Ministry of the Environment, Conservation and Parks

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Ontario

357-2019-441

MAY 31 2019

Brian Lima
Municipality of Middlesex Centre
10227 Ilderton Road
Ilderton ON N0M 2A0

Chris Traini
Middlesex County
399 Ridout Street North
London ON N6A 2P1

Dear Mr. Lima and Mr. Traini:

Between July 31 and August 3, 2018, I received two Part II Order requests asking that Middlesex County and the Municipality of Middlesex Centre be required to prepare an individual environmental assessment for the proposed Glendon Drive Streetscape project.

I am taking this opportunity to inform you that I have decided that an individual environmental assessment is not required. This decision was made after giving careful consideration to the issues raised in the requests, the project documentation, the provisions of the Municipal Class Environmental Assessment, and other relevant matters required to be considered under subsection 16(4) of the Environmental Assessment Act.

Despite my not requiring an individual environmental assessment be prepared, in reviewing the requests, it was noted that there were concerns about disruptions to the natural environment and the emergency gate alternative at Pulham Road and Old River Road. In order to ensure that the project area is properly surveyed for species at risk

habitat and that the residents of Old River Road are well informed of the operation of the emergency gate, I am imposing the following conditions on the project:

1. During detailed design, the Proponents shall consult with the Ministry of the Environment, Conservation and Parks' Species at Risk Branch regarding species at risk habitat.

    a. The Proponents shall ensure sufficient surveys for species at risk habitat are carried out, and that the project will be carried out in compliance with the requirements of the Endangered Species Act.

    b. In the event that any species at risk habitat are discovered during construction of the project, the Proponents will cease all work within the vicinity of the species in question, and contact the Ministry of the Environment, Conservation and Parks' Species at Risk Branch for further direction before proceeding with work on the project.

2. Following the development of the Gate Management Plan in consultation with Middlesex-London Emergency Medical Services and Middlesex Centre Fire Services, the Proponents shall notify and provide copies of the Gate Management Plan and any applicable contacts for its emergency operation to all residents of Old River Road.

3. The Proponents shall submit a written report to the Director, Environmental Assessment and Permissions Branch, on how it has fulfilled conditions 1 and 2.

The reasons for my decision may be found in the attached table. In the interest of transparency, I encourage you to make this letter available to the greater public on each of the Municipality's and County's websites.

With this decision having been made, the Municipality and County can now proceed with the project, subject to the conditions I have imposed and any other permits or approvals required. The Municipality and County must ensure the project is implemented in the manner it was developed and designed, as set out in the project documentation, and inclusive of all mitigating measures, commitments and environmental and other provisions therein.

Lastly, I would like to ensure that the Municipality and County understand that failure to comply with the Act, the provisions of the Municipal Class Environmental Assessment, and failure to implement the project in the manner described in the planning documents, are contraventions of the Act and may result in prosecution under section 38 of the Act.

I am confident that the Municipality and County recognize the importance and value of the Act and will ensure that its requirements and those of the Municipal Class Environmental Assessment are satisfied.

Sincerely,

Rod Phillips
Minister

Attachment

c: Requesters
Stephanie Bergman, Planner, Stantec Consulting Ltd.

EA File No. 18064
Glendon Drive Streetscape Municipal Class Environmental Assessment

Glendon Drive Streetscape Project
Municipality of Middlesex Centre and Middlesex County
Class Environmental Assessment

Minister's Review of Issues Raised by Requesters

Issue	Response and Analysis
Concern that the proposed realignment of the Glendon Drive and Old River Road intersection will negatively impact the natural environment.	The Proponents conducted inventories of all environmentally sensitive features within the study area. An Area of Natural and Scientific Interest (ANSI) was identified north of the existing intersection of Glendon Drive and Old River Road. Potential impacts to this ANSI from the proposed intersection realignment were assessed and deemed to be restricted to edge impacts adjacent to the existing roadways and are not considered to impact the function or significance of the ANSI. The Proponents have included mitigation measures to minimize potential impacts to the ANSI through vegetation protection, sediment and erosion control, and post-construction restoration plans, as outlined in the Environmental Study Report. The Ministry of Natural Resources and Forestry will be consulted during the detailed design stage for the development of post-construction restoration plans. I am satisfied that the Proponents have evaluated areas of environmental significance in accordance with the requirements of the Municipal Class Environmental Assessment, and that appropriate mitigation measures will be implemented in consultation with the Ministry of Natural Resources and Forestry for the Komoka Park Reserve ANSI.
Concern that left-turns at the Glendon Drive and Old River Road intersection are unsafe, and that a right-in, right-out alternative is more appropriate.	Several intersection configurations were evaluated as part of the proposed project. A right-in, right-out configuration that would restrict left-turn movements at Glendon Drive and Old River Road was screened out as the Proponents determined that it encourages unsafe and illegal U-turns on Glendon Drive for motorists

Issue	Response and Analysis
	travelling towards the City of London from Old River Road. A safety review completed at the onset of the Class Environmental Assessment determined that the existing design of the Thames River Bridge impeded sightlines around the intersection of Glendon Drive and Old River Road; contributing to the currently high collision rate at the intersection. The project proposes to address the deficiencies by raising and realigning the existing intersection westward to improve the geometry of the road junction and improve sightlines for drivers heading west. This realignment was considered necessary in order to improve upon the overall safety of the intersection for all road users. Residents and travellers on Old River Road will be permitted to make right-in, right-out movements, in addition to left-hand turns at the realigned intersection with Glendon Drive. The Proponents anticipate a reduction in collision rates at the intersection once the changes are completed. I am satisfied that this concern has been addressed.

Issue	Response and Analysis
Declaring Old River Road a 'Community Safety Zone' would better deter through traffic than the turnaround and emergency gate alternative.	During the project's public consultations, safety concerns were raised about increasing traffic volumes on Old River Road. Old River Road is a residential road with approximately 18 properties. Alternatives to reduce traffic volumes were considered and evaluated during project planning, including alternatives proposed by Old River Road residents. The alternative to construct a turnaround and emergency gate at Pulham Road was recommended for implementation. On their own, traffic calming measures such as speed cushions and signage were deemed ineffective at diverting significant volumes of traffic off of Old River Road. The turnaround and emergency gate was recommended as the best alternative to eliminate through traffic and improve safety conditions at the intersection of Old River Road and Glendon Drive. Public information centres were held on November 26, 2015, June 27, 2016, and November 30, 2017 to present the alternatives. Residents of Old River Road were consulted throughout the planning process. In addition to the implementation of the turnaround and emergency gate, as part of the first phases of project construction, the Proponents have committed to implementing and monitoring traffic calming measures, such as speed cushions and signage to determine the appropriateness of establishing a 'Community Safety Zone' on Old River Road. I am satisfied that the Proponents evaluated alternatives in accordance with the Municipal Class Environmental Assessment.

Issue	Response and Analysis
Concern that the turnaround and emergency gate alternative will increase response times for emergency services and prohibit access to delivery vehicles, school buses, and residents.	Public access to Old River Road will be maintained at all times at the intersection of Glendon Drive. The Proponents shared the concern about emergency access with Middlesex-London Emergency Medical Services and Middlesex Centre Fire Services. Both agencies expressed no concerns with the recommended turnaround and emergency gate alternative at Pulham Road provided it is kept clear of snow and is simple to operate with a padlock or a siren-operated mechanism. The emergency gate will be operated by Middlesex Centre and Middlesex County staff and emergency services staff in the event of an emergency or impasse at the south entrance of Old River Road at Glendon Drive. Local school bus operators were also consulted as part of the Class Environmental Assessment and expressed no operational concerns with the recommended alternative. The Proponents will prepare a Gate Management Plan to clarify the roles and responsibilities of the operation of the emergency gate, and local emergency services will be a part of these discussions. In order to ensure that the residents of Old River Road are well informed of the operation of the emergency gate, I am imposing a condition requiring the Proponents to notify and provide copies of the Gate Management Plan and any applicable contacts for its emergency operation to all residents of Old River Road.
Concern that the emergency gate will not be accessible during inclement weather.	Middlesex-London Emergency Medical Services and Middlesex Centre Fire services expressed no concerns with the recommended turnaround and emergency gate alternative provided it is kept clear of snow through regular maintenance. The Proponents committed to priority snow clearing of Old River Road as part of the municipality's winter maintenance program and committed to ongoing consultation with emergency services during the development of the Gate Management Plan. I am satisfied that this concern has been addressed.

Issue	Response and Analysis
Concern that vehicle access points for future development were not provided on Glendon Drive.	As part of the proposed project, the signalized intersection of Glendon Drive and Crestview Drive will provide access to anticipated development on the south side of Glendon Drive between Komoka Road to Vanneck Road. Future traffic estimates were incorporated into the project's Traffic Analysis as part of the Class Environmental Assessment. Appropriate turning movements for commercial vehicles were considered and identified for intersections and municipally approved developments. Access to Glendon Drive is subject to planning approval by the County of Middlesex (the co-Proponent) through the approval of the County Roads Department and will be addressed through access permits and site plan and subdivision approvals under Ontario's Planning Act. Matters of access requirements for specific development proposals must be addressed through the appropriate planning processes. It is not the intent of the Municipal Class Environmental Assessment to identify site-specific access requirements and designs. I am satisfied that this concern has been addressed.

Issue	Response and Analysis
Concern that the project fails to provide for a transition of speed zones along Glendon Drive, and that permanent on-street parking was not provided for the planned Village Centre lands development.	Municipal and County transportation policies were incorporated into the evaluation of alternatives for the project. The project proposes two new roundabouts at the intersections of Glendon Drive with Komoka Road, and Jefferies Road. These roundabouts will physically reduce vehicular speeds within the urbanized section of Glendon Drive. The posted speed limit between Komoka Road and Jefferies Road will be 50km/h. The Village Centre lands are located within this section. The Proponents will also implement additional speed control measures, by: • Reducing the speed limit of Glendon Drive between Jefferies Road and Kilworth Drive from 80km/h to 70km/h; and, • Constructing pavement markings and pedestrian traffic calming treatments where required throughout the study area. On-street parking during off-peak hours is also recommended for the urbanized section of Glendon Drive. The need to maintain a balance in providing for the efficient movement of traffic with the urbanized function of Glendon Drive was considered and documented throughout the planning of the project. Accordingly, on-street parking will not be provided during peak weekday AM and PM travel times in order to facilitate the needs of commuters travelling between the City of London and Highway 402. I am satisfied that this concern has been addressed.

Glendon Drive Streetscape
Schedule C Municipal Class Environmental Assessment

Environmental Study Report

Prepared for:
Municipality of Middlesex Centre,
Middlesex County

Prepared by:
Stantec Consulting Ltd.

August 3, 2018

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Executive Summary

Abbreviations

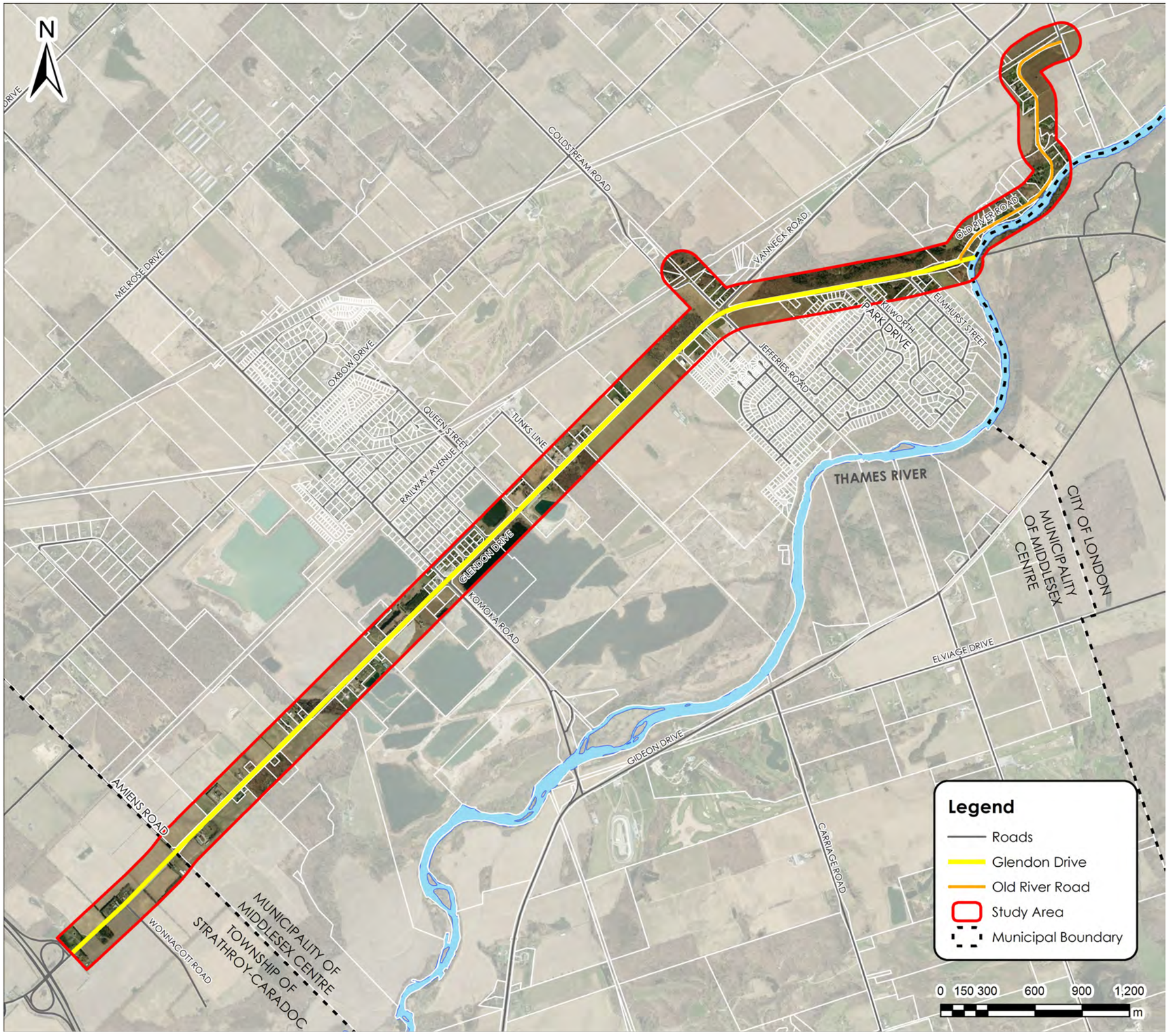
1.0 INTRODUCTION

Middlesex County and the Municipality of Middlesex Centre (Middlesex Centre) retained Stantec Consulting Ltd. (Stantec) to undertake a Municipal Class Environmental Assessment (Class EA) in accordance with the requirements for Schedule 'C' projects to identify transportation and streetscape improvements to Glendon Drive (County Road 14).

The communities of Kilworth and Komoka have seen significant growth in recent years, and are identified as a primary area for future growth within the Municipality of Middlesex Centre Official Plan. Glendon Drive currently functions as an east-west arterial road that provides local connectivity between the communities of Kilworth and Komoka, inter-County traffic, as well as a main commuter route to the City of London to the east and Highway 402 in the west. The improvements considered as part of this study include traffic and transportation planning, road design, streetscape design, active transportation, linear infrastructure and stormwater management, while having regard for the social and environmental functions within the corridor.

1.1 STUDY AREA

The study area for the Class EA includes the Glendon Drive corridor between the interchange with Highway 402 and the Thames River Bridge, including 120 metres on either side. During the project, the study area was extended to include the Old River Road corridor in order to adequately address the operational and safety concerns identified at the Glendon Drive and Old River Road intersection. The study area was also extended to include Coldstream Road from its intersection with Glendon Drive to just north of the CN Rail underpass to address concerns at the intersection, as well as concerns associated with road geometry and sightline concerns at the railway underpass structure.

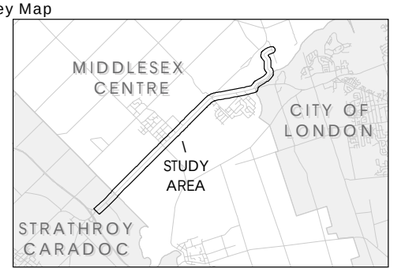


Glendon Drive
paving the way for an active community

middlesex centre
in the centre of it all

middlesex county

Key Map



Notes

1. Coordinate System: NAD 1983 UTM Zone 17N
2. Base features produced under license with the Ontario Ministry of Natural Resources © Queen's Printer for Ontario, 2016.
3. Orthoimagery © First Base Solutions, 2016

December 2016

Stantec

Figure No. 1.1

Study Area

\\CD1217-F01\work_group\016141\active\161413164\design\drawing\GIS\MXD\EnviroStudy\161413164_FigA_StudyArea.mxd
Revised: 2016-12-21 By: albrown

1.2 REPORT FORMAT

This Environmental Study Report (ESR) was prepared to document the Class EA process, in accordance with the requirements for Schedule C projects as identified in the Municipal Engineer's Association Municipal Class Environmental Assessment document (2000 as amended in 2007, 2011 and 2015). The general outline is as follows:

- An overview of the Class EA process;
- The public consultation plan followed throughout the study;
- Identification of the problems and opportunities identified for the Glendon Drive study area;
- An overview of relevant background studies, guidelines, and policy documents that provide the framework for improvements;
- A description of the existing conditions in terms of the socio-economic, cultural, and natural environments;
- An overview of the results of the traffic analysis performed for the Glendon Drive corridor, and the identification of transportation needs;
- Identification and evaluation of planning solutions to address the problems identified;
- Identification and evaluation of design alternatives to implement the preferred planning solutions;
- A description of the preferred designs, including identified impacts to the socio-economic, cultural, and natural environment and associated mitigation measures.

2.0 MUNICIPAL CLASS EA PLANNING PROCESS

All municipalities in Ontario are subject to the provisions of the *Environmental Assessment Act* (EA Act) and its requirements to prepare an Environmental Assessment (EA) for applicable public works projects. The Ontario Municipal Engineers Association (MEA) *Municipal Class Environmental Assessment* document (October 2000 as amended in 2007, 2011, and 2015) provides municipalities with a five-phase planning process approved under the EA Act to plan and undertake all municipal infrastructure projects in a manner that protects the environment as defined in the Act.

Key Components of the Class EA planning process include:

- Consultation with potentially affected parties early and throughout the process;

- Consideration for a reasonable range of alternative solutions;
- Systematic evaluation of alternatives;
- Clear and transparent documentation; and
- Traceable decision-making.

Types of Projects

The MEA Class EA document provides a framework by which projects are classified as Schedule A, A+, B, or C. Classification of a project is based on a variety of factors including the general complexity of the project and level of investigation required, and the potential impacts on the natural and social environment that may occur. It is the responsibility of the proponent to identify the appropriate Schedule for a given project, and to review the applicability of the chosen schedule at various stages throughout the project. Each of the schedules require a different level of documentation and review to satisfy the requirements of the Class EA, and thus comply with the EA Act as noted below.

Schedule A projects are limited in scale, have minimal adverse impacts on the natural and social environments, and include the majority of municipal sewage operations, stormwater management, water operations, and maintenance activities. These projects are pre-approved and may be implemented without following the procedures outlined in the Class EA planning process, or undertaking public consultation. Examples of Schedule A projects include watermain and sewer extensions where all such facilities are located within the Municipal road allowance or an existing utility corridor.

Schedule A+ projects are similarly pre-approved, but require that proponents notify potentially affected parties prior to implementation. The public has a right to comment to municipal official or their council regarding the project; however, since these projects are pre-approved, there is no appeal process to the Minister of the Environment and Climate Change (MOECC).

Schedule B projects have the potential for some adverse environmental and social effects, and proponents are thus required to undertake a screening process involving mandatory contact with potentially affected members of the public, First Nations Communities, and relevant review agencies to ensure that they are aware of the project and that their concerns are addressed. Schedule B projects require the completion of Phases 1 and 2 of the Class EA planning process, which is documented in a Project File that is submitted for a mandatory 30-day public review period. If concerns are raised that cannot be resolved, any member of the public may appeal to the MOECC to issue an order to comply with Part II of the EAA, bumping up the status of the project. Part II Order requests are discussed further below.

