

Middlesex Centre

TRANSPORTATION MASTER PLAN

Phase 2: Transportation Network Development



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Revised Draft Report

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1. Introduction

“**Transportation**” includes the movement of people and goods by all travel modes: car and truck, rail, public transit, cycling, walking and more.

Desirably located in the centre of southwestern Ontario and immediately adjacent to the City of London, Municipality of Middlesex Centre (“the Municipality” or “Middlesex Centre”) has grown from 17,262 residents in 2016 to 18,928 residents in 2021 – 9.7% growth in just 5 years. In line with the Middlesex County and the Municipality’s Official Plans, it is anticipated that Middlesex Centre population will grow to 35,500 residents and employment to 11,700 jobs by 2046.

Transportation connects the Municipality’s 11 urban settlements, community settlements and hamlets spread over 588 square kilometres across a largely rural landscape. Transportation connectivity is vital to making Middlesex Centre an accessible and vibrant place to live, work and visit, to enjoy its rural charm and access its urban amenities.

Developed to guide transportation decision-making, the Municipality’s first stand-alone **Transportation Master Plan (TMP)** is a long-range planning strategy to guide transportation policies, services and infrastructure initiatives for the Municipality’s transportation system through 2046.

1.1 Report Purpose and Outline

The TMP development takes place over a three-phase study process. This report documents the second of these phases, that of developing the preferred transportation networks and strategies for Middlesex Centre. This report collectively represents the “alternative solutions” component of the Municipal Class Environmental Assessment Master Planning process (Section 2.2).

Following this introductory chapter, this report is structured as follows:

- Section 2 provides an **overview of TMP development**, outlining the study process and outlining engagement activities and inputs during the second phase of the study.
- Section 3 describes the TMP’s **strategic framework** and the process of identifying recommended actions toward achieving the transportation vision.

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- Section 4 presents the **three overarching goals** and provides an overview of how they informed TMP recommendations.
- Section 5 presents the **three mobility goals** and their associated **recommended actions** identified in response to the needs and opportunities identified in the first phase of the study;
- Section 6 provides additional detail on for selected actions as **focus areas and supporting strategies**, including infrastructure projects and strategies for roads, walking, cycling and passenger transit.
- Section 7 provides a **summary and outlines the next steps**.

2. TMP Development Overview

Broadly, the TMP:

- Guides decision-making relating to Middlesex Centre's transportation system over the next 25 years (to 2046);
- Aligns with and support the Municipality's Official Plan and other strategic plans and policies;
- Supports the Municipality's vision for the future transportation system, leading Middlesex Centre toward more safe, accessible and sustainable transportation networks and services;
- Supports local trips and longer-distance connections for all travel modes, supporting community livability and strengthening local economic opportunities; and
- Informs long-range financial planning.

Below, this section describes the following aspects of TMP development:

- The multi-phase study process;
- Alignment with the Municipal Class Environmental Assessment Master Plan process; and
- Engagement activities conducted as part of Phase 2 of the TMP study.

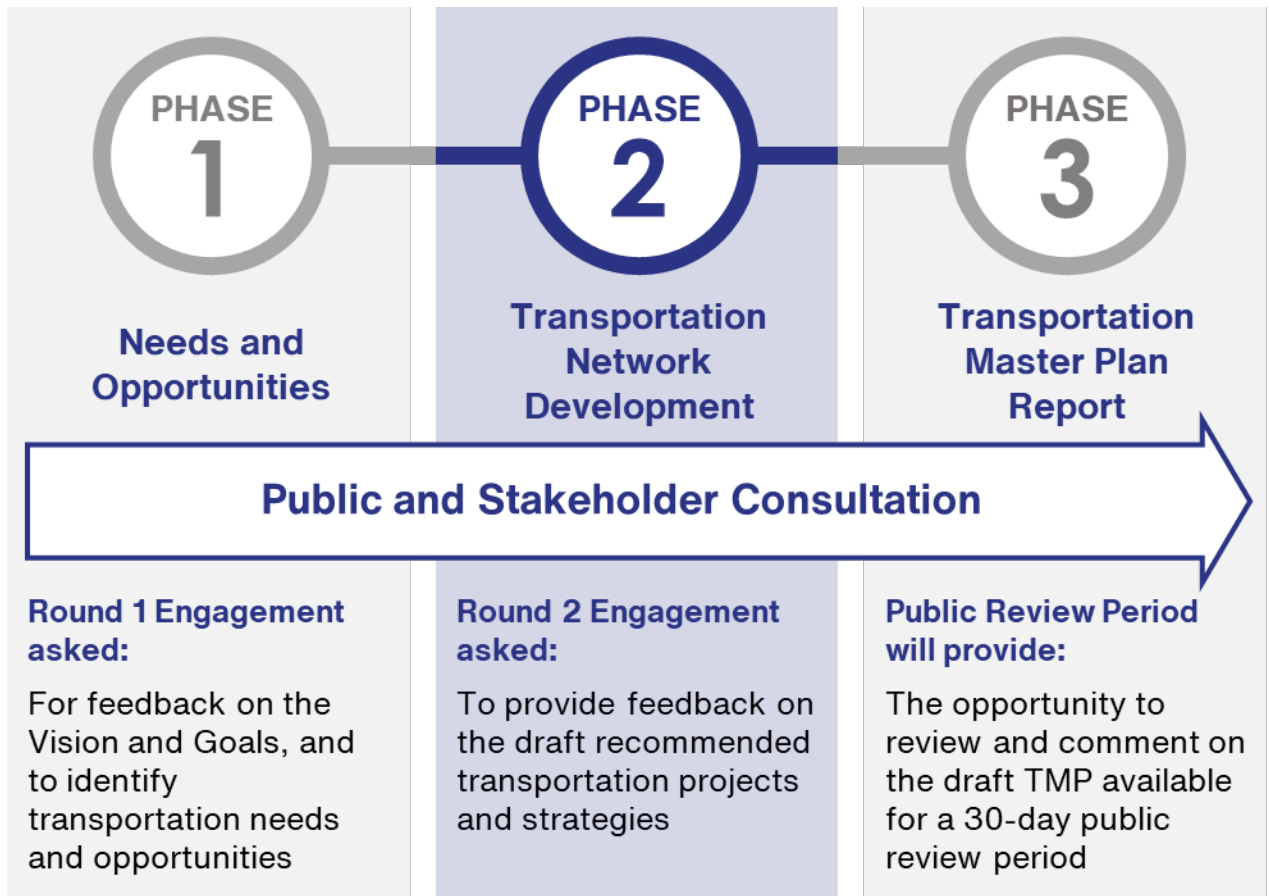
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2.1 Study Process

The TMP development study includes three phases, listed below and summarized in Exhibit 2.1:

- **Phase 1 - Identify Needs and Opportunities:** drawing on technical and qualitative analysis and engagement findings toward identifying transportation needs and opportunities;
- **Phase 2 - Transportation Network Development:** the identification and evaluation of potential infrastructure and strategy solutions to address the needs and opportunities; and
- **Phase 3 - Transportation Master Plan Report:** an action plan and summary of the recommended solutions developed throughout the study.

Exhibit 2.1: Study Process



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Each phase has customized communication and engagement activities to allow for feedback from the public and stakeholders. Existing and future transportation conditions are outlined in detail in the *Phase 1 Needs and Opportunities* report.

The TMP study commenced in August 2022 and has a completion timing of early 2024.

2.2 Municipal Class Environmental Assessment Master Plan Process

The TMP development process adheres to the **Municipal Class Environmental Assessment (MCEA)** planning process for **Master Plans** under the Province of Ontario's *Environmental Assessment Act, 1990*. The MCEA planning process provides a transparent approach to planning and building municipal infrastructure.

The MCEA process is summarized in

for different classes of projects¹ and for Master Plans, together with consultation requirements for each phase.

A Transportation Master Plan, as described by MCEA guidance, is a long-term plan that integrates existing and future land-use planning and the planning of transportation infrastructure with the principles of environmental assessment planning, building upon the analysis and detailed policies developed through municipal Official Plans.

The TMP study follows the Master Plan Approach 1, which requires the first two phases of the MCEA planning process:

- **Phase 1:** Identify the problem or opportunity (corresponding to the Municipality of Middlesex Centre's TMP study's Phase 1); and
- **Phase 2:** Identify and evaluate alternative solutions to address the problem and establish a preferred solution (corresponding to the Municipality of Middlesex Centre's TMP study's Phases 2 and 3).

The MCEA process requires consultation during Phase 1 for master plan studies (this is discretionary for Phase 1 of other EA studies), as there is tremendous value

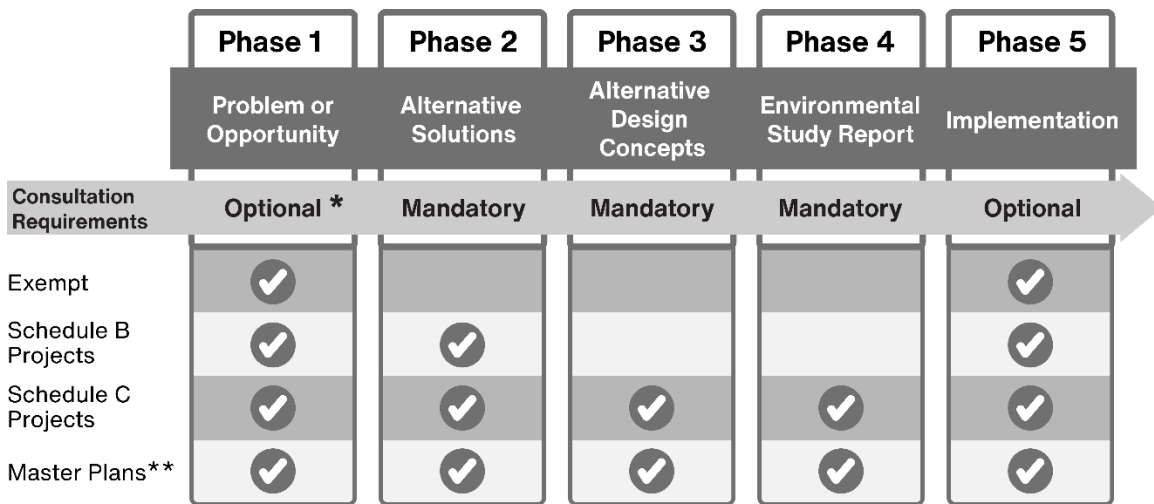
¹ Transportation projects and activities are categorized into Exempt, Schedule B and Schedule C based on the magnitude of their anticipated environmental impact, with EA-Exempt having the lowest anticipated impact and Schedule C having the highest anticipated impact.

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in confirming the needs and opportunities to be addressed with members of the public as well as key stakeholders. The MCEA process also mandates consultation during Phase 2 of the TMP study.

At the conclusion of MCEA Phase 2 under Approach 1, a TMP document is prepared where the level of investigation, consultation and documentation are sufficient to fulfil the requirements for EA-exempt projects within the plan. The TMP can also be used as support for subsequent Schedule B and C project-specific studies (where additional study will be required for recommended projects with higher impacts before they proceed to design and construction).

Exhibit 2.2: Municipal Class Environmental Assessment Process



- ✓ Actions required during relevant phase
- * Proponents must use the discretionary consultation point for master plan studies.
- ** Master plans must follow, at a minimum, the same steps of the first two phases of the MCEA process. Proponents can choose to complete Phase 3 and 4 as part of a master plan for recommended Schedule C projects, or to complete these phases as part of a project specific study.

Source: adapted from Municipal Engineers Association *Municipal Class Environmental Assessment* (MCEA, 2023)

2.3 Phase 2 Engagement Overview

In parallel with the technical work described in this document, public engagement activities were conducted as part of Phase 2 of the TMP study to update the public on the updated transportation vision and goals, and on the draft TMP actions identified to respond to the needs and opportunities identified in Phase 1. Information was also provided on selected TMP strategies for feedback.

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2.3.1 Communications and Engagement Opportunities

Communications for the second round of engagement included the following:

- Updated study webpage (middlesexcentre.ca/tmp); and
- Notice of Public Information Centre (PIC) 2, posted on the study web page (September 15, 2023), printed in the Middlesex Banner (September 27, 2023), sent to members of the public part of study contact list as well as Indigenous communities (September 19, 2023), and posted multiple times on Municipal social media platforms preceding the PIC.

Engagement activities/opportunities included the following:

- Public Information Centre 2:
 - A drop-in style in-person public event was hosted at the Komoka Community Centre (October 19, 2023), in conjunction with the Municipality's Servicing Master Plan study; and
 - To allow for asynchronous engagement and provide a broader opportunity for participation, display boards from the PIC were also available on the study web page.
- Public Opinion Survey – this was launched virtually (with paper copies available at the in-person event) on October 19, 2023, and remained open for input until November 16, 2023; the questionnaire asked about the draft actions that were developed to respond to the transportation needs and opportunity identified as part of Phase 1 of the TMP study.

2.3.2 Engagement Inputs Overview

Some of the themes heard as part of the Phase 2 study engagement are as follows:

- There was generally a positive response to the draft actions presented at the study's second PIC.
- Each of the TMP goals is generally well supported. For example, we heard that it being sensitive to local character is important because residents appreciate the rural and small-town character of Middlesex Centre, and it can't be planned in the same way as a large city. Some also noted that providing safe and efficient connectivity should have a higher priority. Others appreciated that fiscal responsibility is prominently noted as a goal.

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- Progress on improving conditions on Glendon Drive per the County's Environmental Assessment plan is top of mind for Middlesex Centre residents.
- Safe cycling/pedestrian facilities along Glendon Drive are also priority to support active travel connections within and between Kilworth and Komoka. Connection across Glendon Drive bridge should also be implemented to support safe connections to Byron and to Komoka Provincial Park.
- Transportation alternatives to driving to London are needed.
- A new Highway 402 interchange at Carriage Road would provide great value.
- Cycling infrastructure is important as long as it does not impact driving time for locals in Middlesex Centre.

All engagement activities and inputs throughout the TMP study are documented in a separate *Engagement Summary* report, which provides additional details regarding the engagement process, objectives, conduct of engagement activities, and a comprehensive summary of findings from stakeholder and public input.

3. Toward Achieving the Transportation Vision

The Middlesex Centre TMP will guide decision-making relating to the Municipality's transportation system both in the near term and through 2046, supporting the Municipality's vision for transportation now and into the future.

This section describes the TMP's strategic framework, which follows from the Municipality's transportation vision, and outlines the process for identifying actions to bring Middlesex Centre closer to this vision.

Preparing for new or expanded transportation infrastructure where needed is a key part of strategic long-term transportation planning. However, updated strategies, policies, guidelines and decision-making frameworks also have a significant impact on how transportation networks are used, improving the use of existing transportation infrastructure for a range of travel modes². They can also

² Under the MCEA process (section 2.2 of this report), any proposed transportation infrastructure changes that would require a Schedule B or C Municipal Class Environmental

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potentially reduce or postpone the need for transportation infrastructure expansions.

A key aspect of the transportation system in Middlesex County is the interconnectedness of transportation networks under Municipality jurisdiction with networks under the jurisdiction of the County, the Province, and adjacent municipalities. As a result, it is also important for the Municipality to collaborate with, partner with, or advocate to these other governments for improvements to transportation elements beyond Municipality jurisdiction.

3.1 TMP Strategic Framework

The development of transportation network improvements and recommendations follows a structured, step-by-step process, as summarized in Exhibit 3.1. The steps of this process are outlined in subsections below.

Exhibit 3.1: Network Development Process



The starting point of the transportation network development process is the strategic framework, comprising the transportation vision and associated goals—these strategic framework elements are summarized in Exhibit 3.2.

Assessment Process to implement require the development of alternative solutions for assessment. Proposed infrastructure is assessed against the transportation goals developed for the plan as assessment criteria. However, most of the recommendations developed for the Middlesex Centre TMP do not involve Schedule B or C projects and therefore do not involve various alternative scenarios.

Exhibit 3.2: TMP Strategic Framework

VISION: Transportation networks and services will provide the connectivity needed to move people and goods within, to and from our community safely, reliably and efficiently, while supporting a strong quality of life for Middlesex Centre residents, reducing negative environmental impacts, and exercising Municipal fiscal responsibility.

THREE OVERARCHING GOALS: CROSS-CUTTING TO ALL TMP ACTIONS



SENSITIVE TO LOCAL CHARACTER AND QUALITY OF LIFE

Provides transportation solutions that reduce the negative impacts of transportation on local rural communities and urban centres, settlements, and hamlets.



PROTECTS THE NATURAL ENVIRONMENT

Minimizes disruption of local natural habitats, waterways, agricultural land and natural heritage features, and reduces non-renewable energy use for and pollutants arising from transportation.



EXERCISES FISCAL RESPONSIBILITY

Represents cost-effective Municipal spending on infrastructure and operations and takes advantage of partnership opportunities and external grants.

THREE MOBILITY GOALS: TARGETING TRAVEL MODES AND MARKETS



PROVIDES SAFE AND EFFICIENT CONNECTIVITY

Support safe, efficient and dependable personal (passenger) travel between, to and from Middlesex Centre communities and activities.



PROMOTES HEALTHY LOCAL MOBILITY

Provides safe, accessible and convenient mobility options to connect between daily activities within local communities.



SUPPORTS LOCAL INDUSTRY

Supports prosperity in Middlesex Centre by meeting the transportation needs of agriculture and other local industries, such as efficiently moving goods to and from markets.

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The strategic framework for the Middlesex Centre TMP built on previous strategic and policy documents in the Municipality. Draft versions of the vision and goals were shared as part of Phase 1 consultation with the public and stakeholders, and refined based on feedback received.

3.1.1 Transportation Vision

The **Transportation Vision**, which states the desired future state of Middlesex Centre as it relates to its transportation system, is as follows:

Transportation networks and services will provide the connectivity needed to move people and goods within, to and from our community safely, reliably and efficiently, while supporting a strong quality of life for Middlesex Centre residents, reducing negative environmental impacts, and exercising Municipal fiscal responsibility.

3.1.2 Transportation Goals

The Goals are each categorized as either overarching goals or mobility goals.

Overarching Goals – these are cross-cutting and inform all TMP actions, without having specific actions follow from these goals:

- **Goal 1:** Sensitive to local character and quality of life.
- **Goal 2:** Protects the natural environment.
- **Goal 3:** Exercises fiscal responsibility.

Mobility Goals – these target specific travel modes and travel markets:

- **Goal 4:** Provides safe and efficient connectivity.
- **Goal 5:** Promotes healthy local mobility.
- **Goal 6:** Exercises fiscal responsibility.

3.1.3 Needs and Opportunities

The transportation needs and opportunities identified through Phase 1 of the study are now organized under the most applicable transportation goal, and subcategorized by travel mode.

The “needs” can be understood to represent what would cause a gap between the forecasted future without any adjustments to the current course of action,

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compared to and the envisioned future. Meanwhile, “opportunities” represent outside circumstances that can be leveraged, also toward achieving the vision and goals.

3.1.4 Actions

The next step in the process was to identify actions that respond to identified needs or opportunities while also moving the Municipality closer to achieving its transportation vision and goals. **Phase 3 of the study will develop costs and implementation phasing for these actions.**

Focus Areas

Selected actions where additional detail is provided in the TMP are termed focus areas. These are organized by mode and are detailed in Section 6.

4. Overarching Goals

Three overarching goals inform all aspects of the TMP. They do not themselves lead to specific actions, but are integral and supportive to all actions that arise from the TMP study. The following outlines these overarching goals and indicates how each has been considered and represented through the recommended actions of the TMP, which are outlined in Section 5 under the three mobility goals.

4.1 Goal 1: Sensitive to Local Character and Quality of Life



Provides transportation solutions that reduce the negative impacts of transportation on local rural communities and urban centres, settlements and hamlets.

This goal recognizes that Middlesex Centre’s rural and small-town setting is much appreciated by its residents and local businesses and that the approach to transportation planning should be sensitive to this context. It also recognizes that, given its proximity to London, significant volumes of traffic to, from and through the municipality can negatively impact quality of life for residents and local businesses.

The following outlines some of the ways in which the TMP actions have considered the goal of preserving local character and improving quality of life:

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- Given the importance of inter-regional connectivity to London and high through traffic volumes, interregional and heavy vehicle traffic are encouraged to use appropriate routes, e.g. the TMP provides increased clarity on the role and function of each road in the network toward appropriate design, and continuing to work with the County to ensure County roads are appropriately expanded where needed.
- The TMP actions work toward a better balance of County vs. Municipal priorities on County roads through settlement areas.
- Infrastructure will continue to be sensitive to rural/small town character, where appropriate, e.g. dark-sky streetlights, and appropriate sidewalk and road drainage designs.

