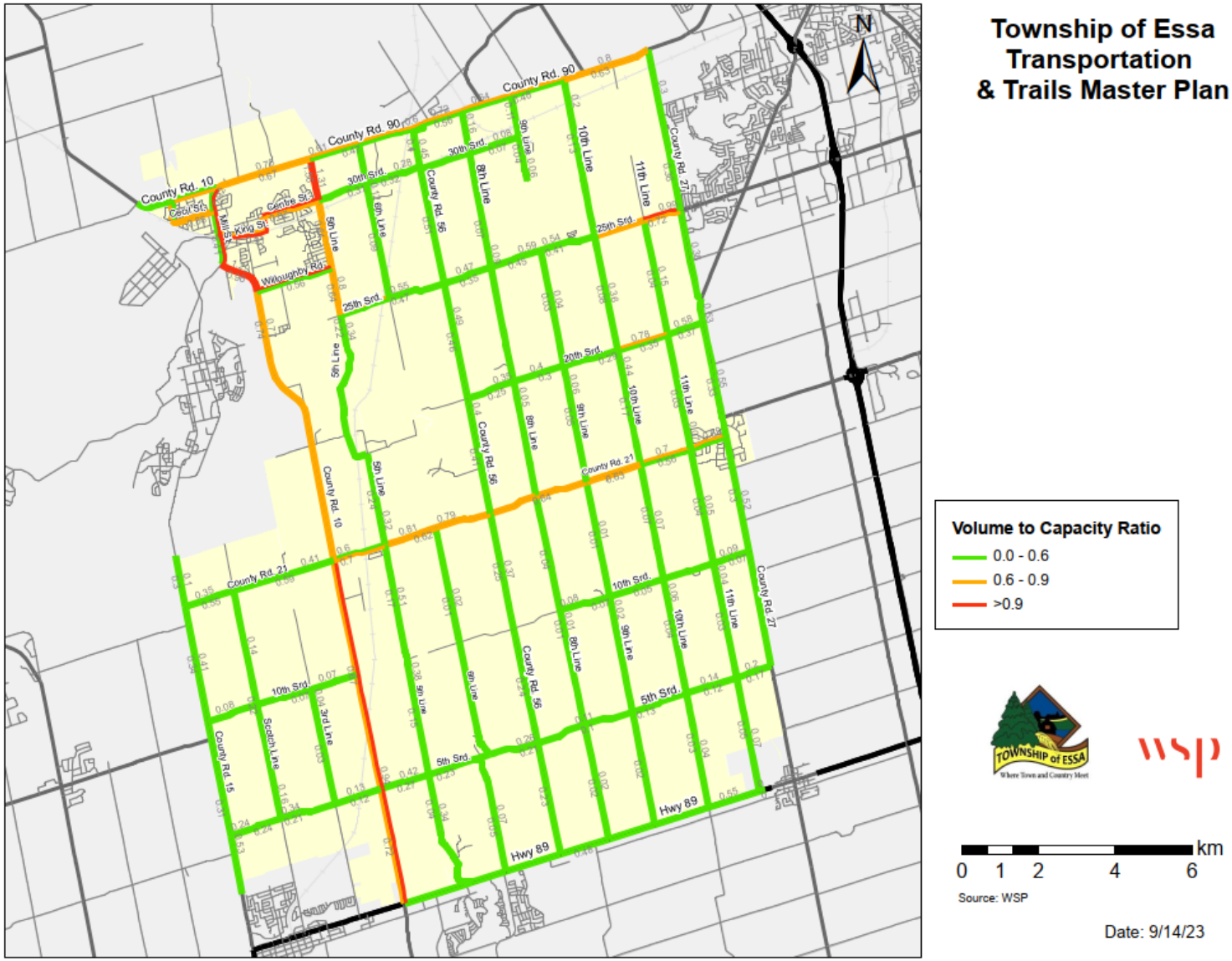
Document Path: \\corp.pbwan.net\IN\IN_BLR_Projects\70130996-221-10569-00-Essa TTMP\Transportation Planning\3 Design and Analysis\T06-Analysis and Calculations\GIS\Figure 22_230201-PC-2043 Alt_1_Roadway Improvements_v2.mxd

Figure 33. 2043 – Alternative 1 - AM Peak Hour Volume to Capacity Ratios



Document Path: \\corp.pbwan.net\IN\IN_BLR_Projects\70130996-221-10569-00-Essa TTMP\Transportation Planning\3 Design and Analysis\T06-Analysis and Calculations\GIS\Figure 23_230201-PC-2043 Alt_2_AM Peak VC_v1.mxd

Figure 34. 2043 – Alternative 1 - PM Peak Hour Volume to Capacity Ratios



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Alternative 2 (Preferred) Scenario Analysis:

This scenario had identified the roadway network improvements to address the deficiencies in the roadway network from Alternative 1. **Figure 35** shows the roadway network improvements identified for Alternative 2.

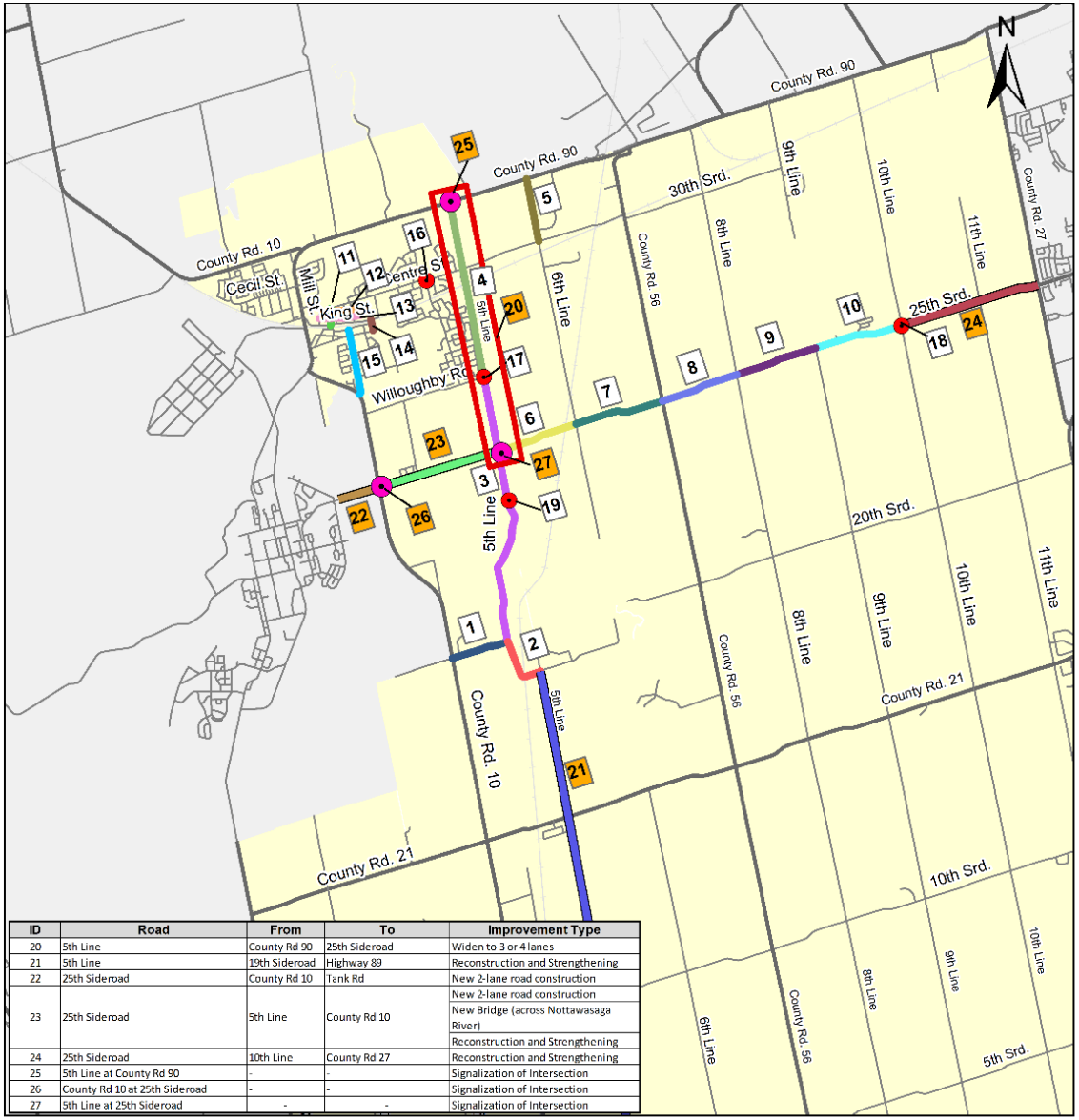
As shown in the figure this network includes significant roadway capacity improvement projects such as:

- Widening of 5th Line to 3-4 lanes between County Road 90 and 25th Sideroad;
- A new 2-lane roadway connection (extension of 25th Sideroad) between 5th Line and Tank Road west of County Road 10;
- Capacity improvement projects are also identified along:
    - Cecil Street;
    - 5th Line south of 19th Sideroad to Highway 89; and
    - 25th Sideroad between 10th Line and County Road 27.

Figure 36 and **Figure 37** show the roadway network performance for the Alternative 2 roadway network during the AM and PM peak periods. As shown in the figures, the improved roadway network in Alternative 2 addresses most of the deficiencies identified in Alternative 1 due to the provision of additional capacity on 5th Line and a new roadway connection between 5th Line and County Road 10. This new roadway connection also provides an alternative entry and exit to Base Borden.

In this scenario, the congested traffic segments are provided with alternative routes. Also, the widening of 5th Line between County Road 90 and 25th Sideroad and improvements along 25th Sideroad in the study area had helped in easing the congestion on County Road 90 and an alternate east-west route towards the City of Barrie. The improvements along 5th Line south of 25th Sideroad up to Highway 89 had provided an alternate north south road parallel to County Road 10 in this scenario.

Figure 35. Alternative 2 Roadway Network Improvements



ID	Road	From	To	Improvement Type
20	5th Line	County Rd 90	25th Sideroad	Widen to 3 or 4 lanes
21	5th Line	19th Sideroad	Highway 89	Reconstruction and Strengthening
22	25th Sideroad	County Rd 10	Tank Rd	New 2-lane road construction
23	25th Sideroad	5th Line	County Rd 10	New 2-lane road construction New Bridge (across Nottawasaga River) Reconstruction and Strengthening
24	25th Sideroad	10th Line	County Rd 27	Reconstruction and Strengthening
25	5th Line at County Rd 90	-	-	Signalization of Intersection
26	County Rd 10 at 25th Sideroad	-	-	Signalization of Intersection
27	5th Line at 25th Sideroad	-	-	Signalization of Intersection

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Note: The projects 1-19 are improvements identified as part of Alternative 1. The table shows only the additional improvements identified for Alternative 2.

- Additional Improvement

- Alternative 1 Improvement

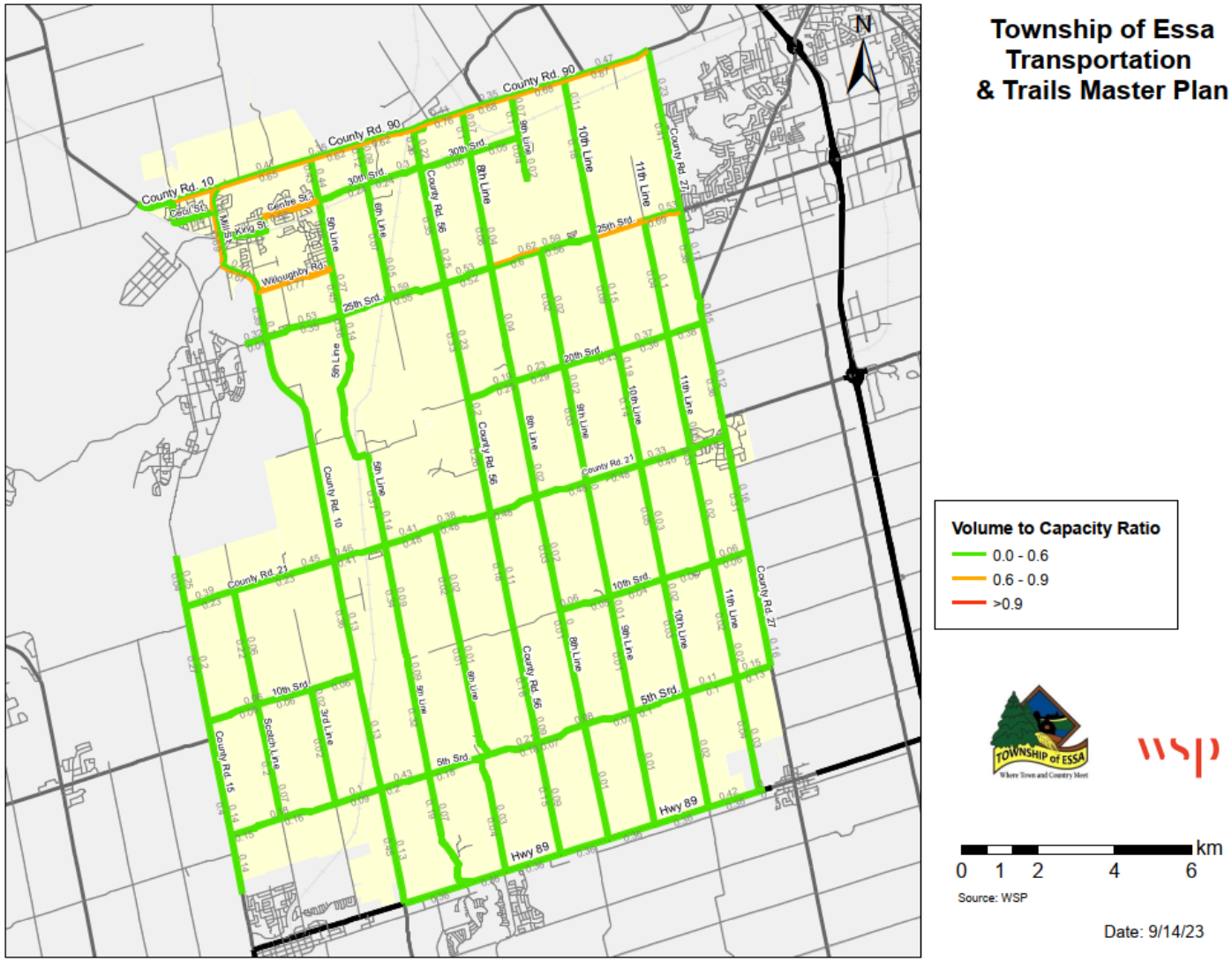
0 0.75 1.5 3 4.5 km

Source: Township of Essa DC Project List, WSP

Date: 10/10/23

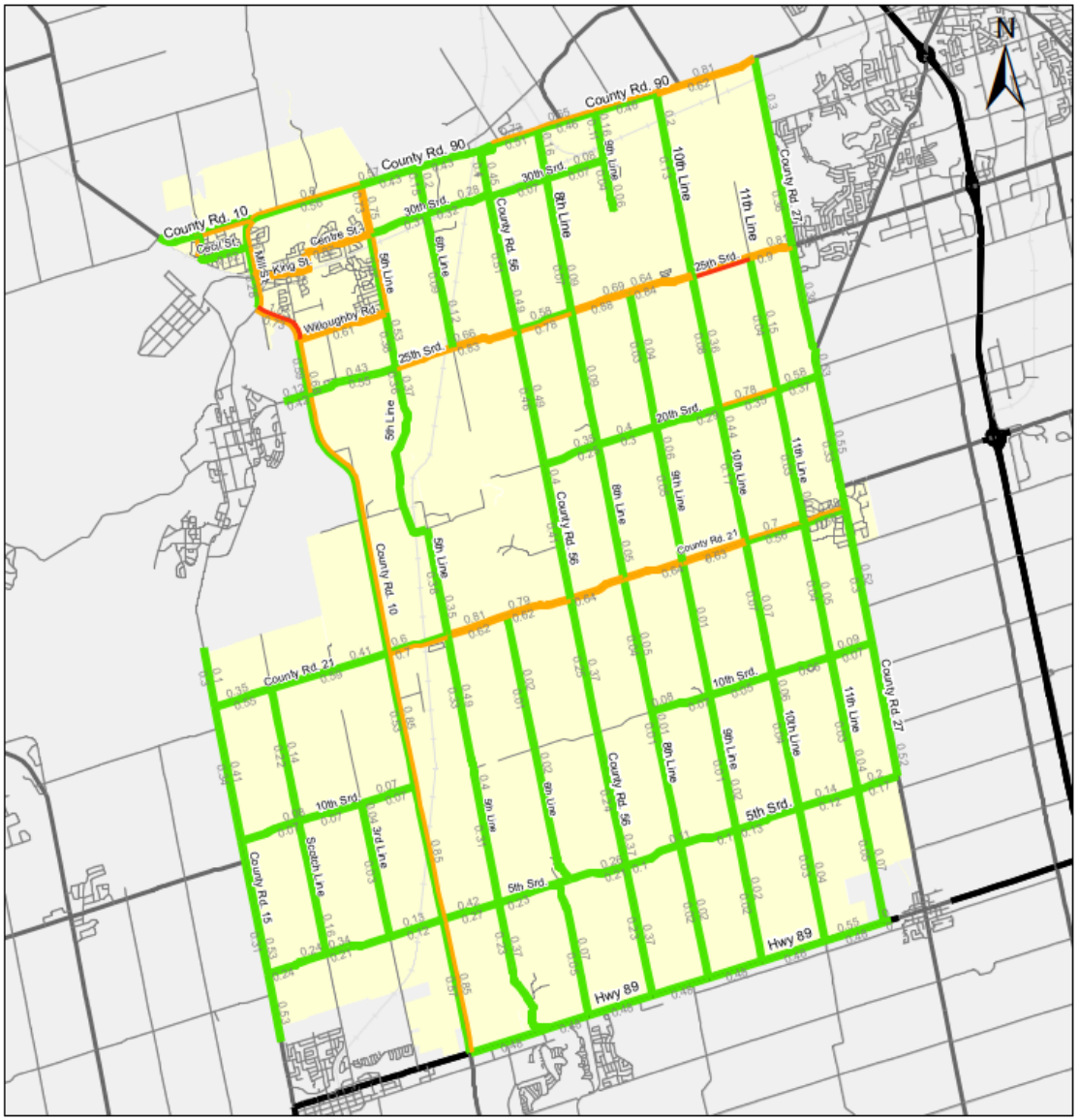
Document Path: \\corp.pbwan.net\IN\IN_BLR_Projects\70130996-221-10569-00-Essa TTMP\Transportation Planning\3 Design and Analysis\T06-Analysis and Calculations\GIS\Figure 25_230201-PC-2043 Alt_3_Roadway Improvements_v6.mxd

Figure 36. 2043 – Alternative 2 - AM Peak Hour Volume to Capacity Ratios



Document Path: \\corp.pbwan.net\IN\IN_BLR_Projects\70130996-221-10569-00-Essa TTMP\Transportation Planning\3 Design and Analysis\T06-Analysis and Calculations\GIS\Figure 26_230208-PC-2043 Alt_3_Preferred_AM Peak VC_v1.mxd

Figure 37. 2043 – Alternative 2 - PM Peak Hour Volume to Capacity Ratios



Township of Essa Transportation & Trails Master Plan

Volume to Capacity Ratio
- 0.0 - 0.6
- 0.6 - 0.9
- >0.9

0 1 2 4 6 km

Source: WSP

Date: 9/14/23

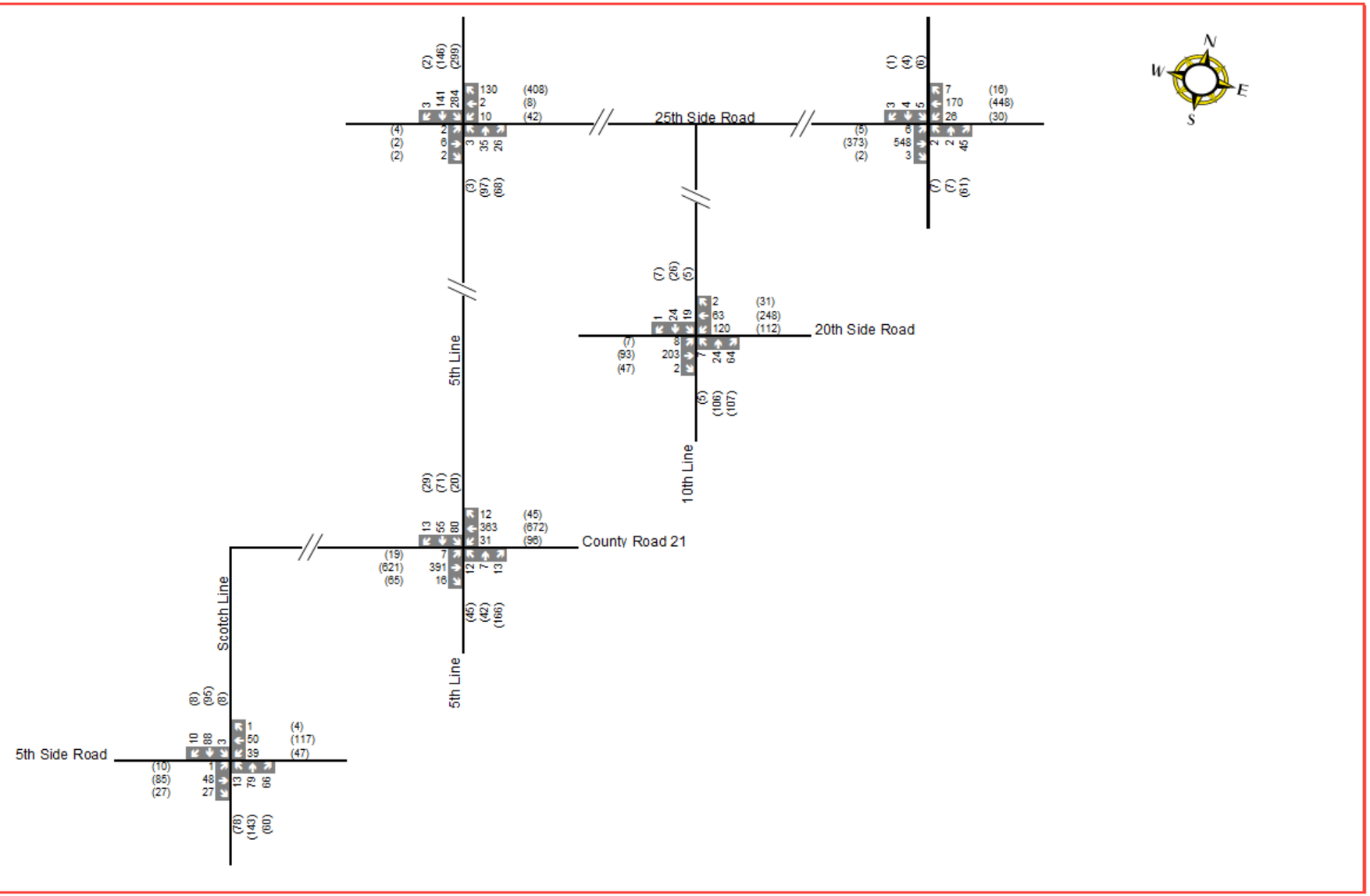
Document Path: \\corp.pbwan.net\IN\IN_BLR_Projects\70130996-221-10569-00-Essa TTMP\Transportation Planning\3 Design and Analysis\T06-Analysis and Calculations\GIS\Figure 27_230208-PC-2043 Alt_3_Preferred_PM Peak VC_v1.mxd

5.4.2 Intersection Analysis of Future Conditions

The intersection analysis for the future conditions (2043) was conducted at the five study intersections presented in **Section 3.1.5** to evaluate the future traffic operations and identify improvement measures (if applicable). The future turning movement volumes at these intersections were developed using the 2043 projected intersection approach volumes obtained from the spreadsheet model and the existing and future traffic distribution patterns. The traffic volumes were developed for both the no build and preferred alternative conditions for 2043. **Figure 38** shows the 2043 no build volumes and **Figure 39** shows the 2043 preferred alternative volumes at the study intersections.

The intersection capacity analysis for the future no build conditions and the preferred alternative conditions are presented in **Table 25** and **Table 26**, respectively.

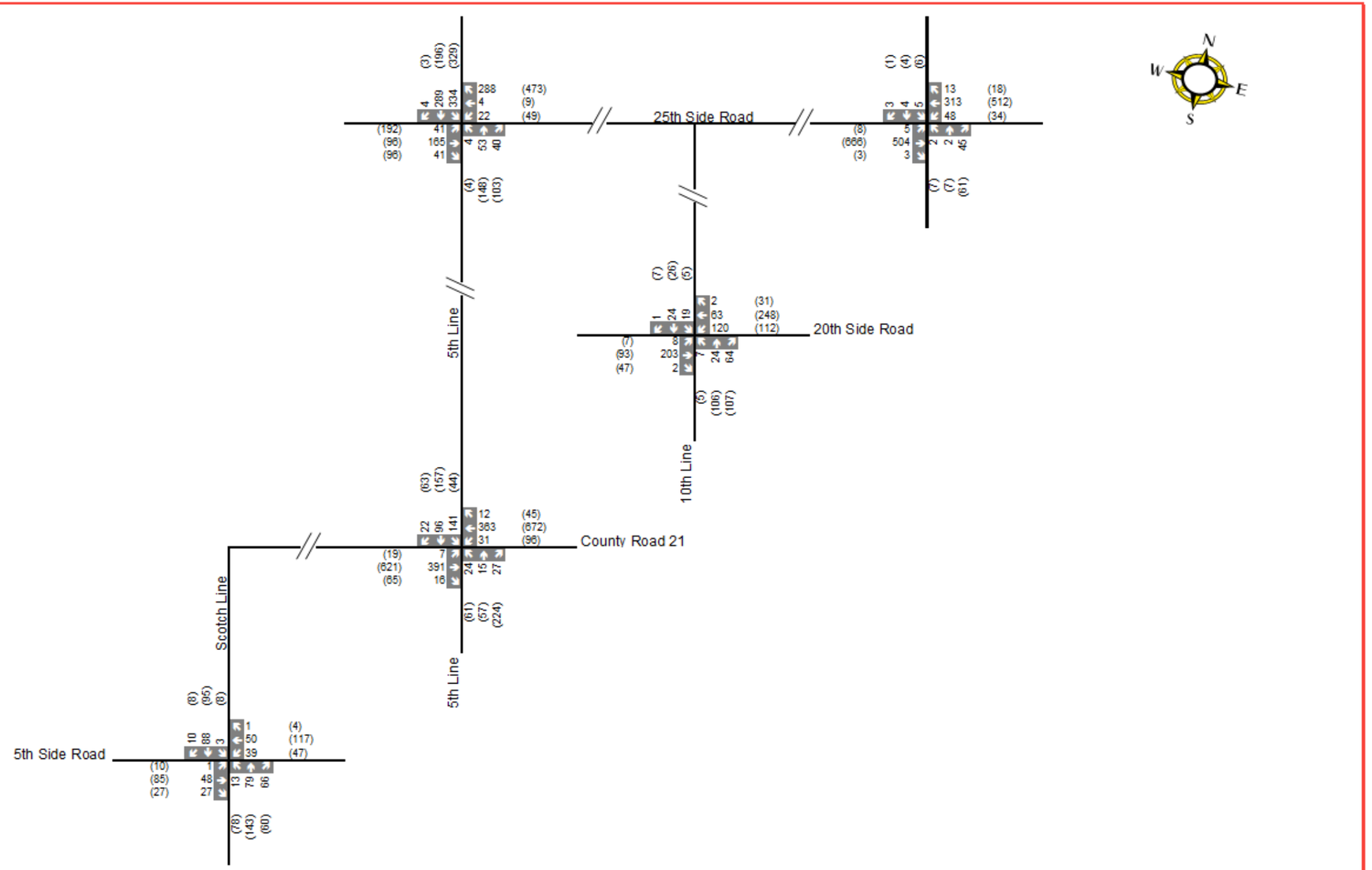
Figure 38. Future 2043 Do Nothing (No Build) Turning Movement Volumes



Legend

xx A.M. Peak Hour Traffic Volumes
(xx) P.M. Peak Hour Traffic Volumes
{xx} Weekend Peak Hour Traffic Volumes

Figure 39. Future Year 2043 Preferred Alternative Turning Movement Volumes



Legend

xx A.M. Peak Hour Traffic Volumes

(xx) P.M. Peak Hour Traffic Volumes

{xx} Weekend Peak Hour Traffic Volumes

Table 25. Intersection Capacity Analysis – Future No Build Conditions

Intersection	Control Type	AM Peak Hour		PM Peak Hour	
		LOS (Delay in Seconds)	Approach (V/C ratio)	LOS (Delay in Seconds)	Approach (V/C ratio)
5th Line & 25th Sideroad	TWSC (Stop Control on 25th Sideroad - E/W)	C (23)	EBLTR (0.05) WBLTR (0.23) NBLTR (0.0) SBLTR (0.22)	F (57)	EBLTR (0.10) WBLTR (0.80) NBLTR (0.00) SBLTR (0.24)
11th Line & 25th Sideroad	TWSC (Stop Control on 11th Line – N/S)	C (20)	EBLTR (0.01) WBLTR (0.03) NBLTR (0.13) SBLTR (0.05)	C (23)	EBLTR (0.01) WBLTR (0.03) NBLTR (0.16) SBLTR (0.05)
10th Line & 20th Sideroad	TWSC (Stop Control on 10th Line- N/S)	C (17)	EBLTR (0.01) WBLTR (0.10) NBLTR (0.17) SBLTR (0.14)	D (35)	EBLTR (0.01) WBLTR (0.11) NBLTR (0.73) SBLTR (0.22)
5th Line & County Road 21	TWSC (Stop Control on 5th Line – N/S)	E (37)	EBLTR (0.01) WBLTR (0.03) NBLTR (0.12) SBLTR (0.59)	F (>80)	EBLTR (0.04) WBLTR (0.15) NBLTR (>1.0) SBLTR (>1.0)
Scotch Line & 5th Sideroad	AWSC	A (8)	EBLTR (0.10) WBLTR (0.13) NBLTR (0.21) SBLTR (0.14)	B (12)	EBLTR (0.25) WBLTR (0.34) NBLTR (0.52) SBLTR (0.22)

AWSC – All Way Stop Control
TWSC – Two Way Stop Control
LOS for TWSC intersection has been provided for the minor street approach with maximum delay.
NB = northbound; SB = southbound; EB = eastbound; WB = westbound; L= left; T = through; R = right

As shown in the **Table 25,** under the existing lane configuration and traffic control, the intersection of 5th Line and 25th Sideroad is projected to operate at LOS F with an average delay of 57 seconds on the minor approach during the PM peak hour. Also, the intersection at 5th Line and County Road 21 is expected to operate at LOS E and LOS F during the AM and PM peak hours, respectively.

Table 26. Intersection Capacity Analysis – Future Preferred Alternative Conditions

Intersection	Control Type	AM Peak Hour		PM Peak Hour	
		LOS (Delay in Seconds)	Approach (V/C ratio)	LOS (Delay in Seconds)	Approach (V/C ratio)
5th Line & 25th Sideroad	Signal	B (12)	-	B (12)	-
11th Line & 25th Sideroad	TWSC (Stop Control on 11th Line – N/S)	C (25)	EBLTR (0.01) WBLTR (0.06) NBLTR (0.13) SBLTR (0.07)	E (41)	EBLTR (0.01) WBLTR (0.04) NBLTR (0.25) SBLTR (0.10)
10th Line & 20th Sideroad	TWSC (Stop Control on 10th Line-N/S)	C (17)	EBLTR (0.01) WBLTR (0.10) NBLTR (0.17) SBLTR (0.14)	D (35)	EBLTR (0.01) WBLTR (0.11) NBLTR (0.73) SBLTR (0.22)
5th Line & County Road 21	Signal	A (8)	-	B (16)	
Scotch Line & 5th Sideroad	AWSC	A (8)	EBLTR (0.10) WBLTR (0.13) NBLTR (0.21) SBLTR (0.14)	B (12)	EBLTR (0.25) WBLTR (0.34) NBLTR (0.52) SBLTR (0.22)

AWSC – All Way Stop Control
TWSC – Two Way Stop Control
LOS for TWSC intersection has been provided for the minor street approach with maximum delay.
NB = northbound; SB = southbound; EB = eastbound; WB = westbound; L= left; T = through; R = right

As shown in **Table 26,** with the roadway improvements under the preferred alternative, the intersection at 5th Line and 25th Sideroad performs at the acceptable LOS B with the installation of a new traffic signal and geometric improvements. The intersection at 5th Line and County Road 21 also performs at the acceptable LOS B or better with the installation of a new signal and geometric improvements. The remaining study intersections continue to operate at LOS D or better except for the southbound approach at 11th Line and 25th Sideroad that is expected to operate at LOS E during the PM peak hour. It is to be noted that the volumes on this approach are low (11 during PM peak) and are experiencing excessive delays due to heavy traffic in the east-west direction. It is recommended that this intersection be monitored for a signal warrant in the future.

5.4.3 Goods Movement

The County Road network is the designated goods movement network and should remain that way in the future, as County roads are designed and constructed for year-round truck usage. Local deliveries by trucks should stay on the County roads a long as practicable before utilizing Township roads to reach their final destination.

Trucks travelling on a Township road should use the most direct route to access County roads for their travel. Industries on Township roads that require year-round heavy truck movements should be reviewed to determine if the Township road has a load restriction in the springtime and if the road needs to be strengthened to remove the load restriction and facilitate more effective goods movement for the industry.

5.5 Collaboration with Simcoe County

A number of the proposed improvements within this TMP will require consultation and collaboration with, or action by, Simcoe County. The Township's TMP recommendations for improved roads, trails, pedestrian crossings, and intersection control measures may coincide with County-owned infrastructure. It is important that this TMP acts as an advocate for the Township to coordinate and collaborate with Simcoe County to review and enact the relevant improvements as both jurisdictions have a role to play in the future of this area.

6 Implementation Schedule and Costing

This section of the report is intended to outline the implementation strategy and to provide a high-level cost estimate for the improvements recommended in the TMP.

6.1 Implementation Strategy

The TMP has been developed with an ultimate horizon year of 2043, and includes a framework for the plan's execution, involving three timeframes: short-term, medium-term and long-term. To assist in the implementation of the plan's suggested network improvements, a high-level cost estimate has been provided to offer the approximate funding required to implement various aspects of the network. All transportation recommendations are categorized within one of the three implementation time frames:

- **Short-term**: Generally implemented within 5 years after the TMP's adoption.
- **Medium-term**: Generally implemented within 6-10 years after the TMP's adoption.
- **Long-term**: Generally implemented within 11-20 years after the TMP's adoption.

This phasing approach has been applied to network recommendations, including improvements for both active transportation and proposed road enhancements. The assignments to these timeframes were determined through a combination of technical analysis and input from stakeholders.

6.1.1 Active Transportation

The recommendations within the TMP network will require a phased implementation approach and will need to be adaptive to respond to the availability of resources (annual budgets, development charges, grants) and opportunities to leverage symbiotic projects (road upgrades, development, utility works). The proposed phasing process relied on the same considerations and principles which informed how the TMP network was developed and was closely coordinated with the phasing of the Transportation Master Plan and the Trails/Parks Master Plan. The plans will support each other throughout their implementation.

Criteria for Essa staff to utilize when identifying projects for implementation are provided below:

- An approximate total of 98,835 metres (98.84 kms) of new trails are proposed within the Township.
- This equates to approximately 32,945 metres (32.9 kms) of trails per phase.

A cost estimate has been developed to guide capital planning efforts, separated by community with an overall summary of total project estimated cost. **Table 27** highlights the proposed phasing plan for identified trail upgrades. Refer to the Trails Master Plan (Section 4 Table 5) (**Appendix F**) for detailed recommended improvements for the proposed existing trail route upgrades and/or closures and opinion of probable cost for each with the timing horizon.

Table 27. Estimated Phasing for Proposed Trails

Project ID	Road	From	To	Improvement Type	Phasing Period
1	Willoughby Rd. MUP	CR-10	5th Line	Neighbourhood Greenway	Short-Term
2	Gold Park Gate	Decarolis Cresent	NVCA River Trail	Close user-made connection and construct a nature trail link to River Trail NE of neighbourhood	Short-Term
3	Rippon/ Pine River Trail	Mill St.	Rippon Trail & Pine River Trail	Update user-made trail to Secondary Trail to complete loop(s).	Short-Term
4	Mount Crescent SWM Pond	Mount Cresent	Pine River Trail	Update surface and trail width to meet secondary trail standards	Medium-Term
5	Huron St.	King St.	Centre St.	Secondary Trail	Medium-Term
6	Cecil St.	Corrie Cresent	Cecil St.	Close pathway and/or post signage notifying as private lands	Short-Term
7	Ganaraska Trail	Multiple		Review all Township road crossings	Short-Medium Term
8	CR-27	CR-27	McKeown St.	Neighbourhood Greenway	Long-Term
9	Byrkman Rd.	Byrkman Rd.	Thornton Soccer Pitches	Neighbourhood Greenway	Long-Term

Essa should plan to implement the proposed on-road network as transportation roadworks are scheduled. New off-road trail segments can be added as funding allows. Focusing on primary and secondary trail linkages/ segments in high-use areas that connect existing residential communities to nearby destinations such as parks, major trails, and neighbourhood greenways to eliminate gaps in the network is recommended. Essa should aim for adding 5.50km of trails annually to reach 32.90km within 6 years. A cost estimate for the recommended trail network is provided in the Trails Master Plan, with supplementary cost estimates per community. Refer to phasing improvements and new infrastructure, section 4.4.1 of the Trails Master Plan. The overall trail network is estimated to cost approximately $14,700,000.

6.1.2 Road Network

The estimated phasing for proposed roads being considered is summarized in **Table 28**. The location ID numbers along with phasing are shown in **Figure 40.** It is to be noted that some of the projects which are not capacity improvement related and identified in the recent direct capital project list are also included in this list. The phasing is based on the technical analysis described in **Section 5.4.7**, along with feedback from stakeholders on pressing needs and likely financial capabilities.

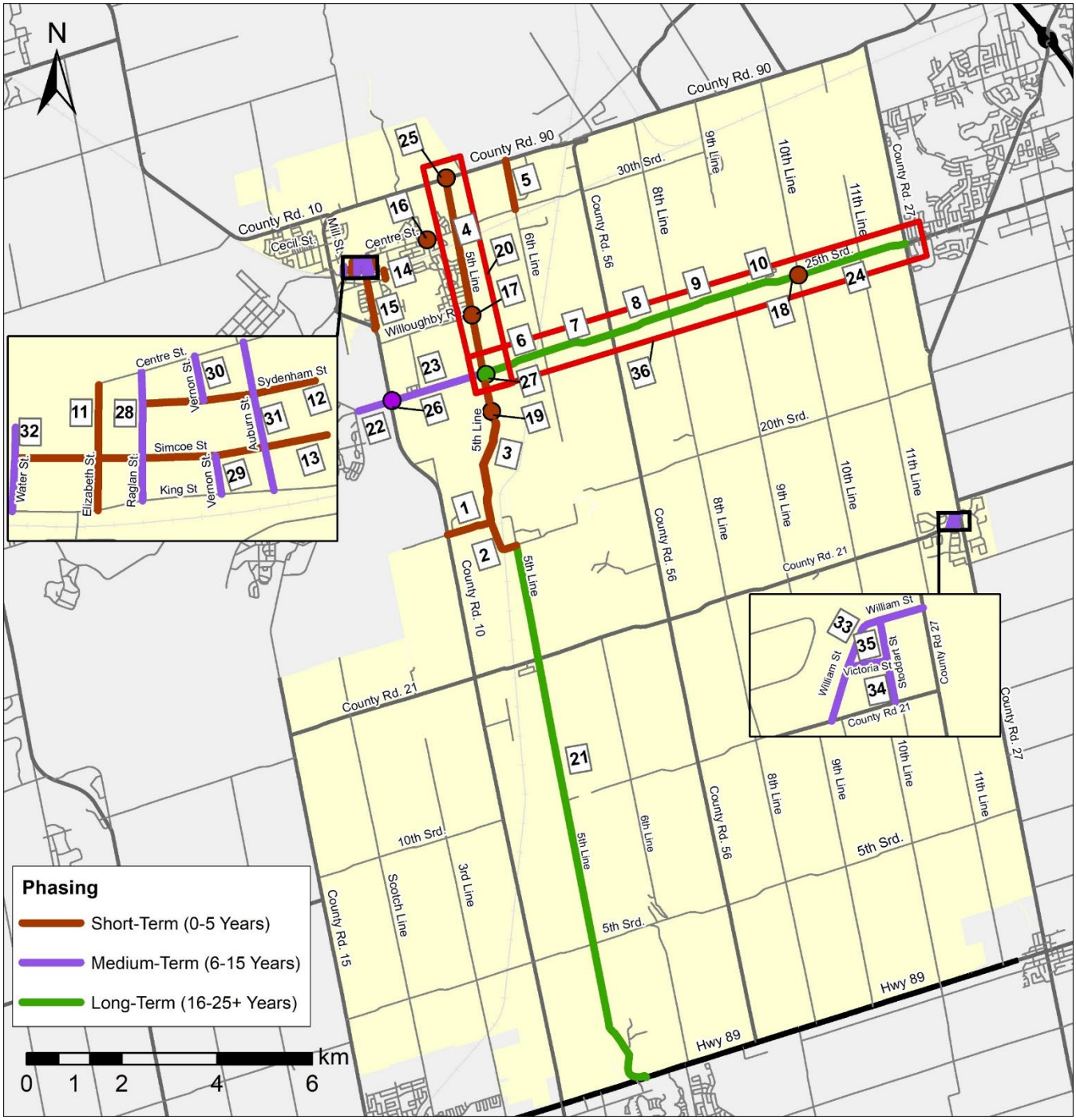
Table 28. Estimated Phasing for Proposed Roads of Preferred Alternative

Project ID	Road	From	To	Improvement Type	Phasing Period
1	20th Sideroad	5th Line	County Rd 10	Reconstruction and strengthening	Short-Term
2	5th Line	20th Sideroad	South of 19th Sideroad	Reconstruction and strengthening	Short-Term
3	5th Line	20th Sideroad	Willoughby Road	Reconstruction and strengthening	Short-Term
4	5th Line	County Rd 90	Willoughby Road	Reconstruction and strengthening	Short-Term
5	6th Line	30th Sideroad	County Rd 90	Reconstruction and strengthening	Short-Term
6	25th Sideroad	5th Line	6th Line	Reconstruction and strengthening	Short-Term
7	25th Sideroad	6th Line	County Rd 56	Reconstruction and strengthening	Short-Term
8	25th Sideroad	County Rd 56	8th Line	Reconstruction and strengthening	Long-Term
9	25th Sideroad	8th Line	9th Line	Reconstruction and strengthening	Short-Term
10	25th Sideroad	9th Line	10th Line	Reconstruction and strengthening	Short-Term
11	Elizabeth St	Centre St	King St	Urbanization	Short-Term
12	Sydenham St	Raglan St	East of Auburn St	Urbanization	Short-Term
13	Simcoe St	Water St	East of Auburn St	Urbanization	Short-Term
14	Alma St	King St	Margaret St	Urbanization	Short-Term
15	Vernon St	Queen St	County Rd 10	Urbanization	Short-Term
16	Centre St at Greenwood Drive	-	-	Signalization of Intersection	Short-Term

Project ID	Road	From	To	Improvement Type	Phasing Period
17	5th Line at Willoughby Rd	-	-	Intersection Improvement (Construct left turning lane and slip-by lane northbound on 5th Line)	Short-Term
18	25th Sideroad at 10th Line	-	-	Intersection Improvement	Short-Term
19	Bridge 9 on 5th Line (1.95 km north 20th Sideroad)	-	-	Bridge (replacement and widening)	Short-Term
20	5th Line	County Rd 90	25th Sideroad	widen to 3 or 4 lanes	Long-Term
21	5th Line	19th Sideroad	Highway 89	Reconstruction and strengthening	Long-Term
22	25th Sideroad	County Rd 10	Tank Rd	New 2-lane road construction	Medium-Term
23	25th Sideroad	5th Line	County Rd 10	New 2-lane road construction New Bridge (across Nottawasaga River) Reconstruction and strengthening	Medium-Term
24	25th Sideroad	10th Line	County Rd 27	Reconstruction and strengthening	Medium-Term
25	5th Line at County Rd 90	-	-	Signalization of Intersection	Short-Term
26	County Rd 10 at 25th Sideroad	-	-	Signalization of Intersection	Medium-Term
27	5th Line at 25th Sideroad	-	-	Signalization of Intersection	Long-Term
28	Raglan St	King St	Centre St	Urbanization	Medium-Term
29	Vernon St	King St	Simcoe St	Urbanization	Medium-Term
30	Vernon St	Sydenham St	Centre St	Urbanization	Medium-Term

Project ID	Road	From	To	Improvement Type	Phasing Period
31	Auburn St	King St	Centre St	Urbanization	Medium-Term
32	Water St	King St	north of Simcoe St	Urbanization	Medium-Term
33	William St	County Rd 27	County Rd 21	Urbanization	Medium-Term
34	Stoddart St	William St	County Rd 21	Urbanization	Medium-Term
35	Victoria St	William St	Stoddart St	Urbanization	Medium-Term
36	25th Sideroad	5th Line	County Rd 27	widen to 3 or 4 lanes	Long-Term - Beyond 2043

Figure 40. Phasing of Proposed Road Improvements



6.2 Costing

High level costs have been estimated for the implementation of the capital projects for active transportation, transit and road infrastructure recommended in this TMP. These costs may need to be reviewed and updated as the projects approach implementation. Additional studies, detailed designs, and technical assessments are required to identify the unique requirements of each project. Further breakdown of costs for each type of project is presented below.

6.2.1 Active Transportation

A cost estimate has been calculated for the implementation of the proposed trail network per community and for the rural areas within the Township, refer to **Table 29**, **Table 30**, **Table 31**, and **Table 32** Cost estimated within the identified communities of Angus, Baxter and Thornton includes only those trail segments that resides inside the settlement limit, refer to Figure 7, Figure 8 and Figure 9 in Subsection 4.1 of the Trails Master Plan Report (**Appendix F**) for these limits.

An overall cost estimate summary for the recommended trail network has been included in Section 4 Recommendations for Trail Infrastructure, subsection 4.4 Costing and Implementation of the Trails Master Plan document (**Appendix F**). The overall cost estimate for the recommended network in its entirety has been divided by trail type and trail category in Table 11, with Table 12 identifying the linear km unit price range and price used. The total trail network is estimated to cost approximately $14,700,000 plus any additional design and contract administration fees, or additional studies.

Table 29. Rural Essa: Estimated Cost for Candidate Trail Network

Trail Type	Trail Width (Metres)	Proposed Length (Metres)	Surfacing Type	Total Estimated Cost
Primary Trail (Type 1)	3.0	0	Asphalt	$ 0.00
Secondary Trail (Type 2)	2.6	28,725.16	Compacted granular	$ 3,062,000
Nature Trail (Type 3)	1.5	0	Natural surfacing (Firm Earthen)	$ 0.00
Neighbourhood Greenway (Type 4)	2.0	28,783.91	Asphalt	$ 3,454,000[1]
Contingency (20%):				$ 1,303,000
Total Trail Estimated Cost:				$ 7,819,000[2]

Table 30. Angus: Estimated Cost for Candidate Trail Network

Trail Type	Trail Width (Metres)	Proposed Length (Metres)	Surfacing Type	Total Estimated Cost
Primary Trail (Type 1)	3.0	6,386.32	Asphalt	$ 1,149,000
Secondary Trail (Type 2)	2.6	1,805.35	Compacted granular	$ 192,000
Nature Trail (Type 3)	1.5	1,343.10	Natural surfacing (Firm Earthen)	$ 46,000
Neighbourhood Greenway (Type 4)	2.0	13,309.50	Asphalt	$ 1,597,000[1]
Contingency (20%):				$ 597,000
Total Trail Estimated Cost:				$ 3,582,000[2]

[1] The neighbourhood greenway typology assumes a new 2.0m wide asphalt MUP. Costs for this specific trail typology could decrease if there is an opportunity to expand an existing 1.5m sidewalk by 0.5m to total a 2.0m width, per individual trail segment.
[2] Estimated costs are for trail implementation only. These estimates do not include the cost of any amenities, infrastructure, crossings, or additional studies.

Table 31. Thornton: Estimated Cost for Candidate Trail Network

Trail Type	Trail Width (Metres)	Proposed Length (Metres)	Surfacing Type	Total Estimated Cost
Primary Trail (Type 1)	3.0	2,496.61	Asphalt	$ 449,000
Secondary Trail (Type 2)	2.6	1,801.20	Compacted granular	$ 192,000
Nature Trail (Type 3)	1.5	0	Natural surfacing (Firm Earthen)	$ 0.00
Neighbourhood Greenway (Type 4)	2.0	5,865.03	Asphalt	$ 703,000[1]
Contingency (20%):				$ 269,000
Total Trail Estimated Cost:				$ 1,614,000[2]

Table 32. Baxter: Estimated Cost for Candidate Trail Network

Trail Type	Trail Width (Metres)	Proposed Length (Metres)	Surfacing Type	Total Estimated Cost
Primary Trail (Type 1)	3.0	118.51	Asphalt	$ 21,000
Secondary Trail (Type 2)	2.6	233.28	Compacted granular	$ 25,000
Nature Trail (Type 3)	1.5	0	Natural surfacing (Firm Earthen)	$ 0.00
Neighbourhood Greenway (Type 4)	2.0	1,766.61	Asphalt	$ 211,000[1]
Contingency (20%):				$ 51,000
Total Trail Estimated Cost:				$ 310,000[2]

Implementation Cost

Implementing the trails network will require funds and resources from the Township and its partners. Annual funding for construction, maintenance, operation, and programming should be identified in the annual budgeting process to strategically implement the network over time.

Additional funding sources should be sought by Essa, such as from the Provincial or Federal government, to maximize budget efficiencies and coordination with other major projects. It is recognized that the level of effort will vary on a project-by-project basis and that the price of materials will vary over time. Certain projects could require additional work and further studies as they are considered for implementation.

The cost estimates within this plan are not intended to represent the total cost that Essa must shoulder, but a foundation to ensure the Township is equipped to leverage external funding opportunities as they arise and to set realistic goals for what will be internally funded.

Based on facility assignments, a total cost estimate to implement the network was determined. In addition to using industry leading facility unit costs based on the precedence of comparable projects, cost estimates relied on a series of assumptions:

- Unit prices gathered from recent tenders and projects of similar scope in Ontario;
- Costs are not intended for functional design purposes as they only include the costs of installation of facilities;
- Costs are not meant to be prescriptive but provide a preliminary estimate of the potential implementation costs;
- Assumption that facilities are implemented across typical environmental conditions and topography, and;
- Best practices from past initiatives completed by comparable municipalities and may vary depending on capacity and availability of funds.

It is vital that the Township consult with all relevant stakeholders to determine a more accurate cost based off confirmed cost-sharing agreements as the cost estimate below is not broken down by owner (jurisdictional owner of the roadway or area where on-road and off-road trail facilities are proposed).

6.2.2 Road Network

The estimated cost to construct the Township's road network have been developed to inform the Township's capital budgeting process. It is recognized that the costs in **Table 33** are estimates of construction costs based primarily on other TMP work close to the Township and within the Simcoe County area. Costs do not include design, contingency, or property acquisition. For this project, a sample of similar projects were reviewed to develop a typical per km cost for the various improvements, highlighted below:

- Reconstruction and strengthening ($4.6M/km)
- Urbanization ($4.64M/km)

- New 2 Lane Construction ($5M/km)
- Widening ($4.25M/km)

Project construction costs are subject to variation and should be further refined and confirmed in the detailed design stage.

Table 33. Road Improvements Costing (2043)

Project ID	Road / Location	Limits	Improvement	Est. Construction Cost ($)
1	20th Sideroad	5th Line to County Rd 10	Reconstruction and strengthening	$3,960,000
2	5th Line	20th Sideroad to South of 19th Sideroad	Reconstruction and strengthening	$4,075,000
3	5th Line	20th Sideroad to Willoughby Road	Reconstruction and strengthening	$21,560,000
4	5th Line	County Rd 90 to Willoughby Road	Reconstruction and strengthening	$12,848,000
5	6th Line	30th Sideroad to County Rd 90	Reconstruction and strengthening	$4,400,000
6	25th Sideroad	5th Line to 6th Line	Reconstruction and strengthening	$5,940,000
7	25th Sideroad	6th Line to County Rd 56	Reconstruction and strengthening	$6,600,000
8	25th Sideroad	County Rd 56 to 8th Line	Reconstruction and strengthening	$5,703,000
9	25th Sideroad	8th Line to 9th Line	Reconstruction and strengthening	$6,160,000
10	25th Sideroad	9th Line to 10th Line	Reconstruction and strengthening	$6,160,000
11	Elizabeth St	Centre St to King St	Urbanization	$1,320,000
12	Sydenham St	Raglan St to East of Auburn St	Urbanization	$1,716,000
13	Simcoe St	Water St to East of Auburn St	Urbanization	$3,080,000

Project ID	Road / Location	Limits	Improvement	Est. Construction Cost ($)
14	Alma St	King St to Margaret St	Urbanization	$836,000
15	Vernon St	Queen St to County Rd 10	Urbanization	$4,752,000
16	Centre St at Greenwood Drive	-	Signalization of Intersection	$350,000
17	5th Line at Willoughby Rd	-	Intersection Improvement (Construct left turning lane and slip-by lane northbound on 5th Line)	$500,000
18	25th Sideroad at 10th Line	-	Intersection Improvement	$313,000
19	Bridge 9 on 5th Line (1.95 km north 20th Sideroad)	-	Bridge (replacement and widening)	$6,000,000
20	5th Line	County Rd 90 to 25th Sideroad	widen to 3 or 4 lanes	$25,002,000
21	5th Line	19th Sideroad to Highway 89	Reconstruction and strengthening	$52,030,000
22	25th Sideroad	County Rd 10 to Tank Rd	New 2-lane road construction	$3,480,000
23	25th Sideroad	5th Line to County Rd 10	New 2-lane road construction	$9,240,000
			New Bridge (across Nottawasaga River)	$6,000,000
			Reconstruction and strengthening	$2,112,000
24	25th Sideroad	10th Line to County Rd 27	Reconstruction and strengthening	$10,288,000

Project ID	Road / Location	Limits	Improvement	Est. Construction Cost ($)
25	5th Line at County Rd 90	-	Signalization of Intersection	$350,000
26	County Rd 10 at 25th Sideroad	-	Signalization of Intersection	$350,000
27	5th Line at 25th Sideroad	-	Signalization of Intersection	$350,000
28	Raglan St	King St to Centre St	Urbanization	$1,246,000
29	Vernon St	King St to Simcoe St	Urbanization	$374,000
30	Vernon St	Sydenham St to Centre St	Urbanization	$436,000
31	Auburn St	King St to Centre St	Urbanization	$1,466,000
32	Water St	King St to north of Simcoe St	Urbanization	$814,000
33	William St	County Rd 27 to County Rd 21	Urbanization	$1,844,000
34	Stoddart St	William St to County Rd 21	Urbanization	$954,000
35	Victoria St	William St to Stoddart St	Urbanization	$457,000
36	25th Sideroad	5th Line to County Rd 27	widen to 3 or 4 lanes	$55,680,000
37	Road upgrades at Local Schools	-	Road Upgrades to improve street parking, sidewalk construction. RRFPS, etc.	$1,500,000
38	Traffic Calming at Various Locations for 10 years	-	Measures such as raised intersections, roundabouts, traffic calming curbs, etc.	$3,000,000

Project ID	Road / Location	Limits	Improvement	Est. Construction Cost ($)
	($300,000/ year)			

7 Supporting Policies

7.1 Pedestrian Crossing Policy

The Pedestrian Crossing Policy was developed with the acknowledgement that each site within the road network is unique, and that implementing policies may not be equally applicable in all cases. The main goal of the Pedestrian Crossing Policy is to maximize both driver and pedestrian awareness, and to minimize the conflict between each other.

7.1.1 Pedestrian Crossing Context – OTM Book 15

The purpose of the Ontario Traffic Manual (OTM) is to provide information and guidance for transportation practitioners and to ensure that there is consistency of treatment in design, application, and operation of traffic control devices across Ontario. OTM Book 15 provides comprehensive guidance and best practices in Ontario for Pedestrian Crossing Treatments. The manual's intent is to be consistent with the Highway Traffic Act (HTA) pertaining to pedestrian crossing application and allows road authorities to generate and update their own guidelines and standards.

The Township of Essa Pedestrian Crossing Policy is intended to supplement OTM Book 15 and is primarily focused on addressing the installation of new pedestrian crossings within the Township.

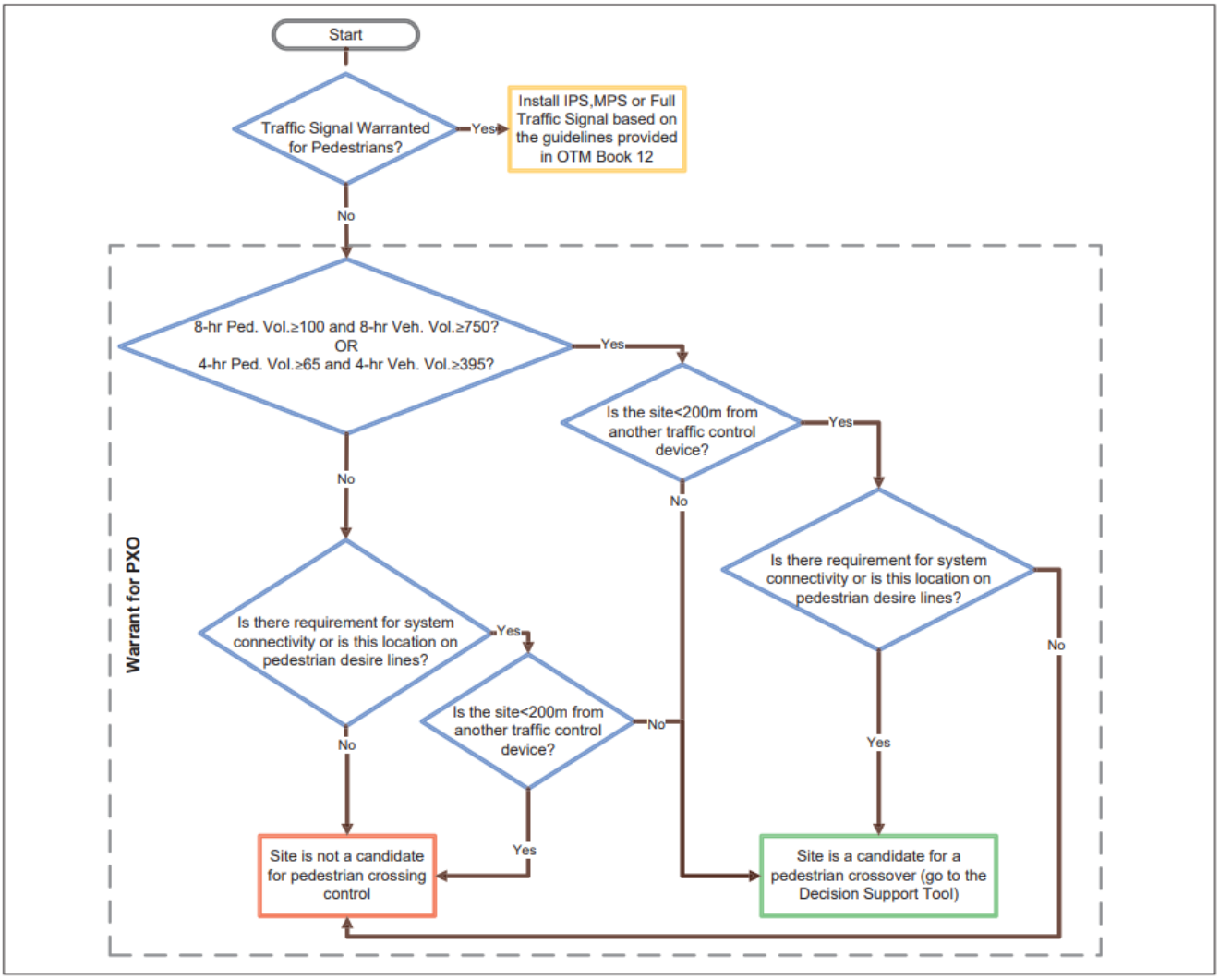
7.1.2 Pedestrian Crossovers (PXOs)

It is recommended that a flow chart be used to perform a preliminary assessment to identify whether a site is a suitable candidate for a pedestrian crossing control (PXO) intervention, shown in **Figure 41**. The preliminary assessment involves the following steps:

- Check whether a traffic signal is warranted for pedestrians according to Justification 6 of OTM Book 12. The pedestrian crossing treatment systems under traffic signals includes full traffic signals, Intersection Pedestrian Signal (IPS), and Midblock Pedestrian Signal (MPS).
- If a traffic signal is not warranted, the flow chart would be used to determine whether a PXO is warranted on the site.

More details on the steps of the decision process for the preliminary assessment can be found in OTM Book 15.

Figure 41. Decision Support Tool - Preliminary Assessment



Source: OTM Book 15, 2016

Pedestrian Crossover Assessment

If a traffic signal is not warranted, then the next step as shown in **Figure 41** is to determine whether a PXO is warranted. The preliminary assessment for PXOs is based on three factors, which include traffic volume, crossing distance, and pedestrian system connectivity, as described in the following:

Traffic volumes: There is a significant relationship between pedestrian collision rate and traffic volume. Locations marked with crosswalks and with ADTs approximately greater than 9,000 vehicles per day, results in a significant increase in collision rates.

Crossing distance: Crossing distance has an impact on the likelihood of a pedestrian collision, especially on roads that have higher traffic volumes.

Pedestrian system connectivity: Enhancing connectivity between crosswalks, sidewalks, and/or trail network involves understanding and monitoring pedestrian desire lines. By providing proper connectivity between origins and destinations, it enables

pedestrians with the most convenient access to facilities with the shortest possible deviation.

Township staff should further review the application of PXOs at sites that do not meet the criteria for a traffic signal. PXOs may be considered at crossings as described below:

- On roadways with a maximum of 4 lanes of two-way traffic or 3 lanes of one-way traffic;
- On roadways with volumes less than or equal to 35,000 AADT;
- At sites that are located more than 200 m from the nearest signal-protected pedestrian crossing; and
- Minimum pedestrian and vehicular volumes are satisfied as defined below; or
    - The 8 hour pedestrian volume is greater than or equal to 100 and the 8 hour vehicle volume is greater than or equal to 750; or,
    - The 4 hour pedestrian volume is greater than or equal to 65 and the 4 hour vehicle volume is greater than or equal to 395.
- The crossing is required for system connectivity such that it aligns with pedestrian desire lines.

PXOs are categorized into two levels with four sub types: Level 1 – Type A, Level 2 – Type B, Level 2 – Type C, Level 2 – Type D. **Appendix C** provides examples of each type from Section 6.3.2 of OTM Book 15. The type of PXO is selected based on 8-hour or 4-hour two-way vehicular volume, posted speed limit of the roadway, total number of lanes for the entire roadway cross sections and presence of raised pedestrian refuge (refuge island or median). Township staff will determine the specific PXO crossing treatment using the selection matrix for PXO treatment systems included in OTM Book 15. A summary of the PXO levels/sub-types are included below.

<u>Level 1 – Type A:</u>

Level 1 Type A pedestrian crossovers are distinctly defined by the prescribed use of regulatory and warning signs, flashing amber beacons, and pavement marking. Subject to the selection criteria described above, they may be applied in the following environments:

- Midblock: 4 lanes tone cross-section, 2-way; and
- Intersection: 4 lanes total cross-section, 2-way.

<u>Level 2 – Type B:</u>

Level 2 Type B crossings are defined by the prescribed use of regulatory and warning signs (side mounted and overhead mounted crossover signs), rapid rectangular flashing beacons and pavement marking. Subject to the selection criteria described above, they may be applied in the following environments:

- Midblock: up to 4 lanes total cross-section, 2-way or up to 3 lanes total cross-section, 1-way;
- Intersection: up to 4 lanes total cross-section, 2-way or up to 3 lanes total cross-section, 1-way; and
- Roundabout: single-lane or double-lane.

Level 2 – Type C:

Level 2 Type C pedestrian crossovers are distinctly defined by the prescribed use of regulatory and warning signs, rapid rectangular flashing beacons and pavement marking. Subject to the selection criteria described above, they may be applied in the following environments:

- Midblock: up to 3 lanes total cross-section, 2-way, 4-lane, 2-way with raised refuge only and up to 2 lanes total cross-section, 1-way;
- Intersection: up to 3 lanes total cross-section, 2-way, 4-lane, 2-way with raised refuge only, and up to 2 lanes total cross-section, 1-way; and
- Roundabout: single-lane or double-lane.