Schedule C projects have the potential for significant environmental impacts and must follow the full planning process specified in the Class EA document including Phases 1 through 4. The

project is documented in an Environmental Study Report (ESR), which is then filed for review by the public, review agencies, and First Nations Communities. If concerns are raised that cannot be resolved, the Part II Order procedure may be invoked. Projects generally include the construction of new facilities, and major expansions to existing facilities.

Municipal Class EA Planning Process
August 3, 2018

Five Phase Planning Process

Figure 2.1 provides an overview of the Municipal Class EA planning process. Figure 2.2 provides additional detail and incorporates steps considered mandatory for compliance with the requirements of the EA Act.

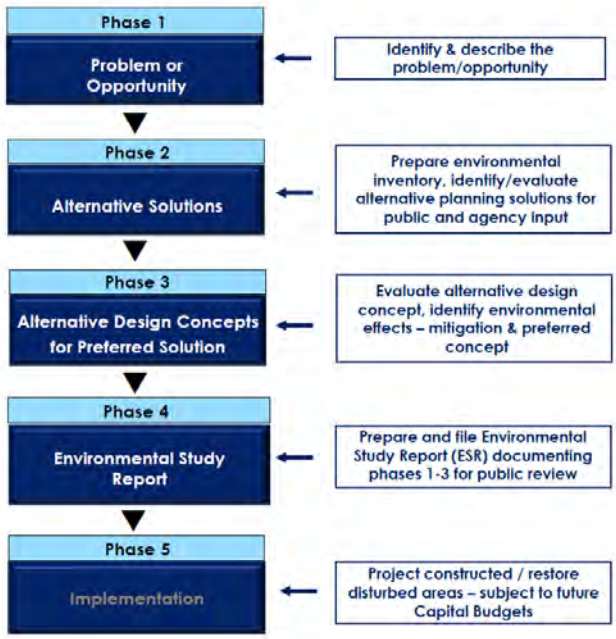


Figure 2.1 Five-Phase Planning Process

Phase 1: Identify the problem (deficiency) or opportunity, which may include public consultation to confirm/review the problem or opportunity.

Phase 2: Identify a reasonable range of alternative solutions to address the problem or opportunity. This phase also includes an inventory of the existing environment, and to assist in the evaluation of alternatives. A preferred solution is chosen based on the results of the evaluation and taking into account input from the public, review agencies, and Aboriginal and First Nations communities. It is at this point that the appropriate project Schedule is chosen and/or confirmed. If the project is identified as a Schedule B activity, the process and decisions are then documented in a Project File. Schedule C projects proceed through Phases 3 and 4.

Phase 3: (For Schedule C projects only) Examine the alternative methods for implementing the preferred solution, i.e. design alternatives, based upon the existing environment, public and agency input, anticipated environmental effects and methods for minimizing negative effects and maximizing positive effects.

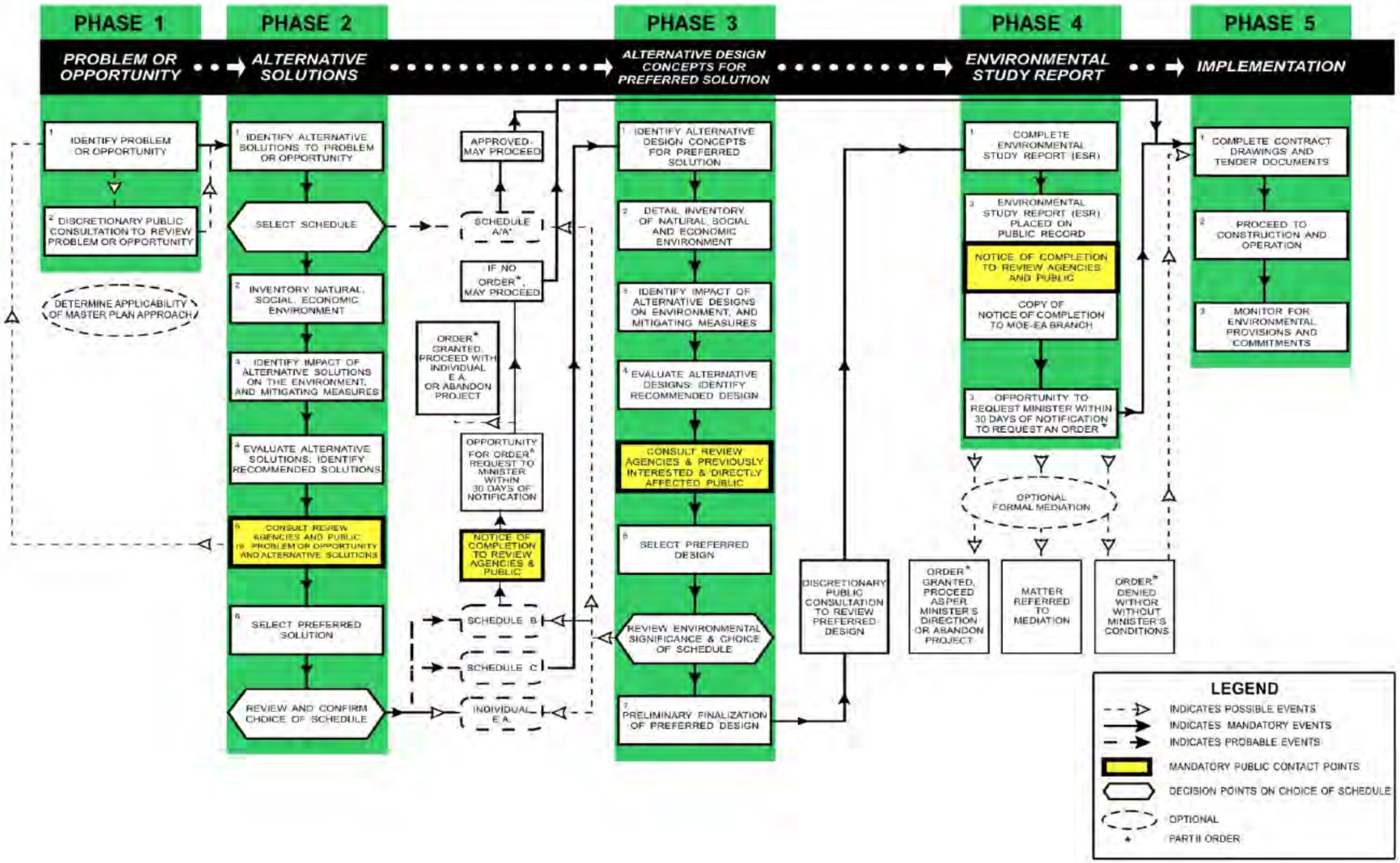
Phase 4: (For Schedule "C" projects only) Document the Class EA process followed in an Environmental Study Report (ESR), which includes a summary of the rationale and the planning, design, and consultation process followed for the project and make the documentation available for consideration by the public, review agencies, First Nations Communities for a mandatory 30-day review period.

Phase 5: Complete contract drawings and documents, and proceed to construction and operation with monitoring to ensure adherence to environmental provisions and commitments.

Municipal Class EA Planning Process
August 3, 2018

The Municipal Class EA process and associated documentation serves as a public statement of the decision making process followed by municipalities for planning and implementation of necessary infrastructure.

MUNICIPAL CLASS EA PLANNING AND DESIGN PROCESS



Notes

1. Municipal Engineers Association Municipal Class Environmental Assessment (2000 as amended in 2007, 2011 & 2015)

December 2016

Figure No. **2.2**

Class EA Planning Process

3.0 CONSULTATION PLAN

Consultation is a vital part of the Class EA process. Active engagement with all potentially affected parties including government agencies, community members, special interest groups, and First Nations Communities ensures a transparent and responsible planning process. Additionally, the Urban Design and Place-Making elements of this project will benefit immensely from meaningful and engaging consultation with the members of the Komoka-Kilworth community.

At the initiation of the project, a mailing list was created which includes relevant federal and provincial government agencies, local government officials, fire and EMS services, potentially interested First Nations communities, special interest groups, as well as land developers active within the Komoka-Kilworth area. The mailing list was updated throughout the study to include those who expressed interest in the study. Addresses for all properties within the study area (Glendon Drive from the interchange with Highway 402 in the west, extending to Glendon Drive at the Thames River crossing in the east) have also been compiled and used for the mailout of the initial Notice of Commencement.

All project notifications were sent via mail or email (where requested) to the project mailing list, posted on the Middlesex County and Middlesex Centre websites (www.middlesex.ca and www.middlesexcentre.on.ca), as well as the Glendon Drive online community (glendondrive.mindmixer.com). Project mailing list and study notifications are included in **Appendix A.1**.

Table 3.1 documents the points of contact with all identified stakeholders throughout the project.

Table 3.1 Points of Contact

Purpose	Distribution	Date
Notice of Commencement: To provide description of the project and study area, contact information for key project members, and	Direct mail-outs to all identified stakeholders (federal, provincial, local governments, fire and EMS services, Aboriginal Communities, land developers, and properties located within study area).	Property Owners – Sept. 21, 2015 – Canada Post
		Agencies/ Aboriginal Communities - Canada Post: Sept. 18, 2015
		Developers – Email September 21, 2015

Consultation Plan
August 3, 2018

Purpose	Distribution	Date
information on the website/ public engagement forum.	Publication in the London Free Press (Two separate editions).	September 26 & October 3, 2015
	Publication on the County and Municipality's websites as well as other social media.	Starting October 2, 2015
Public Information Centre #1 To present work completed to date, including alternative solutions, preliminary evaluation, methodology, and preliminary preferred panning solutions for public comment.	Directly mailed to all stakeholders identified on the project mailing list, including government agencies and Aboriginal communities, and property owners.	Canada Post – November 11, 2015
	Notice published in Middlesex Banner and Londoner newspapers (Two separate editions), Municipality/County's website, and other social media platforms.	Londoner – November 19th, and 26th, 2015; Banner – November 18, and 25, 2015
	PIC material and comment sheet made available on Municipality and County's website, as well as glendondrive.mindmixer.com.	November 27, 2015
	PIC material emailed to First Nations communities.	January 11, 2016
Pubic Information Centre #2 To present work completed to date, including design alternatives of the preferred planning solution and evaluation of the design alternatives.	Notice published in the Middlesex Banner, and Londoner	Londoner – June 16 and 23, 2016; Banner – June 15 and 22, 2016
	Directly mailed to all stakeholders identified on the project mailing list, including government agencies and Aboriginal communities, and property owners. A letter was also couriered to all residents along Old River Road indicating consideration of alternatives to address concerns at its intersection with Glendon Drive.	June 13, 2016
	PIC material and comment sheet made available on Municipality and County's websites, as well as glendondrive.mindmixer.com.	June 28, 2016
	PIC material and update information mailed to First Nations Communities	June 29, 2016

Consultation Plan
August 3, 2018

Purpose	Distribution	Date
Additional Stakeholder Consultation	Upper Thames River Conservation Authority	Correspondence throughout the project, meeting January 13, 2017
	Old River Road Community Group	Correspondence between September 2016-April 2017 and onward. Community Meeting April 18th, 2017
	Coldstream Road Residents – letters were distributed to property owners along Coldstream Road informing of alternatives being considered.	March 24, 2017 and September 22, 2017
Public Information Centre #3 To provide an update on changes to the study, including updated recommendations at the Jefferies Road/Vanneck Road/Coldstream Road intersection with Glendon Drive, along Old River Road, and Coldstream Road.	Notice published in the Middlesex Banner, and Londoner	Londoner: Nov 5th and 18th, 2017; Banner: November 8th and 22nd, 2017
	Directly mailed to all stakeholders identified on the project mailing list, including government agencies and First Nations communities, and property owners.	November 10th, 2017
	PIC material and comment sheet made available on Municipality and County's websites, as well as glendondrive.mindmixer.com.	December 1, 2017.
Notice of Completion: To outline the preferred design alternatives, identify the mandatory 30-day review period for the completed ESR, and where the report has been made available. Provide an overview of the Part II Order request procedure.	Notice to be published in all media as above, and every member of the mailing list. Copies of the ESR to be made available for public review at the Wellness and Recreation Centre, the Komoka Public Library, and as a PDF document on the Municipality/County's website.	

3.1 TRACER – TEAM RESPONSE AND COMMITMENT TO ENVIRONMENTAL RESPONSIBILITIES

All correspondence from the public, agencies, and First Nations Communities has been documented in a TRACER (Team Response and Commitment to Environmental Requirements) table. The TRACER tables document the contact information, date, comment/issue, response (if required), and how the comments have been addressed as part of the study. This format provides a comprehensive, transparent system for documenting stakeholder input in the study, and where possible, how that input has been incorporated into the study process and recommendations. Separate TRACER tables have been maintained throughout the study for Agency and First Nations Communities, and included in **Appendix A**.

3.2 FIRST NATIONS COMMUNITIES

Based on information from the Aboriginal Treaty Rights Information System (ATRIS) administered by Aboriginal Affairs and Northern Development Canada, the following communities were identified as having the potential for interest in this study:

- Chippewas of the Thames First Nations;
- Oneida Nation of the Thames;
- Munsee-Delaware Nation;
- Delaware Nation (Moravian of the Thames);
- Bkejwanong Territory (Walpole Island);
- Caldwell First Nation;
- Chippewas of Kettle and Stoney Point First Nations; and
- Aamjiwnaang First Nation.

The first point of contact for this project is the Notice of Commencement, which was sent via direct mail to the communities listed above on September 18, 2015. All public material has been forwarded to the above Communities, and follow-up phone calls/emails were conducted to ensure that communities had sufficient information to determine consultation interests.

Correspondence was received from Chippewa of the Thames First Nation, stating that the project had been given a high value for the community, due to its location within lands subject to the Longwoods Treaty (1820), and within lands included in the Big Bear Creek Additions to Reserve Lands selection area. An open line of communication has been maintained throughout

the project, and a meeting was held on January 27, 2016. COTTFN requested that they be notified and involved in any additional archaeological field work undertaken as part of this project (in addition to the Stage 1 assessment completed early in the project).

A meeting was also held with Chief Louise Hiller of Caldwell First Nation on January 29, 2016. Chief Hillier requested that enhanced measures be included in the ESR to prevent the establishment of invasive species, and have been included in the recommendations to carry forward into detailed design and construction. Chief Hillier also suggested that Black Willows be considered for landscaping improvements along the corridor, which had been used during traditional ceremonies.

All communications with the above First Nations Communities throughout the project has been documented in a TRACER table included in **Appendix A.5**.

3.3 THE GLENDON DRIVE ONLINE COMMUNITY

The growing popularity of social media has opened new avenues for public engagement in municipal planning projects. To improve the identification of project needs and goals of the community, we utilized the public engagement forum MindMixer. A dedicated online community was developed for the Glendon Drive Streetscape project found at glendondrive.mindmixer.com. Those interested in the project were encouraged to sign-in using their existing Facebook account or email address, and provide their concerns or feedback on the project through the various surveys, polls, and mapping applications. This additional public engagement tool was used to extend the reach of the project, engaging those members of the community that may not typically participate in the standard means of public consultation – namely Public Information Centres – but who nonetheless make up the diverse fabric of the community and can provide valuable input towards the development of a livable, active, and welcoming environment that fits the needs of the entire community. All project notifications and public documents were made available for review and comment on the project website **glendondrive.mindmixer.com**. Comments received from the Mindmixer website are included in **Appendix A.3**.

4.0 PHASE 1 – PROBLEMS AND OPPORTUNITIES

Phase 1 of the Class EA process involves the identification of all factors leading to the need for improvements, and the development of a clear statement of the problems and opportunities to be addressed as part of the study.

4.1 PHASE 1 PUBLIC CONSULTATION

At the outset of the project, the Notice of Commencement was published in the London Free Press, mailed to all properties within 120m of the Glendon Drive corridor, posted on the Middlesex Centre and Middlesex County websites, and mailed to all other agencies and stakeholders identified on the study mailing list (**Appendix A.1**). The Notice provided a link to the glendondrive.mindmixer.com website and solicited comments from the public and agencies regarding existing issues or concerns along the Glendon Drive corridor. Additionally, a mapping application was posted to the website, which allowed participants to identify problem locations or opportunities for improvement.

Over 40 participants visited the site, and 20 comments were submitted within the first few weeks of its launch. All comments submitted are included in **Appendix A.3**, and a summary is provided below.

Table 4.1 Comment Summary

Topic	Comment Summary
Active Transportation	The need for active transportation facilities along the corridor was a strong theme among many of the Mindmixer discussions, including providing access to the Middlesex Wellness and Recreation Centre and local parks, and appropriate cycling facilities throughout the corridor.
Traffic Operations	Safety concerns were identified at Old River Road, where many 'near misses' occur due to vehicle speeds, and motorists not obeying the existing turn-restriction signage. Operational issues were identified at the Glendon Drive/Jefferies intersection, including the need for dedicated right turn lanes, and signal timing modifications to reduce the delay for motorists turning left onto Glendon Drive.

Topic	Comment Summary
Natural Environment	The wooded area along the north of Glendon Drive between Old River Road and Vanneck Road contain important natural resources and a significant community vista.

All additional communications received from the public, agencies, and First Nations communities are included in the TRACER tables within **Appendix A.3**, **A.4**, and **A.5**. An example of the glendondrive.mindmixer.com comment mapping tool is provided in Figure 4.1.

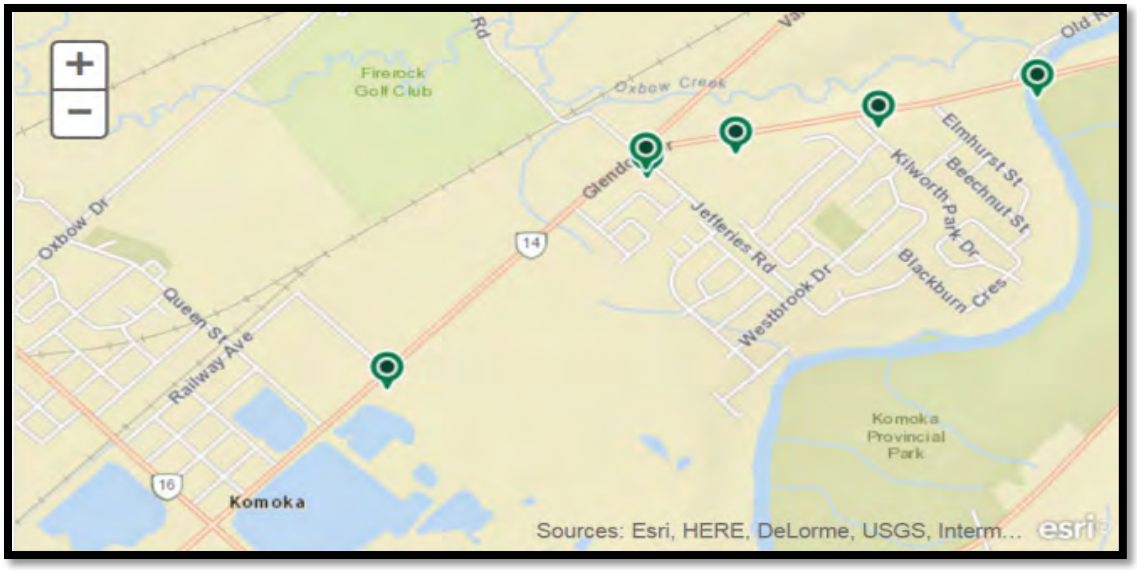


Figure 4.1 Mindmixer Comment Mapping Tool

4.2 PLANNING AND POLICY DOCUMENTS

Several planning and policy documents have been reviewed as part of the Class EA process. These documents provide a description of the existing and planned conditions within the study area and surrounding neighbourhoods which provide the framework for identifying alternatives.