4.2 Goal 2: Protects the Natural Environment



Minimizes disruption of local natural habitats, waterways, agricultural land and natural heritage features, and reduces non-renewable energy use for and pollutants arising from transportation.

Protecting the natural environment is a key concern for Middlesex Centre residents, and is a top priority for many. Greenhouse gas emissions reduction targets are also in place at different levels of government in light of climate change concerns. Reducing anthropogenic pollutants, improving safety for wildlife near transportation corridors, and maintaining as much of the rural or natural landscape as possible are also prime priorities.

The following outlines some of the ways in which the TMP draft actions have considered the goal of protecting the natural environment:

- The disruption of agricultural lands, waterways, habitats and natural heritage features is reduced by optimizing the use of existing infrastructure rather than new infrastructure, where feasible.
- Safety for wildlife is increased through exploring and implementing ways to reduce wildlife collisions.
- Non-renewable energy use and the production of anthropogenic pollutants is reduced by supporting cycling, walking and transit use, as well as by supporting the provision of electric vehicle charging infrastructure.

4.3 Goal 3: Exercises Fiscal Responsibility



Represents cost-effective Municipal spending on infrastructure and operations and takes advantage of partnership opportunities and external grants.

As a relatively small municipality, Middlesex Centre must use local taxpayer dollars wisely and effectively, optimizing the return on Municipal spending for local residents and businesses.

The following outlines some of the ways in which the TMP draft actions have considered the goal of exercising fiscal responsibility:

- Municipal resources are used cost-effectively, focusing spending on actions with tangible impact.
- Transportation spending is kept within Municipal budget limitations.
- Municipal funds are leveraged through partnerships and access to federal and provincial grants where possible.

5. Mobility Goals

The Mobility Goals target specific travel modes and travel markets, each of which are important to a thriving Municipality.

The needs and opportunities identified in Phase 1 are summarized below by goal, and further categorized by transportation mode or topic.

The development of actions corresponding to these needs was informed by the three overarching goals. The actions include infrastructure projects, policy directions, collaborating with partners, and other strategies.

Several actions are detailed further as focus areas or supporting strategies in Section 6.

5.1 Goal 4: Provides Safe and Efficient Connectivity



Supports safe, efficient and dependable personal (passenger) travel between, to and from Middlesex Centre communities and activities.

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This goal focuses on inter-community travel within, to, from and through Middlesex Centre, such as to the neighbouring City of London. These types of trips are typically carried out by motorized means such as by car or transit where service is available, or potentially by cycling. These trips depend on a well-connected, well-designed and well-maintained road network. Municipal roads vary widely in traffic and function, and need to safely and efficiently serve a variety of road users, including motorized vehicles, cyclists and pedestrians. Safety risks, noise and other external impacts of traffic need to be minimized and managed. Recommended actions under this goal are organized as follows:

- Road Design and Classification;
- Road Safety;
- Passenger Transit Services; and
- Resiliency.

5.1.1 Road Design and Classification

Summary of Needs and Opportunities

Phase 1 of the TMP study found that there is a need or opportunity to:

- Respond to anticipated capacity constraints along County roads;
- Clarify the role and function of individual Middlesex Centre roads to facilitate decision-making and design; and
- Create a better balance of County vs. Middlesex Centre priorities for County roads in settlement areas.

Recommended Actions

ROAD CAPACITY IMPROVEMENTS

Phase 1 found that many of the transportation concerns in Middlesex Centre have to do with County roads, given the high levels of traffic they carry and the fact that settlement areas are typically centred on County Roads as a main street or focus road for the community. Concerns included speeds of drivers, difficulty accessing from Municipality roads, safety concerns for those walking or cycling alongside or crossing the roads.

The County's improvement plan for Glendon Drive (County Road 14), summarized in Exhibit 5.1, will address many of the identified concerns.







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This plan will address several operational and safety concerns identified during TMP study engagement activities. The Municipality’s responsibility in implementation includes constructing the multi-use path alongside Glendon Drive for cycling, walking and wheeling.

Meanwhile, based on Phase 1 analysis, no Municipality roads are anticipated to require capacity expansions over the TMP planning horizon.

Action: Support and collaborate with Middlesex County on the implementation of Glendon Drive corridor capacity and operational improvements.

Alignment with TMP Goals:

 Goal 1	 Goal 2	 Goal 3	 Goal 4	 Goal 5	 Goal 6
high	medium	medium	very high	high	high

MUNICIPAL ROAD CLASSIFICATION

Given the wide range of roads under Municipality jurisdiction, developing and applying a road classification framework for Municipality roads will provide clarity, direction and consistency for the Municipality in a range of decision-making.

Section 6.2.1 outlines a recommended functional road classification framework. The application of this framework to the Middlesex Centre road network is mapped in Exhibit 5.2. The TMP’s recommended road classification framework emphasizes safety while meeting the needs of all road users, for example by including guidance for sidewalks and cycling facility types along different roadway classes.

Action: Adopt a new road classification framework and map including designations for urban and rural roads via an Official Plan amendment or update.

Action: Where feasible and in conjunction with other capital works or as other needs arise, implement upgrades to existing roads identified as collector roads to better align with the typical characteristics outlined in the framework.

Alignment with TMP Goals:







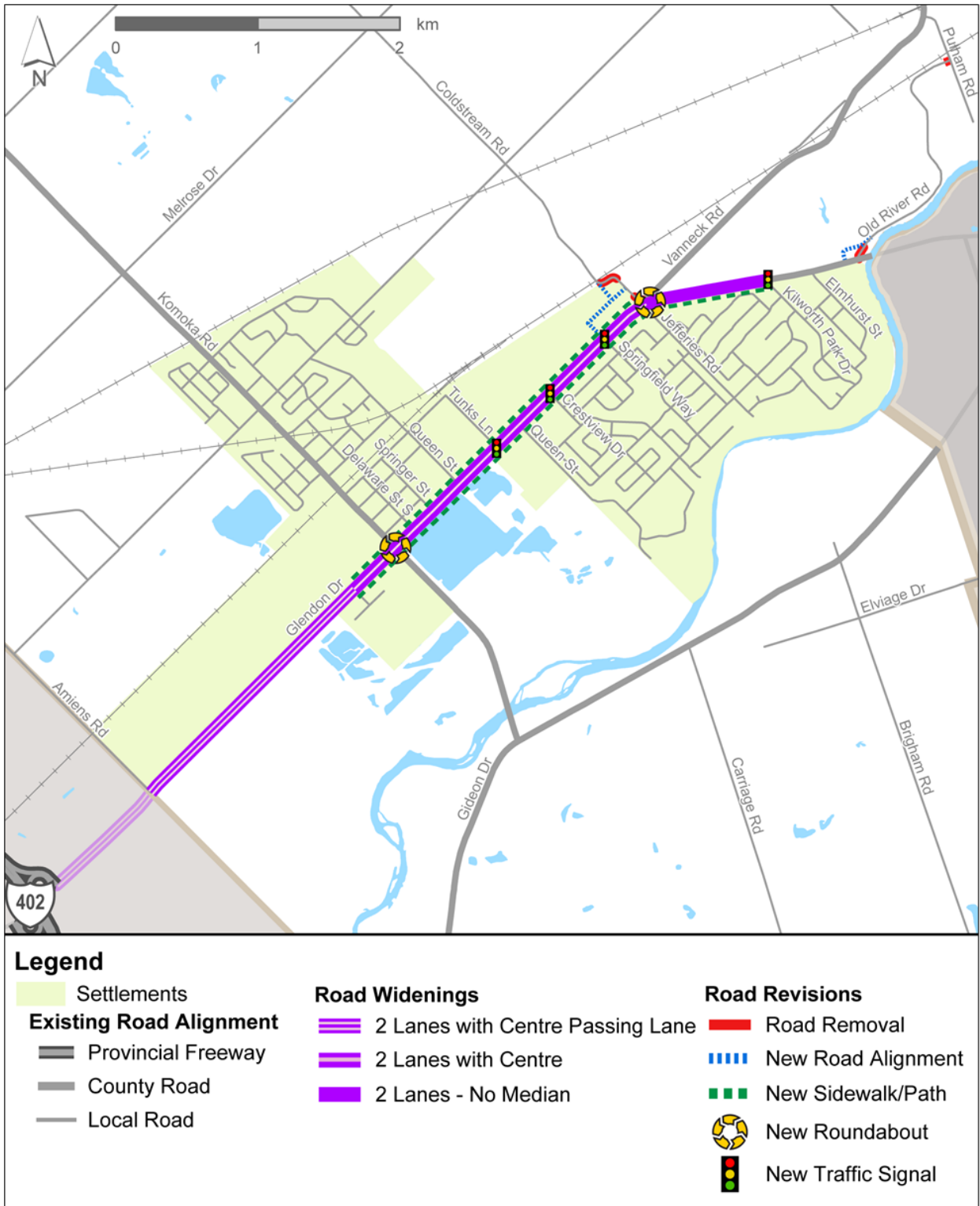
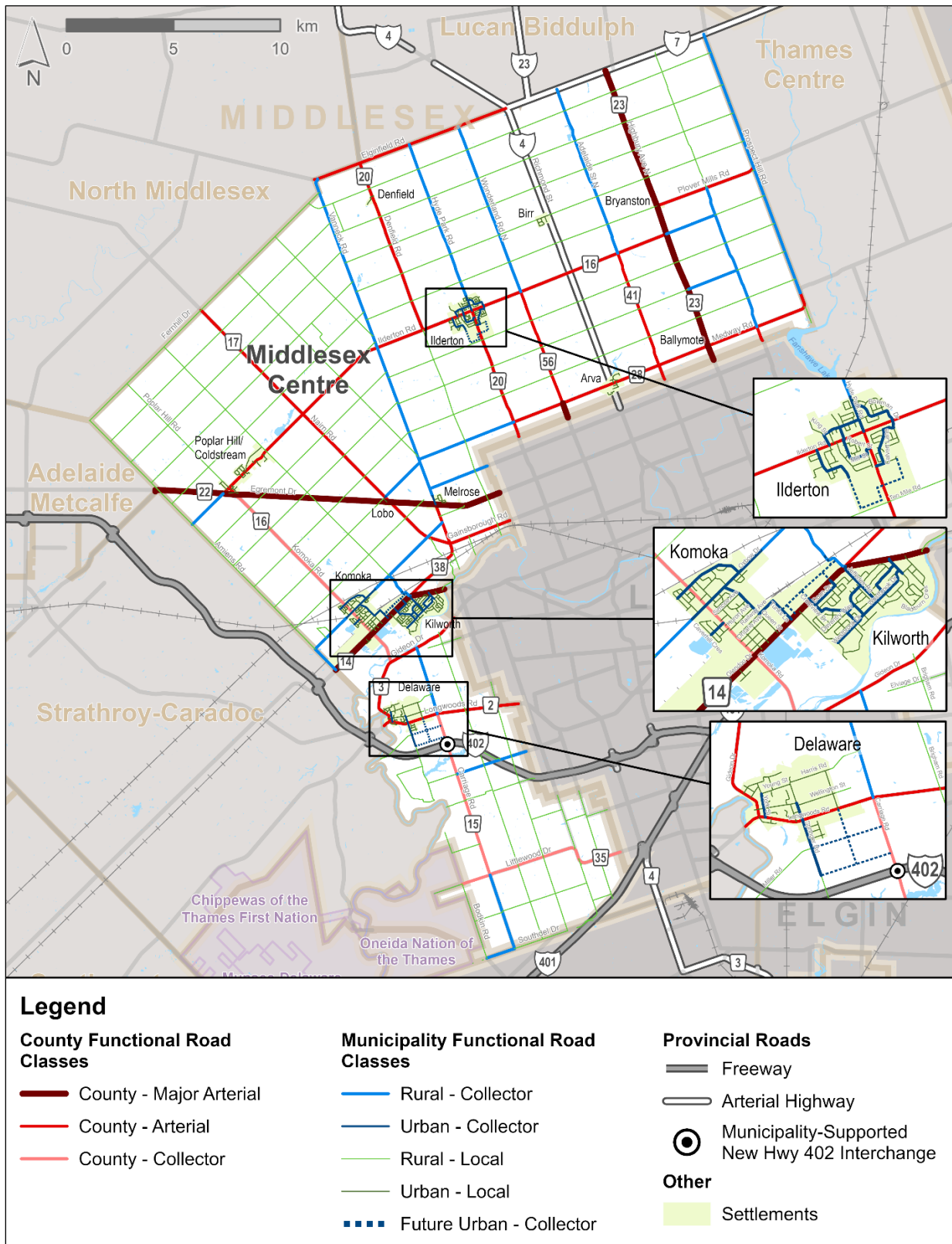
 Goal 1	 Goal 2	 Goal 3	 Goal 4	 Goal 5	 Goal 6
high	high	medium	very high	very high	very high

Exhibit 5.1: Overview of Middlesex County’s Glendon Drive Improvement Plan



Note: Map developed by Arcadis based on Glendon Drive ESR (Stantec, 2018).
 <https://www.middlesex.ca/sites/default/files/20180803_Glendon_Draft_ESR_Public_Review_jh.pdf> Accessed June 2023.

Exhibit 5.2: Recommended Functional Road Classification of Municipality Roads



Note: County road classifications are shown per the Middlesex County Official Plan (2023).

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COUNTY ROADS – URBAN CONTEXT CONSIDERATIONS

The classification of Middlesex County’s road network, shown previously in Exhibit 5.2, reflect the classifications in the County’s Official Plan (2023): Four Lane Arterial Roads (termed Major Arterials in Middlesex Centre TMP documents), Arterial Roads and Collector Roads.

The County’s Official Plan gives some consideration to the urban vs. rural context of its roads in its Official Plan, e.g. providing allowances within urban areas for differing right-of-way widths and set-back requirements, and being constructed to an urban standard (curbs, gutters, underground stormwater collection system). However, additional allowances for County roads within urban contexts would provide greater balance toward Municipality vs. County priorities, such as reduced operating speeds, more frequent allowances for safer pedestrian crossings at pedestrian crossovers or at signalized intersections, and the potential for on-road cycling facilities.

Action: Encourage the County to update County functional road classification and associated design standards for greater recognition of municipal priorities within urban contexts, in collaboration with its local area municipalities.

Alignment with TMP Goals:

 Goal 1	 Goal 2	 Goal 3	 Goal 4	 Goal 5	 Goal 6
very high	high	high	very high	very high	high

5.1.2 Road Safety

Summary of Needs and Opportunities

Phase 1 of the TMP study found that there is a need or opportunity to:

- Address driver behaviour concerns such as speeding, to increase safety;
- Address infrastructure factors that may affect traffic collisions; and
- Ensure at-grade rail crossing safety in view of updated guidelines.

Recommended Actions

ADDRESSING DRIVER BEHAVIOUR CONCERNS

Safety concerns due to driver behaviour such as speeding is one of the top concerns of Middlesex Centre residents. In the TMP’s public opinion survey

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conducted as part of the first round of engagement, 49% of all respondents noted that this was a major concern (increasing to 57% for respondents living in rural areas), and another 36% noted it was somewhat of a concern. Respondents noted specific areas of concerns that included County roads as well as Municipality roads.







Middlesex Centre’s ongoing Vision Zero Road Safety campaign includes speed reduction campaigns, community safety zones and traffic calming initiatives, tools appropriate to continue to help address ongoing road user safety concerns among local residents.

Addressing speeding on County roads is further challenged by direct connectivity of selected County roads to Highway 402, which has a speed limit of 110 km/h. Drivers can have difficulty transitioning from freeway speeds to speeds appropriate for the nearby urban settlements of Komoka-Kilworth and Delaware.

Action: Continue the Municipality’s Vision Zero campaign and related initiatives.

Action: Continue to collaborate with the County regarding safety improvements and efforts to reduce speeding along County roads, especially through urban areas.

Alignment with TMP Goals:

 Goal 1	 Goal 2	 Goal 3	 Goal 4	 Goal 5	 Goal 6
high	medium	high	very high	very high	high

COLLISION REVIEW AND MITIGATIONS

Phase 1 of the study included analysis of 5 years of collision data along County and Municipality roads within Middlesex Centre. This included identifying the ten locations with the highest number of vehicle collisions, for which mitigating measures were put forward for consideration.







Section 6.2.3 outlines additional information related to collision review.

Action: Implement infrastructure changes toward improving safety at top collision locations.

Action: Apply measures to reduce risk of wildlife collisions.

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Alignment with TMP Goals:

 Goal 1	 Goal 2	 Goal 3	 Goal 4	 Goal 5	 Goal 6
high	high	medium	very high	very high	medium

AT-GRADE RAIL CROSSING REVIEW

Middlesex Centre has several at-grade rail crossings in Komoka-Kilworth and area. All at-grade rail crossings are subject to Transport Canada’s technical standards to assess the types of warning systems required (e.g. warning systems with or without gates) and their implementation specifications³.

Although these standards have been updated, typically at-grade road-rail crossings currently in place are considered to be compliant with these standards unless specific safety issues are identified and assessed. However, when a new road-rail crossing is implemented or if traffic or roadway conditions change significantly at existing crossings, a technical study to review the crossings warning systems and implementation specifications will be required. Situations where further studies could be triggered include when paved shoulders are added (either for cycling or safety), and warning lights need to be moved. This would trigger a detailed study to determine whether other changes are needed as well. One example of this is Oxbow Drive, where traffic is growing and adding paved shoulders for cycling is recommended (see Section 5.2.1).

Factors that are considered in the technical studies include traffic volumes (e.g. typically 2,000 or more daily traffic for a warning system without gates, and 50,000 or more daily traffic for a warning system with gates), together with factors such as provision of sidewalks, railway design speeds, proximity to road intersections, sightlines, road approach and rail approach slopes, road widths, and more.

To support rail crossing safety at all crossings, the Municipality can maintain or increase sightlines at at-grade road crossings and allow better visibility of oncoming trains by removing vegetation in the vicinity of the at-grade crossings where feasible, working with adjacent landowners and railway owners/operators as appropriate.







³ Transport Canada. Grade Crossings – Handbook. “Part B – Design Standards”. <<https://tc.canada.ca/en/rail-transportation/grade-crossings/grade-crossings-handbook/part-b-design-standards#article-9>>. Access November 2023.

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Action: Maintain safety at all at-grade railway crossings through review of signal warrants and placement of warning signals when road conditions change, e.g. in tandem with addition of paved shoulders on Oxbow Drive.

Action: Identify and remove excess vegetation within municipal rights-of-way at existing at-grade crossings to improve sightlines and potentially increase safety.

Alignment with TMP Goals:

 Goal 1	 Goal 2	 Goal 3	 Goal 4	 Goal 5	 Goal 6
high	low	high	very high	high	high

5.1.3 Passenger Transit Services

Summary of Needs and Opportunities

Phase 1 of the TMP study found that there is a need or opportunity to:

- Address the transportation needs of those who are unable to or choose not to drive;
- Continue to cooperate with and support the Middlesex County Connect transit service;
- Leverage established municipal transit systems operating near or through Middlesex Centre as additional partnership opportunities;
- Leverage population growth in urban settlement areas that will increasingly support transit operations; and
- Provide transit services appropriate to demand levels.

Recommended Actions

MIDDLESEX COUNTY CONNECT

Public transportation provides an important alternative to personal automobile travel to meet daily needs for those who are unable or would prefer not to drive. The provision of transit in Middlesex Centre is challenging due to its lower population density and significant travel distances between settlement areas and to/from neighbouring communities such as London, and requires creative solutions to improving transit service options. However, with an anticipated

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population of 15,900 in Komoka-Kilworth and 7,100 in Ilderton by 2046⁴, ridership and financial sustainability of passenger transit services within and to/from these settlement areas will continue to improve.

The Phase 1 report summarized the provision of existing transit services in and near Middlesex Centre. A map showing the routing of these services is shown as Exhibit 5.3. A description of each of these services was provided in Phase 1 and is also included in Section 0, which outlines the Transit Strategy in further detail.

Middlesex County Connect, operated by the County of Middlesex, currently provides two fixed route services Monday to Friday in Middlesex Centre:






- Route 1: Lucan – Ilderton – Arva – London; and
- Route 2: Woodstock – Ingersoll – Putnam – Dorchester – London.