Level 2 – Type D:

Level 2 Type D pedestrian crossovers are distinctly defined by the prescribed use of regulatory and warning signs, and pavement marking. Subject to the selection criteria described above, they may be applied in the following environments:

- Mid-block: 2-lane, 2-way, 4-lane, 2-way with raised refuge only, and up to 2 lanes total cross-section, 1-way;
- Intersection: 2-lane, 2-way, 4-lane, 2-way with raised refuge only, and up to lanes total cross-section, 1-way;
- Roundabout: single-lane or double-lane; and
- Right-turn channelization.

Application of the policy is the responsibility of the Engineering Services Department. Refer to **Appendix C** for pedestrian crossover examples.

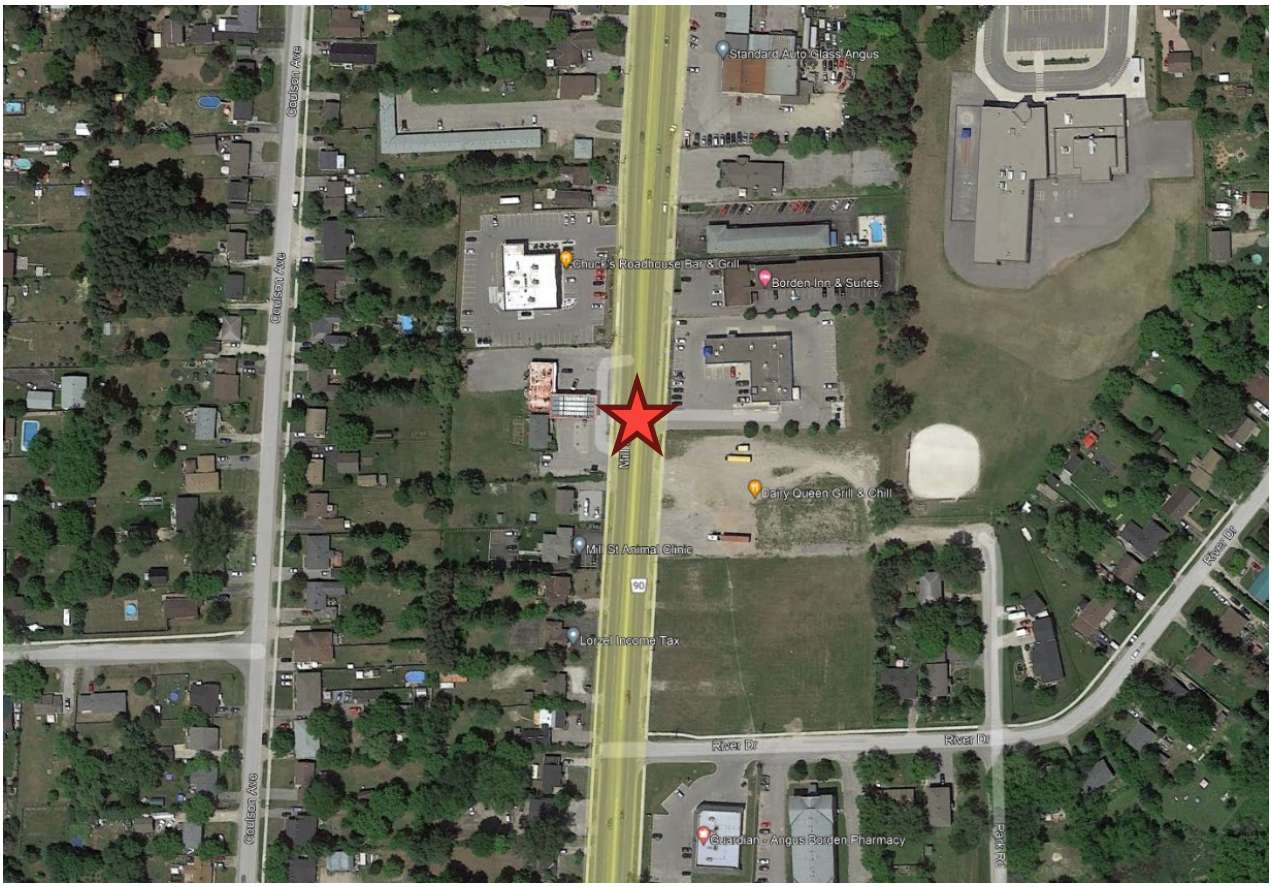
The Township should refer to OTM Book 15 for more details and guidance on developing a pedestrian crossover. The initial step is for the Township to conduct pedestrian and traffic data collection at all potential PXO locations to determine the volume of the area.

Data should be collected at all three intersections listed in **Section 7.1.3** to determine if these locations meet the standard of a pedestrian crossover to be built.

7.1.3 Pedestrian Crossings – Angus

A potential location for a pedestrian crossing to be installed is at the intersection of Mill Street and the entrance of Dairy Queen. This location has commercial land uses on both sides of Mill Street and is located more than 200 metres from a traffic control device on the north side, and approximately 150 metres on the south side.

Figure 42. Potential Location of a Pedestrian Crossing (Angus)

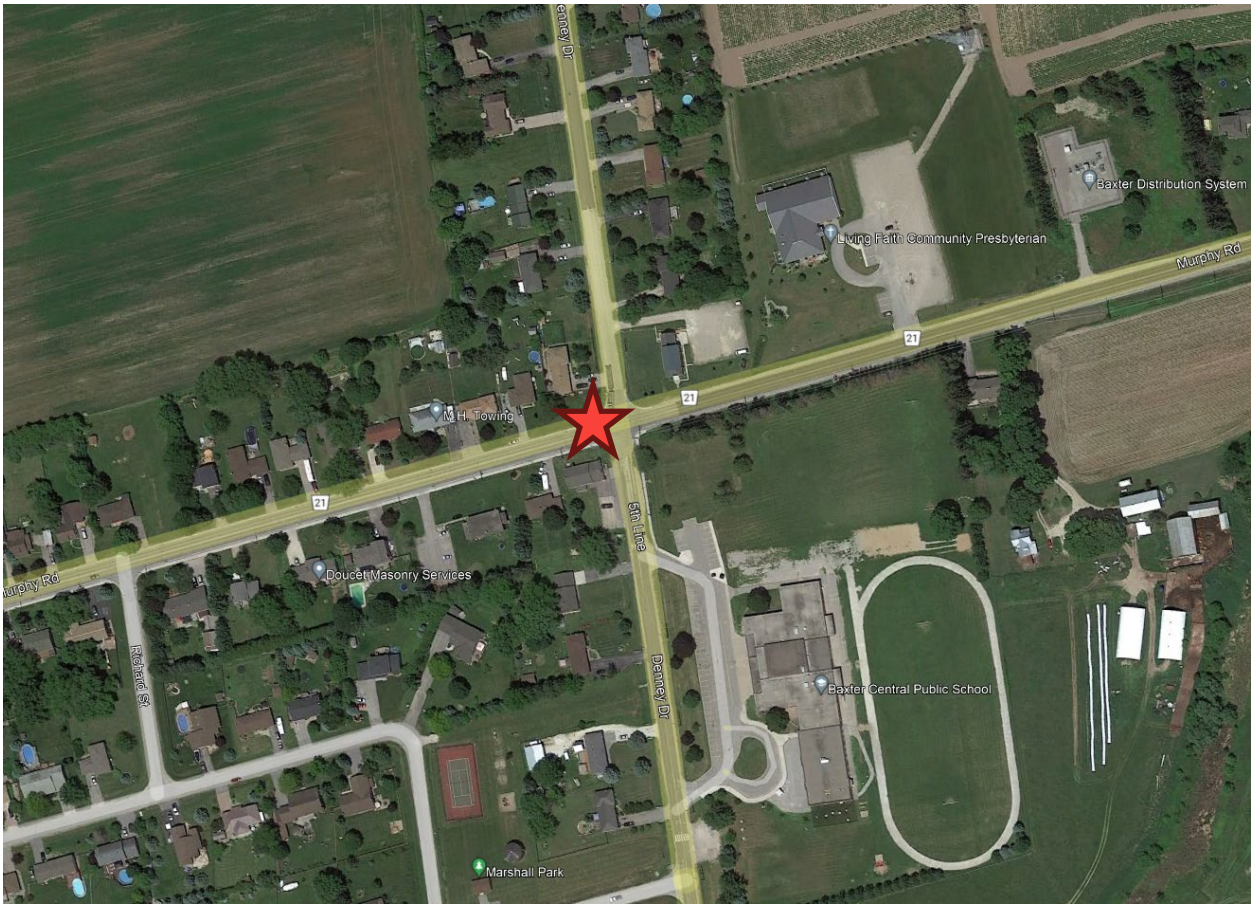


Source: Google Maps, 2023

7.1.4 Pedestrian Crossings – Baxter

The Township could consider installing a pedestrian crossover on the west leg of the intersection at Murphy Rd and Denny Dr shown in **Figure 43**. The intersection was chosen as a potential PXO location based on the factors of enhancing pedestrian system connectivity, and that the location is more than 200m away from the nearest traffic control device. It is recommended that the PXO be put in place in order for residents on the north-east, north-west, and south-west to have easier access to Baxter Central Public School.

Figure 43. Potential Location of a Pedestrian Crossing (Baxter)

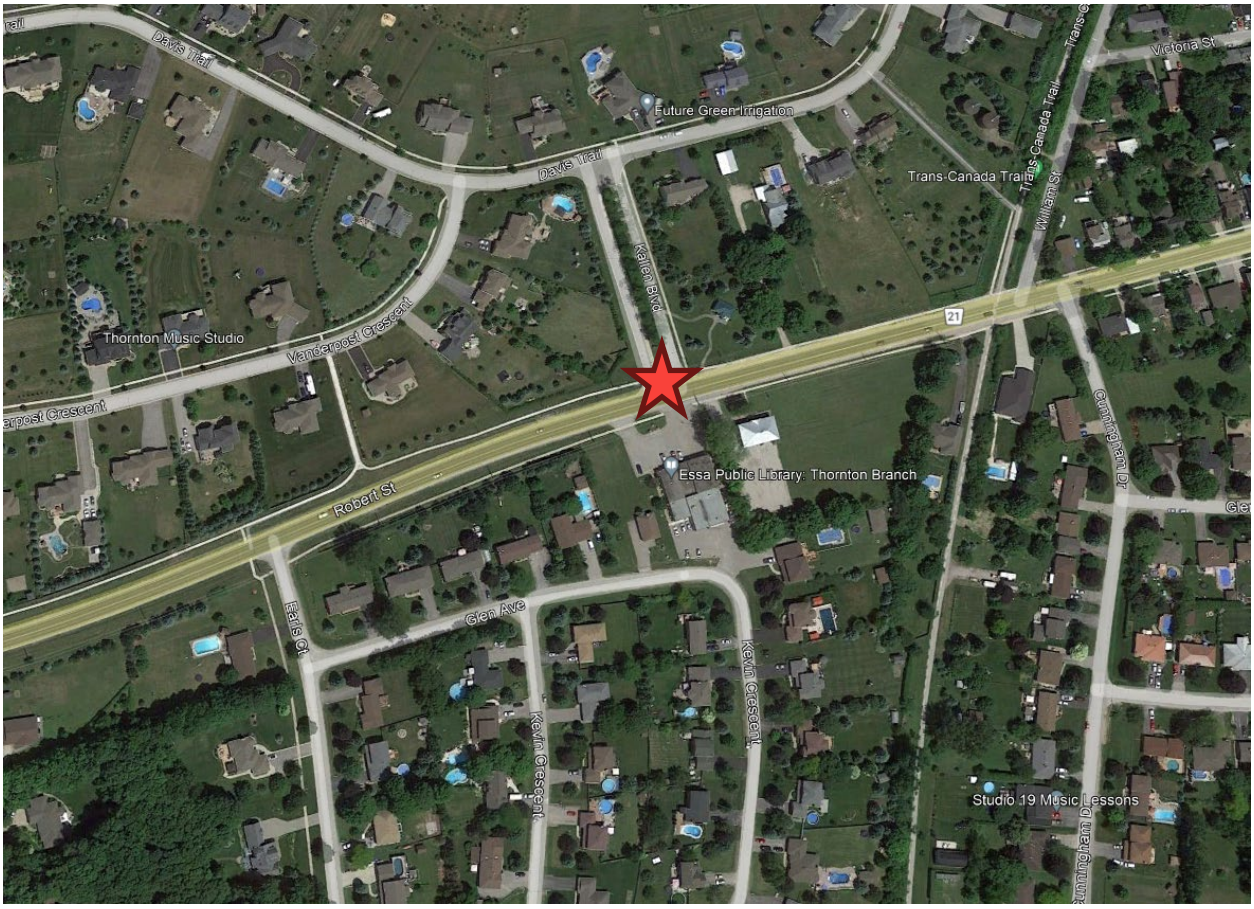


Source: Google Maps, 2023

7.1.5 Pedestrian Crossings – Thornton

A potential location for a pedestrian crossing in Thornton is the intersection in front of the Essa Public Library (Robert St and Kallen Blvd), shown in **Figure 44**. This intersection was chosen as a potential PXOs location since it is situated across the Essa Public Library Thornton Branch and is approximately 200 metres from another intersection in either direction.

Figure 44. Potential Location of a Pedestrian Crossing (Thornton)



Source: Google Maps, 2023

7.2 Traffic Calming Strategies

Included in the TMP was the update of the Township's traffic calming policy to incorporate recent best practices. The revised traffic calming policy is included in **Appendix D**. Within this version of the traffic calming policy, recommended traffic calming measures have been categorized into four types, including speed control measures, volume control measures, education measures, and enforcement measures. **Table 34** outlines the various recommended measures included in the traffic calming policy.

Table 34: Recommended Traffic Calming Measures

Recommended Traffic Calming Measures	
Speed Control Measures	• Speed bumps / humps / cushions • Speed tables • Curb extensions • Lane narrowing via pavement markings • Lane narrowing via flexible bollards • Centre medians • Temporary centre medians • Traffic circles • Chicane (two lane) lateral shift • Intersection centreline hardening • Transverse lane markings (transverse bars or chevron pavement markings on a travel lane)
Volume Control Measures	• Diverters / modal filters / directional closures
Education Measures	• Community Safety Zones • School Zones • Radar speed display signs • Active and safe routes to school programs • Targeted education campaigns
Enforcement Measures	• Police enforcement • Red light cameras • Automated speed enforcement

In addition, the updated traffic calming policy has revised the process for how traffic calming requests are considered and implemented. The new process includes three categories to address feedback and concerns for those that travel and live within Essa. The three categories are as follows:

1. Community-wide
2. Request based
3. Collision hotspot

The newly updated traffic calming policy provides further insight regarding each category and their specific initiation method, process, implementation timeline and funding sources. Additionally, the traffic calming policy includes the traffic calming request form, information on the assessment of traffic calming need, as well as collision data to assist in identifying collision hotspots for traffic calming needs throughout the Township.

7.3 Parking Strategies

A parking strategy has been included in the TMP to address ongoing concerns about parking, on residential streets in the urban communities. The Township's parking concerns are centred around the need to address challenges related to access and safety in neighbourhoods, school zones, and community safety zones.

During the February 23, 2023, Public Information Centre, residents, stakeholders, and local business owners provided input on parking challenges to be considered during the strategy development (summarized in **Table 35**). Recommendations were further refined through the process of preparing a parking strategy with multiple mechanisms recommended to manage parking. An overview of the recommendations is shown in **Table 36**. The complete set of parking strategies is included in **Appendix E** of this TMP.

Table 35. Township of Essa Parking Challenges Overview

Topic	Overview of Challenges
Road Widths	Limited right-of-way along neighbourhood streets that would permit parking on both sides, preventing vehicles from traversing both lanes of the road at the same time.
On-Street Parking	Lack of clarity within Zoning By-law and signage posted throughout communities in the Township, identifying on-street parking allowance. Currently, on-street parking spaces are being utilized by residents despite many/most having access to household garages and a driveway with capacity for one or more vehicles.
Visitor Parking	Limited supply of parking for visitors as residents are often utilizing on-street parking spaces for private vehicles.
Signage	Township parking requirements during certain periods of the year and time of day, for example allowance from the first day of

Topic	Overview of Challenges
	November to the first day of May, including for winter maintenance/clearing.
Community Safety Zones and School Zones	High volume of traffic and vehicular movement around community centres and school zones, creating unsafe movement for pedestrians and school children to safely and comfortably access neighbourhoods and school sites.

Table 36. Township of Essa Parking Recommendations Overview

Topic	Overview of Recommendations
Road Widths	Revise standard engineering drawings to develop narrower roads and retrofit existing roads with traffic calming (road narrowing) measures.
On-Street Parking	Introduce time-restricted parking pilot. Limit on-street parking on any new roads. Remove on-street parking on existing roads which are being reconstructed.
Visitor Parking	As part of time-restricted parking pilot, provide a registration form to park overnight on Township roads up to 15 times per year. Provide off-street municipal parking lots and lay-by parking.
Signage	Improve signage in school zones according to existing Township by-law. Add ‘no overnight parking’ or ‘3 H MAX’ signage for time-restricted parking pilot. Require parking permit to park overnight on Township roads (15 times per year).
Community Safety Zones and School Zones	Improve signage and conduct an education campaign to increase compliance with existing Township parking restrictions in school zones.

8 Measuring and Monitoring Progress

The impact of recommended infrastructure improvements and policy directives of the TMP should be measured through a multi-modal monitoring strategy. The strategy will help the Township gauge progress and provides insight into areas that need further attention or that should be refined in a future update to the TMP, or detailed study. Monitoring progress will help to inform future decision making and resource allocation based on key indicators, needs, and measurable outcomes. Addressing this key aspect of the TMP will ensure that a safer, more balanced, and multi-modal oriented transportation system can help accommodate forecasted growth and maintain or enhance the quality of life for the residents and businesses of Essa.

8.1 Data Collection Framework

A data collection framework was developed to serve as a blueprint for monitoring progress. A key aspect in developing a monitoring strategy is to have a clear list of indicators that measure different aspects of multi-modal facilities, services and their respective performance. **Table 37** portrays this list by mode of transportation, indicator, unit of measure, data source, and frequency of collection. Progress can be monitored by establishing a baseline of historic and existing indicators and consistently updating the indicators as they change over time. Although the Township does not directly operate transit, an indicator for transit ridership has been included so that the Township can monitor ridership trends and advocate for increased transit service.

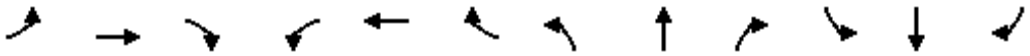
Table 37. Multi-Modal Data Collection Framework

#	Mode	Indicator	Unit	Data Source	Frequency
1	Cycling	Total kilometres of new cycling facilities within the road rights-of-way	Km	Township Simcoe County	Every year
2	Trails	Total kilometres of new trails	Km	Township Simcoe County	Every year
3	Walking	Total kilometres of new sidewalks	Km	Township	Every year
5	Transit	Ridership on Route 2 serving Essa	Passengers	Simcoe County LINX	Every year
6	Vehicle	Private vehicle ownership per 1,000 inhabitants		Canadian Census	Every 5 years, as available

#	Mode	Indicator	Unit	Data Source	Frequency
7	Vehicle	Total lane kilometres of new roads		Township Simcoe County	Every year
8	Vehicle	Daily vehicle kilometres travelled		Transportation Tomorrow Survey (TTS)	Every 5 years, as available
9	Vehicle	Daily vehicle hours travelled		Transportation Tomorrow Survey (TTS)	Every 5 years, as available
10	Vehicle	Modal split (during peak commute hours)		Transportation Tomorrow Survey (TTS)	Every 5 years, as available
11	Vehicle	Number of daily trips	Trips	Transportation Tomorrow Survey (TTS)	Every 5 years, as available

APPENDIX

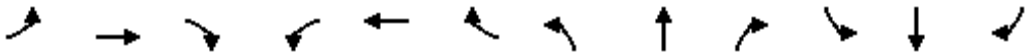
A SYNCHRO OUTPUTS



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	1	4	0	6	1	79	0	12	9	145	18	0
Future Volume (Veh/h)	1	4	0	6	1	79	0	12	9	145	18	0
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83
Hourly flow rate (vph)	1	5	0	7	1	95	0	14	11	175	22	0
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	487	397	22	394	392	20	22			25		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	487	397	22	394	392	20	22			25		
tC, single (s)	7.1	6.5	6.2	7.3	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.7	4.0	3.3	2.2			2.2		
p0 queue free %	100	99	100	99	100	91	100			89		
cM capacity (veh/h)	411	484	1055	490	487	1064	1593			1589		

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	6	103	25	197
Volume Left	1	7	0	175
Volume Right	0	95	11	0
cSH	470	975	1593	1589
Volume to Capacity	0.01	0.11	0.00	0.11
Queue Length 95th (m)	0.3	2.8	0.0	3.0
Control Delay (s)	12.8	9.1	0.0	6.8
Lane LOS	B	A		A
Approach Delay (s)	12.8	9.1	0.0	6.8
Approach LOS	B	A		

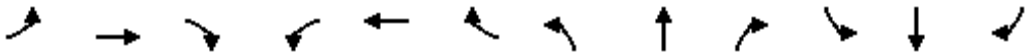
Intersection Summary				
Average Delay	7.1			
Intersection Capacity Utilization	28.1%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	2	194	0	18	117	5	0	0	21	4	3	2
Future Volume (Veh/h)	2	194	0	18	117	5	0	0	21	4	3	2
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86
Hourly flow rate (vph)	2	226	0	21	136	6	0	0	24	5	3	2
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	142			226			414	414	226	435	411	139
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	142			226			414	414	226	435	411	139
tC, single (s)	4.6			4.2			7.1	6.5	6.3	7.1	6.8	6.2
tC, 2 stage (s)												
tF (s)	2.7			2.3			3.5	4.0	3.4	3.5	4.3	3.3
p0 queue free %	100			98			100	100	97	99	99	100
cM capacity (veh/h)	1193			1286			537	519	794	512	476	915

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	228	163	24	10
Volume Left	2	21	0	5
Volume Right	0	6	24	2
cSH	1193	1286	794	548
Volume to Capacity	0.00	0.02	0.03	0.02
Queue Length 95th (m)	0.0	0.4	0.7	0.4
Control Delay (s)	0.1	1.1	9.7	11.7
Lane LOS	A	A	A	B
Approach Delay (s)	0.1	1.1	9.7	11.7
Approach LOS			A	B

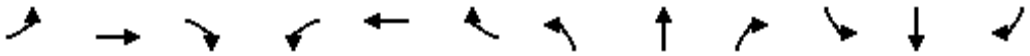
Intersection Summary				
Average Delay	1.3			
Intersection Capacity Utilization	29.1%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	5	122	1	74	39	1	0	18	48	16	20	1
Future Volume (Veh/h)	5	122	1	74	39	1	0	18	48	16	20	1
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	5	133	1	80	42	1	0	20	52	17	22	1
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	43			134			358	346	134	408	346	42
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	43			134			358	346	134	408	346	42
tC, single (s)	4.5			4.1			7.1	6.5	6.2	7.1	6.5	7.2
tC, 2 stage (s)												
tF (s)	2.6			2.2			3.5	4.0	3.3	3.5	4.0	4.2
p0 queue free %	100			94			100	96	94	97	96	100
cM capacity (veh/h)	1353			1451			553	546	921	488	546	807

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	139	123	72	40
Volume Left	5	80	0	17
Volume Right	1	1	52	1
cSH	1353	1451	773	524
Volume to Capacity	0.00	0.06	0.09	0.08
Queue Length 95th (m)	0.1	1.4	2.5	2.0
Control Delay (s)	0.3	5.1	10.1	12.4
Lane LOS	A	A	B	B
Approach Delay (s)	0.3	5.1	10.1	12.4
Approach LOS			B	B

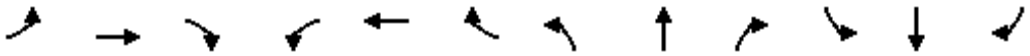
Intersection Summary				
Average Delay	5.1			
Intersection Capacity Utilization	31.6%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	5	263	11	18	212	7	8	5	9	19	13	3
Future Volume (Veh/h)	5	263	11	18	212	7	8	5	9	19	13	3
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	5	277	12	19	223	7	8	5	9	20	14	3
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	230			289			568	561	283	569	564	226
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	230			289			568	561	283	569	564	226
tC, single (s)	4.1			4.2			7.1	6.7	6.2	7.2	6.5	6.5
tC, 2 stage (s)												
tF (s)	2.2			2.3			3.5	4.2	3.3	3.6	4.0	3.6
p0 queue free %	100			98			98	99	99	95	97	100
cM capacity (veh/h)	1350			1218			418	405	761	412	429	739

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	294	249	22	37
Volume Left	5	19	8	20
Volume Right	12	7	9	3
cSH	1350	1218	508	434
Volume to Capacity	0.00	0.02	0.04	0.09
Queue Length 95th (m)	0.1	0.4	1.1	2.2
Control Delay (s)	0.2	0.7	12.4	14.1
Lane LOS	A	A	B	B
Approach Delay (s)	0.2	0.7	12.4	14.1
Approach LOS			B	B

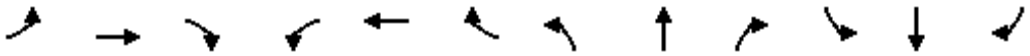
Intersection Summary				
Average Delay	1.7			
Intersection Capacity Utilization	31.5%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	0	39	22	32	41	1	5	31	26	0	26	3
Future Volume (vph)	0	39	22	32	41	1	5	31	26	0	26	3
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Hourly flow rate (vph)	0	43	24	35	45	1	5	34	29	0	29	3

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	67	81	68	32
Volume Left (vph)	0	35	5	0
Volume Right (vph)	24	1	29	3
Hadj (s)	-0.18	0.14	-0.18	-0.06
Departure Headway (s)	4.0	4.3	4.1	4.2
Degree Utilization, x	0.07	0.10	0.08	0.04
Capacity (veh/h)	866	810	844	813
Control Delay (s)	7.3	7.8	7.4	7.4
Approach Delay (s)	7.3	7.8	7.4	7.4
Approach LOS	A	A	A	A

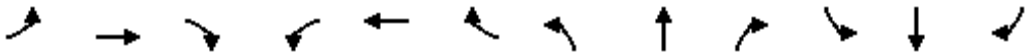
Intersection Summary				
Delay	7.5			
Level of Service	A			
Intersection Capacity Utilization	24.9%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	2	0	1	26	0	251	0	33	23	176	19	0
Future Volume (Veh/h)	2	0	1	26	0	251	0	33	23	176	19	0
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	2	0	1	29	0	279	0	37	26	196	21	0
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	742	476	21	464	463	50	21			63		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	742	476	21	464	463	50	21			63		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	99	100	100	94	100	73	100			87		
cM capacity (veh/h)	219	428	1062	461	435	1021	1595			1540		

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	3	308	63	217
Volume Left	2	29	0	196
Volume Right	1	279	26	0
cSH	298	916	1595	1540
Volume to Capacity	0.01	0.34	0.00	0.13
Queue Length 95th (m)	0.2	11.9	0.0	3.5
Control Delay (s)	17.2	10.9	0.0	7.0
Lane LOS	C	B		A
Approach Delay (s)	17.2	10.9	0.0	7.0
Approach LOS	C	B		

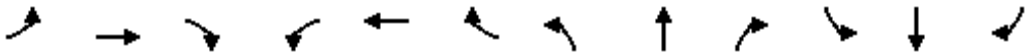
Intersection Summary				
Average Delay	8.4			
Intersection Capacity Utilization	40.7%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	3	240	1	19	287	10	0	0	45	4	3	1
Future Volume (Veh/h)	3	240	1	19	287	10	0	0	45	4	3	1
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	3	253	1	20	302	11	0	0	47	4	3	1
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	313			254			610	612	254	654	608	308
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	313			254			610	612	254	654	608	308
tC, single (s)	4.4			4.1			7.1	6.5	6.2	7.1	6.8	6.2
tC, 2 stage (s)												
tF (s)	2.5			2.2			3.5	4.0	3.3	3.5	4.3	3.3
p0 queue free %	100			98			100	100	94	99	99	100
cM capacity (veh/h)	1087			1323			398	401	783	355	364	737

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	257	333	47	8
Volume Left	3	20	0	4
Volume Right	1	11	47	1
cSH	1087	1323	783	383
Volume to Capacity	0.00	0.02	0.06	0.02
Queue Length 95th (m)	0.1	0.4	1.5	0.5
Control Delay (s)	0.1	0.6	9.9	14.6
Lane LOS	A	A	A	B
Approach Delay (s)	0.1	0.6	9.9	14.6
Approach LOS			A	B

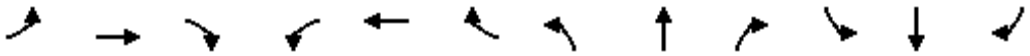
Intersection Summary				
Average Delay	1.3			
Intersection Capacity Utilization	37.8%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	5	71	36	68	150	19	3	66	67	4	21	6
Future Volume (Veh/h)	5	71	36	68	150	19	3	66	67	4	21	6
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75
Hourly flow rate (vph)	7	95	48	91	200	25	4	88	89	5	28	8
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	225			143			550	540	119	660	552	212
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	225			143			550	540	119	660	552	212
tC, single (s)	4.3			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.4			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	99			94			99	79	90	98	93	99
cM capacity (veh/h)	1244			1452			400	414	933	272	408	833

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	150	316	181	41
Volume Left	7	91	4	5
Volume Right	48	25	89	8
cSH	1244	1452	569	424
Volume to Capacity	0.01	0.06	0.32	0.10
Queue Length 95th (m)	0.1	1.6	10.9	2.5
Control Delay (s)	0.4	2.6	14.2	14.4
Lane LOS	A	A	B	B
Approach Delay (s)	0.4	2.6	14.2	14.4
Approach LOS			B	B

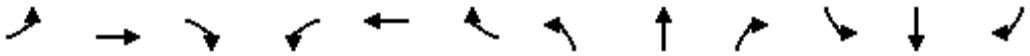
Intersection Summary				
Average Delay	5.9			
Intersection Capacity Utilization	34.3%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	11	365	38	41	286	19	16	15	59	7	25	10
Future Volume (Veh/h)	11	365	38	41	286	19	16	15	59	7	25	10
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81
Hourly flow rate (vph)	14	451	47	51	353	23	20	19	73	9	31	12
Pedestrians											9	
Lane Width (m)											3.6	
Walking Speed (m/s)											1.2	
Percent Blockage											1	
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	385			498			996	990	474	1060	1002	374
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	385			498			996	990	474	1060	1002	374
tC, single (s)	4.4			4.1			7.1	6.5	6.2	7.1	6.5	6.3
tC, 2 stage (s)												
tF (s)	2.5			2.2			3.5	4.0	3.3	3.5	4.0	3.4
p0 queue free %	99			95			89	92	88	94	86	98
cM capacity (veh/h)	1037			1061			188	232	594	158	228	650

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	512	427	112	52
Volume Left	14	51	20	9
Volume Right	47	23	73	12
cSH	1037	1061	360	246
Volume to Capacity	0.01	0.05	0.31	0.21
Queue Length 95th (m)	0.3	1.2	10.4	6.2
Control Delay (s)	0.4	1.5	19.5	23.5
Lane LOS	A	A	C	C
Approach Delay (s)	0.4	1.5	19.5	23.5
Approach LOS			C	C

Intersection Summary			
Average Delay	3.8		
Intersection Capacity Utilization	50.5%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	8	69	22	39	96	3	26	48	20	3	36	3
Future Volume (vph)	8	69	22	39	96	3	26	48	20	3	36	3
Peak Hour Factor	0.78	0.78	0.78	0.78	0.78	0.78	0.78	0.78	0.78	0.78	0.78	0.78
Hourly flow rate (vph)	10	88	28	50	123	4	33	62	26	4	46	4

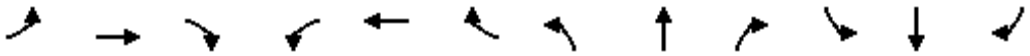
Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	126	177	121	54
Volume Left (vph)	10	50	33	4
Volume Right (vph)	28	4	26	4
Hadj (s)	-0.01	0.08	-0.03	0.06
Departure Headway (s)	4.5	4.6	4.7	4.8
Degree Utilization, x	0.16	0.22	0.16	0.07
Capacity (veh/h)	756	749	723	685
Control Delay (s)	8.4	8.9	8.5	8.2
Approach Delay (s)	8.4	8.9	8.5	8.2
Approach LOS	A	A	A	A

Intersection Summary				
Delay	8.6			
Level of Service	A			
Intersection Capacity Utilization	32.6%	ICU Level of Service	A	
Analysis Period (min)	15			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	2	6	2	10	2	130	3	35	26	284	141	3
Future Volume (Veh/h)	2	6	2	10	2	130	3	35	26	284	141	3
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83
Hourly flow rate (vph)	2	7	2	12	2	157	4	42	31	342	170	4
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	1080	937	172	927	924	58	174			73		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1080	937	172	927	924	58	174			73		
tC, single (s)	7.1	6.5	6.2	7.3	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.7	4.0	3.3	2.2			2.2		
p0 queue free %	99	97	100	94	99	85	100			78		
cM capacity (veh/h)	137	206	872	188	210	1014	1403			1527		

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	11	171	77	516
Volume Left	2	12	4	342
Volume Right	2	157	31	4
cSH	216	749	1403	1527
Volume to Capacity	0.05	0.23	0.00	0.22
Queue Length 95th (m)	1.3	7.0	0.1	6.9
Control Delay (s)	22.5	11.2	0.4	6.0
Lane LOS	C	B	A	A
Approach Delay (s)	22.5	11.2	0.4	6.0
Approach LOS	C	B		

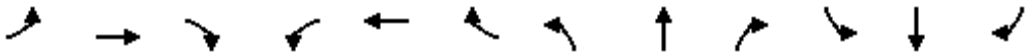
Intersection Summary				
Average Delay	6.8			
Intersection Capacity Utilization	46.2%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	6	548	3	26	170	7	2	2	45	5	4	3
Future Volume (Veh/h)	6	548	3	26	170	7	2	2	45	5	4	3
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86
Hourly flow rate (vph)	7	637	3	30	198	8	2	2	52	6	5	3
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	206			640			920	918	638	968	916	202
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	206			640			920	918	638	968	916	202
tC, single (s)	4.6			4.2			7.1	6.5	6.3	7.1	6.8	6.2
tC, 2 stage (s)												
tF (s)	2.7			2.3			3.5	4.0	3.4	3.5	4.3	3.3
p0 queue free %	99			97			99	99	89	97	98	100
cM capacity (veh/h)	1125			898			239	261	462	201	232	844

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	647	236	56	14
Volume Left	7	30	2	6
Volume Right	3	8	52	3
cSH	1125	898	436	255
Volume to Capacity	0.01	0.03	0.13	0.05
Queue Length 95th (m)	0.2	0.8	3.5	1.4
Control Delay (s)	0.2	1.5	14.5	19.9
Lane LOS	A	A	B	C
Approach Delay (s)	0.2	1.5	14.5	19.9
Approach LOS			B	C

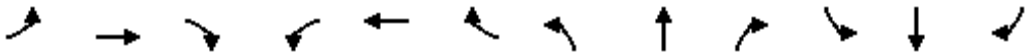
Intersection Summary			
Average Delay	1.6		
Intersection Capacity Utilization	40.0%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	8	203	2	120	63	2	7	24	64	19	24	1
Future Volume (Veh/h)	8	203	2	120	63	2	7	24	64	19	24	1
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	9	221	2	130	68	2	8	26	70	21	26	1
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	70			223			583	570	222	652	570	69
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	70			223			583	570	222	652	570	69
tC, single (s)	4.5			4.1			7.1	6.5	6.2	7.1	6.5	7.2
tC, 2 stage (s)												
tF (s)	2.6			2.2			3.5	4.0	3.3	3.5	4.0	4.2
p0 queue free %	99			90			98	93	91	93	93	100
cM capacity (veh/h)	1321			1346			370	389	823	307	389	777

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	232	200	104	48
Volume Left	9	130	8	21
Volume Right	2	2	70	1
cSH	1321	1346	600	352
Volume to Capacity	0.01	0.10	0.17	0.14
Queue Length 95th (m)	0.2	2.6	5.0	3.7
Control Delay (s)	0.4	5.5	12.3	16.8
Lane LOS	A	A	B	C
Approach Delay (s)	0.4	5.5	12.3	16.8
Approach LOS			B	C

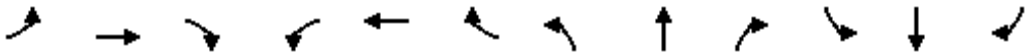
Intersection Summary				
Average Delay	5.6			
Intersection Capacity Utilization	39.3%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	7	391	16	31	363	12	12	7	13	80	55	13
Future Volume (Veh/h)	7	391	16	31	363	12	12	7	13	80	55	13
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	7	412	17	33	382	13	13	7	14	84	58	14
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	395			429			932	896	420	906	898	388
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	395			429			932	896	420	906	898	388
tC, single (s)	4.1			4.2			7.1	6.7	6.2	7.2	6.5	6.5
tC, 2 stage (s)												
tF (s)	2.2			2.3			3.5	4.2	3.3	3.6	4.0	3.6
p0 queue free %	99			97			93	97	98	64	79	98
cM capacity (veh/h)	1175			1079			198	252	637	235	271	595

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	436	428	34	156
Volume Left	7	33	13	84
Volume Right	17	13	14	14
cSH	1175	1079	294	262
Volume to Capacity	0.01	0.03	0.12	0.59
Queue Length 95th (m)	0.1	0.8	3.1	27.9
Control Delay (s)	0.2	1.0	18.8	37.0
Lane LOS	A	A	C	E
Approach Delay (s)	0.2	1.0	18.8	37.0
Approach LOS			C	E

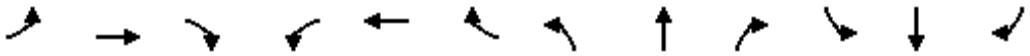
Intersection Summary			
Average Delay	6.6		
Intersection Capacity Utilization	56.4%	ICU Level of Service	B
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	1	48	27	39	50	1	13	79	66	3	88	10
Future Volume (vph)	1	48	27	39	50	1	13	79	66	3	88	10
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Hourly flow rate (vph)	1	53	30	43	55	1	14	87	73	3	97	11

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	84	99	174	111
Volume Left (vph)	1	43	14	3
Volume Right (vph)	30	1	73	11
Hadj (s)	-0.18	0.14	-0.18	-0.05
Departure Headway (s)	4.5	4.8	4.3	4.5
Degree Utilization, x	0.10	0.13	0.21	0.14
Capacity (veh/h)	737	698	797	754
Control Delay (s)	8.0	8.5	8.4	8.2
Approach Delay (s)	8.0	8.5	8.4	8.2
Approach LOS	A	A	A	A

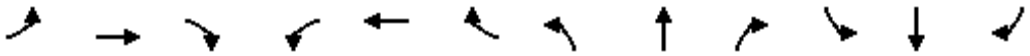
Intersection Summary				
Delay	8.3			
Level of Service	A			
Intersection Capacity Utilization	32.6%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	4	2	2	42	8	408	3	97	68	299	146	2
Future Volume (Veh/h)	4	2	2	42	8	408	3	97	68	299	146	2
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	4	2	2	47	9	453	3	108	76	332	162	2
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	1436	1017	163	982	980	146	164			184		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1436	1017	163	982	980	146	164			184		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	91	99	100	75	95	50	100			76		
cM capacity (veh/h)	44	182	887	186	191	904	1414			1391		

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	8	509	187	496
Volume Left	4	47	3	332
Volume Right	2	453	76	2
cSH	77	635	1414	1391
Volume to Capacity	0.10	0.80	0.00	0.24
Queue Length 95th (m)	2.7	64.2	0.1	7.5
Control Delay (s)	57.2	29.6	0.1	6.4
Lane LOS	F	D	A	A
Approach Delay (s)	57.2	29.6	0.1	6.4
Approach LOS	F	D		

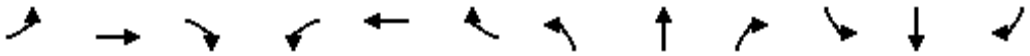
Intersection Summary				
Average Delay	15.6			
Intersection Capacity Utilization	71.9%	ICU Level of Service	C	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	5	373	2	30	448	16	7	7	61	6	4	1
Future Volume (Veh/h)	5	373	2	30	448	16	7	7	61	6	4	1
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	5	393	2	32	472	17	7	7	64	6	4	1
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	489			395			952	957	394	1016	950	480
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	489			395			952	957	394	1016	950	480
tC, single (s)	4.4			4.1			7.1	6.5	6.2	7.1	6.8	6.2
tC, 2 stage (s)												
tF (s)	2.5			2.2			3.5	4.0	3.3	3.5	4.3	3.3
p0 queue free %	99			97			97	97	90	97	98	100
cM capacity (veh/h)	927			1175			230	249	653	188	223	590

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	400	521	78	11
Volume Left	5	32	7	6
Volume Right	2	17	64	1
cSH	927	1175	498	213
Volume to Capacity	0.01	0.03	0.16	0.05
Queue Length 95th (m)	0.1	0.7	4.4	1.3
Control Delay (s)	0.2	0.8	13.6	22.8
Lane LOS	A	A	B	C
Approach Delay (s)	0.2	0.8	13.6	22.8
Approach LOS			B	C

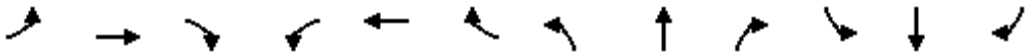
Intersection Summary				
Average Delay	1.8			
Intersection Capacity Utilization	53.8%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	7	93	47	112	248	31	5	106	107	5	26	7
Future Volume (Veh/h)	7	93	47	112	248	31	5	106	107	5	26	7
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75
Hourly flow rate (vph)	9	124	63	149	331	41	7	141	143	7	35	9
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	372			187			850	844	156	1036	854	352
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	372			187			850	844	156	1036	854	352
tC, single (s)	4.3			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.4			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	99			89			97	46	84	93	86	99
cM capacity (veh/h)	1094			1399			229	263	890	94	259	697

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	196	521	291	51
Volume Left	9	149	7	7
Volume Right	63	41	143	9
cSH	1094	1399	400	230
Volume to Capacity	0.01	0.11	0.73	0.22
Queue Length 95th (m)	0.2	2.9	45.2	6.6
Control Delay (s)	0.5	3.0	34.5	25.1
Lane LOS	A	A	D	D
Approach Delay (s)	0.5	3.0	34.5	25.1
Approach LOS			D	D

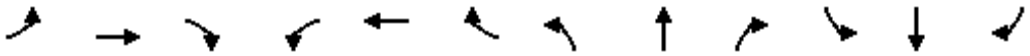
Intersection Summary				
Average Delay	12.3			
Intersection Capacity Utilization	52.3%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	19	621	65	96	672	45	45	42	166	20	71	29
Future Volume (Veh/h)	19	621	65	96	672	45	45	42	166	20	71	29
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81
Hourly flow rate (vph)	23	767	80	119	830	56	56	52	205	25	88	36
Pedestrians											9	
Lane Width (m)											3.6	
Walking Speed (m/s)											1.2	
Percent Blockage											1	
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	895			847			2029	1986	807	2189	1998	867
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	895			847			2029	1986	807	2189	1998	867
tC, single (s)	4.4			4.1			7.1	6.5	6.2	7.1	6.5	6.3
tC, 2 stage (s)												
tF (s)	2.5			2.2			3.5	4.0	3.3	3.5	4.0	3.4
p0 queue free %	96			85			0	0	47	0	0	89
cM capacity (veh/h)	655			786			0	50	385	0	49	338

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	870	1005	313	149
Volume Left	23	119	56	25
Volume Right	80	56	205	36
cSH	655	786	0	0
Volume to Capacity	0.04	0.15	Err	Err
Queue Length 95th (m)	0.9	4.3	Err	Err
Control Delay (s)	1.0	4.1	Err	Err
Lane LOS	A	A	F	F
Approach Delay (s)	1.0	4.1	Err	Err
Approach LOS			F	F

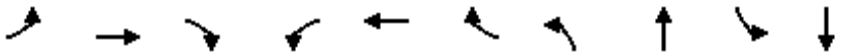
Intersection Summary				
Average Delay	Err			
Intersection Capacity Utilization	111.5%	ICU Level of Service	H	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	10	85	27	47	117	4	78	143	60	8	95	8
Future Volume (vph)	10	85	27	47	117	4	78	143	60	8	95	8
Peak Hour Factor	0.78	0.78	0.78	0.78	0.78	0.78	0.78	0.78	0.78	0.78	0.78	0.78
Hourly flow rate (vph)	13	109	35	60	150	5	100	183	77	10	122	10

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	157	215	360	142
Volume Left (vph)	13	60	100	10
Volume Right (vph)	35	5	77	10
Hadj (s)	-0.01	0.08	-0.03	0.06
Departure Headway (s)	5.7	5.6	5.2	5.6
Degree Utilization, x	0.25	0.34	0.52	0.22
Capacity (veh/h)	568	584	652	576
Control Delay (s)	10.5	11.5	13.7	10.2
Approach Delay (s)	10.5	11.5	13.7	10.2
Approach LOS	B	B	B	B

Intersection Summary				
Delay	12.0			
Level of Service	B			
Intersection Capacity Utilization	44.5%	ICU Level of Service	A	
Analysis Period (min)	15			

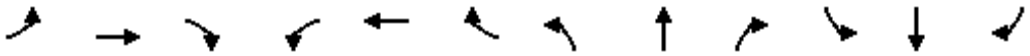


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	49	199	49	27	5	347	5	112	402	353
v/c Ratio	0.09	0.26	0.07	0.07	0.01	0.40	0.01	0.16	0.74	0.47
Control Delay	12.6	13.2	5.4	13.0	12.5	3.8	6.5	5.1	20.1	11.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	12.6	13.2	5.4	13.0	12.5	3.8	6.5	5.1	20.1	11.1
Queue Length 50th (m)	2.5	10.8	0.0	1.4	0.3	0.0	0.2	3.0	26.8	19.9
Queue Length 95th (m)	9.8	29.6	5.4	6.5	2.2	12.0	1.3	7.9	43.5	30.8
Internal Link Dist (m)		202.2			8247.9			6082.9		308.1
Turn Bay Length (m)	30.0		30.0	30.0		30.0	30.0		30.0	
Base Capacity (vph)	576	764	666	413	764	857	649	1193	929	1304
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.09	0.26	0.07	0.07	0.01	0.40	0.01	0.09	0.43	0.27

Intersection Summary

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	41	165	41	22	4	288	4	53	40	334	289	4
Future Volume (vph)	41	165	41	22	4	288	4	53	40	334	289	4
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.94		1.00	1.00	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1805	1900	1583	1543	1900	1615	1770	1618		1770	1790	
Flt Permitted	0.75	1.00	1.00	0.63	1.00	1.00	0.48	1.00		0.68	1.00	
Satd. Flow (perm)	1434	1900	1583	1028	1900	1615	892	1618		1276	1790	
Peak-hour factor, PHF	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83
Adj. Flow (vph)	49	199	49	27	5	347	5	64	48	402	348	5
RTOR Reduction (vph)	0	0	29	0	0	207	0	28	0	0	1	0
Lane Group Flow (vph)	49	199	20	27	5	140	5	84	0	402	352	0
Heavy Vehicles (%)	0%	0%	2%	17%	0%	0%	2%	0%	23%	2%	6%	2%
Turn Type	Perm	NA	Perm	Perm	NA	Perm	Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4		4	8		8	2			6		
Actuated Green, G (s)	19.0	19.0	19.0	19.0	19.0	19.0	20.0	20.0		20.0	20.0	
Effective Green, g (s)	19.0	19.0	19.0	19.0	19.0	19.0	20.0	20.0		20.0	20.0	
Actuated g/C Ratio	0.40	0.40	0.40	0.40	0.40	0.40	0.43	0.43		0.43	0.43	
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0		4.0	4.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	579	768	639	415	768	652	379	688		542	761	
v/s Ratio Prot		c0.10			0.00			0.05			0.20	
v/s Ratio Perm	0.03		0.01	0.03		0.09	0.01			c0.32		
v/c Ratio	0.08	0.26	0.03	0.07	0.01	0.22	0.01	0.12		0.74	0.46	
Uniform Delay, d1	8.6	9.3	8.4	8.6	8.4	9.1	7.8	8.2		11.3	9.7	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.3	0.8	0.1	0.3	0.0	0.8	0.0	0.1		5.4	0.4	
Delay (s)	8.9	10.1	8.5	8.9	8.4	9.9	7.8	8.3		16.8	10.1	
Level of Service	A	B	A	A	A	A	A	A		B	B	
Approach Delay (s)		9.7			9.8			8.2			13.6	
Approach LOS		A			A			A			B	

Intersection Summary			
HCM 2000 Control Delay	11.5	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.51		
Actuated Cycle Length (s)	47.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	50.1%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	5	504	3	48	313	13	2	2	45	5	4	3
Future Volume (Veh/h)	5	504	3	48	313	13	2	2	45	5	4	3
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86
Hourly flow rate (vph)	6	586	3	56	364	15	2	2	52	6	5	3
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	379			589			1088	1090	588	1136	1084	372
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	379			589			1088	1090	588	1136	1084	372
tC, single (s)	4.6			4.2			7.1	6.5	6.3	7.1	6.8	6.2
tC, 2 stage (s)												
tF (s)	2.7			2.3			3.5	4.0	3.4	3.5	4.3	3.3
p0 queue free %	99			94			99	99	89	96	97	100
cM capacity (veh/h)	959			939			179	201	495	153	178	679

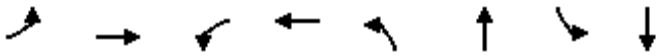
Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	595	435	56	14
Volume Left	6	56	2	6
Volume Right	3	15	52	3
cSH	959	939	443	195
Volume to Capacity	0.01	0.06	0.13	0.07
Queue Length 95th (m)	0.2	1.5	3.4	1.8
Control Delay (s)	0.2	1.8	14.3	24.9
Lane LOS	A	A	B	C
Approach Delay (s)	0.2	1.8	14.3	24.9
Approach LOS			B	C

Intersection Summary			
Average Delay	1.8		
Intersection Capacity Utilization	59.6%	ICU Level of Service	B
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	8	203	2	120	63	2	7	24	64	19	24	1
Future Volume (Veh/h)	8	203	2	120	63	2	7	24	64	19	24	1
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	9	221	2	130	68	2	8	26	70	21	26	1
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	70			223			583	570	222	652	570	69
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	70			223			583	570	222	652	570	69
tC, single (s)	4.5			4.1			7.1	6.5	6.2	7.1	6.5	7.2
tC, 2 stage (s)												
tF (s)	2.6			2.2			3.5	4.0	3.3	3.5	4.0	4.2
p0 queue free %	99			90			98	93	91	93	93	100
cM capacity (veh/h)	1321			1346			370	389	823	307	389	777

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	232	200	104	48
Volume Left	9	130	8	21
Volume Right	2	2	70	1
cSH	1321	1346	600	352
Volume to Capacity	0.01	0.10	0.17	0.14
Queue Length 95th (m)	0.2	2.6	5.0	3.7
Control Delay (s)	0.4	5.5	12.3	16.8
Lane LOS	A	A	B	C
Approach Delay (s)	0.4	5.5	12.3	16.8
Approach LOS			B	C

Intersection Summary				
Average Delay	5.6			
Intersection Capacity Utilization	39.3%	ICU Level of Service	A	
Analysis Period (min)	15			

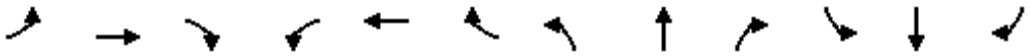


Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	7	429	33	395	25	44	148	124
v/c Ratio	0.01	0.37	0.06	0.35	0.07	0.10	0.43	0.26
Control Delay	5.3	7.0	5.7	6.8	11.5	7.3	16.6	11.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	5.3	7.0	5.7	6.8	11.5	7.3	16.6	11.4
Queue Length 50th (m)	0.2	14.8	0.9	13.3	1.3	0.9	8.8	5.7
Queue Length 95th (m)	1.5	36.6	4.4	33.6	5.1	5.7	20.3	14.6
Internal Link Dist (m)		436.5		433.0		666.9		6082.9
Turn Bay Length (m)	30.0		30.0		30.0		30.0	
Base Capacity (vph)	610	1154	517	1133	784	989	796	1068
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.01	0.37	0.06	0.35	0.03	0.04	0.19	0.12

Intersection Summary

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	7	391	16	31	363	12	24	15	27	141	96	22
Future Volume (vph)	7	391	16	31	363	12	24	15	27	141	96	22
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.99		1.00	1.00		1.00	0.90		1.00	0.97	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1805	1836		1612	1803		1805	1602		1703	1738	
Flt Permitted	0.51	1.00		0.49	1.00		0.68	1.00		0.73	1.00	
Satd. Flow (perm)	974	1836		824	1803		1287	1602		1306	1738	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	7	412	17	33	382	13	25	16	28	148	101	23
RTOR Reduction (vph)	0	2	0	0	2	0	0	22	0	0	18	0
Lane Group Flow (vph)	7	427	0	33	393	0	25	22	0	148	106	0
Heavy Vehicles (%)	0%	3%	0%	12%	5%	0%	0%	20%	0%	6%	0%	34%
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	25.1	25.1		25.1	25.1		9.0	9.0		9.0	9.0	
Effective Green, g (s)	25.1	25.1		25.1	25.1		9.0	9.0		9.0	9.0	
Actuated g/C Ratio	0.60	0.60		0.60	0.60		0.21	0.21		0.21	0.21	
Clearance Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	580	1094		491	1074		275	342		279	371	
v/s Ratio Prot		c0.23			0.22			0.01			0.06	
v/s Ratio Perm	0.01			0.04			0.02			c0.11		
v/c Ratio	0.01	0.39		0.07	0.37		0.09	0.06		0.53	0.29	
Uniform Delay, d1	3.5	4.5		3.6	4.4		13.3	13.2		14.7	13.9	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.0	1.1		0.3	1.0		0.1	0.1		1.9	0.4	
Delay (s)	3.5	5.5		3.8	5.4		13.4	13.3		16.6	14.3	
Level of Service	A	A		A	A		B	B		B	B	
Approach Delay (s)		5.5			5.2			13.3			15.6	
Approach LOS		A			A			B			B	

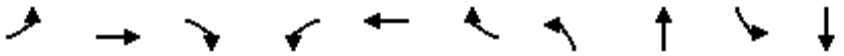
Intersection Summary			
HCM 2000 Control Delay	8.1	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.43		
Actuated Cycle Length (s)	42.1	Sum of lost time (s)	8.0
Intersection Capacity Utilization	46.9%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	1	48	27	39	50	1	13	79	66	3	88	10
Future Volume (vph)	1	48	27	39	50	1	13	79	66	3	88	10
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Hourly flow rate (vph)	1	53	30	43	55	1	14	87	73	3	97	11

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	84	99	174	111
Volume Left (vph)	1	43	14	3
Volume Right (vph)	30	1	73	11
Hadj (s)	-0.18	0.14	-0.18	-0.05
Departure Headway (s)	4.5	4.8	4.3	4.5
Degree Utilization, x	0.10	0.13	0.21	0.14
Capacity (veh/h)	737	698	797	754
Control Delay (s)	8.0	8.5	8.4	8.2
Approach Delay (s)	8.0	8.5	8.4	8.2
Approach LOS	A	A	A	A

Intersection Summary				
Delay	8.3			
Level of Service	A			
Intersection Capacity Utilization	32.6%	ICU Level of Service	A	
Analysis Period (min)	15			

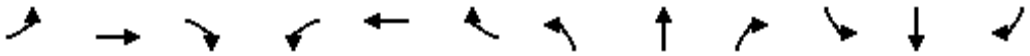


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	213	107	107	54	10	526	4	278	366	221
v/c Ratio	0.38	0.14	0.15	0.10	0.01	0.55	0.01	0.35	0.80	0.27
Control Delay	15.8	13.1	4.5	13.3	12.9	4.4	6.2	6.4	25.6	8.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	15.8	13.1	4.5	13.3	12.9	4.4	6.2	6.4	25.6	8.6
Queue Length 50th (m)	12.5	5.7	0.0	2.8	0.5	0.0	0.2	9.4	25.7	11.3
Queue Length 95th (m)	37.9	19.1	9.2	11.7	3.6	19.1	1.2	19.8	52.5	20.8
Internal Link Dist (m)		202.2			8247.9			6082.9		308.1
Turn Bay Length (m)	30.0		30.0	30.0		30.0	30.0		30.0	
Base Capacity (vph)	562	749	701	515	749	949	824	1254	749	1354
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.38	0.14	0.15	0.10	0.01	0.55	0.00	0.22	0.49	0.16

Intersection Summary

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	192	96	96	49	9	473	4	148	103	329	196	3
Future Volume (vph)	192	96	96	49	9	473	4	148	103	329	196	3
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.94		1.00	1.00	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1805	1900	1615	1805	1900	1599	1770	1720		1770	1896	
Flt Permitted	0.75	1.00	1.00	0.69	1.00	1.00	0.62	1.00		0.56	1.00	
Satd. Flow (perm)	1427	1900	1615	1307	1900	1599	1155	1720		1048	1896	
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	213	107	107	54	10	526	4	164	114	366	218	3
RTOR Reduction (vph)	0	0	65	0	0	318	0	53	0	0	1	0
Lane Group Flow (vph)	213	107	42	54	10	208	4	225	0	366	220	0
Heavy Vehicles (%)	0%	0%	0%	0%	0%	1%	2%	0%	9%	2%	0%	2%
Turn Type	Perm	NA	Perm	Perm	NA	Perm	Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4		4	8		8	2			6		
Actuated Green, G (s)	19.0	19.0	19.0	19.0	19.0	19.0	21.0	21.0		21.0	21.0	
Effective Green, g (s)	19.0	19.0	19.0	19.0	19.0	19.0	21.0	21.0		21.0	21.0	
Actuated g/C Ratio	0.40	0.40	0.40	0.40	0.40	0.40	0.44	0.44		0.44	0.44	
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0		4.0	4.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	564	752	639	517	752	632	505	752		458	829	
v/s Ratio Prot		0.06			0.01			0.13			0.12	
v/s Ratio Perm	c0.15		0.03	0.04		0.13	0.00			c0.35		
v/c Ratio	0.38	0.14	0.07	0.10	0.01	0.33	0.01	0.30		0.80	0.27	
Uniform Delay, d1	10.3	9.3	9.0	9.1	8.8	10.1	7.6	8.7		11.7	8.6	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	1.9	0.4	0.2	0.4	0.0	1.4	0.0	0.2		9.4	0.2	
Delay (s)	12.2	9.7	9.2	9.5	8.8	11.5	7.6	9.0		21.1	8.8	
Level of Service	B	A	A	A	A	B	A	A		C	A	
Approach Delay (s)		10.8			11.2			8.9			16.5	
Approach LOS		B			B			A			B	

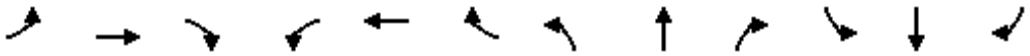
Intersection Summary			
HCM 2000 Control Delay	12.4	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.60		
Actuated Cycle Length (s)	48.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	64.0%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	8	666	3	34	512	18	7	7	61	6	4	1
Future Volume (Veh/h)	8	666	3	34	512	18	7	7	61	6	4	1
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	8	701	3	36	539	19	7	7	64	6	4	1
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	558			704			1342	1348	702	1406	1340	548
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	558			704			1342	1348	702	1406	1340	548
tC, single (s)	4.4			4.1			7.1	6.5	6.2	7.1	6.8	6.2
tC, 2 stage (s)												
tF (s)	2.5			2.2			3.5	4.0	3.3	3.5	4.3	3.3
p0 queue free %	99			96			94	95	85	94	97	100
cM capacity (veh/h)	871			903			121	143	436	93	125	540

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	712	594	78	11
Volume Left	8	36	7	6
Volume Right	3	19	64	1
cSH	871	903	308	112
Volume to Capacity	0.01	0.04	0.25	0.10
Queue Length 95th (m)	0.2	1.0	7.9	2.5
Control Delay (s)	0.2	1.1	20.6	40.6
Lane LOS	A	A	C	E
Approach Delay (s)	0.2	1.1	20.6	40.6
Approach LOS			C	E

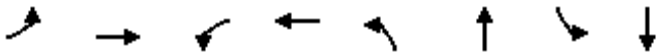
Intersection Summary				
Average Delay	2.1			
Intersection Capacity Utilization	60.2%	ICU Level of Service	B	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	7	93	47	112	248	31	5	106	107	5	26	7
Future Volume (Veh/h)	7	93	47	112	248	31	5	106	107	5	26	7
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75
Hourly flow rate (vph)	9	124	63	149	331	41	7	141	143	7	35	9
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	372			187			850	844	156	1036	854	352
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	372			187			850	844	156	1036	854	352
tC, single (s)	4.3			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.4			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	99			89			97	46	84	93	86	99
cM capacity (veh/h)	1094			1399			229	263	890	94	259	697

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	196	521	291	51
Volume Left	9	149	7	7
Volume Right	63	41	143	9
cSH	1094	1399	400	230
Volume to Capacity	0.01	0.11	0.73	0.22
Queue Length 95th (m)	0.2	2.9	45.2	6.6
Control Delay (s)	0.5	3.0	34.5	25.1
Lane LOS	A	A	D	D
Approach Delay (s)	0.5	3.0	34.5	25.1
Approach LOS			D	D

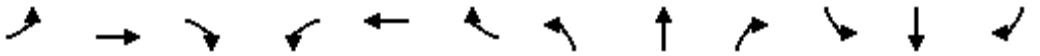
Intersection Summary				
Average Delay	12.3			
Intersection Capacity Utilization	52.3%	ICU Level of Service	A	
Analysis Period (min)	15			



Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	23	847	119	886	75	347	54	272
v/c Ratio	0.15	0.76	0.56	0.80	0.38	0.67	0.39	0.63
Control Delay	9.4	15.4	22.9	17.5	23.0	16.5	25.8	22.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	9.4	15.4	22.9	17.5	23.0	16.5	25.8	22.9
Queue Length 50th (m)	0.9	52.7	6.2	58.2	6.5	15.7	4.7	21.6
Queue Length 95th (m)	4.5	100.2	#28.2	#120.1	14.4	30.2	11.8	35.3
Internal Link Dist (m)		436.5		433.0		666.9		6082.9
Turn Bay Length (m)	30.0		30.0		30.0		30.0	
Base Capacity (vph)	150	1115	213	1105	296	685	208	629
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.15	0.76	0.56	0.80	0.25	0.51	0.26	0.43

Intersection Summary

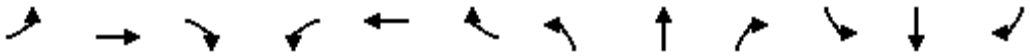
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	19	621	65	96	672	45	61	57	224	44	157	63
Future Volume (vph)	19	621	65	96	672	45	61	57	224	44	157	63
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5		4.5	4.5		4.5	4.5		4.5	4.5	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.99		1.00	0.99		1.00	0.88		1.00	0.96	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1407	1840		1752	1827		1805	1672		1805	1768	
Flt Permitted	0.17	1.00		0.19	1.00		0.45	1.00		0.32	1.00	
Satd. Flow (perm)	248	1840		355	1827		862	1672		608	1768	
Peak-hour factor, PHF	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81
Adj. Flow (vph)	23	767	80	119	830	56	75	70	277	54	194	78
RTOR Reduction (vph)	0	6	0	0	4	0	0	131	0	0	27	0
Lane Group Flow (vph)	23	841	0	119	882	0	75	216	0	54	245	0
Confl. Peds. (#/hr)	9					9						
Heavy Vehicles (%)	28%	2%	0%	3%	3%	0%	0%	0%	0%	0%	0%	10%
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	32.7	32.7		32.7	32.7		12.5	12.5		12.5	12.5	
Effective Green, g (s)	32.7	32.7		32.7	32.7		12.5	12.5		12.5	12.5	
Actuated g/C Ratio	0.60	0.60		0.60	0.60		0.23	0.23		0.23	0.23	
Clearance Time (s)	4.5	4.5		4.5	4.5		4.5	4.5		4.5	4.5	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	149	1110		214	1102		198	385		140	407	
v/s Ratio Prot		0.46			c0.48			0.13			c0.14	
v/s Ratio Perm	0.09			0.34			0.09			0.09		
v/c Ratio	0.15	0.76		0.56	0.80		0.38	0.56		0.39	0.60	
Uniform Delay, d1	4.7	7.9		6.4	8.2		17.6	18.4		17.6	18.6	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	2.2	4.9		10.0	6.1		1.2	1.9		1.8	2.5	
Delay (s)	6.9	12.7		16.4	14.4		18.8	20.3		19.4	21.1	
Level of Service	A	B		B	B		B	C		B	C	
Approach Delay (s)		12.6			14.6			20.0			20.8	
Approach LOS		B			B			C			C	

Intersection Summary			
HCM 2000 Control Delay	15.6	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.75		
Actuated Cycle Length (s)	54.2	Sum of lost time (s)	9.0
Intersection Capacity Utilization	78.3%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	10	85	27	47	117	4	78	143	60	8	95	8
Future Volume (vph)	10	85	27	47	117	4	78	143	60	8	95	8
Peak Hour Factor	0.78	0.78	0.78	0.78	0.78	0.78	0.78	0.78	0.78	0.78	0.78	0.78
Hourly flow rate (vph)	13	109	35	60	150	5	100	183	77	10	122	10

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	157	215	360	142
Volume Left (vph)	13	60	100	10
Volume Right (vph)	35	5	77	10
Hadj (s)	-0.01	0.08	-0.03	0.06
Departure Headway (s)	5.7	5.6	5.2	5.6
Degree Utilization, x	0.25	0.34	0.52	0.22
Capacity (veh/h)	568	584	652	576
Control Delay (s)	10.5	11.5	13.7	10.2
Approach Delay (s)	10.5	11.5	13.7	10.2
Approach LOS	B	B	B	B

Intersection Summary				
Delay	12.0			
Level of Service	B			
Intersection Capacity Utilization	44.5%	ICU Level of Service	A	
Analysis Period (min)	15			

APPENDIX

B PUBLIC INFORMATION CENTRE MATERIAL

Township of Essa

Transportation and Trails Master Plan

Public Open House #1

February 23, 2023

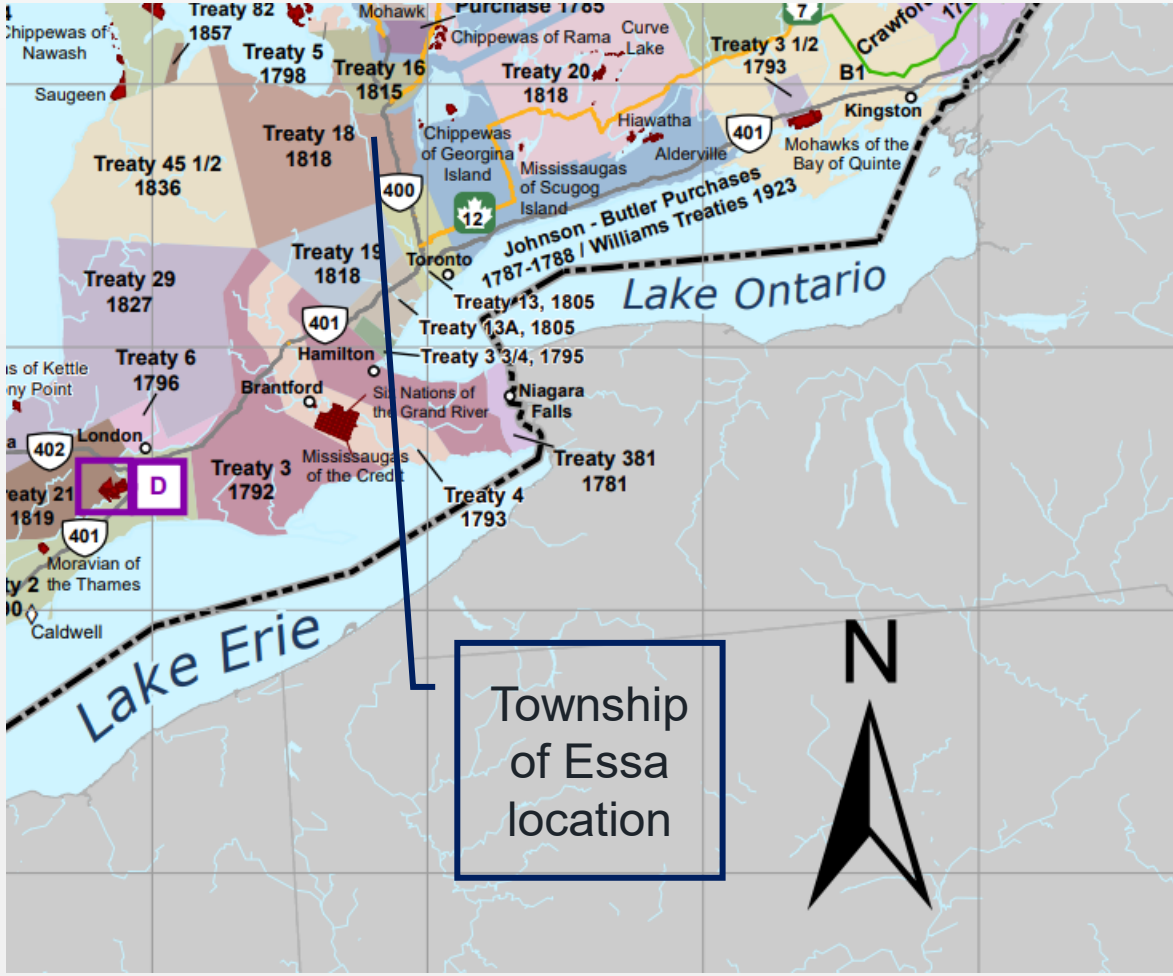
Indigenous Land Acknowledgement

We acknowledge the land that our community safety and well-being planning will take place on is the traditional land of the Anishinaabe People.