The Planning Act 2005

The Planning Act (2005) sets the framework for land use planning in Ontario. According to the provisions in the Planning Act, the Province of Ontario is the primary authority for planning matters within the Province, and the Act enables the Province to delegate some of its planning authority to the upper-tier municipalities (i.e. counties, regional/district municipalities and planning boards) while retaining control through the approval process. Municipalities must

conform to approved policies of the Provincial government and its agencies. Provincial ministries, municipal councils, planners, and other stakeholders implement the Act when such actions include:

- Preparing Official Plans and planning policies that guide future development considering provincial interests, such as protecting and managing natural resources;
- Regulating and controlling land uses through zoning by-laws and minor variances; and
- Dividing land into separate lots for sale or development through Plans of Subdivision or Land Severance.

Provincial Policy Statement

The Provincial Policy Statement (PPS), issued under Section 3 of the Planning Act, sets a policy foundation for regulating the development and use of land. It provides direction on matters of provincial interest and supports the enhancement of the quality of life for all citizens of Ontario. In accordance with Section 3 of the Planning Act, decisions affecting planning matters shall have regard for the Provincial Policy Statement.

Section 1.0 Building Strong Communities outlines that Ontario's long-term prosperity, environmental health and social well-being depend on wisely managing change and promoting efficient land use and development patterns. Efficient land use and development patterns support strong, livable, and healthy communities, protect the environment, public health and safety and facilitate economic growth.

The following provides an overview of policies relevant to the Glendon Drive Class EA:

1.1 Managing and Directing Land Use to Achieve Efficient and Resilient Development and Land Use Patterns:

- Promoting efficient land use which sustains the financial well-being of the Province and municipalities over the long term;
- Accommodating an appropriate range and mix of land uses to meet long-term needs;
- Avoiding land use which may cause environmental or public safety concerns;
- Avoiding land use patterns which may prevent the efficient expansion of settlement areas;
- Promoting cost-effective development patterns and standards to minimize land consumption and servicing costs;

- Improving accessibility for persons with disabilities and removing land use barriers which restrict their full participation in society;

- Ensuring necessary infrastructure, and public service facilities are or will be available to meet current and project needs; and

- Promoting land use patterns that conserve biodiversity and consider the impacts of a changing climate.

1.2 Coordination:

- A coordinated, integrated, and comprehensive approach should be used when dealing with planning matters within municipalities including managing/promoting growth and development, economic development strategies, managing natural heritage and water resources, infrastructure, and natural hazards.

1.5 Public Spaces, Recreation, Parks, Trails, and Open Space:

- Planning public streets to be safe, meet the needs of pedestrians, foster social interaction, and facilitate active transportation and community connectivity to promote healthy active communities;

- Recognizing provincial parks, conservation reserves, and other protected areas and minimizing negative impacts on these areas.

1.6 Infrastructure and Public Service Facilities

- Providing infrastructure in a coordinated, efficient, and cost-effective manner that considers impacts from climate change while accommodating projected needs. Before considering new infrastructure, the use of existing should be optimized and opportunities for adaptive re-use considered, as well as the consideration of green infrastructure. The effective and efficient delivery of emergency services should be considered for strategic location of infrastructure.

- Sewage and water systems shall be planned in a manner that accommodate expected growth in a manner that: promotes the efficient use and optimization of existing municipal services and private services where municipal series are not available; is feasible, financially viable; complies with all regulatory requirements; protects human health and the natural environment; integrates servicing and land use considerations at all stages of the planning process

- Stormwater management systems shall be planned to: minimize/prevent increases in contaminant loads; minimize changes in water balance and erosion; not increase risks to

human health, safety, and property damage; maximize the extent and function of vegetative and pervious surfaces, and promote stormwater management best practices including stormwater attenuation and re-use, and low impact development.

1.7 Transportation Systems

- Safe, energy efficient transportation systems will be planned to: facilitate the movement of people and goods; support connectivity within and among multimodal transportation systems; and to support current and future use of transit and active transportation.

2.1 Wise Use and Management of Resources – Natural Heritage

- Natural features in the study area will be identified per Provincial standards and guidelines, and development and site alteration will be directed away from sensitive natural areas.

2.6 Cultural Heritage and Archaeology

- The potential for cultural heritage and archaeological resources will be identified within the study area, and appropriate recommendations made to protect and conserve resources identified.

3.1-3.2 Protecting Public Health and Safety – Natural and Human Made Hazards

- Natural and human made hazards will be identified within the study area, and development/site alteration will not be identified that increase risks associated with natural or human made hazards.

In accordance with Section 3 of the Planning Act, this Class EA shall have regard for policies of the PPS through the identification of a range of transportation improvements, considering vehicular and active transportation users, and the range of existing and future adjacent land uses.

Middlesex County Official Plan

The Official Plan (OP) for the County of Middlesex, an upper-tier municipality, establishes a Growth Management hierarchy for settlement areas to provide environmentally responsible growth and avoid conflict with natural features and hazards, and agricultural areas. This hierarchy includes Urban Areas, Community Areas, and Hamlets. In addition to Urban Areas, Community Areas are expected to accommodate future growth through population projections. Community Areas must demonstrate the potential to provide a level of service necessary to support future growth.

Transportation Policies (OP Section 2.4.2)

The transportation network within the County consists of a hierarchy of roads owned and maintained by the Federal Government, the Province, the County and local municipalities, and are classified as Provincial freeways and highways, county roads, and local roads.

On Schedule 'B' of the County's Official Plan, Glendon Drive is classified as a 4-lane Arterial County Road for the full length of the Study Area (**Figure 4.2**). County roads are primarily intended for the efficient movement of people and goods between provincial freeways and local roads, and private access is discouraged and controlled by By-law #5783 which requires permit approval for the alteration/creation of accesses to county roads. Development that would impede traffic movement along county roads shall be discouraged.

The County OP identifies minimum right of way limits

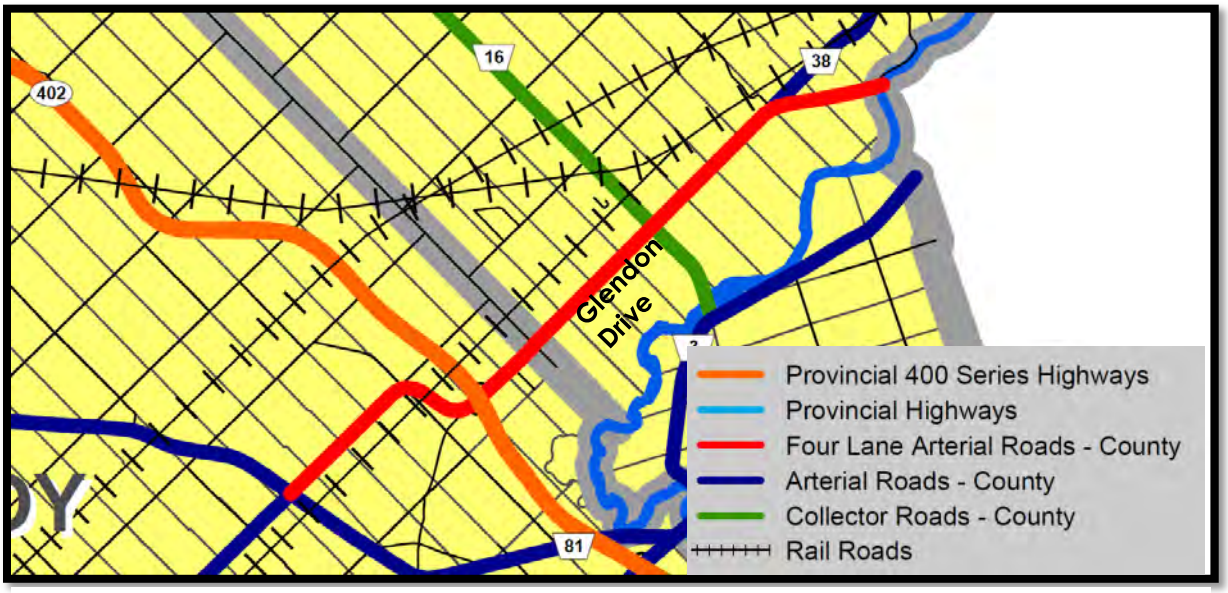


Figure 4.2 Schedule B - Transportation Middlesex County Official Plan

It is acknowledged that the speed and volumes of County roads may have an impact on adjacent land uses, and where they run adjacent to Residential areas, noise and vibration measures will be employed, and back-lotting will be encouraged. Land uses deemed appropriate for areas adjacent to County roads include Agricultural, Industrial, Commercial, and Open Space.

Section 2.4.2.3 provides right-or-way widths for Arterial County roads as 36m, and 30m for arterial County roads constructed to an urban standard within Settlement Areas. Section 2.4.2.4 provides the minimum setback where a building or structure is to be erected on a lot adjacent

to an arterial County road as 38m, with specific setbacks for County roads constructed to an urban standard provided in the local zoning by-law.

Aggregate Resources (OP Section 2.2.3)

The Settlement Areas of Kilworth and Komoka are located within an area identified on Schedule 'C' of the County OP as an Aggregate Resource Area, subject to the policies in Section 2.2.3. These policies are intended to balance competing priorities for the protection of resources, and the need to protect various land uses. Land uses that do not prevent future extraction may be permitted within Aggregate Resource Areas, and other land uses may also be permitted provided supporting documentation is provided that demonstrates future extraction is neither practical nor economical.

Natural Environment Policies (OP Sections 2.2.1 and 3.4.1)

The County's Official Plan outlines policies for the Natural System which includes Natural Hazards, Natural Environment Areas, Natural Heritage Features, and Groundwater Features. While the policies do not preclude development in these areas, they are intended to protect them from adverse impacts of development. Schedule 'C'(Figure 4.3) maps significant woodlands, which have been identified as such through the Middlesex Natural Heritage Study (MNHS), as well as Areas of Natural and Scientific Interest (ANSI), identified for protection by the Ontario Ministry of Natural Resources and Forestry. Schedule 'C' is not intended as a land-use schedule, and the use of land within and contiguous to natural features shall proceed in accordance with the underlying land use designations shown on Schedule 'A' (2.2.1.3 – Natural Systems Policies, pg. 2-7), as well as those of the local Municipal Official Plans.

The Komoka ANSI, located south of Glendon Drive along the edges of the Thames River, is within the 120m area included within the Study Area.

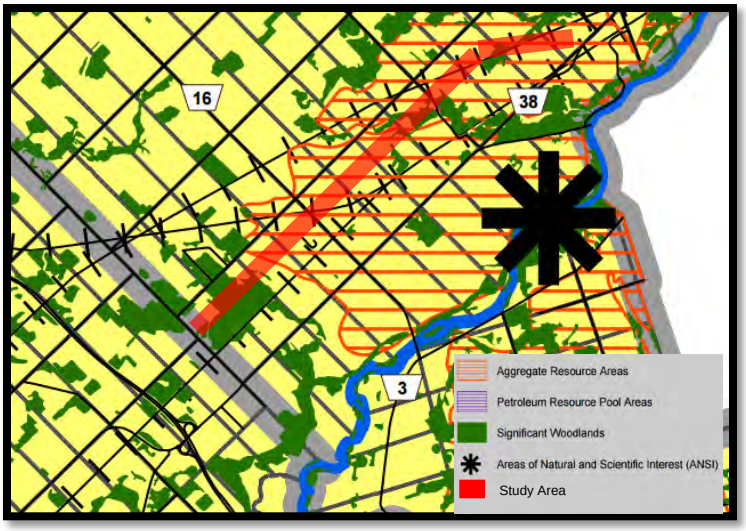


Figure 4.3 Schedule C – Natural Heritage Middlesex County OP

Natural Environment Areas designated on land use Schedule 'A' are subject to the policies within Section 3.4. As shown in Figure 4.4, there are areas designated as Natural Environment (Wetlands) within the Study Area. Development shall not be permitted within areas designated as Wetlands, and development proposed within 120m of areas identified as Wetlands are subject to the completion and approval of a Development Assessment Report (DAR). According to the Middlesex County Official Plan, 'Development' includes the creation of a new lot, the change in land use, or the construction of buildings or structures subject to the Planning Act, but does not include the creation or maintenance of infrastructure authorized under the Environmental Assessment process; thus improvements to the Glendon Drive Corridor will not be subject to a DAR.

Middlesex Natural Heritage Study (MNHS 2014)

The final draft of the MNHS was endorsed by Council on October 6, 2014, and is to be used as the basis for public and stakeholder consultation, providing the base science to support the County's natural heritage planning. The study, however, has not yet been incorporated into the County's Official Plan. The report and accompanying mapping have been reviewed as part of this study, and will be incorporated into the natural heritage considerations throughout the project. Although the Middlesex County Official Plan has adopted vegetation mapping provided in the MNHS 2003, the Municipality of Middlesex Centre Official Plan has adopted mapping from the updated MNHS 2014.

Municipality of Middlesex Centre Official Plan

The Official Plan (OP) for the Municipality of Middlesex Centre is intended to guide development and physical change, address local issues and characteristics based on a set of goals, objectives, and policies, and must confirm to the County of Middlesex Official Plan. General principles of the OP involve the preservation of the traditional 'Town and Country' planning framework, supporting a more community-oriented planning and design approach. The Komoka-Kilworth settlement area is subject to the general transportation, natural environment, land use, and servicing policies within the OP, and more specific policies have been developed within the Komoka-Kilworth Secondary Plan discussed below.

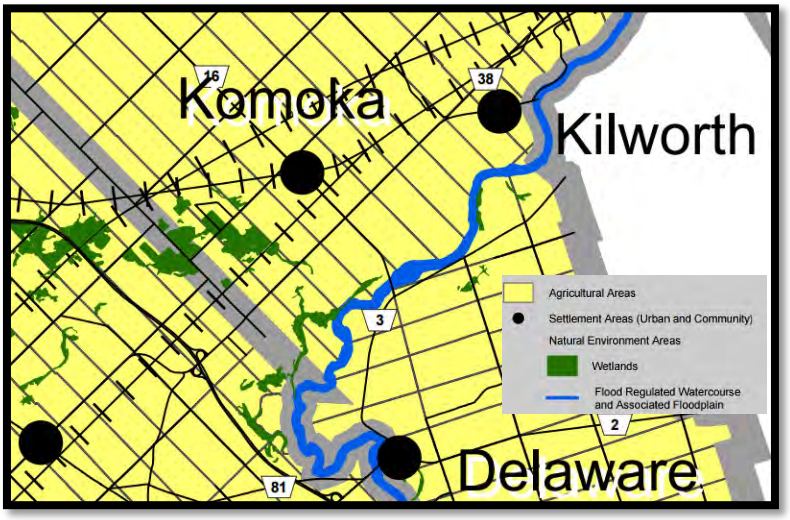


Figure 4.4 Schedule A - Land Use Middlesex County Official Plan

Transportation Policies (OP Section 9.4)

The Municipal transportation structure and accompanying policy align with those of the County OP in terms of the function of and access to County Roads. The General Transportation Goals relating to the Municipality's transportation system found in Section 9.4.1 be considered throughout the project, in addition to Transportation Policies found within the Komoka-Kilworth Secondary Plan discussed below. General Transportation Policies include the following: facilitating efficient movement of people and goods, improving safety, preserving the character of scenic roads within the context of new developments, promoting the establishment of pedestrian friendly and visually appealing environments within settlement areas, considering bicycle and pedestrian transportation options within and between settlement areas (in conjunction with local Parks and Trails Master Plans), and to limit direct access to County roads.

Natural Environment Policies (OP Section 3)

The Municipality's natural system includes Natural Heritage Areas and Floodplains on Schedule 'A', Greenland Features on Schedule 'B', and Natural Hazard Areas on Schedule 'C'. Within the

OP, the natural features are divided into: Natural Environment Areas (shown on land use Schedule 'A') within which development is prohibited; Significant Woodlands (shown on Schedule 'B'), within which development and site alteration may be permitted subject to the results of a Development Assessment Report (DAR); and areas where preservation is generally encouraged (such as Natural Heritage Enhancement Areas on Schedule A-2).

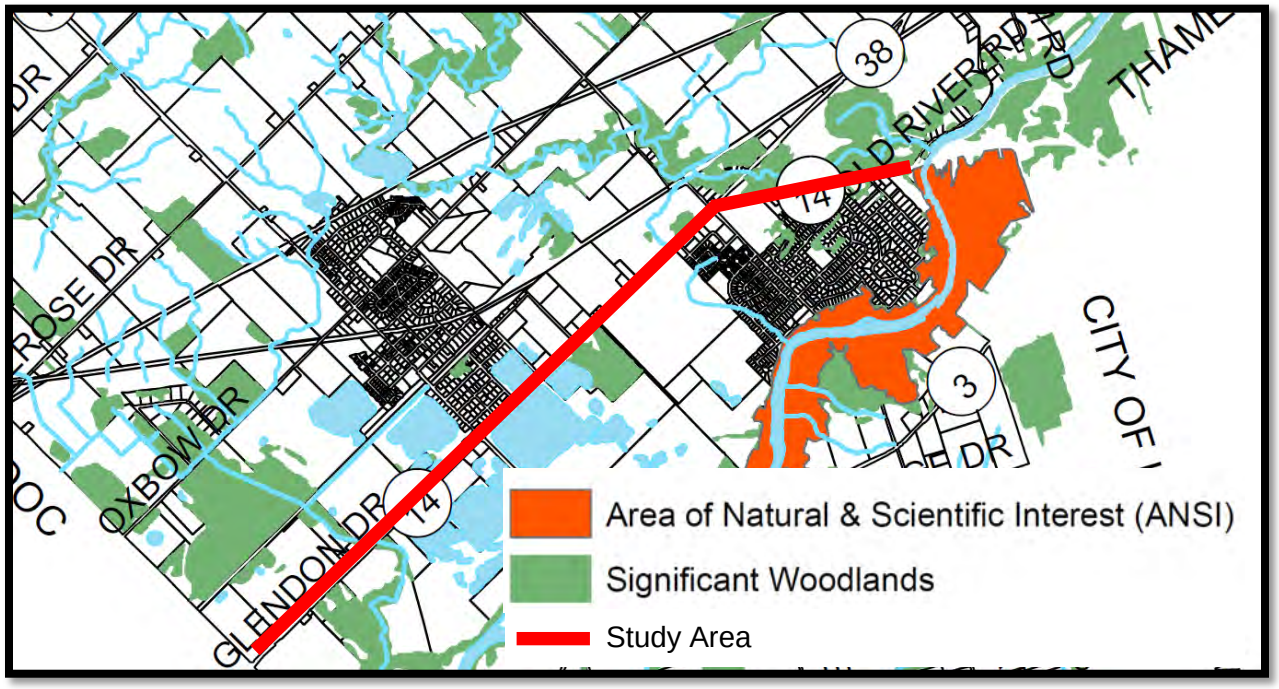


Figure 4.5 Schedule B - Natural Heritage Middlesex Centre OP

Greenland Features shown on Schedule 'B' (Figure 4.5) consist mainly of Significant Woodlands, which have been identified as significant through the Middlesex Natural Heritage Study (MNHS). Permitted uses within both Natural Environment Areas on Schedule 'A', and features identified on Schedule 'B' include but are not limited to: silviculture, woodlot or wildlife management, activities promoting the appreciation of natural heritage features including small scale interpretative facilities such as nature trails and outdoor displays, maple syrup production, recreational trails existing as of the date of the OP (2014), existing agricultural uses. In terms of watercourses, crossing or farm culverts, flood and erosion control works, or fisheries habitat improvement projects approved or undertaken by the Conservation Authorities.

There are several areas mapped as Significant Woodlands within the study area, as well as the provincially significant Komoka Lake Maumee II earth science Area of Natural and Scientific Interest (ANSI) located along the bank of the River Thames. A review of the existing conditions in terms of the natural environment within the study area is included in **Section 5.6** of this report.

Middlesex Centre OP - Komoka-Kilworth Secondary Plan (Section 5.7)

Pursuant to the Municipality of Middlesex Centre OP, the Komoka-Kilworth Urban Settlement Area is one of the primary areas identified for future growth, and is subject to the guidelines within the Komoka-Kilworth Secondary Plan, Section 5.7 of the Middlesex Centre OP.