For 2025 and beyond, the County is planning to implement a hybrid transit solution that would include two modified fixed routes and two on-demand service zones covering the entirety of Middlesex Centre, as described in Section 6.5.

The continued provision of transit services by Middlesex County represents important mobility option for Middlesex Centre. The Municipality will continue to work with and support the County in its current and planned transit service provision.

Action: Support and promote Middlesex County Connect transit services for Middlesex Centre residents and visitors. Provide barrier-free access to stops, as well as amenities at stops (e.g. benches and shelter).

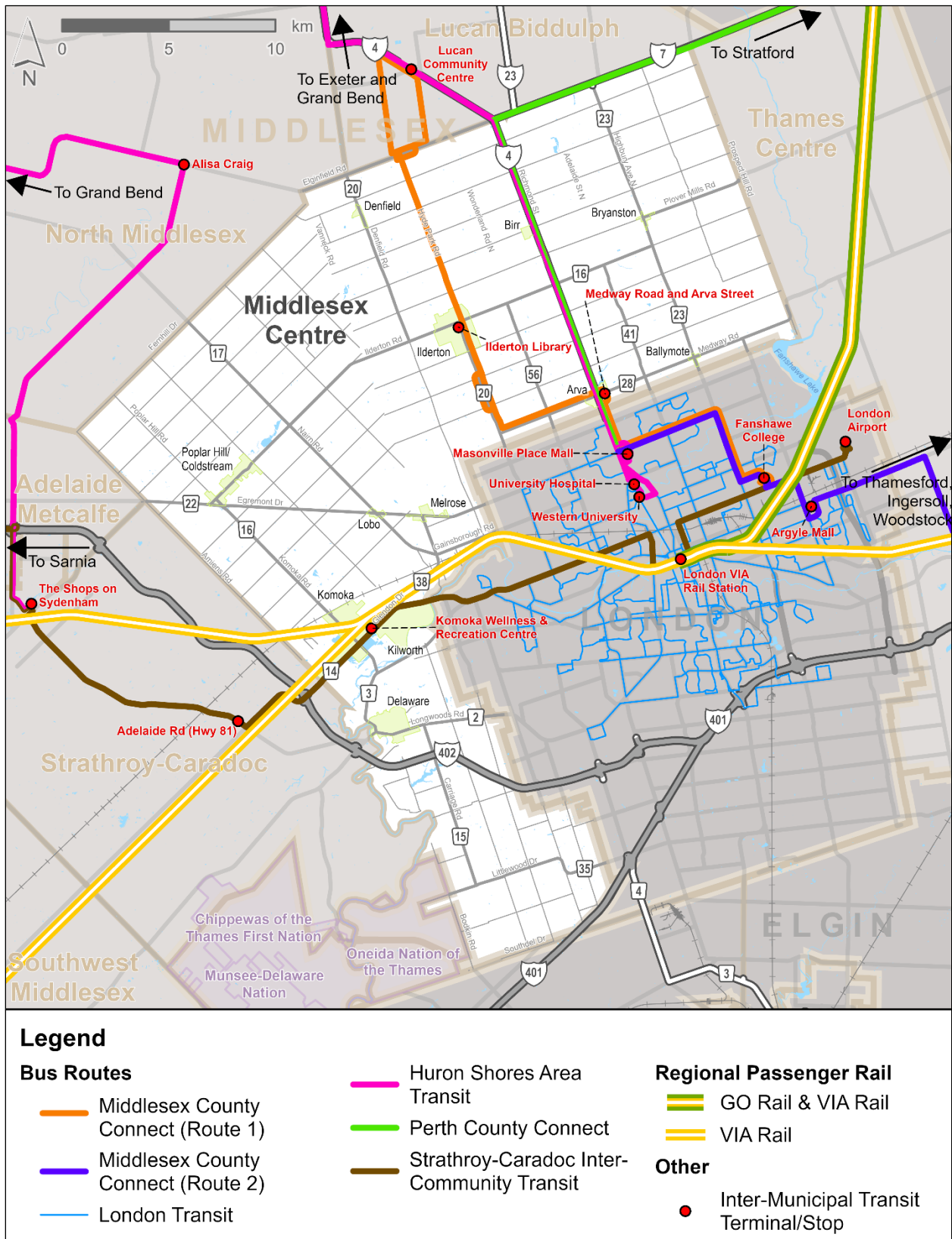
Alignment with TMP Goals:

 Goal 1	 Goal 2	 Goal 3	 Goal 4	 Goal 5	 Goal 6
high	high	high	very high	high	medium

⁴ Watson & Associates Economists Ltd. (2022), Official Plan Review – Growth Management Strategy Technical Report, Figure 6-2 – High Scenario, noted to include 3.5% Census undercount adjustment

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Exhibit 5.3: Passenger Transportation Services in Middlesex Centre and Vicinity



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Note: Routing current as of July 2023.

OTHER AREA PASSENGER TRANSIT SERVICES

The following bus and passenger rail services operate near Middlesex Centre:

- **GO Transit** service via between London and Toronto, via a pilot project launched by Metrolinx in 2021;
- **VIA Rail** services, with rail stations in London, Glencoe, Strathroy and St. Marys; and
- **London Transit Commission (LTC)** currently provides service entirely within its municipal boundary, adjacent to Middlesex Centre.

The following other transit services with routes through Middlesex Centre:

- **Strathroy-Caradoc Inter-Municipal Transit** provides scheduled fixed-route service along a Sarnia-Strathroy-Mount Brydges-Komoka-London route, stopping at the Komoka Wellness Centre; and
- **Perth County Connect** and **Huron Shores Area Transit** provide scheduled fixed-route intercommunity bus service to and from London via Highway 4, but currently do not have any stops within Middlesex Centre.

London Transit is an especially important potential service partner, given its very close proximity to Middlesex Centre and the ability to connect throughout the city on a variety of bus routes once an initial connection to the city is made.

Connections can focus on Middlesex Centre's nearby urban centres.

With support from the County of Middlesex, it is recommended that Middlesex Centre seek new partnerships with these neighbouring transit service providers to build on and expand existing services into Middlesex Centre. This can be a cost-effective solution for the Municipality to adopt, and can benefit partnering services through additional transit ridership.

A strategy toward these potential partnerships is detailed further in **Section 6.5**.







Action: Seek to partner with London Transit to extend routes to nearby settlements of Komoka-Kilworth, Arva, Delaware and Ilderton as they continue to grow.

Action: Seek to partner with Perth County Connect and Huron Shores Area Transit to add stops along existing routes that pass through Arva and Birr.

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Action: Collaborate with and promote future passenger transit service connections into the broader region with a focus on service to employment centres (e.g. new Amazon distribution centre in Elgin County and future electric vehicle battery plant in St. Thomas).

Alignment with TMP Goals:







 Goal 1	 Goal 2	 Goal 3	 Goal 4	 Goal 5	 Goal 6
high	high	high	high	high	medium

CONSOLIDATED PASSENGER TRANSIT INFORMATION

Given the variety of services available within, to, from, through and near Middlesex Centre, residents and visitors of Middlesex Centre may not be aware of the passenger service options available to them. Consolidating this information in one location would be of great value to current and potential transit riders.

Action: Develop and maintain an up-to-date one-stop source for transit information in and around Middlesex Centre to improve ease and convenience of the transit systems serving residents.

Alignment with TMP Goals:

 Goal 1	 Goal 2	 Goal 3	 Goal 4	 Goal 5	 Goal 6
high	high	high	high	high	medium

5.1.4 Resiliency

Summary of Needs and Opportunities

Phase 1 of the TMP study found that there is a need or opportunity to:

- Review standards for bridges and culvert design;
- Review and address concerns regarding gravel roads;
- Address the lack of electric vehicle charging infrastructure in Middlesex Centre; and
- Consider transportation demand management (TDM) strategies.

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Recommended Actions







STORMWATER MANAGEMENT

Middlesex Centre includes numerous waterways of varying sizes associated with five watersheds. The locations of bridges and culverts (larger than 3 metres), key transportation infrastructure related to these waterways, are shown in Exhibit 5.4.

It is essential to have appropriate stormwater infrastructure to protect the Municipality over the long term from flooding of these waterways and damage that can result from increased storm frequency and intensity. A stormwater management strategy is discussed in **Section 6.2.5**.

Action: Update standards for bridges and culverts to account for increased frequency and magnitude of extreme weather events, and implement the updated stormwater management strategy.

Alignment with TMP Goals:

 Goal 1	 Goal 2	 Goal 3	 Goal 4	 Goal 5	 Goal 6
high	high	high	very high	high	high

ROAD SURFACE CONVERSION POLICY

In March 2023, a *Road Needs Study* for Middlesex Centre was prepared that applied criteria and identified a list of over 40 segments that are recommended for upgraded surfaces. The report also prioritized these segments based on relative need and benefit, with traffic volume thresholds being a key factor, together with other considerations. The identified segments are reflected in the Municipality’s capital budget planning for roads. Exhibit 5.4 shows the current road surface type of Middlesex Centre roadways.

Section 0 discusses the road surface conversion policy further.

Action: Continue to apply road surface conversion policy as first outlined in the *2023 Road Needs Study*.

Alignment with TMP Goals:







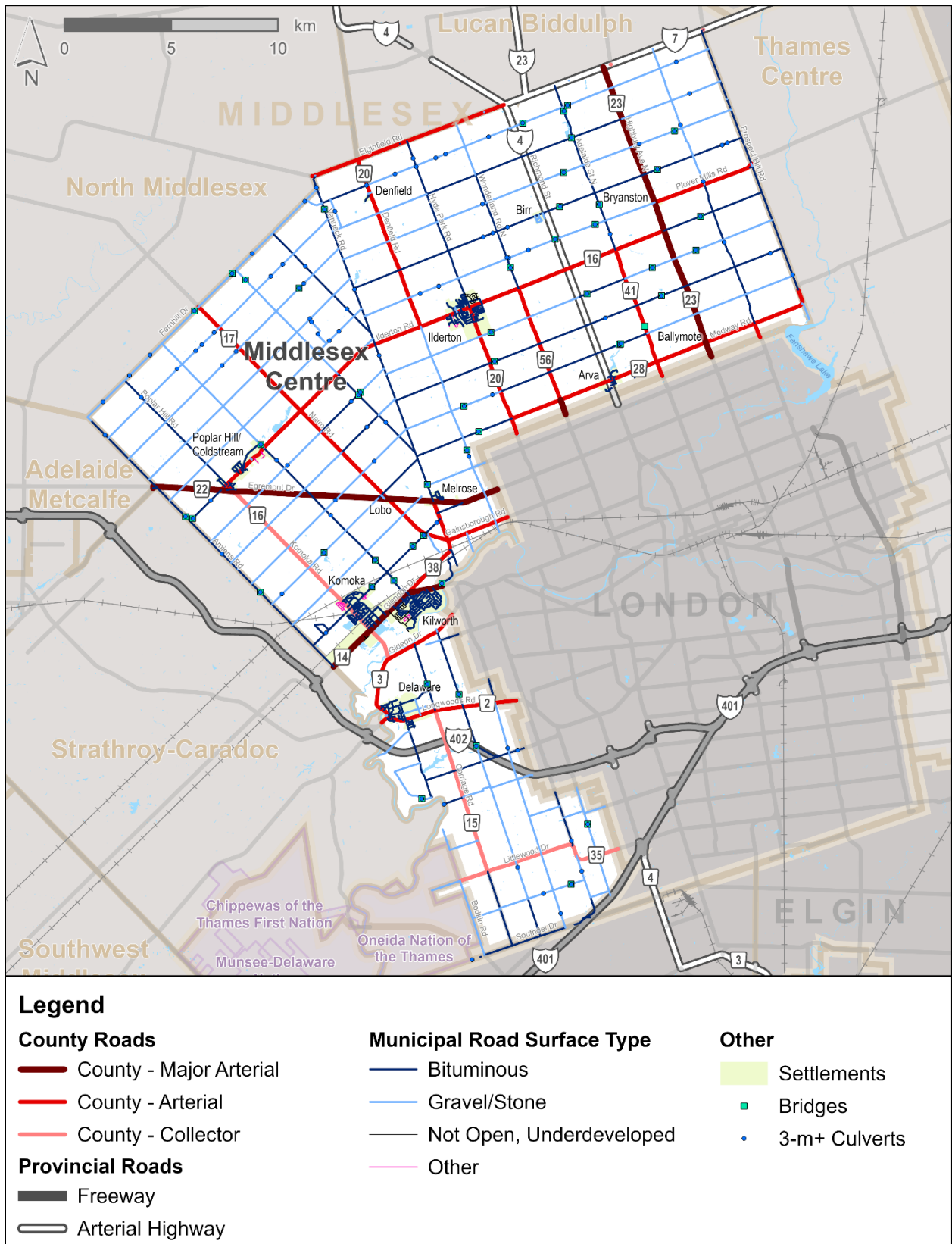
 Goal 1	 Goal 2	 Goal 3	 Goal 4	 Goal 5	 Goal 6
high	medium	medium	very high	high	high

Exhibit 5.4: Roadway Infrastructure and Road Surface Type



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ELECTRIC VEHICLE CHARGING INFRASTRUCTURE







As discussed in the Phase 1 report, as of fall 2023, there is only one public electric vehicle (EV) charging station in Middlesex Centre, located in Komoka-Kilworth.

In light of the growing market share of electric vehicles and hybrid electric vehicles, as well as the Government of Canada’s mandatory target for new light-duty cars and passenger truck sales be “Zero-Emission Vehicles (ZEVs)” by 2035⁵, increased provision of public electric vehicle charging infrastructure would support the use of electric vehicles. Increased provision also aligns with the County of Middlesex Official Plan’s (2023) general transportation policies to encourage greater electric vehicle usage through the provision of charging infrastructure (policy 2.3.4).

Locations to assess for the feasibility and effectiveness of adding EV charging infrastructure include the Municipality-owned off-street parking lots in Ilderton and Arva, on-street parking spots along York Street in Delaware, parking lots at municipal facilities (arenas, community centres, municipal office, parks, etc.), and potential new municipal parking supply (discussed in Section 0).

Action: Develop and implement a strategy for electric vehicle charging stations.

Alignment with TMP Goals:

 Goal 1	 Goal 2	 Goal 3	 Goal 4	 Goal 5	 Goal 6
medium	high	medium	high	medium	medium

TRAVEL DEMAND MANAGEMENT

Travel demand management (TDM) is the use of strategies, policies, infrastructure and technologies to optimize the transportation network by influencing and directing travel behaviour toward reduced personal vehicle use. While TDM is often associated with larger municipalities and urban areas, it can help reduce the demand placed on the Municipality’s transportation network, and can also replace

⁵ “Transport Canada News (2021, June 29). Building a green economy: Government of Canada to require 100% of car and passenger truck sales be zero-emission by 2035 in Canada” in <<https://www.canada.ca/en/transport-canada/news/2021/06/building-a-green-economy-government-of-canada-to-require-100-of-car-and-passenger-truck-sales-be-zero-emission-by-2035-in-canada.html>>.

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or delay more expensive capital projects such as corridor widening or rehabilitation.






It is recommended that the TDM plan specify target mode shares—the proportion of trips made by different travel modes such as auto passenger, auto driver, transit, cycling, walking, and other—with the aim of shifting the distribution of travel away from single-occupancy vehicles and towards more sustainable alternatives. Progress towards these targets can be measured through data collection, surveys and monitoring of transportation patterns.

Carpooling, or ridesharing, is an established and effective transportation demand management measure that can help reduce single-occupancy vehicles trips. This can be especially effective in Middlesex Centre, where a high proportion of the labour force commutes to workplaces outside of the Municipality, especially London. Carpool lots are locations where pre-arranged carpool partners can meet to travel together in one vehicle, while parking the other vehicles at the lot for the duration of the trip.

The main elements of the Municipality’s TDM plan would be to provide feasible transportation alternatives to personal vehicle use via passenger transit services, safe and attractive cycling and pedestrian routes, and support of carpooling, as well as to provide support for remote work where feasible to reduce overall travel demand.

Action: Develop and implement a travel demand management strategy to reduce demand for vehicular road capacity.

Alignment with TMP Goals:

 Goal 1	 Goal 2	 Goal 3	 Goal 4	 Goal 5	 Goal 6
high	high	high	high	high	high

5.2 Goal 5: Promotes Healthy Local Mobility



Provides safe, accessible and convenient mobility options to connect between daily activities within local communities.

Walkable communities can decrease reliance on vehicles for accessing local businesses and community offerings. It creates a community feel when residents and visitors of all ages and abilities can move about safely on sidewalks and designated pedestrian trails. Similarly, increased provision of appropriate cycling infrastructure can allow residents an alternative way to travel between activities, and can attract more cycling tourists and visitors to take in the rural and small-town atmosphere.

In the TMP's public opinion survey, 48% of respondents noted that they would cycle more if increased separation from traffic was provided. 41% of respondents noted that they would walk to local destinations more often if safer and more pedestrian crossings were available.

Recommended actions under this goal are organized first for cycling then for pedestrians.

5.2.1 Cycling

Summary of Needs and Opportunities

Phase 1 of the TMP study found that there is a need or opportunity to:

- Increase separation between vehicles and cyclists, where appropriate and feasible, to improve safety for both cyclists and motorists;
- Continue to support the County in the implementation of its planned cycling network;
- Review the County's cycling network for routes along Middlesex Centre roads;
- Leverage increasing interest in cycling for recreation, while expanding cycling for utilitarian purposes;
- Continue to leverage broader (inter-community and inter-municipal) cycling network connectivity opportunities;
- Improve the alignment between the Trails Master Plan and the County's cycling network; and

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- Continue to build upon, update and implement the Trails Master Plan network.

Recommended Actions







CYCLING FACILITY (ROUTE) TYPE GUIDANCE

In 2021, the Province provided updated cycling facility guidelines, *Ontario Traffic Manual – Book 18 – Cycling Facilities*.

Section 6.3.1 provides an overview of cycling facility (route) type selection guidance to be suitable for “All Ages and Abilities”.

Action: Update the Municipality’s design guidance for cycling facility (route) selection (e.g. bike lane, paved shoulder, multi-use path, etc.) to reflect latest guidance provided by the Ontario Traffic Council (*Ontario Traffic Manual – Book 18 – Cycling Facilities, 2021*).

Alignment with TMP Goals:

 Goal 1	 Goal 2	 Goal 3	 Goal 4	 Goal 5	 Goal 6
high	medium	medium	high	very high	medium

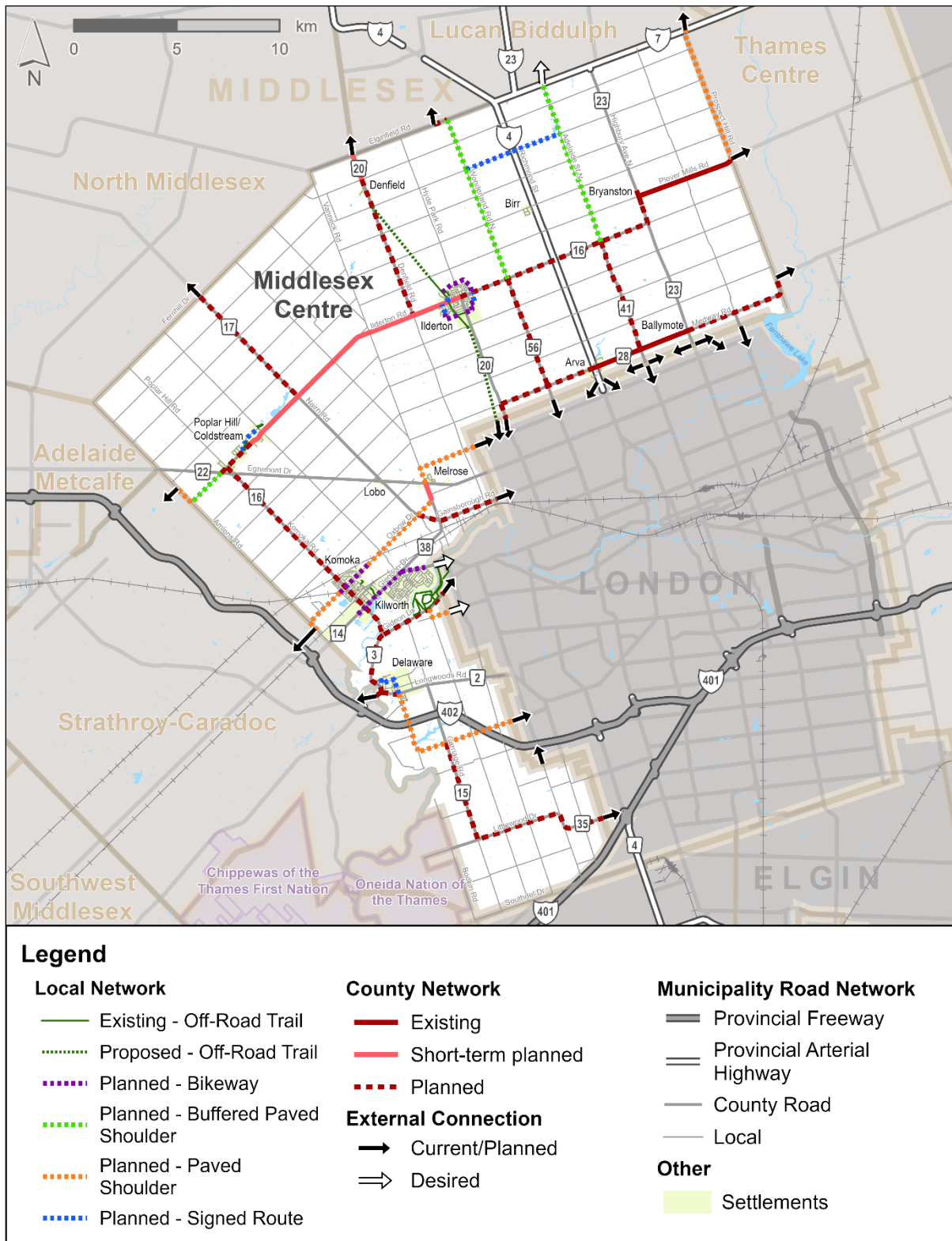
COUNTY CYCLING PLAN: REVIEW OF ROUTES UNDER MUNICIPALITY JURISDICTION

Middlesex County’s first comprehensive Cycling Strategy was developed in 2018, proposing a network of cycling infrastructure along selected County roads as well as local municipal roadways.