The Anishinaabe include the Ojibwe, Odawa, and Potawatomi Nations, collectively known as the Three Fires Confederacy. It should be noted that the Wendat and the Haudenosaunee Nations have also walked on this territory over time.

In times of great change, we recognize more than ever the importance to honour Indigenous history and culture and are committed to moving forward in the spirit of reconciliation, respect and good health with all First Nation, Métis and Inuit people and our community as a whole.

As representatives of the people of the Township of Essa, we are grateful to have the opportunity to work and live on these lands.



Source: Provincial Government of Ontario (2022). First Nations and Treaties.

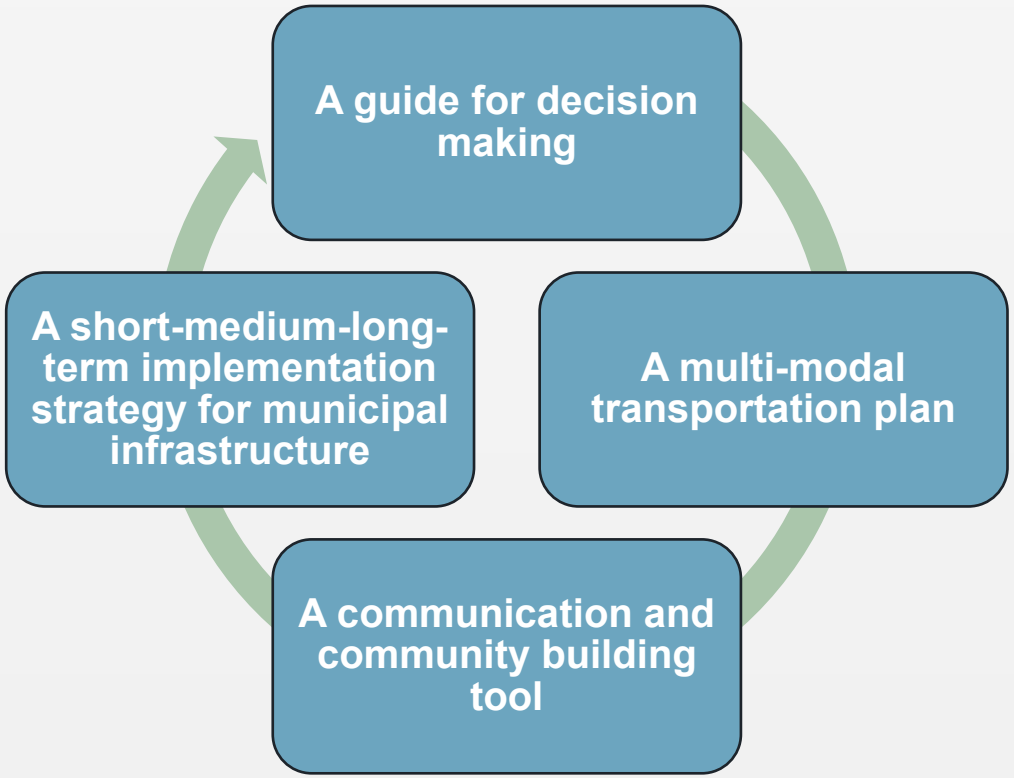
Presentation Overview

1. Introductions and Meeting Objectives
2. What is a Transportation and Trails Master Plan (TTMP)?
3. TTMP Study Timeline
4. TTMP Background Context
5. TTMP Study Objectives
6. Transportation and Trails Master Plan Vision
7. Active Transportation, Trails, and Road Network Options
8. Next Steps

Introductions and Meeting Objectives

1. Provide an overview of the Transportation and Trails Master Plan Development Process
2. Present existing conditions, future growth, and assessment of network options for Roads, Active Transportation, and Trails
3. Summarize outcomes of assessment of network options and present the recommended strategy
4. Discuss and gather feedback on the direction for the recommended strategy

What is a TTMP?



Why do we develop a TTMP?

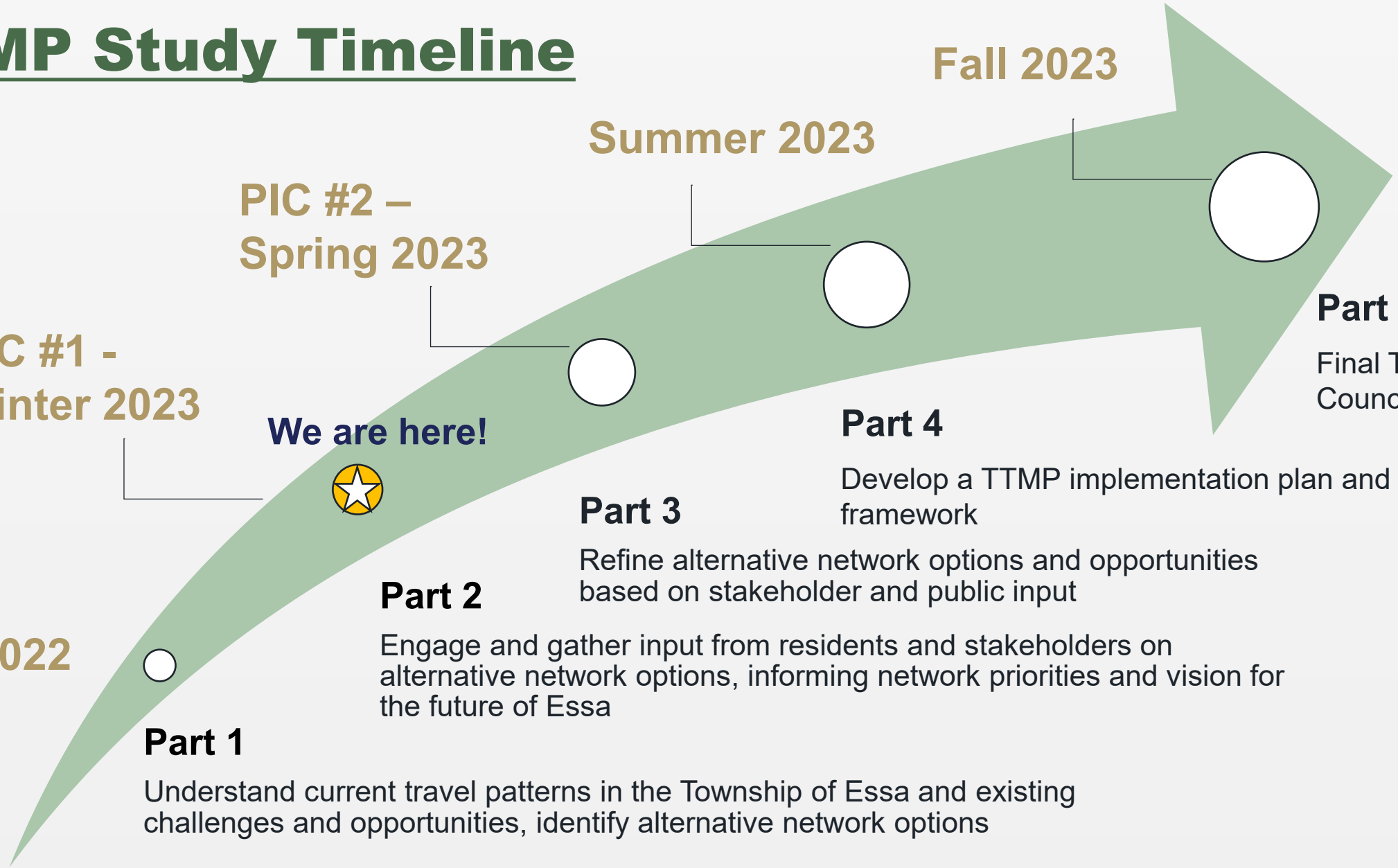
- **Plan for future growth to 2043** and serve as input into the Development Charges Background Study
- **Provide a connected, multi-modal network** to support community travel needs
- Support the Township's goals for a **vibrant, connected, and complete communities to enhance quality of life**
- **Coordinate** the TTMP policy objectives with the Township's Official Plan Update

TTMP Development Process

The **Municipal Class Environmental Assessment** (E.A.) **provides a process** in accordance with the E.A. Act for municipal **infrastructure projects**.

Master plans, such as this Transportation and Trails Master Plan, are **required to complete Phases 1 and 2** of the five phases of the Municipal Class E.A. process. The **plan is being completed consistent** with approach 1 of the E.A. Master Planning process and will include:

TTMP Study Timeline



Fall 2022

PIC #1 - Winter 2023

We are here!

PIC #2 – Spring 2023

Summer 2023

Fall 2023

Part 1

Understand current travel patterns in the Township of Essa and existing challenges and opportunities, identify alternative network options

Part 2

Engage and gather input from residents and stakeholders on alternative network options, informing network priorities and vision for the future of Essa

Part 3

Refine alternative network options and opportunities based on stakeholder and public input

Part 4

Develop a TTMP implementation plan and policy framework

Part 5

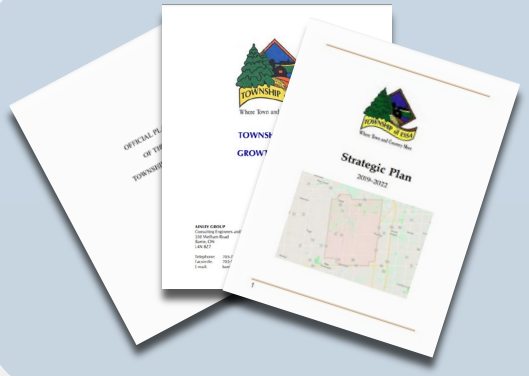
Final TTMP and Council Presentation

Background – Existing Policy Framework

County

- Transportation Master Plan (2014, Update Ongoing)
- Transit Feasibility & Implementation Study (2015)
- Trails Strategy (2014)

Local



- Official Plan (2001, Update Ongoing)
- Growth Strategy (2013)
- Strategic Plan (2019-2022)

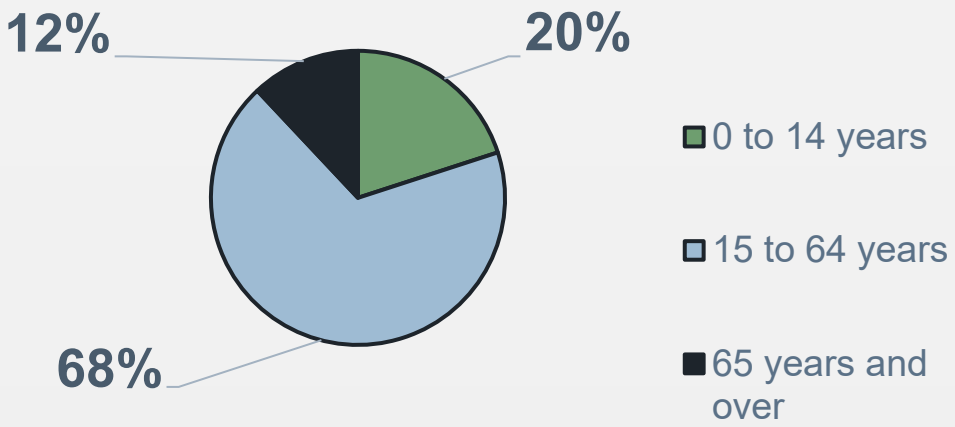
Background – Township of Essa Context

ESSA POPULATION (TOTAL)

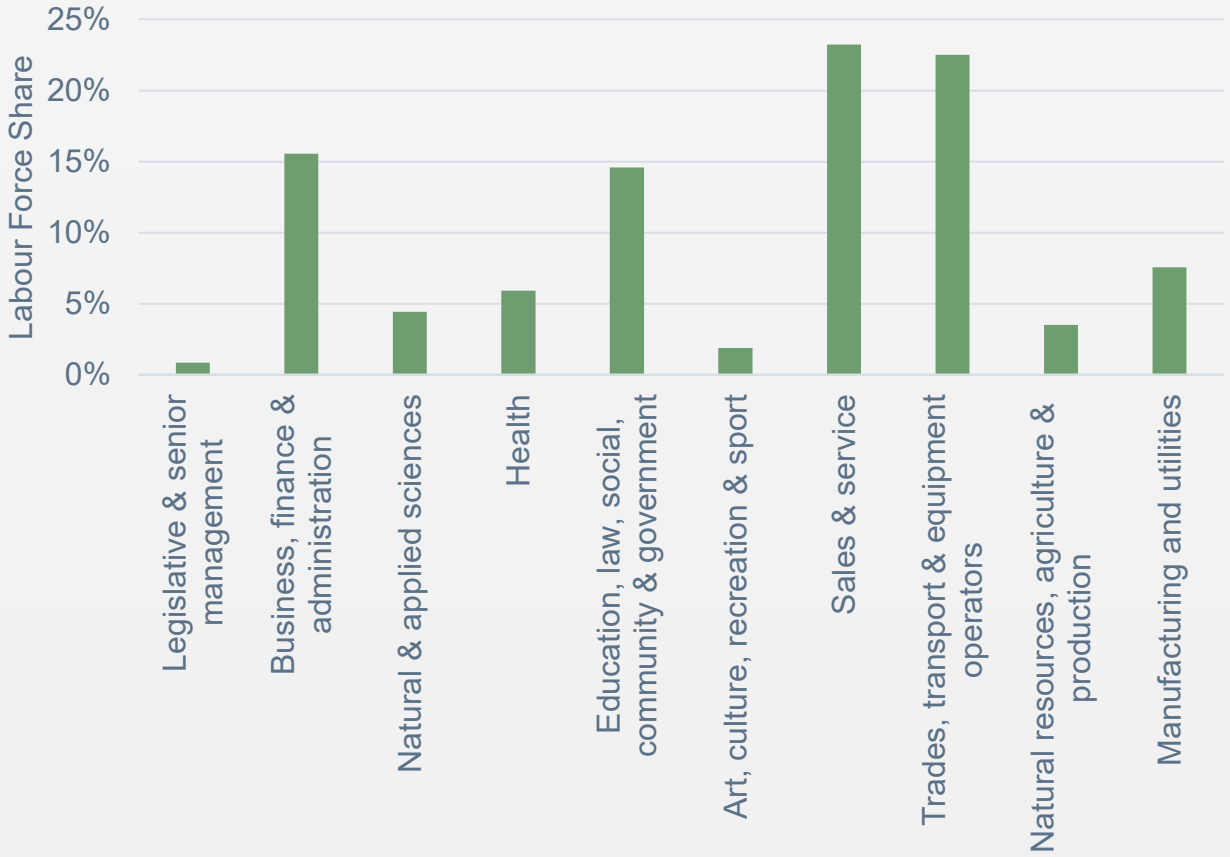
21,083 (2016)

22,970 (2021)

ESSA AGE GROUP DISTRIBUTION



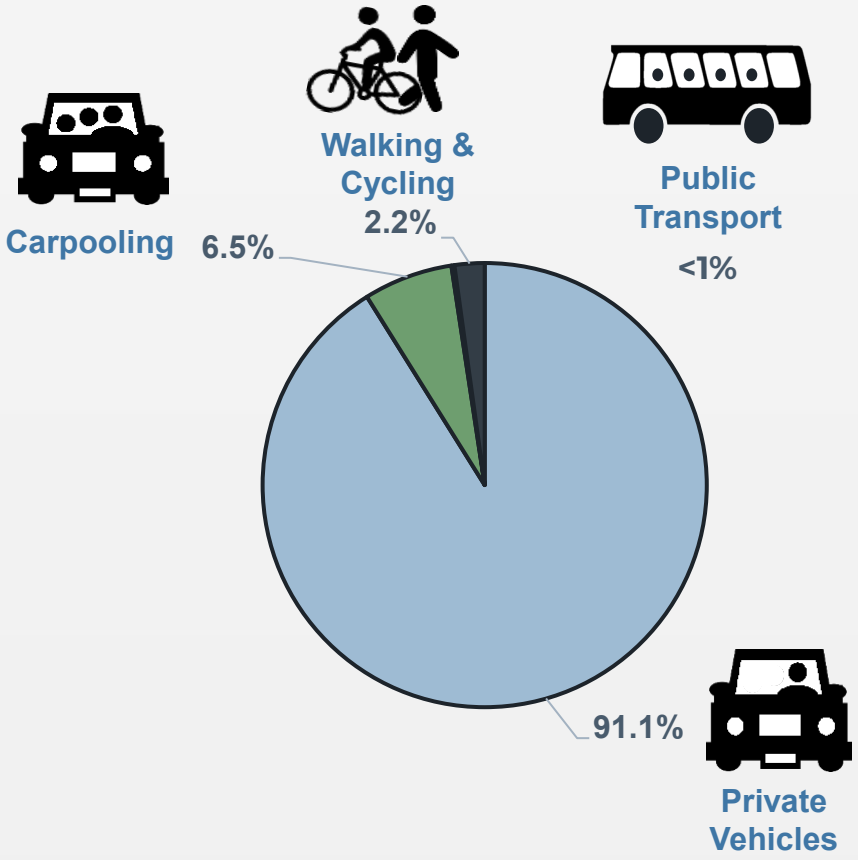
ESSA TOP EMPLOYMENT INDUSTRIES
Total Employed Labour Force: ~ 12,510



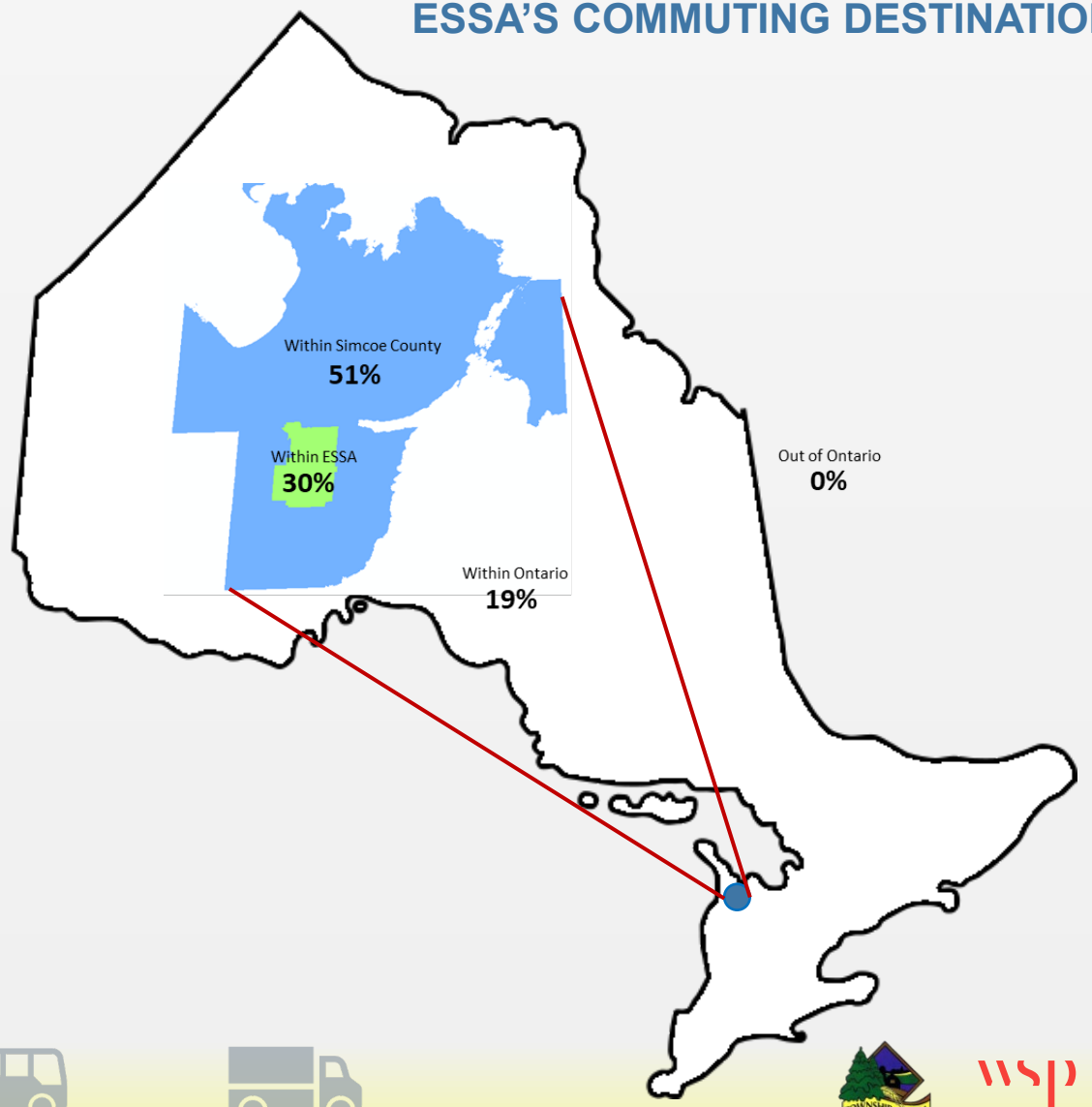
Source: Census Canada (2021)

Background – Existing Travel Patterns

ESSA'S MODE OF COMMUTING



ESSA'S COMMUTING DESTINATIONS



TTMP Study Objectives

Building the Active Transportation and Off-Road Trails Network

Identify:

- Retrofit existing roads by identifying long-term treatments to support active transportation and off-road trails
- Develop active transportation, trails-supportive, and complete streets policies through the Official Plan update
- Programming opportunities to expand cycling culture

Planning for Better Roads

Identify:

- Extensions, intersection improvements, new construction, and/or road widening opportunities
- Road improvements with active transportation and transit to better support growth
- County network improvements
- Network connection opportunities with neighbouring municipalities

Develop:

- Short-, medium-, and long-term implementation strategy
- Financial funding strategy
- Policy framework objectives for the Official Plan update
- Transit advocacy framework

TTMP Working Vision

A vision for transportation has been established for the Township of Essa to reflect the priorities of the community and the Township's strategic objectives looking to the future. The visions reads as follows:

> To provide a multi-modal network that allows users of **all ages and abilities** to **access all modes of transportation**, contributing to a **connected** and resilient community. The success of the Plan will be based on its ability to accentuate Essa's unique natural and rural areas, while accommodating future travel demands as the community continues to grow. Its success will be based on the implementation of achievable and relevant programming looking to the 20 year planning horizon.

The vision for Essa's transportation future integrates FOUR key principles:

Accommodate future growth and associated travel demands

Promote equitable and accessible travel for all ages and abilities

Integrate traffic calming measures to enhance safety

Improving connectivity for all modes of transportation to create resilient communities

Trails Overview

- There are currently 7 existing recreational trails within the Township of Essa totalling 18.1km.
  - 3 are maintained by the Township
  - Most trails are crushed limestone surfacing
  - Numerous user-made pathways due to gaps in existing network
- Planning for the Trail network:
  - Possible trail alignments/formalizations have been identified for review and comment.
  - Collect feedback on alignments to add, what could be removed, and identify preferred typologies.
  - Identify opportunities and concerns regarding user types, infrastructure design considerations, policy considerations.

Proposed Trail Typologies:

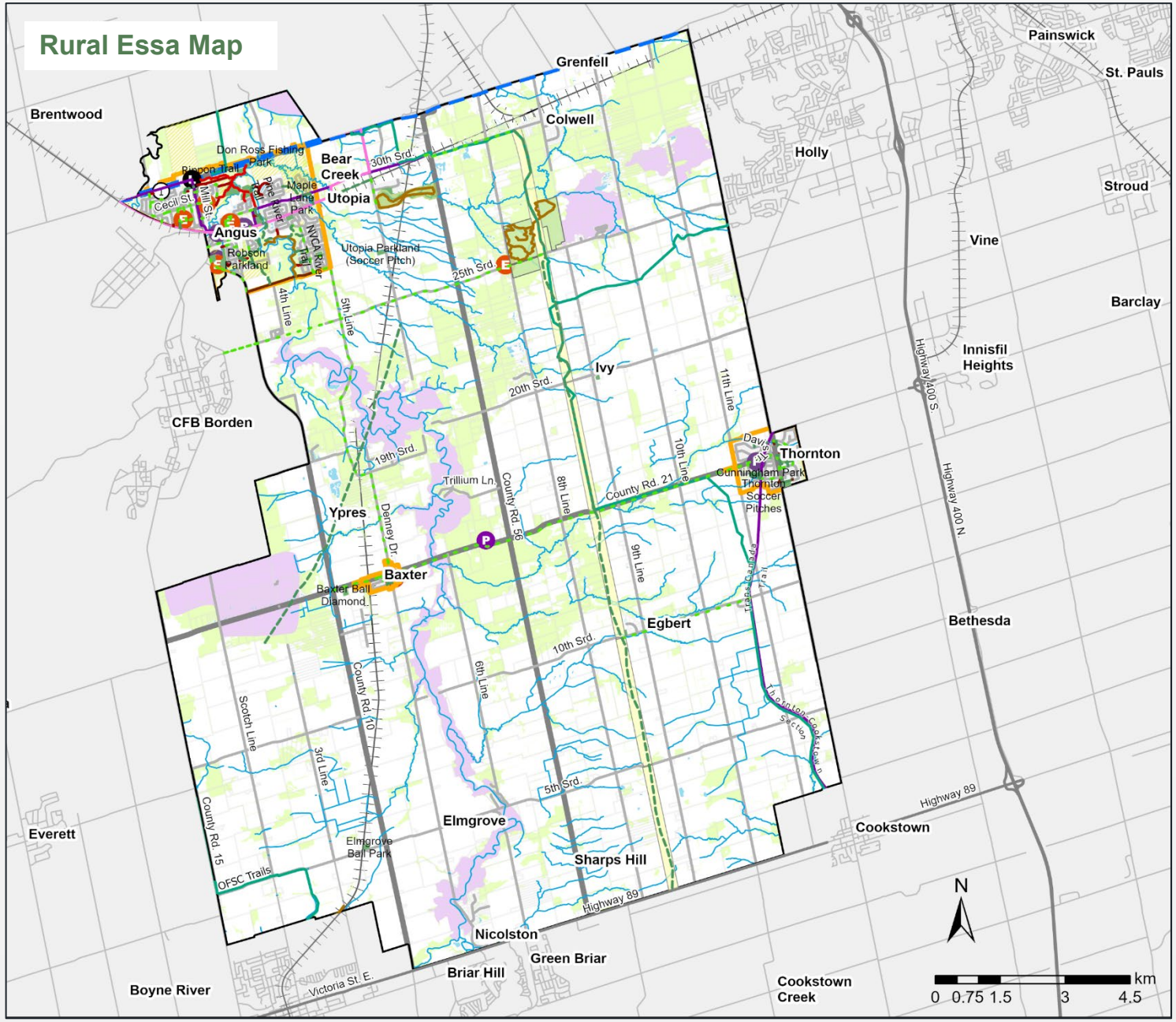
Primary
- Asphalt pathway, off-road condition
- Frequently use, winter maintained.
- Connects neighbourhood to key destinations

Secondary
- Compacted stone dust surface
- Connects neighbourhoods to recreational experiences
- Accessible routes through both urban and nature areas.

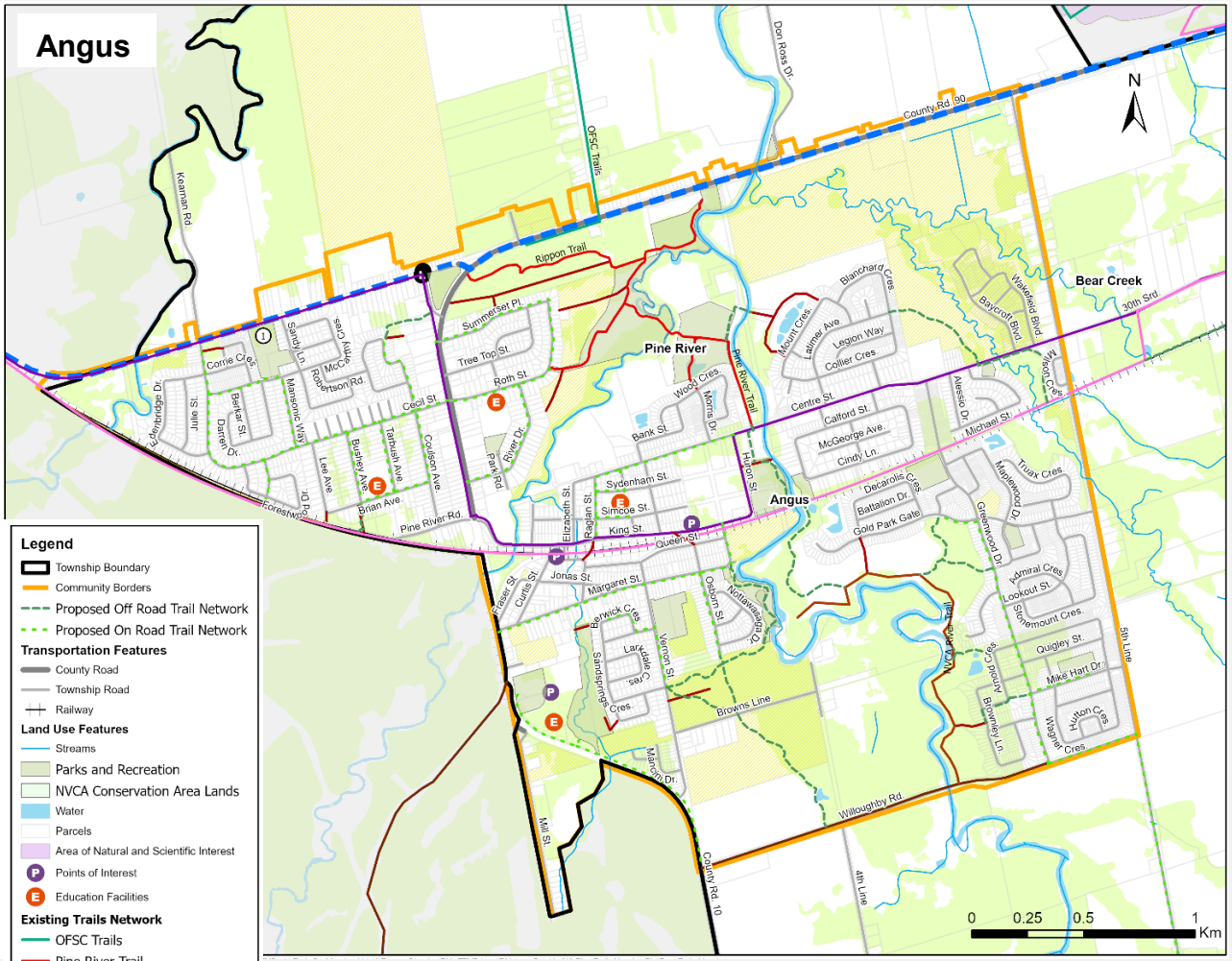
Rustic / Natural
- Natural, compacted earth or mulch surfacing.
- Located in sensitive areas or areas of lower frequency use.
- Offers a more challenging experience.

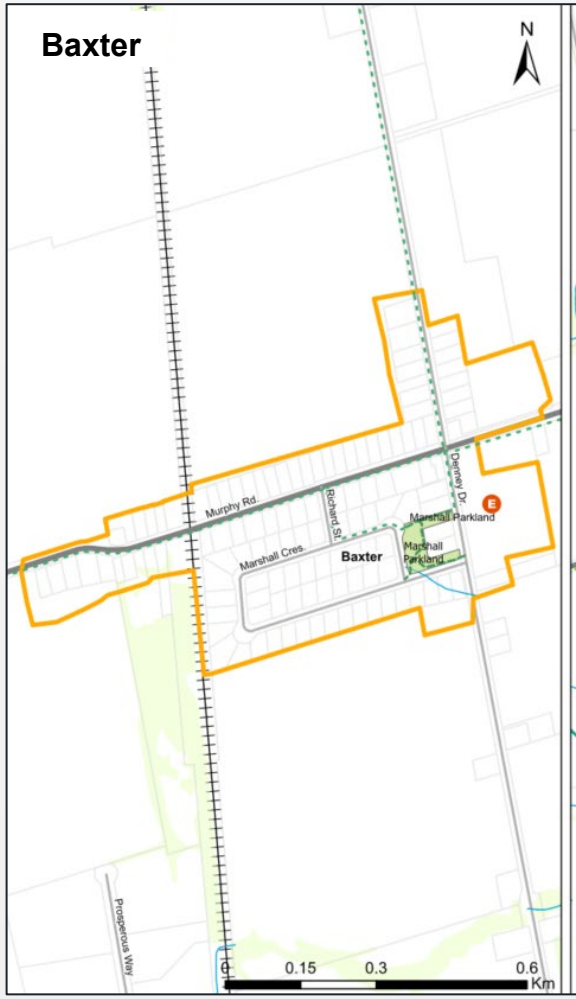
Neighbour-hood Greenway
- Sidewalk and on-road facility on quiet streets
- Asphalt multi-use pathway on busy streets
- Connects neighbourhoods to destinations and trails.

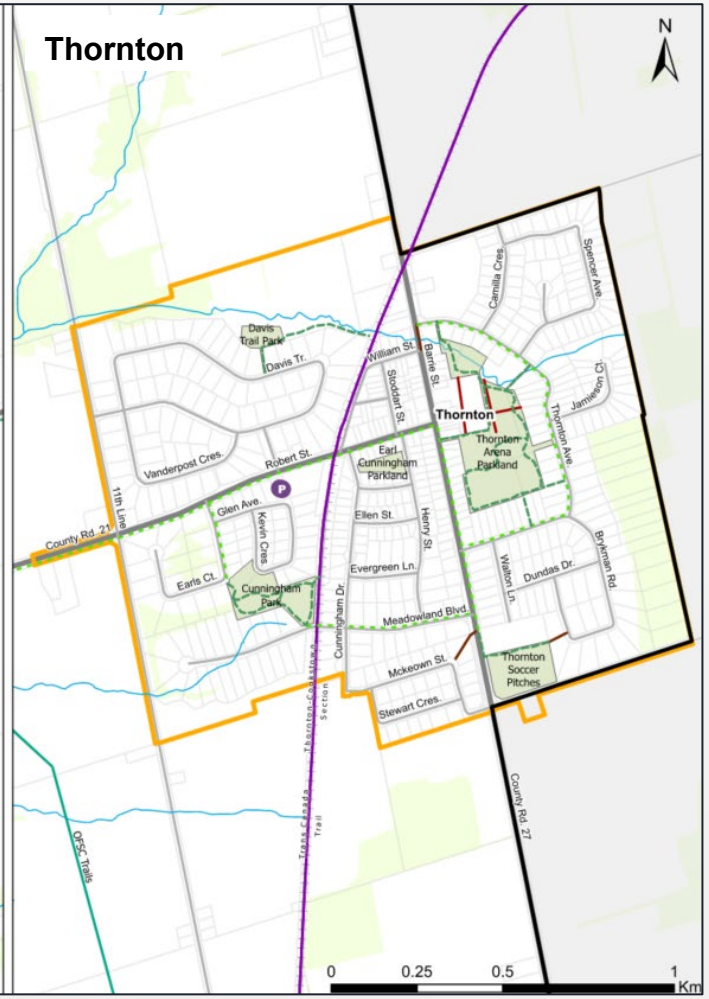
Existing and Proposed Trails



Existing and Proposed Trails







Parks Overview

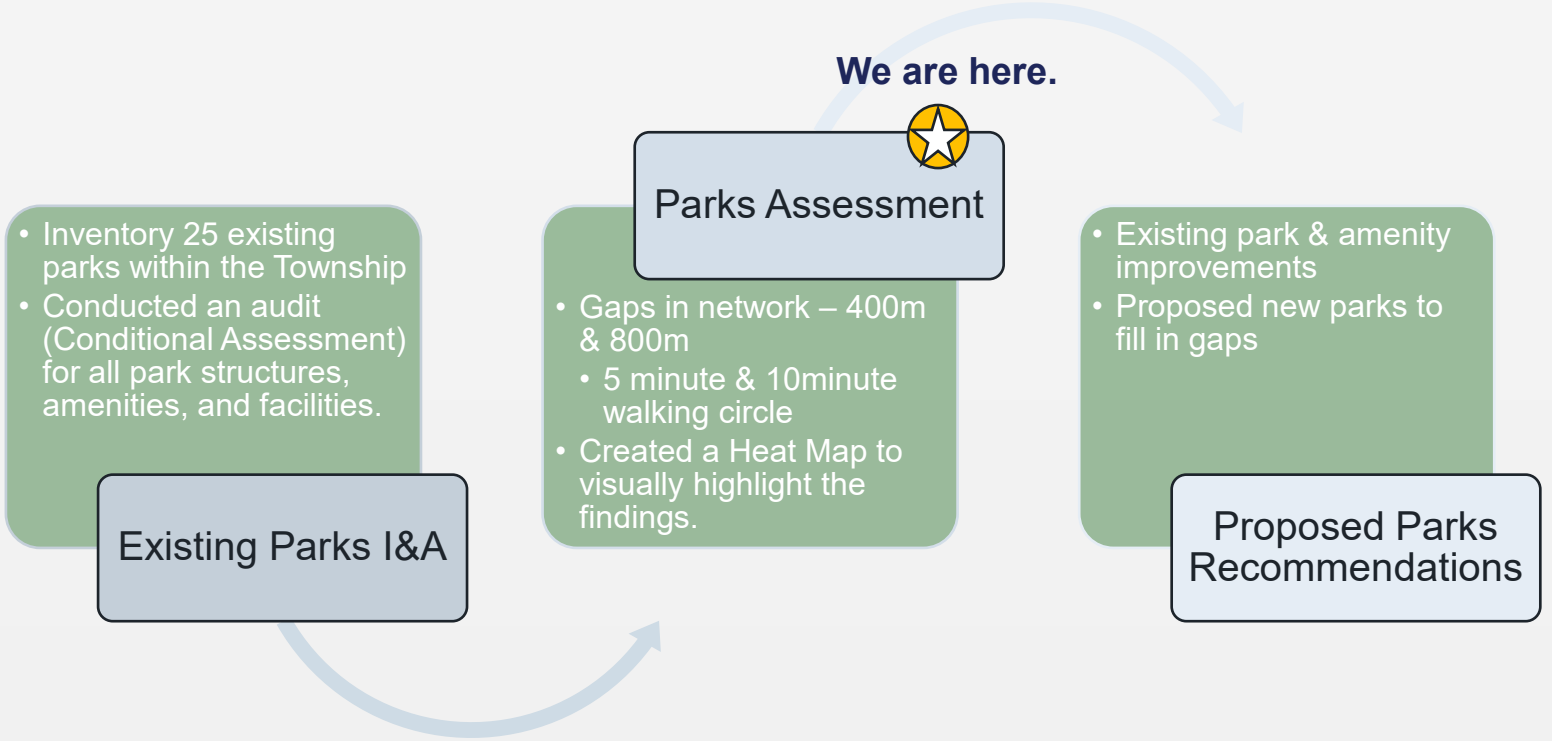
The Township of Essa has approximately:

- 25 existing parks,
- 20 playgrounds, and
- a variety of sports facilities.

An audit was conducted via a conditional assessment. The status is defined as:

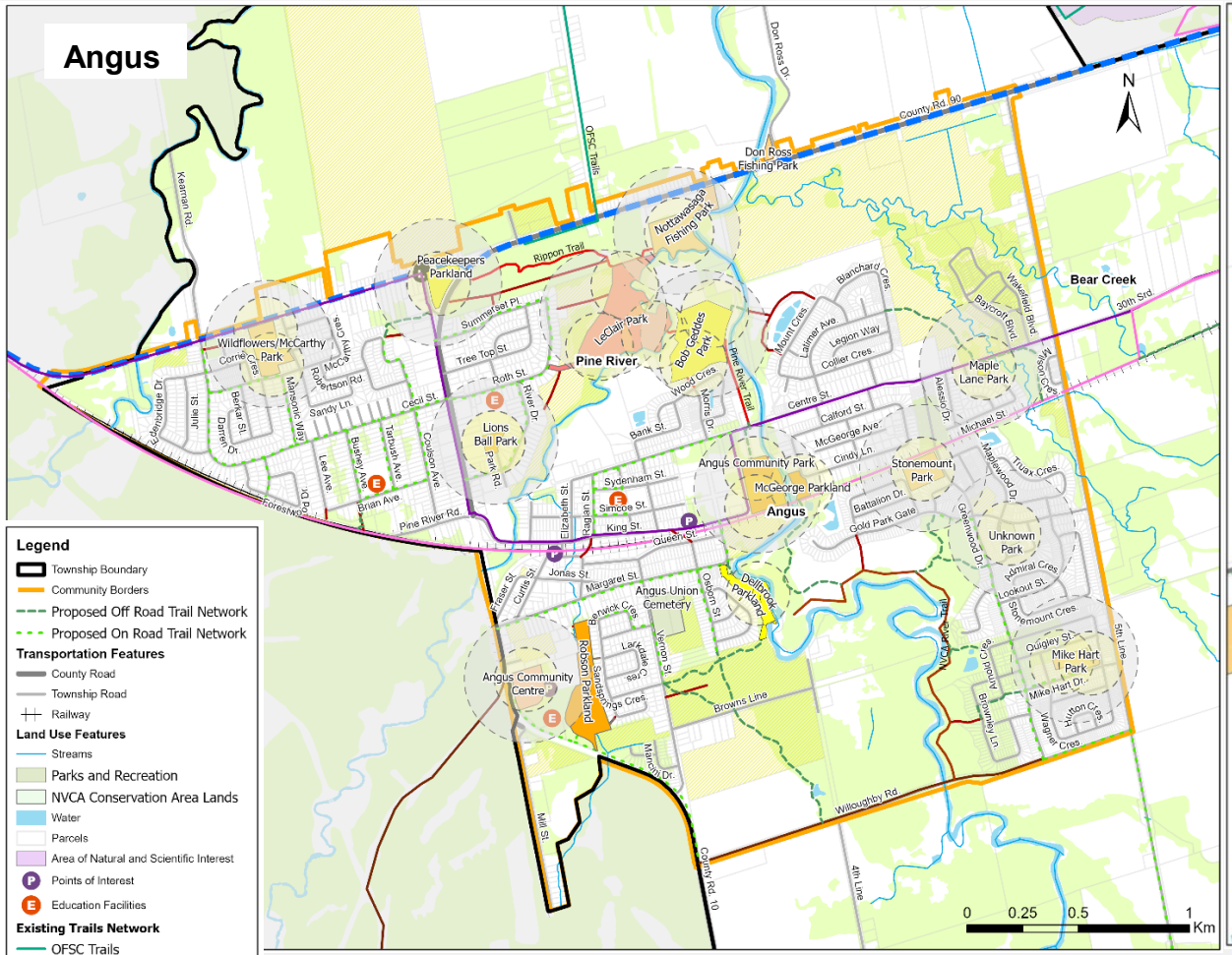
- Good – usually in 2nd third of its useful life
- Fair – Usually in end third of its useful life
- Poor – Exceeds its useful life

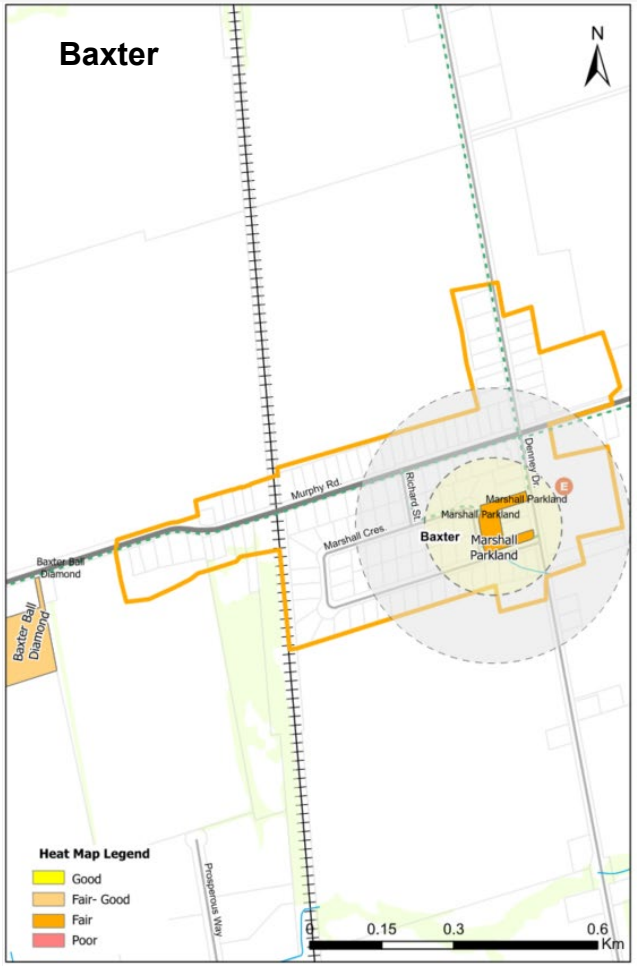
Parks Assessment Process:

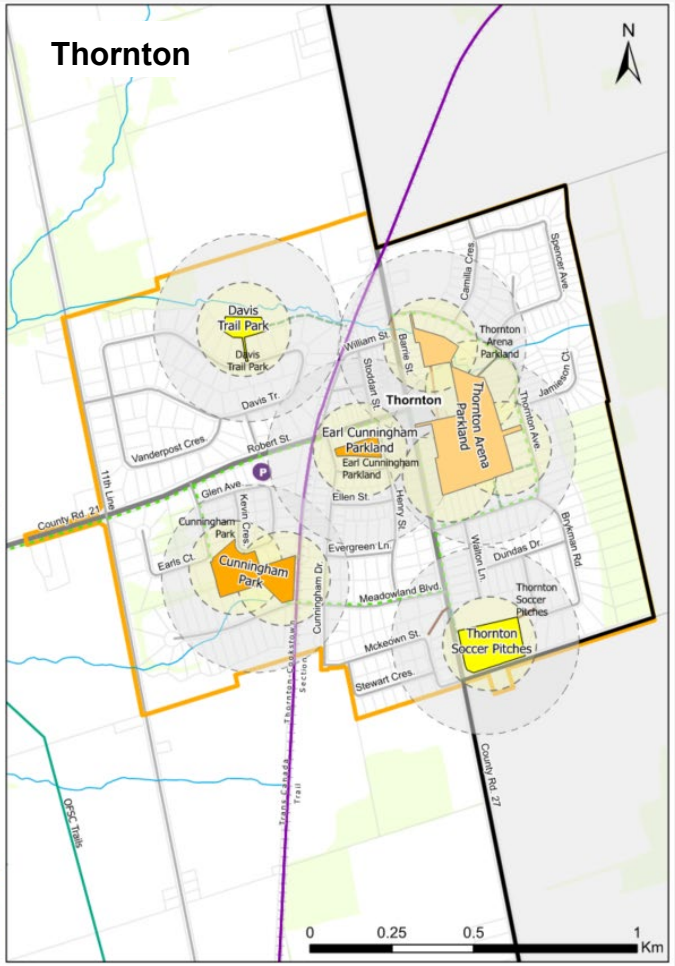


Planning for Parks: Now to identify needs and locations for new park infrastructure and/or infrastructure improvements!

Existing Parks



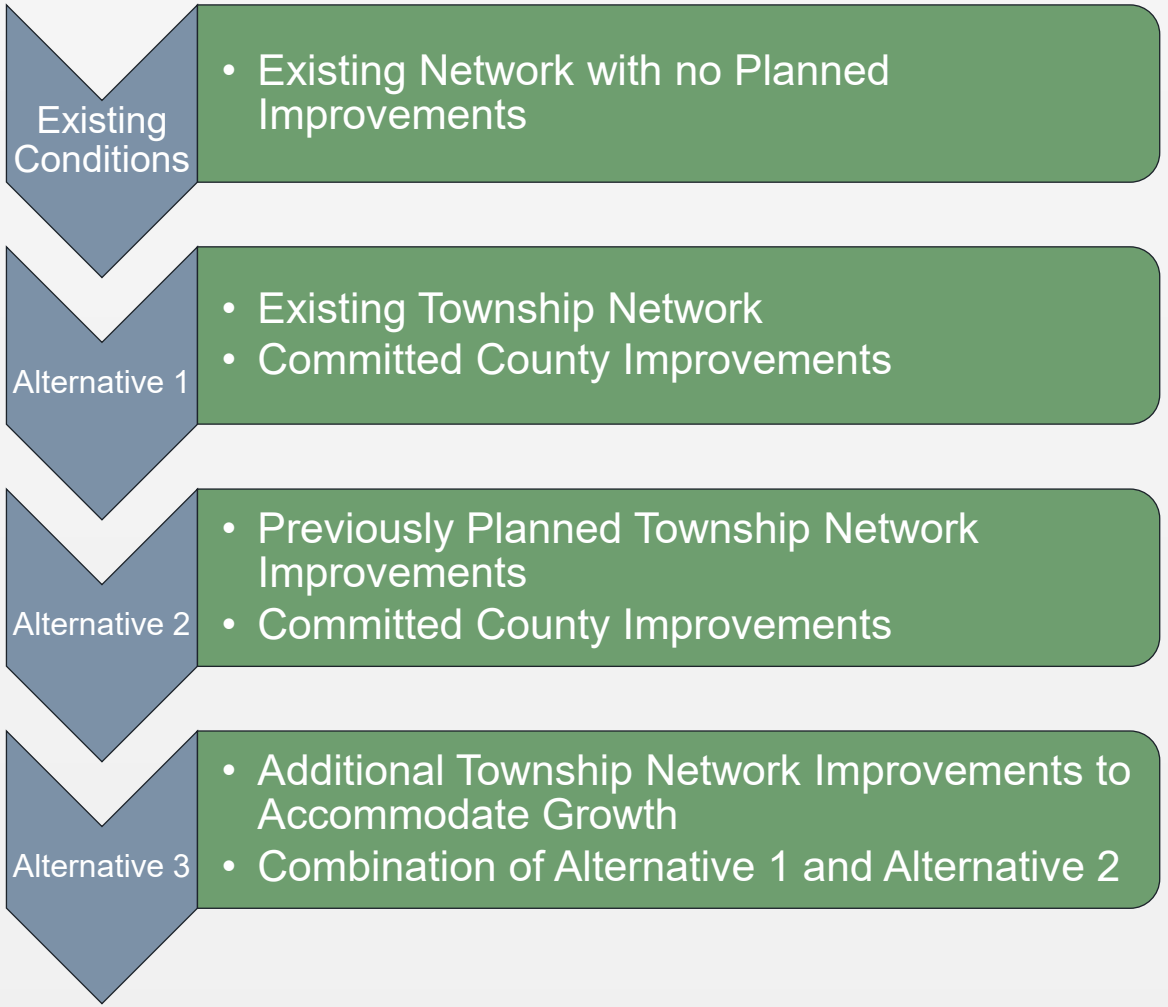




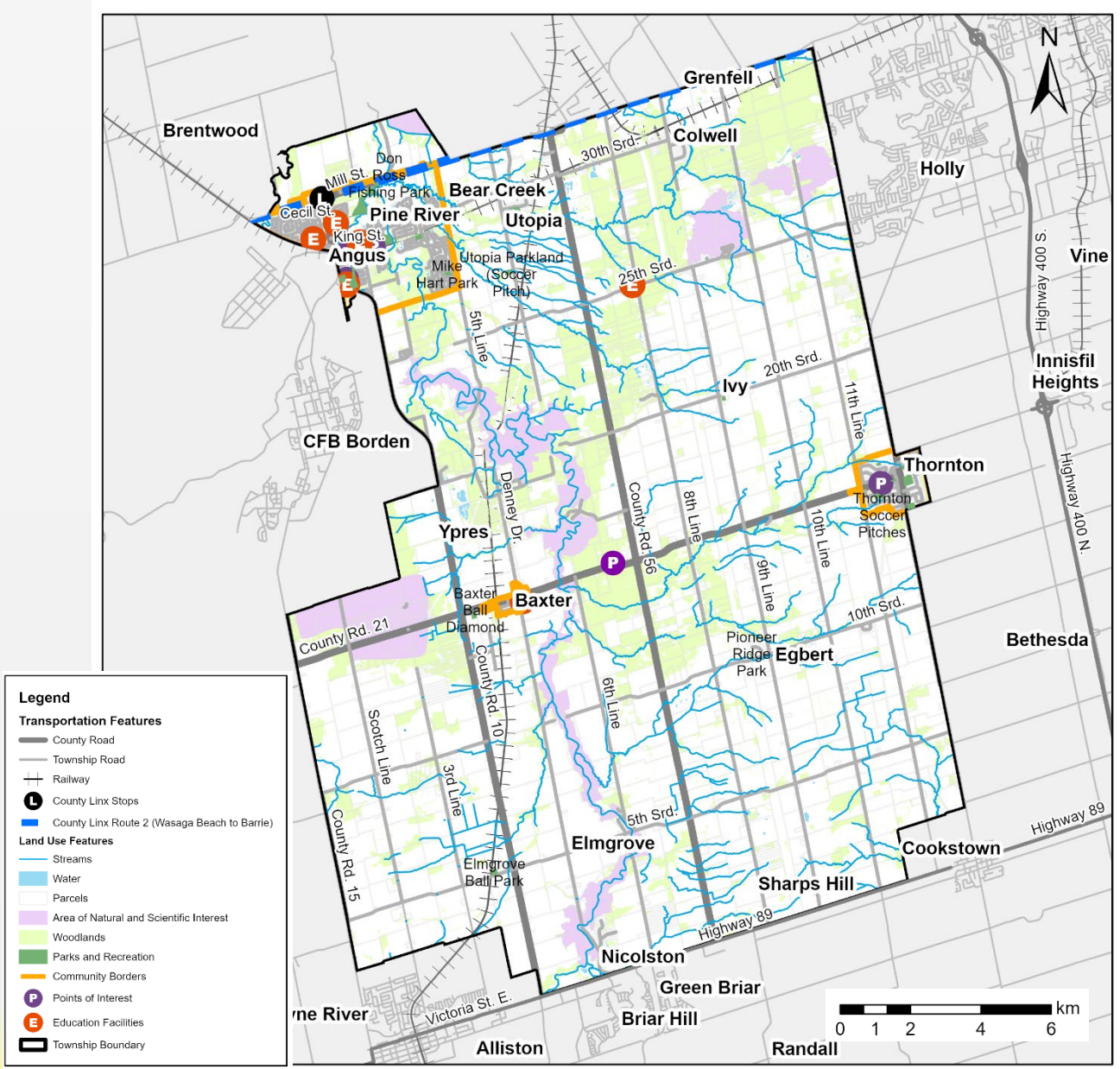
Road Network Overview

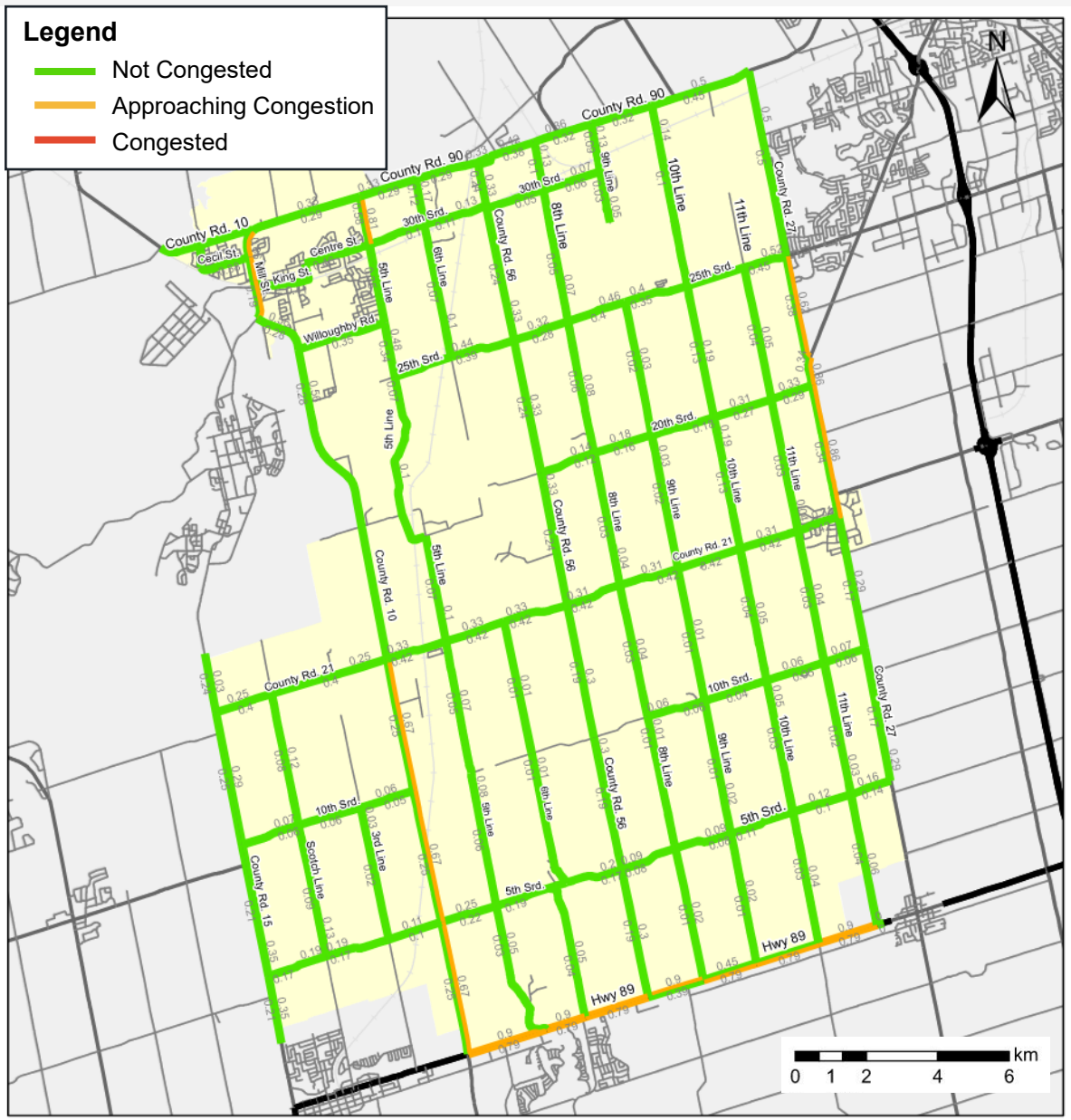
- In addition to the existing conditions, 3 road network alternatives are being analyzed to determine the preferred transportation network, looking forward to 2043
- Planning for the Road network:
  - Possible road alignment opportunities with Active Transportation and Trails improvements
  - Strategic capacity improvements to accommodate future growth
  - Identify opportunities for alignments with local municipalities and Simcoe County for proposed road improvements

Proposed Road Network Alternatives:



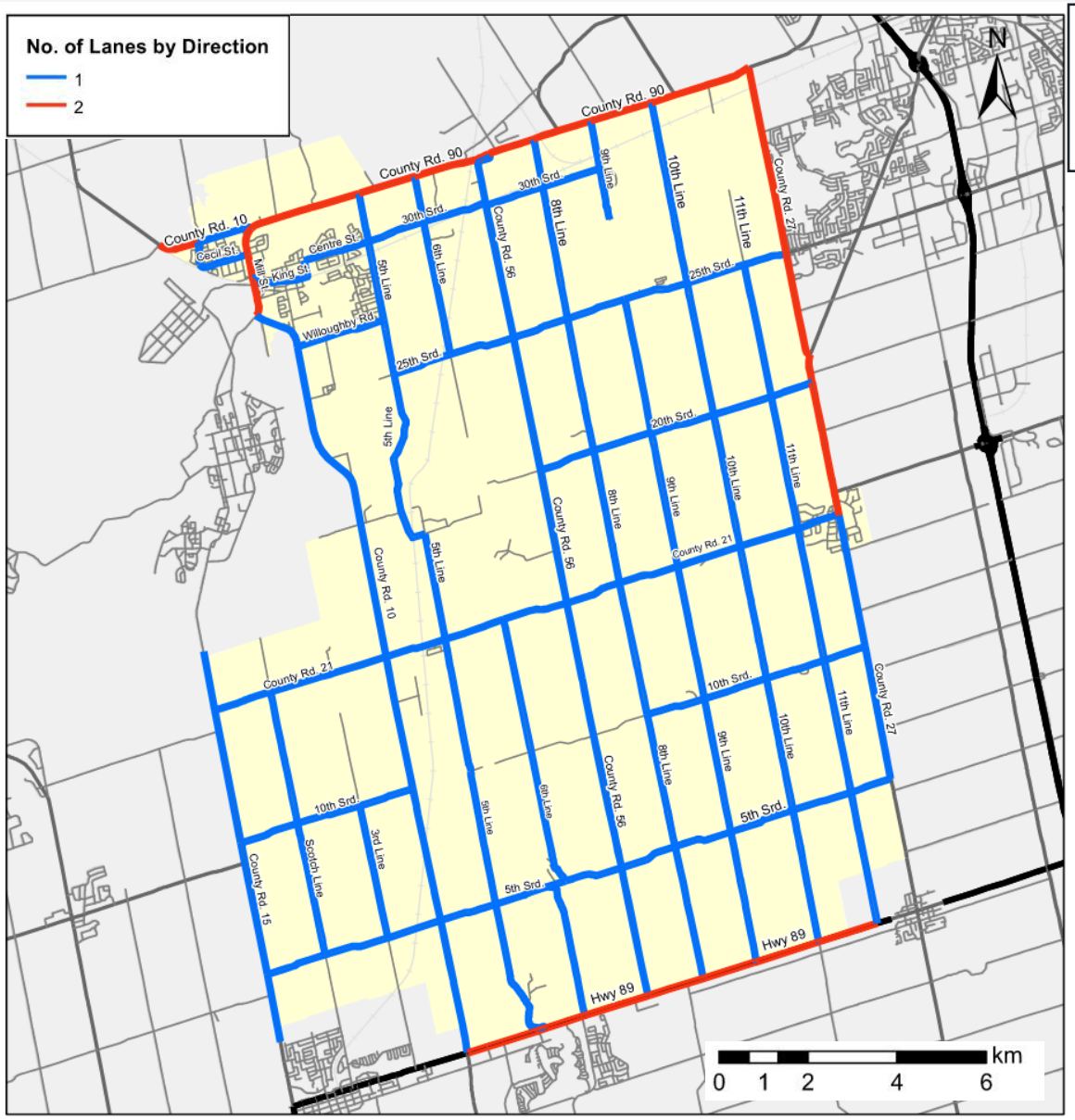
Existing Road Network – Existing PM Peak Hour



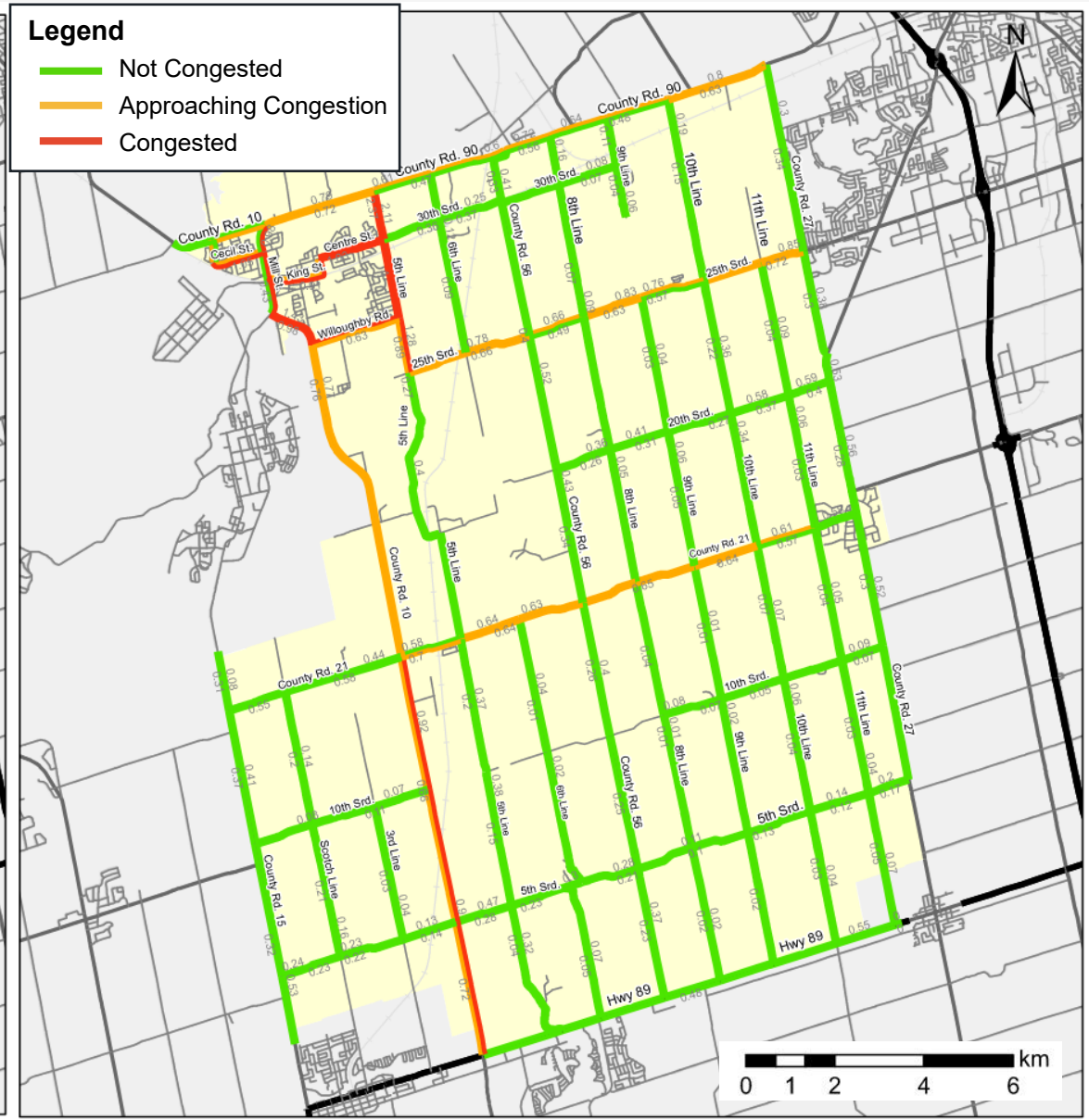


Alternative 1 – Base Case (20 year horizon)

No Build Conditions

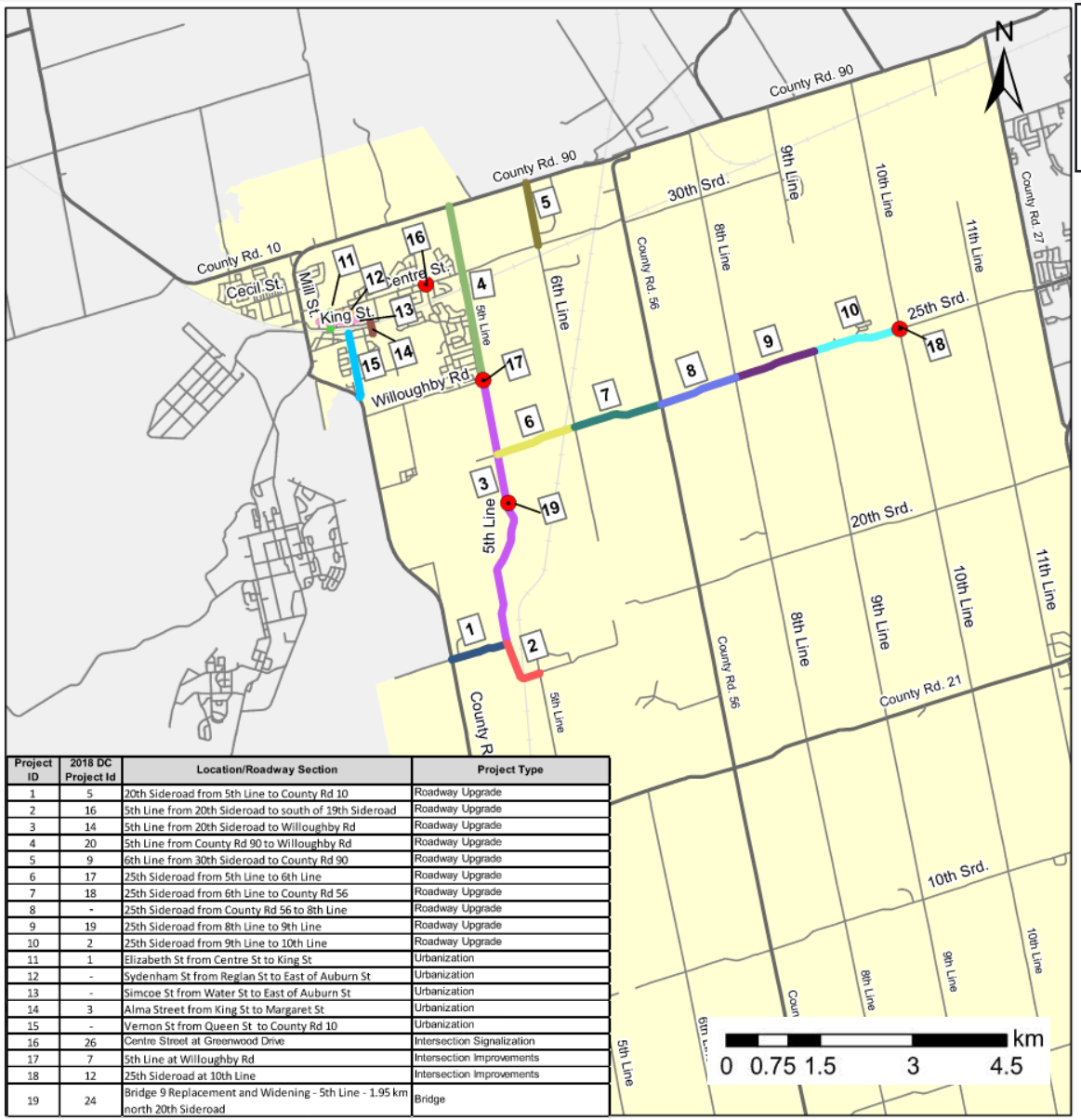


PM Peak Hour



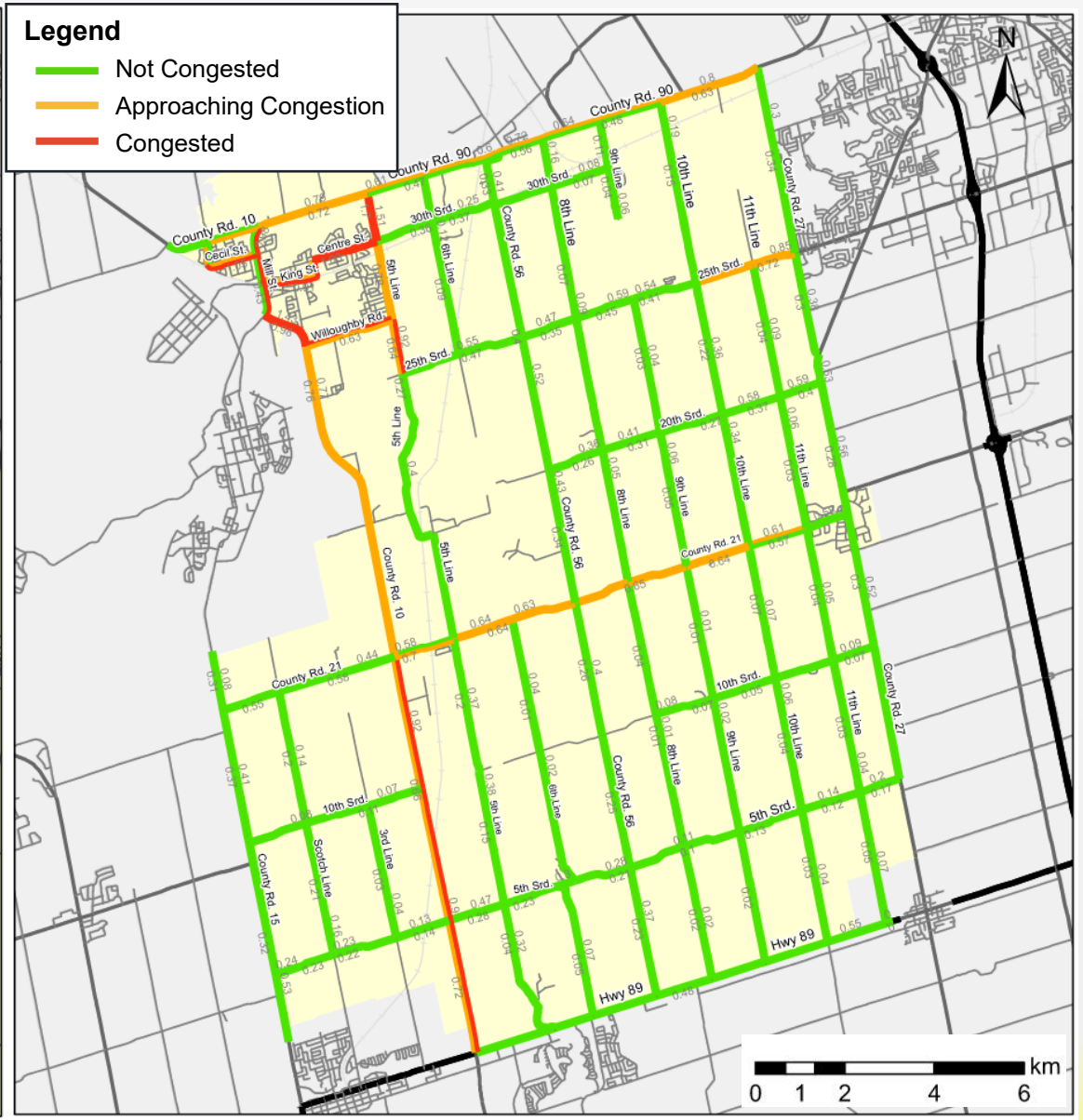
Alternative 2 (20 year horizon)

Roadway Improvements



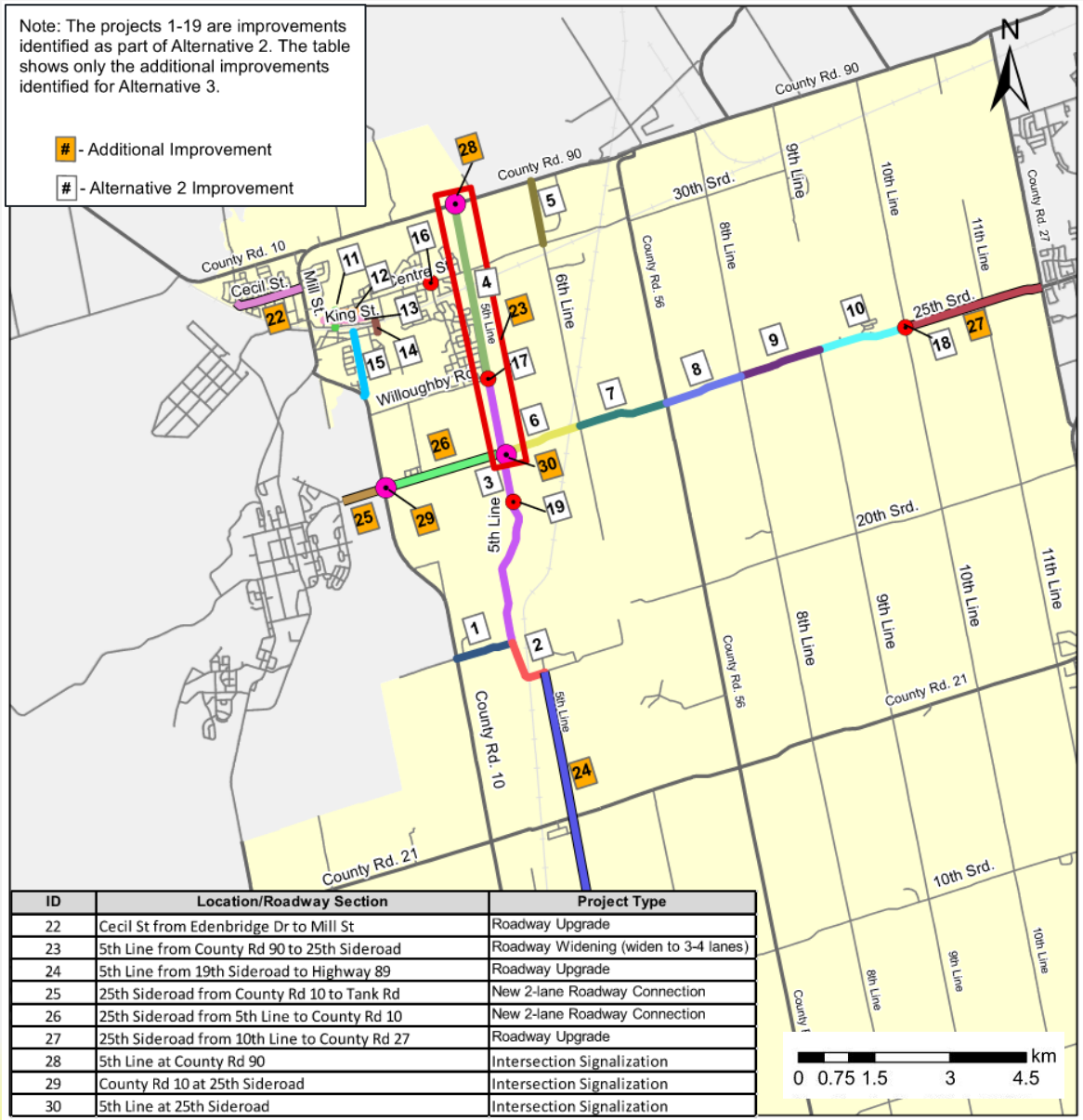
Project ID	2018 DC Project Id	Location/Roadway Section	Project Type
1	5	20th Sideroad from 5th Line to County Rd 10	Roadway Upgrade
2	16	5th Line from 20th Sideroad to south of 19th Sideroad	Roadway Upgrade
3	14	5th Line from 20th Sideroad to Willoughby Rd	Roadway Upgrade
4	20	5th Line from County Rd 90 to Willoughby Rd	Roadway Upgrade
5	9	6th Line from 30th Sideroad to County Rd 90	Roadway Upgrade
6	17	25th Sideroad from 5th Line to 6th Line	Roadway Upgrade
7	18	25th Sideroad from 6th Line to County Rd 56	Roadway Upgrade
8	-	25th Sideroad from County Rd 56 to 8th Line	Roadway Upgrade
9	19	25th Sideroad from 8th Line to 9th Line	Roadway Upgrade
10	2	25th Sideroad from 9th Line to 10th Line	Roadway Upgrade
11	1	Elizabeth St from Centre St to King St	Urbanization
12	-	Sydenham St from Reglan St to East of Auburn St	Urbanization
13	-	Simcoe St from Water St to East of Auburn St	Urbanization
14	3	Alma Street from King St to Margaret St	Urbanization
15	-	Vernon St from Queen St to County Rd 10	Urbanization
16	26	Centre Street at Greenwood Drive	Intersection Signalization
17	7	5th Line at Willoughby Rd	Intersection Improvements
18	12	25th Sideroad at 10th Line	Intersection Improvements
19	24	Bridge 9 Replacement and Widening - 5th Line - 1.95 km north 20th Sideroad	Bridge

PM Peak Hour



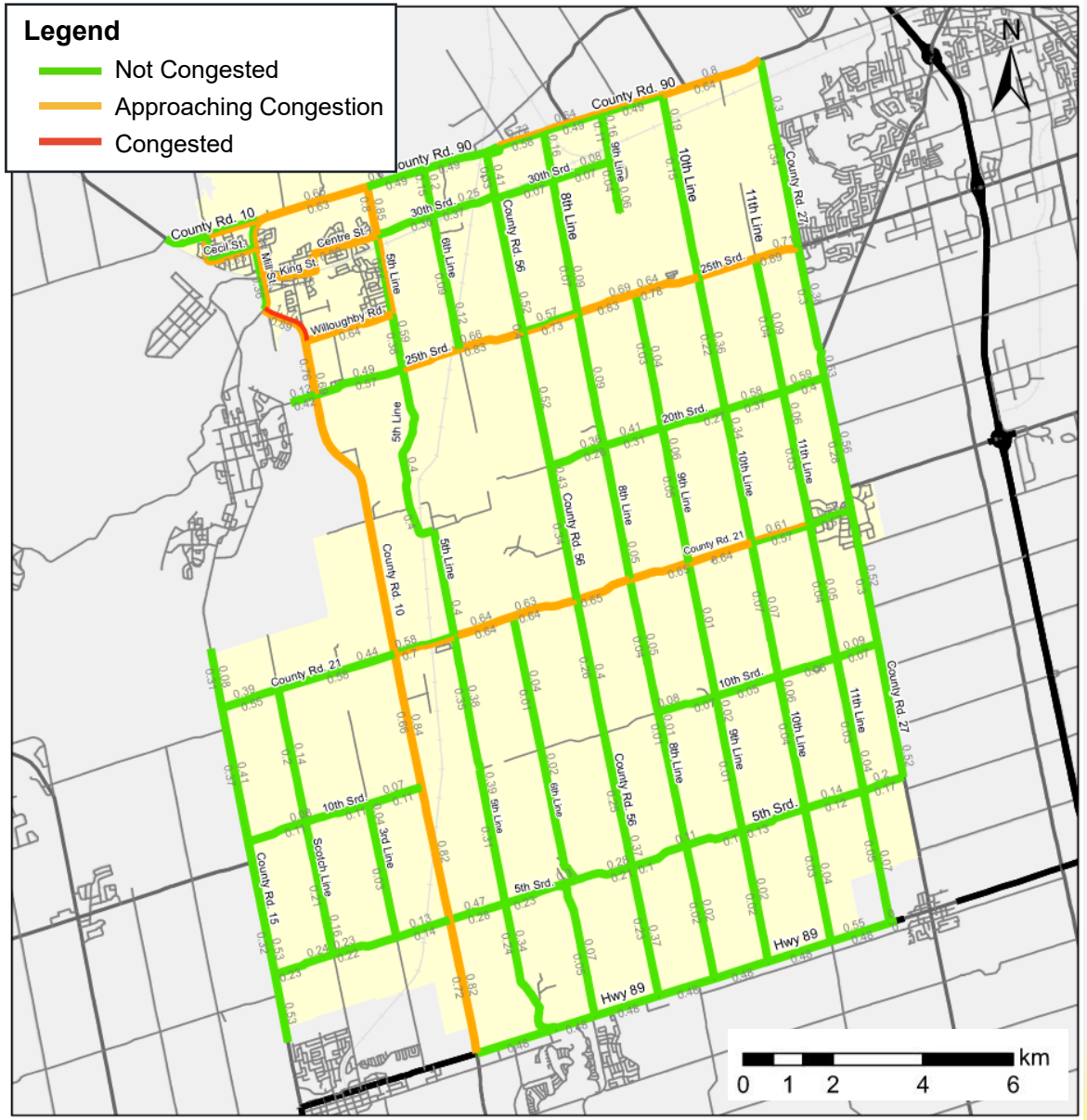
Alternative 3 – Preliminary Recommended Network (20 year horizon)

Roadway Improvements



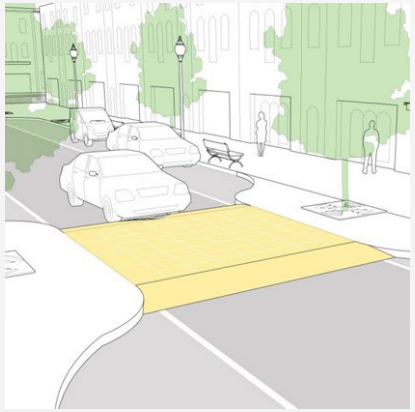
ID	Location/Roadway Section	Project Type
22	Cecil St from Edenbridge Dr to Mill St	Roadway Upgrade
23	5th Line from County Rd 90 to 25th Sideroad	Roadway Widening (widen to 3-4 lanes)
24	5th Line from 19th Sideroad to Highway 89	Roadway Upgrade
25	25th Sideroad from County Rd 10 to Tank Rd	New 2-lane Roadway Connection
26	25th Sideroad from 5th Line to County Rd 10	New 2-lane Roadway Connection
27	25th Sideroad from 10th Line to County Rd 27	Roadway Upgrade
28	5th Line at County Rd 90	Intersection Signalization
29	County Rd 10 at 25th Sideroad	Intersection Signalization
30	5th Line at 25th Sideroad	Intersection Signalization

PM Peak Hour



Examples of Traffic Calming Measures

Speed Cushions



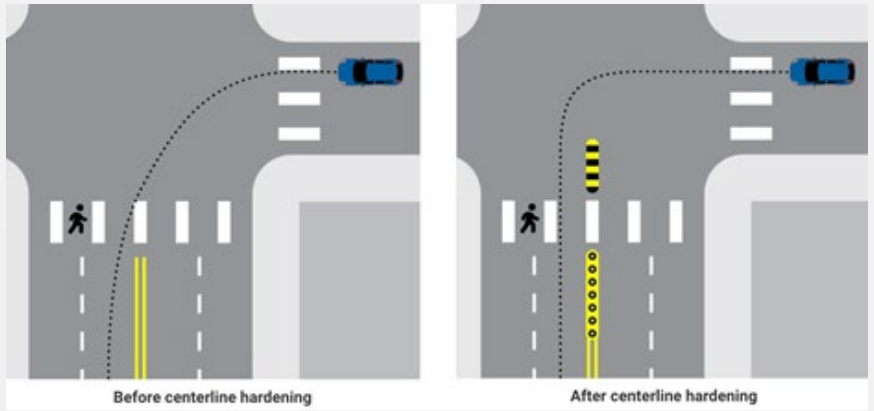
Speed table / Raised Crossing

Raised Crosswalk / Intersection

Curb Extensions

Truck Apron

Raised Median Island



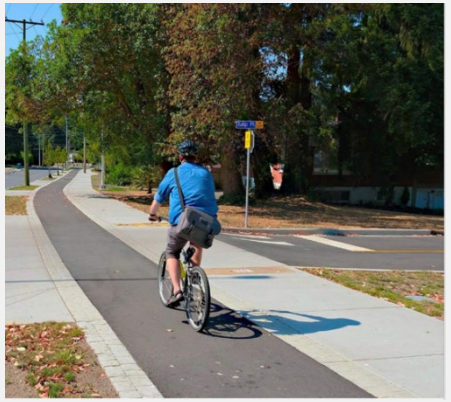
Intersection Centreline Hardening

Examples of Traffic Calming Measures

Diverters / Modal Filters

Dynamic Speed Signs

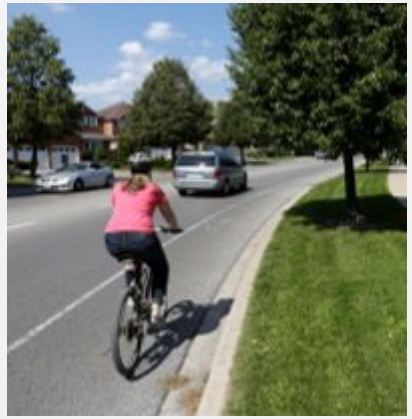
Centreline Bollards / Flex Bollards



Continuous Sidewalks

Neighbourhood Traffic Circles

Roundabout



Urban Shoulders

School Parking and Drop Off

Add sidewalks and crossing guards

Walk-A-Block programs and dedicated drop-off zones

School streets

On Street Parking

Resident Permit parking

Parking Bays

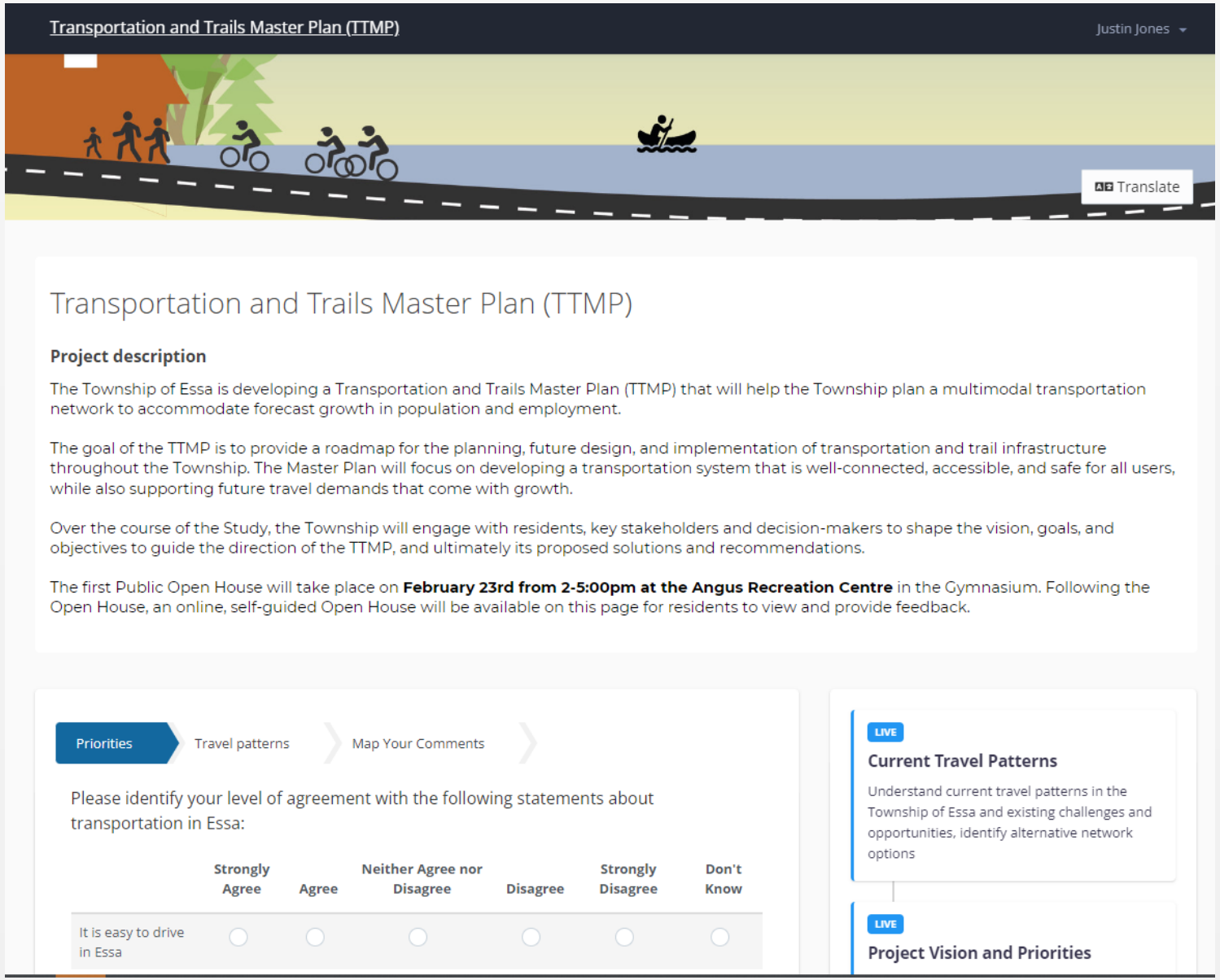
Project Webpage

We want to hear from you!

To Participate

1. **Scan the QR Code or use the link:**

www.publicinput.com/EssaTTMP



Next Steps & Contact Information

Thank you for contributing to the Transportation and Trails Master Plan!

1. **Summarize** and process input received
2. **Confirm** active transportation, transit, and road network recommendations
3. Provide transportation **inputs** into the Development Charges Background Study and By-law Update
4. **Prepare** draft recommendations including policy directives and implementation strategy for Public Consultation Round #2

Have more comments? Please visit:
https://publicinput.com/essattmp

Contact information:

Michael Mikael, P.Eng
(Township of Essa)
E:mmikael@essatownship.on.ca

Brett Sears, MCIP RPP
(WSP Canada Inc.)
E: brett.sears@wsp.com

Township of Essa

Transportation and Trails Master Plan

Public Open House #2

March 19, 2024

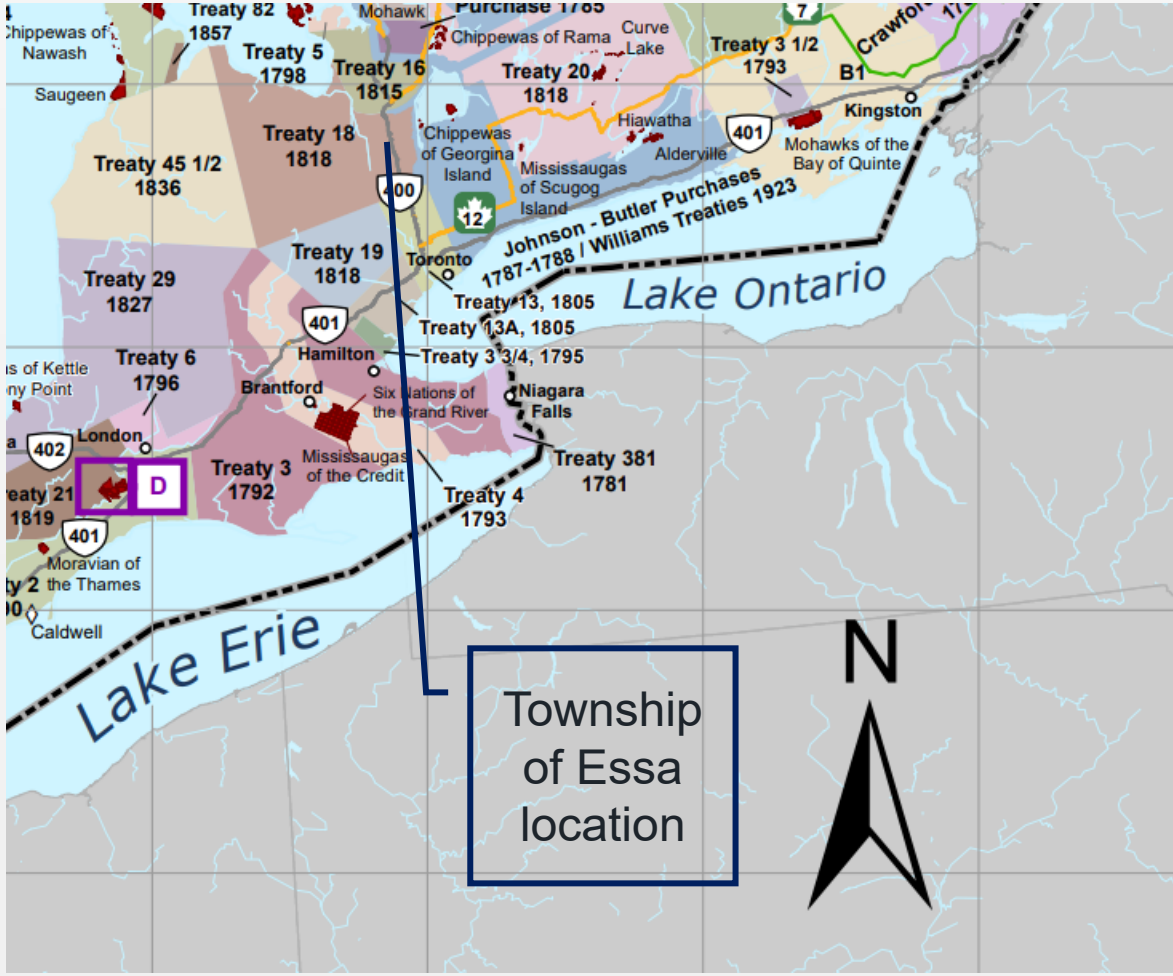
Indigenous Land Acknowledgement

We acknowledge the land that our community safety and well-being planning will take place on is the traditional land of the Anishinaabe People.

The Anishinaabe include the Ojibwe, Odawa, and Potawatomi Nations, collectively known as the Three Fires Confederacy. It should be noted that the Wendat and the Haudenosaunee Nations have also walked on this territory over time.

In times of great change, we recognize more than ever the importance to honour Indigenous history and culture and are committed to moving forward in the spirit of reconciliation, respect and good health with all First Nation, Métis and Inuit people and our community as a whole.

As representatives of the people of the Township of Essa, we are grateful to have the opportunity to work and live on these lands.



Source: Provincial Government of Ontario (2022). First Nations and Treaties.

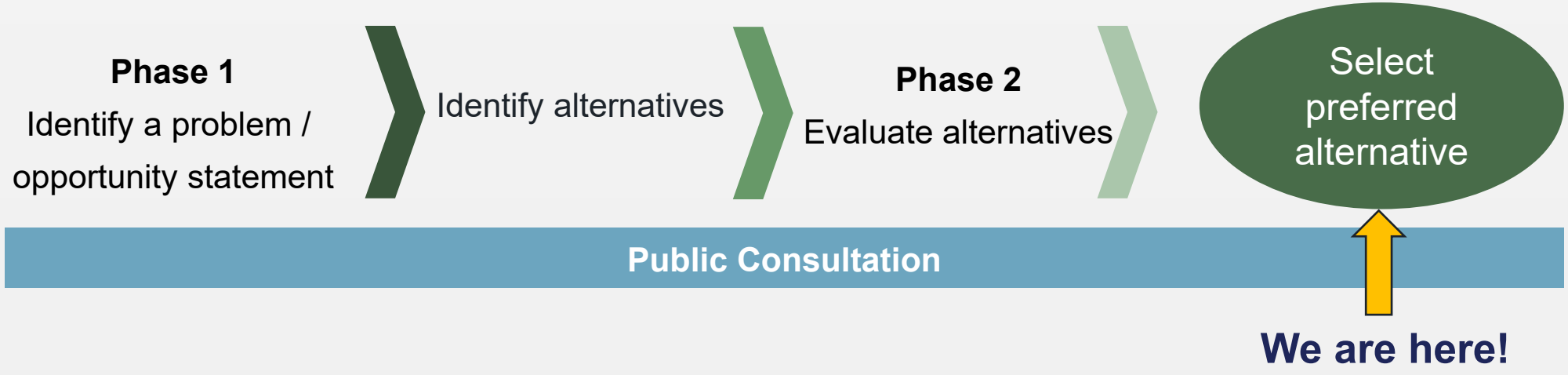
Introductions and Meeting Objectives

1. Provide an overview of the Transportation and Trails Master Plan Development Process
2. Present recommendations for Roads, Active Transportation, and Trails
3. Discuss recommended strategies for pedestrian crossover locations, traffic calming measures, and parking in the Township
4. Gather feedback to finalize and complete the Transportation and Trails Master Plan

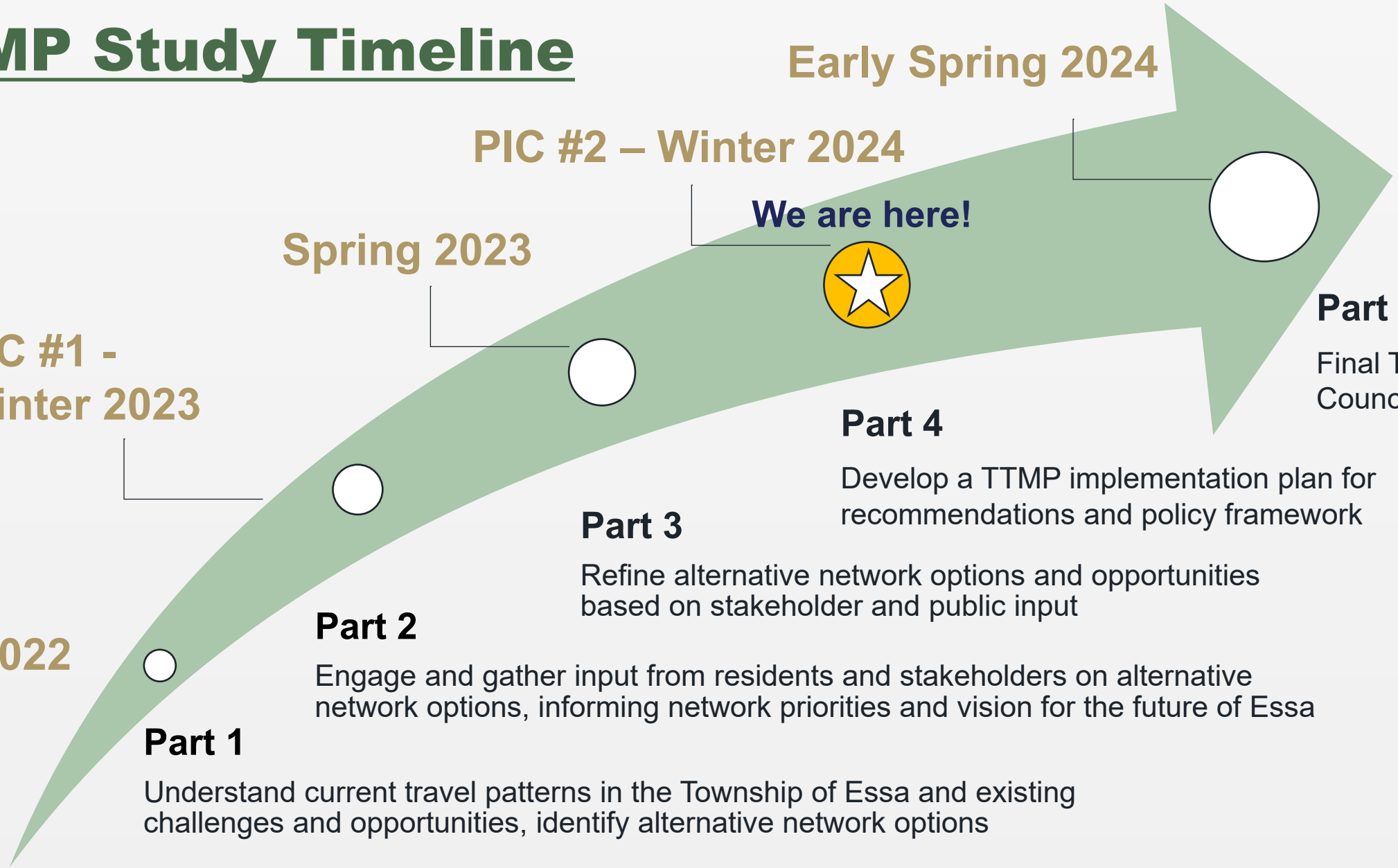
TTMP Development Process

The **Municipal Class Environmental Assessment** (E.A.) **provides a process** in accordance with the E.A. Act for municipal **infrastructure projects**.

Master plans, such as this Transportation and Trails Master Plan, are **required to complete Phases 1 and 2** of the five phases of the Municipal Class E.A. process. The **plan is being completed consistent** with approach 1 of the E.A. Master Planning process and will include:



TTMP Study Timeline



Part 5

Final TTMP and Council Presentation

Part 4

Develop a TTMP implementation plan for recommendations and policy framework

Part 3

Refine alternative network options and opportunities based on stakeholder and public input

Part 2

Engage and gather input from residents and stakeholders on alternative network options, informing network priorities and vision for the future of Essa

Part 1

Understand current travel patterns in the Township of Essa and existing challenges and opportunities, identify alternative network options

TTMP Working Vision

A vision for transportation has been established for the Township of Essa to reflect the priorities of the community and the Township's strategic objectives looking to the future. The visions reads as follows:

> To provide a multi-modal network that allows users of **all ages and abilities** to **access all modes of transportation**, contributing to a **connected** and resilient community. The success of the Plan will be based on its ability to accentuate Essa's unique natural and rural areas, while accommodating future travel demands as the community continues to grow. Its success will be based on the implementation of achievable and relevant programming looking to the 20 year planning horizon.

The vision for Essa's transportation future integrates FOUR key principles:

Accommodate future growth and associated travel demands

Promote equitable and accessible travel for all ages and abilities

Integrate traffic calming measures to enhance safety

Improving connectivity for all modes of transportation to create resilient communities

Active Transportation and Trails Network Options

Trails Overview

- Based on the existing conditions, trends, best practices, and design standards, **98.84km of new trail is proposed**.

Trail Type	Trail Width	Proposed Length (Meters)
Primary Trail (Type 1)	3.0	15,201
Secondary Trail (Type 2)	2.6	32,565
Nature Trail (Type 3)	1.5	1,344
Neighbourhood Greenway (Type 4)	2.0	49,725
Total Proposed Trails:		98,835

- The proposed trail network is shown on the following maps, which includes proposed upgrades to existing facilities.
- Recommendations to address accessibility and safety have also been identified.

Proposed Trail Typologies:

Primary
- Asphalt pathway, off-road condition
- Frequently use, winter maintained.
- Connects neighbourhood to key destinations

Secondary
- Compacted stone dust surface
- Connects neighbourhoods to recreational experiences
- Accessible routes through both urban and nature areas.

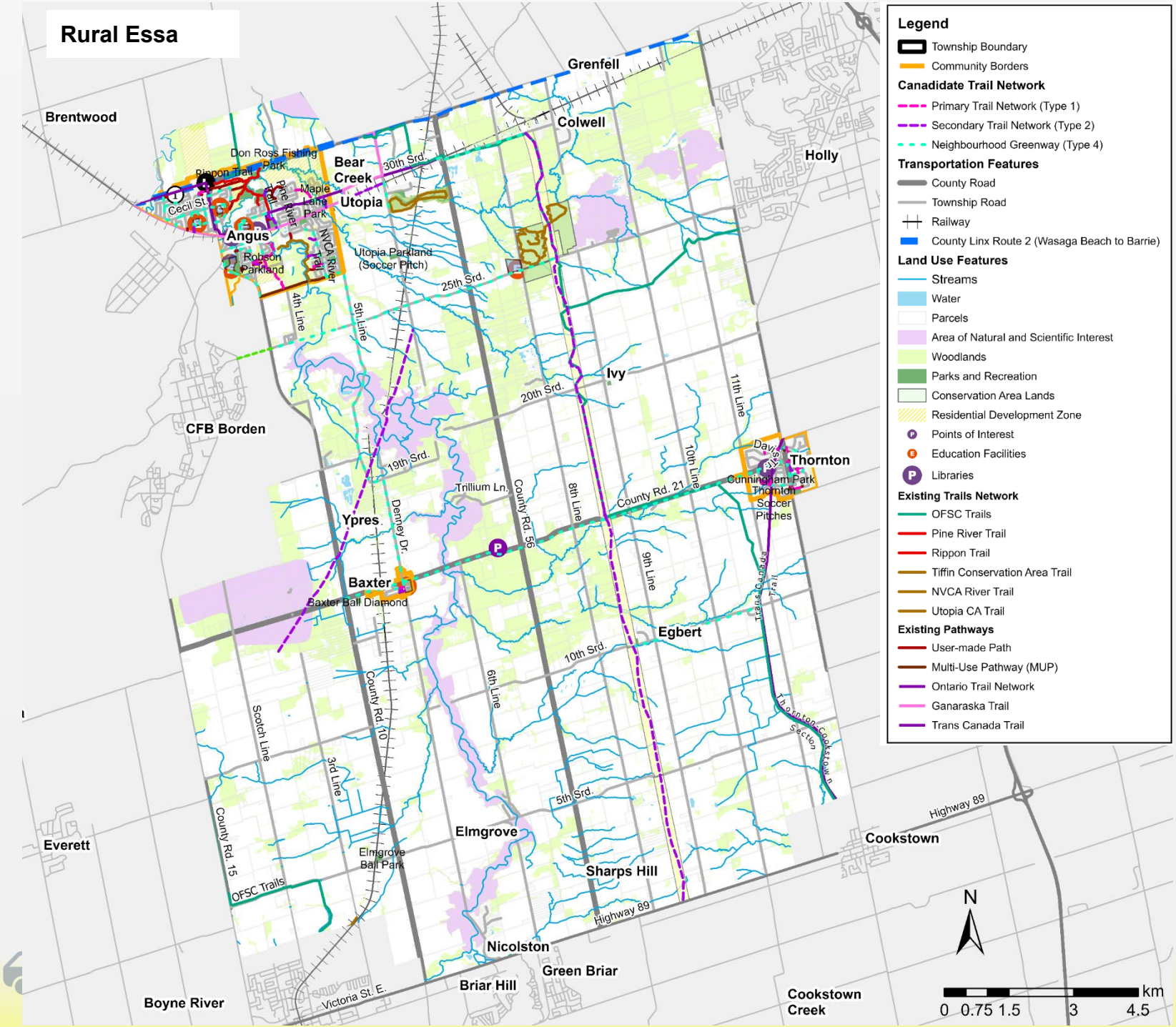
Rustic / Natural
- Natural, compacted earth or mulch surfacing.
- Located in sensitive areas or areas of lower frequency use.
- Offers a more challenging experience.

Neighbour-hood Greenway
- Sidewalk and on-road facility on quiet streets
- Asphalt multi-use pathway on busy streets
- Connects neighbourhoods to destinations and trails.

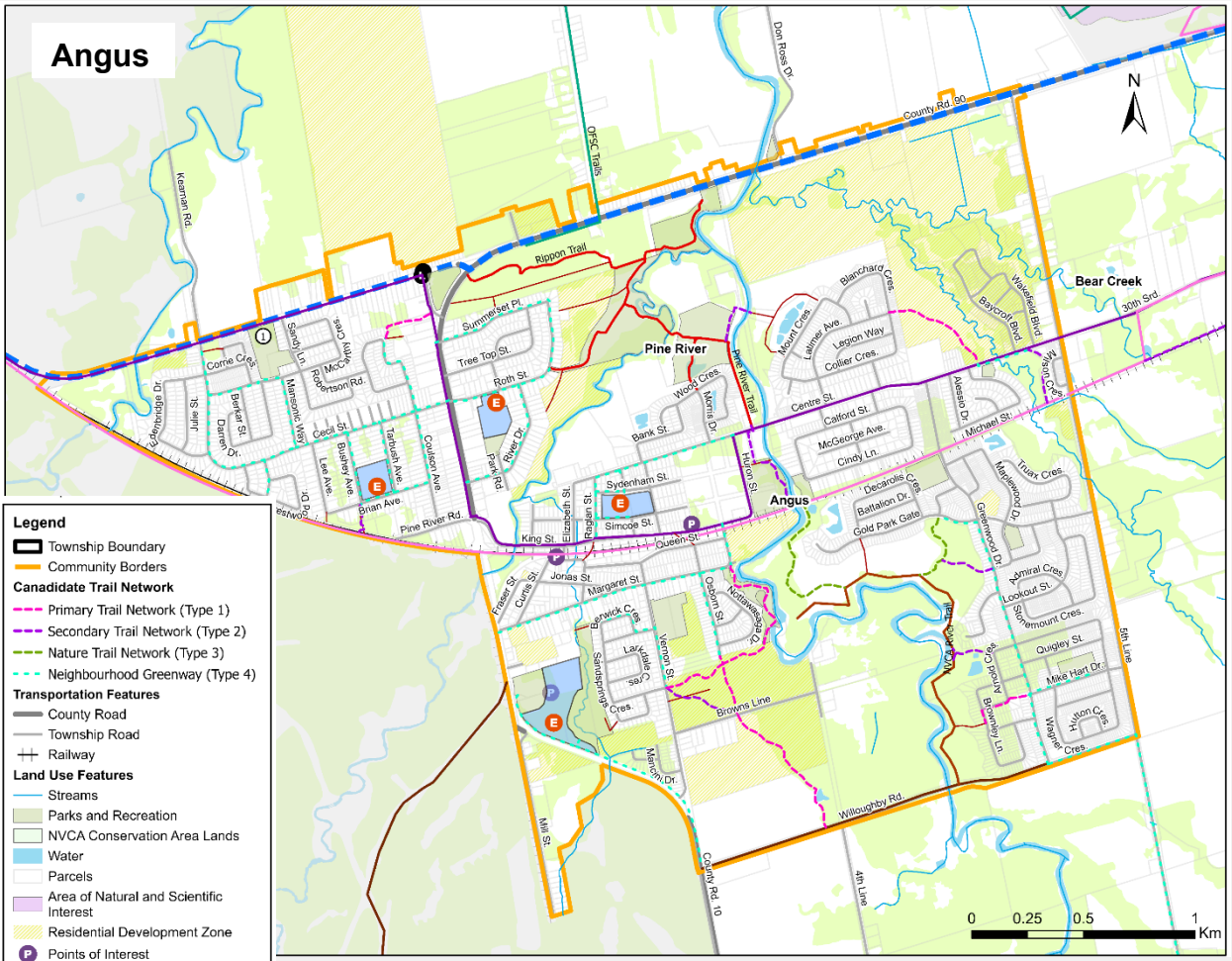
Proposed Trails Network

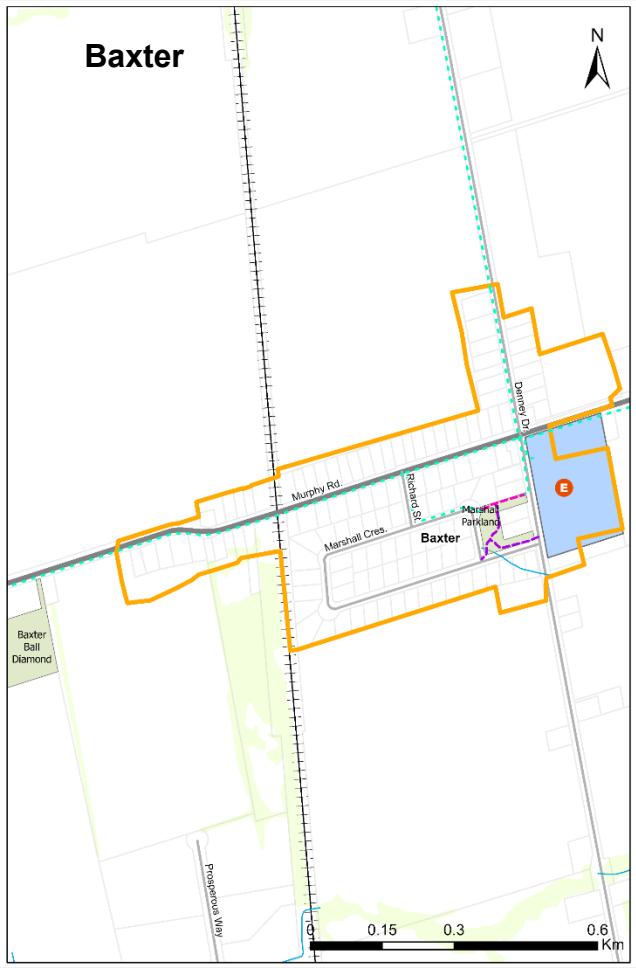
Key Highlights:

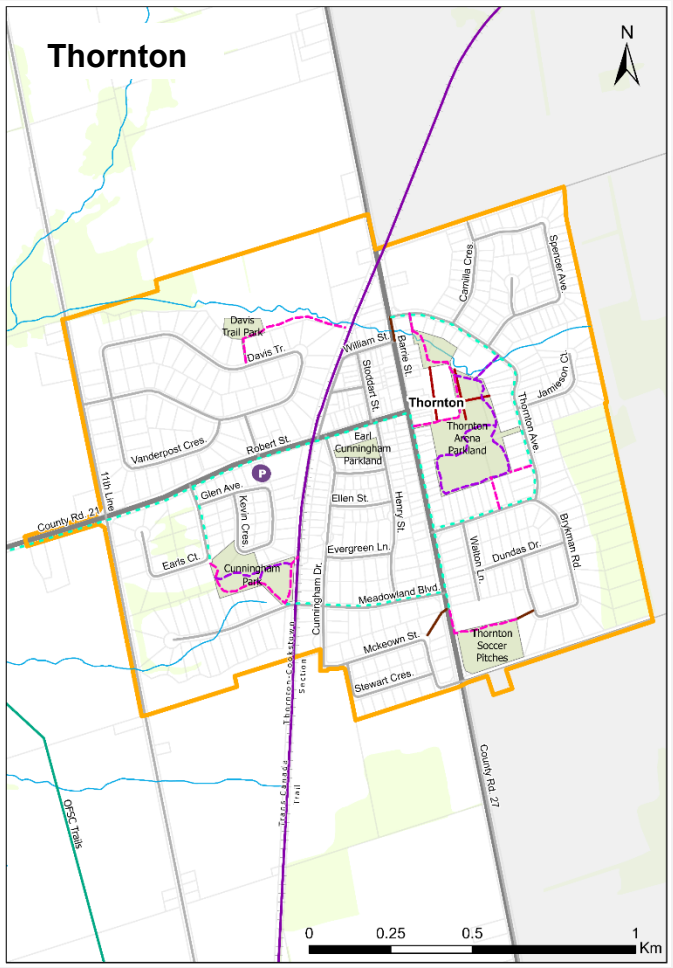
- 5 proposed ‘spines’ to connect Angus, Thornton and Baxter.
- E-W Spines:
  - CR-21& 25th Sideroad proposed to include Neighbourhood Greenway Trail.
  - 30th Sideroad to be Secondary Trail & Neighbourhood Greenway.
- N-S Spines:
  - off-road via hydro corridor between 8th & 9th Line.
  - 5th Line proposed to include Neighbourhood Greenway Trail.



Proposed Trail Network







Legend

- Township Boundary
- Community Borders

Canadidate Trail Network

- Primary Trail Network (Type 1)
- Secondary Trail Network (Type 2)
- Nature Trail Network (Type 3)
- Neighbourhood Greenway (Type 4)

Transportation Features

- County Road
- Township Road
- Railway

Land Use Features

- Streams
- Parks and Recreation
- NVCA Conservation Area Lands
- Water
- Parcels
- Area of Natural and Scientific Interest
- Residential Development Zone
- Points of Interest
- Education Facilities

Existing Trails Network

- OFSC Trails
- Pine River Trail
- Rippon Trail
- Tiffin Conservation Area Trail
- NVCA River Trail
- Utopia CA Trail
- Ganaraska Trail
- Trans Canada Trail

Existing Pathways

- User-made Path
- Multi-Use Pathway (MUP)

Parks Overview

The Township of Essa has approximately:

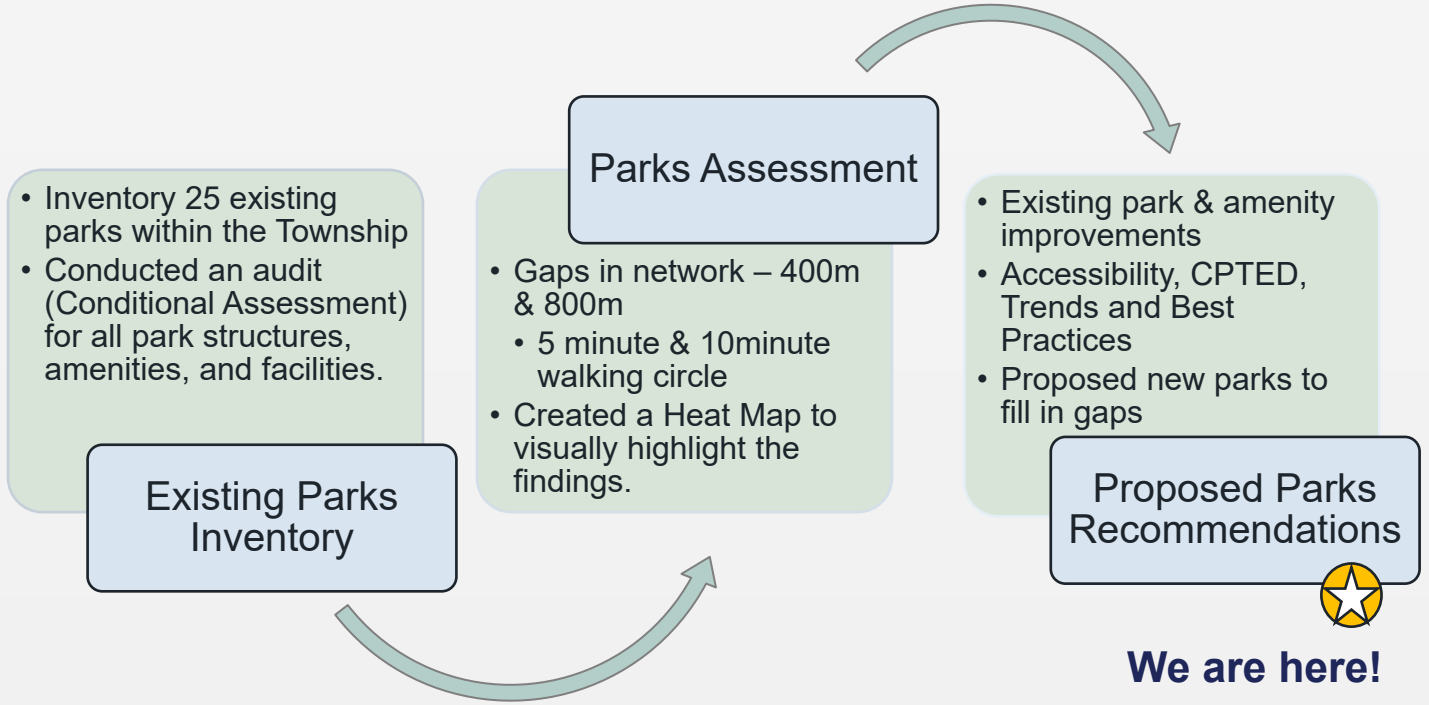
- 25 existing parks,
- 20 playgrounds, and
- a variety of sports facilities.

A conditional assessment audit found:

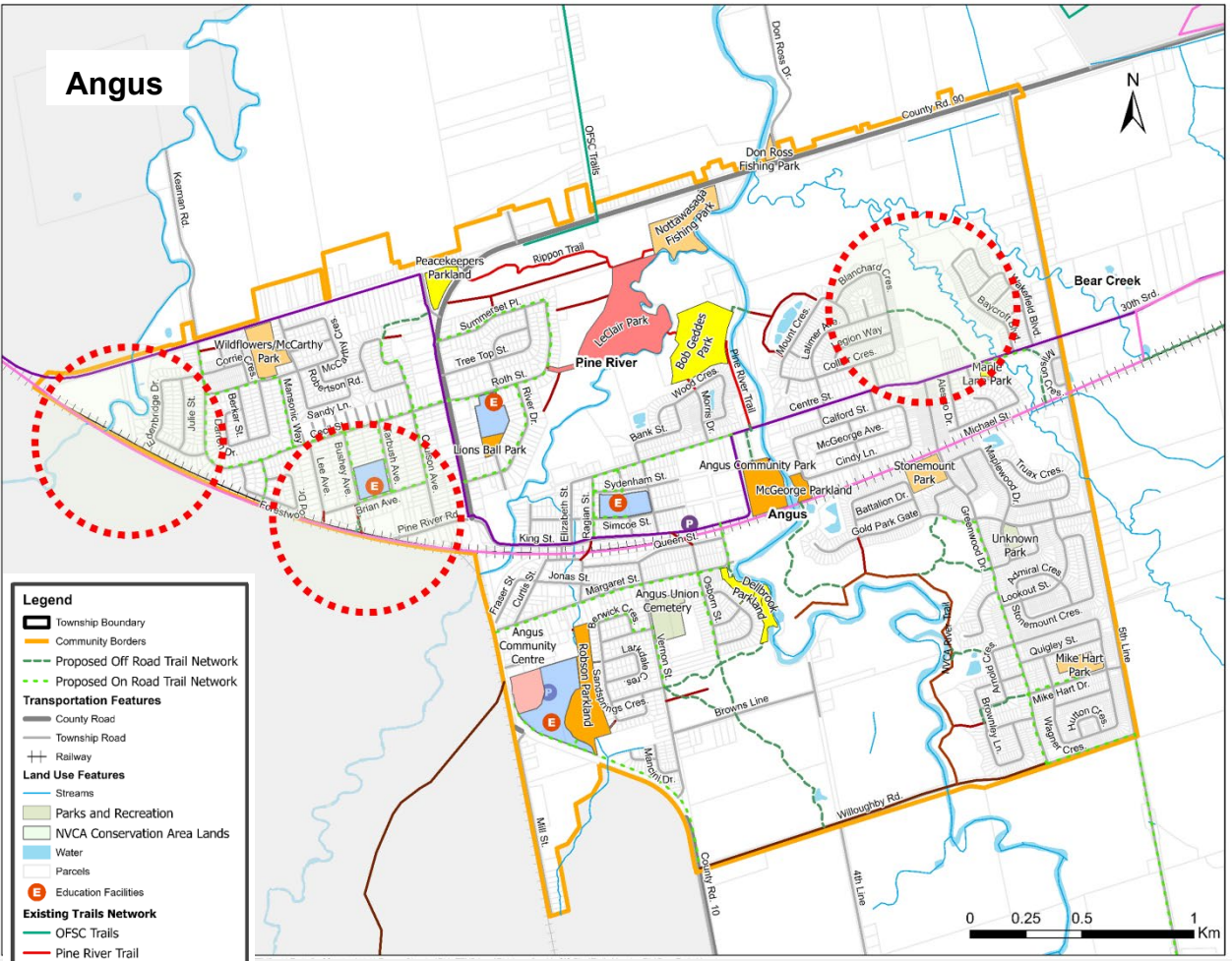
Existing Parks Condition					
Excellent	Good	Good- Fair	Fair	Poor	Critical
0	8 (31%)	8 (31%)	8 (31%)	2 (7%)	0

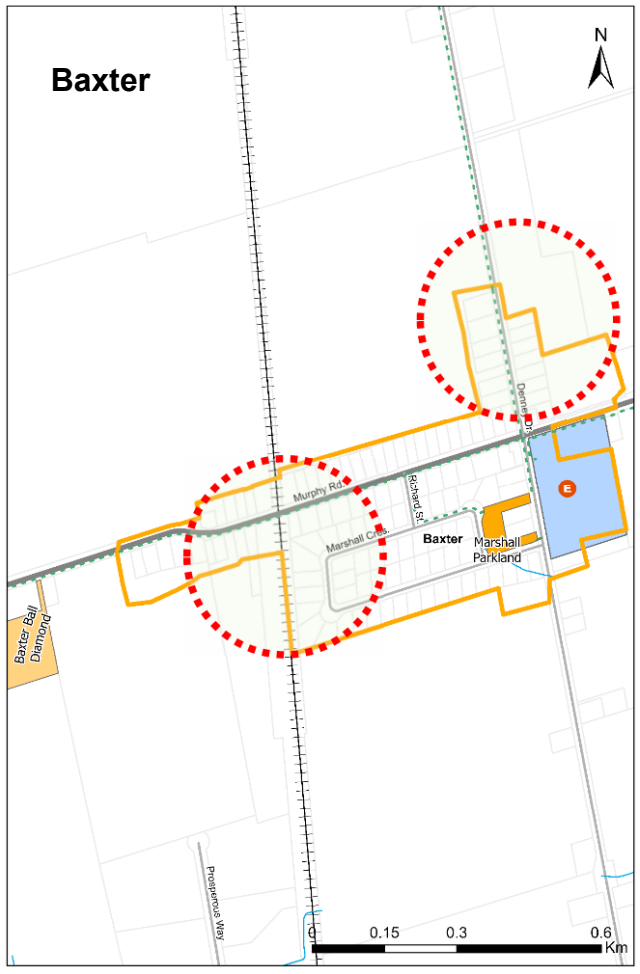
Planning for Parks: Locations for new park infrastructure and/or infrastructure improvements based on needs & gaps are shown in the following maps.