Land Use

As shown on Schedule A-2 of the OP (Figure 4.6), land-use adjacent to Glendon Drive includes Strategic Settlement Employment, Parks and Recreation, Natural Environment, Natural Heritage Enhancement Area, Settlement Commercial, Residential and Medium Density Residential, Village Centre, Rural Commercial, along with Special Policy Areas 2, 22, and 24. The goal of the land use pattern is to establish a balanced, mixed used community, with the lands surrounding the Middlesex Wellness Centre as the central destination between the two communities. Alternative solutions and designs for the study area shall be consistent with the Policies set out for the range of land uses summarized below.

Lands designated as Village Centre are intended to function as a traditional village main street, contributing to the communities' identity and providing a space for community gathering (Section 5.7.3). Policy states that future improvements are to consider an urban road cross-section, with off-street cycling lanes, street trees, wide sidewalks, street lighting, signage and street furniture, underground utilities, on-street parking, bicycle parking, and safe and well-defined pedestrian crossing locations; overall, policies encourage high quality of urban design to create a pedestrian-friendly streetscape. A wide range of uses are permitted from commercial and institutional to parks and open space, found in Section 5.3.3 and 5.7.3.

For the Medium Density Residential areas adjacent to Glendon Drive, a high level of urban design will also be employed to create an attractive streetscape, with all driveways accessed from internal local roads. As a condition of approval for residential developments on either side of Glendon Drive, upgrades to Glendon Drive may be required, including an urban road cross-section, bike lanes, sidewalks and boulevards (Section 5.7.4 and 5.2).

Settlement Commercial are subject to the policies of Section 5.4 and 5.7.5, and where Community Gateway locations overlay the commercial designation, the design of development proposals shall enhance the street corner in terms of building orientation, location of parking, landscape treatments, and an overall high quality design character that contributes to the identity of the Kilworth-Komoka communities.

The Settlement Employment Areas to the north of Glendon Drive and west of Komoka Road are protected as Strategic Employment Areas under section 5.6, and conversion to non-employment uses will only be permitted upon completion of a Comprehensive Review, where it is determined that the lands will not be required for employment uses over the long term, and that there is a need for the conversion. Policies within Section 5.7.6 require development

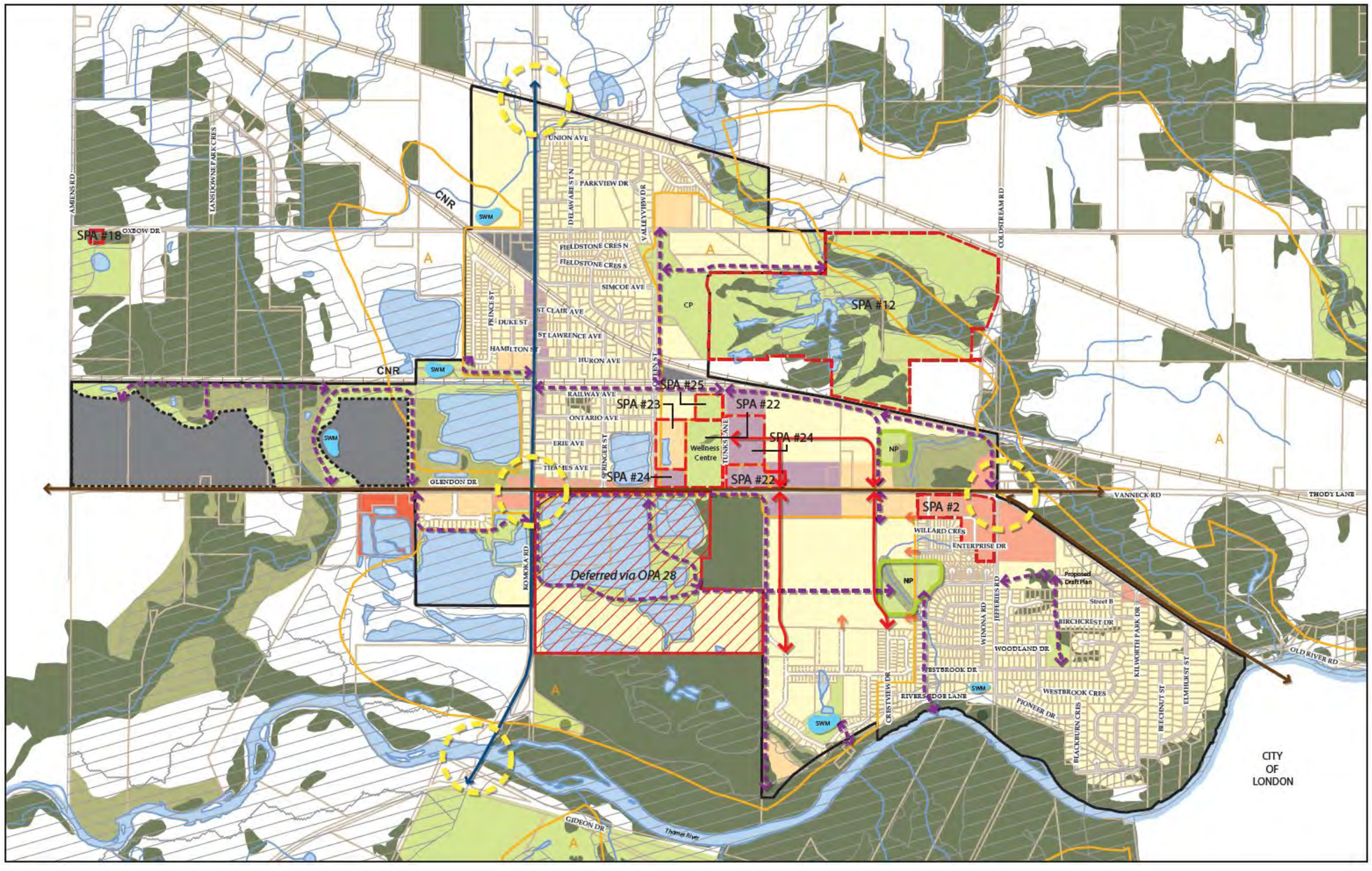
proposals to provide both on and off-road pedestrian connections to other areas within the community, to encourage active transportation.

Natural Environment, Natural Heritage Enhancement, and Natural Hazard Area designations are subject to policies of Section 5.7.9, along with Section 3 discussed above. Policies encourage the filling of these areas with native trees and shrubs, the acquisition of adjacent properties by the Municipality for increasing corridor links along stream corridors and significant vegetation patches as well as for compatible land uses such as public parks, open space, and multi-use trails. Several areas within and adjacent to the study area are identified as Natural Environment, Natural Heritage Enhancement, and Natural Hazard areas on Schedule 'A-2' in addition to/conjunction with Schedule 'B' and Schedule 'C'.

Special Policy Area #2, designated as Settlement Commercial, may also be used for uses permitted within the Settlement Employment designation.

Official Plan Amendment No. 29 was approved in 2013 which contained policies for Special Policy Areas #22-25 along Glendon Drive in the vicinity of the Komoka Wellness Centre. Development in these areas shall be directed toward creating a unique and sustainable town centre that recognizes the evolution of Glendon Drive to a Village Main Street and as such promotes safe passage of pedestrians and cyclists.

Official Plan Schedule A-2
Land Use & Secondary Plan



Legend

- SPECIAL POLICY AREA #
- SETTLEMENT BOUNDARY
- AGGREGATE OVERLAY

OFFICIAL PLAN DESIGNATION
DESIGNATION

- AGRICULTURE
- RESIDENTIAL
- MEDIUM DENSITY RESIDENTIAL
- VILLAGE CENTRE
- SETTLEMENT COMMERCIAL
- RURAL COMMERCIAL
- SETTLEMENT EMPLOYMENT
- STRATEGIC EMPLOYMENT AREA
- PARKS AND RECREATION
- NATURAL ENVIRONMENT
- NATURAL HERITAGE ENHANCEMENT AREA
- HAZARD LANDS

COMMUNITY USE

- CP COMMUNITY PARK
- NP NEIGHBOURHOOD PARK
- RECREATION FACILITY
- SCHOOL
- FUTURE SCHOOL SITE

TRANSPORTATION:

- ARTERIAL ROAD
- COLLECTOR ROAD
- FUTURE COLLECTOR ROAD
- FUTURE LOCAL ROAD CONNECTION
- COMMUNITY GATEWAY
- MULTI-USE TRAILS

OTHER:

- WASTEWATER TREATMENT FACILITY
- STORMWATER MANAGEMENT

Notes

1. Schedule A-2 from Municipality of Middlesex Center Official Plan May 27, 2015

January 2017

Figure No. **4.6**

Middlesex Centre Official Plan Schedule A-2

Komoka-Kilworth Secondary Plan – Servicing Policies (5.7.11)

Servicing policies within the Komoka-Kilworth Secondary Plan require that all land development proposals must proceed on full municipal servicing. A Master Servicing Plan was developed to guide the implementation of servicing in a coordinated manner. Implementation of recommendations of the Master Servicing Plan and subsequent studies along Glendon Drive shall be addressed in conjunction with transportation improvements.

Komoka-Kilworth Secondary Plan – Transportation Policies (5.7.12)

Transportation Policies within the Komoka-Kilworth Secondary Plan are centred on maintaining existing and future transportation hierarchy of Arterial, Collector, and Local Roads including on-road pedestrian and cycling facilities and multi-use trails that corresponds with future land use. The Plan includes several policies directly relevant to the Glendon Drive corridor.

- Glendon Drive is an Arterial Road intending to serve high volumes of local and regional traffic; however, within the designated Village Centre area (surrounding the Middlesex Wellness Centre), Glendon Drive shall function as a traditional Main Street with street oriented development.

- Glendon Drive may be upgraded to a four lane Arterial Road with an urban road cross section including underground stormwater infrastructure and utilities, with consideration for sidewalks and landscaped boulevards and street trees.

Provisions have also been made for a multi-use trail system as identified on Schedule A-2, including a multi-use trail along Glendon Drive between Komoka Road and Queen Street. Multi-use trails are also shown intersecting with Glendon Drive at a location west of Komoka Road; along a new collector road extending north from Crestview Drive, and at Jefferies Road.

Municipality of Middlesex Centre, Trails Master Plan (April 2014)

This Trails Master Plan was completed to guide the development of future trails and supporting amenities in Middlesex Centre. It provides a framework for future trail design, construction, maintenance, and promoting a trail network, ultimately providing a toolkit to guide the work of both the Municipality and the development community. The Master Plan explored trail networks to connect settlement areas and key destinations. The Plan focuses on trails (primary, secondary, tertiary), sidewalks, bicycle routes and amenities.

Primary trails consist of multi-use trails supporting the widest range of uses (walking, hiking cycling, cross country skiing and other non-motorized recreational or utilitarian uses) located off road or along utility corridors. Secondary trails consist of on-road or off-road facilities within settlement areas, intended for both recreational and utilitarian uses (walking, hiking, both recreational and

commuter cycling). Tertiary trails are intended to connect municipal park spaces with primary or secondary trails and other amenities, serving primarily recreational uses.

Within the Kilworth-Komoka settlement area, Glendon Drive is identified as a proposed secondary trail between the Thames River bridge and approximately 500m east of Amiens Road, and as a potential cycling route between the Thames River bridge and Komoka Road. Komoka Road is also identified as a proposed cycling route. It should be noted that the County is currently completing a County-wide Cycling Strategy to confirm cycling routes and facilities throughout the County.

County of Middlesex Tourism Signage Strategy

"Grassroutes" wayfinding signage has been implemented along Glendon Drive between Komoka and Highway 402 to promote this route as one of a series of driving routes intended to promote tourism activity. The routes are intended to provide the highest concentration of local tourism products and attractions.

County of Middlesex, Economic Development Strategic Plan (January 2014)

A lack of transportation options other than private automobile (i.e. public transit) was consistently identified in stakeholder consultation as a challenge to economic development within Middlesex Centre.

County of Middlesex, Population Project 2001 – 2026, County of Middlesex (November 2003)

This report provides a County population forecast for 2026 that represents an annual growth rate of 0.2% which results in an overall projected increase in population between 2001 and 2026 of 5%.

Middlesex Centre, 2012 – 2017 Strategic Plan, Middlesex Centre (2012)

Investment in the expansion of the Middlesex Centre trail system is recommended over the medium term to support economic development.

4.3 BACKGROUND STUDIES

Several relevant background studies, reports, and guideline documents specific to Urban Design and Transportation have been reviewed. These reports provide background information on the study area, and provide a framework for identifying improvements.

4.3.1 Urban Design

Municipality of Middlesex Centre Urban Design Guidelines

The Urban Design Guidelines establish a framework to address the development of built form within the Municipality. Komoka-Kilworth is identified as a single urban settlement area within the larger municipality due to their proximity to each other. Settlement areas within Middlesex Centre are separated geographically by agricultural lands and natural heritage features, but have many common qualities.

The community of Kilworth is identified as having a population of approximately 1940 people. A large commercial node exists at the southwest corner of Glendon Drive and Jefferies Road. As well, a smaller commercial node is located at the intersection of Glendon Drive and Kilworth Park Drive. Commercial areas are car oriented due to the lack of sidewalks. Housing types are predominantly one or two story single family detached homes. Newer developments typically have narrower lots with contemporary style homes. A considerable amount of land within the Kilworth settlement remains undeveloped. Lands abutting the Thames River are designated park and open space, which adds to the character of Kilworth. Komoka Provincial Park is located on the south side of the Thames River and is accessed via Gideon Drive.

The community of Komoka has a population of approximately 1190 people. A commercial node is located at the intersection of Komoka Road and Glendon Drive and is somewhat car-oriented due to limited sidewalk connections. Komoka Road is the community main street, having the most diverse commercial / office uses and the oldest homes. Komoka is home to an elementary school, a community centre and two large senior residences. The predominant housing type is single detached ranch style homes. Contemporary single detached homes are located in the newer developments. Vacant lands remain throughout the settlement area. Three existing national railway lines add to the character of Komoka.

The guidelines in Section 4.4 Community Streetscapes identify specific design objectives and direction based on street hierarchy, which includes:

- Major Road Edges;
- Gateway Streets; and
- Local Streets.

The guidelines also provide objectives for streetscape design in relation to the adjacent land use. Some relevant urban design objectives include:

- Provide varied and high quality streetscapes;

- Promote pedestrian circulation and connections;
- Provide safe and attractive pedestrian environment;
- Promote architectural interest and human scale;
- Retain significant views and vistas;
- Provide a complimentary visual and physical character (including lighting, landscaping and signage).

Municipal Centre for Middlesex Centre – Avi Friedman October 2011

This document examines the potential creation of a centrally located destination / town centre, along Glendon Drive between the communities of Komoka and Kilworth, located around the new Wellness Centre. The document was prepared following an extensive public consultation program, soliciting input from Councillors, City Staff, developers, and the general public. Two detailed master plan alternatives were developed through the process including, the Green Neighbourhood and the Cultural Community. A key connection point was indicated at Tunks Lane (the vehicular connection point to the Wellness Centre). The focused design principals include:

- Create a centre that is a regional draw and destination;
- Traffic calming along the county road;
- Introduce bike paths;
- Introduce mixed use residential and commercial;
- Introduce vegetation;
- Provide access to water;
- Create a 'Place' accessible for all ages and all hours;
- Introduce taller structures between 3 and 4 stories;
- Continue the standard of environmentally sustainable 'Green' design;
- Create a walkable community;
- Express local culture and heritage;

- Propose a cost effective proposal using local materials;
- Create a self-sustaining and adaptable economy;
- Create opportunities for outdoor fun in winter;
- Provide clear signage for way finding;
- Introduce a civic space for public gatherings.

Recommendations were also provided for specific design elements such as paving, lighting, signage, landscaping and street furniture. A detailed review of how to employ LEED criteria as a part of this potential development was also included.

Municipality of Middlesex Centre Site Plan Manual

The site plan manual provides relevant objectives and guidelines related to:

- Pedestrian facilities;
- Lighting;
- Landscaping and buffering; and
- Tree protection.

Middlesex Centre Infrastructure Design Standards

The Infrastructure Design Standards provides guidance for urban vs. rural roadway design, traffic calming, street lighting and tree planting. Street tree planting design objectives, tree selection, spacing and location, and standards and specifications are addressed.

Municipality of Middlesex Centre Accessibility Policy

The Accessibility Policy indicates that all development within the municipality must fully comply with the Municipality's Accessibility Policy and meet the requirements of Ontario Regulations 29/07 – Accessibility Standards for Customer Service and Ontario Regulation 191/11 – Integrated Accessibility Standards Regulation. Design must also comply with the Accessibility for Ontarians with Disabilities Act, 2005.

4.3.2 Transportation

Roundabout Feasibility Study – Glendon Drive and Vanneck Road/Jefferies Road 2014

GHD/Ourston Roundabout Engineering completed a study investigating the feasibility of a roundabout at the intersection of Glendon Drive, Jefferies Road, and Vanneck Road. The report provided a roundabout concept that involved the realignment of the intersection to the south-east, but did not incorporate the Coldstream Road approach; this approach was expected to be realigned to the west to intersect Glendon Drive opposite Springfield Way.

Results of the feasibility study state that a roundabout would function well at the intersection in terms of vehicle capacity including large transport trucks, and safety performance; however, the concept design created would impact existing properties, as well as several driveways along Vanneck Road, with an estimated construction cost of $1.5 million.

10293 Glendon Drive, Kilworth, ON – Traffic Impact Study – Stantec Consulting Ltd. (March 2015)

This study identified the future need for two new signalized intersections along Glendon Drive with auxiliary turn lanes as well as highlighting the future need to consider improvements at the Glendon Drive/Jefferies Road-Vanneck Road intersections. Refer to **Sections 5.8-6.3** in this report for further traffic analysis.

Old River Road Municipal Class Environmental Assessment (2011)

Spriet Associates was retained to undertake a Municipal Class Environmental Assessment to investigate the alternatives for reconstructing Old River Road, based on known issues including embankment instability, substandard road profile and cross section, improper position of the guardrail at the erosion location, road movement, drainage problems, and road flooding along the Thames River.

The study area included the portion of Old River Road from 120m north of the intersection with Glendon Drive, to its intersection with Pulham Road. At the time of the EA, the remaining portion of Old River Road had recently been reconstructed by the Municipality. Therefore, that portion of Old River Road was not considered within the 2011 EA.

The preferred alternative identified for Old River Road involved the reconstruction of the road with partial relocation. This alternative involved shifting the road surface further from the river, as well as implementing enhanced bank stabilization.

Due to the extent of safety and operational concerns at the Old River Road and Glendon Drive intersection and the assessment of alternatives to address these problems, it was important that the Glendon Drive EA have regard for the recommendations brought forward from the 2011 EA.

Proposed Commercial Development Glendon Drive at Jefferies Road Kilworth – Preliminary Traffic Impact Study – F.R. Berry and Associates April 2016

This study was undertaken to accompany a proposed commercial development located at the southeast corner of Jefferies Road and Glendon Drive. The vehicle trips generated by the proposed development were used to assess several access scenarios at the site. The report concluded that providing full access from Glendon Drive would not be prudent. While the study did not take into consideration the improvements identified as part of the current Glendon Drive Class EA, the report recommended a right-in, right out access to the property from Glendon Drive in addition to the full access on Jefferies Road. While the provision for property access is to be determined through the development application process, the trips generated from the proposed land uses were incorporated into the traffic analysis completed for the Glendon Drive Class EA.

4.4 PROBLEM/OPPORTUNITY STATEMENT

Based on the context provided by the initial public consultation, planning and policy documents, and background reports, the following Problem and Opportunity Statement has been identified for the Glendon Drive Class EA:

As the local communities of Kilworth and Komoka develop it will be important to make improvements to Glendon Drive that will maintain its arterial road function and provide sufficient road capacity, while safely and efficiently accommodating active transportation modes and the varying adjacent land uses.