A review of the County Cycling Network was conducted for routes under Municipality of Middlesex Centre jurisdiction based on updated OTM Book 18 guidance (see Section 6.3.1), and in light of existing and planned cycling connections with adjacent municipalities, as reflected in the recommended Cycling Network Plan shown in Exhibit 5.5.

A review of proposed and implemented cycling facility types along County roads is outside the scope of the Middlesex Centre TMP. Exhibit 5.5 indicates only the current status of the cycling network on County roads: existing, short-term planned (i.e. currently in the County’s 5-year capital plan), and other planned. The vast majority of the County’s existing and planned cycling routes are paved shoulders.

Exhibit 5.5: Recommended Middlesex Centre Cycling Network Plan



Note: Planned bikeway means any roadway or path provided for bicycle travel along urban streets, either for the exclusive use of bicycles or shared with other transportation modes.

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To better align with Provincial guidelines, some of the more significant changes in cycling facility types compared to the original County Plan, where these routes were identified as shared lanes together with motorized vehicles, include the following:

- Oxbow Drive between Amiens Road and Vanneck Road (County Road 38): Upgrade to paved shoulders in the rural area and to a designated or separated facility along the urban roadway;
- Adelaide Street between County Road 16 and Highway 7: upgrade to buffered paved shoulders, given high traffic volumes and speeds— compared to the County plan, this route is extended north to Highway 7, with a desire for a cycling connection beyond in Lucan Biddulph; and
- Wonderland Road between County Road 16 and Fifteen Mile Road: upgrade to buffered paved shoulders, given high traffic volumes and speeds.

It should be noted that a proposed future interchange at Highway 402 and County Road 15 would increase motor vehicle traffic along the roadway. With 135 gross hectares of planned employment area in Delaware, commercial goods traffic and other motor vehicle traffic is expected to increase. This is an important consideration for a cycling route along County Road 15, which will likely require a higher facility class than what is currently recommended, or an alternative route.

Section 6.3.2 provides additional information about priority cycling connections across Middlesex Centre.







Action: Adopt the recommended updates to the County Cycling Network Plan based on preliminary facility type review and in consideration of additional inter-municipal connectivity, and encourage the County of Middlesex to adopt the same changes in their Cycling Network Plan.

Action: Continue to support implementation of the County Cycling Network Plan on County Roads, encouraging the County to take into consideration updated Provincial guidance on cycling facility type selection, as well as the impacts of the Municipality's population and employment growth on traffic conditions on planned cycling routes.

Action: Provide safe crossings at intersections and at locations where trails cross roadways.

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Alignment with TMP Goals:

 Goal 1	 Goal 2	 Goal 3	 Goal 4	 Goal 5	 Goal 6
high	medium	low	high	very high	medium

PRIORITIZATION OF AREA CYCLING CONNECTIONS

In general, the planned cycling routes on County and Municipality roads will be implemented when road reconstruction is conducted to manage the costs of adding cycling infrastructure. However, a number of connections have been identified that are of particular importance to Middlesex Centre residents and visitors. These are discussed in **Section 6.3.2**.

A high-priority cycling (or walking) linkage for community health is on Ilderton Road (County Road 15) between the settlement area of Ilderton and Oxbow Public School. **Adherence to provincial design guidance is strongly recommended given the anticipated use of this segment by school-aged children**, as well as high travel speeds (the posted speed limit on Ilderton Road in front of the school is 90 km/h). Continuing beyond the school to provide a direct connection between Ilderton and London is also a high priority for the Municipality. (A future extension of the London-Denfield rail trail would be an alternative multi-modal connection between Ilderton and London—see Trails Master Plan Update, below.)

Action: Encourage the County to prioritize implementation of its planned cycling network along Ilderton Road (County Road 16) between the Ilderton settlement area and Oxbow Public School. This would allow for safer cycling/walking to Oxbow Public School.







Action: Advocate that the County prioritize a safe and direct cycling route between Ilderton and London via Ilderton Road (County Road 16) and Wonderland Road (County Road 56).

Another segment of the cycling network of note is Oxbow Drive, an important east-west connection to the growing Komoka settlement area and also part of the Provincial Cycling Network. Given the very limited existing crossings of the Thames River in western London that are suitable for cyclists and pedestrians, Oxbow Drive is part of one of few cycling connectivity options between London and the Komoka-Kilworth area. In the longer term, a direct connection over the Glendon Drive/Oxford Street West bridge is desired, which would likely require a bridge widening.

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Action: Work with London and Middlesex County to provide a direct cycling connection between Komoka-Kilworth and London over the Thames River, preferably over the Glendon Drive/Oxford Street West bridge.

Alignment with TMP Goals:

 Goal 1	 Goal 2	 Goal 3	 Goal 4	 Goal 5	 Goal 6
high	medium	medium	medium	very high	low







TRAILS MASTER PLAN UPDATE

A number of changes have taken place since Middlesex Centre’s *Trails Master Plan* was developed and adopted in 2014, including the development of the County’s Cycling Network Plan in 2018, updated guidance from the Province on cycling design, and considerable growth in Middlesex Centre. An update to the 2014 Trails Master Plan is recommended to:

- Provide a comprehensive up-to-date trails plan for Middlesex Centre;
- Expand and improve planned cycling and trail connections throughout the municipality, including connections within and between settlement areas, in alignment with the County’s Cycling Network Plan;
- Reflect current and planned road infrastructure plans such as the Glendon Drive improvement plan;
- Add specificity to residential and employment growth areas;
- Provide a strengthened assessment and actionable plan toward development of the London-Denfield rail trail;
- Ensure transportation planning and route design best practices are considered; and
- Identify trail infrastructure, phasing and funding requirements needed above and beyond the scope of this TMP.

Action: Update the Trails Master Plan (developed in 2014), coordinating with the County and adjacent municipalities for regional connectivity. The plan would build on and connect with the County’s planned cycling network to provide connections to local destinations, points of interest and natural areas.

Alignment with TMP Goals:

 Goal 1	 Goal 2	 Goal 3	 Goal 4	 Goal 5	 Goal 6
very high	medium	medium	high	very high	low

5.2.2 Pedestrians

Summary of Needs and Opportunities

Phase 1 of the TMP study found that there is a need or opportunity to:

- Respond to a safety concerns regarding pedestrian road crossings across busy roadways;
- Implement safe walking routes between homes and schools;
- Improve network connections for pedestrian activity in settlement areas;
- Prioritize a network of sidewalks and trails in new developments in Middlesex Centre; and
- Remove barriers to building sidewalks in existing neighbourhoods.

Recommended Actions

PEDESTRIAN CROSSING GUIDANCE AND IMPLEMENTATION

Concerns with the safety of pedestrian crossings was a common theme in Phase 1 engagement activities. Safe pedestrian crossings are an important facet of the pedestrian network, and a key component of the TMP Pedestrian Strategy.

The Ontario Traffic Council via *Ontario Traffic Manual Book 15 – Pedestrian Crossing Treatments* (2016) provides guidance for the selection of appropriate pedestrian crossing treatments under a variety of contexts. Guidance is also provided on locating pedestrian crossing gaps. This guidance is summarized in **Section 6.4.1**.

The continued installation of safe and appropriate pedestrian crossings in settlement areas across Middlesex Centre will be instrumental to increasing pedestrian activity and to support the development of Complete Streets, allowing for convenient and safe pedestrian access to destinations and improving transportation sustainability and equity. Providing dedicated infrastructure to facilitate safe crossings is integral to meeting the needs of vulnerable road users and encouraging more people to make walking trips.

A preliminary review was conducted of two school crossings that were frequently perceived to have inadequate pedestrian crossing provision across County roads:

- Longwoods Road (County Road 2) at Springer Road/Victoria Street in Delaware; and
- Hyde Park Road (County Road 20) at Heritage Drive in Ilderton.

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Based on the review, these should be considered as candidate locations for upgrades to pedestrian crossovers for improved all-day and all-season pedestrian safety and connectivity. These two locations in particular provide connectivity across the County roads at or near intersecting collector roads (Action **Error! Reference source not found.**), and have increased presence of vulnerable road users due to the proximity of either a school or community centre. For the Delaware crossing, the potential to move the crossing location further east where sight lines can be increased should be explored.







Additionally, it is recommended that that a pedestrian crossing be implemented at Ilderton Drive (County Road 16) at Bowman Drive/Willow Ridge Road on the east side of the Ilderton settlement area to support a connected pedestrian network. It is also noted that the County’s Glendon Drive improvement plan (see Exhibit 5.1) will respond to operational and safety concerns by providing new or improved pedestrian crossing opportunities.

While a preliminary review has not identified a need for additional controlled pedestrian crossings along Municipality roadways, it is recommended that the Municipality continue to keep an eye on potential future needs based on population and employment growth.

Action: Continue to follow Ontario Traffic Manual guidance for the implementation of pedestrian crossings on Municipal roadways where needed.

Action: In collaboration with the County, upgrade pedestrian crossings from school crossings to pedestrian crossovers at strategic locations along County roads to reflect latest best practices.

Alignment with TMP Goals:

 Goal 1	 Goal 2	 Goal 3	 Goal 4	 Goal 5	 Goal 6
high	medium	medium	high	very high	medium

SIDEWALK IMPLEMENTATION AND PRIORITIZATION

Note that the TMP’s recommended road classification framework (Sections 5.1.1 and 6.2.1) emphasizes safety while meeting the needs of all road users throughout communities by including guidance for sidewalks along different roadway classes.

A sidewalk prioritization framework is presented this document in **Section 6.4.2**, and a preliminary list of collector roads was identified as being among priority

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sidewalk gap locations on existing roadways. The Municipality should develop a fuller inventory of sidewalks gaps to prioritize via this framework, and allocate consistent funding on an annual basis to complete the sidewalk network, prioritizing the segments that score the highest based on the recommended prioritization framework.

While TMP engagement participants generally noted support for a more connected sidewalk network, some participants were very much against having sidewalk in established neighbourhoods and roads. The standard sidewalk design placement in Middlesex Centre is approximately 2 metres from the road edge. While this is within the Municipality’s right-of-way and allows space for utilities and accumulated snow, it can also have the effect of bisecting front lawns, bisecting driveways and limiting driveway parking, and bringing pedestrians closer to residents’ homes. An alternative sidewalk design with the sidewalk adjacent to the roadway (e.g. Wellington Street in Delaware) may be more acceptable in some instances in some established neighbourhoods or on narrower roads.

Amenities such as improved night-time lighting, seating such as benches, and improved streetscapes can also encourage increased use of sidewalks and trails.







Action: Formalize a framework to prioritize sidewalks gaps based on road classification, proximity to schools, transit, parks, community facilities, etc.

Action: Update by-laws and relevant policies to require new developments to include sidewalks or trails consistent with the road classification framework.

Action: Implement a connected sidewalk network using a sidewalk prioritization framework for guidance in filling network gaps, and including pedestrian lighting and amenities such as benches where needed, consistent with AODA requirements.

Action: Update design guidelines to include alternative sidewalk designs and placement to facilitate sidewalk retrofits along existing roads.

Alignment with TMP Goals:

 Goal 1	 Goal 2	 Goal 3	 Goal 4	 Goal 5	 Goal 6
high	high	medium	high	very high	medium

5.3 Goal 6: Supports Local Industry



Supports prosperity in Middlesex Centre by meeting the transportation needs of agriculture and other local industries, such as efficiently moving goods to and from markets.

The focus of this goal is to help sustain a vibrant local economy in Middlesex Centre through important transportation-related considerations for goods movement and local businesses. The TMP can include strategies that make accessing shopping and economic opportunities convenient and efficient, and support the efficient movement of goods within, to and from the municipality by maintaining appropriate Municipal roadway connections to County roads and Provincial highways. The ability for businesses and agriculture to operate and move goods is a municipal priority, to be balanced with the need for minimizing negative community impacts, including safety.

A major employment growth opportunity for Middlesex Centre is the planned addition of a large industrial complex southwest of Delaware and immediately north of Highway 402, which will benefit greatly from direct highway access.

Continued parking provision is also an ongoing need in support of local industry.

Recommended actions under this goal are organized under the topic of goods movement and parking supply.

5.3.1 Goods Movement

Summary of Needs and Opportunities

Phase 1 of the TMP study found that there is a need or opportunity to:

- Continue to plan for the efficient and reliable movement of goods;
- Address challenges to the movement of trucks and agricultural equipment;
- Create a direct road connection between the planned employment area in Delaware and Highway 402; and
- Continue to collaborate toward implementing a road-rail freight transfer opportunity in Middlesex Centre.

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Recommended Actions

MORE-DIRECT HIGHWAY 402 CONNECTIVITY







Supporting connections to Highway 402 is important to accommodate future industrial and commercial growth in Delaware (described in Section 6.1.1), as well as to ensure commercial vehicles have more direct access to the regional highway network. County Road 15 (Carriage Road) is identified as the most suitable candidate for a new interchange at Highway 402, an endeavor that would require support and coordination between the Municipality, the County and the Province.

In addition to providing direct connection for the planned employment lands near Delaware, City of London representatives have stated support for the interchange as it would reduce neighbourhood cut-through traffic in Lambeth as many drivers use the current closest interchange to the east at Colonel Talbot Road. The closest interchange to the west is at Longwoods Road (Highway 2), which involves travel through the community of Delaware.

Section 6.1.1 provides additional rationale regarding a Municipality-supported Highway 402 interchange and broad support for having the interchange at Carriage Road. Conducting a detailed Schedule C Environmental Assessment would be a necessary step toward planning for this interchange, given the considerable potential environmental impacts.

Action: Collaborate with the County and Province toward a new interchange at Highway 402 and Carriage Road.

Alignment with TMP Goals:

 Goal 1	 Goal 2	 Goal 3	 Goal 4	 Goal 5	 Goal 6
high	medium	<i>uncertain</i>	high	medium	very high

AGRICULTURAL EQUIPMENT ON PUBLIC ROADS







Moving large, slow-moving farm equipment on public roads brings many challenges. Road design needs to consider road widths, maneuverability through intersections and roundabouts, speed limits, and availability of road shoulders if needed. Where narrow road rights-of-way would make widening the roadway for safer agricultural equipment provision prohibitive, constructing periodic laybys along the roadways can be considered.

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Section 6.2.5 provides additional considerations regarding the movement of agricultural vehicles on public roads.

Action: Ensure that farm equipment is considered in the design and maintenance of rural roads.

Alignment with TMP Goals:

 Goal 1	 Goal 2	 Goal 3	 Goal 4	 Goal 5	 Goal 6
very high	high	medium	high	medium	very high







RAIL TRANSLOAD OPPORTUNITIES

Rail freight lines in Middlesex Centre serve as an additional opportunity for local industries to move goods to markets farther afield, but freight transfer opportunities within the municipality are lacking.

The potential for a rail transfer station at the convergence of the CN and CPKC rail lines has long been a topic of discussion in Middlesex Centre. While a rail transload facility, HCL Transport under HCL Logistics Inc., has recently begun operation in northeast London (over 40 km away via highways and expressways), the planned increase in employment land in Delaware will add further demand for a transload opportunity. Early steps toward a potential transload facility within Middlesex Centre would include specifying a location for the station and preparing a business case for discussion with the rail operators.

Action: Work with partners (e.g. CN, CPKC) to explore the feasibility of a road-rail transload station.

Alignment with TMP Goals:

 Goal 1	 Goal 2	 Goal 3	 Goal 4	 Goal 5	 Goal 6
medium	medium	medium	high	low	high

5.3.2 Parking Supply

Summary of Needs and Opportunities

Phase 1 of the TMP study found that there is a need or opportunity to:

- Continue to provide adequate parking to support local businesses.

PHASE 2: TRANSPORTATION NETWORK DEVELOPMENT

Recommended Actions

MUNICIPAL PARKING SUPPLY

In addition to parking supplied by private businesses and on-street parking where permitted, Middlesex Centre currently provides municipal off-street parking in Ilderton and in Arva.

While parking supply is currently adequate and was not identified in TMP engagement activities as a major concern, it is a need to monitor and address with future growth. Middlesex Centre’s Official Plan includes a policy (5.3.2) that states: “Parking within Village Centres will be provided in the context of new development. Cash-in-lieu of parking may be collected by the municipality to facilitate the establishment of appropriately located municipal parking. All parking will be designed and landscaped to de-emphasize its effect on the physical appearance of the Village Centre.”

In addition to ensuring adequate parking supply for businesses in Village Centres, municipal parking can dovetail with other objectives, such as supporting carpooling and transit services (e.g. by serving as a transit stop and including a transit shelter), as well as providing electric vehicle charging infrastructure – these also align with Provincial and County Goals.

A candidate location for municipal off-street parking is at the southwest corner of Longwoods Road (County Road 2) and Pleasant Street in Delaware, shown in Exhibit 5.6. This parcel of land is under Municipality ownership and is conveniently located close to Delaware’s commercial centre to support local businesses (e.g. the adjacent Royal Canadian Legion), as well as Highway 402 to support commuter carpooling. It also has direct access to power supply for EV charging.

Action: Continue to plan for Municipality parking provision in or near Village Centres to support local businesses as well as other Municipality objectives (e.g. electric vehicle charging, supporting carpooling and supporting transit services), and implement as needed.

Alignment with TMP Goals:







 Goal 1	 Goal 2	 Goal 3	 Goal 4	 Goal 5	 Goal 6
medium	medium	medium	high	medium	high

Exhibit 5.6: Candidate Municipal Parking/Carpool Lot Location in Delaware



Map Data: Google ©2023 CNES / Airbus, First Base Solutions, Maxar Technologies, SWOP

6. Focus Areas and Supporting Strategies

Selected actions involving further analysis or description are detailed in this section. These focus areas are subcategorized by mode as follows:

- **New or Expanded Infrastructure:** One location was proposed for infrastructure improvements—the new Highway 402 Interchange at Carriage Road. This has the potential to be classified under Schedule C under the Municipal Class Environmental Assessment process. This proposal is assessed using the strategic framework against alternatives.
- **Roads Strategy:** The Roads Strategy includes key strategic and policy initiatives to guide design and decision-making related to roads.
- **Cycling Strategy:** The Cycling Strategy outlines the facility type review and priority cycling connections required to improve the safety, comfort and convenience of cycling across Middlesex Centre.
- **Pedestrian Strategy:** The Pedestrian Strategy outlines two fundamental components to improve the pedestrian realm: pedestrian crossings and a sidewalk prioritization framework.