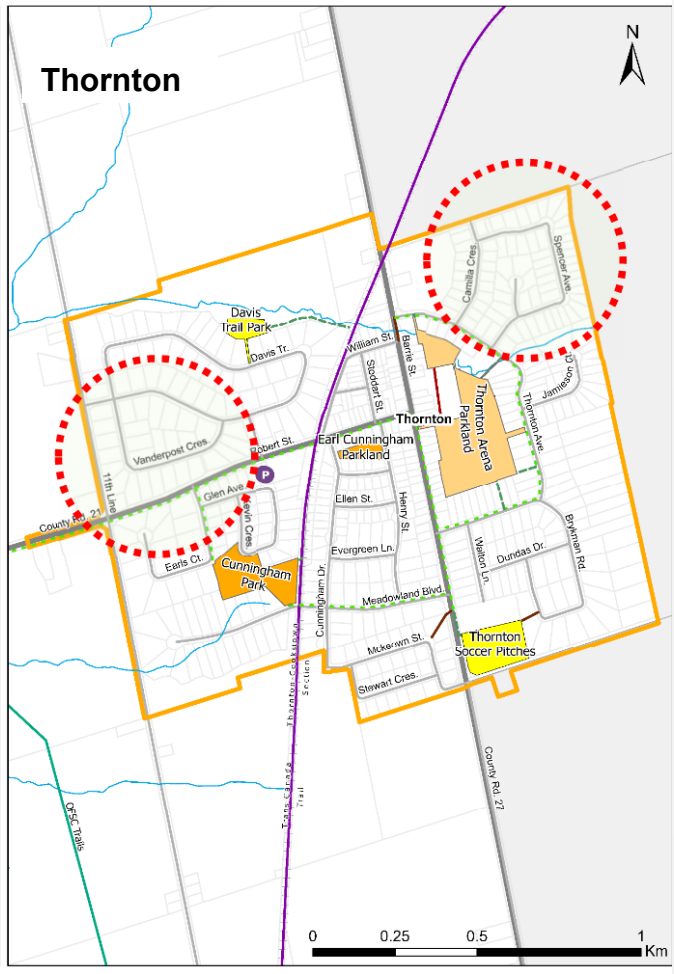
Parks Assessment Process:



Proposed Parks







Park Recommendations

Short Term (1-3 years)	**Medium Term** (4-6 years)	**Long Term** (7-10+ years)
Essa to complete **accessibility audits** for all **parks & playgrounds** and develop a **funding plan** for capital expenditures to rehab/ upgrade features to meet AODA standards by 2025. (ongoing).	Essa should **adopt the four park types** proposed to guide the development and redevelopment of active parkland.	Essa should explore developing a **sport facility management plan** for scheduling and distribution of **outdoor sport fields** as demand for passive recreation grows with aging population.
Essa should develop a **parks and recreation master plan** to help identify and guide current and future needs to assist with long-term capital planning.	Group amenities and facilities into the various park typologies and fill gaps based on local residential need.	Come 2031, Essa will face a deficit of 3 parks. Plan a **capital budget** to acquire land and develop the parks according to gap needs.
Essa should categorize their existing parks into a **park classification system** based on the park types proposed.	Parks are a great way to increase urban tree canopy. Essa should explore a **canopy target and naturalization target**. (Medium – Long)	**Ongoing Recommendations** - Essa staff should increase the **maintenance budget** for park infrastructure that is reaching its end of lifecycle. - External **funding opportunities** should be explored to supplement capital reserves.
Essa should **prioritize** its efforts on **upgrades and improvements** to those parks that fall within the Poor to Fair categories as per the Conditional Assessment Reports.		

Road Network Options

Road Network Overview

- In addition to the existing conditions, three road network alternatives are being analyzed to determine the preferred transportation network, looking forward to 2043.
- **Planning for the road network:**
  - Possible road alignment opportunities with Active Transportation and Trails improvements.
  - Strategic capacity improvements to accommodate future growth
  - Identify opportunities for alignments with local municipalities and Simcoe County for proposed road improvements.

Proposed Road Network Alternatives:

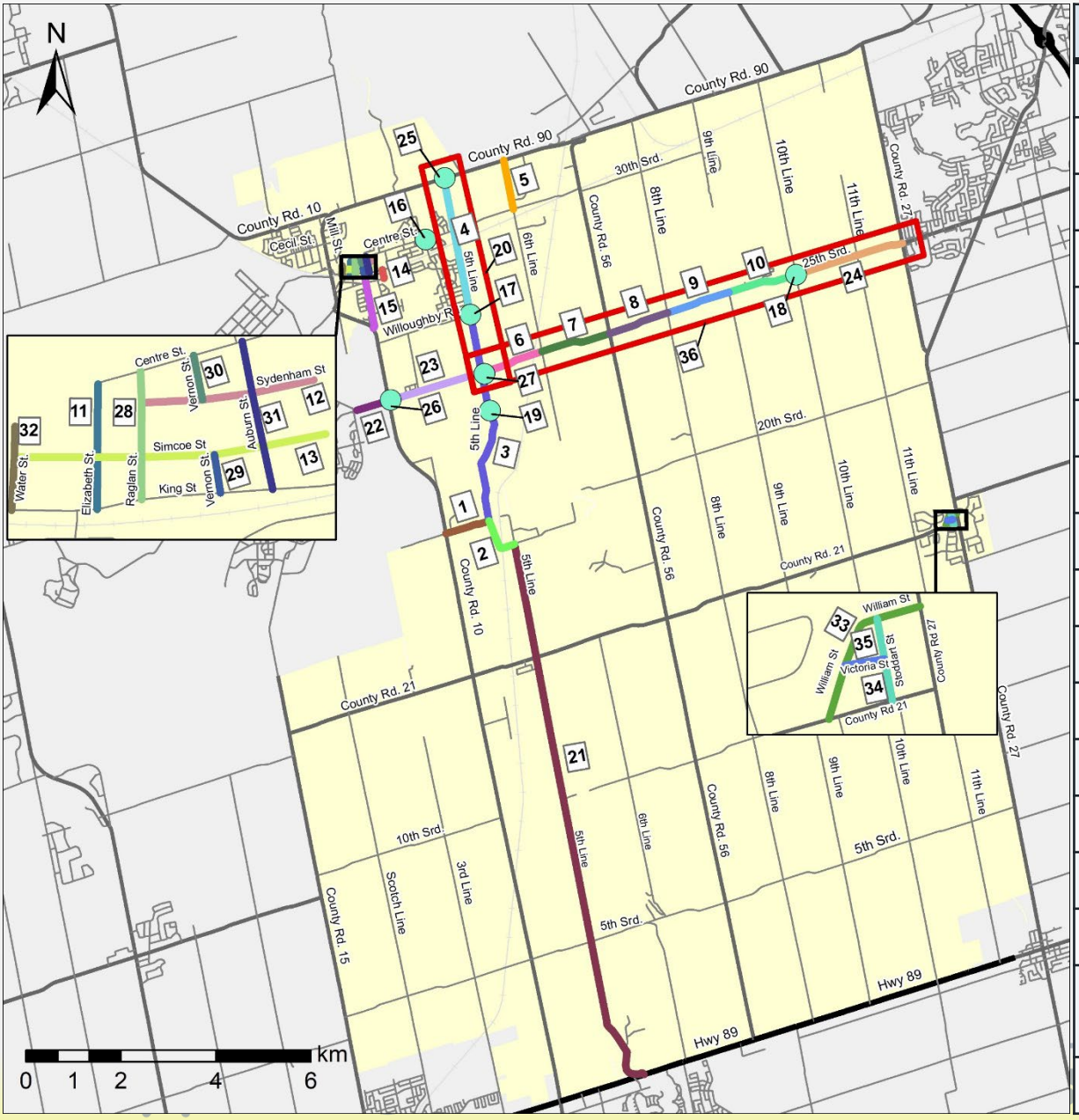
Existing Conditions
- Existing Network with no Planned Improvements

Alternative 1
- Existing Township Network
- Committed County Improvements

Alternative 2
- Previously Planned Township Network Improvements
- Committed County Improvements

Alternative 3
- Additional Township Network Improvements to Accommodate Growth
- Combination of Alternative 1 and Alternative 2

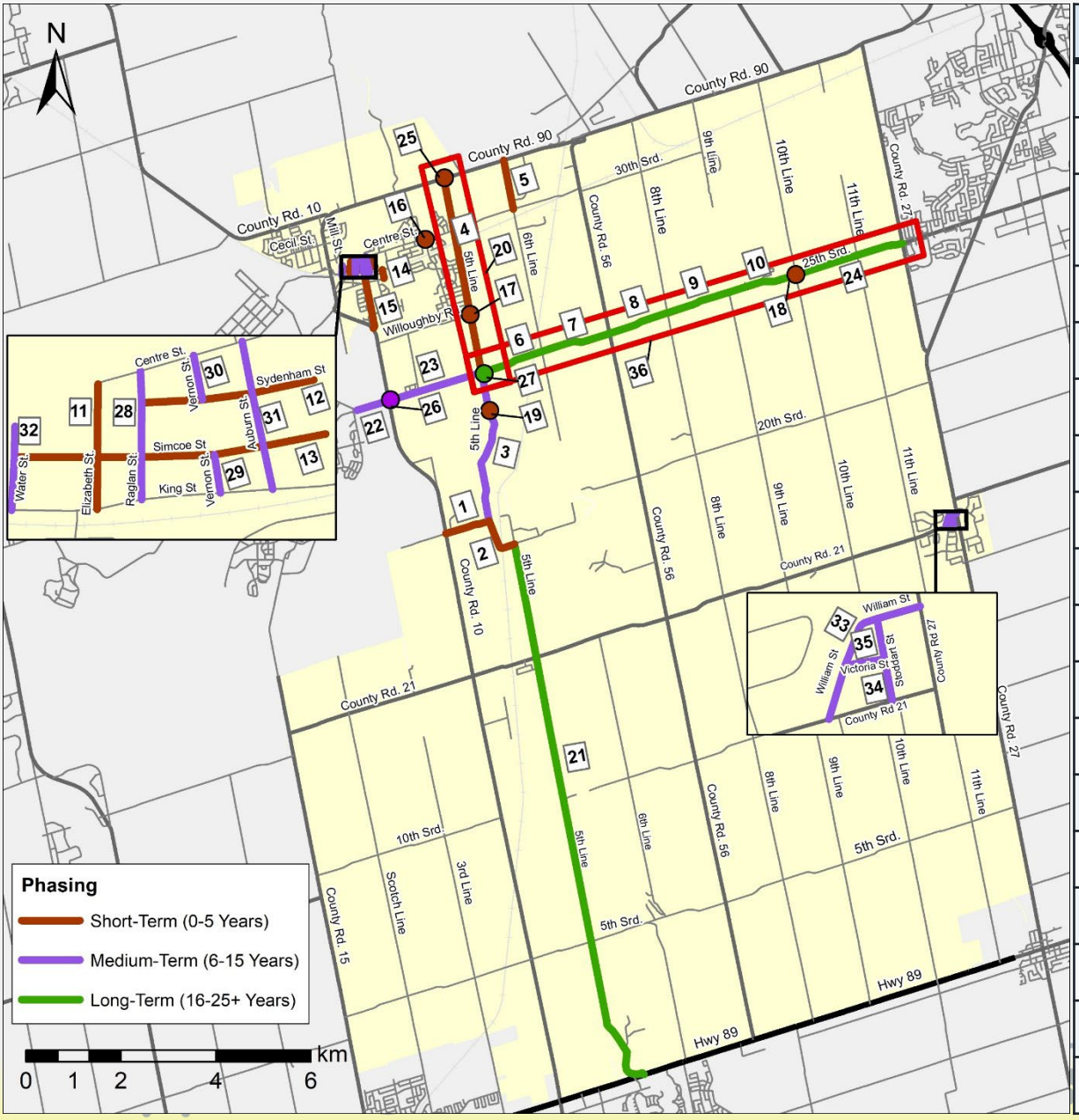
Recommended Road Improvements (Alternative 3)



ID	Road	Improvement Type
1	20th Sideroad from 5th Line to County Rd 10	Reconstruction and strengthening
2	5th Line from 20th Sideroad to South of 19th Sideroad	Reconstruction and strengthening
3	5th Line from 20th Sideroad to Willoughby Road	Reconstruction and strengthening
4	5th Line from County Rd 90 to Willoughby Road	Reconstruction and strengthening
5	6th Line from 30th Sideroad to County Rd 90	Reconstruction and strengthening
6	25th Sideroad from 5th Line to 6th Line	Reconstruction and strengthening
7	25th Sideroad from 6th Line to County Rd 56	Reconstruction and strengthening
8	25th Sideroad from County Rd 56 to 8th Line	Reconstruction and strengthening
9	25th Sideroad from 8th Line to 9th Line	Reconstruction and strengthening
10	25th Sideroad from 9th Line to 10th Line	Reconstruction and strengthening
11	Elizabeth St from Centre St to King St	Urbanization
12	Sydenham St from Raglan St to East of Auburn St	Urbanization
13	Simcoe St from Water St to East of Auburn St	Urbanization
14	Alma St from King St to Margaret St	Urbanization
15	Vernon St from Queen St to County Rd 10	Urbanization
16	Centre St at Greenwood Drive	Signalization of Intersection
17	5th Line at Willoughby Rd	Intersection Improvement (Construct left turning lane and slip-by lane northbound on 5th Line)
18	25th Sideroad at 10th Line	Intersection Improvement

ID	Road	Improvement Type
19	Bridge 9 on 5th Line (1.95 km north 20th Sideroad) from - to -	Bridge (replacement and widening)
20	5th Line from County Rd 90 to 25th Sideroad	widen to 3 or 4 lanes
21	5th Line from 19th Sideroad to Highway 89	Reconstruction and strengthening
22	25th Sideroad from County Rd 10 to Tank Rd	New 2-lane road construction
23	25th Sideroad from 5th Line to County Rd 10	New 2-lane road construction, New Bridge (across Nottawasaga River), Reconstruction and strengthening for existing roadway
24	25th Sideroad from 10th Line to County Rd 27	Reconstruction and strengthening
25	5th Line at County Rd 90	Signalization of Intersection
26	County Rd 10 at 25th Sideroad	Signalization of Intersection
27	5th Line at 25th Sideroad	Signalization of Intersection
28	Raglan St from King St to Centre St	Urbanization
29	Vernon St from King St to Simcoe St	Urbanization
30	Vernon St from Sydenham St to Centre St	Urbanization
31	Auburn St from King St to Centre St	Urbanization
32	Water St from King St to north of Simcoe St	Urbanization
33	William St from County Rd 27 to County Rd 21	Urbanization
34	Stoddart St from William St to County Rd 21	Urbanization
35	Victoria St from William St to Stoddart St	Urbanization
36	25th Sideroad from 5th Line to County Rd 27	widen to 3 or 4 lanes

Phasing of Recommended Road Improvements



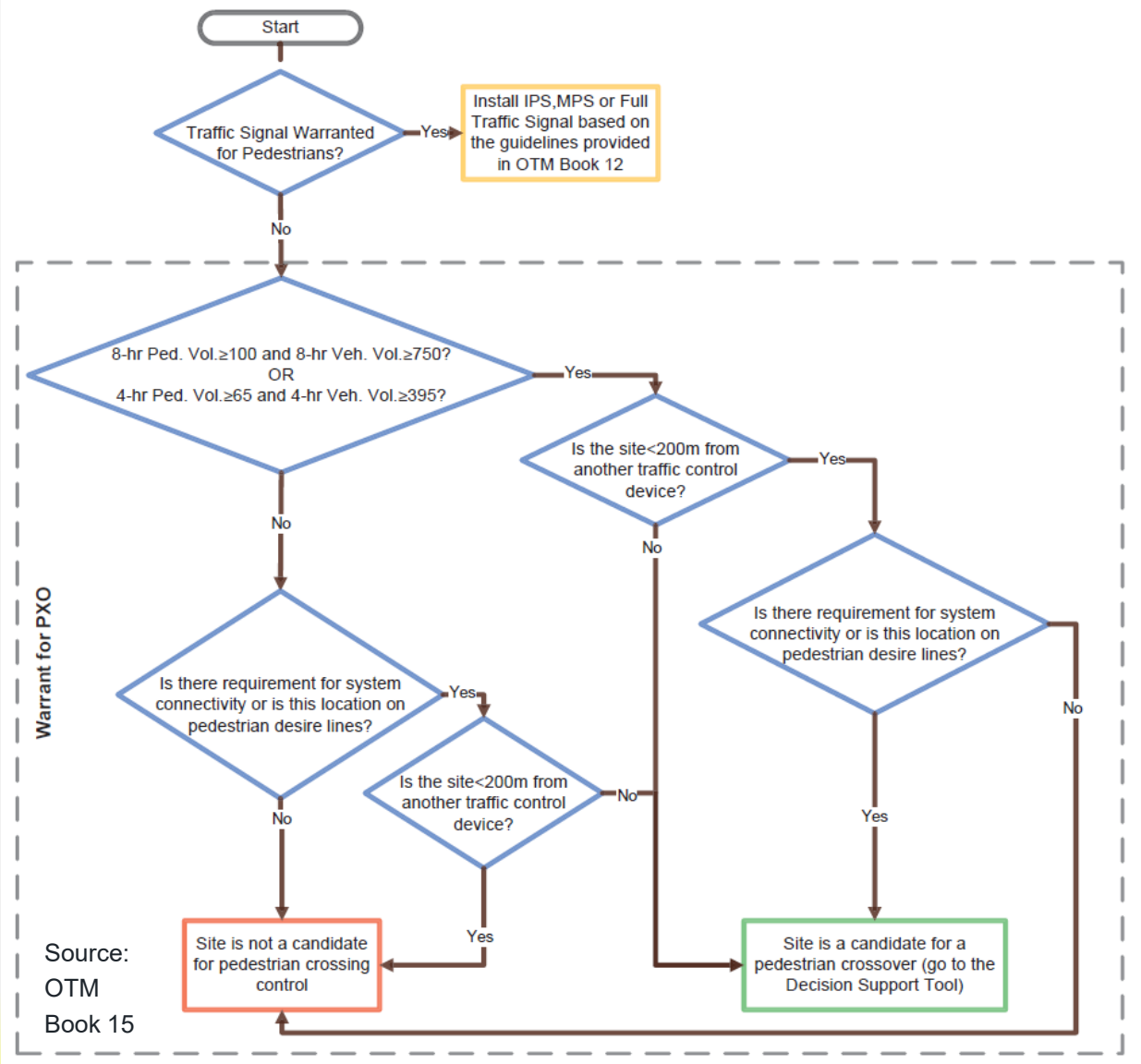
ID	Road	Phasing
1	20th Sideroad from 5th Line to County Rd 10	Short-Term
2	5th Line from 20th Sideroad to South of 19th Sideroad	Short-Term
3	5th Line from 20th Sideroad to Willoughby Road	Short - Term (Willoughby Rd to 25th Sideroad), Medium-Term (25th Sideroad to 20th Sideroad)
4	5th Line from County Rd 90 to Willoughby Road	Short-Term
5	6th Line from 30th Sideroad to County Rd 90	Short-Term
6	25th Sideroad from 5th Line to 6th Line	Short-Term
7	25th Sideroad from 6th Line to County Rd 56	Short-Term
8	25th Sideroad from County Rd 56 to 8th Line	Long-Term
9	25th Sideroad from 8th Line to 9th Line	Short-Term
10	25th Sideroad from 9th Line to 10th Line	Short-Term
11	Elizabeth St from Centre St to King St	Short-Term
12	Sydenham St from Raglan St to East of Auburn St	Short-Term
13	Simcoe St from Water St to East of Auburn St	Short-Term
14	Alma St from King St to Margaret St	Short-Term
15	Vernon St from Queen St to County Rd 10	Short-Term
16	Centre St at Greenwood Drive	Short-Term
17	5th Line at Willoughby Rd	Short-Term
18	25th Sideroad at 10th Line	Short-Term

ID	Road	Phasing
19	Bridge 9 on 5th Line (1.95 km north 20th Sideroad) from - to -	Short-Term
20	5th Line from County Rd 90 to 25th Sideroad	Long-Term
21	5th Line from 19th Sideroad to Highway 89	Long-Term
22	25th Sideroad from County Rd 10 to Tank Rd	Medium-Term
23	25th Sideroad from 5th Line to County Rd 10	Medium-Term
24	25th Sideroad from 10th Line to County Rd 27	Medium-Term
25	5th Line at County Rd 90	Short-Term
26	County Rd 10 at 25th Sideroad	Medium-Term
27	5th Line at 25th Sideroad	Long-Term
28	Raglan St from King St to Centre St	Medium-Term
29	Vernon St from King St to Simcoe St	Medium-Term
30	Vernon St from Sydenham St to Centre St	Medium-Term
31	Auburn St from King St to Centre St	Medium-Term
32	Water St from King St to north of Simcoe St	Medium-Term
33	William St from County Rd 27 to County Rd 21	Medium-Term
34	Stoddart St from William St to County Rd 21	Medium-Term
35	Victoria St from William St to Stoddart St	Medium-Term
36	25th Sideroad from 5th Line to County Rd 27	Long-Term - Beyond 2043

Other Considerations

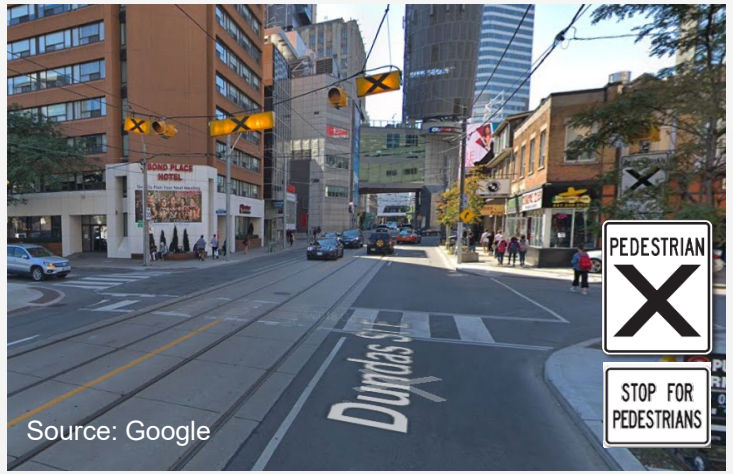
Pedestrian Crossovers

Selection Criteria



Source: OTM Book 15

Pedestrian Crossovers (Type A)



- Overhead flashing amber beacons
- Crosswalk markings
- Pedestrian push button

Pedestrian Crossovers (Type B)

- Rapid rectangular flashing beacons (RRFBs)
- Side-mounted signage
- Overhead sign (in some cases)

Potential Locations of Pedestrian Crossovers

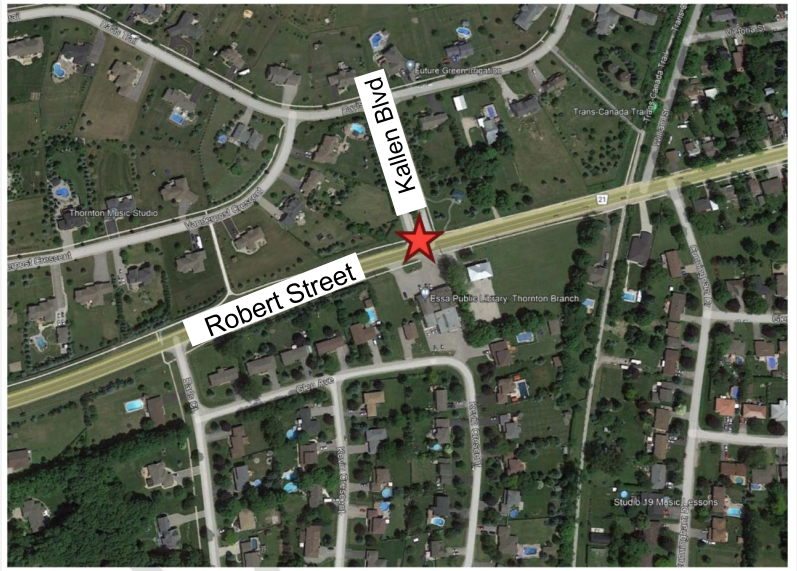
Angus

Intersection of Mill Street and entrance of Dairy Queen

Baxter

West leg of intersection at Murphy Road and Denny Drive

Thornton



Intersection of Robert Street and Kallen Boulevard (in front of Essa Public Library)

Traffic Calming Process




1 Initiation

- Receive and Assess Request
- Screening Criteria

2 Data Collection and Assessment

- Data Collection
- Basis for Assessment
- Assessment Thresholds

3 Implementation

- Assessment of Eligible Alternatives
- Public Consultation
- Council Approval
- Resident Notification

4 Evaluation and Reporting

- Monitor and Evaluate
- Prepare and Publish Reports with Recommended Adjustments






Traffic Calming Measures

Speed Control Measures

Purpose: Intended to reduce travel speeds

Speed Bumps / Humps

Speed Tables

Volume Control Measures

Purpose: Intended to reduce traffic volumes

Source: Richard Drdull

Directional Closures

Education Measures

Purpose: Support other types of traffic calming measures

Radar Speed Display Sign

Community Safety / School Zones

Speed Control Measures

Purpose: Non-physical measure to aid in achieving outcomes of traffic calming

Source: Region of Durham

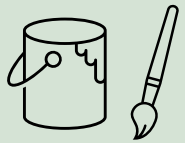
Automated Speed Enforcement

Speed Limit Recommendations

1. Align with Ontario cities and industry trends by setting a default **urban area** speed limit of **40 km/h** in the Township.
2. Implement measures to encourage behavioural change and ensure compliance with the speed limit.

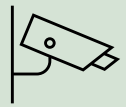
Measures should include:

- Public awareness campaigns to alert residents of the speed limit.



- Existing roads should be painted with white edge lines and a centre yellow line to ensure each travel lane is 3 metres.

- Revisit road standards for new road construction to narrow travel lanes and design new streets for lower speeds.



- Implement automated speed enforcement across the Township.

Intersections that are Recommended for Speed Review:

- County Road 90 & County Road 10/ Brentwood Road
- County Road & 5th Line

Automated Speed Enforcement (ASE) is:

an automated device that uses a camera and speed measurement device to detect and capture images of vehicles exceeding the posted speed limit.

Parking Challenges and Recommendations

Topic	Challenges	Recommendations
Road Widths	Limited right-of-way along neighbourhood streets that would permit parking on both sides, preventing vehicles from traversing both lanes of the road at the same time.	Revise standard engineering drawings to develop narrower roads and retrofit existing roads with traffic calming (road narrowing) measures.
On-Street Parking	Unclear Zoning By-law and signage posted throughout the Township, identifying on-street parking allowance. On-street parking spaces are utilized by residents despite most having access to household garages/ driveway.	Introduce time-restricted parking pilot. Limit on-street parking on any new roads. Remove on-street parking on existing roads which are being reconstructed.
Visitor Parking	Limited supply of parking for visitors as residents are often utilizing on-street parking spaces for private vehicles.	As part of time-restricted parking pilot, provide a registration form to park overnight on Township roads up to 15 times per year. Provide off-street municipal parking lots and lay-by parking.
Signage	Township parking requirements during certain periods of the year and time of day, for example allowance from the first day of November to the first day of May, for winter maintenance/clearing.	Improve signage in school zones according to existing Township by-law. Add ‘no overnight parking’ or ‘3 H MAX’ signage for time-restricted parking pilot. Require parking permit to park overnight on Township roads (15 times per year).
Community Safety Zones and School Zones	High volume of traffic and vehicular movement around community centres and school zones, make it uncomfortable for pedestrians and school children to safely access neighbourhoods and school sites.	Improve signage and conduct an education campaign to increase compliance with existing Township parking restrictions in school zones.

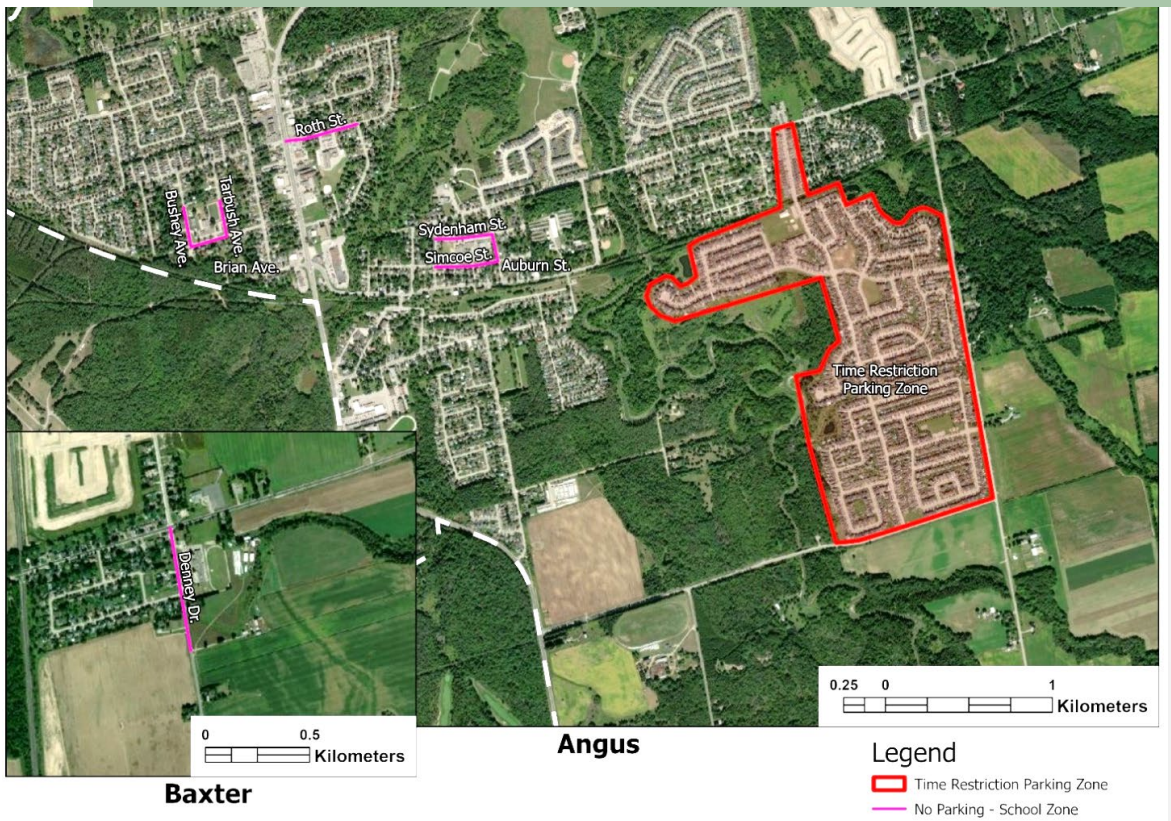
Parking Recommendations

1 Curbside Giveaway Days

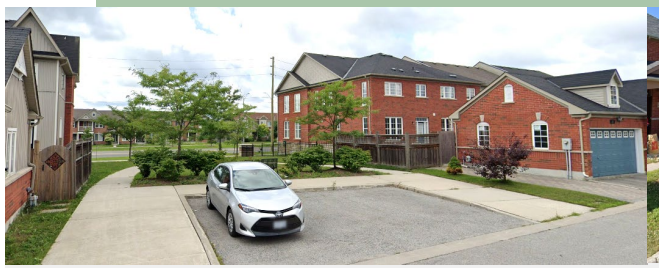
2 On-Street Right-of-Way Parking Time Restrictions

Source: City of Ottawa

3 Update Existing 'No Parking' Signage to 'No Stopping' Signage and Increase the Number of Signs



4 Update Residential and Visitor Parking Provisions



Residential Visitor Parking Lot (City of Markham)

Lay-By Parking (City of Markham)

Next Steps & Contact Information

Thank you for contributing to the Transportation and Trails Master Plan!

1. **Summarize** and process input received
2. Adjust and refine improvements to transportation, trails, and parks network
3. Present Report to Council

Have more comments? Please visit:
https://publicinput.com/essattmp

Contact information:

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(Township of Essa)
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Brett Sears, MCIP RPP
(WSP Canada Inc.)
E: brett.sears@wsp.com

APPENDIX

C PEDESTRIAN CROSSOVERS EXAMPLES

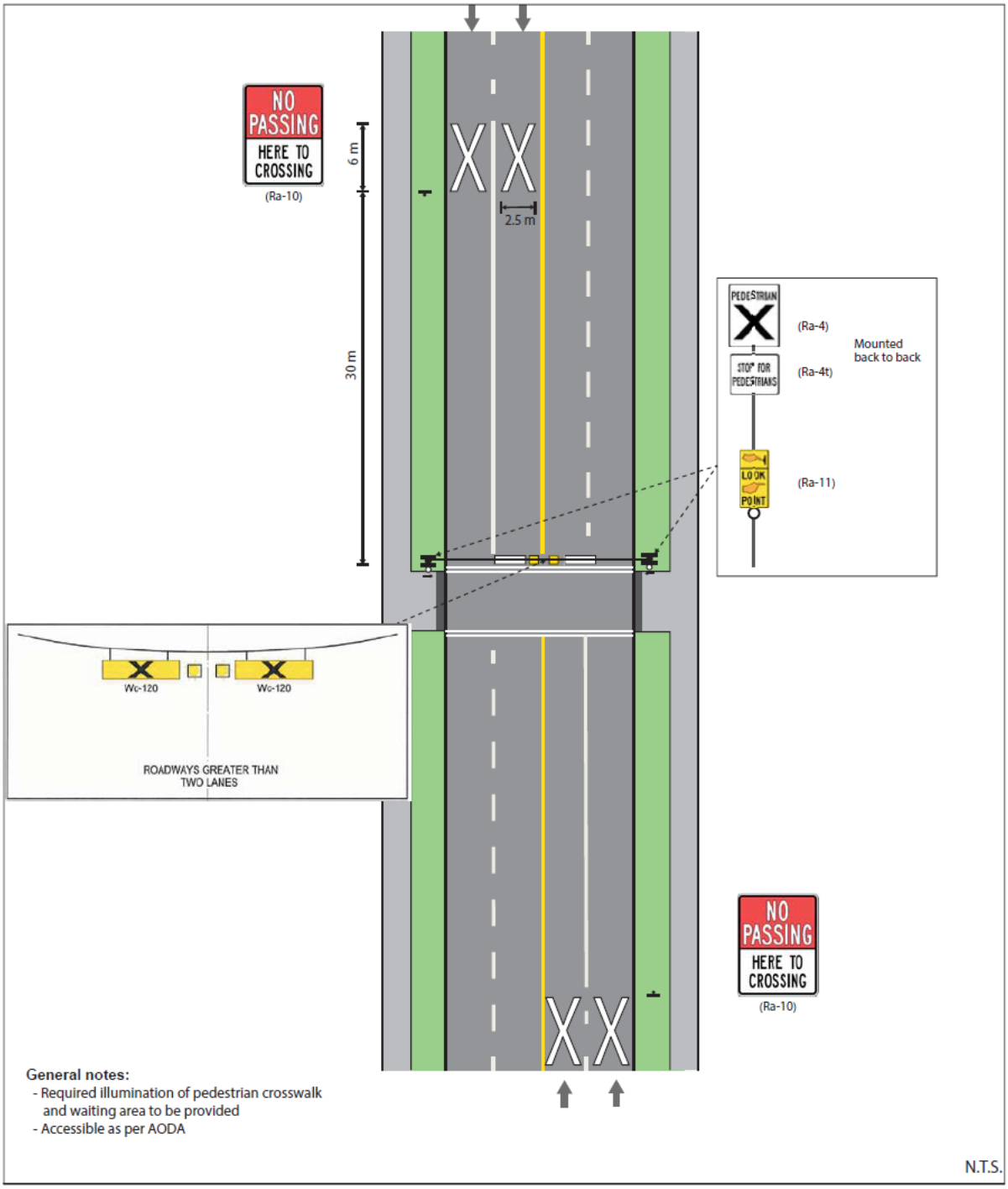


Figure 20: Pedestrian Crossover Level 1 Type A – Mid-block (4-lane, 2-way)

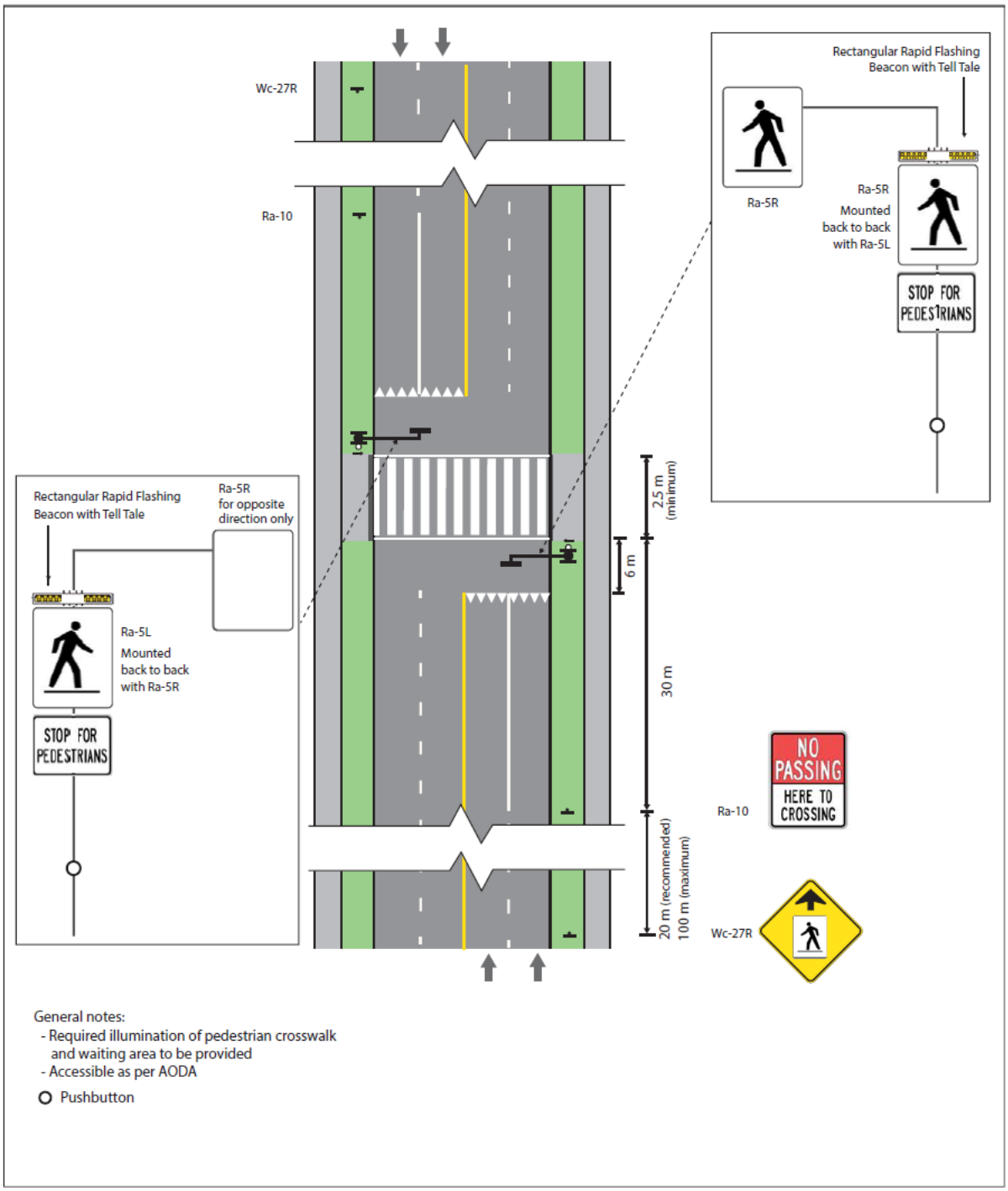


Figure 23: Pedestrian Crossover Level 2 Type B – Mid-block (4-lane, 2-way)

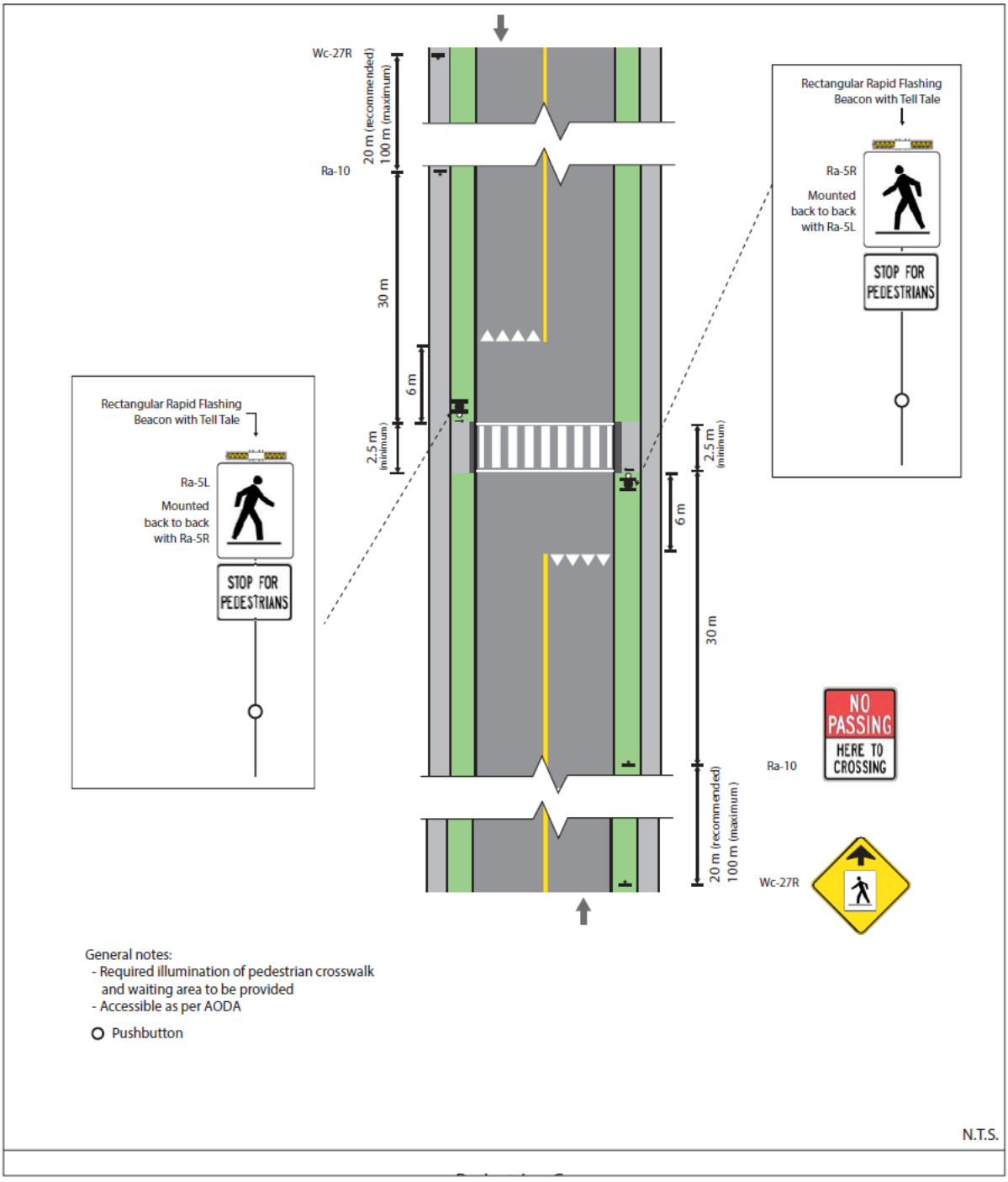


Figure 30: Pedestrian Crossover Level 2 Type C – Mid-block (2-lane, 2-way)

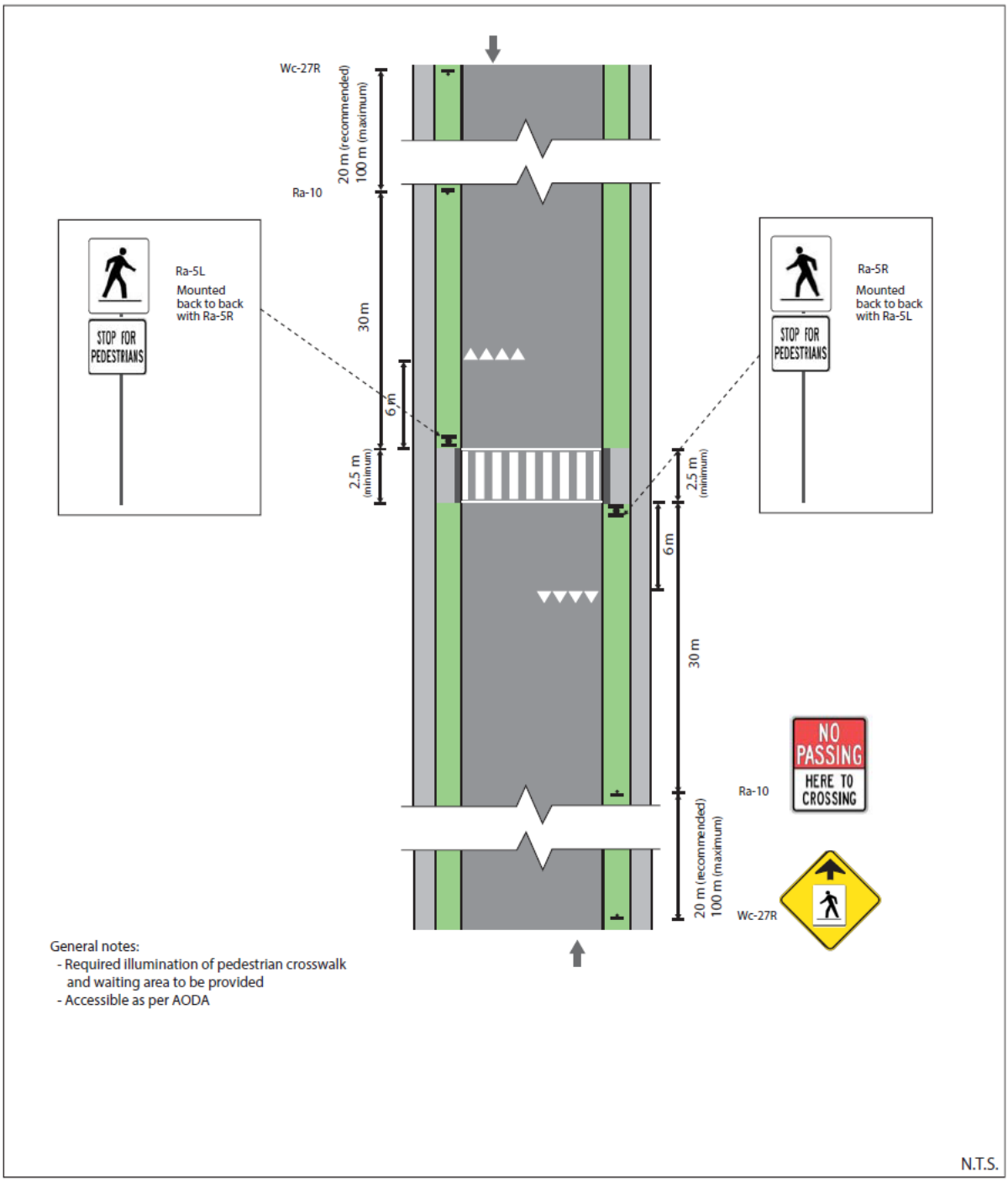


Figure 39: Pedestrian Crossover Level 2 Type D – Mid-block (2-lane, 2-way)

APPENDIX

D TRAFFIC CALMING STRATEGIES

Township of Essa
Transportation and Trails Master Plan

May 2024

Traffic Calming Policy

Table of Contents

1 INTRODUCTION

The Township of Essa is planning for future growth and change within their transportation planning practices. Through the Transportation Master Plan, the Township aims to ensure that the transportation system is tailored to the needs of all community members and allows safe, accessible, and well-connected transportation options. In September of 2018, the Township adopted a traffic calming policy which outlines traffic calming measures, guidelines, and monitoring requirements. The policy contains a series of recommendations that largely align with those identified in the 2017 TAC ITE guide and industry best practices. As the Township has continued to grow and traffic calming guidelines have continued to evolve, it is necessary to update policies to reflect community needs and evolving understandings of best practices. With that understanding in mind, the Township is advised to adopt the following update to the existing Traffic Calming Policy to better suit the Township of Essa's current context and expected growth.

1.1 PURPOSE

The purpose of this policy is to provide staff with a guideline and procedure for the initiation, investigation and implementation of traffic calming measures for roadways within the Township of Essa.

This policy also ensures that there is a formal process defined by which all sites/traffic calming requests can be evaluated against using consistent screening and criteria.

Note: This policy does not apply to arterial roads, as they are intended to serve higher traffic volumes.

2 TRAFFIC CALMING

2.1 WHAT IS TRAFFIC CALMING?

Traffic calming is defined as the combination of measures that alter driver behavior to reduce the potential of negative effects of motor vehicle use and improve conditions for alternate modes of transportation. Traffic calming measures are frequently physical measures, which can be combined with educational and enforcement tools to improve the safety and comfort of neighbourhood streets.

2.2 OBJECTIVES OF TRAFFIC CALMING

To address undesirable traffic conditions such as poor sight lines, speeding, and excessive volume on local and collector roads, the specific objectives of traffic calming and this guide are to:

A) Increase the Safety in Neighbourhoods

Through the use of physical measures to alter driver behavior, traffic calming can improve safety on neighbourhood streets. The resulting reduction in volume and speed creates a safer environment for all residents including pedestrians and cyclists.

B) Improve the Livability in Neighbourhoods

Traffic calming is intended to uphold and restore the livability and sense of community within neighbourhoods by minimizing the volume and speed of through traffic. As a result, negative impacts from traffic such as excessive noise, air pollution, visual presence of numerous vehicles and potential safety hazards are minimized. In addition, attractively designed traffic calming measures can enhance the aesthetics of a neighbourhood and improve streetscapes by adding additional opportunities to incorporate vegetation, public artwork and more.

C) Restore Streets to Their Intended Function

The intended function of a local road is to accommodate low to moderate volumes of traffic travelling at lower speeds in and out of neighbourhoods or from points of origin to the collector road system. Local roads provide direct vehicle access to residences that typically front onto these roads. Through traffic should be discouraged from using local roads. The Township of Essa's collector roads are intended to provide access to properties as well as to provide linkages between local roads and other collector and arterial roads. When these roads serve as through streets, the risk of negative outcomes is elevated due to the high number of potential conflicts along these roads.

D) Maintain Access Routes for Emergency Services, Public Transit & Maintenance Services

The potential impacts to these services have been considered in the development of this guide and will continue to be considered throughout the implementation of traffic calming measures. The needs of these services will be balanced against the need to slow and/or reduce traffic. In addition, this guide outlines the process through which all potentially impacted services will have the opportunity to comment on any proposed plans before implementation.

E) Promote Public Participation and Community Support

Traffic calming measures have a direct impact on neighbourhoods and the residents living in them. As such, an integral part of the process includes resident communication and feedback. Good community involvement leads to solutions to specific local traffic issues. Effective communication with residents provides staff with the opportunity to explain to residents the benefits of traffic calming measures while deterring them from less effective countermeasures.

2.3 ADVANTAGES AND DISADVANTAGES

Traffic calming measures introduce a number of trade-offs which need to be considered when selecting and implementing measures. In general, the advantages of a well-executed traffic calming policy are:

- Reductions in motor vehicle speeds, particularly ‘top-end’ speeding (95th to 99th percentile speeds);
- Reductions in traffic volumes on traffic calmed streets;
- Reduced levels of cut-through traffic on residential streets;
- Improvements in overall road safety outcomes for all users;
- Improvements in neighbourhood livability due to reduced noise and traffic risk; and
- Reductions in conflicts between road users.

Traffic calming measures need to be carefully considered to respect the context of the neighbourhoods in which they are being implemented. Some of the potential disadvantages that practitioners should be mindful of when installing traffic calming measures are:

- Increases in emergency vehicle response time associated with some horizontal deflection measures such as speed humps;
- reduced ease of access in and out of neighbourhoods;

- Traffic diversion onto adjacent roads where traffic calming measures have not been implemented; and
- Increases in maintenance costs such as snow clearing or garbage pick-up associated with some measures.

3 TRAFFIC CALMING MEASURES

As per the Institute of Transportation Engineers (ITE) *Traffic Calming: State of the Practice*, physical traffic calming measures are classified as either speed control measures or volume control measures.

3.1 SPEED CONTROL MEASURES

Speed control measures are intended to reduce travel speeds and may include:

- Speed bumps / humps (rounded, raised areas placed across the roadway);
    - Not to be considered unless upon urban curb and gutter streets
    - Not to be considered in winter months
    - Could be considered in school zones
    - Consider through trial periods only with community feedback
- Speed tables (flat-topped speed humps);
- Speed cushions (similar to a speed hump, but with channels that permit vehicles with wider wheelbases, such as transit vehicles and fire trucks, to travel through at speed.)
- Raised intersections (flat raised areas covering entire intersection, with ramps on all approaches and often with brick or other textured materials on the flat section);
- Traffic circles (raised island, placed in intersections, around which traffic circulates);
- Roundabouts (larger than traffic circles and typically have raised splitter islands to channel approaching traffic to the right and are used on higher volume streets);
- Chokers (curb extensions at midblock locations that narrow a street);
- Realigned intersections (changes in alignment that convert T-intersections with straight approaches into curving streets that meet at right angles);
- Neck downs (curb extensions at intersections that reduce roadway width curb to curb);
- Centre island narrowing (placement of a raised island located along the centreline of a street that narrows the travel lanes at that location);
- Chicane (Two-Lane) Lateral Shift (consists of curb extensions placed on alternating sides of the road);

- Lane narrowing through collapsible bollards; and
- Intersection centreline hardening (placement of bollards or concrete/rubber curbs to prevent drivers from cutting across intersections).

3.1.1 SPEED LIMIT CHANGES

In line with other cities in Ontario and the industry trend to reduce speed limits on local streets to improve safety, the default speed limit in urban areas of the Township should be posted at 40km/hr. Additional measures need to be taken to induce behavioral change to comply with the speed limit. Measures should include:

- Public awareness campaigns to alert residents of the speed limit;
- Existing roads should be painted with white edge lines and a centre yellow line to ensure each travel lane is 3m; and
- Revisit road standards for new road construction to narrow travel lanes and design new streets for lower speeds.

3.2 VOLUME CONTROL MEASURES

Volume control measures are intended to reduce traffic volumes and include:

- Full or partial street closures (full street closures are barriers placed across a street to close the street completely to through traffic, usually leaving only sidewalks or bicycle paths open, whereas half closures are barriers that block travel in one direction for a short distance on otherwise two-way streets);
- Diagonal diverters (barriers placed diagonally across an intersection blocking through movement);
- Median barriers (raised islands located along the centreline of a street and continuing through an intersection to block through movements at a cross street); and forced turn islands (raised islands that block certain movements on approaches to an intersection); and
- Directional closures (a curb extension or vertical barrier that extends to around the centerline of a roadway, effectively blocking one direction of traffic). When used in conjunction with other measures within a neighborhood, directional closures discourage short-cutting traffic.
    - Apply to local streets with high levels of cut-through traffic that may abut onto collector or arterial roads.

3.3 EDUCATION MEASURES

Education can be utilized to support other traffic calming measures but should not be implemented without physical changes to the roadways. The education of motorists, bicyclists, and pedestrians are beneficial as it requires lower levels of investment than physical measures, making them easier to implement. Education campaigns can also be community specific and combined with other approaches to encourage long-term behavioral shifts in transportation and result in safer roadways for all users. Some measures as determined in the TAC guide include:

- Active and Safe Routes to School Programs:
- Pace Car Programs;
- Speed Display Devices;
- Vehicle Activated Signs (VAS);
- Targeted Education Campaigns to educate and inform drivers on responsible and safe behaviors on the road;
- Speed enforcement campaigns across the municipality in effort to raise awareness to the issue of speeding in the municipality;
- Expand Community Safety and School Zones: Work with schoolboards and community members to establish safe school zones that restrict vehicle movement around schools to encourage higher uptake of active transportation to school; and
- Active and Safe Routes to School Program.

3.4 ENFORCEMENT MEASURES

Enforcement is another tool for non-physical traffic calming measures. Enforcement can aid in achieving intended outcomes of traffic calming measures, especially when fixed enforcement tools are deployed.

Some measures as recommended by TAC include:

- Fixed speed enforcement;
- Mobile speed enforcement;
- Speed Watch Programs;
- Speed enforcement (police enforcement); and

- Redlight cameras on high-volume roads, particularly in commercial areas to passively enforce speed limits.

4 TRAFFIC CALMING MEASURES GUIDELINES

4.1 RECOMMENDED MEASURES

In consideration of the Township's objectives in implementing a Traffic Calming Policy, and recognizing a large extent of the Township's road system includes urban, semi-urban and rural roads, the following traffic calming measures have been considered as viable options to implement:

- **Speed Control Measures**
  - Speed bumps / humps / cushions
  - Speed tables
  - Curb extensions
  - Lane narrowing via pavement markings
  - Lane narrowing via flexible bollards
  - Centre medians
  - Temporary centre medians
  - Traffic circles
  - Chicane (two lane) lateral shift
  - Intersection centreline hardening
  - Transverse lane markings (transverse bars or chevron pavement markings on a travel lane)
- **Volume Control Measures**
  - Diverters / modal filters / directional closures
- **Education Measures**
  - Community Safety Zones
  - School Zones
  - Radar speed display signs
  - Active and safe routes to school programs

- Targeted education campaigns

- **Enforcement Measures**
  - Police enforcement
  - Red light cameras
  - Automated speed enforcement

Descriptions of each of the measures proposed for the Township are included below.

4.2 SPEED CONTROL MEASURES

4.2.1 SPEED BUMPS/HUMPS AND CUSHIONS

Speed bumps / humps are defined as a raised area of the road, which deflects both the wheels and frame of a traversing vehicle. They may be paved as a permanent feature or temporary, removable rubber mounds for seasonal use.

Typically, 80mm high and 4.0m wide (in the direction of travel), spaced 125m to 225m apart. In more dense urban locations, speed humps can be located as close as 60m apart. Speed humps are used on residential (local) streets and collector roads.

On roads that are frequently travelled by transit vehicles or emergency services vehicles, speed cushions may be a preferred alternative to speed humps. Speed cushions are similar to a speed hump, but with channels that permit vehicles with wider wheel-bases, such as transit vehicles and fire trucks, to travel through at speed, minimizing the impact on travel times for these larger vehicles.

Advantages

- Relatively cost-efficient
- Easy to construct
- Deters cut-through traffic
- Reduces vehicle speeds

Disadvantages

- Speed humps May delay emergency vehicles
- May divert traffic to alternate routes that could negatively affect other roads
- Possible noise from braking/acceleration
- May cause discomfort to drivers with disabilities
- Impacts to snowplows and trucks
- Resources needed to install/remove seasonally

Estimated Cost

- $2,000 to $3,000 each
- $7,000 for a modular speed hump

4.2.2 SPEED TABLES

Speed tables are flat-topped asphalt or rubber mounds that cover the full width of the roadway. The ramps of the speed table are more gently sloped than speed humps and thus speed tables are less jarring than a standard speed hump and can allow larger vehicles (emergency vehicles, trucks and snowploughs) to cross with reduced disruption. As such, speed tables are typically not removed seasonally.

For an 85th percentile speed of approximately 40 km/h, the speed table should be 80 mm high and 6.5 metres long in the direction of travel (2 metre ramps at the ends and a 2.5 metre plateau which is typically long enough to accommodate the entire wheelbase of a passenger car).

Advantages

- Relatively cost-efficient
- Easy to construct
- Deters cut-through traffic
- Reduces vehicle speeds
- Lesser impacts to larger vehicles as compared to speed humps
- Can be applied in both directions on two-way streets

Disadvantages

- May delay emergency vehicle response times
- May divert traffic to alternate routes that could negatively affect other roads
- Possible noise created by braking/acceleration
- May cause discomfort to drivers with disabilities
- Potential impacts to snowplows and trucks
- May require additional maintenance responsibilities

Estimated Cost

- $3,000 to $5,000 each
- $10,000 for a modular speed table

4.2.3 CURB EXTENSIONS

Also known as “bump- outs”, curb extensions are horizontal extensions of a curb into a road, resulting in a narrower road section. These may be used to provide high visibility of pedestrians, shorter walking distances to cross the road, and to slow motorists down.

Advantages

- Interrupts straight line curbs and slows traffic
- Reduces turning radii to slow turning speed
- Improves pedestrian safety

Disadvantages

- May reduce on-street parking
- Large vehicles may need to cross centerline to negotiate turns
- May interrupt bike lanes if not designed

Estimated Cost

- $5,000 to $20,000 Each

- Improves sightlines at intersections by providing additional daylighting
- No impacts to emergency services

with adequate consideration

- Increased snow removal costs and operation time

4.2.4 LANE NARROWING THROUGH PAVEMENT MARKINGS

This measure narrows the travel lanes to a minimum width of 3.0 metres through the use of pavement markings (centreline and edge lines). Reduced lane widths provide a feeling of constraint and should cause drivers to reduce their travel speed. Any remaining road width would be designated as shoulder.

Advantages

- Provides additional space for shoulders, which may be used for other road users (particularly in absence of sidewalks)
- Low cost
- No impact to emergency vehicles and snowplows
- Can be readily implemented
- Does not affect vehicle operations

Disadvantages

- Lane narrowing reduces separation between oncoming vehicles
- Pavement markings require maintenance and are not visible during winter months

Estimated Cost

- $1,000 to $2,000 per km of pavement marking and mobilization

- Provides guidance during low light conditions through reflectivity

4.2.5 LANE NARROWING THROUGH COLLAPSIBLE BOLLARDS

Lane narrowing is a technique used to reduce lane widths and influence driver behavior. By making lanes narrower, drivers perceive the road as less comfortable at higher speeds, leading to reduced operating speeds.

Collapsible bollards can be used. Strategically place collapsible bollards to create temporary narrow lanes. They create both physical and visual cue for drivers to slow down.

Source: Municipality of Leamington

Advantages

- Flexible and adaptable measure to implement
- Low-cost initiative that can be placed in existing right of ways
- Provision of both physical and visual cue

Disadvantages

- May require more detailed maintenance considerations

Estimated Cost

- $1,000 to $1,200 per set of three bollards

4.2.6 CENTRE MEDIAN

A centre median is a raised island installed in the centre of a road to reduce the overall width of the travelled lanes. They help slow traffic without affecting the capacity of the road.