To fulfill this Problem and Opportunity statement, the Glendon Drive Class Environmental Assessment shall:

- Address several transportation problem areas taking into consideration development and growth within a 20-year planning period. Problem areas to be identified include:
    - Road safety at collision prone intersections and mid-block locations;
    - Roadway capacity requirements;
    - Active transportation network and design deficiencies;
    - Operating characteristics of Glendon Drive and its function classifications per the County and Municipal Official Plans
- Develop and evaluate opportunities for improving transportation conditions under future (20 year) conditions. These improvements may include:

- Intersection and roadway traffic control, design, and/or safety improvements;
- Alternatives to increase or enhance transportation capacity to better accommodate travel demand for all modes;
- Alternatives to increase or enhance east-west connectivity and capacity not only for vehicular traffic, but also active transportation

Actively engage all potentially affected parties to ensure a transparent and responsible planning process.

5.0 PHASE 2 – EXISTING CONDITIONS

This section of the report summarizes existing conditions regarding urban design and streetscape, the cultural and socio-economic environments, water, wastewater, and stormwater servicing, natural environment, and transportation operations within the study area. This information was used to identify alternative solutions and provides the framework for identifying impacts of the alternatives being considered.

5.1 URBAN DESIGN

Glendon Drive has a rural roadway cross-section consisting of a paved asphalt surface with gravel shoulders and vegetated roadway ditches. Roadway illumination is restricted to main intersections including where Glendon Drive meets Kilworth Park Drive, the intersection of Glendon Drive, Vanneck Road, Coldstream Road and Jefferies Road, the intersection of Komoka Road and the Highway 402 connection, as well as a few minor intersections. Light fixtures consist of standard roadway poles and luminaires. Above ground hydro lines are present on the south side of Glendon between the eastern study area limit and the intersection at Vanneck Road, Coldstream Road and Jefferies Road and on the west side between Coldstream Road and Tunks Line. The hydro line transfers to the south side from Tunks Line westerly to the Highway 402 connection. Mature trees are present along the roadway intermittently and are set back from the roadway edge and hydro lines.

The existing Glendon Drive streetscape can be identified as three distinct types or zones, including rural, urban and transitional (a blending of urban and rural). The location of each zone is illustrated in Urban Design Existing Conditions Figure 5.1.

The streetscape in Kilworth is considered rural between the eastern study area limit (connection to the City of London) and Elmhurst Street. A transitional zone begins at Elmhurst Street, and ends where it meets with Kilworth's core urban zone near the intersection of Glendon Drive and Kilworth Park Drive. The transitional zone is composed of older residential homes on the south side of Glendon Drive and vegetated land along Oxbow Creek to the north. The urban zone at Kilworth Park Drive is comprised of an existing commercial development on the south side of Glendon Drive. A second transitional zone exists between the urban zone and the start of a second rural zone just west of Springfield Way. This transitional zone is a combination of new single family housing, land cleared for future development and large commercial properties to the south, as well as older residential, agricultural and natural heritage lands to the north.

The land which joins Kilworth and Komoka is a rural zone consisting of agricultural lands. A transition between urban and rural zones begins just east of Queen Street and ends at the beginning of the Komoka's core commercial development along Glendon Drive, at the intersection of Komoka Road. The transitional zone is a mix of developed land including older

single family residential, commercial land, naturalized abandoned gravel pits and the new Komoka Wellness Centre. Unique to this zone is a patch of vegetated land owned by Ontario Parks. The urban zone is restricted to the commercial development around the intersection at Komoka Road. The Glendon Drive streetscape returns to a rural zone south of Komoka's urban zone and extends to the western study area limit at the Highway 402 connection. This zone This zone consists of agricultural lands, rural commercial, natural heritage features and abandoned gravel pits.

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Legend

- Roads
- Study Area
- Municipal Boundary
- Rural Zone
- Transitional Zone
- Urban Zone

Key Map

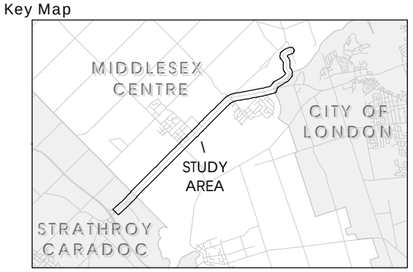

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Figure No. 5.1

Existing Conditions - Urban Design

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Revised: 2015-10-07 By: albrown

5.2 CULTURAL ENVIRONMENT

5.2.1 Archaeological Resources

A stage 1 archaeological assessment was conducted as part of this study, consisting of background historical research, and visual site inspections. The study area for the assessment included the existing Glendon Drive (County Road 14) right of way, and a 10 metre buffer on either side of the right of way limits.

Based on background and historical research, the archaeological potential for pre-contact Aboriginal, post-contact Aboriginal, and Euro-Canadian archaeological resources is deemed moderate to high within the study area. The stage 1 property inspection has determined that portions of the study area, largely restricted to the Gendon Drive right of way, have been subject to extensive land disturbance which has removed archaeological potential. No further archaeological assessment is required for portions of the study area which do not retain archaeological potential. For portions of the study area which have not been disturbed and retain potential for the identification and recovery of archaeological resources, further stage 2 archaeological assessment is required. Refer to **Appendix B**.

5.2.2 Built Heritage and Cultural Heritage Landscapes

There were no Registered Built Heritage resources within the study area through consultation with Municipal and County staff, as well as the Ontario Heritage Trust. Since the improvements being identified as part of this study are generally limited to being adjacent to the existing right of way, there are no anticipated impacts to any potential Built Heritage or Cultural Heritage Landscapes along the main Glendon Drive corridor.

Through site visits and consultation with local residents, it was determined that the area around Old River Road and Glendon Drive contains the potential for Built Heritage Resources, including Municipal Number 10805 Old River Road. Though the improvements do not directly impact the structures, further study requirements may be needed to identify construction mitigation/ monitoring measures so as to avoid the potential to impact any identified or unidentified Heritage Resources.

The Checklists for Evaluating Potential for Built Heritage and Cultural Heritage Landscapes provided by the Ministry of Tourism, Culture and Sport (MTCS) has been completed and is included in **Appendix B**.

5.3 WATER AND WASTEWATER SERVICING AND UTILITIES

A review of the existing water and wastewater servicing within the communities of Kilworth and Komoka was undertaken to identify potential impacts and opportunities along the corridor.

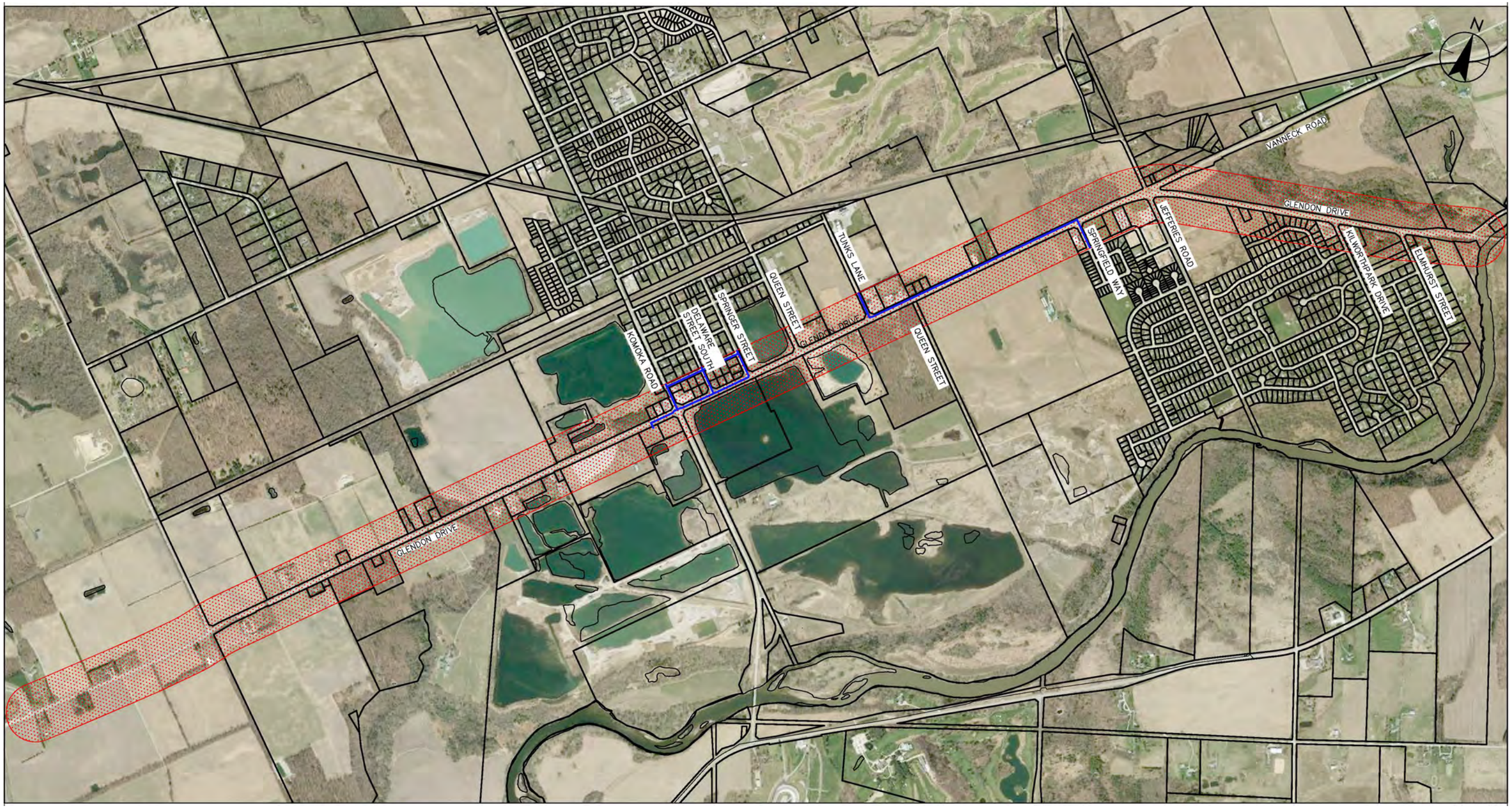
5.3.1 Komoka and Kilworth Water System

Following upgrades undertaken in 2010, the community of Komoka receives water via a 400mm transmission main from the Lake Huron Primary Water Supply System (LHPWSS), administered by the Regional Water Supply. The system includes a booster pumping station (BPS) located at the Arva Reservoir, an intermediate pumping station, and the Komoka Water Tower. The system was designed to provide water services not only to Komoka, but also to Kilworth and Delaware for the next 20 years before further upgrades are required.

With respect to Glendon Drive, an existing 150mm watermain west of Komoka Road runs along the north side of the corridor and services three properties on the north side, and one property on the south side of Glendon Drive. The watermain has recently been increased to 200mm in diameter, and now crosses Glendon Drive and continues westward to service the Bella Lago development. Between Komoka Road and Springer Street, an existing 200mm watermain runs along the north side of the Glendon Drive corridor servicing 6 parcels (Municipal Numbers [MN] 9952, 9964, 9990, 9998, and 10006 Glendon Drive).

Water is supplied to the Kilworth community via a 300mm watermain connection which crosses Glendon Drive at Tunks Lane, and runs east to Springfield Way.

Water infrastructure within the study area is shown on Figure 5.2.



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EXISTING WATERMAIN

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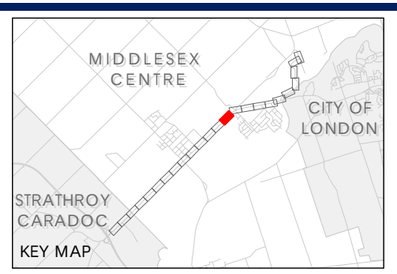

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Figure No.
5.2

Existing Water Services

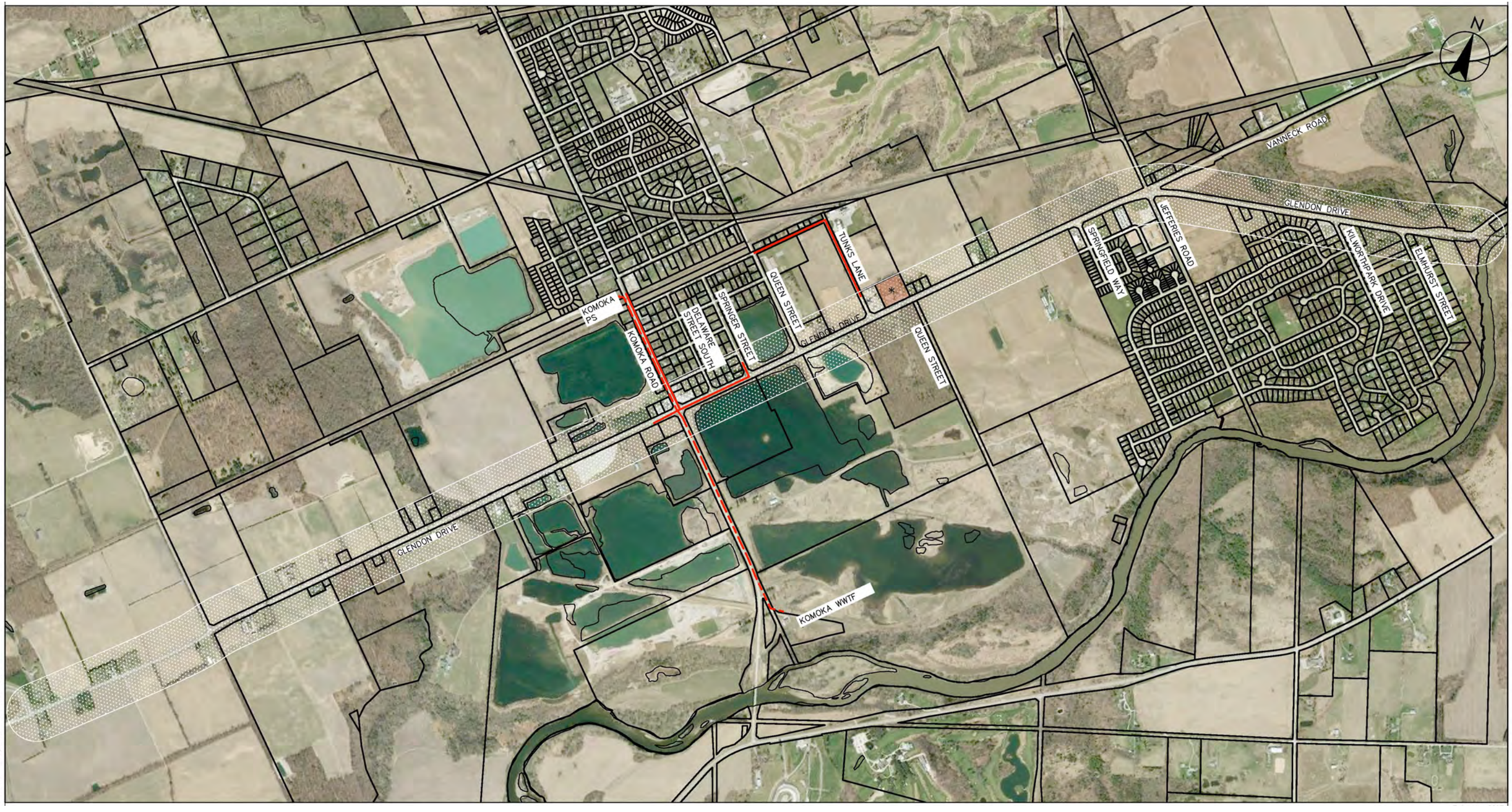
5.3.2 Komoka and Kilworth Sanitary Servicing

A network of sanitary sewers collects the wastewater from both the Komoka and Kilworth communities. In Komoka, flows are directed via gravity sewers to a pumping station located at Komoka Road and Railway Avenue. Flows are then pumped via a forcemain to the Komoka Wastewater Treatment Facility (WWTF) located on Komoka Road just north of the Thames River Bridge. Treated effluent is then discharged into the Thames River.

With respect to Glendon Drive, a 200mm sanitary forcemain crosses Glendon Drive at Komoka Road, and a 200mm gravity sewer runs along the north side of the corridor west of Komoka Road, servicing parcels on the north side (MN 9918 and 9930), and one commercial property on the south side (MN 9919). Between Komoka Road and Springer Street, an existing 300mm to 250mm gravity sewer runs along the north side of Glendon Drive servicing 6 parcels fronting Glendon Drive (MN 9952, 9964, 9990, 9998, and 10006 Glendon Drive).

Gravity sewers collect wastewater from the Community of Kilworth which is conveyed to the Kilworth Wastewater Treatment Facility. Treated effluent is discharged to the Thames River. A small pumping station exists on Blackburn Crescent, which collects flows from a portion of the development and pumps flows into the gravity sewer system along Westbrook Crescent. The Kilworth sanitary system does not encroach upon Glendon Drive.

Sanitary infrastructure within the study area is identified on Figure 5.3.



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EXISTING SANITARY SEWER

EXISTING SANITARY FORCEMAIN

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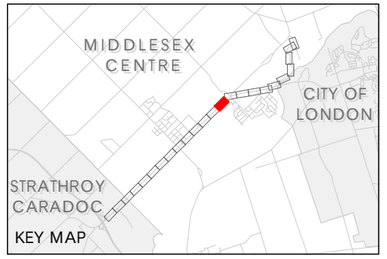

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Figure No.

5.3

Existing Sanitary System

5.3.3 Utilities

Utility companies were contacted to identify existing or future planned utilities along the Glendon Drive that may be impacted by proposed corridor improvements. The following utilities were identified:

BELL: One Bell line is located along north shoulder of Glendon Drive and a second line is located under the roadway from near Vanneck Road until approximately Queen Street. From Queen Street until Komoka Road both Bell lines move towards the north side of the Glendon Drive corridor. West of Komoka Road one Bell line is located within the north shoulder of the road while another Bell line is located within the south shoulder.

Rogers: Their service is delivered primarily via aerial cable on the hydro poles. The overhead line exists starting at Tunks Lane and runs along the Glendon Drive corridor easterly until Old River Road. An underground service exists at Tunks Lane and crosses under Glendon Drive. A second underground service runs along the north side of Glendon Drive between Springer Street and Komoka Road. Rogers also runs overhead north-south along Komoka Road, and runs a short distance west of Komoka Road on Glendon drive to services the developing properties there.

Union Gas: Distribution pipe easements generally run in the north and south shoulders of Glendon Drive. Occasional distribution and service pipes cross Glendon Drive to service individual parcels and developments. Future works along the corridor were identified through consultation with Union Gas, and include the following:

- A new regulating station around the southwest corner of the Wellness Centre property and near the intersection of Glendon Drive/Jefferies Road/Vanneck Road is planned to supply an additional feed to new developments south of Glendon Drive. Based on timing of the developments and the improvements identified along Glendon Drive, the construction of this station was deferred beyond 2017.

5.4 STORMWATER MANAGEMENT

An assessment of the drainage conditions was undertaken to characterize the existing drainage, identify drainage concerns, and to provide the framework for recommendations for future stormwater servicing to coincide with identified transportation improvements along the Glendon Drive corridor. The drainage assessment was performed based on the following background information:

- Field Survey from Komoka Road to the Thames River;
- Glendon Drive plan and profile drawings provided by Middlesex County;

- 2010 aerial photography; and topographic mapping with 1m contour intervals developed from elevation information from the 2010 aerial imagery; and

- Municipal Drain drawings.

The Glendon Drive corridor along the entire study area from Highway 402 to the Thames River has a rural cross section, and runoff is typically conveyed by roadside ditches and culverts.

The corridor was divided into 22 catchment areas based on the available survey data and plan and profile drawings. Refer to **Appendix C** for catchment area descriptions and mapping.

The most common drainage concern and/or constraint identified along the corridor involved the lack of surface water outlet or identified drainage works associated with the existing roadside ditches. Several catchment areas located west of Komoka Road ultimately drain to ponds located on private property. Given that not all the existing downstream receiving ponds are legally owned by the Municipality, legally an extension via a Section 78 drain petition would be required to maintain use of the ponds.

For a full description of the existing catchment areas and identified drainage concerns, refer to **Appendix C**.