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- **Passenger Transit Strategy:** The Transit Strategy outlines the identified opportunities to leverage existing transit services for Middlesex Centre residents and visitors into the future.

6.1 Assessment of Proposed New Infrastructure

6.1.1 New Highway 402 Interchange

Overview

An Employment Area Settlement Area Boundary Expansion of about 135 gross hectares to accommodate an industrial/employment complex south of Delaware will increase commercial goods traffic and other motor vehicle traffic to and from the area considerably. Having a more direct connection between Highway 402 and the growth area would allow for a much more direct connection, making goods movement and commuting travel related to the site more efficient.

A direct connection between Highway 402 and planned employment area can reduce the amount of traffic that would otherwise travel on County and arterial roads to access other interchanges and help mitigate potential conflicts between trucks and other road users through communities. County Road 15 (Carriage Road) may be well suited for a new interchange at Highway 402. Further study, as well as support and coordination between the Municipality, the County, the Province, and adjacent municipalities would be needed.

While the Municipality of Middlesex would likely play a smaller role in this project alongside upper-tier partner Middlesex County and the Province of Ontario, it was determined to be a matter of significant interest to the Municipality, given the potential impacts to its own roads. As such, it is critical to include this analysis as part of the Municipality's TMP.

Three alternative approaches to address this need were identified, analyzed, and evaluated. The following sums up the key takeaways from that analysis.

1. **Do nothing:** This does not address the core need and creates or exacerbates downstream issues along Longwoods Road (CR-2) which can lead to spillover onto Municipal roads such as Carriage Road north of CR-2. Widening of Longwoods Road to accommodate increased industry-related traffic without the interchange may be needed.

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2. **Construct new interchange at Highway 402 and Carriage Road:** Direct access to Highway 402 via Carriage Road (CR-15) would significantly reduce truck and general traffic through the Delaware settlement area and provide efficient connections for goods movement and other commercial needs.
3. **Construct new interchange at alternative Middlesex Centre location:** Alternative locations may be possible, but do not provide the directness needed to achieve the highest benefits. Springer Road would still require vehicles moving through the Delaware settlement area, while an interchange at Sharon Drive would require a longer detour on Municipal and County roads, which would in turn require upgrades. Either Municipality road would require major upgrades to accommodate the additional anticipated traffic.

Given the above, each of these alternative solutions were evaluated against the TMP’s stated goals on a scale of 0-4. The outcome of that evaluation is presented below in Exhibit 6.1, with the preferred alternative, a new interchange at Carriage Road, highlighted by blue borders.

Exhibit 6.1: Evaluation of Alternatives – Highway 402 Interchange

Alternative	 Goal 1	 Goal 2	 Goal 3	 Goal 4	 Goal 5	 Goal 6	Total
1. Do nothing	Low	Very High	Very High	None	None	None	Low
2. New interchange at CR 15	High	High	Low	Very High	Low	Very High	High
3. New interchange elsewhere	Medium	Medium	Low	Medium	Low	High	Medium

Recommendation

The TMP asserts the Municipality of Middlesex Centre’s support for a new interchange between Provincial Highway 402 and Carriage Road (CR-15), with associated upgrades to Carriage Road (CR-15) as needed. The Municipality is anticipated to be a partner, along with the County of Middlesex, for a MTO-lead future Environmental Assessment study.

6.2 Roads Strategies

The road network within Middlesex Centre provides the critical infrastructure to move people and goods via cars, trucks, buses, agricultural vehicles, bicycles and more. Maintaining efficient and safe multi-modal connections within and between communities, to adjacent municipalities and especially London, as well as to major traffic generators is an important outcome of the TMP that is responsive to the needs of all residents and visitors of Middlesex Centre.

The Roads Strategy is comprised of the following components, expanding on actions previously outlined in Section 5:

- Functional Road Classification;
- Road Surface Conversion;
- Intersection Safety Review;
- Accommodating Agricultural Equipment; and
- Stormwater Management.

6.2.1 Functional Road Classification

Overview

A functional road classification framework establishes a hierarchy of roads based on each road segment's context and the degree to which the segment prioritizes serving mobility vs. land access needs. Reducing access to adjacent properties along roads whose function puts a higher priority on traffic movement reduces traffic conflicts and increases safety.

All Municipality roadways are currently classified as Local Roads in the Middlesex Centre Official Plan, with the exception of the Komoka Kilworth Secondary Plan, which identifies future and proposed collector roads.

This TMP provides a functional road classification framework that incorporates road context (urban vs. rural) and that more clearly stratifies the travel vs. local access function for individual Middlesex Centre road segments. The framework also reflects a Complete Streets approach by indicating typical accommodations for different road users (pedestrians, cyclists and transit services) as feasible for each road classification.

This classification of Municipality roads will provide clarity, direction and consistency for the Municipality in a range of decision-making.

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URBAN VS. RURAL CONTEXT

There are two distinct roadway contexts in Middlesex Centre: urban and rural.

Urban streets are within settlement areas and therefore have a higher density of adjacent land uses, with an increased volumes of pedestrians, cyclists, and transit vehicles, in addition to cars and trucks. They typically have lower posted and design speeds, sidewalks, cycling lanes, and may have roadside parking provided. These roads are built with urban cross-section design, e.g. with curbs and underground storm sewer drainage.

Rural roads tend to serve longer-distance travel at higher speeds, and may have a higher proportion of trucks and farm equipment. Paved road surfaces may not always be feasible where traffic volumes are very low. Where appropriate, pedestrians and cyclists are accommodated through paved shoulders. These are built with rural cross-section design, e.g. with roadside drainage ditches.

Within designated settlement areas that do not yet have a sufficiently high density of adjacent development to be design with urban street features, roads may be designated as **semi-urban** for design purposes and may retain rural road design features.

TRAFFIC AND ACCESS FUNCTION

The proposed Middlesex Centre functional road class framework includes the following road classifications based on their traffic service vs. land access priorities:

- **Provincial and County:** These roads are outside of the jurisdiction of Middlesex Centre but belong in the larger road network hierarchy. Provincial and County roads support longer-distance, inter-community travel, with an emphasis on carrying the highest volumes of traffic, with access to property being of significantly lower priority.
- **Arterial:** Traffic flow and network connectivity are the primary concern and therefore the roads tend to carry the highest volumes of traffic. Access to private properties is restricted to limit traffic conflicts. Active transportation facilities should be separated from vehicular traffic.
- **Collector:** Traffic flow and land access are of equal priority, with some limits on adjacent land access. Collectors provide connectivity between arterial roads and local roads and carry moderate volumes of traffic. In urban areas, sidewalks should be provided on both sides, and cycling facilities should generally have a degree of separation from vehicular traffic.

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- **Local:** Local roads prioritize property access; the movement of traffic is a secondary consideration. Sidewalks should generally be provided on at least one side of the road in urban areas. Given their lower traffic volumes and operating speeds, it is typically appropriate for cyclists to share the same road space as cars.

APPLICATION

The road classification framework was applied to categorize Municipality roads as local, collector or arterial and by their rural vs. urban context. Connectivity to higher-order roads and traffic volumes are primary considerations in the review, though road characteristics are also considered. Urban and rural categorizations are based on urban settlement area boundaries.

Exhibit 5.2 presented the proposed functional road classification, showing the Middlesex Centre road network identified as urban local, urban collector, rural local, and rural collector roads. The County and Province road networks are provided for reference.

No road segments under Middlesex Centre's jurisdiction are currently designated as arterial roads. However, this designation is included in the framework for future consideration should the underlying conditions change.

TYPICAL CHARACTERISTICS

Typical characteristics are summarized for each functional road classification category in Exhibit 6.2 for rural roads and in Exhibit 6.3 for urban streets. This includes considerations for the roadway's strategic value and connectivity, road segment traits (e.g. speed, traffic volume, land access restrictions), and the typical allowances for pedestrians, cyclists and transit. These characteristics are summarized

This framework forms the basis for the Complete Streets approach to road design, ensuring that all road users are considered during all planning and design phases. The typical characteristics table should also form the basis for the development of standard cross-sections and requirements for new roads and new developments.

PHASE 2: TRANSPORTATION NETWORK DEVELOPMENT**Exhibit 6.2: Rural Roads Typical Characteristics**

Characteristic	Rural Arterial	Rural Collector	Rural Local
Strategic Value / Connectivity			
Land Access/ Traffic Service	Traffic movement primary function	Traffic movement/land access of equal importance	Individual property access primary function
Desirable Connections	Collectors, Arterials, County, Provincial	Locals, Collectors, Arterials, County, Provincial	Collectors, Locals
Access	Private driveways generally discouraged	Private driveways permitted, subject to design controls	Private driveways permitted
Road Segment Characteristics			
Average Daily Traffic	Over 2,500	Up to 3,000	Up to 1,000
Commercial Vehicles	Permitted	Permitted	For local access only
Design Speed (km/h)	80 to 90	60 to 90	50 to 80
Posted Speed (km/h)	80	60 to 80	50 to 80
Flow Characteristics	Uninterrupted flow except at signals	Interrupted flow	Interrupted flow
Typical Traffic Control	Roundabouts or signalized at major roads	Stop control	Stop control
Typical Road ROW Width	30 m	26 m	20 m
Road Surface Type	Paved	Surface-Treated or Paved	Granular or Surface Treated
Typical Shoulder Width*	1.0 to 3.0 m	1.0 m	1.0 m
Typical Lane Width	3.5 m	3.3 to 3.5 m	3.0 to 3.5 m
No. of Through Lanes	2	2	2
Parking Restrictions	Few restrictions	Few restrictions	Few restrictions
Other Road Users			
Pedestrian Facilities** (where provided)	Paved shoulders or separated path	Paved shoulders	None
Typical Cycling Facilities*** (where provided)	Buffered paved shoulders or separate path	Paved shoulders or separate path	Shared operating space or paved shoulders
Bus Service	Permitted	Permitted	Generally avoided

Adapted from Table 2.6.4 in TAC Geometric Design Guide for Canadian Roads (2017)

* Wider paved shoulder widths and potentially paved buffers are needed on designated cycling routes.

** See Ontario Traffic Manual Book 15 – Cycling Facilities

*** See Ontario Traffic Manual Book 18 – Pedestrian Crossing Treatments

PHASE 2: TRANSPORTATION NETWORK DEVELOPMENT**Exhibit 6.3: Urban Streets Typical Characteristics**

Characteristic	Urban Arterial	Urban Collector	Urban Local
Strategic Value / Connectivity			
Land Access/ Traffic Service	Traffic movement primary function	Traffic movement/land access of equal importance	Land access primary function; traffic movement secondary
Desirable Connections	Collectors, Arterials, County, Provincial	Collectors, Arterials, County, Provincial	Locals, Collectors
Access	Private driveways generally discouraged	Private driveways generally discouraged	Private driveways permitted
Road Segment Characteristics			
Average Annual Daily Traffic (AADT)	Over 3,000	Up to 4,000	Up to 2,000
Commercial Vehicles	Permitted	Permitted	For local access only
Design Speed (km/h)	50 to 60	40 to 50	30 to 50
Posted Speed (km/h)	50 to 60	40 to 50	30 to 50
Flow Characteristics	Uninterrupted except at signals and crosswalks	Interrupted flow	Interrupted flow
Typical Traffic Control	Roundabouts or signalized at major roads	Stop control	Stop control
Typical Road ROW Width	36 m	24 m	20 m
Typical Lane Width	3.5 m	3.3 to 3.5 m	3.0 to 3.5 m
Number of Through Lanes	2	2	2
Parking Restrictions	Peak period restrictions where dedicated parking bays not provided.	Few restrictions except peak period	No restrictions or restrictions on one side only
Other Road Users			
Pedestrian Facilities* (where provided)	Sidewalks on both sides, separated from traffic lanes	Sidewalks on both sides	Sidewalks on one or both sides
Typical Cycling Facilities** (where provided)	Physically separated bikeway (e.g. cycle tracks, multi-use path)	Physically separated bikeway (e.g. protected bike lanes, cycle tracks, multi-use path)	Shared or designated operating space (e.g. bike lanes, buffered bike lanes)
Bus Service	Permitted. Bus laybys may be provided.	Permitted	Generally avoided

Adapted from Table 2.6.5 in TAC Geometric Design Guide for Canadian Roads (2017)

* See Ontario Traffic Manual Book 15 – Cycling Facilities

** See Ontario Traffic Manual Book 18 – Pedestrian Crossing Treatments

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IMPLEMENTATION

Re-classifying a Municipality roadway from Local to Collector does not imply immediate geometric changes are needed to bring it up to the standard outlined in the typical classification tables. The degree to which a road can feasibly be retrofitted to align with typical characteristics of its road classification must be determined on a case-by-case basis. Rights-of-way should be protected in case of future construction or upgrades as needed in order to meet the standards identified above. When major capital projects are anticipated due to typical lifecycle renewal, etc., roads should be reconstructed in consideration to the typical road characteristics by class.

6.2.2 Collision Review and Mitigations

As part of Phase 1 analysis, collision data along County and Municipality roads for the five-year period 2012 to 2016 were compiled and analyzed by location and collision type. (More recent collision could not be analyzed by collision type.)

Of the average of 117 collisions reported per year, the most prevalent were collisions involving deer and other animals at 40% of reported collisions, given the largely rural nature of the area, the prevalence of woodlots that are attractive to wildlife, etc. It may be possible to reduce the numbers of wildlife collisions at common wildlife collision locations by increasing the clear distance between woodlots and the roadway, adding street lighting, or other means. The Municipality could also consider the implementation of wildlife fencing at selected strategic corridors.

The next most-common collision types were other single-vehicle collisions at 36% of reported collisions. Collisions involving more than one vehicle accounted for 24% of reports collisions (10% rear end collisions, 6% side swipe collisions, 5% T-bone collisions, 3% head-on collision).

A review of the top ten collision locations was conducted in Phase 1 of the TMP study and mitigating measures to consider were identified; these are summarized in Exhibit 6.4. The implementation of mitigating measures as appropriate addresses the study goals can improving safety for all users, protecting local wildlife populations, and reducing delay caused by collisions, while being fiscally responsible through applying lower cost interventions, while proactively reducing the likelihood of future costs borne by society associated with vehicle collisions.

PHASE 2: TRANSPORTATION NETWORK DEVELOPMENT**Exhibit 6.4: Top Collision Locations 2012-2016 – Mitigation Considerations**

Location	Potential Mitigation Measures
Coldstream Road and Oxbow Drive	<ul style="list-style-type: none"> • Larger stop signs • Adding stop bar pavement markings • Adding deer signage • Trimming nearby trees to help wildlife visibility • Widening shoulders on Oxbow Drive and on Coldstream Road south approach
Denfield Road and Medway Road	<ul style="list-style-type: none"> • Adding stop bar pavement markings • Adding centreline markings along Denfield Road • Widening shoulders along Denfield Road • Adding deer signage
Amiens Road and Ilderton Road	<ul style="list-style-type: none"> • Adding stop bar pavement markings • Increasing tree clearance for wildlife visibility • Adding deer signage
Glendon Drive (County Road 14) and Old River Road*	<ul style="list-style-type: none"> • Adding stop bar pavement markings • Increasing radius of westbound right-turn • Creating a smoother road geometry southbound
Carriage Road and Gideon Drive	<ul style="list-style-type: none"> • Trimming nearby trees for road and wildlife visibility • Adding deer signage • Adding stop bar pavement markings • Widening shoulders for eastbound right turn
Nairn Road (County Road 17) and Oxbow Drive	<ul style="list-style-type: none"> • Trimming nearby trees for road and wildlife visibility • Adding stop bar pavement markings • Adding deer signage
Adelaide Street N and Thirteen Mile Road	<ul style="list-style-type: none"> • Adding stop bar pavement markings <p>(Recent road shoulder widenings will reduce risks)</p>
Adelaide Street N and Twelve Mile Road	<ul style="list-style-type: none"> • Adding stop bar pavement markings • Improving pavement condition <p>(Recent tree trimmings have improved sight lines)</p>
Hyde Park Road and Fourteen Mile Road	<ul style="list-style-type: none"> • Adding stop bar pavement markings <p>(Recent road shoulder widenings will reduce risks)</p>
Hyde Park Road and Thirteen Mile Road	<ul style="list-style-type: none"> • Wildlife fencing • Deer signage <p>(Recent road shoulder widenings and addition of stop bar pavement markings will reduce risks)</p>

Note: * The Glendon Drive improvement plan addresses concerns at this intersection by re-aligning it to the west, though nearer-term improvements can be considered.

6.2.3 Stormwater Management

The stormwater management strategy includes an overview of watersheds in Middlesex Centre, a discussion of stormwater design criteria, and identification of road locations prone to flooding issues.

Applying current best practices to stormwater management is essential to the resilience of Middlesex Centre Roadways. The locations of the Municipality's many bridge and culverts, key infrastructure related to stormwater management, are shown in Exhibit 6.5 together with their five-year infrastructure needs based on a recent assessment.

Watershed Overview

The Municipality's natural features include these watercourses as well as their tributaries, and the floodplains, hazard lands (steep slopes or fill) and woodlands adjacent to them. The locations of these features are identified in the Municipality's *Official Plan (2023)*. While the Municipality's waterways are a rich natural asset, they also represent barriers or challenges to transportation, with the building and maintenance of bridges and culverts needed to accommodate transportation infrastructure to cross them.

Five Provincial Conservation Authorities are active within Middlesex Centre, each based on one of the five watersheds represented in the Municipality:

- Upper Thames River;
- Ausable Bayfield;
- St. Clair Region;
- Lower Thames Valley; and
- Kettle Creek.

The largest of these is the Upper Thames River watershed,

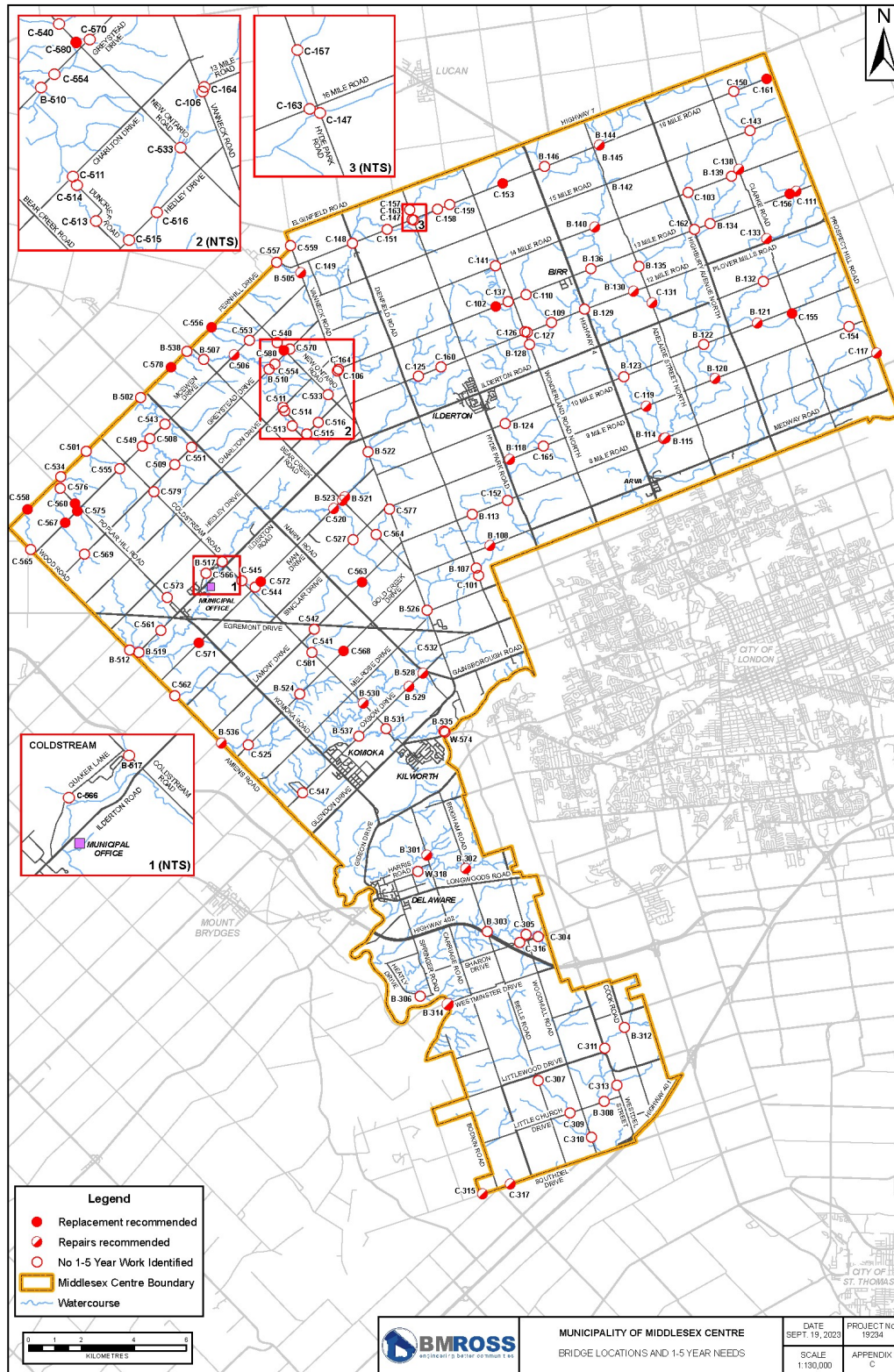
The mandate of Conservation Authorities is to protect people and property from flooding and natural hazards and to conserve natural resources for economic, social and environmental benefits⁶.