Raised median islands can be combined with curb extensions and/or textured crosswalks to further improve pedestrian safety. This measure may be considered on both local and collector roads.

Advantages

- provides refuge for pedestrians
- Increases motorist awareness
- Can be designed to prohibit left-turns thereby reducing cut-through traffic

Disadvantages

- May reduce on-street parking
- Restricts driveway access
- Speeds may increase due to lack of left turns
- Additional maintenance if landscaped
- Potential conflict with snow clearing operations

Estimated Cost

- $4,000 for 2.0m x 5.0m median with no landscaping

4.2.7 TEMPORARY CENTRE MEDIAN

Similar to the centre median, the temporary centre median is installed in the centre of a road using flexible delineator posts to create reduced travelled lane widths. They help slow traffic without affecting the capacity of the road and are removable for winter snow clearing operations.

Advantages

- Increases motorist awareness
- Can be designed to prohibit left-turns thereby reducing cut-through traffic
- Removable for snow clearing operations

Disadvantages

- May reduce on-street parking
- Restricts driveway access
- Speeds may increase due to lack of left turns
- Required to be set up each year

Estimated Cost

- $1,000 for signage and flexible posts

4.2.8 TRAFFIC CIRCLES

A “traffic circle” is not the same as a modern day “roundabout”. They are much smaller and serve a different purpose for the intersection, which is simply to reduce speed rather than to control high traffic volumes through an intersection.

Circular island about 3m to 6m in diameter, is placed at intersections of residential streets, around which traffic circulates in a counter-clockwise direction.

Advantages

- Reduces speeds through intersections
- Provides visual breaks
- Reduces collisions
- Provides landscaping opportunities
- Provide yield control for motor vehicles

Disadvantages

- Increased maintenance cost if landscaped
- Potential conflict with snow clearing operations
- Learning curve for drivers when first installed
- Restricted access for trucks and longer school buses

Estimated Cost

- $8,000 to $25,000 each

4.2.9 CHICANE (TWO LANE) LATERAL SHIFT

A chicane is a traffic calming measure consisting of curb extensions placed on alternating sides of a road. These extensions narrow the roadway, requiring drivers to steer from one side to the other as they pass through the chicane.

Chicanes can discourage drivers from taking shortcuts or using the road for through traffic, as well as to reduce overall speeds by forcing vehicles to shift laterally while passing through the chicane.

Source: Wikimedia Commons. Credit: Richard Drdull

Advantages

- Discourage drivers from taking short-cuts
- Reduce overall speeds
- Provides visual traffic calming effect

Disadvantages

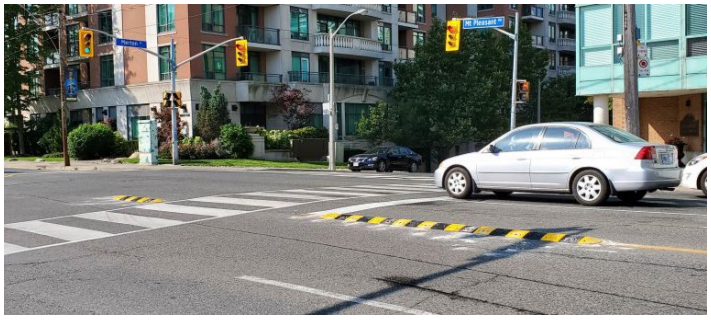
- May require removal of on street parking
- May require curb alignment

Estimated Cost

- $5,000 to $20,000 each

4.2.10 INTERSECTION CENTRELINE HARDENING

Intersection centerline hardening entails using either bollards or rubber/concrete curbs to prevent drivers from cutting across intersections at a diagonal. They are beneficial in reducing conflicts among pedestrians/cyclists and motor vehicles.



Source: City of Toronto

Advantages

- Forces drivers to turn slowly at a right angle
- Can decrease vehicle and pedestrian conflicts by 70%

Disadvantages

- Required to be set up each year

Estimated Cost

- $1,200 to $1,900 per location

4.2.11 TRANSVERSE LANE MARKINGS

Full-Lane Transverse Bars include parallel pavement markings which extend across the width of the road. The markings can be placed closer together with distance to create the illusion that a vehicle's speed is increasing and to encourage the driver to slow down.

Advantages

- Reduced vehicle speeds
- Quick to implement
- No impacts to emergency vehicles, transit, maintenance vehicles, etc.

Disadvantages

- Pavement markings will require regular maintenance
- Potential increase in costs if placed in wheel path of vehicles
- Visibility of pavement markings may be reduced in winter months and from significant upstream distances

Estimated Cost

- $500 per location

4.3 VOLUME CONTROL MEASURES

4.3.1 DIVERTERS AND MODAL FILTERS (DIRECTIONAL CLOSURES)

A diverter / modal filter / directional closure is a raised barrier or sign placed at an intersection that forces traffic to turn and prevents traffic from proceeding straight through the intersection. Diverters can incorporate gaps for pedestrians, wheelchairs and bicycles and can be mountable by emergency vehicles.

Modal filters can also be implemented as a directional closure at an intersection – restricting through movements on a local street through a curb extension or physical barrier on the far side of the intersection.

Source: Wikimedia Commons. Credit: Richard Drdull

Advantages

- Appropriate for local and collector streets
- Can permit passage of by emergency vehicles through mountable elements
- Can be implemented as a part of overall network policy or comprehensive system

Disadvantages

- Can be unsatisfactory to through cyclists who may be exposed to unsuspecting traffic on both sides of the diverter (depending on the diverter geometry and cyclist manoeuvre)

Estimated Cost

- $500 - $8,000 depending on construction measures selected

4.4 EDUCATION MEASURES

4.4.1 COMMUNITY SAFETY AND SCHOOL ZONES

Community Safety Zone signs inform drivers they are entering a zone that the community has designated as an area where the safety of its

children/citizens is paramount. Traffic related offences committed within the zone are subject to increased fines (many set fines are doubled such as speeding and traffic signal related offences) through a special designation under the Highway Traffic Act

Community Safety Zones may include roadways near day care centers, playgrounds, parks, and senior citizen residences. Community Safety Zones can also be deployed in areas with an extensive collision history within the community.

Community Safety Zones should include areas that extend for two blocks in all directions from schools, parks and senior citizen residences. Community Safety Zones should be prioritized for reduced speed limits to 40km/h, with School Zones being reduced to 30km/h on all residential streets within 2 blocks of the school. Under current provincial legislation, Automated speed enforcement can only be used within Community Safety Zones. The Township is eligible to use automated speed enforcement in appropriately designated Community Safety Zones.

Advantages

- Effective as a temporary speed reduction measure.
- Permits the use of Automatic Speed Enforcement

Disadvantages

- Limited efficacy without regular enforcement or physical measures

Estimated Cost

- $250 includes sign and posts installation

4.4.2 RADAR SPEED DISPLAY SIGN

Radar speed display signs are portable or permanent radar activated signs that instantaneously display approaching speeds for individual vehicles. They can also be programmed to flash when motorists are exceeding the speed assigned within the sign. The signs can be solar powered to reduce environmental impact.

These devices create a sense of being monitored to the driver and provide an instant notification that the speed limit is being exceeded (if such is the case).

Advantages

- Educational tool, good public relations, effective as a temporary speed
- Collect data relating to speed, traffic volume, etc.
- Inexpensive, and easy to install

Disadvantages

- Relies on motorist to voluntarily comply, duration of effectiveness is limited, not accurate on roads with multiple lanes per direction (too much traffic).
- Staff time consuming, requires to be moved to different locations.

Estimated Cost

- $4,500 for sign

4.5 ENFORCEMENT MEASURES

4.5.1 POLICE ENFORCEMENT

Speeding is an infraction of the Highway Traffic Act enforceable by the OPP. It is often used with other traffic calming devices to regulate behaviour and is proven quite effective in reducing travel speeds, but requires the presence of an officer to provide the benefits.

Advantages	Disadvantages	Estimated Cost
• Effective in getting drivers' attention • No impact to emergency vehicles and snowplows • Can be implemented immediately, when resources permit • Does not affect vehicle operations	• May be costly as additional revenue for tickets does not pay for officer work time • Does not provide for a continuous and consistent solution (i.e. not present for 24 hours per day and 7 days a week) • Competing priorities	• Varies

4.5.2 RED LIGHT CAMERAS

A red light camera is a device that detects vehicles that run a red light at an intersection. The camera takes a photo of the vehicle, its license plate and the traffic signal when the violation occurs. The photo is used as evidence to issue a fine to the registered owner of the vehicle. Red light cameras are intended to improve road safety by deterring drivers from running red lights, which can cause serious collisions and injuries.

Advantages	Disadvantages	Estimated Cost
• 24/7 monitoring allows for continuous enforcement • Enhances road safety at all times including late night and early morning • Red light camera funds can be used to support road safety enhancements	• Initial setup and maintenance costs can be substantial • Many signalized intersections are within Simcoe County jurisdiction	• Varies depending on the model of implementation

4.5.3 AUTOMATED SPEED ENFORCEMENT

Automated Speed Enforcement (ASE) is a system that uses a camera and speed measurement device to enforce speed limits in identified areas. If a vehicle exceeds the posted speed limit in an automated speed enforcement area, the automated speed enforcement system captures an image which is reviewed by a provincial offences officer. An image of the offence, license plate and ticket with an associated fine will be mailed within the next 30 days.

Source: Region of Durham

Advantages

- 24/7 monitoring allows for continuous enforcement
- Enhances road safety at all times including late night and early morning

Disadvantages

- Initial setup and maintenance costs can be substantial
- Municipalities are unable to recover any costs as revenue is collected by courts

Estimated Cost

- Varies depending on the model of implementation

5 TRAFFIC CALMING MEASURES GUIDELINES

5.1 CONSIDERATION FOR TRAFFIC CALMING

Traffic calming measures will:

- Be considered when there is a demonstrated safety, speed or short-cutting traffic concern and acceptable alternative measures have been exhausted.
- Be considered after focus is placed first on improvements to the arterial road network, such as signal timing optimization.
- Be considered as part of an area-wide plan as opposed to a street-specific plan unless there is a demonstrated rationale for why a street-specific plan is more preferred.
- Be predominantly restricted to two lane roads (one lane of through traffic in each direction).
- Not impede non-motorized, alternative modes of transportation and be designed to ensure pedestrian and cycling traffic is unaffected.
- Not impede Emergency and Transit services access unless alternate measures are agreed upon with the affected Departments.
- Maintain reasonable automobile access to Township roads.
- Prioritize areas that feature high-rates of pedestrian-vehicle conflicts and ensure measures match road typology.
- Where applicable, passively enforce speed limits and generate revenue that can be allocated towards additional traffic calming measures.
- Prioritize areas that should receive traffic calming measures through utilizing staff and resources to survey and confirm with traffic counts where cut-through traffic is prevalent on residential roads.
- Prioritize rolling out low-cost interventions including signage along residential streets and abutting intersections to restrict cut-through traffic in residential areas.
- Build awareness around the positive effects of traffic calming measures throughout the municipality in efforts to increase momentum behind enacting other measures.
- Consider collision data to determine where additional calming needs should be implemented annually.

- Include considerations of Council and staff recommendations for appropriate locations allowing for more agile efforts.
- Consider parking removal on a project-by-project basis. Parking needs of residents should be balanced with the equally important functions of traffic, emergency vehicle access, transit, bicycle, and pedestrian movement.
- Only be installed after staff has investigated existing traffic conditions and the necessary approvals have been received.
- Be monitored; follow-up assessment and report will be completed to confirm effectiveness and the results will be communicated to area residents and Council.

A note on Stop Signs:

It is important to note that stop signs are not to be used for speed control. In accordance with the Ministry of Ontario (MTO) Traffic Manual Book 5 (Regulatory Signs) unwarranted stop signs increase vehicular speeds between stop signs and encourage rolling stops (stop signs only affect speeds within approximately 40 metres of the stop sign). An excessive number of stop signs, particularly those that are not warranted, encourage disrespect for stop control signs and other traffic control devices.

5.2 COMMUNITY INVOLVEMENT

Restoring neighbourhood streets to their intended function and improving overall livability are primary objectives of traffic calming. In order to achieve this goal, community involvement and support is paramount. Throughout the process, residents are encouraged to participate in the development of a traffic calming plan suitable to the neighbourhood and the concerns within it.

Communication with residents is made at various stages throughout the process as the traffic calming plan is developed and implemented. Traffic calming plans should be developed with an understanding of current and historical traffic patterns within the area under investigation. For a traffic calming program to be successful, the neighbourhood must support and be committed to the solution. The only means of gaining this commitment is to involve the residents by informing them of the study location being considered for traffic calming measures and the proposed solution.

The benefit of neighbourhood involvement is that it generates support for a traffic calming program and assists in the implementation of a plan without significant opposition upon completion. Neighbourhood involvement also enhances the credibility of the traffic calming program, particularly when it is eventually presented to Committee or Council for approval. In order to obtain a working partnership with the committee or residents, a description of the study will be issued in a notice along with a survey delivered to residents affected by the implementation of the proposed traffic calming measures.

These forms of contact will provide the affected residents with opportunities to offer input into the development of the plan, as well as publicize and increase the awareness of the study.

The review and implementation of traffic calming measures is a time consuming and expensive process requiring many resources. Without public support, the traffic calming measures intended to alleviate traffic concerns could be met with negative public opinion as a result, jeopardizing the outcome and potential positive impacts to affected neighbourhoods.

Neighbourhood support, enforcement, education of motorists, bicyclists and pedestrians, appropriate engineering applications and economics typically determine the success of any traffic calming endeavor. A cooperative partnership between the affected residents and the Township is essential to the success of the project.

In some cases, it may be found that traffic calming measures are warranted and a majority of affected residents would prefer some form of mitigation, but there is a wide range of conflicting opinions regarding the type of mitigation etc. Pending comments received from the residents regarding the notification and survey, the Township may offer to host a Public Open House to discuss potential options for traffic calming measures.

5.3 CLASS ENVIRONMENTAL ASSESMENT PROCESS

Traffic calming is exempt from the Ontario Environmental Assessment Act and is not an undertaking subject to the Municipal Engineers Association Municipal Class Environmental Assessment (October 2000, as amended). Where appropriate, public consultation elements of the Municipal Class EA for a Schedule B project (including the potential public meeting when warranted as noted above) have been incorporated in this policy as a best practice.

The manner in which the public is informed throughout this policy will serve as the preferred method of public notification for any traffic calming measures that involve the retirement of existing road facilities.

6 TRAFFIC CALMING IMPLEMENTATION PROCESS

The following process will be used when proceeding with a request for traffic calming measures within the Township of Essa. An established and formal process for investigating roads provides consistency and equality in the determination of need and suitability of traffic calming measures.

To address concerns and feedback brought forward by those who travel and live within Essa three streams for implementing traffic calming measures are included:

1. Community-wide
2. Request based
3. Collision hotspot correction

These streams vary in the initiation method, process, implementation timeline and funding sources. Collectively they will result in slower traffic and increased safety in Essa. The strategy includes traffic calming as part of community-wide initiatives, new development, capital infrastructure projects, and modification to existing neighborhoods.

6.1 COMMUNITY-WIDE APPROACH

The community approach is a holistic implementation across Essa by lowering the default speed limit from 50km/hr to 40km/hr. Having the default speed limit of 40 km/hr be posted throughout the urban areas of Essa will play and important role in traffic calming. The posted speed limit will send a message to motorists about the expected behaviours on the road and speed is a significant factor related to the frequency and severity of collisions.

As of 2018, the Ontario Highway Traffic Act (Section 128 (2.1)) allows municipalities to set a posted speed limit less than 50 km/h for roads under the municipalities' jurisdiction. With this recent change to the HTA, other municipalities have implemented the default speed limit of 40 km/h in Ontario: Toronto, Hamilton, Ottawa, London, Mississauga, Waterloo, Prescott, Oakville (pilot), and Kitchener (pilot).

6.2 REQUEST-BASED APPROACH

Residents, staff, and Council can submit a request for traffic calming in on a roadway. The residents can contribute with the local knowledge of daily traffic conditions and identify safety concerns. The following approach evaluates requests to determine if action will be taken and what the suitable treatment is.

6.2.1 PROCESS

There are four stages of the traffic calming request stream: initiation, data collection and assessment, implementation, and evaluation.

Stage 1: Initiation

Traffic Calming Requests

Residents with traffic related concerns are instructed to complete the form in **Appendix A** of this Policy and submit their written request to investigate traffic calming on their road or within their neighbourhood to the Township of Essa Public Works Department.

Screening Criteria

Initial screening criteria to determine eligibility for consideration for traffic calming measures have been established.

With respect to the road or road section in question, it must:

- Be a local or collector road assumed and maintained by the Township of Essa;
- Have a minimum length of 150m

In addition, the following must also be satisfied:

- Zoning should be primarily residential, institutional or recreational (parklands).

For roads or road sections with restricted horizontal and/or vertical alignment, and hence restricted sight lines, traffic calming measures could be considered in conjunction with reduced speed limits and adequate warning signs.

The requestor should be notified of the screening results.

Stage 2: Data Collection and Assessment

Data Collection

If the requested location meets the initial screening criteria, data collection and analysis will commence. The collection of traffic data, as deemed necessary by Township staff, will serve to provide a better understanding of the current traffic conditions and to prioritize locations for the investigation of traffic calming.

Staff will conduct the necessary traffic studies (or outsource such studies) to quantify and qualify the submitted traffic concerns. The data collected may include traffic volumes and composition (cars and trucks), vehicle speeds, collisions, sight lines related to deficient horizontal and/or vertical alignment and stopping distance, pedestrian activity, an origin/destination study (third party study), if the request relates to shortcutting traffic, and historical site-specific information.

For vehicle speeds, it is not prudent to consider the highest speed at which motorists travel. Rather, the 85th percentile speed will be considered, which is the speed at which

85% of the total traffic volume on a road is travelling at or below. In considering the need for traffic calming, the 85th percentile speed must exceed the posted speed limit by a minimum of 10 km/h as per the values provided in **Table 1**.

Table 1: 85th Percentile Speed Considerations

Posted Speed Limit	85th Percentile Speed
40 km/h	50 km/h
50 km/h	60 km/h
60 km/h	70 km/h

With respect to sight distances and the need for traffic calming to reduce travel speeds upon approach to intersections, the existing sight distances at intersections must be less than the distances outlined in **Table 2** for traffic calming to be warranted. For lower speed roads (e.g. posted speed of 50 km/h or less), the design speed is typically taken as 10 km/h over the posted speed, whereas for higher speed roads (e.g. posted speed of 60 km/h or more), design speed is typically 20 km/h greater than posted speed.

Table 2: Stopping Sight Distance Considerations

Design Speed	Minimum Stopping Sight Distance
40 km/h	45 m
50 km/h	65 m
60 km/h	85 m
70 km/h	110 m

The above distances in metres (m) at each design speed are the “minimum stopping sight distances on wet pavement” as outlined in the MTO Geometric Design Standards.

Once collected and summarized, the data will be utilized in the overall assessment to determine the need for traffic calming and assist in setting priority for locations of consideration.

Basis for Assessment

The data assessment is a screening process focused on the various attributes of a road in order to quantify its potential need for traffic calming. By means of assigning weighted points based on the severity of certain road attributes (e.g. 85th percentile speed), this process will bring to the forefront roads requiring consideration while quantifying the current conditions. A basis for assessment has been prepared in consideration of comparable traffic calming policies in effect throughout the area (refer to Appendix B for

the assessment worksheet). Only road sections that achieve the minimum required points as specified in Appendix B will be reviewed further in the next steps of the process.

Should the minimum required points be met for a request, depending on funding availability, locations for implementation will be selected based on the point system, with those locations with the highest points implemented first. If funding does not permit all locations to be implemented in one year, roads will be carried forward to the next year when they will then be re-prioritized to include any new locations.

Assessment Thresholds

The minimum number of points required to proceed with the investigation of traffic calming measures differs based on the classification of road. In keeping with the objective of restoring roads to their intended function, local and collector roads are designed and expected to convey varying levels of traffic volume. This, in turn, has a bearing on the minimum point value required to proceed, as traffic volume is a major consideration. Based on this, the following are minimum point values for each road type, as can be seen in **Appendix B**:

- Local road minimum 35 points
- Collector road minimum 52 points

Stage 3: Implementation

During implementation, a letter will be provided to affected residents notifying them of the proposed plan, including the objective, rationale on the selected device and the intended outcome of the installation. In addition, the Mayor and members of Council will be advised. The final design will include the location of the implementation, spacing, specifications of the treatment, and estimated cost.

Implementation of ‘quick build’ measures will be prioritized where capital projects in the study areas are not feasible or desired. Quick-build measures such as temporary speed cushions, flexible bollards, line painting, radar speed display signs and temporary curb extensions allow for evaluation and iteration in the traffic calming process, helping to build support for future measures.

Once the traffic calming measure has been installed, it is recommended that the Township continue to engage with the impacted community. Township staff should provide information on how to provide feedback through mail drops to residents along the affected corridor as well as through the Township’s website and social media platforms. Engagement efforts should provide participants will an opportunity to provide feedback on how the traffic calming installations are operating, and if any adjustments should be considered. It is important to note that consultation should not act as a barrier to implementing traffic calming measures, but instead help to inform how they can be adjusted going forward to ensure they are effective.

Stage 4: Evaluation and Reporting

Township staff should continually monitor and evaluate the implemented traffic calming measure to ensure it is achieving its purpose without causing any additional negative impacts. Through the monitoring process, the Township can determine whether design and/or location adjustments and any additional efforts are required.

To assess the effectiveness of the measure, Township staff should monitor traffic data, similar to pre-installation data collection during Stage 2 of the process. Township staff should compare this data to the pre-installation data from Stage 2 to determine whether the measure is achieving the objectives effectively. The measure should be monitored after sufficient time has elapsed in order to allow traffic patterns to stabilize and road users to become familiar with the measure/s (e.g., three to six months after installation). When conducting traffic volume data collection, it should be noted that adjacent roadways may see increased volumes as a result of the traffic calming measures. The potential impact on adjacent roadways should be considered when reviewing the broader impact of installed traffic calming measures to further refine the Township's approach to traffic calming.

If installed permanently, the measure should also be monitored during the winter to ensure it is effective under all potential circumstances. The Township should also engage with residents or key stakeholders to obtain feedback regarding the effectiveness of the measures and to identify any potential concerns.

For transparency, the Township should prepare and publish reports online detailing the monitoring and evaluation results, including any recommended adjustments or removal of the measure/s based on key findings from the monitoring and evaluation process.

6.3 COLLISION HOTSPOT CORRECTION PROCESS

As the Township collects and analyzes safety and collision data, certain locations may begin to emerge as collision 'hot spots'. These locations account for a significant percentage of the injury and fatality collisions on the Township's roadways, and should be identified and addressed through the measures listed in this policy as soon as possible.

Through the process of the development of the Transportation Master Plan (2023), a collision history map was generated to identify the intersections and corridors with the most significant collision history. This analysis should be reviewed annually, with plans developed to mitigate the conditions that are leading to these elevated levels of collisions.

The process for the Collision Hotspot Correction stream of traffic calming is for staff to identify the hotspots based on an annual review of collision data, updating the collision heatmap included in **Appendix C** of this report. Regardless of other screening factors, the top 5 intersections or corridors should be reviewed through a Road Safety Analysis process, and safety measures should be reviewed and implemented as soon as possible to address the known safety issues with these areas of the Township.

Ongoing evaluation of the efficacy of the measures should be performed, with additional measures implemented if there is not a significant change in collision history where treatments are applied.

APPENDIX A – TRAFFIC CALMING REQUEST FORM

Appendix A: Traffic Calming Request Form

Application date: _____

Description of Location:

_____

_____

_____

Email request to: dperreault@essatownship.on.ca

-OR-

Mail, Fax or Drop off to: Township of Essa, 5786 County Road 21
Utopia, ON L0M 1T0 Fax# 705-424-2367

Name: _____
Address: _____
Contact phone #: _____
Email address: _____

Why are additional traffic signage and/or mitigation / traffic calming measures being requested at this location? (Provide pictures if available.)

_____

_____

_____

_____

_____

_____

_____

OFFICE USE ONLY	
Staff Review:	Date:
Council Review:	Date:
Council Review:	Date:
Approved/ Bylaw:	

APPENDIX B – ASSESSMENT OF TRAFFIC CALMING NEED

Appendix B: Assessment of Traffic Calming Need

Road Section:_____	Prepared By:_____
Road Class:_____	Prepared On:_____

Traffic Data

Feature	Range	Criteria	Score
1. Speed	0 to 35	5 points for every 2 km/h that the 85th percentile speed is greater than 10 km/h over the posted speed limit	
2. Volume	0 to 20	Local Roadways: 5 points per 500 ADT Collector Roads: 5 points per 1000 ADT	
3. Short-Cutting Traffic	0 to 15	5 points if there is a presence of 25% or more shortcutting traffic, additional 5 points for every 10% increment above 25%	
4. Collisions	0 to 10	1 point for every collision/year over a 3-year period	

Road Characteristics

Feature	Range	Criteria	Score
1. Sidewalks	0 to 5	5 points for no sidewalks with evidence of pedestrian activity	
2. Pedestrian Generators	0 to 15	5 points for each nearby (must have direct connection to subject roadway) pedestrian generator such as school, playground, community centre, libraries, retail, etc.	
3. Sight Lines	0 to 10	0 points for excellent sight lines, 5 points impaired sight lines, 10 points for very poor sight lines	
4. Road Allowance Limitations Paved Width ≤6m	0 to 5	5 points for limited paved surface and/or boulevard width	

Overall Assessment

Does the location meet the minimum requirement:	**Total Score:**
35 Points	**Local Road**
52 points	**Collector Road**

APPENDIX C – COLLISION DATA

Appendix C: Collision Data

The Collison data received had no latitude and longitude information of the Collison occurrence location. The Collison location was tied to the intersection based on street and its cross streets information to identify and quantify the incident types at the intersections. The street names were not consistent across the data and was processed for its consistency based on the street and its cross streets references. Example, the study area had similar road numbers like 5th Side Road and 5th Line and was presented in the data as just 5th without much further information and based on the crossroads name the correct name of the roads were identified. A total of 1387 collisions were reported in the Essa Township area for around five-year period from January 1, 2018, to November 30, 2022. We found that around 180 incidences of the collision data did not have the street or cross street information nor clear location description. The spatial location was identified with the cross-street information for the rest of the 1207 collisions.

- **Yearly Distribution of Collisions:** The following table shows the number of collisions by year and incident type in the study area.

Collisions by Year and Incident Type					
Year	**Incident Type**				
	Property Damage Only	**Injury**	**Fatal Injury**	**Other**	**Total**
2018	254	59		2	315
2019	270	47	4	1	322
2020	187	45	1		233
2021	193	34			227
2022	250	39	1		290
Total	**1154**	**224**	**6**	**3**	**1387**

As shown in the above table, the number of collisions had decreased during COVID19 in years 2020 and 2021. The collisions in the year 2022 were similar to the pre COVID 19 levels. Based on the Collison data during the five-year period, about 83% constituted property damage collisions, and about 16.5% constituted injury collisions including six fatal injury collisions.

- **Fatal Injury Collisions:** There were six fatal collisions that occurred in the study area over the five-year period. The following table summarizes the date of the fatal collision along with the location and primary cause of the collision.

Date	**Location**	**Primary Cause**
17-Jun-19	County Road 56 & Side Road 30	Other
09-Nov-19	Mill Street & Cecil Street	Pedestrian
12-Nov-19	9th Line & County Road 21	Lost control
25-Dec-19	Roth Street & Mill Street	Other
04-Jun-20	Elizabeth Street & Simcoe Street	Failed to yield right of way
24-Apr-22	Mill Street & Summerset Place	Speed too fast for conditions

Note: The location of the collision is approximate as inferred from the provided collision information

As shown in the above table, four out of six fatal collisions (66%) occurred in the year 2019. Three out of six fatal collisions (50%) occurred along Mill Street. There was one pedestrian involved fatal collision at Mill Street and others related to vehicles losing control, failing to yield and excessive speeds as the primary causes of these fatal collisions. The cause of the two fatal collisions is mentioned as “other” with out much information.

- **Pedestrian Collisions:** There were a total of 11 collisions involving pedestrians as the primary cause of the collision. The following table summarizes the year of the pedestrian involved collision along with the location, and Incident Type.

Year	Location	Incident Type
2018	Brentwood Road & Commerce Road	Non-Fatal Injury
2018	County Road 10 & Willoughby Road	Non-Fatal Injury
2018	Mill Street & River Drive	Non-Fatal Injury
2019	Roth Street & Mill Street	Non-Fatal Injury
2019	King Street & Mill Street	Non-Fatal Injury
2019	Mill Street & Cecil Street	Fatal Injury
2021	Mill Street & Tree Top Street	Non-Fatal Injury
2021	Greenwood Drive & Lookout Street	Non-Fatal Injury
2021	5th Line & Marshall Crescent	Non-Fatal Injury
2022	Centre Street & Duckworth Street	Non-Fatal Injury
2022	King Street & Elizabeth Street	Non-Fatal Injury

Note: The location of the collision is approximate as inferred from the provided collision information

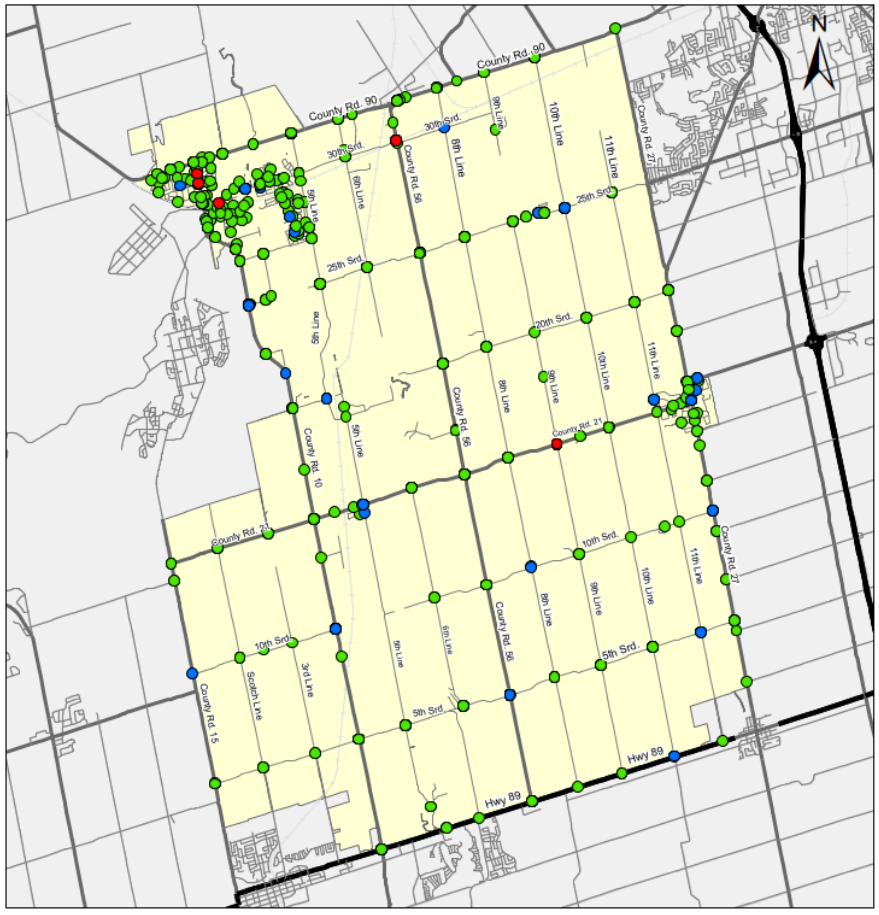
As shown in the table, of the 11 pedestrian collisions one collision resulted in a fatality, while the rest were injury collisions and five out of 11 collisions (45%) occurred along Mill Street.

- **Primary Cause of Collisions:** The table below summarized the primary cause of all the collisions occurred in the study area.

Primary Cause	No. of Collisions	Percentage
Failed to yield right of way	213	15%
Lost control	181	13%
Animal - Wild or Domestic	164	12%
Other	162	12%
Inattentive driver	149	11%
Speed -- too fast for conditions	139	10%
Following too closely	100	7%
Unknown	99	7%
Improper turn	85	6%
Disobeyed traffic control	45	3%
Ability Impaired Alcohol/Drugs	39	3%
Pedestrian	11	1%
Grand Total	**1387**	**100%**

As shown in the table, failure to yield the right-of-way is the most predominant cause (15%) of all the collisions in the study area followed by losing control (13%), Animal (12%), Inattentive Driver (11%) and Excessive Speeds (10%).

Spatial Distribution of Collisions: The collision data was plotted in GIS to identify the hot spot locations or high collision incidence locations. We found that around 180 incidence of the collision data did not have the intersection information nor clear location description which were left out of this hotspot maps. Figure below shows the collision locations along with the incident type. As shown in the figure the collisions are generally concentrated in the populated areas of Angus and Thornton.



DRAFT

Township of Essa Transportation & Trails Master Plan

Figure X
Collision Locations

Incident Type
- Fatal Injury
- Non-Fatal Injury
- Other
- Property Damage Only

Note:
1. The collision locations are approximate.
2. Collisions with same location overlap one on other.

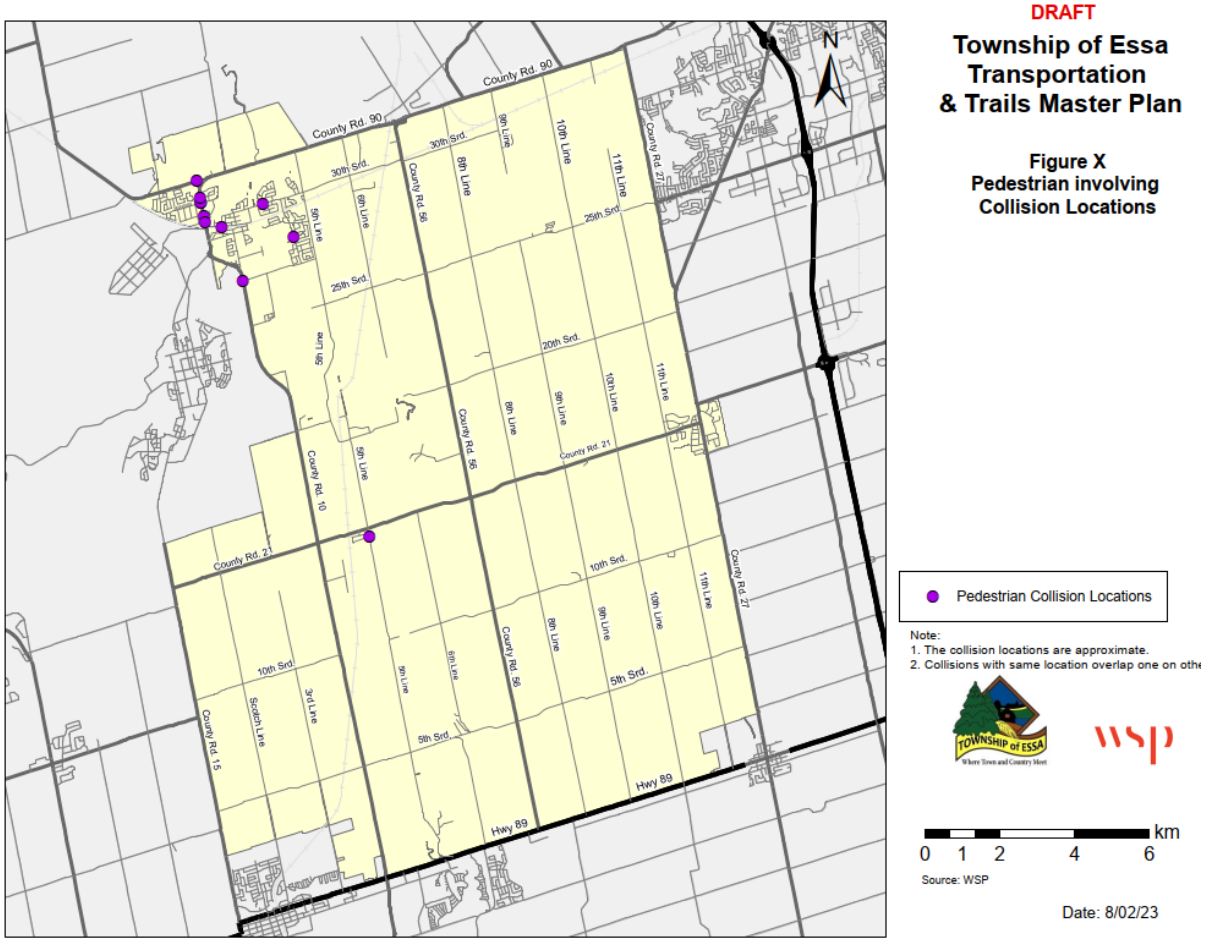
km
0 1 2 4 6

Source: WSP

Date: 8/02/23

Document Path: \\corp.pbwan.net\IN\N_BLR_Projects\70130996-221-10569-00-Essa TTMP\Transportation Planning\3 Design and Analysis\T06-Analysis and Calculations\GIS\230802-PC-Collision Locations.mxd

Figure below shows the location of pedestrian involved collisions.



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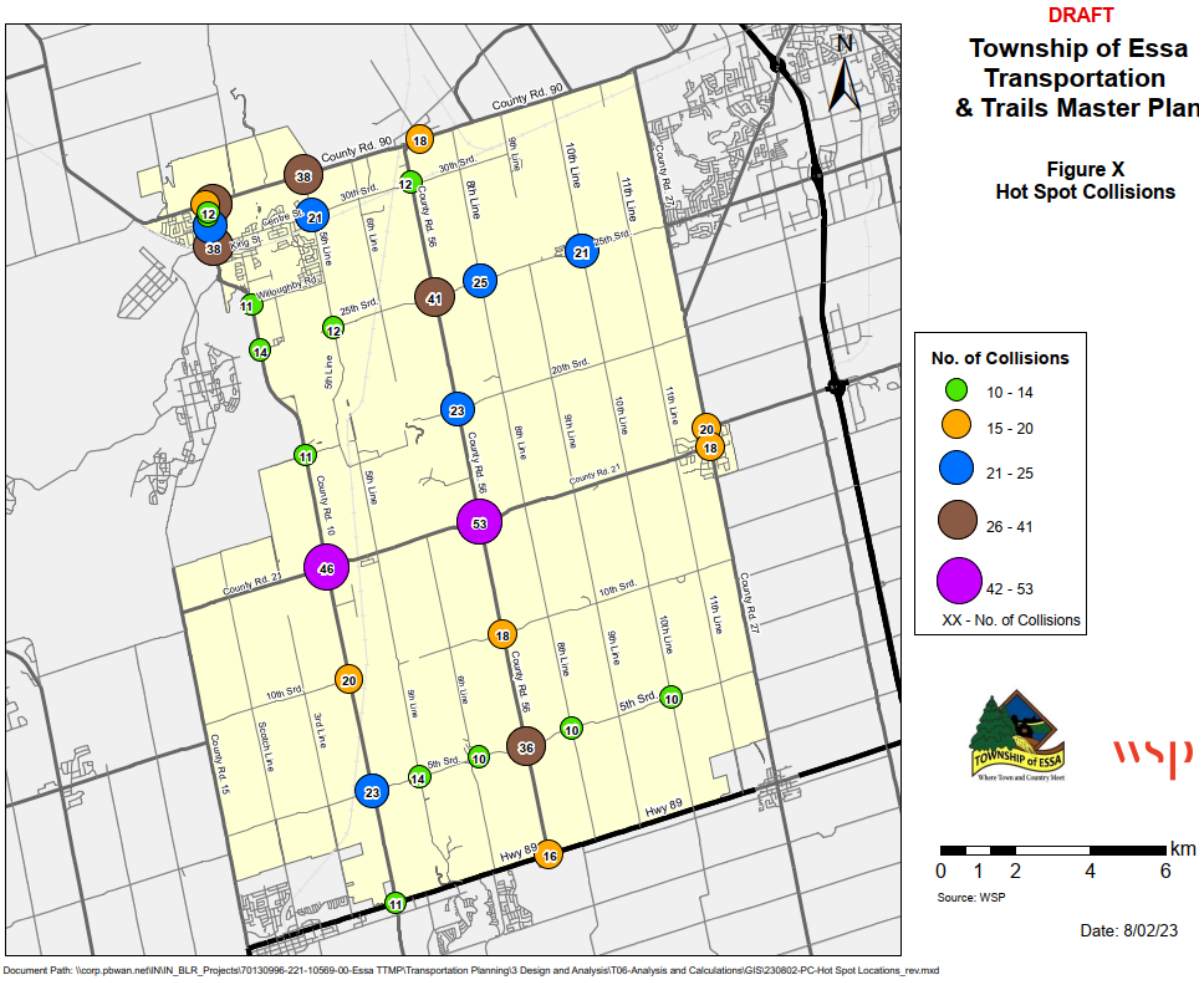
Hot Spot Collision Analysis: The collision data was analyzed to identify the locations with highest number of collisions. The table below shows the locations with 10 or more collisions over the five-year period. As shown in the table there are 32 locations which had 10 or more collisions during the five-year period. Figure below shows the hot spot locations along with the number of collisions occurring at the location.

S.No.	Location	Property Damage Only	Non-Fatal Injury	Fatal Injury	Other	Total Collisions
1	County Road 21 & County Road 56	45	8	0	0	53
2	County Road 21 & County Road 10	37	9	0	0	46
3	**County Road 56 & 25th Sideroad**	26	15	0	0	41
4	County Road 90 & County Road 10/Brentwood Road	37	3	0	0	40
5	**County Road 90 & 5th Line**	33	5	0	0	38
6	**County Road 90 & King Street**	28	10	0	0	38
7	**5th Sideroad & County Road 56**	29	7	0	0	36
8	**25th Sideroad & 8th Line**	17	8	0	0	25
9	**County Road 56 & 20th Sideroad**	17	6	0	0	23
10	**5th Sideroad & County Road 10**	15	8	0	0	23
11	**Mill St & Cecil St/Roth St**	15	4	2	0	21
12	**5th Line & Centre St/30th Sideroad**	20	1	0	0	21
13	**25th Sideroad & 10th Line**	16	5	0	0	21
14	**10th Sideroad & County Road 10**	15	4	0	1	20
15	**Brentwood Dr & Commerce Rd**	15	5	0	0	20
16	**County Road 27 & County Innisfil Beach Road**	19	1	0	0	20
17	County Rd 90 & County Rd 56	14	4	0	0	18
18	County Road 21 & County Road 27	15	3	0	0	18
19	**County Rd 56 & 10th Sideroad**	16	2	0	0	18
20	Highway 89 & County Rd 56	14	2	0	0	16
21	**County Rd 10 & 25th Sideroad**	12	2	0	0	14
22	**5th Line & 5th Sideroad**	10	4	0	0	14
23	**Mill St & Summerset Pl**	9	2	1	1	13
24	**5th Line & 25th Sideroad**	12	0	0	0	12
25	**Mill St & Commerce Rd**	10	2	0	0	12
26	**County Rd 56 & 30th Sideroad**	6	5	1	0	12
27	**County Rd 10 & 20th Sideroad**	9	2	0	0	11
28	Highway 89 & County Rd 10	10	1	0	0	11
29	**County Rd 10 & Willoughby Rd**	10	1	0	0	11

S.No.	Location	Property Damage Only	Non-Fatal Injury	Fatal Injury	Other	Total Collisions
30	**10th Line & 5th Sideroad**	6	4	0	0	10
31	**6th Line & 5th Sideroad**	7	3	0	0	10
32	**8th Line & 5th Sideroad**	9	1	0	0	10

Note: The **bold** letters indicate that one or both the streets of the intersection belong to Essa Township

Figure below shows the hot spot locations.



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- The following section presents the detailed analysis based on the available collision data at various hot spot locations with 25 or more collisions over the study period.
    - **County Road 21 & County Road 56:** There are a total of 53 reported collisions at this location. According to the collision data there were a total of 45 property damage only collisions and 8 injury collisions at this location. Failure to yield the right-of-way was the primary cause of the collisions in about 28% of the collisions followed by collisions with animals (24.5%). Currently, County Road 21 and County Road 56 is a two-way stop-controlled intersection with stop signs on County Road 56. There is also a flashing orange beacon installed at this intersection. The posted speed limits on County Road 21 and County Road 56 are both 80 kmph. To mitigate the occurrence of collisions at this intersection, it is suggested to review change in the type of intersection control, approach speeds on County Road 56 and take measures to increase the compliance of the traffic control through education and enforcement.

- **County Road 21 & County Road 10:** There are a total of 46 reported collisions at this location. According to the collision data there were a total of 37 property damage collisions and nine injury collisions at this location. Failure to yield the right-of-way was the primary cause of the collisions in about 24% of the collisions followed by excessive speeds (13%). Currently, County Road 21 and County Road 10 is a signalized intersection. The posted speed limits on County Road 21 and County Road 56 are both 80 kmph except for the County Road 21 east of County Road 10. To mitigate the occurrence of collisions at this intersection, it is suggested to review the approach speeds and signal timing at this intersection.

- **County Road 56 & 25th Sideroad:** There are a total of 41 reported collisions at this location. According to the collision data there were a total of 26 property damage only collisions and 15 injury collisions at this location. Losing Control of the motor vehicle (29%) and failure to yield the right-of-way (27%) were the primary causes of the collisions at this intersection. Currently, County Road 56 and 25th Sideroad is a two-way stop-controlled intersection with 25th Sideroad stop controlled. The posted speed limits on County Road 21 and County Road 56 are both 80 kmph except for the County Road 21 east of County Road 10. To mitigate the occurrence of collisions at this intersection, it is recommended to review the approach speeds and roadway geometry at the intersection. Installation of flashing yellow light beacons will also caution the drivers to cross the intersection cautiously. The field conditions need to be reviewed for identifying any geometrical deficiencies.

- **County Road 90 & County Road 10/Brentwood Road:** There are a total of 40 reported collisions at this location. According to the collision data there were a total of 37 property damage only collisions and three injury collisions at this location. Following too close to another vehicle (20%) was the primary cause of the collisions at this intersection. Currently, County Road 10 and County Road 90 is a signalized intersection. Recommended for signal timing review and speed review, and field review to identify any geometrical deficiencies at the intersection.

- **County Road 90 & 5th Line:** There are a total of 38 reported collisions at this location. According to the collision data there were a total of 33 property damage only collisions and five injury collisions at this location. Following too close to another vehicle (26%) was the primary cause of the collisions at this intersection. Currently, County Road 90 and 5th Line is a signalized intersection. Recommended for speed review, and field review to identify any geometrical deficiencies at the intersection.

- **County Road 90 & King Street:** There are a total of 38 reported collisions at this location. According to the collision data there were a total of 28 property damage only collisions and ten injury collisions at this location. Failure to yield the right-of-way (31%) followed by improper turn (24%) were the two primary causes of the collisions at this intersection. Currently, County Road 90 and King Street is a signalized intersection. The collision types indicate that a review of signal timing may be needed to mitigate the occurrences of collisions at this intersection. The field conditions may also be reviewed for any geometrical deficiencies.

- **County Road 56 & 5th Sideroad:** There are a total of 36 reported collisions at this location. According to the collision data there were a total of 29 property damage only collisions and seven injury collisions at this location. Failure to yield the right-of-way (28%) was the primary cause of the collisions at this intersection along with losing control of the vehicle (22%) and animal related collisions (22%). Currently, County Road 56 and 5th Sideroad is a two-way stop-controlled intersection with 5th Sideroad stop controlled. The collision types indicate that a flashing yellow beacon will make the drivers to cautiously drive through the intersection and yield to the conflicting traffic. The field conditions may also be reviewed for identifying any geometrical deficiencies.

- **25th Sideroad & 8th Line:** There are a total of 25 reported collisions at this location. According to the collision data there were a total of 17 property damage only collisions and eight injury collisions at this location. Failure to yield the right-of-way (56%) was the primary cause of the collisions at this intersection. Currently, 25th Sideroad and 8th Line is a two-way stop-controlled intersection with 25th Sideroad stop controlled. The collision types indicate that a flashing yellow beacon will make the drivers to cautiously drive through the intersection and yield to the conflicting traffic. Also, a detailed study need to be undertaken to see if the stop signs are to be placed on 8th Line instead of 25th Sideroad.

- **Mill Street between King Street and Brentwood Road/County Road 10:** The 1.2 KM segment of Mill Street corridor between Brentwood Road and King Street is a segment with highest number of collisions. There are 124 collisions in the 5-year period along this segment of which there are three reported fatal injury collisions along with three pedestrian involved collisions. Failure to yield the right-of-way (22%), and improper turn (17%) were reported as the primary cause of collisions in this segment. It is to be noted that this stretch of the roadway has four signalized intersections and three unsignalized intersections along with multiple driveways from the abutting developments. A detailed corridor study is recommended along this roadway segment to understand the operation conditions, identify contributing factors of these collisions and to identify mitigation measures along the corridor.

APPENDIX

E PARKING STRATEGIES

Township of Essa
Transportation and Trails Master Plan

May 2024

Parking Strategies

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1 INTRODUCTION AND EXISTING CONTEXT

Working towards developing a complete and liveable community requires the Township of Essa to implement a parking strategy that supports the vision of the Transportation Master Plan. Introducing and implementing a parking strategy allows the Township to move towards a more sustainable and accessible transportation network as well as supporting overall municipal operations that reinforce travel demand and parking. Currently, the Township's primary concerns are centred around the need to address challenges related to access and safety in neighbourhoods, school zones, and community safety zones. **Table 1** is an overview of the feedback gathered during the February 23, 2023, Public Information Centre, where residents, stakeholders, and local business owners provided input on parking challenges to consider as part of the strategy development.

Table 1. Township of Essa Parking Challenges Overview

Topic	Overview of Challenges
Road Widths	Limited right-of-way along neighbourhood streets that would permit parking on both sides, preventing vehicles from traversing both lanes of the road.
On-Street Parking	Lack of clarity within Zoning By-law and signage posted throughout communities in the Township, identifying on-street parking allowance. Currently, on-street parking spaces are being utilized by residents despite many/most having access to household garages and a driveway with capacity for one or two vehicles.
Visitor Parking	Limited supply of parking for visitors as residents are often utilizing on-street parking spaces for private vehicles.
Signage	Township parking requirements during certain periods of the year and time of day, for example allowance from the first day of November to the first day of May, including for winter maintenance/clearing.
Community Safety Zones and School Zones	High volume of traffic and vehicular movement around community safety and school zones, creating unsafe movement for pedestrians and school children to safely and comfortably access neighbourhoods and school sites.

Examples of on-street parking are shown below, in **Figures 1** and **2**, highlighting how continued on-street parking can minimize mobility throughout the network between vehicle and active transportation users as well as operations and maintenance such as snow removal during the winter season.

Figure 1. On-Street Parking on Greenwood Drive

Source: Google Street View (2015)

Figure 2. On-Street Parking on Banting Crescent

Source: Google Street View (2015)

2 POTENTIAL STRATEGIES

Traditionally, planning for parking has been primarily focused on providing supply to meet growing demand. Modern parking management principles emphasize the need for solutions that manage demand and at the same time optimize the efficiency of existing parking supply within a municipality. As the Township continues to develop and grow, there will be an increased demand for parking amongst households and visitors. With this in mind, new developments would be expected to provide on-site parking as per the Township's By-law regulations. However, as Essa continues to experience growth, an alternative to parking within the street right-of-way and public spaces must be explored to maintain public space for public uses and not as storage for private property (vehicles parked on the street).

To highlight the opportunities around introducing short- and long-term parking management strategies, a jurisdictional scan was undertaken where municipalities of similar characteristics were selected and reviewed for applicability. The jurisdictional scan included the Town of Grimsby and the Town of Lincoln. Stemming from the jurisdictional scan, in addition to WSP's experience in other municipalities across Ontario, the following parking management strategies are proposed to equip the Township with future-ready measures that manage parking, support growth, while ensuring complete, accessible, and safe communities.

2.1 SHORT-TERM PARKING STRATEGIES

- **"Clear Your Garage" Campaign.** Building off campaigns launched throughout multiple municipalities on Earth Day, the "Clear Your Garage" Campaign is an opportunity for Township residents to participate in organizing and decluttering their garages as a means to make space for parking personal vehicles as opposed to the on-street right-of-way. As part of this initiative, it is recommended the Township offer a designated day or days during the warmer months for curbside pickup related to the campaign.
- **On-street right-of-way parking time restrictions**. The Township of Essa should implement a year-round time limit of up to three hours along on-street rights-of-way. This will increase turnover and allow for ease of movement along Township corridors. Consideration should be given to shifting longer-term parking (all day or all night parking) to off-street parking lots. For residential areas where over-night parking is required for visitors, the Township should provide permitted 15-hour on-street parking.
- **Safe and Accessible Parking**. The Township should continue to process applications for accessible on-street parking spaces, when requested. Moving forward and building upon the Township's existing policies for safe and accessible parking, there are factors that can detract certain users from using municipal parking lots when needed. Off-street parking lots should strive to

provide safe and convenient parking for all users, during all seasons, and all times of day. Equally important are provisions for pedestrian connections between parking lots and destination. Strategies that can improve safety, accessibility, and attractiveness of off-street parking lots and pedestrian-friendly connections can include: providing adequate lighting at appropriate times of the day, delineating pedestrian walkways and wayfinding to and within the parking facility, maintenance and operations of the off-street parking facility such as snow clearance, provide accessible parking spaces and pathways from the parking location to destinations that are AODA compliant, and incorporate design principles from Crime Prevention Through Environmental Design (CPTED) to reduce concerns such as security cameras and emergency call stations.

2.2 LONG-TERM PARKING STRATEGIES

- **Zoning By-Law review to update residential and visitor parking requirements**. Updating and adding new regulations to support Essa's vision for providing a multi-modal transportation network, including parking regulations that would favour modes that are an alternative to the private automobile.
- **Paid Parking**. Paid parking is a strategy implemented to reduce parking demand. Currently, the Township does not need to implement paid parking. However, in the long-term, it is recommended that Essa continue to monitor parking utilization and consider implementing paid on-street right-of-way parking. This approach has two benefits: one, it will encourage users to consider parking in off-street parking facilities, and two, it has the potential to encourage alternative modes, such as carpooling, walking, or cycling. For parking along residential corridors, the Township can offer two types of on-street right-of-way parking permits: Parking Zones Permit and Parking Time Limit Zones Permit. Parking Zones Permits allow the holders to park their vehicles in select streets specified by the Township, and the Parking Time Limit Zones Permits exempt permit holders from all signed time limits in the purchased zone.
- **Monthly permit parking in future municipal parking areas/lots**. Implementing a permitting system across future municipal parking facilities is an opportunity to leverage underutilization while removing on-street right-of-way parking. Through this approach, the municipality can focus its efforts on providing cycle tracks or accommodating for multi-use pathways, giving way to increased multi-mobility options for users versus sole dependency on the automobile.
- **Implement Improvements and Uses of Municipal Parking Facilities.** Designate carpool parking spaces in highly desirable locations of the municipality to promote carpooling over single-occupant vehicular travel. Provide secure bicycle parking, for example at schools, community centres, and key destinations as a means of encouraging cycling over driving.

2.3 COMMUNITY SAFETY ZONES/ SCHOOL PICK-UP AND DROP-OFF ZONES PARKING STRATEGIES

Currently, the Township of Essa Parking By-law 2005-96 as amended states that parking or stopping on either side of a highway adjacent to a school, park or playground between the hours of 7:30 a.m. and 7:00 p.m. is prohibited. According to the Parking By-law, "highway" is defined as a common and public highway, street, avenue, parkway, square, place, bridge, viaduct or trestle, designed and intended for, or used by the general public for the passage of vehicles, including unopened and unassumed highways.

By providing designated pick-up and drop-off areas that allow vehicles to temporarily stop to load and unload passengers can reduce the need for on-street right-of-way parking and simultaneously increase passenger safety. To help the Township with alleviating traffic volumes and current parking practices in front of schools, the following approaches are being recommended for implementation:

- By-law 2005-96 states that no parking or stopping is allowed on roads adjacent to schools. **Update existing 'No Parking' signage to 'No Stopping' signage and increase the number of signs** to increase awareness of restrictions during school hours. A key driver of this strategy will be educational campaigns and programs that advertise measures to residents and parents. The Township can create brochures and a webpage outlining stopping restrictions in school zones. Examples include the City of Brampton's School Zone Parking Regulations webpage and informational brochure. On a school level, a notice could be issued by schools throughout the Township, similar to the Our Lady of Perpetual Help School form.
- Provide parents with a **designated location to drop-off students and specific time limits**.
    - Option One: Designate a 'kiss and ride' area. These are dedicated drop-off/pick-up lanes that are typically located on school property where the parent remains in the car as their child disembarks. For younger students, a designated volunteer will accompany the student to their classroom. This type of designated "kiss and ride" area can be considered for schools within the Township such as Angus Morrison Elementary School shown in **Figure 3**.
    - Option Two: Adopt signage to allow for stopping (no parking) on the school-side of the roadway, and no stopping nor parking allowed on the opposite side. This allows parents to use the curb on the school side as a drop-off zone, while restricting drop-off on the opposite side, which forces students to make a road crossing.
    - Option Three: Use a 3, 5, or 15-minute parking zone during school hours for school pick-up and drop-off depending on characteristics of the roadway and demand. This allows parents to leave their vehicles during

the drop-off/pick-up process, while still being restrictive on parking and cognizant of demand for space in the school area.

Figure 3. Angus Morrison Elementary School

Source: Google Street View (2015)

- **Initiate Active School Travel programs** to promote other methods of commuting to school. By increasing the number of families who choose alternative transportation methods to school, the demand for parking and roadway demand can be indirectly lessened. Numerous Active School Travel programs have been successfully implemented across Ontario, in communities such as Ajax, Toronto, Peterborough, Hamilton, and Newmarket. Some examples of initiated programs include:
    - Car-Free Wednesdays – A program encouraging students to walk, bike, or ride the bus on the first (or every) Wednesday of each month.
    - In-School Cycling Education – A program which provides training for students on safe cycling practices and rules of the road. Public schools should focus on offering active transportation amenities including bicycle racks and applicable repair stations to encourage an uptake in cycling as a form of commuting.
    - School Streets – Temporary roadway closures in front of schools, designating the area to pedestrians only, further incentivizing walking to school on frequent occasions.
    - Active and Safe Routes to School – Encourages children to use active transportation such as walking, biking or scootering to and from school, as well as improving safety in areas around schools.

3 FINAL RECOMMENDATIONS

Recommendations for each challenge identified in **Section 1** are highlighted in **Table 2**.

Table 2. Township of Essa Parking Recommendations Overview

Topic	Overview of Recommendations
Road Widths	Revise standard engineering drawings to develop narrower roads, and retrofit existing roads with traffic calming (road narrowing) measures.
On-Street Parking	Introduce time-restricted parking pilot. Limit on-street parking on any new roads. Remove on-street parking on existing roads which are being reconstructed.
Visitor Parking	As part of time-restricted parking pilot, provide a registration form to park overnight on Township roads up to 15 times per year. Provide off-street municipal parking lots and lay-by parking.
Signage	Improve signage in school zones according to existing Township by-law. Add 'no overnight parking' or '3 H MAX' signage for time-restricted parking pilot. Require parking permit to park overnight on Township roads (15 times per year).
Community Safety Zones and School Zones	Improve signage and conduct an education campaign to increase compliance with existing Township parking restrictions in school zones.

3.1 "CURBSIDE GIVEAWAY DAYS"

As mentioned in **Section 2.1** of this memo, if the Clear Your Garage campaign is implemented in conjunction with the Curbside Giveaway Days initiative it could help alleviate on-street parking concerns.

Curbside Giveaway Days provide an opportunity for Township residents to place unwanted, gently used items at the curb for other residents to take for their use, free of charge. This initiative allows people to find items for free experiencing the benefit of tidying residents' homes of unwanted items, while helping to prolong the County of Simcoe's landfill. **Figure 4** shows an example of a banner that could be used to advertise the Curbside Giveaway Days initiative on the Township's website.

It is recommended that Curbside Giveaway Days be held from 8:00 a.m. to 6:00 p.m. at least twice a year, on a Saturday in the middle of the month, June, and September, exclusively. The three major communities within the Township of Essa that should participate in the Curbside Giveaway Days includes Angus, Baxter, and Thornton. **Table 3** presents Curbside Giveaway Days Guidelines that elaborates on frequently asked questions and concerns that could be posted on the Township's website.

Figure 4. Example of Curbside Giveaway Day Poster

Source: Town of Newmarket

Table 3. Curbside Giveaway Guidelines

Curbside Giveaway Days Guidelines	
Frequently Asked Questions/ Concerns	**Details**
How to participate?	Place unwanted, gently used items clearly labelled with a "FREE" sign at the curb, in front of your home by 7 a.m. on the morning of the day the Curbside Giveaway Day is held. *Note the Township should provide "FREE Curbside Giveaway" signs with the Township's logo and website of the initiative, hours of the initiative, and when to remove unclaimed items, available to download and print.

What can be placed at the curb?	• Artwork and mirrors • Books, CDs, and DVDs • Clothing • Construction material (nails, paint, wood, etc.) and tools • Electronics • Furniture and small appliances • Kitchen gadgets, dishes, cutlery, pots and pans • Sports equipment and toys • Yard and gardening equipment (for example, lawn mowers, shovels, rakes)
What should not be placed at the curb?	• Items that are not re-usable • Items that could be infested with bed bugs (for example, mattresses, furniture, bedding) • Visit Consumer Product Safety Bureau to review items that are not safe to give away.
What to do with unclaimed items?	• Remove unclaimed items from the curb by 6 p.m. on that evening. • Items left at the curb can potentially result in a By-Law violation. • Consider donating unclaimed items to charitable, non-profit organizations or community groups instead of placing it out for waste collection. • Post item(s) for trade or sale on local buy and sell Facebook Groups, Kijiji or VarageSale. • Bulky items (for example furniture) left at the curb will not be picked up with regular garbage collection. The County of Simcoe has a Bulky Waste Removal Program, contact County of Simcoe at 705-735-6901 or visit their website at www.simcoe.ca. • Items not accepted in the Township's curbside programs (for example electronics) should be taken to a Simcoe County Electronics Collection Facility. • Download Simcoe County's "Waste App" to find the nearest waste facility, receive collection reminders, and view upcoming collections.

3.2 ON-STREET RIGHT-OF-WAY PARKING TIME RESTRICTIONS

Section 2.1 of this document presents on-street right-of-way parking time restrictions as a solution to discourage residents or long-term guests from parking on-street. It suggests restricting parking on these corridors to three hours per vehicle. For these timed parking restrictions to be effective, heightened parking enforcement may be required.

As part of the consultation process and further verified by site visit, two corridors were initially identified for this type of parking restriction: Greenwood Drive and Banting Crescent. To ensure this program works as intended rather than relocating the issue to alternate streets, the three-hour parking restriction area was expanded to include all subdivision developments which branch off Greenwood Drive, such as Gold Park Gate, Lookout Street, and Brownley Lane. **Figure 5** shows the corridors recommended to receive three-hour on-street parking restrictions.

To allow visitors and residents more flexibility, many municipalities provide an option to register for overnight parking up to 15 times annually, per vehicle. This allotment provides a balance between keeping the streets clear and understanding that situations will arise of more drivers than space on private property. This restriction will set the precedent that residents are to park on their own property, rather than on the Township-owned right-of-way.

This program can serve as a pilot program to kickstart the development of a more robust Township-wide overnight and time-restricted street parking strategy, especially in the winter when street parking can inhibit snow ploughing efforts. Should this program prove successful in keeping the roadways clearer and safer for all modes of transportation, it could be expanded to encompass the entirety of the urban settlement areas. This measurement of success can be determined from several factors:

- Before and after surveys of the pilot area can be used to determine whether time restricted parking is being adhered to by residents.
- Analysis of an increase or a decrease in the level of safety on roadways within the pilot area.
- Resident feedback: There may be some initial pushback from residents who will need to find alternative locations to house their vehicle. This feedback should be considered while also accounting for the sightline and multi-modal benefits of less parking congestion on the roadway, which were also identified as current resident concerns.