5.5 SOCIO-ECONOMIC ENVIRONMENT - LAND USE AND DEVELOPMENT

Between the Highway 402 interchange and Komoka Road, land use adjacent to Glendon Drive consists mainly of agricultural and residential, with a small commercial development at the Komoka Road/Glendon Drive intersection. Between Komoka Road and Tunks Lane, land use consists of residential, previous gravel pits to the south, with the Komoka Wellness Centre and small service garage at the Glendon Drive/Tunks Lane intersection. Between Tunks Lane and Jefferies Road, land use consists mostly of agricultural land, with a small commercial and business park located south of Glendon Drive at Jefferies Road. Larger residential developments exist south of Glendon Drive between Jefferies Road and the Thames River Bridge. A natural forested area designated as Natural Environment exists north of the Glendon Drive between Jefferies Road and the Thames River Bridge.

5.5.1 Future Development

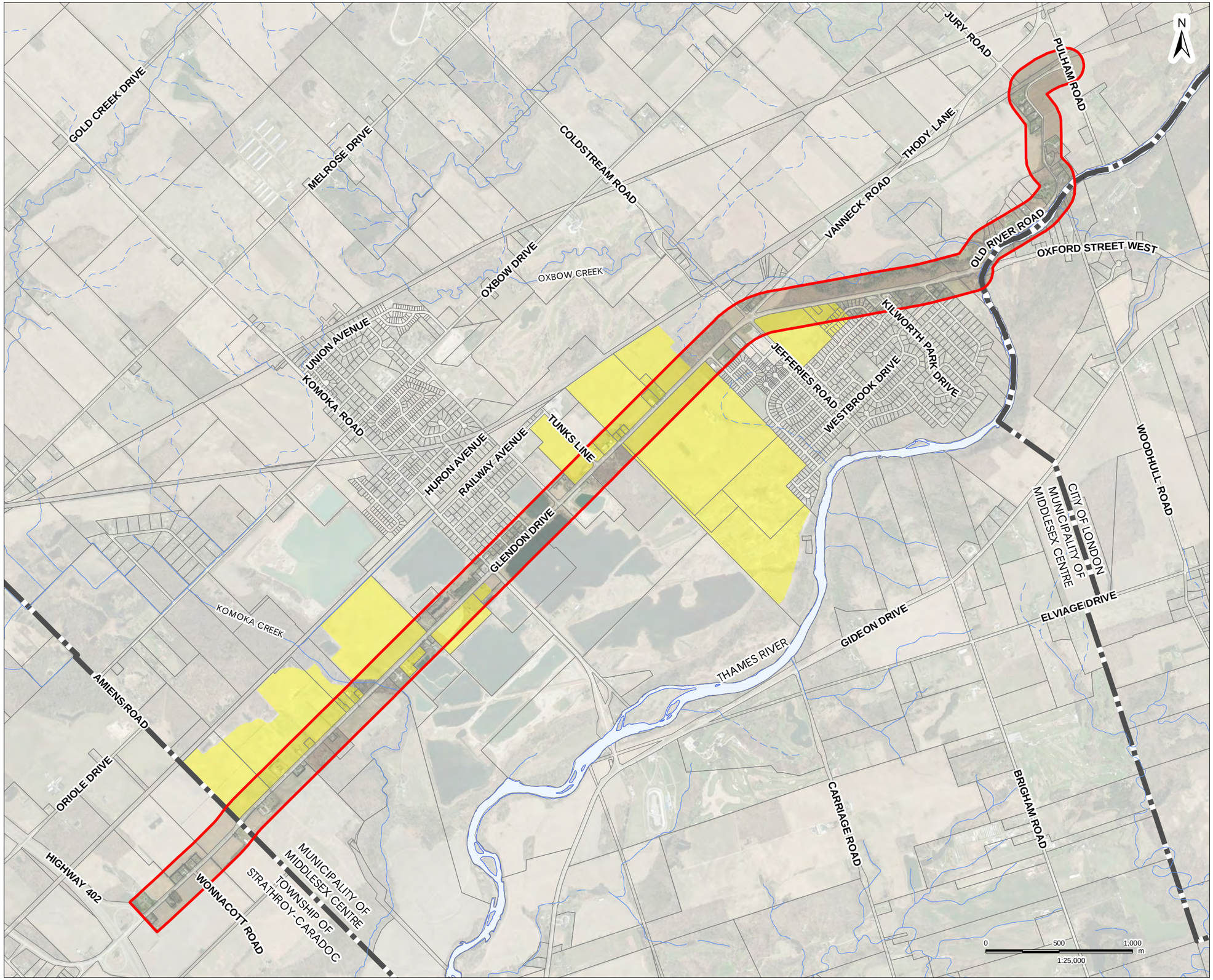
The Komoka-Kilworth communities have seen significant development in recent years, and will continue to see significant growth within the 20-year planning period. Future developments are expected to proceed in accordance with the land use designations on Schedule A-2 and applicable Official Plan policies as discussed previously.

Information on active planning applications and future development lands was provided by the Municipality of Middlesex Centre Planning Department, and shown on Figure 5.4. An overview of active developments is provided in Table 5.1

Table 5.1 Planned Developments

Address	Status of Application	Land Use/Description
9879 Glendon Drive – Bella Lago Estates	Approved Plan of Condominium – June 1st, 2015. Currently under construction.	Vacant Land Condominium 32 units single detached units, 4.2 units/ha Additional Phase 2 to include 72 individual town house units attached in block clusters.
10497 Glendon Drive – Birchcrest	Approved Plan of Condominium (August 2015). Currently under construction.	32 single detached Vacant Land Condominiums
10293 Glendon Drive – 'Kilworth Heights West'	Draft Plan Approved following decision by the Ontario Municipal Board.	447 single family lots; 98 freehold townhome lots; 3.2ha vacant land condominium block; 3.22ha and 1.68ha commercial blocks; 2 - 1.7ha medium density blocks; 2ha school block; and 2.3ha park block
Edgewater Estates (Southwinds Developments - Graham Property)	Draft Plan Approval (2015)	Approx. 108 low density residential units.
9763 Glendon Drive – Elysium Spa	Site Plan Approved (September 16th, 2015)	Spa Facility
Kilworth Mews – 9 Dausett Dr. (East of 5 corners off of Jefferies Rd)	Registered	Vacant Land Condominium 16 townhouse dwellings, 19 single detached

Address	Status of Application	Land Use/Description
		Access will be from a private lane off of Dausett Drive, with no direct access to Glendon Drive.
Southwest corner of Jefferies Drive/Glendon Drive	No formal development applications	Mixed use commercial development concept and preliminary Traffic Impact Study (provided April 2016)
North Corner of Glendon Drive and Tunks Lane	Site Plan application under review	Grocery store/mixed use commercial development
9909 Glendon Drive	Construction underway	Commercial development consisting of three detached commercial buildings
9904 Oxbow Drive	Draft approved	153 single detached units, 4.96 ha for medium density residential, and a .34 ha commercial block



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Legend

- Study Area
- Municipal Boundary
- Future Development Areas
- Watercourse (Permanent)
- Watercourse (Intermittent)

Key Map

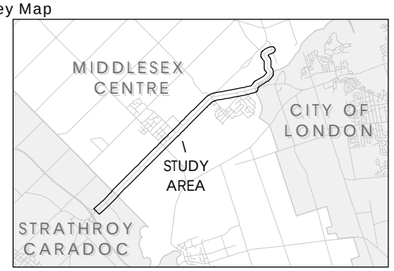

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Figure No. **5.4**

Future Development Areas

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Revised: 2016-12-21 By: albrown

5.6 EXISTING CONDITIONS – NATURAL ENVIRONMENT

A review of the natural environment was conducted in order to identify and characterize the significance and sensitivity of the natural features within the study area. The objectives were to:

- Review relevant Natural Heritage Policy documents to identify potential policy implications;
- Conduct a background review of the study area to identify species at risk (SAR), provincially rare species, and provincially designated natural heritage and aquatic features that may be present;
- Document the existing vegetation communities and aquatic features that may be present;
- Describe the sensitivities of vegetation communities and wildlife habitats, including an assessment of habitat suitability for potential SAR and provincially rare species.

Full details of the Natural Environment Review (NER) conducted for the study area is provided in the Terrestrial Ecosystems Existing Conditions Report, and Old River Road Addendum included in **Appendix D**. The study area for the purposes of this NER includes 120 metres on either side of the Glendon Drive corridor between the Highway 402 interchange and the Thames River Bridge, along with the Old River Road corridor between Glendon Drive and Pulham Road, including a 120 metre buffer on either side.

5.6.1 Natural Environment Policy

Various policy and guideline documents characterize the natural environment, and provide a framework in which approvals will be granted by the various approval agencies. These documents provide direction and guidance for the selection of a preferred solution that protects significant natural features, avoids and mitigates negative impacts, and identifies opportunities to restore and enhance the natural environment.

The natural heritage policies within the Middlesex County and Middlesex Centre Official Plans are discussed above, and provide policies for development of land within or adjacent to a range of natural features, including Significant Woodlands, Natural Hazards, Areas of Natural and Scientific Interest (ANSIs), and other identified features.

Endangered Species Act (ESA)

The Endangered Species Act (ESA) protects habitat and individuals of wildlife and vegetation species designated as threatened, endangered, or extirpated in Ontario. Provincial species at

risk are identified and assessed by the Committee on the Status of Species at Risk in Ontario (COSSARO).

The ESA protects species listed by COSSARO as threatened, endangered or extirpated in Ontario and their habitats by prohibiting anyone from killing, harming, harassing or possessing protected species, as well as prohibiting any damage or destruction to the habitat of the listed species. All listed species are provided with general habitat protection under the ESA aimed at protecting areas that species depend on to carry out their life processes, such as reproduction, rearing, hibernation, migration or feeding. Some species have had detailed habitat regulations passed that go beyond the general habitat protection to define specifically the extent and character of protected habitats.

Activities that may impact a protected species or its habitat require the prior issuance of a Permit from the Ministry of Natural Resources and Forestry (MNRF), unless the activities are exempted under Regulation. The current Ontario Regulation 242/08 identifies activities which are exempt from the permitting requirements of the Act subject to rigorous controls outside the permit process including registration of the activity and preparation of mitigation. Activities that are not exempted under O. Reg. 242.08 require a complete permit application process.

The ESA (2007) replaces the original ESA (1971) to provide broader protection for species at risk and their habitats, a stronger commitment to recovery of species, greater flexibility, increased fines and more effective enforcement, as well as greater accountability through government reporting requirements.

Conservation Authority

The study area lay within the Upper Thames River Watershed, under the jurisdiction of the Upper Thames River Conservation Authority (UTRCA). Issued under the Conservation Authorities Act (CAA), UTRCA's O. Reg 157/06 Development, Interference with Wetlands and Alterations to Shorelines and Watercourses regulates natural features and activities, including development and site alteration in or adjacent to river or stream valleys, hazardous lands, and wetlands, known as the Regulation Limit. Development or site alteration within UTRCA's Regulation Limit may be subject to a permit under Section 28 of the CAA.

The approximate Regulated Limit within the study area is included on Figure 5.5

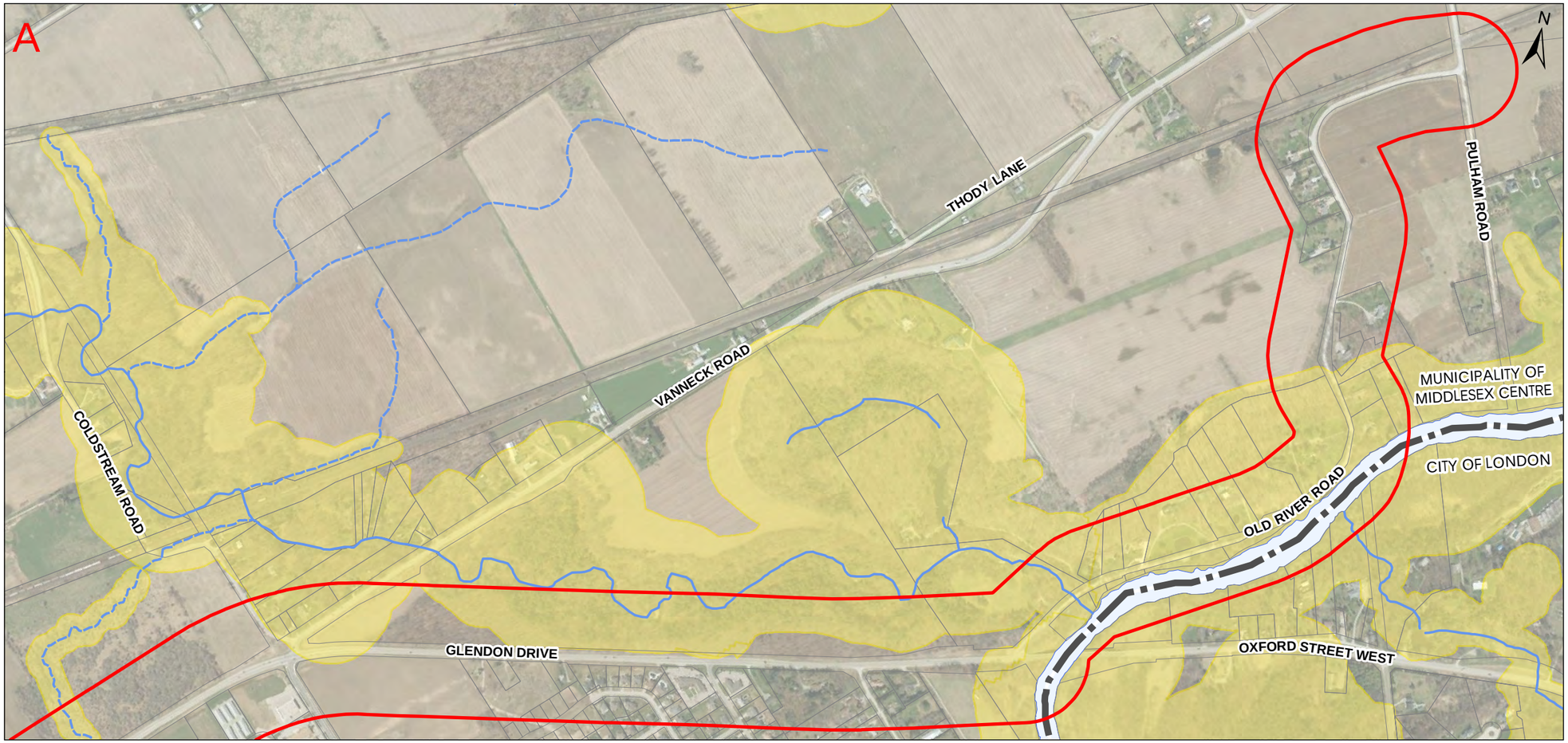
Background Review

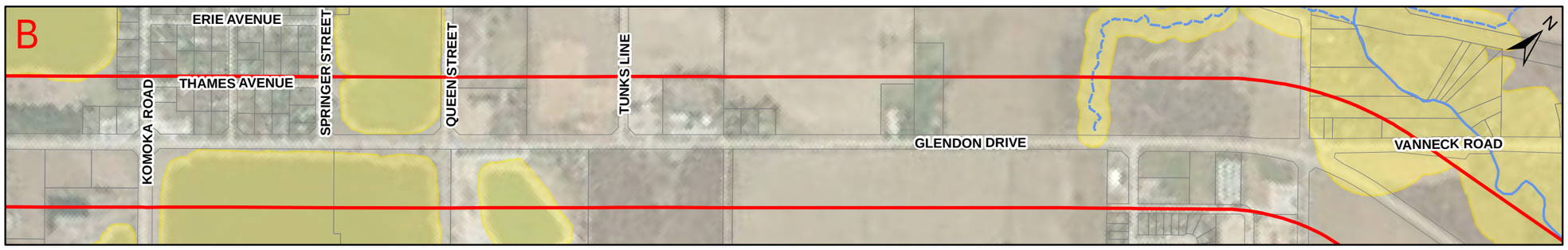
The following information sources were accessed to obtain information about known natural heritage and aquatic features as well as species at risk (SAR) and species of concern occurrences:

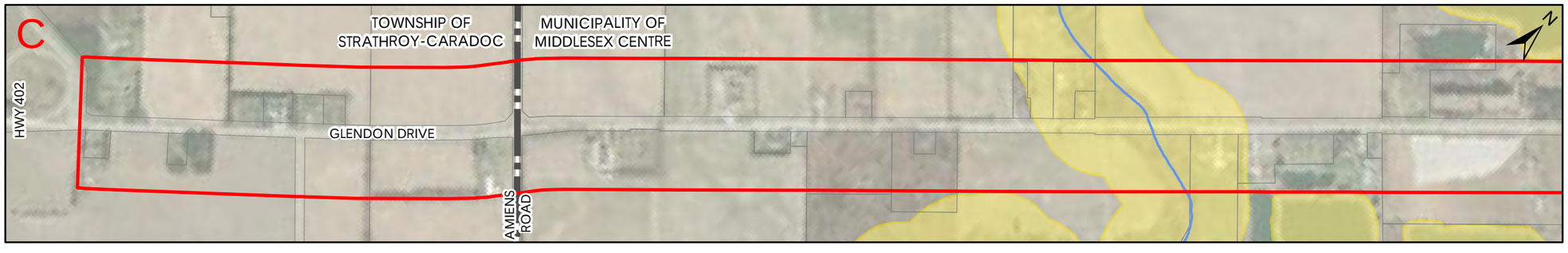
- Natural Heritage Information Centre (NHIC) database (last updated February 18, 2015);
- Ontario Ministry of Natural Resources and Forestry's (MNRF) Land Information Ontario (LIO) digital mapping (LIO, 2014);
- Fisheries and Ocean's Canada (DFO) aquatic species at risk (SAR) mapping (DFO, 2014)
- Middlesex County Official Plan (2006) and Middlesex Natural Heritage Systems Study (2014);
- The Natural Heritage Assessment for the Old River Road Reconstruction Schedule B Class Environmental Assessment (LCA Environmental Consultants, 2011);
- The Ontario Reptile and Amphibian Atlas (ORAA; Ontario Nature, 2015);
- Ontario Breeding Bird Atlas (OBBA; Cadman et al, 2007); and
- Atlas of the Mammals of Ontario (AMO; Dobbyn, 1994).

Field Data Collection

Natural heritage features examined for this report included vegetation communities, vegetation species, areas of potential candidate significant wildlife habitat, and aquatic habitat. All surveys were conducted from the edge of the right of way**.**







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Legend

- Study Area
- Municipal Boundary
- Watercourse (Permanent)
- Watercourse (Intermittent)
- Regulated Area (UTRCA)

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Key Map

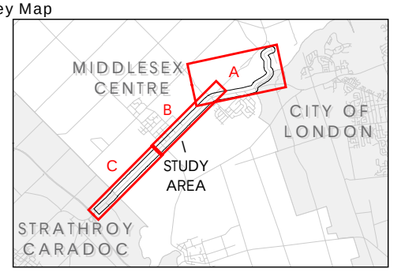

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Figure No. **5.5**

Conservation Authority Regulated Area

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Revised: 2017-02-28 By: kbuchanan

5.6.1 Existing Environmental Features

Significant Natural Areas

A review of the NHIC and LIO databases indicates that the following significant natural areas are present in proximity to the study area:

- The Komoka/South Strathroy Creek Provincially Significant Wetland (PSW);
- The Komoka Park Reserve Area of Natural and Scientific Interest (ANSI);
- The Komoka Park PSW Complex;
- Komoka Provincial Park; and
- The Thames River, and Oxbow Creek, unnamed tributary to Oxbow Creek, and Komoka Creek.
- Significant Woodlots (Middlesex Centre OP, consistent with the Significant Vegetation Patches identified in the Middlesex Natural Heritage Study 2014).

Identified Natural Heritage Features are shown on Figure 5.6.

Species at Risk and Provincially Rare Species

The potential for species at risk (SAR) and provincially rare species (species ranked S1-S3) within the study area was determined through a review of the documentation listed above. Full documentation of SAR and provincially rare species identified in proximity to the study area are included in **Appendix D.**

Wildlife

Threatened and endangered species with the potential to occur in the study area include: Spiny Shoftshell, Blanding's Turtle, Queen Snake, Eastern Hog-nosed Snake, Least Bittern, Chimney Swift, Bank Swallow, Barn Swallow, Yellow-breasted Chat, Henslow's Sparrow, Bobolink, Eastern Meadowlark, Small-footed Myotis, Little Brown Myotis, Northern Myotis and American Badger.