⁶ Conservation Ontario. Natural Champions: Making a Difference.

<<https://conservationontario.ca/about-us/conservation-ontario>> Accessed April 2023.

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Exhibit 6.5: Municipality Bridges and Culverts by 5-Year Infrastructure Need



Source: Municipality of Middlesex Centre (2023). Structures Inspection and Assessment. Prepared by B. M. Ross and Associates Limited.

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Conservation Authorities are responsible for reviewing applications that involve development within regulated areas to ensure that the control of flooding, erosion, pollution or the conservation of land will not be affected by the development within their watershed. A permit needs to be obtained from the respective Conservation Authority for any development work occurs within a Regulated Area.

Stormwater Design Criteria

The 2020 Provincial Policy Statement (PPS) provides direction for the quality and quantity of water at a watershed scale. Currently applicable design criteria for the Municipality to follow for roadway developments include the following:

- Municipality of Middlesex Centre's Infrastructure Design Guidelines (January 2018);
- Municipality of Middlesex Centre's Stormwater Management Policy Manual (June 2011); and
- Ministry of the Environment, Conservation and Parks (MECP) Stormwater Management Planning and Design Manual (2003).

Currently there are no stormwater management design criteria/guidelines available from the conservation authorities in Middlesex Centre.

A review of Middlesex Centre's Infrastructure Design Guidelines regarding the stormwater collection system identified some additions and modifications to bring the guidelines closer in line to current best practices. These include the following:

- applying an additional 25% to the peak flow for the minor design storm; and
- include an additional 20% to the rainfall amount for the 100-year, 24-hour storm event (equally distributed over the 24-hour period) to account for the range of possible climate change outcomes.

A list of additional updates to infrastructure design standards is included as **Appendix A**.

Road Flooding Issues

The Municipality of Middlesex Centre staff identified flooding concerns across Municipality roadway corridors at several locations:

- Prospect Hill between 8 Mile Road and 9 Mile Road;
- Heatley Drive between Sharon Drive and Springer Road;

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- Old River Road between Pulham Road and Glendon Drive;
- Sharon Drive between Bells Road and Brigham Road;
- 9 Mile Road between Denfield Road and Hyde Park Road;
- Hyde Park Road North of 13 Mile Road;
- Wonderland Road North of 16 Mile Road;
- Bearcreek Road north of Ilderton Road;
- 16 Mile Road between Wonderland and Richmond;
- In the vicinity of 14140 Thirteen Mile Road (west of Birr and Highway 4);
- 9 Mile Road east of Hyde Park Road;
- 16 Mile Road west of Denfield Road; and
- Wellington Street south of Gideon Drive.

The application of updated stormwater management standards will be especially important to the above locations.

6.2.4 Road Surface Conversion Policy Review

The Municipality of Middlesex Centre maintains more than 603 kilometres of local municipal roads. About 45% of the total length of these roadways is currently soft-surfaced (i.e. granular—gravel, stone, and other loose aggregate). The Municipality maintains 272 km of soft-surfaced roadways.

Granular roads require an increased stopping distance and have visibility issues associated with dust on newly resurfaced roads. Regular maintenance is required to mitigate issues such as rutting, loose gravel and potholes. Granular roads are not preferred for segments with higher average annual daily traffic volumes due to the increased maintenance costs related to road wear from higher vehicle volumes. However, upgrading a roadway surface is costly and the benefits do not always justify the costs.

The Municipality has developed a gravel-to-hard surface conversion policy as part of its Road Needs Study (2023) to upgrade local roads when warranted. The threshold for conversion from gravel to surface treated roads is set at 400 Average Annual Daily Traffic (AADT) and the threshold for conversion from surface treated to hot mix asphalt was set at 1,500 AADT. It should be noted that while AADT is the primary factor in determining whether a road may be a

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candidate for upgrading to a hard surface based, other factors should be considered. These include:

- **Functional road classification and network connectivity:** Higher road classes should be treated with the appropriate surface type, and consistent surface times should be considered for needed connection between two existing paved routes, should be considered.
- **Design considerations:** This includes road platform width, drainage, slope, and other geometric considerations.
- **Cost:** Effective cost management must be considered.

These considerations may outweigh the AADT thresholds and candidate roads identified for hard surface conversion will need to be considered on an individual basis.

6.2.5 Accommodating Agricultural Equipment on Roads

The Ontario Federation of Agriculture outlines regulations relating to agricultural or farm equipment⁷; these include the following:

- Every vehicle driven on the road including farm equipment is subject to the *Highway Traffic Act, 1990* (HTA);
- A driver's licence is not needed to drive a farm tractor or self-propelled implement of husbandry (SPIH) along a public highway, but the driver must be at least 16 years of age;
- Farm equipment should be driven on the travelled portion of the highway: while it is legal to drive equipment on some road shoulders, the shoulder may not be able to support the weight of the farm equipment and there may be obstacles;
- While farm equipment is exempt from HTA vehicle width regulations, they must yield half of the roadway to oncoming vehicles—if this means leaving the travelled lane to travel on the shoulder, the driver must yield to any traffic on the roadway before re-entry;
- Every farm tractor or SPIH must display a slow-moving vehicle sign (SMV) and are not to exceed 40 km/h travel speed, including high-speed tractors that are capable of exceeding 40 km/h travel speeds;

⁷ Ontario Federation of Agriculture (2022). Fact Sheets: Farm Implements on the Road <<https://ofa.on.ca/resources/farm-implements>> Accessed November 2023.

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- Farm equipment must have at least two white headlights and one red taillight when travelling between a half hour before sunset and a half hour after sunrise on public roads;
- Trailers or wagons towed must have two separate means of attachment for redundancy (typically a hitch and chains); and
- Licence plates are not required on farm equipment moved from farm to farm, to perform a farm use, or to or from places of maintenance or repair; otherwise they are required.

Also, farm equipment may not be driven on a 400-series highway (HTA, section 1).

The following outlines the most common types of collisions involving farm equipment⁸:

- Single-vehicle incidents resulting from the equipment being driven too close to the edge of the road and rolling over into the ditch;
- Being hit by another vehicle while turning onto a public road from another road or a driveway;
- Being rear-ended by motorists overestimating the speed of the farm vehicles; and
- Being hit while making a left turn where the signal was not visible or failing to signal.

Implementing the following for road design and maintenance can support the movement of farm equipment on public roads in Middlesex County on routes:

- Intersections and roundabouts with large enough turn radii for tractors with wagons or SPIHs, as these need more room to turn;
- Road shoulders designed to be wide and strong enough to support the weight of farm vehicles;
- Bridges that are wide and strong enough for farm equipment to traverse safely;
- Making blind corners or hidden driveways more visible by ensuring that vegetation that can block sight lines is cleared; and
- Continuing to ensure that road hazards such as potholes and washouts are reduced through regular road maintenance.

⁸ These points are selected from: Alberta Agriculture and Rural Development (2009). Make It Safe, Make It Visible: Safe Transport of Farm Equipment in Alberta.

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For roads with significant volumes of farm vehicles but where it is not feasible to widen the road or to add durable shoulders along the full length, the Municipality can explore adding periodic laybys on a pilot project basis on selected roadways to allow the farm vehicles to pull over safely to allow other vehicles to pass.

6.3 Cycling Strategies

The TMP goals reflect growing the transportation system into a more multi-modal one by providing diverse mobility options to residents and visitors. A key component of this is the construction of a network that provides safe, comfortable and connected cycling facilities⁹. With a growing interest in cycling for recreation and transportation, improving the safety, connectivity and desirability of cycling routes within and between settlement areas in Middlesex Centre, as well as to settlements beyond its borders, would result in a more robust multi-modal transportation system and support the development of complete communities.

While the TMP Cycling Strategy is focused on infrastructure to support cyclists, other active transportation users would also benefit from an improved cycling network in Middlesex Centre. Active Transportation (AT)—or active travel—is a term that refers to all forms of human-powered or power-assisted travel. Most commonly, this means walking and cycling, but can also refer to any travel with the use of mobility aids, and any other form of rolling such as e-scooters, e-bicycles, skateboards, rollerblades, etc.

The Cycling Strategy comprises two components, expanding on actions previously outlined in Section 5:

- Cycling facility (route) selection guidance; and
- Priority cycling connections.

⁹ A cycling facility is a comprehensive term that encompasses all types of infrastructure or spaces specifically designed to accommodate and promote cycling.

6.3.1 Cycling Facility (Route) Selection Guidance

Overview

FACILITY TYPES

The Ontario Traffic Manual (OTM) Book 18 – Cycling Facilities¹⁰ is the primary resource guiding the selection of appropriate cycling facility types and design along all potential routes within Middlesex Centre. Facility type refers to the level of separation provided to cyclists along a given cycling route. A description of the level of separation provided by different facility types among urban and rural roadways is provided in Exhibit 6.6.

DESIGN CYCLIST

Further, there are a wide range of cyclists in terms of interest and ability, and OTM Book 18 defines different design cycling user groups to help inform practitioners in the planning and designing of cycling facilities, as follows:

- **Interested but concerned**, representing 51-56% of the population;
- **Somewhat confident**, representing 5-9% of the population;
- **Highly confident**, representing 4-7% of the population; and
- **No way no how**, representing the remaining population who are not interested in cycling.

The “interested but concerned” cycling group is the **design cyclist**, the user category that practitioners should seek to accommodate. Comprising 51% to 56% of the population, this category of cyclist may vary in experience and age but are typically uncomfortable when interacting with moderate speed traffic. These riders prefer a lower-stress riding environment that can be provided through separated facilities, or low-traffic and low-speed shared-use streets (also known as All Ages and Abilities or AAA facilities).

¹⁰ Ontario Traffic Manual Book 18 – Cycling Facilities was developed in association with the Ontario Traffic Council and provides guidance to Ontario municipalities on the uniformity and treatment of cycling design facilities, and is consistent with the Highway Traffic Act regarding municipal roads and infrastructure. A 2021 update provided up-to-date guidance on determining appropriate facility types and design for various roadway context, with a focus on designing for all ages and abilities.

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Exhibit 6.6: Urban and Rural Cycling Level of Separation

Context	Shared	Dedicated	Separated
Urban/ Suburban Roadway	<p>Shared Operating Space</p> <p>People cycling are expected to share traffic lanes with motor vehicles, which may be indicated with pavement markings or signage.</p> <p>Facility type options include shared roadways, neighbourhood bikeways, and advisory bicycle lanes.</p>	<p>Designated Operating Space</p> <p>Space in the road right-of-way is designated exclusively for cycling, but there are no physical barriers separating people cycling from motorists.</p> <p>Facility type options include bicycle lanes, buffered bicycle lanes and contraflow bicycle lanes.</p>	<p>Physically Separated</p> <p>People cycling ride on dedicated cycling facilities that are separated from motor vehicle traffic by horizontal space and physical barriers.</p> <p>Facility type options include separated bicycle lanes, protected bicycle lanes, cycle tracks and in-boulevard multi-use paths.</p>
Rural Roadway	<p>Shared Operating Space</p> <p>Roadways with low motor vehicle volumes and speeds where people cycling share the operating space with motor vehicles.</p>	<p>Paved Shoulder</p> <p>People on bikes ride on a paved surface adjacent to the traveled portion of the roadway in the same direction as traffic. A buffer may be added for additional separation from motor vehicle traffic.</p>	<p>In-Boulevard Multi-use Path or Off-road Trail</p> <p>A multi-use path beyond the clear zone of the roadway or an off-road trail provide the highest degree of separation between people cycling and motorists, which are used when motor vehicle speeds and volumes are high.</p>

Source: Adapted from Ontario Traffic Manual Book 18 – Cycling Facilities (MTO, 2021)

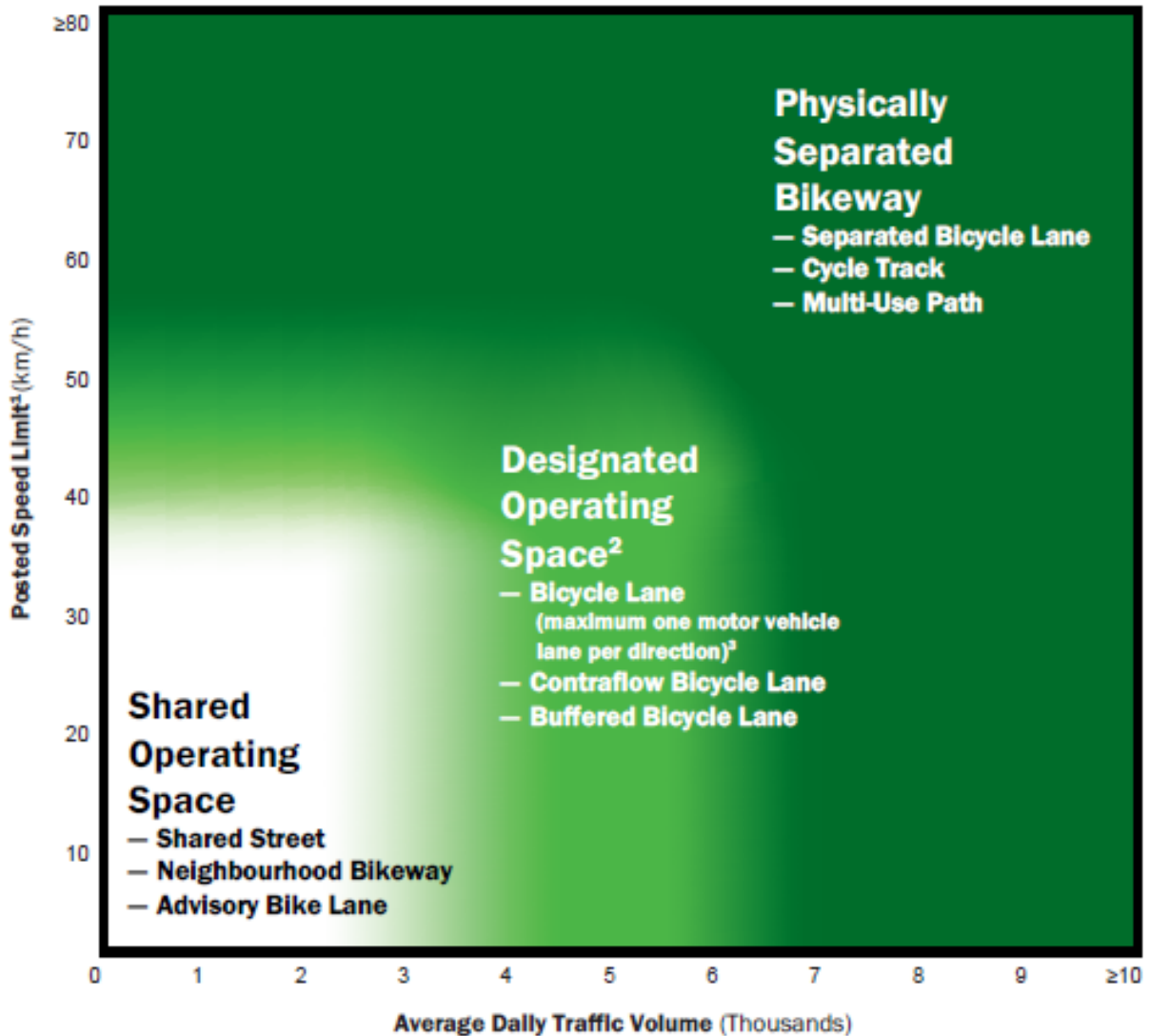
PRELIMINARY FACILITY TYPE (ROUTE) SELECTION

The urban/suburban and rural facility selection nomographs are shown in Exhibit 6.6 and Exhibit 6.7. These nomographs illustrate the mechanism used to select the facility class appropriate for a given corridor. Applying these tools involves implicitly targeting an All Ages and Abilities (AAA) network approach based on OTM Book 18 guidance.

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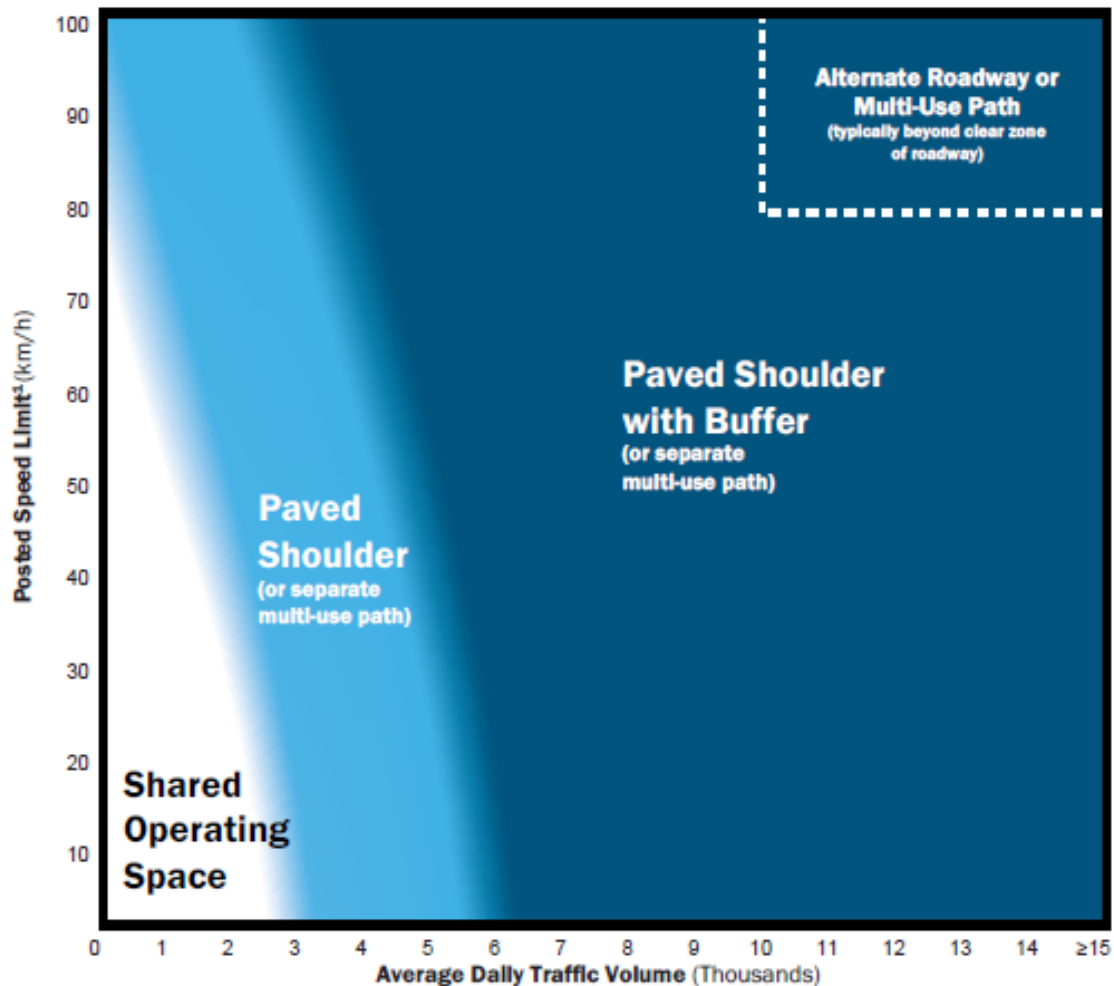
Compared to the previous version, the updated OTM Book 18 provides strengthened warrants for facility types—shared, designated or separated facilities—recommending a lower threshold for traffic volume and speed for the implementation of higher-order facilities such as protected bike lanes and cycle tracks.