3.3 UPDATE EXISTING ‘NO PARKING’ SIGNAGE TO ‘NO STOPPING’ SIGNAGE AND INCREASE THE NUMBER OF SIGNS

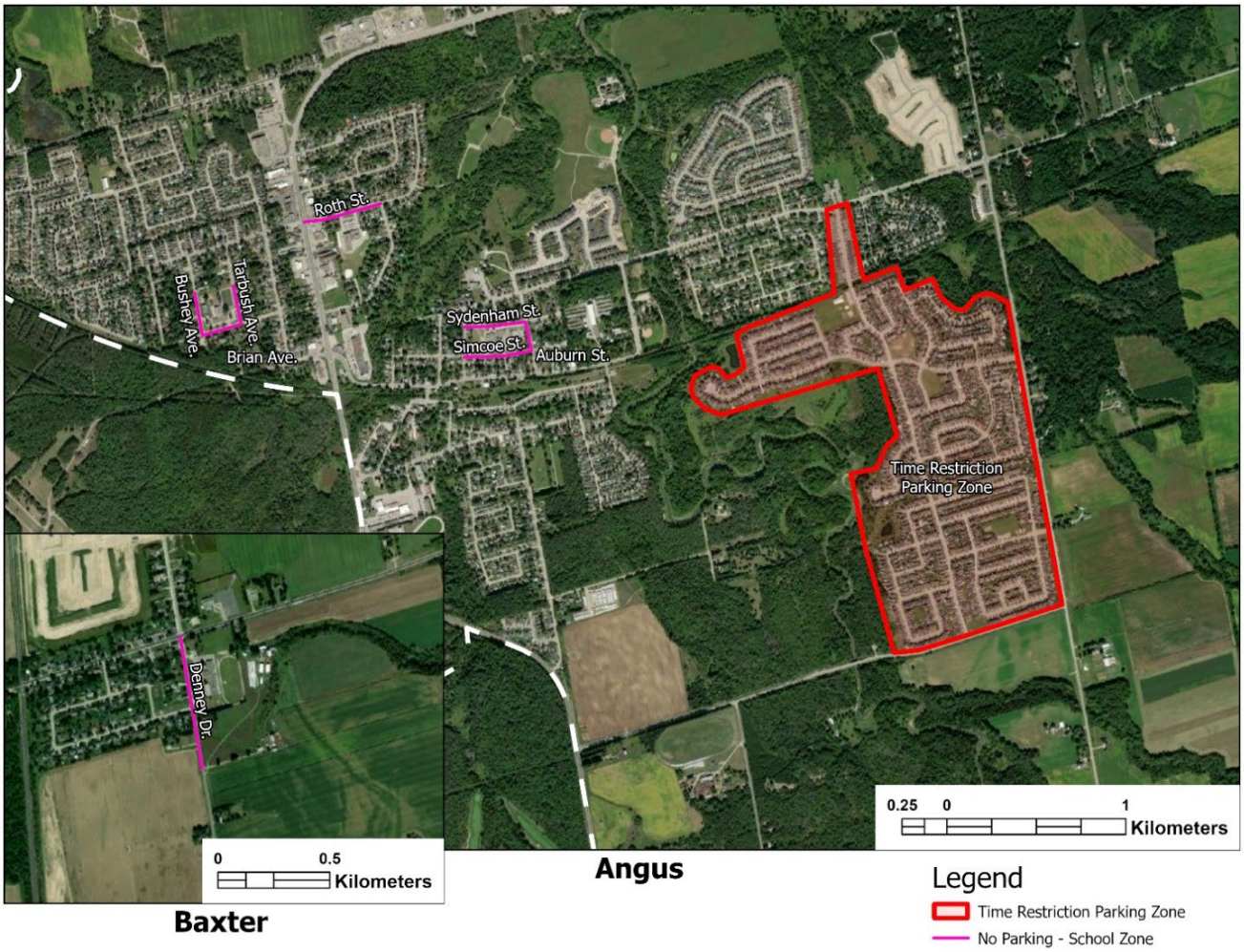
As specified in **Section 2.3** of this strategy, the Township currently has by-law in place preventing stopping on roadways adjacent to schools, parks, and playgrounds. Although this by-law is in effect across the Township, it is not signed nor enforced in many locations.

Given that all schools within the Township have dedicated pick-up/drop-off facilities on school property, parents should take advantage of that facility rather than utilizing the public right-of-way for their pick-up and drop-off. By updating the existing ‘No Parking’ signage and installing new ‘No Stopping’ signage, drop-off and pick-up efforts around a school can be streamlined into their dedicated zones on school property. This will decrease the amount of parking congestion and provide a quicker and safer pick-up and drop-off process, while keeping the roadway clearer during peak times.

Alongside elevated signage and restrictions, education campaigns are important to discourage drop-off and pick-up outside of dedicated facilities. Both the Township and school districts should release information to parents and affected residents informing them of these signage updates, and to further encourage use of dedicated facilities.

Figure 5 below highlights the locations where ‘No Stopping’ signage should be posted and enforced.

Figure 5. Proposed Parking Restrictions



3.4 UPDATE RESIDENTIAL AND VISITOR PARKING PROVISIONS

The Township should conduct a review of the existing design standards manual and determine whether it is up to date with current parking requirements and best practices. The current Township guide presents a minimum roadway width of 7.5 meters from face of curb to curb, which is wider than the Transportation Association of Canada (TAC) recommendations for roadways without parking on both sides. By conducting this review, the Township can consider building narrower roads, with the remainder of the right-of-way dedicated to other facilities.

Existing roadways which are noted to have parking difficulties should be considered for traffic calming measures, such as roadway narrowing by the use of bollards or paint

markings. The adjacent Traffic Calming Policy Recommendations document outlines a toolbox which can be used for these retrofit projects.

For existing streets that experience parking capacity concerns, such as Greenwood Drive and Banting Crescent, the Township should implement a policy that restricts parking on one side of the road only, and on-street parking should be located on the side of the road that has a sidewalk if a sidewalk is available. This policy needs to be simultaneously updated with the Township's design standards to ensure that there is consistency and uniformity.

For proposed new developments within the Township, two types of parking facilities should be built, including off-street residential parking lots and lay-by parking. The Township should consider implementing residential parking lots to allow visitors to park rather than on the right-of-way. **Figure 6** shows an example of an off-street residential parking lot situated in the City of Markham that allows for visitors to park. Lay-by parking should be used as an alternative to vehicles parking on the roadway, an example also from the City of Markham is shown in **Figure 7**. Lay-by parking is known as parking bays in a dedicated lane, off the roadway, directly adjacent to the through lanes, delineated by curbs or pavement markings. There could be multiple lay-by parking facilities installed along residential streets when constructing new residential developments. In addition, the Township should review the current engineering design standards and consider reducing the amount of paved space on local right-of-way streets.

The Township should also consider updating their zoning by-law to review parking requirements for residential developments.

Figure 6. Example of a Residential Visitor Parking Lot (City of Markham)

Source: Google Maps, 2018

Figure 7. Example of Lay-By Parking (City of Markham)

Source: Google Maps, 2018

APPENDIX

F TRAILS MASTER PLAN

TRAILS MASTER PLAN

May 2024

APPENDIX F

TOWNSHIP OF ESSA

TRAILS MASTER PLAN

APPENDIX F

TOWNSHIP OF ESSA

DATE: MAY 2024

WSP

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REVISION HISTORY

FIRST ISSUE

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REVISION 1				
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REVISION 2				
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September 18 2023
Date

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Allison Good OALA, CSLA
Senior Landscape Architect

September 18 2023
Date

[1] Approval of this document is an administrative function indicating readiness for release and does not impart legal liability on to the Approver for any technical content contained herein. Technical accuracy and fit-for-purpose of this content is obtained through the review process. The Approver shall ensure the applicable review process has occurred prior to signing the document.

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1 TRAIL ASSESSMENT

To ensure a successful trails network, it is essential to take advantage of existing infrastructure while promoting active transportation and recreational opportunities. The focus of this study is on off-road or 'recreational' trail facilities, including both formal and informal trails, while on-road facilities (such as multi-use pathways, sidewalks, and on-road cycling) are limited to essential locations that enhance connectivity to recreation destinations and close gaps in the overall network. This trail master plan aims to prioritize investments that connect to existing facilities and meet the diverse needs of users, to maximize the value and utility of existing trail facilities within the Township of Essa.

1.1 EXISTING TRAIL FACILITIES:

The recommendations from this Plan serve to connect the communities of Essa. To ensure this, it is important to have a clear understanding of what currently exists, what is planned (including future growth areas), and what connections may be difficult to implement based on their complexity or their cost. While not an exhaustive list, the existing trail routes within the Township are generally catalogued below. Refer to **Figure 1** for existing trails located in rural Essa boundary and **Figure 2**: Existing Trails and Parks in Angus and **Figure 3**: Existing Trails and Parks in Baxter and Thornton for trails located in the settlement areas (Angus, Thornton, Baxter).

NUMBER OF TOWNSHIP TRAILS	**7**

There are currently seven (7) formally identified recreational trails within the Township of Essa, three (3) of which are maintained by the Township, totalling 18.1 km. These include:

Township Dedicated/ Maintained Trails

Provincial Trails (TCT, GT)

Conservation Areas

Forest Tract Trails

Snowmobile (OFSC) Trail Networks

Hydro Corridors

Railway Corridor

User-made Trails

DEDICATED, TOWNSHIP-MAINTAINED TRAILS: PINE RIVER, RIPPON TRAIL, THORNTON COOKSTOWN TRAIL

- Pine River Trail is a 1.5km meandering trail through Nottawasaga Fishing Park and LeClair Park. There are two access points (54 Roth St. and 380 Mill St. in Angus). The trail surface is compacted limestone screening and is popular for hiking, birding, fishing, and dog walking (must be on leash). This trail is also open year-round.
- Rippon Trail is a 1km trail that connects Peacekeepers Park at the north end of Mill St. to Nottawasaga Fishing Park and the Pine River Trail. Access points are located at 330 and 380 Mill St. in Angus. The trail surface is compacted limestone screening.
- Thornton Cookstown Trail is part of the TCT and is 15.6km of shared use (walking, cycling, cross country skiing, snowmobiling), running between the villages of Thornton and Cookstown. This trail is part of nearly 24,000km of trail that goes through 13 provinces and territories, traversing through green pastureland, forest, and crosses the Cookstown Creek.
- These trails do not allow motorized vehicles and pets must be on a leash.
- Full trail etiquette, along with breakdown of each trail, its length and access point locations, is outlined on the Township website.
- Most trail surfaces are made of compacted limestone screening and/or compacted natural earth.

PROVINCIAL TRAILS: THE TRANS CANADA TRAIL AND GANARASKA TRAIL

- The Thornton Cookstown Trail, which is included as a Township-maintained trail, is also part of the Trans Canada Trail (TCT) system.
- Both provincial trail systems connect to adjacent municipalities including Barrier and Clearview.
- The Ganaraska Trail was a former rail line that was decommissioned and has been transformed into a main trail (currently under construction) connecting the communities within Angus, running East-West (E-W). The start and end of this trail connects to parts of the TCT.
- The Ganaraska Trail is maintained by the Ganaraska Hiking Trail Association and runs E-W through Angus towards Creemore and Glen Huron. This trail eventually meets the Bruce Trail. This section is known as the “Mad River Section” and encompasses 50.5km of trail that runs through Angus and Glencairn.

CONSERVATION AREAS: UTOPIA CONSERVATION AREA, TIFFIN CONSERVATION AREA AND NOTTAWASAGA CONSERVATION AREA

- These areas contain numerous trail systems that include looped and linear segments.
- Utopia Conservation Area trails encompass an area of 100 acres used as passive green space.
- Utopia Conservation Area Trail is a natural woodland trail that has parking and picnic areas that is family friendly.
- Nottawasaga Conservation Area has the Nottawasaga River Trail with 1 trail head located off Willoughby Road. Tiffin Conservation Area has the Tiffin Centre Loop Trail that includes 5km of looped trails that meander through wetlands, forest, open meadows and ancient lake beds. Users include walkers/hikers, cyclists, cross county skiers and snowshoers.
- Nottawasaga River Trail is part of the Nottawasaga Conservation Area and is 4.2km round trip. It is considered an easy route and is great for walking and hiking. The main trailhead

access is via Willoughby Road and includes a small parking lot. The trail runs from Willoughby along the river to Greenwood. There is a multi-use pathway that runs sporadically along Willoughby.

FOREST TRACT TRAILS: FOSTER TRACT AND BAXTER TRACT

– These forest tracts are located within the Township but are maintained by Simcoe County Forests. Baxter Tract is a 3.5km looped trail, popular for cross-country skiing, hiking, and horseback riding. ATV's are not allowed. Foster Tract is a 3.9km looped trail that permits hunting however ATV, Snowmobile, and trail riders are not allowed.

SNOWMOBILE TRAILS

– The Ontario Federation of Snowmobile Club (OFSC) has four (4) trail networks that operate within Essa Township. The trail network includes club trails and trunk trails, with connector trails and feeder trails located outside the Township. The main "C" trunk trail primarily runs in a North-South (N-S) direction, crossing at 8th Line east of Angus and runs south to Cookstown. It runs east along CR-22 road to connect to the Thornton-Cookstown TCT segment. The majority of the N-S segment of this trail runs through the existing hydro corridor, with the remaining sections utilizing on-road shoulder conditions and/or private use agreements with landowners.

RAIL CORRIDOR

– There is an active railway line that runs NE-SW through Essa from Baxter to Utopia. The existing active railway corridor is a double track, providing an opportunity for a trail corridor to run parallel.

HYDRO CORRIDORS

– The above mentioned railway corridor intersects with a hydro corridor that could provide additional trail opportunities running SW-NE near County Rd. 10, through agricultural fields to Highway 90 northward. However, many sections of this corridor are used for agricultural production and a section from Highway 90 to Side Rd. 30 is within an industrial facility property. This hydro corridor is 1 of 2 hydro corridors located within the Township that provides opportunity for a trail network spine.
– Another hydro corridor is located east of Angus, running N-S from Highway 90 to County Rd. 21 onwards. It is located between Angus, Utopia and Thornton, making it an ideal opportunity to connect these settlement areas. This hydro corridor is also currently being used by the OFSC, eventually connecting to the Thornton-Cookstown TCT. However, while aerial views show some existing trails within the corridor, many agricultural lands are encroaching on the corridor; land-use agreements/ negotiations may be required.

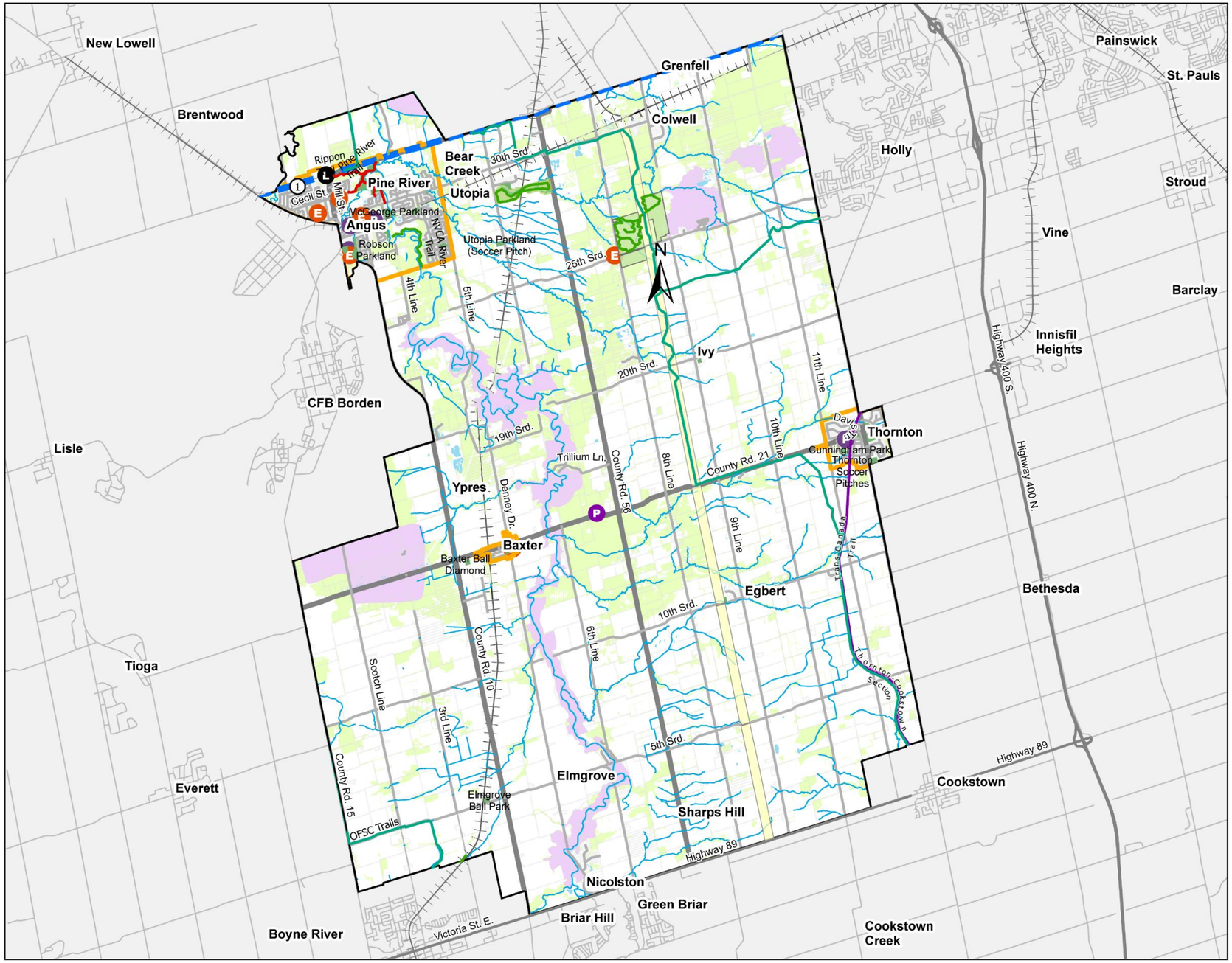
INFORMAL TRAILS

– There are numerous user-made trails and pathways within the township boundary, including an unknown amount of looped and linear trails within the Utopia, Tiffin, and Nottawasaga Conservation Area lands exist as well, with several user-made trail connections. This indicates a desire for additional trails and connections.

— Currently, there are a mix of natural surface and paved multi-use pedestrian pathways within the Township that appear to be disconnected and/ or unsigned.

The three (3) main urban centres of Angus, Thornton, and Baxter are spread out across the Township which poses a challenge to creating a primary trail “spine” to connect the communities.

Figure 1: Existing Trails and Parks in Rural Essa



Township of Essa Transportation & Trails Master Plan

RURAL

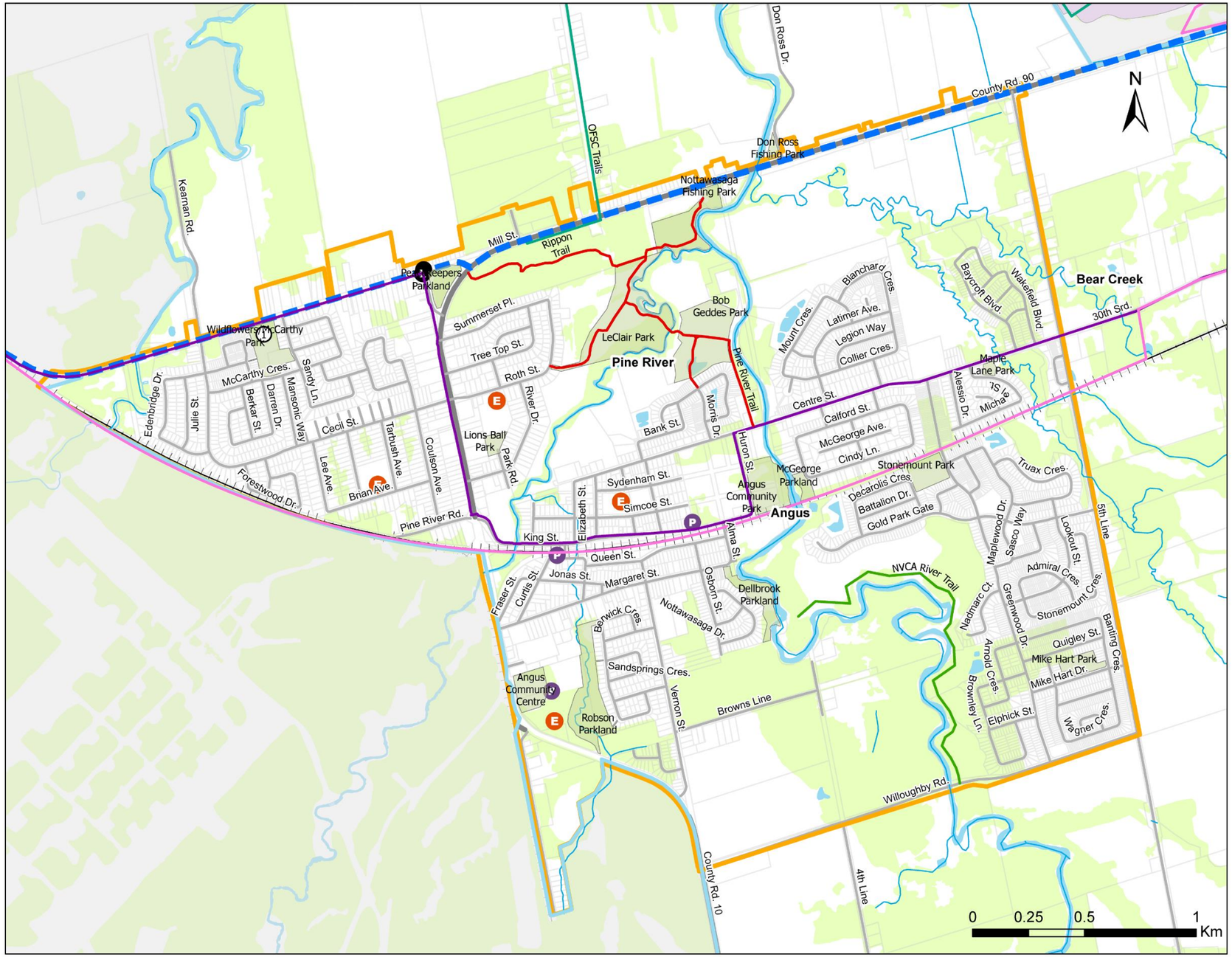
Existing Trail Network and Parks

Legend

- County Road
- Township Road
- Railway
- County Linx Stops
- County Linx Route 2 (Wasaga Beach to Barrie)
- Streams
- Water
- Parcels
- Area of Natural and Scientific Interest
- Woodlands
- Parks and Recreation
- Community Borders
- Points of Interest
- Education Facilities
- Township Boundary
- Ontario Trail Network
- Conservation Area Lands
- OFSC Trails
- Pine River Trail
- Rippon Trail
- Tiffin Conservation Area Trail
- NVCA River Trail
- Utopia CA Trail

0 0.75 1.5 3 4.5 km

Figure 2: Existing Trails and Parks in Angus



Township of Essa Transportation & Trails Master Plan

ANGUS

Existing Trail Network and Parks

Legend

Transportation Features
- County Road
- Township Road
- Railway
- County Linx Stops
- County Linx Route 2 (Wasaga Beach to Barrie)

Land Use Features
- Streams
- Water
- Parcels
- Area of Natural and Scientific Interest
- Park/Open Space
- Township Boundary
- Community Borders
- Points of Interest
- Education Facilities

Existing Trails Network
- OFSC Trails
- Pine River Trail
- Rippon Trail
- Tiffin Conservation Area Trail
- NVCA River Trail
- Utopia CA Trail
- Ganaraska Trail
- Trans Canada Trail
- Ontario Trail Network
- Parks and Recreation
- NVCA Conservation Area Lands

Date: 2023-01-13

Figure 3: Existing Trails and Parks in Baxter and Thornton

1.1.1 CONNECTIONS TO THE REGION

Ganaraska Hiking Trail straddles the NW boundary of Essa and eventually connects to the Bruce Trail as shown in **Figure 4**. The trail itself is managed and maintained by the County of Simcoe, including the portion of trail that lies within Essa.

The Trans Canada Trail (TCT) is a national trail, that runs across Canada. It is the longest network of multi-use recreational trails in the world. This trail (shown in purple in the above rural inventory map) enters portions of the Township of Essa, through Thornton towards Barrie and New Tecumseth.

Within the County of Simcoe's Transportation Master Plan (June 2023), strava data was provided for recorded cycling trips in 2020. Refer to **Figure 5** and **Figure 6** below. Within Essa, this mapping shows a high level of cycling trips in the following areas:

- Trans Canada Trail (Thornton-Cookstown Trail) and sections of Side Rd. 30 are seeing approximately 1001-2000 trips.
- On-road trips along sections of 5th Line and Side Rd. 25 are seeing approximately 751-1000 trips (in addition to some roads within CFB Borden).
- On-road trips along sections of 5th Line, Side Rd. 25, 10th Line, and CR-56 are seeing between 251-750 trips.

The majority of trips are occurring between identified corridors that serve multiple connections between rural settlement areas and the urban hubs, especially along the TCT. Generally, 3 to 5 kilometres is considered a reasonable cycling distance for most trips.

Figure 4: Simcoe County Existing Trail Network

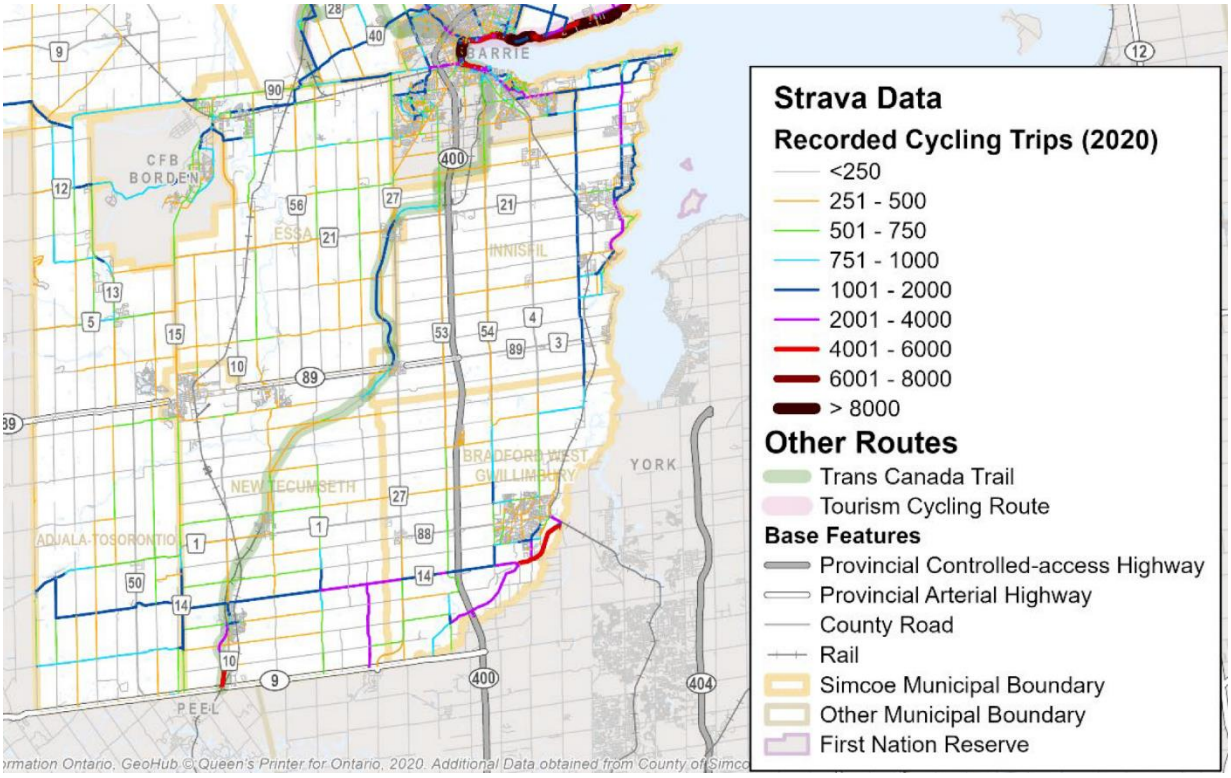


Figure 5: Simcoe County (South) Cycling Trip Data

Within the County of Simcoe Phase II: Transportation Network Development report, the below recommended ultimate cycling map highlights CR-10 (off-road route) and CR-21 (on-road route) for cycling facilities. The recommended priority route is for an off-road route that follows the existing Ganaraska Trail/ Trans Canada Trail route.

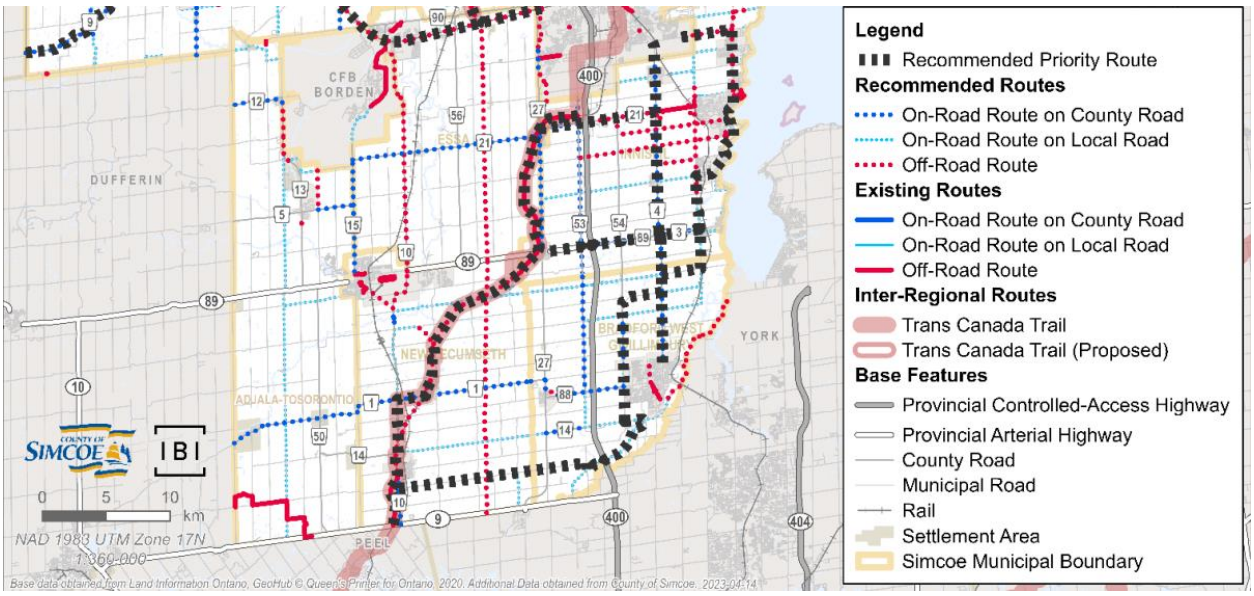


Figure 6: Simcoe County (South) Recommended Cycling Routes

1.2 TRAIL GAP ANALYSIS

Identifying the missing links in the trail network is a crucial aspect of creating a comprehensive and inclusive trail system that caters to the needs of all users. Lack of trail facilities connecting to destinations that causes gaps in the network, even if they are small sections of trail, it can appear unsafe thus discourages individuals from using them for walking, biking, or other recreational activities. Therefore, it is important to pinpoint the critical gaps in the existing trail network and devise practical solutions to address them in the short term.

Priority gaps were identified by a combination of techniques – a review of the available GIS mapping files from online sources, consultations with Essa staff, and a desktop review and field sampling of the Township trails to confirm conditions. Based on the review of the existing network, and the priorities identified by the client, the following priority gaps and missing connections were identified:

Rural	- Connections from existing residential communities and new developments are limited and/or non-existent. - Existing settlement areas are fairly distanced from each other, located along the perimeter of the Township boundary. - No formal trails maintained by the Township are in this area.
Angus	- Two main trail “spines” (Ganaraska Trail and existing trails made up of Pine River, Rippon, Nottawasaga Valley Conservation Authority NVCA River Trail) are located centrally in Angus, creating good connections and access points to local parks and greenspace. Connections from existing residential neighbourhoods and new developments on the Eastern, Western, and Southern boundaries to the main trail spines are limited to existing sidewalk infrastructure. - Trail linkages to educational facilities and key points of interest are limited to existing sidewalk infrastructure. - Many on-road trail facilities exist through Angus with a few user-made pathways that connect neighbourhood roads (i.e.: Brian Ave. to Ganaraska Trail, Armeda Clow Cres., Corrie Crescent to Cecil St., Mount Crescent to River, Sandsprings Ct. to Robson Parkland). - User-made pathways have been created due to gap in trail network from LeClair Park to River Drive, from Nottawasaga River Trail to Angus Community Park/ Ganaraska Trail, and from Robinson Parkland to woodlands parallel to Browns Line.
Thornton	- Connections from existing residential communities and new developments are limited and/or non-existent. - User-made pathways connect neighbourhoods to open space and parkland.

	- User-made pathways have been created due to no dedicated trails from Thornton-Cookstown trail, existing parks and parkland, Thornton soccer pitches, and community centre. - Crossing location is not ideal at Barrie Street. Users must cross at Innisfil Beach Rd. (no formal crossing) and walk along Barrier St. to access crossing that connects to existing parks and Thornton-Cookstown trail.
Baxter	- No existing trail infrastructure exists.

With a large geographic area with a variety of landforms and topography and a population that is spread out, the Township must carefully consider the costs and benefits of the investments that it makes in its future trail system.

1.3 WHAT WE HEARD

Through consultation, WSP identified opportunities for trails and met with Township staff to review candidate routes with the end goal of developing a realistic overview of potential routes.

Virtual Engagement Session # 1:

- Held virtually (December 2022) with presentation and online facilitation tool for guided discussion, with ability to share ideas and comments.
- The staff included the manager of parks and recreation, the parks and recreation administrator and a representative from public works.
- It was confirmed that the parks and recreation department are responsible for operations of all parks and trails, including the Trans Canada Trail section within the Township.

Public Information Centre Engagement Session # 1:

- A public information centre was held (February 23, 2023), at the Angus Recreation Centre.
- Approximately 30 attendees participated, with virtual tools available for those who could not attend.

Key takeaways and comments heard from the engagement sessions regarding the existing trail network are detailed below. All feedback received assisted in informing the final recommendations.

General takeaways included:

- Once the Ganaraska trail is complete, it is assumed the Township will be encouraged to include 10-12km of its operation and maintenance within the Parks and Recreation envelope.
- Public works would be responsible for any seasonal maintenance (plowing, asphalt repair, etc.) of all trails and multi-use paths (MUP).

- Within the last 5 years minimal repairs have been done and the trail surfacing is more rural (compacted gravel).
- Minimal repairs included filling in potholes, removing any fallen trees and invasive plant species (Giant Hogweed and Poison Ivy primarily) that have been encroaching on the trail.
- The pedestrian bridges are inspected annually.
- The Ganaraska trail is in progress however it is not formalized yet.
- Segments remain as an abandoned railway which does separate Angus north and south.
- The Ganaraska Hiking Trail Association volunteers are responsible for maintenance including inspecting trail sections, reporting issues, repainting blazes, and cutting back branches, weeds and removal of litter.
- Angus does have a few multi-use pathways (MUPS) in place of sidewalks along various road corridors.

Key Public Comments included:

- "More signage about recreational trails & have a [specific] snowmobile 'loop'"
- "Option for parkland and connect to existing and proposed trails (Thornton)"
- "Connecting Rural to town safely with lit trails (Baxter)"
- "[add] benches for fatigue"
- "Not enough cycling paths. Very challenging to ride around"
- "Transit is extremely limited"
- "Turn the old train tracks into a trail system"
- "[Prioritize] Public transit to connect us to Alliston, Barrie, Wasaga, etc., biking and walking routes, walking trails that are actually accessible (for seniors, children, etc.) and safe"
- "It would be nice to add a cycling path between Angus and Barrie. "The old train track could be used, as all the infrastructure is there".

1.4 ACCESSIBILITY FRAMEWORK

A primary goal for all Trail System is to develop sustainable trails that have minimal impacts on the environment, require little maintenance, and meet the needs of a wide range of users. The following accessibility framework provides an overview of trail characteristics to assist Essa staff in evaluating each trail to help determine if they are accessible. By using the framework criteria outlined below, Township staff can develop a method to collect and provide detailed information to the public about the trail characteristics.

'Accessible' is a term used to describe a facility or trail that can be approached, entered, and used by persons with disabilities and that complies with standards established under the *Accessibility for Ontarians with Disabilities Act* (AODA). If a particular trail does not meet those standards, the information obtained is still useful for individuals to determine whether or not that trail is appropriate for them (level of effort required). Objective information about trail conditions will enhance the accessibility, safety, and satisfaction of all trail users.

New trails or existing trails that require rehabilitation should be designed to improve accessibility for persons with disabilities. Adequate vehicular parking access to trails should be included as an integral part of accessible trail development.

All trails, but especially primary and neighbourhood greenway trails (refer to Section 3, **Trail Typologies**) should be evaluated to determine the following:

- Total trail length (in linear feet)
- Distance from the user's vehicle to the trailhead
- Length of trail segments meeting accessible standards (in linear feet)
- Location of the first point of exception to accessible standards
- Running slope (average and maximum)
- Maximum cross slope
- Minimum clear tread width
- Surface type, firmness, and stability
- Tread obstacles that limit accessibility
- Elevation (trailhead, maximum, and minimum)
- Total elevation change

Basic information about trail characteristics should be displayed at the trailhead of all trails regardless of whether they meet accessible standards. This allows the trail user the opportunity to determine if the trail is appropriate for their abilities.

Section 2.3, **Principles for Designing Trails for All**, outlines the specific AODA and universal accessibility requirements for trails.

Section 3, **Trail Typologies**, outlines the proposed trail hierarchy typologies and their associated trail characteristics.

By combining the accessibility framework with the AODA requirements and trail typologies & characteristics, the Township will be able to successfully assess and plan for future upgrades that will ensure a fully accessible trails network.

2 TRAIL VISION AND APPROACH

The importance of trails is more then just being a recreation program. Trails play a critical role in providing a safe and accessible network for active transportation, which can reduce reliance on cars and contribute to a more sustainable community. In addition to recreation, trails can serve as key connectors between schools, residential communities, and other destinations, providing equitable access to parks, open spaces, and other amenities. Connecting communities through trail systems provide several benefits, such as:

- Trails encourage physical activity and active transportation by providing safe and convenient routes for people to walk, run, bike, or roll to their destinations. This can help reduce traffic congestion, improve air quality, and promote a healthier lifestyle;
- Trails that connect to schools and other community destinations can help strengthen social connections and community cohesion. They provide opportunities for people to meet and interact with others and can help create a sense of place and belonging;
- Connecting trails to key destinations within a municipality can increase the overall accessibility and usability of the trail network. By providing connections to important destinations, trails become more than just recreational amenities, but also functional transportation corridors that provide valuable mobility options for residents; and,
- By prioritizing the development and maintenance of a comprehensive trail network, communities can enhance quality of life, promote healthy lifestyles, and support economic development through increased tourism and other benefits.

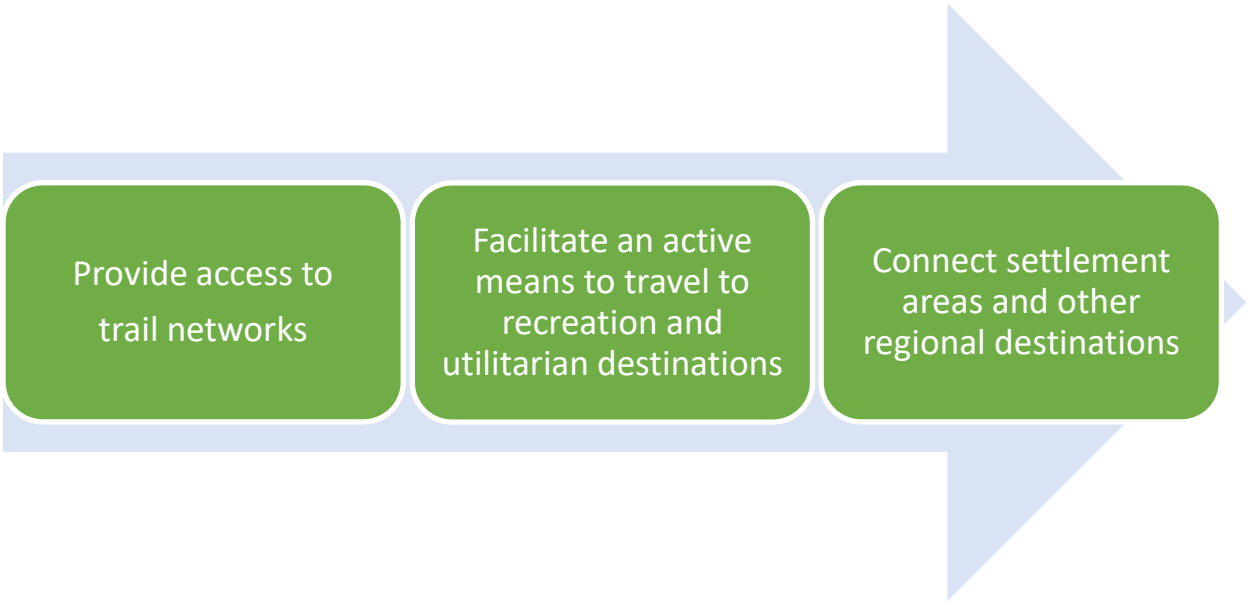
In order to achieve this multitude of benefits, the following vision and mission have been developed to support and apply to this trails Master Plan.

Vision: Connect people to trails and connect people to places.

> Our mission is to enhance community connectivity by establishing a cohesive trails network that is accessible to all and connects communities to places.

2.1 APPROACH TO TRAIL PLANNING IN ESSA

The approach to developing the network recommendations within this plan has focused on specific moves to improve connectivity and access, while identifying opportunities to improve and broaden user experiences. The following process was used to guide the development of this Trails Master Plan and is intended to set overarching objectives for its implementation.



5-key priorities and related focus areas were identified and applied in the development of the proposed trails network and recommendations. These are detailed in **Table 1**.

Table 1 | Trail Priorities and Focus Areas to Complete a Network Development Approach

	Priority	Key Focus Area
1	Identify ways to improve access and the experience within the existing trail network.	Review of potential barriers to accessing the existing network and identify infrastructure and amenities to improve/broaden user experiences.
2	Identify 'low effort' gaps in the trail network that will facilitate connectivity and access.	Review of the location of existing trails and potential desire lines to community destinations to extend existing trails or infill between trail segments.
3	Explore road corridors for multi-use pathways (MUPs) to create connectivity.	Begin with a core network of off-road trails within Angus, whose alignments prioritize using existing municipal lands, unopened road allowances and public lands which connect to existing trail facilities and key destinations. Fill in sections where land is otherwise restricted or unavailable with MUPs along nearby road corridors.
4	Identify neighbourhood greenways.	Where unfeasible to provide separated trail facilities, such as MUPs or other trail types, consider low volume largely residential streets which could operate as shared "neighbourhood greenway" facilities.
5	Identify alignments to connect communities.	Review property parcel data to identify ideal alignments to construct facilities between sparse destinations (i.e., connection between Angus, Baxter, and Thornton and Rural Essa to neighbouring municipalities such as New Tecumseh, Barrie, Creemore, Stayner). Continue to explore opportunities with the County of Simcoe and potential partnerships with trail extensions, such as the BCRY Trail efforts.

The proposed trail network contained herein acknowledges that recreation and mobility can complement each other and aims to utilize the existing sidewalk and road networks to improve connectivity and expand options for users. This approach aims to encourage and provide alternate modes of transportation, ultimately decreasing vehicular dependency.

2.2 TRENDS IN TRAIL SYSTEMS

Current trends in trail systems represent the new and emerging applications and considerations that are at the forefront of trail design at the time of writing this document. Implementation of these trends through new trail design and construction, or improvements to existing trails, is encouraged to ensure that new and revitalized trails benefit from current best practices.

Current trends in trail system design are outlined in the following sections.

INCORPORATING ELECTRIC BIKES AND MICROMOBILITY

Modern trail designs recognize the growing popularity of e-bikes and micro mobility devices. These trails are being planned and developed to accommodate these emerging modes of transportation, providing safe and efficient pathways for users of all mobility types.

- Trail design widths are increasing from the conventional 3.0m to 4.0m to better accommodate the increased demands and the increasing use of trails by cyclists, e-bike and other micro-mobility users and other recreational users (joggers, etc.) above and beyond pedestrians.
- Older pedestrians often report that they are less comfortable with more cyclists and other higher speed users on trails, which is partly driving the trend for wider trails.

SUPPORTING SUSTAINABLE TRANSPORTATION

Trails are now not only catering to traditional forms of recreation but are also becoming vital links in urban mobility networks. Thereby trails are being used in urban areas increasingly for commuting purposes. By designing trails that accommodate electric bikes and micro mobility, communities promote sustainable transportation options, reducing traffic congestion and carbon emissions.

SAFETY THROUGH VISION ZERO

Vision Zero principles, which prioritize safety and aim for zero fatalities on roads and trails, are being integrated into trail design. Ensuring clear visibility, well-marked crossings, and separated lanes for different modes of transportation (where space allows) contributes to a safer environment for all trail users.

COMPLETE STREETS APPROACH

Modern trail designs are embracing the Complete Streets concept, where trails are planned with consideration for all users – pedestrians, cyclists, skaters, and even users of mobility devices. These trails are designed to foster coexistence, offering safe and convenient routes for everyone.

- There is a significant increase in trail investments by municipalities across Ontario.
- Accessible trail design and wayfinding signage are key growth areas for trail design.
- Linking major trail systems with transit nodes is a key trend.

2.3 PRINCIPLES FOR DESIGNING TRAILS FOR ALL

Just as people with disabilities experience social and environmental barriers to full participation in society, they can also experience social and environmental barriers to full participation and enjoyment of parks and trails. Creating parks and trail networks that support people of all abilities is based on the fundamental right to quality of life, individual empowerment, respect and dignity for all people, and the guarantee of equal access to and participation in society.

Barriers are not only physical, and future trail design and programming needs to consider mechanisms for mitigating barriers to use. Barriers can be derived from differing cognitive abilities and mental processes experienced by potential trail users. Barriers can be socially-based and stem from issues related to income, language, race, religion, sexual orientation, health, and gender.

Examples of common barriers related to trail use include:

- Concern or fear of a new trail experience for reasons of accessibility and/or other anxieties;
- Fear for safety after sundown and/or in secluded areas;
- Unavailability or unknown locations of rest areas and distances when selecting a route;
- Inability to read English for navigation and trail information purposes;
- Worry over judgement and/or suspicion when using the trail; and,
- Concern over access to amenities such as washrooms and drinking water.

Action item: Essa can strive to create opportunities within the existing network and through new trail connections or offshoots to encourage participation in the Townships trail network and rural vistas. Consider prioritization of upgrades, maintenance and programming that addresses barriers to usage as the plan is implemented.

ADDRESSING BARRIERS BASED ON GENDER AND THE LGBTQ+ COMMUNITY

Trails may be underutilized by certain groups included women and the LGBTQ+ community due to not feeling physically safe or welcome (unlit, unmarked, far from urban areas, etc.).

— Consult these groups to understand how trails may be designed to promote safety and inclusion.
— Design elements like clear and consistent signage, communication about trail surfacing and lighting, mapping that shows community connections and exit points, emergency call boxes, and open sightlines make trail infrastructure more accessible to women and gender minorities.

PROVIDE REST AND REFUGE

Incorporating places for people to rest and take refuge is important to user experience and impacts trail use.

— Strive for some form of informal or formal seating every 200m, ideally located at points of entry and vistas. This metric is based on accommodating the average user.
— In areas where there is a higher potential for users with mobility impairments, such as near seniors' homes or amenities, along transit routes, or trails within tourism destination locations, rest seating is recommended every 50m.

- For Adventurer trail types that are for experienced users, seating should be focused in areas at top/bottom of slopes and vistas where seating is strongly desired.
- Formal bench seating with arm rests and back rests are recommended for areas where accessibility is of greater need, however provision of seating outweighs the priority for quality. Substitution or augmentation with natural materials such as flat-topped stones is always welcomed.

LEVERAGING MEDIA SUPPORTING INFORMED USE

Trail information, including “level of effort”, can be posted on the Township website that highlights the overall trail network and where challenges are located. This can be a tool to enable users to make informed decisions to experience portions of the trail system. This should contain:

- Trail details such as location, length of trail, surface type, maximum slope/ endurance required, community connections, etc.
- Information provided on the website should also be included at each point of entry, including route options for a less challenging experience.

INCORPORATE LIGHTING

Lighting a trail, in part or full, can remove barriers to recreational and commuter trail use.

- Consider lighting all urban trails that facilitate connections to transit, amenities, and community services.
- If full lighting is not feasible, consider ‘refuge’ lighting in key areas at regular intervals to provide safe landing points. Solar is a great, affordable option.
- While illuminating entire trails is not standard practice in trail development, trail lighting is often recommended in key locations such as:
- Main connections to important attractions such as popular parks.
- Celebratory spaces and waterfront promenades that have regular activity after dusk.
- Trails that serve important commuter and school routes, where lighting may be needed to provide guidance during periods of low light (i.e.: fall and winter days are shorter).
- Trails that provide a commuter/access function, connecting people to transit, groceries, etc.
- At refuge nodes/urban trailheads where intermittent lighting is more feasible.

RETHINK ACCESS CONTROL

Access barriers are intended to allow free flowing passage by permitted user groups and restrict access by user groups that are prohibited, such as cars. Typical types of access barriers (P-gates, bollards, rocks) continue to present issues with creating barriers and even hazards for users. Persons with low vision, users in larger carriers (three or four wheeled cycles and pull trailers), and higher speed users often struggle passing barriers, issues that are escalated when barriers are in poor repair or the soil around them becomes eroded. Industry standards are beginning to rethink barrier controls and encourage other design measures (alignment, curb, tree plantings, etc.) to control access.

WASHROOMS

Many trail users are limited to the time duration they are able to participate between trips to the washroom.

- It is not feasible to provide washrooms on every trail, however, consider identifying locations of publicly accessible washrooms near trail routes as a part of website mapping.

— Prioritize allocation of permanent and temporary washroom facilities at remote destination trails where public washroom resources are limited.

LEVERAGING TECHNOLOGY

Emerging technologies and innovations that can be incorporated into the design of new trails and improvements to existing trails that can enhance the user experience, promote use and widen inclusivity of the trails network. Technology-based applications can have high capital, staffing, and training investments costs thus the benefits need to be tangible and in magnitude with the problem they are addressing.

Technology is fun and the enthusiasm for technology-based solutions will garnish a high impact amongst current and future generations of young trail users. Consider how technology can expand the traditional parameters of a trail function and programming – reaching more people in meaningful ways, while reducing demands of maintenance and operational practices

Examples of how technology can be incorporated into a trail system include:

— Waste and parking management systems;
— Charging stations for devises and E-bike rapid charge ports (can be solar);
— Electric Car charging stations at appropriate locations/ parking lots;
— Wi-fi;
— Digital mapping (i.e.: Google Street view and 360-degree imagery);
— User count displays (Can collect data on trail use to inform operational management while promoting trail system success);
— Heated surfaces for snow removal (i.e.: Geothermal or electric systems, snow melting mats);
— Innovative Trail Surfacing (permeable paving, renewable/recycled materials);
— Electric Bikes and Scooter Share Programs; and
— Solar or LED Lighting.

SAFETY AND SECURITY

Trails should be designed to allow users to feel comfortable, safe, and secure. Although personal safety can be an issue for all, women, the elderly, and children, are among the most vulnerable groups. Principles of Crime Prevention Through Environmental Design (CPTED) should be considered and applied to help address security issues concerning trail use, particularly in locations where trails are infrequently used, isolated, or in areas where security problems have occurred in the past.

The four (4) main underlying principles of CPTED are:

1. **Natural Access Control**: Deter access to a target and create a perception of risk to the offender.
2. **Natural Surveillance:** Place physical features and/or activities to provide natural visibility or observations.
3. **Territorial Reinforcement:** Define clear borders of controlled space from public to semi-private to private so that users of an area develop a sense of proprietorship.
4. **Maintenance:** Allow for the continued use of space for its intended purpose.

Specifically related to trails, the following CPTED-related design criteria include:

— Good visibility by having routes pass through well-used public spaces;
— Good Signage that tells users where they are along the trail system in order to obtain help;
— Provide “escape” routes from isolated areas at regular intervals;

- Maintain sight lines and sight distances that are appropriately open to allow good visibility by users;
- Provide trailhead parking in highly visible areas;
- Minimize routing close to features that create hiding places such as stairwells and dense shrubs;
- Design underpasses and bridges so that users can see to the end and beyond, and;
- Use signs near entrances to identify and suggest alternative routes.

2.3.1 ACCESSIBILITY (AODA)

The Ontario Government is committed to building a more accessible province. The goal of the *Accessibility for Ontarians with Disabilities Act* (AODA, 2005) is 'to make Ontario accessible for people with disabilities by 2025'.

As part of the AODA, a set of Accessibility Standards for the Design of Public Spaces are developed to inform pathway and trail design. The intent is that these standards will help remove barriers in outdoor spaces for people with disabilities. The standards are to be applied for new construction and / or extensive renovation of trails and exterior paths of travel. They do not apply to on-road cycling facilities. Ontario Regulation 413/12 groups outdoor pedestrian routes into one of the three categories:

1. **Paths of Exterior Travel** which includes sidewalks and exterior walkways that connect directly to buildings and facilities. Examples include walkways that connect parking lots to buildings, main walkways in parks that connect to park pavilions, playgrounds and washroom buildings etc.
2. **Beach Access Routes** which are defined as the main connecting walkway(s) and beaches intended for public use.
3. **Recreational Trails** which encompass a range of facility types ranging from hard surfaces multi-use trails in major urban parks to natural surface walking trails in more remote areas.

ACT REGULATIONS

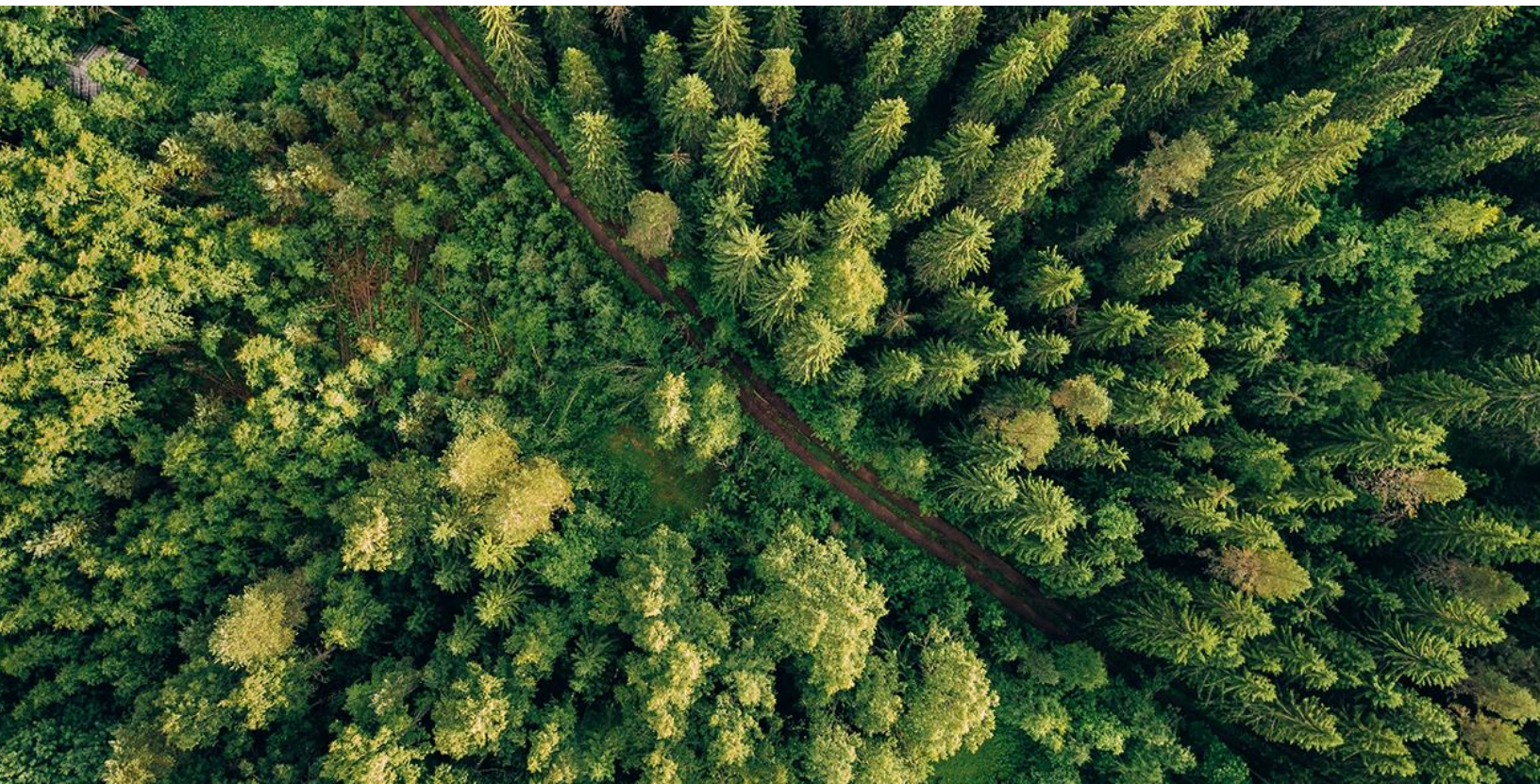
Sections 80.8 and 80.10 in O.Reg. 413/12 provide the technical requirements for Recreational Trails. Some of the key requirements include:

- A **minimum 1.0m** wide tread, free from obstructions;
- A minimum of 2.1m of clear head room above trail surface;
- Trail surfaces that are **firm and stable**;
- Any **openings** in a trail's surface must not allow passage of an object that has a diameter of greater than 20mm, and elongated openings must be oriented perpendicular to the direction of travel;
- Where trails are constructed adjacent to water or a drop-off the trail must have **edge protection** that prevents users from slipping over the edge. The top of the edge protection must be at least 50mm above trail surface and it must be designed to not impede the drainage of the trail surface. **Edge protection** adjacent to water or a drop-off is not required where there is a protective barrier/railing that runs along the edge of the trail;
- Where there are gates/barriers at trail entrances they must have an **opening** of between 850mm and 1000mm;
- **Trailhead signage** must be provided that indicated the length of the trail; type of surface; average and minimum trail width; average maximum running/longitudinal and cross slope; and the location of amenities (where provided). Signage must have text that has a high tonal

contrast with background colours to facilitate visual recognition, and text must use a sans serif font; and,

— **Factual information** on trailhead signs and brochures (e.g. slope, width etc.), as opposed to subjective information (e.g. level of difficulty rating) about the trail's characteristics allows the user to make an informed decision whether or not to use the trail before they set out, based on their personal level of ability.

Accessibility allows for provision of a challenge. People want to be able to be informed and choose the level of challenge that reflects their needs and recreation ambitions. The end goal is not for all trails to be flat and paved, but to create a tailorable experience for everyone.



Recommendations:

With regards to accessibility and safety, the following actions are recommended:

- **Existing trail systems should be assessed to determine actions to make trails more accessible for all, where appropriate.**
- **Identify trails which meet, or can be updated to meet, federal standards for designation as accessible. Refer to Section 2.3,** Principles for Designing Trails for All **for specific AODA requirements.**
- **Post a direct number to get immediate emergency help (I.e.: 911 regulatory signage and "nonemergency" number to dedicated Township representative for reporting issues/concerns, etc.).**
- **Improve & maintain site lines at trail heads. Install 1-2 portable motion triggered security cameras to move around and place in problem areas.**
- **Empower monitoring and reporting through volunteers (i.e., invested trail users, trail user organization, etc.).**
- **Develop a partnership program/ opportunity for bike patrols by police or volunteer groups in response to concerns. Provide light refuge at trailheads.**
- **Implement a reporting system to georeferenced alert issues.**

3 TRAIL TYPOLOGIES

3.1 TRAIL CLASSIFICATION

A cornerstone of the Transportation Trails Master Plan (TTMP) is a fully-fledged trails network that guarantees a safe and comfortable trails experience for interested users across the Township. Recognizing that most trail users do not distinguish a difference between trails within the road allowance (on-road) and more recreation-based trails. It is vital that all networks being accessed through the transportation and trails master plan be designed as one integrated system. This involves prioritizing candidate trails routes that connect to either existing or proposed on-road facilities, such as sidewalks, multi-use pathways, paved shoulders and bike lanes.

Other underlying considerations that informed the proposed trails network included:

- constructability (i.e., cost, land ownership and geometric feasibility);
- proximity to natural amenities and trip generators; and,
- alignment with scheduled capital works.

Identifying routes for new trail expansions and assigning each an appropriate facility type is an important step to create a formalized trail classification system.

3.1.1 TRAIL HIERARCHY

In addition to identifying ideal routes for new trail expansions, it is important to assign each an appropriate facility type through a formalized trail hierarchy. A trail hierarchy is not only a useful reference for practitioners responsible for maintaining and designing trail facilities, but it is also a great reference for interested facility users. Publicly labelling trail facilities under a consistent and legible trail hierarchy informs expectations regarding the difficulty and accessibility of different trail facilities. Ultimately, this provides a more predictable and inclusive travel experience to a wider range of users across all segments of the network.

The hierarchy should be treated as a living document and updated to reflect the changing needs of the network and reflect lessons learned.

Key aspects of the Trail Hierarchy:

- Trail design requirements, surfacing, widths, etc.;
- Provision and frequency of amenities;
- Typical accessibility characteristics and thresholds;
- User experience, target users, permitted users; and,
- Seasonal and regular maintenance practices.

The following four (4) facility types have been developed to create a trail hierarchy for Essa. A high-level summary of the four trail types and trail head types is below, followed by a more detailed table providing full descriptions of each.

Type 1: Primary Trails

'Primary Trails' is the first trail class. This class includes asphalt surface facilities or compacted stone dust (with more frequent monitoring/maintenance) with low slopes/level of challenge. These trails are more urban in nature and are well suited for parks, urban rail trails, multi-use pathways within road corridors. These trails are well suited for winter maintenance, though action and frequency of plowing is dependent on available resources and annual reassessment of user needs.

DESIGN STANDARDS:

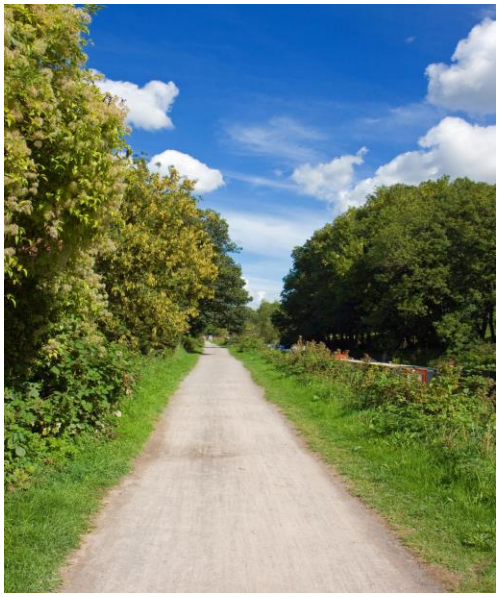
- **Width:** 3.0 – 4.0m wide
- **Surfacing:** Asphalt, compacted stone dust granular surface (crushed limestone), and/or structural reinforcing grid installed in problem areas (i.e.: due to water erosion or rutting from vehicular use).
- **Maintenance:** 3-season service (i.e.: annual surface repair, vegetation management and trail edge maintenance), regular inspections to identify and repair trip hazards and debris (e.g.: garbage, pruning to maintain clear zone).
- **Accessibility:** Maximum of 5% slopes (AODA path of travel standards), with minor occurrences of maximum 5-10% (AODA recreational trail standards), signage at trail head to inform level of challenge/ conditions to users.
- **Amenities:** Moderate/ high frequency of amenities in urban areas. Examples include trash receptacles at key trail entry points, easily accessible by service vehicles and at high-volume areas where litter is observed, seating at key locations/ regular intervals (i.e.: every 200m on average, every 50m in select areas where there is a higher potential for users with mobility impairments), formal bench seating with arm rests and back rests, augmented with natural materials for additional seating opportunities.
- **Grading/ Drainage:** 1-2% cross slope to minimize longitudinal drainage. Culverts, swales, or water bars to manage overland flow crossing the trail. Maximum longitudinal slope 5% or match slope of adjacent roadway.
- **Lighting/ Security:** Considerations for 'refuge' lighting and full lighting for trails in higher volume urban/urban tourism areas.

Type 2: Secondary Trails

'Secondary Trails' is the second trail class. This class includes a compacted stone dust or loose granular surface facilities better suited to advanced trail users with a larger width to accommodate light motorized active modes (i.e.: ATVs and Snowmobiles). This treatment will be applied to less frequently travelled sections of trails, and where trails may be too costly or physically challenging to maintain to a higher standard.

DESIGN STANDARDS:

- **Width:** 2.6m – 3.0m wide.