An additional 13 species of concern (i.e. those that are ranked S1-3 or identified as Special Concern) were identified. This includes 2 butterflies, 3 reptiles, 7 birds, and 1 mammal. Detailed lists are included in **Appendix D**. Species at risk designated as Special Concern and/or provincially rare species are not afforded protection under the ESA; however, habitat for species of conservation concern (i.e. those that are ranked S1-S3, or listed as Special Concern) is a

category of Significant Wildlife Habitat, and presence of these species and their habitat is assessed in the Candidate Wildlife Habitat discussion below.

Vascular Plants

A full list of vascular plant species at risk and provincially rare species is included in **Appendix D**. Plant SAR that have the potential to occur within the study area include: American Chestnut, and Eastern Flowering Dogwood (both listed as endangered). Endangered tree species whose geographic range overlaps with the Study Area that were not identified in the NHIC database include Butternut, and Red Mulberry.

Aquatic Species

The data sources listed above indicated the presence of four watercourses within the Study Area (Oxbow Creek, an unnamed tributary to Oxbow Creek, Komoka Creek, and the Thames River). Details for each watercourse are summarized below, including the presence of aquatic species at risk according to DFO SAR mapping (DFO 2015). Aquatic features are identified on Figure 5.7.

Oxbow Creek

According to DFO aquatic SAR mapping (DFO, 2015), the upper reaches of Oxbow Creek (upstream of the Study Area) are mapped for listed mussel species and may be one or more of Rainbow (Villosa iris), Kidneyshell (Ptychobranchus fasciolaris), Mapleleaf (Quadrula quadrula), Rayed Bean (Villosa fabalis), Round Pigtoe (Pleurobema sintoxia) and Salamander Mussel (Simpsonaias ambigua). MNRF's Natural Heritage Information Centre (NHIC) online database (NHIC, 2015) only showed Rainbow (Villosa iris) as being a potential SAR in Oxbow Creek. Spotted Sucker (Minytema melanops) is identified as occurring in Oxbow Creek however it is not a protected species. The provincial and federal status of species listed on the DFO's mapping for the UTRCA is provided in **Appendix D**.

The majority of Oxbow Creek is classified as a coldwater system. LIO (2015) data suggests that Oxbow Creek serves as habitat for White Sucker (Catostomus commersonii), Brook Stickleback (Culaea inconstans), Northern Hog Sucker (Hypentelium nigricans), Hornyhead Chub (Nocomis biguttatus), Common Shiner (Luxilus cornutus), Rainbow Trout (Oncorhynchus mykiss), and Largemouth Bass (Micropterus salmoides).

Unnamed Tributary to Oxbow Creek

There were no SAR records found for the Unnamed Tributary to Oxbow Creek. This tributary is a Constructed Drain and is classified as a Type F Drain (Intermittent) starting at Glendon Drive just west of Coldstream Road and flowing north.

Komoka Creek

According to DFO's SAR mapping (DFO, 2015) Pugnose Minnow (Opsopoeodus emiliae) and/or Silver Shiner (Notropis photogenis) may occur in Komoka Creek. MNRF's NHIC online database did not show either of these species as potential SAR at this location (NHIC, 2015). Holm et al., (2009) states that Pugnose Minnow prefer warmwater, vegetated, slow-moving flows with bottoms of silt sand or gravel; however, the species is considered extirpated from the Thames River (COSSARO, 2012 and COSWEIC 2012) Silver Shiner prefer cool to warm, clear waters of streams, over bottoms of clean gravel, cobble and boulders (Holm et al., 2009).

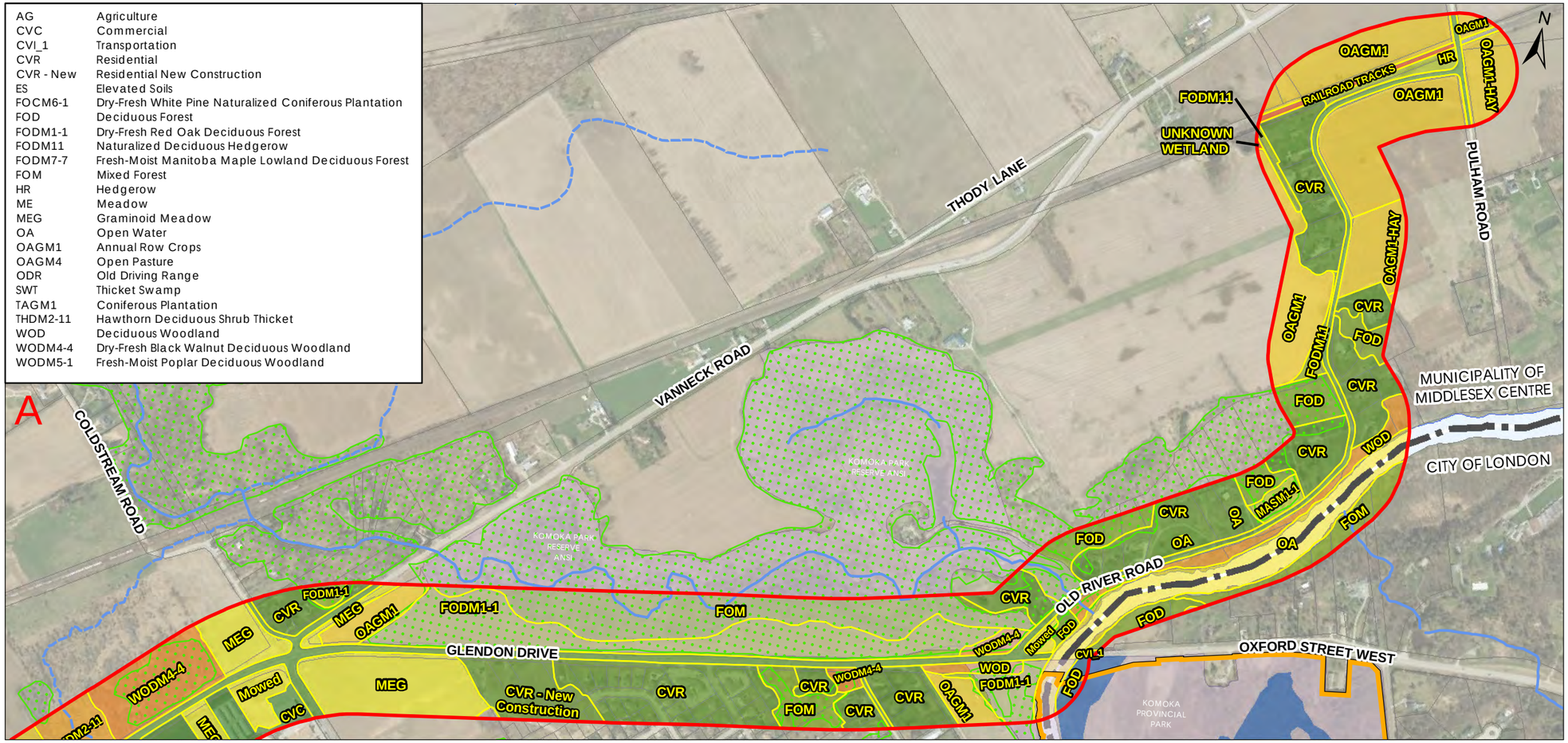
The majority of Komoka Creek is a coldwater system (UTRCA, 2012a and 2012b) and within the Study Area, LIO data indicate it is a constructed drain (Crow Creek Drain) and with a DFO Class D designation (permanent flow with coldwater thermal regime and sensitive species or communities). LIO (2015) data suggests that Komoka Creek serves as habitat for White Sucker (Catostomus commersonii), Brook Stickleback (Culaea inconstans), Pearl Dace (Margariscus margarita), Common Shiner (Luxilus cornutus), Rainbow Trout (Oncorhynchus mykiss), Bluntnose Minnow (Pimephales notatus), Brown Trout (Salmo trutta), Brook Trout (Salvelinus fontinalis) and Smallmouth Bass (Micropterus dolomieu).

Thames River

According to DFO's mapping (DFO, 2015) and the MNRF's NHIC online database, the Thames River supports Eastern Sand Darter (Ammocrypta pellucida) and is also mapped as critical habitat (NHIC, 2015). Kidneyshell (Ptychobranchus fasciolaris), Mapleleaf (Quadrula quadrula), Rainbow (Villosa iris), Rayed Bean (Villosa fabalis), Round Pigtoe (Pleurobema sintoxia) and Salamander Mussel (Simpsonaias ambigua) may occur in the Thames River, which is also mapped as critical habitat for mussels.

The Thames River is a warmwater system and supports a diversity of large and small-bodied fish species including Yellow Perch (Perca flavescens), Largemouth Bass (Micropterus salmoides), Smallmouth Bass (Micropterus dolomieu), Bullhead species (Ictaluridae), Sunfish species (Centrarchidae), Longnose Gar (Lepiososteus osseus), Emerald Shiner (Notropis atherinoides), Ghost Shiner (Notropis buchanani), Gizzard Shad (Dorosoma cepedianum) and Redhorse species (Moxostoma).

AG	Agriculture
CVC	Commercial
CVI_1	Transportation
CVR	Residential
CVR - New	Residential New Construction
ES	Elevated Soils
FOCM6-1	Dry-Fresh White Pine Naturalized Coniferous Plantation
FOD	Deciduous Forest
FODM1-1	Dry-Fresh Red Oak Deciduous Forest
FODM11	Naturalized Deciduous Hedgerow
FODM7-7	Fresh-Moist Manitoba Maple Lowland Deciduous Forest
FOM	Mixed Forest
HR	Hedgerow
ME	Meadow
MEG	Graminoid Meadow
OA	Open Water
OAGM1	Annual Row Crops
OAGM4	Open Pasture
ODR	Old Driving Range
SWT	Thicket Swamp
TAGM1	Coniferous Plantation
THDM2-11	Hawthorn Deciduous Shrub Thicket
WOD	Deciduous Woodland
WODM4-4	Dry-Fresh Black Walnut Deciduous Woodland
WODM5-1	Fresh-Moist Poplar Deciduous Woodland



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Legend

- Study Area
- Municipal Boundary
- Watercourse (Permanent)
- Watercourse (Intermittent)
- Provincial Park
- Significant Woodland (OP)
- Provincially Significant Wetland
- Provincially Significant Life Science ANSI

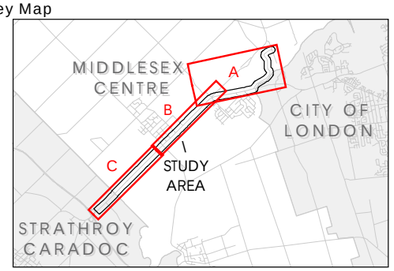
Ecological Land Classification Code

AG	OA
CVC	OAGM
CVI	SWT
CVR	TAGM
FOC	THDM
FOD	WOD
FOM	WODM
FODM	Old Driving Range
HR	Elevated Soils
MASM	Railway Tracks
ME	Unknown Wetland
MEG	ELC Unknown
Mowed	

0 250 500 m

1:10,000

Key Map



Notes

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Figure 5.6

Existing Conditions Natural Environment

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Revised: 2016-12-23 By: albrown

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Legend

- Study Area
- Municipal Boundary
- Watercourse (Permanent)
- Watercourse (Intermittent)

Key Map

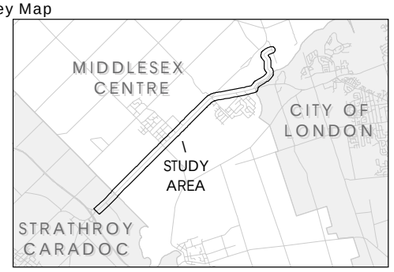

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Figure No. **5.7**

Aquatic Habitat Assessments

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Revised: 2016-12-21 By: albrown

5.6.2 Vegetation Communities

The majority of the study area consists of agricultural land uses with residences and commercial developments occurring along Glendon Drive. The area also consists of scattered isolated woodlands as well as some larger tracts of vegetation, predominantly associated with the Komoka/South Strathroy Creek PSW (located on either side of Glendon Drive between Amiens Road and Komoka Road), and the Komoka Park Reserve ANSI (Located along the north of Glendon Drive between Vanneck Road and the Thames River Bridge). The Old River Road portion of the study area consists mainly of woodland, residential, and agricultural lands. Old River Road is located adjacent to the Thames River, with a narrow strip of vegetation between the road and the river. The Oxbow Creek flows under Old River Road near the intersection of Glendon Drive, and is surrounded by a woodland feature designated as the Komoka Park Reserve ANSI.

Vegetation communities were classified according to the Ecological Land Classification (ELC) for Southern Ontario field guide (Lee et al., 1998), with 2008 updates. Vegetation communities were first identified on aerial imagery and then checked in the field by a qualified Stantec ecologist. ELC classifications within the study area are identified on Figure 5.6 and additional information is included in **Appendix D.**

No rare or highly sensitive communities or plant species were encountered during field surveys; however, one Butternut (Endangered) was identified during the Tree Inventory on the north side of Glendon Drive adjacent to Elmhurst Street, approximately 10m outside of the existing Glendon Drive right of way.

Significant Natural Features

Wetland features consistent with the Ontario Wetland Evaluation System criteria were confirmed within the Komoka/South Strathroy Creek PSW, and the Komoka Park PSW complex along the Thames River, to the south of the study area.

Several Significant Woodlands identified in the Middlesex County and Middlesex Centre Official Plans were confirmed through the vegetation investigation. Refer to **Appendix D** for a review of the vegetation communities identified within the Significant Woodlands.

Candidate Significant Wildlife Habitat

Candidate significant wildlife habitat (CSWH) pursuant to the Significant Wildlife Habitat Criteria Schedules for Ecoregion 7E (MNRF 2015) was accessed using the ELC vegetation community and wildlife habitat assessment results and GIS analysis. Criteria include: (a) seasonal concentration areas, (b) rare or specialized habitat, (c) habitat for species of conservation concern, and (d) animal migration corridors. A description of the CSWH criteria and an

assessment of the potential presence within the study area is provided in **Appendix D**. A summary of all CSWH identified through this assessment within the study area is included below:

- Waterfowl Stopover and Staging Area (aquatic): The Thames River may provide stopover and staging habitat for migrating waterfowl.
- Bat Maternity Colonies: Mature deciduous and mixed forest communities identified throughout the Study Area may provide habitat for bat maternity colonies.
- Turtle Wintering Areas: Any deep water pool areas within the Thames River may provide overwintering habitat for turtles.
- Bald Eagle and Osprey nesting, Foraging, and Perching Habitat: There is a potential for Bald Eagle or Osprey nesting, foraging and perching habitat within the Study Area, as these features could not be confirmed using Google Streetview.
- Amphibian Breeding Habitat (Woodlands/Wetlands): Open aquatic ponds may provide amphibian breeding habitat. Some of these occur within proximity to woodlands.
- Seeps and Springs: There is a potential for seeps and springs to occur within the forested communities, as these features could not be confirmed using Google Streetview.
- Habitat for Special Concern and Rare Wildlife Species: Wildlife species habitat that may occur within the study area includes habitat for Common Nighthawk, Wood Thrush, Eastern Wood-Peewee, Golden-Winged Warbler, Map Turtle, Snapping Turtle, Woodland Vole, Hackberry Emperor, and Tawny Emperor.
- Marsh Breeding Bird Habitat: The MASM1-1 cattail marsh may provide breeding habitat for marsh birds.
- Terrestrial Crayfish Habitat: The MASM1-1 cattail marsh may provide habitat for Terrestrial Crayfish.

5.6.3 Aquatic Habitat Assessment

As discussed above, four watercourses were identified within the study area: Oxbow Creek, an unnamed tributary to Oxbow Creek (constructed F classification drain), Komoka Creek, and the Thames River.

Oxbow Creek

Oxbow Creek meanders just inside the northeast end of the Study Area through the Komoka Park Reserve ANSI. Oxbow Creek was assessed at Old River Road (northeast end of the Study

Area) and at Vanneck Road (upstream of the Study Area). Oxbow Creek is a natural watercourse and is surrounded by forest.

The Old River Road Bridge is immediately upstream of the confluence with the Thames River. At this location, during the field review, Oxbow Creek was dominated by riffle morphology. The substrate was comprised of cobble, boulder, gravel and sand. The mean watercourse wetted width was approximately 9 m and bankfull width was approximately 12 m. The maximum pool depth was 25 cm and mean water depth within in the vicinity of the bridge was 15 cm. The banks in this section of Oxbow Creek appeared to be stable as they are supported by vegetation and boulders. The riparian area of this reach was dominated by sycamore (Platanus sp.), Manitoba maple (Acer negundo) and staghorn sumac (Rhus typhina). In-water cover consisted of boulders. No fish were observed at this reach during field investigations; however, this section of the creek may provide spawning habitat for fish entering the creek from the Thames River.

At the Vanneck Road bridge Oxbow Creek was dominated by run morphology with some pools. Substrate was comprised of cobble, boulder, sand, gravel and clay. The mean watercourse wetted width was approximately 9 m and bankfull width was approximately 11 m. The maximum pool depth was 40 cm and mean water depth in the vicinity of the bridge was 25 cm. The majority of the creek banks in this reach were vegetated and stable. Throughout this reach, the riparian area was dominated by sycamore (Platanus sp.), staghorn sumac (Rhus typhina), virginia creeper (Parthenocissus quinquefolia) and river bank grape (Vitis riparia). In-water cover consisted of deep pools, overhanging vegetation, undercut banks and boulders. Cyprinids, Common Carp and darter species were observed from the bridge and creek banks during the field investigation. Based on field investigations, this section of Oxbow Creek most likely provides spawning, nursery and rearing habitat for some of the coldwater fish species known to occur in Oxbow Creek.

Unnamed Tributary to Oxbow Creek

An Unnamed Tributary to Oxbow Creek crosses Glendon Drive west of the Coldstream Road/Vanneck Road intersection. There was no channelized feature at the location mapped as a watercourse and the area was a meadow thicket. Within the study area, the unnamed Tributary to Oxbow Creek does not contain fish habitat.

Komoka Creek

Komoka Creek flows in a southerly direction within the Study Area (approximately 1.1 km west of Komoka Road) and then converges with the Thames River approximately 2.3 km downstream of Glendon Drive. At Glendon Drive Komoka Creek is dominated by run morphology. The substrates are comprised of gravel, sand and cobble. The mean watercourse wetted width was approximately 4.5 m and bankfull width was approximately 7 m. The maximum pool depth was

25 cm and mean water depth was 15 cm. The majority of the banks in this reach were vegetated and stable. Throughout this reach, the riparian area was dominated by linden (Tilia sp.), Manitoba maple (Acer negundo) and river bank grape (Vitis riparia). In-water cover consisted of undercut banks, overhanging vegetation and woody debris. No fish were observed during the field investigation; however this reach of Komoka Creek most likely provides spawning, nursery and rearing habitat for fish species known to occur in the watercourse. Habitat in Komoka Creek may be suitable for Silver Shiner.

5.6.4 Species at Risk Habitat Assessment

Species at Risk with the potential to occur within the study area based on the background review are discussed above. The potential for these species to occur within the study area will be limited by the habitats that are available. An assessment of habitat availability for endangered and threatened wildlife species is provided in **Appendix D**. Species for which suitable habitat may occur within the study area based on this assessment include: American Chestnut, Eastern Flowering Dogwood, Butternut, Red Mulberry, Barn Swallow, Eastern Meadowlark, Wood Thrush, Yellow-Breasted Chat, Eastern Spiny Softshell, Queen Snake, American Badger, Small-Footed Myotis, Little Brown Myotis, and Northern Myotis.

5.6.5 Natural Environment Review Summary

This NER and the accompanying Terrestrial Ecosystems Existing Conditions Report and Old River Road Addendum found in **Appendix D** provide a general assessment of the natural features present within the study area, including identification of various vegetation community types and potential significant wildlife habitat features, an aquatic habitat assessment, and a review of species at risk that may be present within the study area.