Exhibit 6.7: OTM Book 18 – Urban/Suburban Nomograph



Source: Ontario Traffic Manual Book 18 – Cycling Facilities (MTO, 2021), Figure 5.5

Exhibit 6.8: OTM Book 18 – Rural Nomograph



Source: Ontario Traffic Manual Book 18 – Cycling Facilities (MTO, 2021), Figure 5.6

6.3.2 Priority Cycling Connections

County Cycling Strategy

Middlesex County’s first comprehensive Cycling Strategy was developed in 2018, proposing a network of cycling infrastructure in Middlesex Centre. Cycling routes are proposed along selected County roads as well as local municipal roadways.

As this is a County-level cycling strategy, planned County-wide connections between settlement areas are the focus of the plan. These routes, however, also serve local residents and function to connect settlement areas within Middlesex Centre and between Middlesex Centre to external municipalities.

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Of the cycling network routes identified, a large majority have not yet been implemented. Overall, the general strategy for implementing the County's cycling network plan is to implement the facilities in tandem with County or Middlesex Centre road resurfacing or rehabilitation projects, which helps manage the costs of implementation.

Building on the County's plan and developing cycling connections represents an important outcome of the TMP, and serves as an opportunity to tap into a market of underserved cyclists, given they are provided with the right infrastructure to support them. A comprehensive cycling network also plays an important role in addressing equity-deserving groups¹¹, and helps ensure that transportation equity¹² is considered as part of the TMP. Building on the momentum created by the County's Cycling Network Plan can help continue to enable and normalize active travel as an everyday mobility option within and between settlement areas.

Trails, too, represent an important active travel connection serving an array of users depending on the trail type, including cyclists. Trail linkages within and between settlement areas internal to Middlesex Centre, as well as linkages to London, are a critical piece of mobility infrastructure that support multi-modal trips. However, a complete assessment of the 2014 Trails Master Plan study is outside the scope of the TMP.

Priority Connections

As part of Phase 1 of the TMP study, cycling flows within Middlesex Centre were assessed using Strava data¹³, showing high cycling demand and relatively high cycling frequencies within and between settlement areas, along selected County and local municipal roads within rural areas, and near the City of London. While all

¹¹ "Equity-deserving groups" are communities that experience significant collective barriers to participating in society and accessing safe, reliable and affordable transportation due to a disregard for their needs in transportation policies and investments.

¹² "Transportation equity" is the provision of policies, funding, infrastructure and services in ways that are fair and aim to ensure that users, irrespective of race, ability, sex, class or any other social identity, can safely access transportation options.

¹³ Strava provides an app for its subscribers to track their physical exercise (i.e. cycling and running) using Global Positioning System data. Strava cycling subscribers are typically confident cyclists willing to cycle longer distances and use routes that are not always suitable for all ages and abilities given current cycling infrastructure, but gives a general indication of the relative demand for cycling in a given area.

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cycling connections identified in the County's Cycling Network Plan represent important opportunities to advance multi-modal travel options across Middlesex Centre, the following priority cycling routes have been identified as key connections across Middlesex Centre and connecting to London and other external municipalities:

- **Ilderton Road (County Road 16) between Hyde Park Road (County Road 20) and Oxford Public School, and beyond to Wonderland Road (County Road 56):** This route is part of a key connection to London via Wonderland Road. The ability to walk or cycle more safely between Ilderton and Oxbow Public School is a top priority for the Municipality.
- **Wonderland Road (County Road 56) between Ilderton Road (County Road 16) and City of London Boundary:** County Road 56 is part of a key connection between Ilderton and London and should be prioritized to improve safe access for local residents into London.
- **Glendon Drive (County Road 14) from west of Komoka Road (County Road 16) easterly to the City of London Boundary:** As per the Glendon Drive improvement plan (summarized earlier in Exhibit 5.1), the cycling connection along this County road will be implemented outside the County's right-of-way, which, in accordance with the *Municipal Act, 2001*, is the responsibility of the lower-tier municipality. This new active travel connection is critical to developing safe local mobility options for residents of Komoka-Kilworth (a recurring theme among input received as part of PIC 1 and 2), as well as support connections to the City of London.
- **Oxford Street Bridge Connection:** Connecting Komoka-Kilworth and Byron in the City of London represents a key inter-municipal travel connection. The Oxford Street Bridge currently is too narrow to safely accommodate active travel users, and the lack of infrastructure represents a key bottleneck among Middlesex Centre residents, as reported throughout PIC 1 and 2. With no existing plans for the City of London to widen Oxford Street to correspond to the four-lane widening of County Road 14—as described in the Glendon Drive Environmental Assessment—an adequate active travel connection along the bridge in the near-term is unlikely.
- **Multi-use trail between Denfield and the City of London:** The 2014 Trails Master Plan identifies the segment of the former London, Huron and Bruce Railway between Denfield and the City of London boundary as a long-term priority trail. This proposed trail would connect with the multi-use trail proposed as part of the *City of London Cycling Master Plan Update* (2016), which utilizes the southern expanse of the abandoned

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railway corridor. Prioritizing this connection represents a key opportunity to expand safe and dedicated multi-modal travel options between Middlesex Centre and London.

Desired cycling connections: The recommended network shown in Exhibit 5.4 also includes “desired cycling connections”. This term has been used to identify places in the cycling network where a cycling connection to an external municipality is needed, but the implementation within the time frame of the TMP or with the resources available is very unlikely. These would include major projects such as bridge widening or significant new trail construction. These connections continue to be a part of the preferred network, and should be included if major capital works are planned in these areas.

Oxbow Drive Cycling Improvements

Oxbow Drive has been identified as part of a key east-west link in both the Provincial and County cycling network plans. A key factor in the route’s importance is that provides a direct connection to the cycling network in London via Gainsborough Drive without requiring crossing of the Thames River. Given the importance of this cycling connection, it is discussed in further detail below.

Oxbow Drive runs east-west north of the Komoka-Kilworth urban area, parallel to and approximately 1.4 km north of Glendon Drive (CR 14). It is among the highest-volume local road segments in Middlesex Centre, and as Komoka-Kilworth is a focus of population growth in the Municipality, traffic volumes will further increase. While the increase in traffic volumes is not anticipated to require additional travel lanes for vehicles, it can make the safe accommodation of cyclists on this priority cycling route more difficult. Given its vehicle traffic volumes, shared lanes with vehicle traffic are not appropriate cycling infrastructure for all ages and abilities.

There is a need to approach this from a multi-modal perspective that is consistent with the general Complete Streets approach. As such, further study is recommended to develop a design for upgrading Oxbow Drive between Komoka Road and Nairn Road that includes the following elements:

- Two general purpose travel lanes with turning lanes where required, with an urban cross-section through all built-up areas (including planned development lands once developed);
- Permanent intersection improvements at Coldstream Road and Nairn Road, building on the short-term recommendations made as part of the safety review;

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- Dedicated or separated cycling route (exact implementation to be determined through design study with guidance from Ontario Traffic Manual – Book 18: Cycling Facilities, based on projected volumes and speeds);
- Sidewalks and/or multi-use path (which could be shared with cyclists) throughout the built-up areas and paved shoulders, at a minimum where a rural cross-section is preferred and
- Pedestrian crossing opportunities – either signalized intersections or pedestrian crossovers – at regular intervals, with reference to *Ontario Traffic Manual – Book 15: Pedestrian Crossing Treatments*.

In implanting updates to Oxbow Drive, special attention should be paid to the Coldstream Road and Oxbow Drive intersection, as this was the top location for traffic collisions in 2012-2016 (see Section 6.2.1). The intersection at Nairn Road also placed in the top 5 in the Municipality in terms of total collisions. There are also at-grade mainline freight rail crossings will also need to be reviewed (Section 5.1.2).

Recommendation

It is recommended that Middlesex Centre advocate to the County of Middlesex, as well as the City of London, to support these connections throughout the municipality advance the implementation of selected key cycling routes. Considerations for human health, safety, vulnerable and equity-deserving populations when assessing priorities for connectivity should also be provided, with attention also given to connections to local employers and schools, to ensure an accessible transportation system that responds to different needs across different demographics.

6.4 Pedestrian Strategies

The pedestrian network is a critical piece of the overall transportation system. Improving local mobility options, with a focus on connections within settlement areas, is an important component of the TMP. While Middlesex Centre is a vast rural municipality with dispersed settlement areas, continuing to improve the pedestrian realm and provide residents with safe, convenient, accessible, and connected local mobility options is an important community-building objective.

Supporting the safe movement of pedestrians through a network of connected and accessible sidewalks and off-street trails is also an important component of

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the local transportation system in Middlesex Centre, encouraging the use of active transportation options, supporting the development of healthy and complete communities, improving access to shopping and economic opportunities, and reducing the reliance on driving to complete local trips.

The Pedestrian Strategy is comprised of the following two components, expanding on actions previously outlined in Section 5:

- Pedestrian crossing guidance and review; and
- A sidewalk prioritization framework.

6.4.1 Pedestrian Crossings

Overview

A pedestrian corridor is only as safe as its “weakest link”, i.e. the area presenting the most risk for pedestrians. In many cases, these occur at intersections and crossings. Pedestrian crossings, therefore, are an important facet of the pedestrian network, and a key component of the TMP Pedestrian Strategy.

Provincial guidance on the selection of appropriate pedestrian crossing treatments and in identifying pedestrian crossing gaps is summarized below.

Pedestrian Crossing Treatment Systems

The *Ontario Traffic Manual Book 15 – Pedestrian Crossing Treatments* (2016) provides practical guidance on the planning, design, and operation of pedestrian crossings in accordance with the Highway Traffic Act.

An overview of controlled pedestrian crossing treatments¹⁴ is presented below. These are listed in order of increasing complexity of roadway environmental conditions:

- Supervised School Crossings;
- Stop or Yield-Controlled Intersections;
- Pedestrian Crossovers; and

¹⁴ Controlled crossings require vehicles to stop or yield to pedestrians, whereas uncontrolled crossings require pedestrians to wait for a safe gap in traffic prior to crossing the roadway, without the aid of traffic control measures (OTM Book 15 – Pedestrian Crossing Treatments, 2016).

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- Traffic Control Signals.

Supervised School Crossings: Drivers are required to stop only when a crossing guard is present with their stop sign. School crossings provide safe passage during peak hours when a crossing guard is present but are not in force the rest of the time, limiting their utility. Provincial guidelines limit these crossings to streets with speed limits no higher than 60 km/h. School crossing guards are normally stationed at marked school crossings but may be stationed at locations that are controlled crossings. School crossing guards are governed by municipal policies. A diagram of a school crossing is shown as Exhibit 6.9.

Exhibit 6.9: Diagram of School Crossing



Source: MTO (2021). Driving near pedestrian crossovers and school crossings.
<<https://www.ontario.ca/page/driving-near-pedestrian-crossovers-and-school-crossings>

Stop-Controlled Intersections: Stop controlled intersections use STOP signs as a form of traffic control to manage right-of-way at intersections. Vehicles approaching a STOP in advance of a crosswalk are required to stop at the stop bar and yield to vehicular traffic and pedestrians whose arrival preceded theirs before proceeding.

Yield-Controlled Intersections: Yield controlled intersections use YIELD signs as a form of traffic control to manage right-of-way at intersections. Vehicles

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approaching a YIELD sign in advance of a crosswalk on an intersection are required to slow down or stop when necessary to yield the right-of-way to pedestrians before entering the crosswalk. Implementation guidelines for both STOP and YIELD controlled intersections are provided in *OTM Book 5 – Regulatory Signs* (2021).

Pedestrian Crossovers (PXOs): These are designated areas where pedestrians have the right of way to cross the street – drivers must always yield to pedestrians and wait until they clear the roadway before proceeding. The crossings include regulatory signs and markings on the roadway, and depending on the PXO type can also include flashing overhead amber beacons or rapid rectangular flashing beacons, and pedestrian push buttons.

PXOs provide on-demand safe crossing for pedestrians at all hours, while limiting impacts to traffic flow only to the times where pedestrians are present. OTM Book 15 outlines two levels of PXOs, all prescribed and illustrated by Ontario Regulation 402/15:

- Level 1 PXO type A: these include regulatory and warning signs, pavement markings, and flashing amber beacons (activated by pedestrians);
- Level 2 PXO types B or C: these include regulatory and warning signs (type B includes overhead signs), pavement markings, and rapid rectangular flashing beacons (RRFB) (activated by pedestrians); and
- Level 2 PXO types D: these include regulatory and warning signs and pavement markings, but does not require flashing beacons.

Example diagrams of these pedestrian crossing types are shown in Exhibit 6.10.

Traffic Control Signals: Implementation guidelines are provided in *OTM Book 12 – Traffic Signals* (2012).

- **Full Traffic Signal:** Power-operated traffic control signal that alternatively directs vehicular traffic to stop at a given approach and permits pedestrian traffic to proceed. Signalized intersections often have countdown timers and other automated safety elements.
- **Intersection Pedestrian Signals (IPS):** Traffic control signals implemented for dedicated pedestrian crossings at intersections.
- **Mid-Block Pedestrian Signals (MPS):** Traffic control signal implemented for dedicated pedestrian crossings at mid-blocks.

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Exhibit 6.10: Diagrams of Pedestrian Crossovers

PXO Level 1 – Type A



PXO Level 2 – Type B



PXO Level 2 – Type C



Note: Both PXO Level 2 Types B and C have rapid rectangular flashing beacons mounted above the “stop for pedestrians” signs, activated by pedestrians.

Source: MTO (2021). Driving near pedestrian crossovers and school crossings.

<<https://www.ontario.ca/page/driving-near-pedestrian-crossovers-and-school-crossings>>

Before any pedestrian crossing treatment is selected, it must be confirmed that the identified location has adequate site distance for both motorists and pedestrians.

A preliminary assessment of controlled crossing treatment type is based on the following:

- whether a traffic signal is warranted for the location;
- whether 8-hour pedestrian volumes are greater than 100 and 8-hour vehicle volumes are greater than 750 (or 4-hour pedestrian volumes are greater than 65 and 4-hour vehicle volumes are greater than 395);
- whether the site is less than 200 m from another traffic control device; and
- whether there is a requirement for system connectivity or the location is on pedestrian desire lines.

Identifying Pedestrian Crossing Gaps

A safe and connected pedestrian network forms a strong basis for a healthy and accessible community. The identification of potential controlled pedestrian crossing locations should consider the following:

- **Existing Pedestrian Crossings:** This includes signalized intersections as well as pedestrian crossovers, with a focus along the arterial and collector road network.

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- **Public and Stakeholder Input:** Soliciting input from the public, as well as interested stakeholders, is essential in improving the pedestrian realm and meaningfully responding to safety concerns.
- **Network Spacing:** Network spacing of pedestrian crossings is an important consideration in identifying the future pedestrian network in Middlesex Centre. The Ontario Traffic Manual provides recommendations on network spacing between pedestrian crossings, as follows:
 - **OTM Book 12 – Traffic Signals (2012):** The minimum distance between traffic control signals for roads posted at 60 km/h or less is 215 metres and for roads posted at 80 km/h is 350 metres. Additionally, PXOs should not be installed within 200 metres of other signal protected pedestrian crossings.
 - **OTM Book 5 – Regulatory Signs (2021):** All-way stop controls should not be used where any other traffic device controlling right-of-way is permanently in place within 250 metres, with the exception of a YIELD sign.
- **Adjacent Land Uses:** The land use planning context adjacent to the roadway is an important factor in identifying potential crossing locations. For example, less dense areas at the periphery of settlement areas would not require pedestrian crossings like the Village Centres. However, the Municipality of Middlesex Centre should monitor gaps in the pedestrian network as development advances and demand increases throughout its settlement areas, especially in Komoka-Kilworth and Delaware.
- **Pedestrian Routing and Desire Lines:** A qualitative assessment of assumed pedestrian routing may also factor into the identification of pedestrian crossing locations, as it considers the logical and desired paths a pedestrian would take between two points.
- **Safe Sight Distances:** Appropriate sight distances for both vehicle drivers and pedestrians must be provided and maintained for all controlled crossings. The *Geometric Design Guide for Canadian Roads* by the Transportation Association of Canada (TAC) provides guidance on stopping distances for road geometries that should be used to determine whether a potential crossing location has sufficient sight lines.

As the urban areas of Middlesex Centre continue to grow, a gap analysis can be undertaken to identify areas where controlled pedestrian crossings are needed to respond to safety concerns and network connectivity gaps.

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Review of County Road Pedestrian Crossings

Input received from the Public Opinion Survey conducted as part of the first round of public consultation indicated that 41% of respondents would like to see safer and more pedestrian crossings to support increased active travel. Two specific locations were frequently perceived to have inadequate pedestrian crossing provision across County roads, as follows:

- Longwoods Road (County Road 2) at Springer Road/Victoria Street in Delaware; and
- Hyde Park Road (County Road 20) at Heritage Drive in Ilderton.

Both locations have “school crossing” signage only, which gives pedestrians the right-of-way to cross only when a crossing guard is present, and can be ambiguous to both pedestrians and drivers. Given the high vehicle volumes along these County roads, the locations of these crossings along pedestrian desire lines, and the absence of other controlled crossings within 200m, upgraded pedestrian crossings at these locations are recommended.

At the Longwoods Road location, consideration should be given to moving the crossing a sufficient distance to the east of the horizontal and vertical road curves west of Springer Road to provide sufficient sightlines at his crossing.

Additionally, it is also recommended that that a pedestrian crossing be implemented at Ilderton Drive (County Road 16) at Bowman Drive/Willow Ridge Road on the east side of the Ilderton settlement area to support a connected pedestrian network.

Road user safety concerns were also identified along County Road 14 through feedback received as part of PIC 1 and PIC 2. The County’s Glendon Drive improvement plan (see Exhibit 5.1) will respond to operational and safety concerns by providing new or improved pedestrian crossing opportunities along Glendon Drive at the following locations, listed from west to east:

- Komoka Road;
- Tunks Lane;
- Crestview Drive;
- Springfield Way;
- Jeffries Road/Vanneck Road; and
- Kilworth Park Drive.

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The County of Middlesex currently conducts pedestrian counts and implements crossings if warrants are meant. While pedestrian demand for selected locations across Middlesex Centre may not be as high as perceived, there is likely latent demand beyond current pedestrian crossing volumes, as people simply avoid walking where crossing a roadway is not safe. While it is recognized that thresholds may not be met initially based on existing pedestrian volumes, the provision of safe pedestrian crossing infrastructure responds to important TMP Goals and will help support the development of safe, complete communities.

Identifying Municipality Pedestrian Crossing Gaps

While a preliminary assessment has not identified a need for additional pedestrian crossings along Municipality roadways, it is recommended that the Municipality continue to keep an eye on potential future needs based on population and employment growth. For example, residential development in Komoka-Kilworth and employment development in Delaware will create both higher levels of motor vehicle traffic as well as pedestrian volumes. Proactively planning for safe, local mobility options through appropriate pedestrian crossing treatments will be key into Middlesex Centre's future.

A view to pedestrian desire lines and community connectivity is recommended for identifying gaps in crossing locations, with an emphasis on linking communities and destinations (e.g schools, Village Centres, community centres, etc.). Ontario Traffic Manual guidance for the implementation of safer pedestrian crossings along Municipal roadways should continue to be followed.

6.4.2 Sidewalk Prioritization Framework

Overview

Sidewalk connectivity is an integral component of the pedestrian network and to improving overall safety, and the Municipality of Middlesex Centre continues to make strides through ongoing sidewalk infilling. Input received from the Public Opinion Survey conducted as part of PIC 1 indicated that 40% of respondents would like to see improved sidewalks to encourage local walking trips, and 37% of respondents would like to see fewer gaps in the sidewalk network.

The Municipality of Middlesex Centre maintains 35 kilometres of sidewalks along both County and local municipal roads. (In accordance with the *Municipal Act, 2001*, the provision, construction, and maintenance of sidewalks along upper-tier municipal roads, i.e. County roads, is the responsibility of lower-tier

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municipalities.) Continuing to infill gaps in the sidewalk network is a key component to creating an accessible, equitable and safe urban realm.