- **Surfacing:** Compacted stone dust granular or gravel surface (clear stone or granular 'A'), structural reinforcing grid installed in problem areas (i.e.: due to water erosion or rutting from vehicular use).
- **Surfacing:** Compacted stone dust granular surface (crushed limestone), structural reinforcing grid installed in problem areas (i.e.: due to water erosion or rutting from vehicular use), or gravel surface (clear stone or granular 'A' only where wheeled users (wheelchairs, cyclists, etc.) are already.
- **Maintenance:** 3-season service (i.e.: biannual surface repair, vegetation management and trail edge management).
- **Accessibility:** 0% to 8% slopes (AODA recreational trail standards).
- **Amenities:** Basic trailhead amenities such as signage and waste bins. Examples include signage, trash receptacles and natural seating at trail entry points, vehicular parking lots at key access points.
- **Grading/ Drainage:** 1-2% cross slope to minimize longitudinal drainage. Culverts, swales, or water bars to manage overland flow crossing the trail. 8% maximum longitudinal slope.
- **Lighting/ Security:** No lighting, future considerations for 'refuge' lighting at trail heads.

Type 3: Natural Trails

'Natural Trails' are the third trail class. This class includes non-paved trails placed directly within woodlots and other naturally immersive areas. Given their location within natural areas, these facilities are often constructed with cleared/compacted earthen surface. Compacted earth and/ granular stone can be used to mitigate muddy or well-traversed sections, including areas with high motorized recreational vehicular use. Delineation of the trail location is important as vegetation growth, leaf litter, snow and obstruct the route.

DESIGN STANDARDS:

- **Width:** 1.0m – 2.0m wide.
- **Surfacing:** Compacted natural surface (compacted earth), granular/woodchip, reinforcing geogrid and boardwalks where applicable.
- **Maintenance:** Annual/ reactive service (i.e.: tree hazard removal). Includes topping up of mulch surface as necessary, keeping trail envelope free from obstacles (e.g.: pruning to maintain clear zone). No winter snow clearing.
- **Accessibility:** 0% to 10% slopes (AODA recreational trail standards, Max. 5-10% slopes (AODA recreational trail standards), signage to inform level of challenge/ conditions to users.

- **Amenities:** Low frequency of amenities. Examples include trash receptacles at trail entry points, seating at key locations in support of AODA standards (e.g.: top of long climb, viewpoint). Natural materials used for seating opportunities.
- **Grading/ Drainage:** 1-2% cross slope to minimize longitudinal drainage. Culverts, swales, or water bars to manage overland flow crossing the trail.
- **Lighting/ Security:** No lighting, future considerations for lighting at trail head parking lots.

Type 4: Neighbourhood Greenway

The fourth trail class, “Neighbourhood Greenways”, includes active transportation routes established through the enhancement of existing roads, sidewalks and shared on-road cycling infrastructure to improve user experience and safety. This can include a range of low or higher cost infrastructure investments with a goal of creating a distinct route that connects people to places where a more traditional recreation trail is not possible. Actions may include tree planting, wayfinding signage, and the inclusion of geometric traffic calming measures, such as bump-outs, speed humps and targeted signage. These facilities improve connections through and from residential areas, with minimal cost and disruption to the existing area. Neighbourhood Greenways are typically within quiet residential areas and neighbourhoods, where a connection to trail systems are desired without the need for large infrastructure and facilities.

DESIGN STANDARDS:

- **Width**: Varies (standard sidewalk or increased width sidewalk to 2.8m).
- **Surfacing**: Concrete sidewalk and/or asphalt.
- **Maintenance**: Winter maintenance based on sidewalk and road clearing mandates. Sidewalk clearing should be prioritized in these areas.
- **Accessibility**: Meets municipal sidewalk and roadway standards.
- **Amenities:** Wayfinding signage, increased shade tree planting, bench rest area where distance exceeds two average blocks.

3.2 APPLICATION TO EXISTING AND FUTURE TRAILS

The above trail hierarchy (trail type) has been applied to the existing trails and proposed trails (refer to **Figure 7**, **Figure 8** and **Figure 9**), including recommendations for upgrading existing routes to meet the standards. The below table outlines recommended minimum trail widths and length of proposed new trails by type. Trail widening should occur at lifecycle renewal if the existing facility is within 0.5m of the standard.

Table 2 | Proposed Trail Widths and Length by Type

Trail Type	Trail Width	Proposed Length (Meters)
Primary Trail (Type 1)	3.0	15,201
Secondary Trail (Type 2)	2.6	32,565
Nature Trail (Type 3)	1.5	1,344
Neighbourhood Greenway (Type 4)	2.0	49,725
Total Proposed Trails:		98,835

A total of **98.84km of new trail is proposed**. Refer to Section **4.1**, **Figure 7**, **Figure 8** and **Figure 9** for proposed candidate trail network maps. This mapping includes proposed upgrades to existing trail facilities.

3.3 TRAIL OPERATIONS AND MAINTENANCE

Considerations for ongoing maintenance of the existing and proposed routes is needed to ensure successful implementation. User experience can be significantly impacted by inadequate or infrequent maintenance. The following section provides an overview of suggested maintenance practices for the Township's consideration.

Once implementation has occurred there is ongoing work which needs to be executed related to the trail system. Essa will need to consider how they will maintain the existing and future trail system to ensure that the trail and associated facilities are monitored and maintained to a level that is considered suitable for those managing the trail and effectively communicated to those using the trail.

3.3.1 RISK MANAGEMENT AND LIABILITY

Liability concerns are becoming a key consideration due to the potential for lawsuits. Adhering to widely accepted design, construction and maintenance standards are one of a number of strategies to manage risk. Aside from proper design, signage, and operation of on- and off-road trails, steps should be taken to address potential hazards including accidents, theft, vandalism, and other problems.

Some general strategies which could be used to reduce risk and to help minimize the liability associated with providing designated trail facilities are listed below.

- Improve the physical environment, increase public awareness of the right and obligations of users and improve access to educational programs.
- Maintenance operations should conform to accepted / best practice standards, and a maintenance program that is achievable for the municipality should be developed, documented, and acted on.
- If hazards cannot be immediately removed, they should be isolated with a barrier or identified with warning signs.
- Monitor trails on a regular basis to document the physical conditions and operations of the route. All reports of hazardous conditions received should be promptly and thoroughly investigated.
- Written records of all monitoring and maintenance activities should be documented and maintained.
- Avoid using descriptions such as "safe" or "safer" when describing trails when promoting their use. Identify practices that enable users to assess their own capabilities or level of comfort and make their choices, accordingly.
- Ensure signage, mapping and promotional materials associate the term 'Recreational' with trails and the trail network.
- Maintain proper insurance coverage as a safeguard against having to draw payments for damages from the public treasury.

Through the *Ontario Trails Act*, there were amendments to various Acts that have a bearing on recreation trails, including the *Occupiers Liability Act*, *Public Lands Act* and *Trespass to Property Act* which help to protect owners of properties that contain public trails as well as adjacent landowners, and also provide stiffer penalties for those that trespass on private property (i.e., go off trail property onto private lands), vandalize or cause damage.

The *Occupiers' Liability Act* has been amended to clarify that the lower standard of care (responsibility) applies to occupiers of trail property which are not-for-profit or public-sector organizations, even if there is an incidental fee related to access onto or use of the land, such as for parking; or if a public benefit or payment is given to a not-for-profit trail manager.

The *Public Lands Act* has been amended to:

- Make damage to Crown land and property an offence;
- Enable a court to order a person, who has been convicted of this offence, to stop the activity and/or rehabilitate lands and repair any damage to property;
- Provide the Ministry of Natural Resources and Forestry with new enforcement tools to stop vehicles, inspect documents, and arrest persons suspected or caught violating the act;
- Increase the maximum penalties for offenders and the length of time to initiate charges;
- The Trespass to Property Act has been amended to raise the maximum fine for trespassing from $2,000 to $10,000 and remove the limit on the number of damages that could be recovered in a prosecution; and,
- Insurance coverage is often added to the liability insurance Municipalities already carry for their other public parks and open space.

The risk management and liability prevention strategies identified above should be reviewed and incorporated into day to-day decision making processes where applicable when planning, designing and operating trails within the Township of Essa.

3.3.2 TRAIL MAINTENANCE AND MONITORING STRATEGIES

A monitoring plan is an important component post-implementation to evaluate the success of a route, and to inform smarter investments through data-driven measures. Research indicates that meaningful performance measures can help to prioritize future projects and appropriately allocate resources. The following approaches are recommended to be explored by Township Staff in further detail, for inclusion into the on-going workplans of monitoring for maintenance and operations staff.

- Guiding next steps in the management and maintenance of trails, Essa should consider adopting a trail maintenance log to document maintenance activities. The log should be updated when features are repaired, modified, replaced, removed, or when new features are added. Accurate trail logs also become a useful resource for determining maintenance budgets for individual items and tasks, and in determining total maintenance costs for the entire trail. In addition, they are a useful source of information during the preparation of tender documents for trail contracts, and to show the location of structures and other features that require maintenance.
- Leveraging technology to collect managing data can be a powerful tool to finding efficiencies and more accurately budgeting for need. Digital dashboard style programs can be an effective interface for staff to organize inputs and action items. This type of technology can be linked to digital trail logging, user reporting systems, and on-site sensors (such as waste bin sensors) to create the ability for on-demand service and strategic deployment of resources. On-demand service styles can replace regular maintenances practices and reduce overall demand on resources.
- Reducing maintenance through strategic infrastructure investments, including trail realignment, surface treatment and use of structures should be considered for areas of reoccurring maintenance issues.

- Using the maintenance strategies outlined within the trail plan as well as any existing trail infrastructure maintenance practices **(Table 2)** should be a starting point from which a trail-specific maintenance plan and budget can be developed.
- In addition, annual maintenance budgets should be refined to accommodate the maintenance of trail facilities. As the proposed trail network is implemented the trail budget should increase to address the increasing number / length of trail facilities that have been implemented.

Table 3 | Trail Maintenance and Management: High Level Overview over Time

Frequency	Maintenance Task
IMMEDIATE **(Within 24 hours of becoming aware of the situation through an app reporting system, email, or other notification or observation)**	— At a minimum, mark, barricade and sign the subject area to warn trail users or close the trail completely until the problem can be corrected. — Remove vegetation and/or windfalls, downed branches, etc., where traffic flow on the trail is being impaired or the obstruction is resulting in a sight line issue. Remove hazard trees that have been identified. — Repair or replace items that have been vandalized or stolen/removed. This is especially important for regulatory signs that provide important information about trail hazards such as road crossings, steep grades, and sharp curves. — Removal of trash in overflowing containers or material that has been illegally dumped. — Repair obstructed drainage systems causing flooding that pose a hazard to trail users or that is resulting in deterioration that poses an immediate safety hazard. — Monitor trail areas and structures that are prone to erosion after severe summer storms and repair as required. — Repairs to structural elements on bridges such as beams, railings, access barriers, and signs.
REGULARLY **(Weekly/ bi-weekly/ monthly)**	— Trail patrols/ inspections should review the trail conditions (as often as weekly in high-use areas), to assess conditions and prioritize maintenance tasks and monitor known problem areas. — Mow grass along edges of trails (in parks and open meadow settings only). Depending on trail location this may be done weekly, bi-weekly, or monthly and can vary according to the location (typically 0.5 to 1.0m width). This helps establish a clear zone and can slow the invasion of weeds into granular trail surfaces. Not all trails will have mown edges. In woodland and wetland areas, pruning and brushing is often the only vegetation maintenance undertaken. — Regular garbage pickup (10-day cycle or more frequently for heavily used areas). — Repair within 30 days or less, partially obstructed drainage systems causing intermittent water backups that do not pose an immediate safety hazard, but that if left unchecked over time, will

Frequency	Maintenance Task
	adversely affect the integrity of the trail and/or any other trail infrastructure or the surrounding area.
ANNUALLY	— Conduct an annual safety audit. This task can be efficiently including with general annual safety audits for parks and other recreational facilities. — Evaluate support facilities/ trailside amenities to determine repair and/or replacement needs. — Examine trail surface to determine the need for patching and grading. — Grading/ grooming granular trail surface and topping up of wood chip trails. — Pruning/ vegetation management for straight sections of trail and areas where branches may be encroaching into the clear zone. This task is a preventative maintenance procedure. Cuttings may be chipped on site and placed appropriately or used as mulch for new plantings. Remove branches from the site unless they can be used for habitat (i.e.: brush piles in woodlot setting) or used as part of the rehabilitation of closed trails. Where invasive species are being pruned and/or removed, branches and cuttings should be disposed of in an appropriate manner. — Inspect and secure all loose side rails, bridge supports, decking (ensure any structural repairs meet the original design criteria).
EVERY 3 – 5 YEARS	— Cleaning and refurbishment of signs, benches and other trailside amenities.
EVERY 10 – 20 YEARS	— Resurface asphalt trails (assume approximately every 15 years). — Major renovation or replacement of large items such as bridges, kiosks, gates, parking lots, benches, etc.
COST EFFECTIVE	— Patching/minor regrading of trail surfaces and removal of loose rocks from trail. — Culvert cleanout where required. — Top up granular trail surfaces at approaches to bridges. — Planting, landscape rehabilitation, pruning/ beautification. — Installation/ removal of seasonal signage.

While dependent on the Township's available resources, listed below are some suggested guidelines to inform the proper maintenance of specific trail amenities.

Table 4 | Trail Amenity Maintenance Guidelines

Amenity	Benefits	Life Cycle	Maintenance Considerations
Parking, Drop Off Areas & Loading Zone	Improves access to trail facilities	5 – 10 years	Annual infill of potholes and ruts (gravel), repaving or power washing (asphalt)
Rest Area	Provides greater accommodation and comfort to those with limited mobility	15 – 25 years	Annual inspection for defects, basic landscaping
Lighting	Enhances trail safety (CPTED) and reduces potential crime	10 – 15 years (bulbs) 35 – 45 years (poles)	Monitoring for bulb replacement and repairs due to vandalism
Signage	Improves facility wayfinding and reinforces facility's brand identity	10 – 25 years (depending on changes to posted information)	Monitoring for vandalism or expiration of posted information
Waste Management	Minimizes facility upkeep	10 – 25 years (depending on chosen model)	General inspections for waste pick-up or damages
Barrier Controls	Enables temporal access restrictions, including during periods of facility maintenance	15 -25 years	General inspections for damages (i.e.: weather events, degradation, or salt erosion)
Shelter	Provides protections from inclement weather. Provides greater accommodation and comfort to those with limited mobility	15 – 35 years (depending on chosen construction material)	General inspections for damages and potential touch-up painting
Potable Water	Improves comfort of trail experience	N/A	Fall decommissioning to empty lines and spring reactivation and quality testing

Amenity	Benefits	Life Cycle	Maintenance Considerations
Washroom	Improves comfort of trail experience	30 – 40 years	Daily to weekly inspections and cleaning, nightly locking, and daytime opening

SEASONAL TRAIL MAINTENANCE

Seasonal maintenance should be informed by user experience and need, with realistic expectations outlined to the public. Each trail typology in the trail hierarchy provides a recommendation for the level of seasonal maintenance that should be expected, including winter maintenance, and this information should be made available to trail users. Seasonal maintenance includes vegetation clearing along edge zones, hazard tree removal, surfacing repairs, signage repairs, and winter snow removal.

Winter trail maintenance can include:

- Identify which trails within the network will be winter maintained for commuting purposes versus recreational activities.
- Trails that have been identified for winter activities (i.e., snowshoeing, cross-country skiing, snowmobiling, fat bikes, etc.) should be thoughtfully programmed to accommodate these activities.
- This involves creating a clear plan for trail grooming, ensuring that identified trails are properly maintained and groomed for optimal skiing conditions. This aspect requires coordination and collaboration with local groups, such as ski clubs or recreation organizations, to determine grooming schedules, techniques, and equipment needed.
- Trails that have been identified for winter maintenance for commuting purposes should be included in the operational plan of snow clearing & de-icing (i.e.: urban trails that connect areas as residential communities and transit stops to key destinations such as educational facilities and downtown business areas/ Township facilities (Town Hall, Recreation Centre, etc.).

Recognizing that Essa has limited resources to address existing trail infrastructure, the Township should approach management of the trails through a combination of increase in staffing resources and leveraging volunteer support.

4 RECOMMENDATIONS FOR TRAIL INFRASTRUCTURE

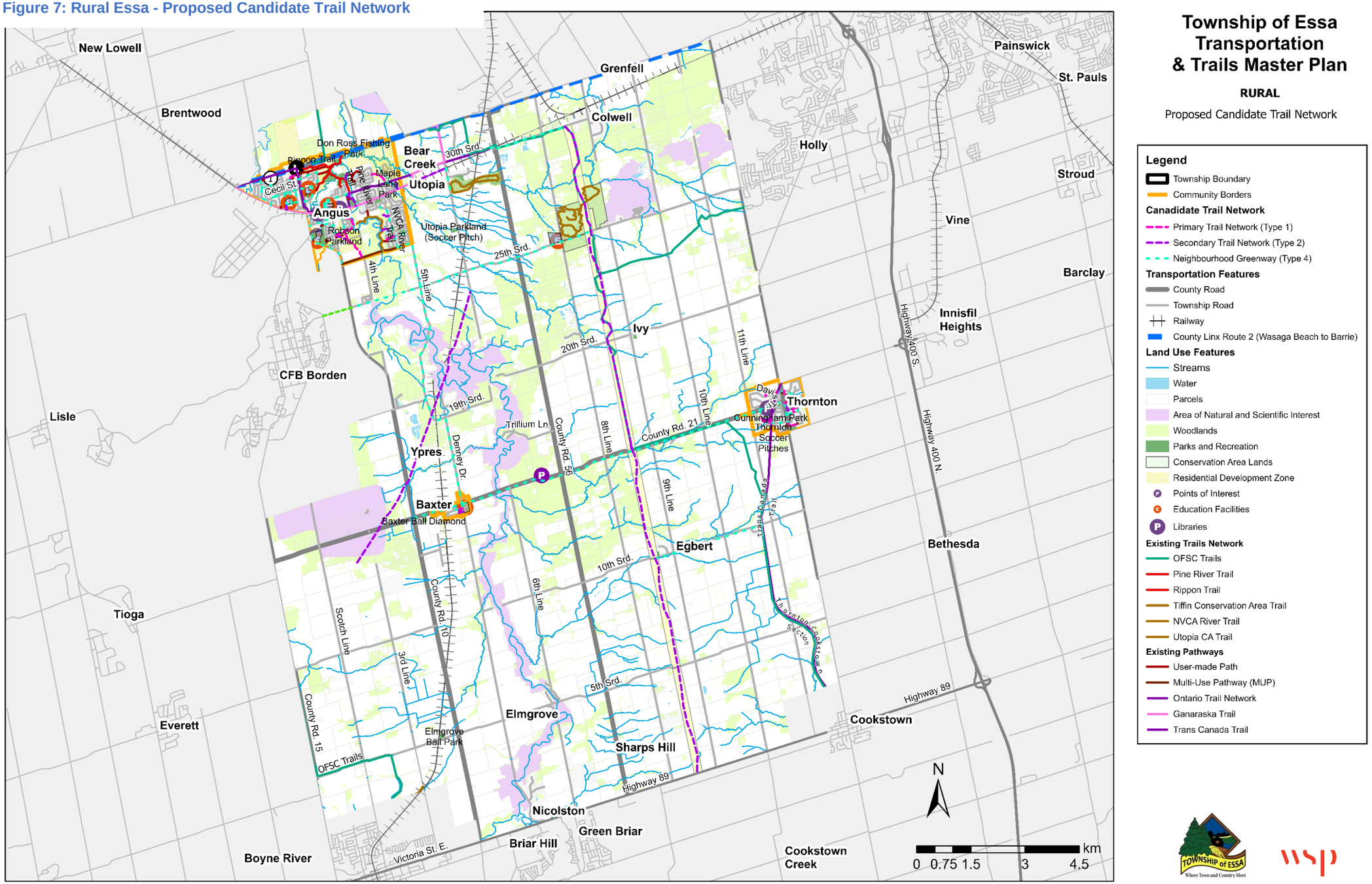
4.1 NEW TRAIL INFRASTRUCTURE

The proposed trail network aims to enhance the community's recreational opportunities, promote active transportation, and connect key destinations throughout the area. The network is designed to be inclusive, providing safe and accessible routes for all users, including pedestrians, cyclists, and individuals with disabilities. Through a comprehensive analysis of the existing trail system and an evaluation of community needs and preferences, the following proposed trail network will serve as a valuable asset to the community, promoting health, well-being, and a stronger sense of place.

Proposed trail maps **Figure 7**, **Figure 8** and **Figure 9** showcase the proposed trail network. These trails connect to existing parks and open space, educational facilities, and existing trail segments.

For guidance on the design, construction and maintenance of new trails, refer to **Section 2 Trail Vision and Approach**, and **Section 3** Trail Typologies.

Figure 7: Rural Essa - Proposed Candidate Trail Network



Township of Essa Transportation & Trails Master Plan

RURAL

Proposed Candidate Trail Network

Legend

- Township Boundary
- Community Borders

Canadidate Trail Network

- Primary Trail Network (Type 1)
- Secondary Trail Network (Type 2)
- Neighbourhood Greenway (Type 4)

Transportation Features

- County Road
- Township Road
- Railway
- County Linx Route 2 (Wasaga Beach to Barrie)

Land Use Features

- Streams
- Water
- Parcels
- Area of Natural and Scientific Interest
- Woodlands
- Parks and Recreation
- Conservation Area Lands
- Residential Development Zone
- Points of Interest
- Education Facilities
- Libraries

Existing Trails Network

- OFSC Trails
- Pine River Trail
- Rippon Trail
- Tiffin Conservation Area Trail
- NVCA River Trail
- Utopia CA Trail

Existing Pathways

- User-made Path
- Multi-Use Pathway (MUP)
- Ontario Trail Network
- Ganaraska Trail
- Trans Canada Trail

Figure 8: Angus - Proposed Candidate Trail Network

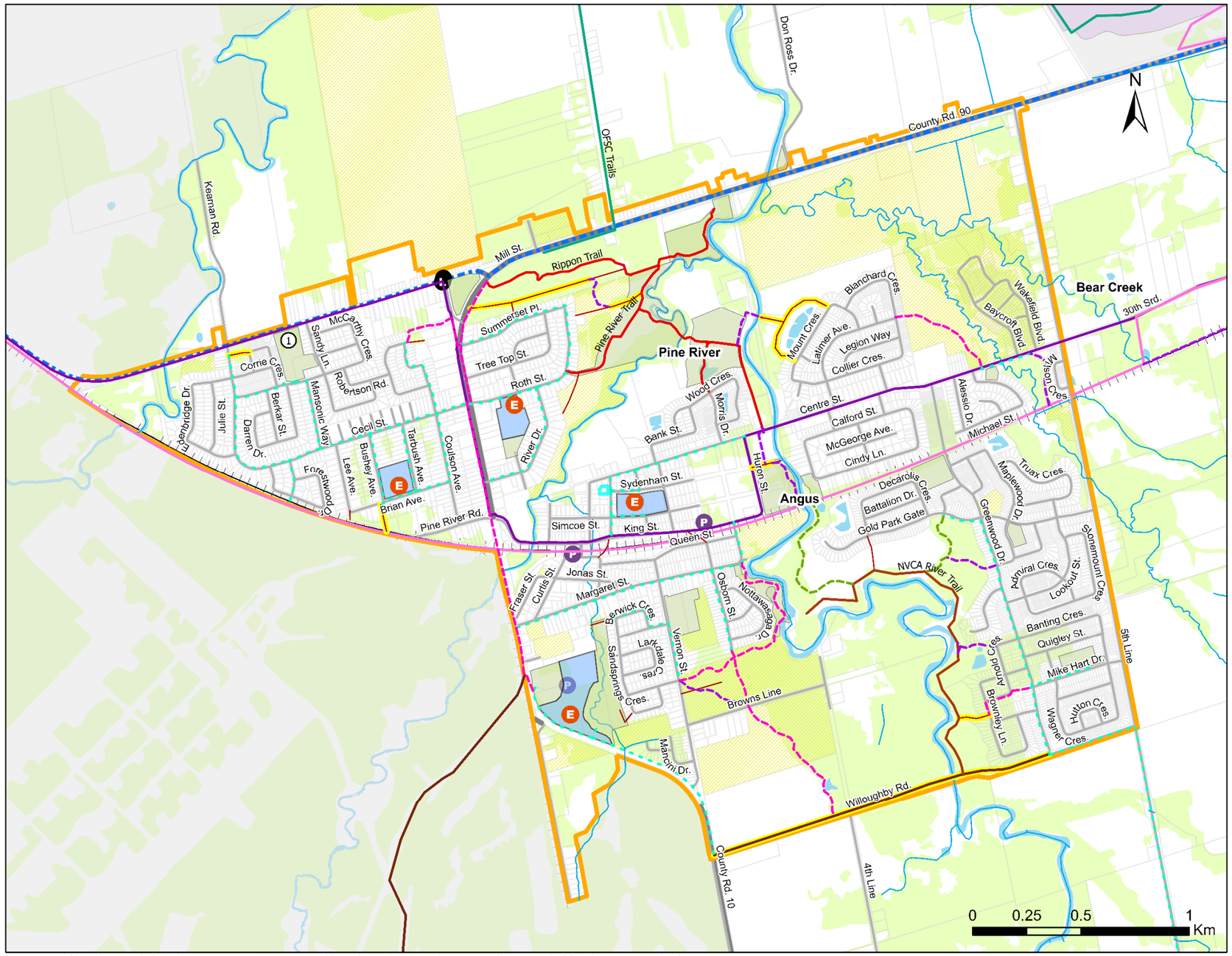


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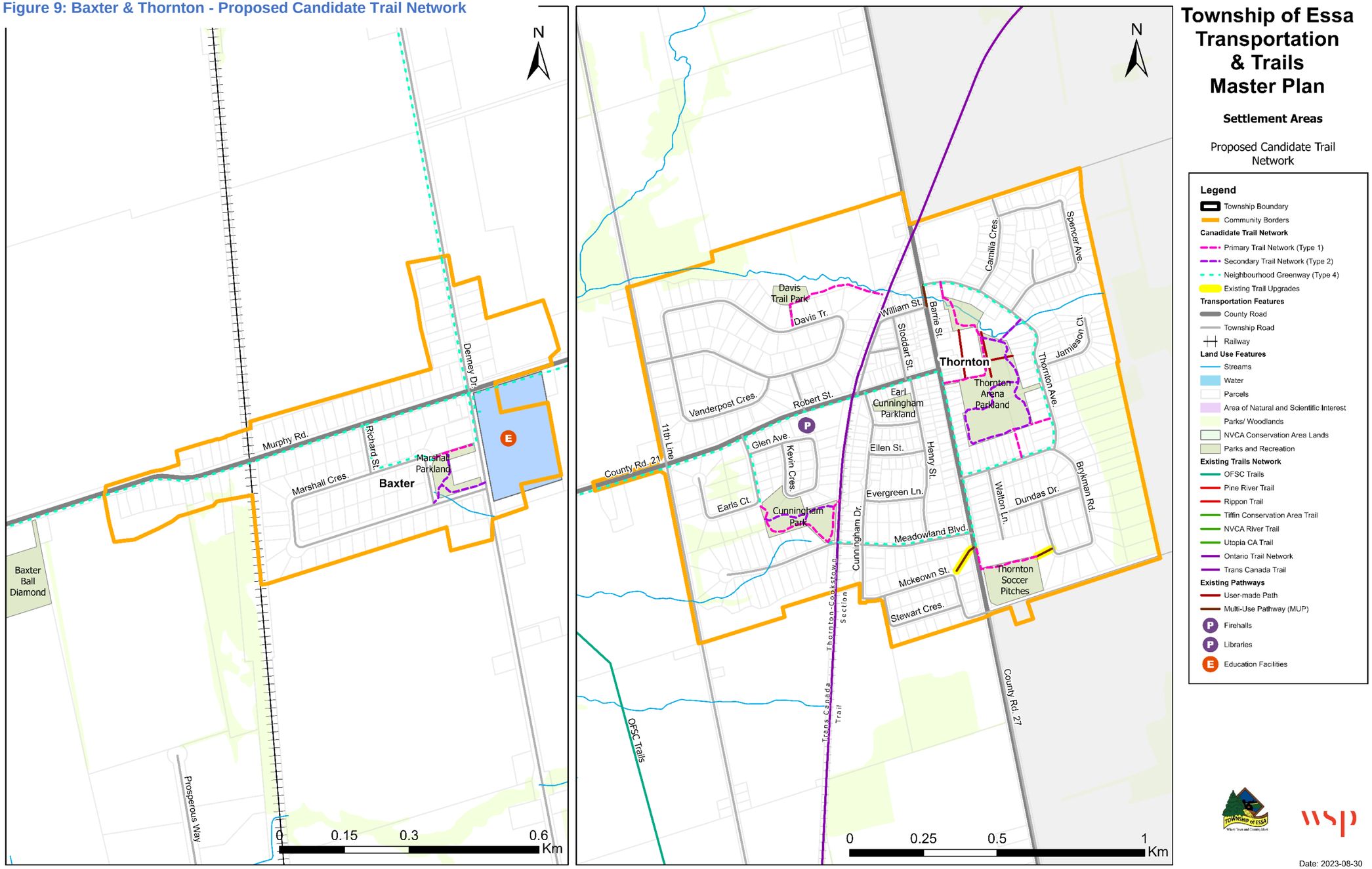
Figure 9: Baxter & Thornton - Proposed Candidate Trail Network



Township of Essa Transportation & Trails Master Plan

Settlement Areas

Proposed Candidate Trail Network

Legend

- Township Boundary
- Community Borders

Canadidate Trail Network

- Primary Trail Network (Type 1)
- Secondary Trail Network (Type 2)
- Neighbourhood Greenway (Type 4)
- Existing Trail Upgrades

Transportation Features

- County Road
- Township Road
- Railway

Land Use Features

- Streams
- Water
- Parcels
- Area of Natural and Scientific Interest
- Parks/ Woodlands
- NVCA Conservation Area Lands
- Parks and Recreation

Existing Trails Network

- OFSC Trails
- Pine River Trail
- Rippon Trail
- Tiffin Conservation Area Trail
- NVCA River Trail
- Utopia CA Trail
- Ontario Trail Network
- Trans Canada Trail

Existing Pathways

- User-made Path
- Multi-Use Pathway (MUP)
- P Firehalls
- P Libraries
- E Education Facilities

Date: 2023-08-30

4.2 UPGRADING TRAIL INFRASTRUCTURE

Existing trails within Essa's trail network have been identified for upgrade to compliment and connect the proposed candidate routes and to seamlessly knit the various elements of the Active Transportation Master Plan (ATMP) together.

Some of these existing trails are informal trails that the community has created. For example, the user-made pathway connecting Lee Ave & Brian Avenue to the Ganaraska Trail and Decarolis Cres. & Gold Park Gate to the NVCA River Trail. As people are using them, a phased implementation can be applied. Where existing trails are upgraded and connect to desired destinations, the Township can proceed with closing the informal, user-made trails located nearby. This will encourage the community to use the dedicated trail connections.

Table 5 outlines the existing trail routes that are to be upgraded as per the proposed trail hierarchy and candidate trail network. Short, Medium, and Long-term planning horizons have been provided in addition to an opinion of probable cost. Note: Opinion of probably cost does not include infrastructure, amenities, crossings, or additional studies, contingencies, etc.

- Short = within 5 years
- Medium = 5 to 10 years
- Long = 10+ years

Table 5 | Proposed Upgrades for Existing Trail Routes

	Existing Trail Route Upgrades						
	Road/ Location	Route	Existing Width	Existing Condition	Proposed Trail Typology	Timing Horizon	Recommended Improvements
ANGUS	Willoughby Rd. MUP	CR-10 to 5th Line	Varies: 2.5m off-road section, 2.0m on-road, raised section	Asphalt pathway & raised asphalt trail with curb separating drive lane.	Neighbourhood Greenway (1,640 linear m)	Short $104,960.00	— Review condition of surfacing and re-surface and/or patch as needed. — Add wayfinding signage.
	Gold Park Gate	Informal	N/A	User-made connection	N/A	Short	— Close pathway as a proposed nature trail linkage to the River Trail is proposed NE of neighbourhood.
	Rippon/ Pine River Trail	Mix of formal and informal trail segments	-Varies (3.6m max)	Compacted granular/ natural surface	Secondary Trail (728.5 linear m)	Short $89,605.50	— Update surface and trail width to meet secondary trail standards. — Install additional trail segment along user-made trail to complete a loop.
	Mount Crescent SWM Pond	Informal pathway from Mount Cres. to Pine River Trail	+/- 3.0m	Informal, natural surface	Secondary Trail (612.25 linear m)	Medium $75,306.75	— Update surface and trail width to meet secondary trail standards. — Review water crossing feasibility and review funding opportunities to connect to Pine River Trail.
	Huron Street	User-made pathway	1.5m	Informal, user-made connection	Secondary Trail (190 linear m)	Medium $11,685.00	— Update pathway to connect with proposed secondary trail from Ganaraska Trail to Centre St.
	Cecil St.	Corrie Cres. to Cecil St.	N/A	Informal, user-made connection	N/A	Short $ N/A	— Close pathway and/or post signage notifying private lands. — Opportunity for Township to purchase land and turn into a neighbourhood/ local park. A trail pathway can be incorporated into the design.
	Ganaraska Trail	Road Crossings	N/A		Secondary Trail	Short-Medium $4,000 to $180,000	— Review existing road crossings and ensure they meet OTM Book 15 and 18 standards. — At minimum, ensure line paint and signage to notify vehicles of crossing ahead (short term solution). Essa staff should work with the trail committee on planning and execution. Cost ranges dependant on crossing type. I.e.: line paint and signage vs. full intersection signalization. — Plan for road crossing in conjunction with 5th line road improvements as per the TMP.
THORNTON	CR-27 to McKeown St.	Sidewalk	1.5m	Concrete	Neighbourhood Greenway (115.25 linear m)	Long $ 7, 376.00	— Expand sidewalk 0.5m upon lifecycle renew as it is within 0.5m of the standard. Sidewalk becomes a primary MUP (surfacing can become asphalt or remain concrete).
	Byrkman Rd. to Thornton Soccer Pitches	Sidewalk	1.5m	concrete	Neighbourhood Greenway (63.70 linear m)	Long $ 4,076.80	— Expand sidewalk 0.5m upon lifecycle renew as it is within 0.5m of the standard. — Sidewalk becomes a primary MUP (surfacing can become asphalt or remain concrete).

4.3 TRAIL PROGRAMMING & AMENITIY CONSIDERATIONS

4.3.1 TRAIL AMENITIES

Trail amenities can be implemented individually or as a grouping of amenities commonly referred to as a staging area. Staging areas are nodes throughout the trail network where users can travel to, or where groups can meet to begin their journey on the trail. An even distribution of staging areas in the rural parts of the community will provide multiple meeting and access points to the trail system. In urban areas, existing community centres are excellent candidates for trail staging areas as they often have many of the necessary amenities. A typical staging area will include the following elements:

Figure 10: Photo of End of Trip Facilities with amenity examples including shelter, picnic table, and flat boulder seating.

- **Parking for automobiles**: parking capacity will vary depending on the location of the staging area. A minor staging area may accommodate five to eight cars, whereas a major staging area may accommodate over 30 cars. Spaces for trailers may be included at rural staging areas where equestrian and/or snowmobile use is permitted on the trail;
- **Waste receptacles**: located where they can be easily accessed by service crews and at regular intervals, typically grouped with other amenities such as benches, etc.;
- **Information/trailhead signage** complete with mapping;
- **Bicycle parking facilities;**
- **Seating**: may also include picnic tables;
- **Washrooms**: should be considered for all staging areas. Seasonal, portable toilets are sufficient at small rural staging areas; and,
- **Potable water**: optional, typically only at major urban staging areas (e.g., community centres).

In the urban areas (Angus, Baxter, Thornton), staging areas could be integrated into the existing park spaces and recreational destinations. Once the TMP has been approved, Essa should undertake and identify a set of strategic priorities for future staging areas. There are several trail amenities which could be incorporated into the trail network.

The following are some examples of different types of trail amenities and best practice considerations for selection:

- Provide trail amenities in strategic locations along the trail route (e.g., break up long distances between destinations with rest areas and/or interpretive nodes);
- Cluster trail amenities around key destinations to enhance comfort and enjoyment at trip generators (e.g., around trailheads and staging areas); and,
- Consider maintenance requirements for amenities, including whether seasonal or year-round use is planned.

— Seating provides the opportunity to pause along the trail at points of interest or just to rest. Young children, older adults and those with disabilities will need to rest more frequently than others. Benches are the most common form of seating, but walls of appropriate height and width, large flat boulders, and sawn logs are some alternatives depending on the trail setting. The design of seating areas and lookouts should include a level area beside the bench with a curb or other appropriate wheel stop for mobility-assisted devices. For heavily used routes it is reasonable to provide some form of seating every 250 – 500m.

Where consultation and coordination are required with other parties or agencies prior to the installation of amenities, ensure that consultation occurs early in the process to ensure agreement over amenity location and design.

Figure 11: Photo Highlighting Key Amenity Features (trail head staging area and end of trip facilities

TRAIL HEADS

Trailheads are an important component of placemaking and wayfinding. They can improve a trail user's experience and function as a marketing agent for the greater trail system. Whether minor in nature, or featuring more complex amenities, all points of entry from a roadway or parking area should feature trailhead amenities.

Trailheads are often busy hubs of most trail systems making them more susceptible to wear and tear, waste accumulation, and vandalism. It is critical that the appropriate maintenance protocols and procedures be adopted to maintain a state of good repair. Identifying and managing the level of maintenance required is influenced by the frequency of use, type of user, and size/complexity of trailhead programming.

Three types of trailhead facilities are recommended to accommodate different types of trail connections and to provide flexibility to accommodate budget availability. The table below outlines the trailhead types, typical application, and amenities that each should include. At a

minimum, Trailhead Type C standards should be applied to all points of entry if there is deviation from the recommended application parameters.

Table 6 | Trailhead Type and Application

Trailhead Type	Application	Amenities
TRAILHEAD TYPE A	Feature entrances such as those in prominent locations, where parking facilities can be accommodated, and at destination trails that do not have reasonable active transportation connectivity to collect users.	— Large trail branding signage with map feature of immediate and community routes, accessibility information, regulatory signage — Parking for 3 – 5 cars — Formal seating/rest refuge — Bicycle parking
TRAILHEAD TYPE B	Where the point of entry will benefit from detailed user experience and wayfinding information such as more complex trail sections or where the provision of amenities is inline with user demand.	— Trail branding signage, map of immediate route, accessibility information, regulatory signage — Parking for 1-3 cars, which may include on street parking or independent trail parking — Formal or informal seating/rest refuge — Bicycle parking
TRAILHEAD TYPE C	Any trail entry point that does not warrant Type A or B.	— Trail branding signage accessibility information, regulatory signage — Informal seating/rest refuge

Trailheads could provide opportunity to celebrate the culture or history of a place through interpretive signage, historic markers, and public art placed at the staging area. They can also be ideal gathering places for organized runs or community celebrations.

Trailheads can be an opportunity for revenue generation and should not be overlooked as part of an ongoing funding resource. Like potential trail naming programs, a clear policy and procedure should be developed to govern the format and content parameters that the Township determines appropriate for Essa.

ACCESS CONTROL

Access barriers are intended to allow free flowing passage by permitted user groups and restrict access by user groups that are prohibited. Barriers typically require some mechanism to allow access by service and emergency vehicles. Depending on site conditions, it may also be necessary to provide additional treatments between the ends of the access barrier and edge of the multi-use trail right-of-way to prevent bypassing of the barrier altogether. Additional

treatments may consist of plantings, boulders, fencing or extension of the barrier treatment depending on the location.

There are many design alternatives for trail access barriers, and some have proven to be more successful than others. They can generally be grouped into three categories:

— Bollards;
— Offset Swing Gates; and
— Single Swing Gates.

Each access point throughout the trails network should be evaluated to determine which type of barrier is the most appropriate and what additional treatment(s) may be required to discourage unauthorized users from bypassing the barrier.

Figure 12: Photos (left to right) Swing Gate (P-Gate), Bollard (Permanent or Removeable)

Access control also includes the circulation route users take to get from the parking lot (or other amenities) to the trail itself. This may mean constructing an accessible pathway to the starting point of the trail and if there are any street crossings, installing clearly marked crossings.

PARKING/ END OF TRIP FACILITIES

Network continuity, connectivity and feasibility are further enhanced through the implementation of trail amenities. In some cases, amenities can be a determining factor for trail users and cyclists as they meet a variety of accessibility needs. Trail amenities can reinforce Essa's commitment to promoting active transportation and recreation and may include lighting, seating/rest areas, parking areas, signage, bicycle parking, loading or unloading areas, garbage receptacles, washroom and amenity buildings and gates/access barriers.

WASTE MANAGEMENT

Waste and recycling receptacles are a necessity through the trail network. They should be located at regular intervals and in locations where they can be easily serviced. Trailhead staging areas, trail nodes, mid-block crossing points, viewing areas, and in association with other site amenities such as seating and interpretive signage, are recommended locations. Bins should be located at a distance from seating or gathering areas to reduce smell and insect nuisances. Placement of bins should face the trail, except where they are part of a resting or viewing area or trailhead.

Bins should be monitored and emptied on a regular basis to prevent overflow. In heavily used areas, below ground waste receptacles could be installed as they have a larger capacity and

are “out of sight” and may result in fewer odours as the waste is stored at a cooler temperature. If bins are overflowing in increased frequency, consider weight sensors to manage waste better – proper, regular, waste management is very important.

Waste containers shall include animal-proof lids (where and if needed), and the design, color, and style should stay consistent with the trail segments outside of the Township.

Trail users can also include the four-legged kind, installing special waste bins for pet disposal should also be considered at regular intervals along the trail. For example: Sutera Dog waste, which is a collection means that converts dog waste to energy. This is done by diverting dog waste that would go from the park to the local landfill and re-directing it to a nearby biodigester, where renewable energy and fertilizer are produced. The dog waste is collected and transported to a facility where it is digested anaerobically, and the resulting biogas is used to general electricity.

Figure 13: Photo of dog waste collection receptacle

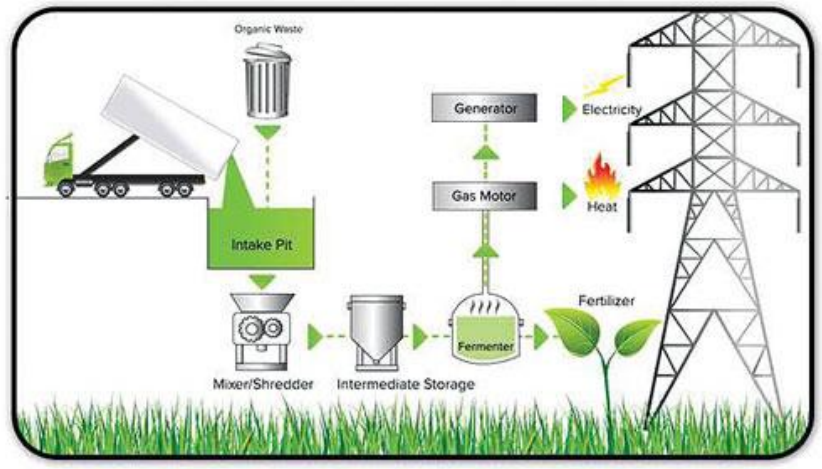


Figure 14: Example of dog waste collection to energy process

WASHROOMS & POTABLE WATER

Trails should have washroom facilities provided at major trailheads and where possible, make use of existing facilities (i.e.: community centres, major parks, etc.) if there is a trail linkage/access point. Otherwise, direct trail users to the nearest facility on trail signage and directional signs.

As trail use continues to increase and the network becomes denser, it may be necessary to provide additional facilities. Washroom facilities, when necessary, should be placed where they can be easily accessed for maintenance and surveillance. Many municipalities and trail organizations use portable washrooms prior to installing permanent facilities as they provide an opportunity to determine the most appropriate location before the investment is made in design and construction.

Potable water and/or bottle re-fill stations should also be considered at trailheads and trail accesses, where feasible. It is recommended for rest stops and viewing areas, where practical. Is there an existing water line along the roadway that can be tied into? This provides a great

opportunity to add this valuable amenity to trailhead staging areas. Water bottle fillers could be installed instead of traditional drinking foundations.

Maintenance schedules should include decommissioning any water service prior to the winter months. Decommissioning potable water services for winter can include:

- Turning off the water via the shutoff valve;
- Disconnect the supply line tubing from the shutoff value at the lowest point and let water drain from the tubing; and,
- Clearing water from pipes to prevent burst pipes from freezing.

It is always recommended to check with the manufacture for specific directions relating to the model installed and/ or contact the municipal public works department if tied into road service.

STAFFING OPTIONS

Levering volunteers is a great way to build support, create a sense of ownership, develop a strong trail community, and share resources and knowledge. However, managing the coordination of the trail efforts (planning, maintenance, and improvements), is outside the scope of what is typically possible when relying on volunteer efforts.

Key to the success of moving trail initiatives forward will be the identification of necessary staffing levels to support the ongoing efforts to improve the trail network, which will also include the identification of preferred funding sources to maintaining those staffing levels.

Action items for consideration of utilizing existing staff include:

- Determine key staffing responsibilities necessary for the early stages of implementation of the master plan and identify necessary resources to meet those responsibilities. Determine the appropriate level of staff resources required and seek funding opportunities to cover expense shortfalls. Draw on existing expertise and seek out professional expertise for specialized knowledge sharing (this could be a dedicated staff member or staff-share with existing resources). Example partners include adjacent Municipalities, Conservation Authorities, Ganaraska Hiking Trail Association, and Service Clubs;
- Identify roles and responsibilities for support staff and create a prioritization of positions to gradually scale up the staffing capacity of the Trail over time;
- Seek ongoing funding for capital improvements and maintenance to the Trail; and,
- In conjunction with reporting, review resourcing needs annually to modify partnership requests based on priorities and changes in capacity of the staff, volunteers, and service organization.

LEVERAGING TRAINED VOLUNTEERS

Trails face a major challenge provisioning consistent, reliable, standard of maintenance. Municipalities, Counties, Conservation Areas, and private landowners all have different levels of resources and expectations for maintenance. For users, it is the experience that matters.

The Township's trail network presents an opportunity to attract dedicated volunteers and to formalize some of the enthusiasm from the volunteers by aligning their desire to support the trails. Creating clear expectations and consistent agreements with all partner agencies across the trail network, volunteers will be empowered to support the Township, the County, the Conservation Authorities, and other landowners in maintaining the trails to a consistent, high-quality standard.

Leveraging volunteers and local community organizations/businesses for support is a beneficial tool to reduce costs and increase the quality of a trail system. There is often a willingness within

a community to contribute, however, there is often a disconnect in connecting interest with actionable projects and/or activities. Facilitating partnerships and volunteer activities should be addressed on two fronts:

— With a direct contact person for inquiries of this nature, and
— A posted list of future projects or activities that are under consideration.

Community groups are often looking for projects to adopt and having a 'wish list' of prioritised items desired for the trail system can help connect the level/type of contribution interest with the item most needed. Information can be publicly posted or circulated annually to local organizations and interest groups.

A positive volunteer experience brings people to the trail in a more meaningful way, creating new avenues for people to support the quality experience community members expect and want to share with visitors. Engaged volunteers are more likely to be long-term donors, to promote the trail and to speak in support of the trail when decisions are being made.

Energizing and engaging new volunteer audiences is also vital for the long-term sustainability of the trail, as it creates a new generation of trail advocates, leaders, and volunteer organizers. To provide an optimal experience, however, it is important to meaningfully differentiate between volunteer audiences to provide the types of volunteer experiences that meet the needs and expectations of different populations. Youth, retired people, company / corporate groups, and others should all be considered and have volunteer opportunities crafted in consultation with members of those audiences.

Essa should provide a hub to expand the resources available to volunteer organizations to ensure that their efforts and outreach can be more impactful by identifying priority volunteer projects, connecting potential volunteers to those projects, coordinating logistics and providing follow-up activities to provide a positive experience. By creating clear expectations and consistent agreements with all partner agencies and volunteer groups across Essa, volunteers will be empowered to support the Township in maintaining trails to a consistent, high-quality standard.

Action items may include:

— Identify volunteer 'audiences' – students, seniors, service clubs etc. and identify experience preferences;
— Expand resources available to coordinate volunteer activities;
— Develop an Essa Trails Committee to support maintenance, programming and promotion;
— Plan trail events for volunteers that include both 'work' and 'play' components;
— Identify liability and insurance needs for all partners and acquire the necessary coverage to be able to support volunteer maintenance activities;
— Develop and certify Volunteer Training programs to build ownership and maintenance capacity; and,
— Program and identify volunteer opportunities on the Township's webpage, social media and issued directly to local organizations. Opportunities should be developed to include a range of commitments including one-time, annual, and geographical opportunities.

4.4 COSTING AND IMPLEMENTATION

The recommendations within the TTMP network will require a phased implementation approach and will need to be adaptive to respond to the availability of resources (annual budgets, development charges, grants) and opportunities to leverage symbiotic projects (road upgrades, development, utility works). The proposed phasing process relied on the same considerations and principles which informed how the TTMP network was developed and was closely coordinated with the phasing of the Transportation Master Plan and the Parks Master Plan. The plans will need to be supported by each other throughout their implementation.

Provided below are criteria for Essa staff to utilize when identifying projects for implementation planning.

- An approximate total of 98,835 meters (98.84 km's) of new trails are proposed within the Township.
- This equates to approximately 32,945 meters (32.9 km's) of trails per phase.

A cost estimate **(Table 7 through 10)** has been developed to guide capital planning efforts, separated by community with an overall summary of total project estimated cost **(Table 11)**.

4.4.1 PHASING IMPROVEMENTS AND NEW INFRASTRUCTURE

Recognizing that all trail network recommendations cannot be built at once, individual facilities were assigned among the three implementation horizons of: short-term, medium-term and long-term. These facilities can guide the phased implementation approach of each specific trail segment to future detailed design and construction of the trail.

Short-Term horizons include strategies that guide the prioritization of trail sections within the overall trail network that are easily implemented, and of which will create meaningful connections for users to the existing trails and local amenities.

Below is a summary of the criteria generally used to inform how different segments of the recommended trail network were phased.

SHORT-TERM HORIZON (0-5 YEARS)

- Facilities that represent "quick-wins" given their low cost and high feasibility relative to their benefit to overall network connectivity and user comfort (i.e., Neighbourhood Greenways – signage and line paint approach, Primary trails that directly connect communities to Ganaraska Trail & Thornton Cookstown Trail).
- Facilities that can be included in planned road infrastructure upgrades (i.e., Neighbourhood Greenways that require on-road works and/or sidewalk extensions).
- Improvements to trails in urban areas and parklands.
- Facilities likely to service a high degree of demand, based on their proximity to key travel destinations and travel corridors.
- Facilities flagged by township staff or members of the public as key priorities (i.e., upgrades to Ganaraska Trail System, on-road cycling facilities – line paint & signage).

MEDIUM-TERM HORIZON (6-10 YEARS)

- Parking lots and rerouting of trails to meet new entry locations.
- Multi-use pathways and other highly accessibility asphalt Type 1 & Type 4 trails that play a strong role for facilitating safe active transportation. Focus on short urban area trails.

- Road/rail crossing infrastructure.
- Facilities whose cost and usage are contingent on the completion of newly planned subdivisions and redevelopment areas.
- Facilities that provide a substantive network improvement yet are forestalled due to cost and construction challenges.

LONG-TERM HORIZON (10+ YEARS)

- Neighbourhood Greenways – sidewalk upgrades.
- Multi-use pathways and other highly accessibility asphalt Type 1 trails that play a strong role for facilitating safe active transportation. Focus on larger and rural area trails.
- Facilities with substantive cost and construction challenges (i.e., trail link between Angus and Thornton, Angus and Baxter).
- Facilities that serve as a secondary route within the overall network.
- Facilities which require the buy-in and coordination of additional stakeholders (i.e., primary trails along educational facilities and/or along/ within private lands i.e., CFB Borden).

Supplementary to the following criteria, projects that directly connect to each other are often phased together to encourage construction streamlining and to avoid creating network dead heads.

Recommendations:

The following actions are recommended for prioritizing implementation:

- **Essa currently has 18.1km's of trails, plan adding 5.49 km's yearly to reach 32.90 km's within 6 years.**
- **Identify trail segment priorities based on road construction implementation schedule. Upgrading sidewalks & extending road shoulders for on-road trail use is cost effective.**
- **Neighbourhood Greenways – implement wayfinding and signage then plan infrastructure upgrades.**
- **Primary, Type 1 Trails – connect parkland to residential communities & regional trail systems (i.e., Ganaraska & Thornton Cookstown Trans Canada Trail).**
- **Identify vital trail amenities that can be added as "quick wins" if planned road construction upgrades fall within the medium-term horizon. Plan to add rest & refuge, road crossings, and signage first then additional amenities as funding allows.**
- **Identify maintenance tasks suitable for volunteers and promote opportunities to reduce staff needs and costs.**

COSTING ESTIMATE

A cost estimate has been calculated for the implementation of the proposed trail network per community and for the rural areas within the Township, refer to **Table 7**, **Table 8,**

Table 9 and **Table 10**. Cost estimated within the identified communities of Angus, Baxter and Thornton includes only those trail segments that resident inside the settlement limit, refer to **Figure 7**, **Figure 8** and **Figure 9** in subsection **4.1** for these limits.

Additional cost estimates include a breakdown for each trail typology defined above (refer to Section 3.1: **Trail Classification**) with proposed trail length, width, surface type, and estimated cost, refer to **Table 11** and **Table 12**.

Table 7 | Rural Essa: Estimated Cost for Candidate Trail Network

Trail Type	Trail Width (Meters)	Proposed Length (Meters)	Surfacing Type	Total Estimated Cost
Primary Trail (Type 1)	3.0	0	Asphalt	$ 0.00
Secondary Trail (Type 2)	2.6	28,725.16	Compacted granular	$ 3,062,102.06
Nature Trail (Type 3)	1.5	0	Natural surfacing (Firm Earthen)	$ 0.00
Neighbourhood Greenway (Type 4)	2.0	28,783.91	Asphalt	$ 3,454,069.20[2]
Contingency (20%):				$ 1,303,234.25
Total Trail Estimated Cost:				$ 7,819,405.51[3]

Table 8 | Angus: Estimated Cost for Candidate Trail Network

Trail Type	Trail Width (Meters)	Proposed Length (Meters)	Surfacing Type	Total Estimated Cost
Primary Trail (Type 1)	3.0	6,386.32	Asphalt	$ 1,149,537.60
Secondary Trail (Type 2)	2.6	1,805.35	Compacted granular	$ 192,450.31
Nature Trail (Type 3)	1.5	1,343.10	Natural surfacing (Firm Earthen)	$ 46,336.95
Neighbourhood Greenway (Type 4)	2.0	13,309.50	Asphalt	$ 1,597,140.00[2]
Contingency (20%):				$ 597,092.97
Total Trail Estimated Cost:				$ 3,582,557.83[3]

[2] The neighbourhood greenway typology assumes a new 2.0m wide asphalt MUP. Costs for this specific trail typology could decrease if there is an opportunity to expand an existing 1.5m sidewalk by 0.5m to total a 2.0m width, per individual trail segment.
[3] Estimated costs are for trail implementation only. These estimates do not include the cost of any amenities, infrastructure, crossings, or additional studies.

Table 9 | Thornton: Estimated Cost for Candidate Trail Network

Trail Type	Trail Width (Meters)	Proposed Length (Meters)	Surfacing Type	Total Estimated Cost
Primary Trail (Type 1)	3.0	2,496.61	Asphalt	$ 449,389.80
Secondary Trail (Type 2)	2.6	1,801.20	Compacted granular	$ 192,007.92
Nature Trail (Type 3)	1.5	0	Natural surfacing (Firm Earthen)	$ 0.00
Neighbourhood Greenway (Type 4)	2.0	5,865.03	Asphalt	$ 703,803.60[2]
Contingency (20%):				$ 269,040.26
Total Trail Estimated Cost:				$ 1,614,241.58[3]

Table 10 | Baxter: Estimated Cost for Candidate Trail Network

Trail Type	Trail Width (Meters)	Proposed Length (Meters)	Surfacing Type	Total Estimated Cost
Primary Trail (Type 1)	3.0	118.51	Asphalt	$ 21,331.80
Secondary Trail (Type 2)	2.6	233.28	Compacted granular	$ 24,867.65
Nature Trail (Type 3)	1.5	0	Natural surfacing (Firm Earthen)	$ 0.00
Neighbourhood Greenway (Type 4)	2.0	1,766.61	Asphalt	$ 211,993.20[2]
Contingency (20%):				$ 51,638.53
Total Trail Estimated Cost:				$ 309,831.18[3]

IMPLEMENTATION COST

Implementing the trails network will require funds and resources from the Township and its partners. Annual funding for construction, maintenance, operation, and programming should be identified in the annual budgeting process to strategically implement the network over time.

Additional funding sources should be sought by Essa, such as from the Provincial or Federal government, to maximize budget efficiencies and coordination with other major projects. It is recognized that the level of effort will vary on a project-by-project basis and that the price of materials will vary over time. Certain projects could require additional work and further studies as they are considered for implementation.

The cost estimates within this plan are not intended to represent the total cost that Essa must shoulder, but a foundation to ensure the Township is equipped to leverage external funding opportunities as they arise and to set realistic goals for what will be internally funded.

Based on facility assignments, a total cost estimate to implement the network was determined. In addition to using industry leading facility unit costs based on the precedence of comparable projects, cost estimates relied on a series of assumptions:

- Unit prices gathered from recent tenders and projects of similar scope in Ontario;
- Costs are not intended for functional design purposes as they only include the costs of installation of facilities;
- Costs are not meant to be prescriptive but provide a preliminary estimate of the potential implementation costs;
- Assumption that facilities are implemented across typical environmental conditions and topography, and;
- Best practices from past initiatives completed by comparable municipalities and may vary depending on capacity and availability of funds.

A complete breakdown of how this costing was completed, including applied per linear kilometer unit costs, is summarized below. It is vital that the Township consult with all relevant stakeholders to determine a more accurate cost based off confirmed cost-sharing agreements as the cost estimate below is not broken down by owner (jurisdictional owner of the roadway or area where on-road and off-road trail facilities are proposed).

Table 11 | Recommended Trail Network Cost Estimate

Trail Type			Trail Category Estimated Costs			Total Estimated Cost	Notes
	Trail Width (Meters)	Proposed Length (Meters)	Trail Cost	Amenity Cost	Crossing Cost	Total	
Primary Trail (Type 1)	3.0	15,201	$ 2,231,820	$141,100	$35,000	$ 2,912,280	Crossing includes 5-line paint/sign, 1 Level 2 Type D PXO, 1 short water crossing, and moderate wayfinding.
Secondary Trail (Type 2)	2.6	32,565	$ 3,481,130	$305,400	$100,000	$ 4,315,596	Crossing includes 3-line paint/sign, 4 short water crossings, and 3 Level 2 Type D PXO.
Nature Trail (Type 3)	1.5	1,344	$ 46,368.00	$28,105	$0.00	$ 74,473	No crossings required.
Neighborhood Greenway (Types 4)	2.0	49,725	$ 5,967,000	$212,020.00	$1,200,000	$ 7,379,020	As road infrastructure is upgraded, include a 2.0m wide concrete sidewalk along neighbourhood greenway streets, this will decrease the cost incurred. This proposed estimated cost is if all upgrades were completed at once, for an entirely new 2.0m wide asphalt MUP for this trail type. Crossing types include 12-line paint/signs, 3 intersection signalizations, 3 mid-block pedestrian signals, and 1 at grade railway crossing.
Neighborhood Greenway (Types 4) – Signed Bike Route with Sharrows	N/A	N/A	$50,628	$151,600	$110,000	$ 312,228	For interim, it is suggested the Township install basic signage and wayfinding (post and pedestrian directional sign along trail route and at minor trail heads, and vehicular directional signs to major trail heads). As this is incorporated and the Township is directing users, trail crossings will need to be managed. A number of non-controlled crossings are needed, and 2 controlled crossings are to be upgraded in future as budget allows. (Price not included in total)
Total Trail Estimated Cost						$ 14, 681,368.52	

Note: All projected trail estimated costs include trail infrastructure, trail head (major and minor), seating & garbage receptacles, moderate wayfinding, crossings (at grade railway crossing, pedestrian signalized intersection, or crosswalk painting), and a 20% contingency. This estimate does not include design and contract administration fees, additional studies, etc.

Table 12 | Recommended Trail Network Cost Estimate by Linear Kilometre

ITEM	DESCRIPTION	UNIT	UNIT PRICE RANGE	PRICE USED	COMMENTS / ASSUMPTIONS
2.1	**Primary Trail (Trail Type 1)** - Hard Surfaced Off-Road Multi-Use Trail Outside of Road Right-of-Way (Upgrade existing granular surface)	linear KM	$150,000 - $225,000	$200,000	Includes some new base work (25% approx.), half of the material excavated is removed from site. Price depends on scale / complexity of project.
2.2	**Secondary Trail (Trail Type 2**) - Upgrade existing granular surface trail to meet 2.6m wide compacted granular trail standard	linear KM	$75,000 - $125,000	$100,000	Includes some new base work (25% approx.) and an average of 20 regulatory signs per kilometre. Price depends on scale and existing trail conditions e.g., width, slope, location of trail, etc.
2.3	Nature Trail (Trail Type 3) - earthen trail (new)	linear KM	$5,000-$20,000	$10,000	2.0m wide compact dirt surface, vegetation clearing and minor rock removal. Assumes $10/linear meter, $10,000 /Km
2.4	**Neighbourhood Greenway (Trail Type 4)** - Signed Bike Route with Sharrow Lane Markings - Intended to supplement a signed bike route in specific locations. Not intended to be a stand-alone facility type.	linear KM	$11,000	$11,000	Price for both sides of the road, includes route signs every 500 metres and sharrow stencils every 75 metres as per OTM Book 18 guidelines. Price includes: - $300 per sign x 4 signs (2 signs on each side of the road) - $400 per stencil marking x 26 (13 stencils on each side of the road)

FUNDING OPTIONS

A review of internal and external funding options was conducted to identify different options available. Essa is encouraged to monitor available funding opportunities including those outside of the Township. Information contained within this strategy to support these funding applications.

The following is a list of potential external funding sources that could be explored; however, they are subject to change and should be reviewed again prior to applications. It is important for the municipality to seek a diverse range of funding sources for the various initiatives and programs highlighted in this plan and external sources are an effective way to reduce the Township's costs while being an opportunity to develop new partnerships.

Funding Opportunities	Additional Details
County of Simcoe Trails Connecting Communities Grant Program	Assists municipalities in the development of active transportation and recreational opportunities with a focus on enhancing and/or expanding trail networks for non-motorized uses. 50/50 matching structure. For additional details refer to: https://www.simcoe.ca/dpt/pln/trails-transportation
Federal Active Transportation Fund	For additional details regarding the Active Transportation Fund refer to: https://www.infrastructure.gc.ca/trans/active-actif-eng.html
Canada Community – Building Fund / Provincial Gas Tax	For the federal Canada Community-Building Fund program please refer to: https://www.infrastructure.gc.ca/plan/gtf-fte-eng.html For the provincial program refer to: http://www.mto.gov.on.ca/english/service-commitment/gas-tax-program.shtml
Federation of Canadian Municipalities Green Municipal Fund	For additional details regarding the Green Municipal Fund and potential funding alternatives refer to: https://fcm.ca/home/programs/green-municipal-fund.html
Federal and Provincial Infrastructure / Stimulus Programs	For Federal Government infrastructure stimulus fund details refer to: https://www.canada.ca/en/office-infrastructure.html For Provincial Government infrastructure stimulus fund details refer to: https://www.ontario.ca/page/ministry-infrastructure

Ontario Trillium Foundation	For details regarding potential funding alternatives refer to: https://otf.ca/
Ontario Rural Economic Development Program (RED)	For details refer to: http://www.grants.gov.on.ca/GrantsPortal/en/OntarioGrants/GrantOpportunities
Ontario Sport and Recreation Communities Fund	As part of the Ontario Sport and Recreation Communities Fund: https://www.ontario.ca/page/rural-economic-development-program
Tourism Economic Development and Recovery Fund	For additional details regarding the Tourism Development fund refer to: https://www.ontario.ca/page/available-funding-opportunities-ontario-government#section-26
Service Club Support	Lions, Rotary and Optimist clubs who often assist with highly visible projects at the community level.
Corporate Environmental Funds (e.g.: Shell, TD, MEC, etc.)	For example refer to: https://www.shell.ca/en_ca/sustainability/communities/funding-guidelines-process.html for Shell Canada's Social Investment Program or https://www.td.com/corporate-responsibility/fefgrant.jsp for TD's Friends of the Environment Foundation Grant
Private Citizen Donation / Bequeaths	Can also include tax receipts for donors where appropriate