In 2021, the Municipality of Middlesex Centre hosted the *Sidewalks and Streetlights Survey* to collect input on priority areas for new sidewalks and streetlighting over the short-term (one to five years). More than 500 Middlesex Centre residents shared their preferences and priorities for pedestrian infrastructure. The top choice among survey participants was to prioritize sidewalks near schools 61%, including routes to schools. The ability to walk or cycle more safely between Ilderton and Oxbow Public School is a top priority for the Municipality, and a concern noted by the public during PIC 1 and PIC 2.

To respond to the priorities of the residents, and to help meet important city-building objectives of safe, accessible, healthy, and convenient local mobility options, it is recommended that the provision of sidewalks along existing roadways be undertaken through a formalized infilling policy approach.

As the settlement areas across Middlesex Centre continue to grow, the following policy components are recommended to guide the provision of sidewalks:

- **Functional road classification:** Follow the recommended road classification framework, which will inform decision-making on the provision of sidewalk coverage along urban streets. Gaps on higher-order roadways should be prioritized over lower-order roadways.
- **Updated by-laws:** New policies should require the construction of sidewalks for all new developments and bike lanes and/or trails in accordance with the functional road classification, as well as the Cycling Strategy and updated Trails Master Plan, as deemed appropriate by the Municipality.
- **Updated design guidelines:** Reduce barriers to implementing sidewalks along existing roadways with minimal property impacts.

Applying the policy approach, the TMP identified the following three priority locations for sidewalk installation/expansion:

- **Komoka:** Queen Street from Simcoe Avenue to Railway Avenue, Railway Avenue from Queen Street to Tunks Lane, and Tunks Lane from Railway Ave to County Road 14; and
- **Kilworth:** Westbrook Drive between Jeffries Road and Kilworth Park Drive.

A sidewalk gap prioritization framework is presented shown in Exhibit 6.11 to aid decision makers in Middlesex Centre. This framework utilizes a points system and

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is intended to help identify the sidewalk projects that will provide the largest impact within the urban areas of the municipality.

Exhibit 6.11: Sidewalk Infilling Prioritization Framework for Urban Areas

Criteria	Description / Rationale	Scoring (pts = points)
Road Classification	As higher-class roadways are more likely to be designed for higher traffic volumes and speeds, there is a heightened need for sidewalks to maintain safe separation from vehicles and pedestrians in urban contexts.	County – Major Arterial = 20 pts County – Arterial = 20 pts County – Collector = 20 pts Urban – Collector = 10 pts Urban – Local cul-de-sac = 0 pts Urban – Local other = 5 pts
Schools	To forge safe and healthy local mobility connections, especially for vulnerable road users, the provision of sidewalks near schools and along corridors in all directions deserve increased priority.	Within 500 m of a school = 20 pts
Pedestrian Activity Generators	Attention should be given to land uses more likely to generate pedestrian trips and gaps nearby should be prioritized.	Within 500 m of a Park, Library, Community Centre, Major Trail, Recreation Facility, Seniors Housing, Higher Density Housing = 5 pts each
Transit Route	Walking is a component of all transit trips, so continuous sidewalks are needed to bring passengers to and from the bus stops.	Along a transit route = 10 pts
No Sidewalks on Either Side	Filling in sidewalk gaps on streets where sidewalks are not present on either side is more important than where one side is already provided.	No sidewalks on either side = 20 pts
Desire Line	Paths worn by existing pedestrians show a demand for facilities not being met.	Along County Road = 20 pts Along Municipal urban collector road = 10 pts

Note: This tool is intended to prioritize sidewalk gaps already identified for future construction. Scoring is relative, and lower scoring segments are not necessarily excluded from sidewalk implementation.

6.5 Passenger Transit Strategies

Public transportation provides an important alternative to personal automobile travel to meet daily needs for those who are unable or would prefer not to drive. The provision of transit in Middlesex Centre is challenging due to its lower population density and significant travel distances between settlement areas and to/from neighbouring communities such as London, and requires creative solutions to improving transit service options. However, as the Municipality continues to experience population and employment growth, transit service ridership can be expected to increase.

6.5.1 Partnerships for Passenger Transit Connectivity

Overview

The Phase 1 report summarized the provision of existing transit services in and near Middlesex Centre. A map showing the routing of these services was also shown previously as Exhibit 5.3

The Municipality of Middlesex Centre does not currently operate public transit, the following bus and passenger rail services are operated through or near Middlesex Centre by other agencies or governments.

MIDDLESEX COUNTY CONNECT

Middlesex County Connect, operated by the County of Middlesex, currently provides the following service within Middlesex Centre and area:

- **Route 1: Lucan – Ilderton – Arva – London:** two morning southbound trips toward London and one northbound trip stop at Ilderton and Arva; while two late afternoon northbound trips and one southbound trip stop at Ilderton and Arva; London stops are at Maisonville Mall and at Fanshawe College.
- **Route 2: Woodstock – Ingersoll – Putnam – Dorchester – London:** One trip daily each way is timed to allow transfer between Routes 1 and 2 at Maisonville Mall or at Fanshawe College.

The routes run Monday to Friday inclusive.

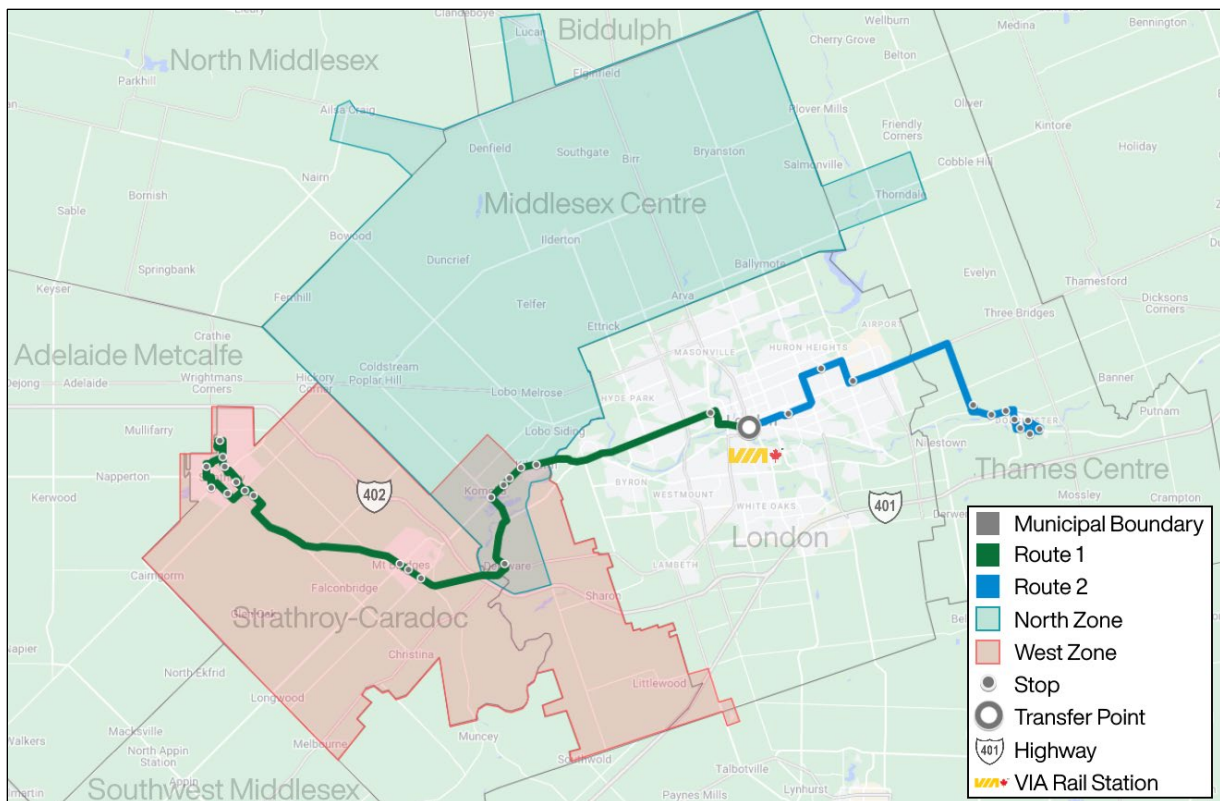
Of important note, the *Middlesex County On-Demand Transportation Needs Assessment Study (2023)* recommended a long-term hybrid transit solution as the preferred service delivery approach, as shown in Exhibit 6.11, including the following:

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- **Two fixed routes** forming an east-west spine across the corridor of highest travel demand, population density and residential development growth – the westerly route would include several stops in Delaware, Komoka and Kilworth;
- **Two on-demand zones** (north and west) overlapping in the Komoka-Kilworth area – the entirety of Middlesex Centre is covered between both zones (the new Amazon fulfillment Centre in Southwold is also included within the west zone); and
- **A taxi voucher program** to subsidize taxi trips in areas that do not initially receive transit service – because Middlesex Centre would have coverage with the above services, the taxi vouchers would not be applicable to Middlesex Centre.

Service improvements in the short-term represent important mobility options for Middlesex Centre residents and visitors, and the Municipality is supportive of these improvements and should continue to work with and support the County to ensure that these connections are provided.

Exhibit 6.12: Middlesex County Recommended Transit Service, Post-2025



Source: Arcadis IBI Group for County of Middlesex (2023). *Middlesex County On-Demand Transportation Needs Assessment Study*. Base map: Google Maps 2023 (cropped image).

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OTHER AREA PASSENGER TRANSIT SERVICES

Other passenger transportation services with operations through or near Middlesex Centre are outlined below.

GO Transit is a public transit system and division of Metrolinx (a provincial Crown agency) responsible for bus and rail service between major transit hubs in the Greater Golden Horseshoe. GO Transit expanded rail service along its Kitchener Line to southwestern Ontario, providing daily service between London and Toronto, as part of a pilot project launched by Metrolinx in 2021.

VIA Rail is a federal Crown Corporation and Class 1 railway that provides inter-city passenger rail service throughout Canada, operating along CN and CPKC-owned mainline tracks through Middlesex Centre. VIA Rail stations in the vicinity of Middlesex Centre include London, Glencoe, Strathroy, London and St. Marys.

London Transit Commission (LTC) currently provides service entirely within its municipal boundary, adjacent to Middlesex Centre.

Strathroy-Caradoc Inter-Municipal Transit provides scheduled fixed-route service along a Sarnia-Strathroy-Mount Brydges-Komoka-London route, stopping at the Komoka Wellness Centre and connecting to London VIA rail and London Airport. There are three runs in each direction on weekdays and two on weekend days.

Perth County Connect provides scheduled fixed-route service London-St. Marys-Stratford-Shakespeare-New Hamburg-Waterloo (Route 3), with no stops between St Marys and Masonville Place Mall in London. Although this route runs three trips per direction (Monday through Saturday) through Middlesex Centre along Highway 4, there are currently no stops within Middlesex Centre.

Huron Shores Area Transit's Route 2 is a scheduled fixed-route service from Grand Bend to London, stopping in Lucan and in London at Maisonville Place Mall and at University Hospital, running two trips per direction per day. Although this route runs through Middlesex Centre along Highway 4, there are currently no stops within Middlesex Centre. Route 4 Grand Bend-Strathroy runs two trips per direction daily near but not within Middlesex Centre.

Recommendation

Transit connectivity is an increasingly important component of the transportation system as residents and visitors seek and depend on improved alternate mobility solutions. The most feasible way for Middlesex Centre to improve its transit network is to advocate for improved **Middlesex County Connect** service, and the

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County's recommended transit service post-2025 represents a key opportunity to reduce barriers and provide access to transit options across Middlesex Centre in the short-term.

It is also recommended that Middlesex Centre forge new partnerships with neighbouring transit service providers to build on and expand existing services into Middlesex Centre. Forging partnerships with key agencies/governments to leverage the services of already established transit systems can be a more cost-effective solution for the Municipality to adopt.

The following priority transit service partnership opportunities are recommended for the Municipality to explore, in cooperation with the County of Middlesex:

Initiate discussions with London Transit Commission: Expanded LTC service would afford connectivity of nearby Middlesex Centre residents and visitors to a wide range of employment, as well education, shopping, medical and other opportunities within the City of London. Middlesex Centre, with support from the County of Middlesex, should initiate discussions with the LTC about the possibility of extending routes to nearby urban settlement area of Komoka-Kilworth. Connections to Delaware, Ilderton and Arva can also be explored into the future as these settlements continue to grow.

Initiate discussions with Perth County Connect and Huron Shores Area Transit: Adding stops along existing routes that currently pass through Middlesex Centre (i.e. in Arva and Birr) represent relatively simple opportunities that can help respond to transit needs for local residents.

Identify other service provider partnership opportunities: As new and planned major employment centres take off in the region (e.g. Delaware industrial complex, Amazon Fulfilment Centre in Southwold, St. Thomas Electric-Vehicle Battery Manufacturing Plant), supporting transit connections for workers will be key. The Municipality should identify appropriate transit service providers for possible connections into the broader region with a focus on connections to these major employment centres.

7. Summary and Next Steps

7.1 Summary of Phase 2

This report documents the second phase in the Middlesex Centre Transportation Master Plan study, that of identifying and evaluating potential network improvements to address the needs and opportunities identified in the first study phase. These actions were outlined in draft in the second round of study engagement, where they received general support from participants.

The study identified a transportation vision and three overarching transportation goals: Actions identified in this study phase are organized under the study's three mobility goals and by mode, informed by the overarching goals.

Preparing for new or expanded transportation infrastructure where needed is a key part of strategic long-term transportation planning. However, updated strategies, policies, guidelines and decision-making frameworks also have a significant impact on how transportation networks are used, improving the use of existing transportation infrastructure for a range of travel modes.

A key aspect of the transportation system in Middlesex County is the interconnectedness of transportation networks under Municipality jurisdiction with networks under the jurisdiction of the County, the Province, and adjacent municipalities. As a result, it is also important for the Municipality to collaborate with, partner with, or advocate to these other governments for improvements to transportation elements beyond Municipality jurisdiction.

Selected actions represented focus areas or supporting strategies that provided additional analysis or detail. These included the following:

- Assessment of proposed new infrastructure (i.e. a new Highway 402 and Carriage Rd interchange);
- Roads Strategies that included a functional road classification framework to help guide decision-making and road surface conversion policy review, among others;
- Pedestrian Strategies included a discussion of pedestrian crossing type selection and prioritization framework for sidewalk gaps;
- A Cycling Strategy focused on applying updated guidance to develop a cycling network plan for the Municipality based on the County's planned

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cycling network, and identifying priority connections to neighbouring communities; and

- A Transit Strategy focused on leveraging existing and potential partnerships for improved connectivity within Middlesex Centre and to/from key external destinations.

7.2 Next Steps

The third and final phase of the TMP study involves preparing a TMP summary report. This report summarizes the study findings and recommendations, and will also outline the implementation of recommended actions including cost estimates where applicable, and grouping the infrastructure projects and strategic actions into planning horizons (short-, medium- and long-term) with 2046 as the ultimate TMP horizon.

Phase 3 of the study includes presentation of study recommendations and documentation to Middlesex Centre Council. Following a formal 30-Day Public Review period, the TMP reports will incorporate feedback and stakeholder feedback as needed. The updated TMP reports will then be presented to Council for final approval.

Appendix A: Review of Stormwater Management Standards

Review of Stormwater Management Standards

A review of Middlesex Centre’s Infrastructure Design Standards regarding the Stormwater Collection system identified recommended additions and modifications to bring the guidelines closer in line to current best practices. These are outlined below.

Modifications

Section 1.1.12 Drainage Issues

Current:

Minimum Storm Event To Be Conveyed By Culvert:

Local & Secondary Collector - 25 Year Storm Event

Primary Collector & Arterial: 50 Year Storm

Event Bridges: 100 Year Storm Event or Regional storm event (250 year, subject to the Conservation Authority’s conditions)

Suggested revision to be consistent with MTO criteria below, while noting allowance for Conservation Authority conditions:

Design Flow Return Period for Bridges and Culverts – Standard Road Classifications

Functional Road Classification	Return Period of Design Flows (Years)* – Total Span less than or equal to 6.0 m	Return Period of Design Flows (Years)* – Total Span greater than 6.0 m	Check Flow for Scour
Freeway, Urban Arterial	50	100	130% of 100 year
Rural Arterial, Collector Road	15	50	115% of 100 year
Local Road	10	25	100% of 100 year

* Note: These are subject to conservation authority conditions, e.g. the Upper Thames River Conservation Authority (UTRCA) recommends that the detail design stage consider/ evaluate potential bridge configurations with the hydraulic capacity to convey - at a minimum - the 250-year return period flows, with additional consideration of a factor of safety for ice/debris blocking and/or future unknowns such as climate change. UTRCA also recommends that the evaluation consider the benefit of reducing flood risk/damages (upstream/downstream) with respect to the bridge hydraulic capacity.

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Section 4.8.3: Runoff Coefficients

Current:

Runoff coefficients are based on the amount of impervious area for a particular land use:

Parks, open space and playgrounds - 0.20

Single family/semi detached - 0.35 / 0.50

Townhouse/rowhouse - 0.65

Apartments - 0.65 / 0.70

Commercial, institutional and industrial - 0.70 0.90

Densely built, paved - 0.90

Recommended addition: Forest and dense wooded areas 0.10–0.25

Section 4.9: Mannings Roughness Coefficient

Current:

A coefficient of 0.013 is to be used for all concrete and PVC pipe for pipe sizes 300mm to 1650mm.

A coefficient of 0.011 is to be used for all pipe sizes 1800mm or greater.

Recommended revision:

The value of the roughness coefficient 'n' used in the Manning's formula shall be as follows:

Concrete Pipe - 0.013

Concrete Box Culverts - 0.013

Corrugated Metal 68 x 13mm corrugations - 0.024

Corrugated Metal 25% paved invert - 0.021,

PVC Pipe - 0.013

Missing Criteria

Climate Change Impacts

Apply an additional 25% to the peak flow for the minor design storm and include an additional 20% to the rainfall amount for the 100-year, 24-hour storm event (equally distributed over the 24-hour period) to account for the range of possible climate change outcomes.

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Storm Service Connection to Storm Sewers

If the service connection diameter is less than or equal to half the diameter of the main storm sewer, then no maintenance hole is required.

Storm Pipe Backfilling

Granular 'A' or as specified by geotechnical investigations

Easement Width

The minimum width of easements for storm sewers shall be in accordance with the following guidelines:

Size of Pipe	Depth of Invert	Minimum Width of Easement
250 to 375 mm	3.0 m maximum	3.0 m
450 to 675 mm	3.0 m maximum	4.5 m
750 to 1500 mm	3.0 m maximum	6.0 m
1650 mm and up	4.0 m maximum	4.0 m plus 3 times O.D. of Pipe

Zone of Influence

When a building is close to a buried pipeline, whether the building is in the easement, or close to it, the designer needs to ensure no loads are placed on the pipe. To avoid placing any load on the pipe, the base of any foundation should be below the zone of influence of the pipe. This zone of influence starts at the base of the pipe and rises at a slope of 1 in 1 to ground level.

Stormwater Quality Control

At a site level, applicants are required to provide a minimum treatment of 80% total suspended solids removal (TSS Removal) unless the site drains to an existing downstream stormwater management facility designed to provide enhanced (Level 1) protection, in which case such on-site control measures are voluntary.

Water Balance

The first 5 mm of runoff shall be retained on-site and managed by way of infiltration, evapotranspiration, re-use or filtration. This is calculated as the product of impervious site area times 5mm, excluding initial abstraction. This is a minimum requirement whereas applicable Master Drainage Plans or Subwatershed Plans may carry a higher minimum requirement. Methods to achieve this can

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include measures such as permeable pavements, infiltration systems, rainwater harvesting tanks, bioretention systems or green roofs.

Stormwater Quantity Control

The modified rational method, or equivalent (areas lesser than 40ha), is to be used for the analysis.

Major system to be designed comparing 100-year post- to 2-year pre-development flows where site drains to municipal storm sewers. If the site outlets to watercourse, particular conservation authority design criteria are to be followed.

Minor system to be designed using 2-year storm event.

A control device (orifice) must have a diameter of no less than 75 mm in order to prevent clogging of the opening and shall preferably be an orifice tube or pipe.

Ponding limits and available storage are to be depicted on the engineering drawings, and the maximum ponding depth in parking areas is not to exceed 300 mm.

An overland flow route shall be clearly marked and the grading of parking lots and landscaped areas must provide a safe overland flow path to the surrounding municipal right-of-way during storms exceeding the design storm event.

For institutional, industrial or commercial sites, roof drains should be selected to give a maximum discharge of 42 lps/ha of roof area.