The evaluation of alternative solutions considered as part of this Class EA shall have regard for the natural features identified within this NER, and impacts should be minimized. Where impacts are identified, mitigation and/or compensation measures shall be recommended in order to reduce net impacts. Potential impacts and associated mitigation measures to be carried forward into detailed design will be identified for the recommended designs.

5.7 EXISTING CONDITIONS – TRANSPORTATION NETWORK

The characterization of the existing road network (Glendon Drive and its intersections) has been undertaken based on the review of applicable planning and policy documents, background studies, as well as site investigations.

Glendon Drive (County Road 14) is an east-west two lane undivided arterial road and links the communities of Kilworth and Komoka to the City of London and Highway 402. Along Glendon Drive within the study area, the maximum posted speed limit transitions from 80km/h to 70km/h,

to 50km/h. The 50 km/h maximum speed zone covers west of Komoka Road easterly to just west of Queen Street. The 70km/h maximum speed zone acts as a transition zone, and extends west of Queen Street easterly for approximately 350 metres. The 80km/h maximum posted speed limit covers the areas east of the 70km/h transition zone and west of Komoka Road.

Several roads intersect with Glendon Drive within the study area, and are described in Table 5.2.

Table 5.2 Existing Road Characteristics

Intersecting Road and Classification	Intersection Type	Auxiliary Lanes
Amiens Road, Local Road	Unsignalized (stop control)	Unmarked westbound right turn taper on Glendon Drive
Komoka Road (County Road 16), Collector Road	Signalized	Left turn lanes provided on all approaches, and right turn lane on westbound approach
Queen Street N., Local Road	Unsignalized (stop control)	Unmarked westbound right turn taper on Glendon Drive
Tunks Lane (Komoka Wellness Centre access), Local Road	Unsignalized (stop control)	3 lane cross section on Glendon Drive with eastbound left turn lane, and westbound right turn lane with 1 through lane in each direction
Springfield Way (Local Road)	Unsignalized (stop control)	Eastbound right turn lane on Glendon Drive
Jefferies Road, Collector Road /Vanneck Road (County Road 38), Rural Arterial	Signalized	Left turn lanes on eastbound, westbound, and northbound approaches
Kilworth Park Drive, Local Road	Unsignalized (stop control)	Westbound left turn lane and unmarked eastbound right turn lanes on Glendon Drive
Old River Road, Local Road	Unsignalized; left turns are prohibited from Glendon Drive by signage	No auxiliary turn lanes on Glendon Drive or Old River Road. Turning movements restricted by signage

Active Transportation Facilities

Active Transportation conditions along the Glendon Drive corridor were observed during a driving and walking site visit on Wednesday September 30th, 2015. A summary of the observations are provided below, and details are found in the Existing Conditions Transportation Memo included in **Appendix E**.

Sidewalks

Throughout the Study Area there are minimal pedestrian facilities currently in place along Glendon Drive. Gravel shoulders are present along the corridor. Cross streets approaching Glendon Drive that have sidewalks include Komoka Road (1.45m wide and 1.7m wide at the intersection, north of Glendon Drive on the east side only); Springfield Way (1.5m wide, south of Glendon Drive on the east side only); and Jefferies Road (1.5m wide, south of Glendon Drive, both sides).

Trails

Hiking trails can be accessed from Glendon Drive/Oxford Street West, just east of the study area at the entrance to Komoka Provincial Park. This trail access is intended for hiking only. Cycling trails are accessed via the Gideon Drive entrance to the park south of the study area.

Cycling Facilities

There are no dedicated cycling facilities on Glendon Drive or on the approaching cross streets. Despite the absence of dedicated facilities, Figure 5.8 shows billboard signage located at the entrance to the Wellness Centre, directed to motorists along the Glendon Drive corridor. The signage promotes safety and awareness for cyclists riding in shared curb lane conditions. The signage was installed as part of an education program initiated in part by the Middlesex London Health Unit.

Figure 5.8 Share the Road Signage

Planned Active Transportation Facilities

The Komoka-Kilworth Secondary Plan identifies a proposed boulevard multi-use trail in the Glendon Drive corridor between Komoka Road and Queen Street. The Secondary Plan also shows proposed multi-use trails intersecting with Glendon Drive at a location west of Komoka Road, along a new collector road extending north from Crestview Drive, and at Jefferies Road.

Within the Middlesex Centre Trails Master Plan, the Glendon Drive corridor is identified as a proposed secondary trail between the Thames River bridge and approximately 500m east of Amiens Road, and as a potential cycling route between the Thames River bridge and Komoka Road. Komoka Road is also identified as a proposed cycling route. The Plan also shows 8 connections along the Glendon Drive Corridor to other proposed secondary trails. Planned trails as identified in the Komoka-Kilworth Secondary Plan and Trails Master Plan are identified on Figure 5.9.

A County-wide Cycling Strategy is currently being completed to provide a holistic framework for the implementation of cycling facilities throughout the County. The draft Cycling Strategy (April 2018) identifies proposed buffered paved shoulders on Glendon Drive from the Thames River Bridge to Jefferies Road and a proposed multi-use trail from Jefferies Road to Komoka Road. A proposed signed route continues north on Komoka Road and proposed paved shoulders south on Komoka Road.

Public Transit

Currently, there is no public transit service within the communities of Kilworth and Komoka. The Municipality is currently in the early stages of investigating the feasibility of introducing transit services.

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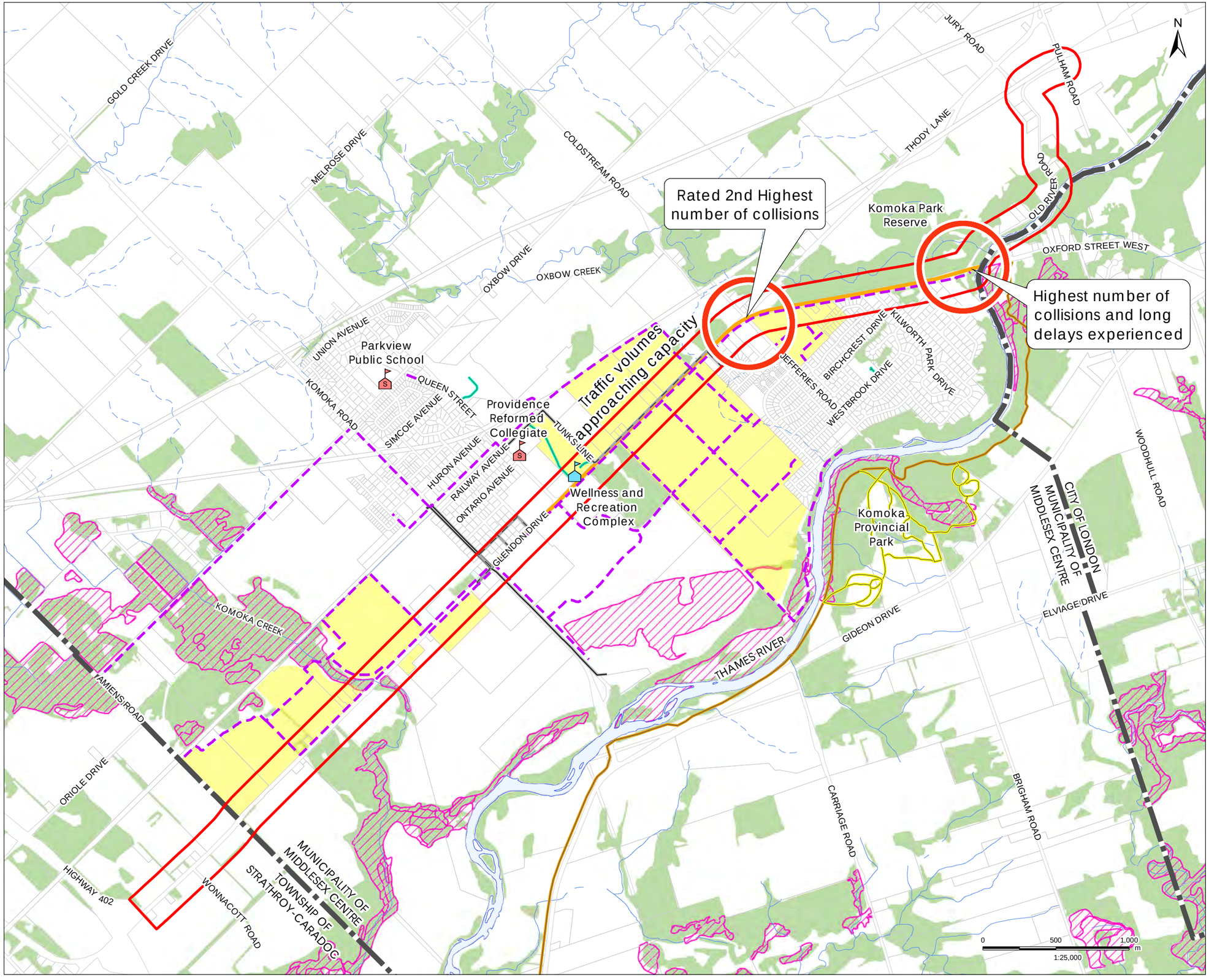

Legend

- Study Area
- Municipal Boundary
- Parcel Fabric
- Watercourse (Permanent)
- Watercourse (Intermittent)
- Water Body
- Provincially Significant Wetland
- Wooded Area
- Known Development Areas
- Peak Traffic Near Capacity
- Existing Sanitary System
- Existing Water Main

Trails

- Local Trail
- Thames Valley Trail
- Komoka Provincial Trail
- Proposed Trail

Points of Interest

- Wellness & Recreation Complex
- School

Key Map

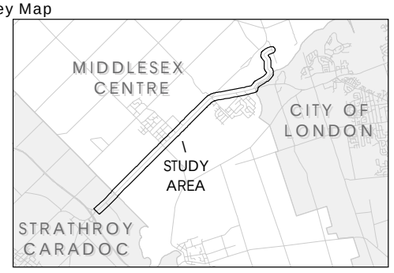

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Figure No. **5.9**

Existing Conditions

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Revised: 2016-12-22 By: albrown

5.7.1 Traffic Analysis

A data collection program was undertaken to establish base year traffic volumes (2015). Traffic volume data for 8 intersections within the study area were manually collected for an 8 hour period: 7:00-10:00am, 11:30am-1:30pm, and 3:00pm-6pm. Automatic traffic recorder (ATR) counter tubes were installed at three representative mid-block locations along Glendon Drive, which included directional and speed information. Available traffic data from MTO for the Highway 402 interchange ramp terminals were also provided by Middlesex County staff.

The mid-block ATR counts were collected between Amiens Road and Komoka Road (Location 1); between Tunks Lane and Springfield Way (Location 2); and between Kilworth Park Drive and Old River Road (Location 3). A summary of the average daily volumes at each of the locations are provided in the table below, with detailed information including daily and hourly vehicle counts provided in **Appendix E.**

Table 5.3 ATR Counts

Mid-Block Location	Average Weekday Volumes	Average Weekend Volumes
Between Amiens Road and Komoka Road	9,000-10,000 vehicles per day	7,000-8,000 vehicles per day
Between Tunks Land and Springfield Way	11,000-12,000 vehicles per day	9,000-10,000 vehicles per day
Between Kilworth Park Drive and Old River Road	13,000 vehicles per day	9,000-10,000 vehicles per day

Based on the hourly vehicle counts, am and pm peak periods were determined and will be used during the analysis of corridor capacity and level of service.

Speed Compliance

Based on the speed information collected by the ATR recorders, it was determined that there is poor compliance with the posted speed limit at selected locations. The 50th and 85th percentile speeds (i.e. the speed at which 50% and 15% of vehicles exceed) at Locations 1 and 2 are greater than the posted speed limits and the percentage of vehicles traveling at speeds greater than 10km/h over the speed limit are relatively high. At Location 3, the 50th and 85th percentile speeds are reasonable close to the speed limit. The relatively high speeds recorded between Amiens Road and Komoka Road can be attributed to some vehicles travelling to and from Highway 402, which has a 100km/h posted maximum speed limit, as well as the rural nature of this section of roadway with very little roadside development and infrequent intersections and driveways.

Traffic Composition

The vehicle classifications information included in the ATR data is summarized in Table 5.4.

Table 5.4 Traffic Composition

Location	Composition by Vehicle Class[1]
1 – Amiens Road to Komoka Road	93% Passenger Vehicles 2% Light Trucks 5% Heavy Trucks
2 – Tunks Lane to Springfield Way	92% Passenger Vehicles 1% Light Trucks 7% Heavy Trucks
3 – Kilworth Park Drive to Old River Road	91% Passenger Trucks 1% Light Trucks 8% Heavy Trucks
[1] Passenger vehicles (cars, cycles, 2A-4T); light trucks (bus, 2A-SU, 3A-SU); heavy trucks (4A-SI+ and larger)	

Vehicle classification information provided by the ATRs was confirmed through a comparison of the eight-hour manual turning movement classifications counts, and can be considered typical for this type of arterial road in a rural/urban fringe environment.

Roadway Capacity Analysis

Traffic information was compared to a typical planning level arterial roadway capacity for arterial roads with signalized intersections (900 vehicles per hour per lane) to determine the existing volume to capacity ratios (v/c) for the road sections along Glendon Drive. 'At Capacity' is represented as a v/c of 1.0. The following colour coding is utilized to further illustrate the v/c ratios:

Table 5.5 Roadway Capacity

Colour	V/C Ratio	Operation
Green	Less than 0.80	"Good" flow condition
Orange	0.80 – 0.90	"Unstable" flow condition
Red	0.90 – 1.00	"Congested" flow condition
Dark Red	Greater than 1.00	"Very Congested" flow condition

Table 5.6 Mid-Block Roadway Capacity

Glendon Drive Mid-Block Roadway Link Capacity Analysis Existing Conditions								
Road Section	AM Peak Hour				PM Peak Hour			
	EB		WB		EB		WB	
	Vol[1]	v/c[2]	Vol	v/c	Vol[1]	v/c[2]	Vol	v/c
West of Amiens Road	467	0.52	431	0.48	481	0.53	514	0.57
Amiens Road – Komoka Road	510	0.57	458	0.51	475	0.53	509	0.57
Komoka Road – Queen Street	612	0.68	430	0.48	568	0.63	617	0.69
Queen Street – Tunks Lane	656	0.73	440	0.49	579	0.64	664	0.74
Tunks Lane – Springfield Way	639	0.71	440	0.49	523	0.58	667	0.74
Springfield Way – Jefferies Road-Vanneck Road	659	0.73	437	0.49	537	0.60	651	0.72
Jefferies Road-Vanneck Road – Kilworth Park Drive	651	0.72	426	0.47	539	0.60	615	0.68
Kilworth Park Drive – Old River Road	770	0.86	432	0.48	571	0.63	717	0.80

[1] Volume = two-way traffic; [2] v/c = two-way traffic/capacity of 900 vehicles per hour per lane

The analysis shows that under existing conditions, Glendon Drive is generally operating well within capacity and with most v/c ratios less than 0.80, i.e. operating with traffic volumes 20% less than capacity.

Intersection Traffic Operations

The quality of intersection operations at signalized and unsignalized intersections was evaluated in terms of level of service (LOS) and volume to capacity (v/c) as defined by the Highway Capacity Manual (HCM). LOS is evaluated on the basis of average control delay per vehicle and includes deceleration delay, queue move-up time, stopped delay, and final acceleration delay. Capacity is evaluated in terms of ratio of demand flow to capacity with an at-capacity

condition represented by a v/c ratio of 1.00 (i.e. volume demand equals capacity). LOS range from A to F, with slightly different criteria for signalized and unsignalized intersections; for signalized intersection, the LOS ranges from A for 10 seconds average delay or less, to LOS F for delays greater than 80 seconds. For unsignalized intersections, LOS ranges from A for 10 seconds or less, to greater than 50 seconds for LOS F (refer to Table 5.7 and Table 5.8).

Table 5.7 Level of Service Criteria - Signalized Intersections

Level of Service (LOS)	Delay (seconds / vehicle)
A	0 – 10 seconds
B	> 10 – 20 seconds
C	> 20 – 35 seconds
D	> 35 – 55 seconds
E	> 55 – 80 seconds
D	> 80 seconds

Table 5.8 Level of Service Criteria - Unsignalized Intersections

Level of Service (LOS)	Delay (seconds / vehicle)
A	0 – 10 seconds
B	> 10 – 15 seconds
C	> 15 – 25 seconds
D	> 25 – 35 seconds
E	> 35 – 50 seconds
D	> 50 seconds

Acceptable operations are generally considered to be LOS C or better; however, during peak hours, a LOS D is considered acceptable for through movements and for the overall intersection operation, and a LOS E is considered acceptable for turning movements. Similar to LOS, the v/c ratio for signalized intersection is calculated as a whole (sum of critical movements), and for individual movements. For unsignalized intersections, LOS is only calculated for those movements that conflict with opposing free-flow traffic and is not defined for the intersections as a whole.

While the LOS and v/c for each movement are related, they are calculated independently. Therefore, it is possible to have a poor intersection level of service associated with a low v/c ratio or a good level of a service associated with a high v/c ratio. The designation LOS F does not automatically imply that the volume demands at an intersection or on a specific movement exceed capacity, nor does a LOS better than E automatically imply that unused capacity is available.

To assess the existing peak hour conditions, a level of service analysis was conducted using Synchro 9.0 software, which implements the methods of the 2000/2010 Highway Capacity Manual. The key parameters used in the analysis include:

- Existing lane configurations;
- Heavy vehicle percentages as derived from existing traffic counts;
- Calculated peak hour factors (PHF). It is noted that this factor adjusts the hourly volumes to better represent conditions during the peak 15 minutes of intersection operations;
- Signal timings as provided by Middlesex County staff; and
- Synchro default values for all other inputs.
- The results of the analysis are presented in the table below. The Synchro software analysis outputs have been provided in **Appendix E.**

Table 5.9 Level of Service

Existing 2015 Base Year Conditions Peak Hour Operational Analysis										
Intersection	**Approach/Movement**		**AM Peak Hour**				**PM Peak Hour**			
			LOS[1]	**Delay[2]**	**v/c[3]**	**Q[4]**	**LOS[1]**	**Delay[2]**	**v/c[3]**	**Q[4]**
Glendon Drive/ Amiens Road *Unsignalized*	EB	Left/Thru	A	< 1	0.01	< 1	A	1	0.02	1
	WB	Thru/Right	Unopposed Movement							
	SB	Left/Right	C	17	0.20	5	C	17	0.15	4
Glendon Drive/ Komoka Road *Signalized*	EB	Left	B	13	0.15	9	B	14	0.20	11
		Thru/Right	C	21	0.70	73	B	19	0.60	61
	WB	Left	B	15	0.17	8	B	17	0.32	13
		Thru	B	18	0.51	45	B	20	0.60	54
		Right	C	28	0.03	4	C	21	0.05	6
	NB	Left	B	12	0.07	7	B	12	0.06	6
		Thru/Right	B	12	0.10	10	B	13	0.16	15
	SB	Left	B	13	0.12	11	B	13	0.15	12
		Thru/Right	B	12	0.12	11	B	12	0.10	10
	Overall Intersection		***B***	***18***	***0.41***	***-***	***B***	***17***	***0.38***	***-***
Glendon Drive/ Queen Street *Unsignalized*	EB	Left/Thru	A	< 1	0.01	< 1	A	< 1	0.00	< 1
	WB	Thru	Unopposed Movement							
		Right	Unopposed Movement							
	SB	Left/Right	C	24	0.25	7	C	22	0.10	3
Glendon Drive/ Tunks Lane	EB	Left	A	9	0.02	< 1	A	9	0.08	2
		Thru	Unopposed Movement							

Existing 2015 Base Year Conditions
Peak Hour Operational Analysis

Intersection	Approach/Movement		AM Peak Hour				PM Peak Hour			
			LOS[1]	Delay[2]	v/c[3]	Q[4]	LOS[1]	Delay[2]	v/c[3]	Q[4]
Unsignalized	WB	Thru	Unopposed Movement							
		Right	Unopposed Movement							
	SB	Left	C	24	0.01	3	D	31	0.15	4
		Right	B	11	0.02	1	B	13	0.09	2
Glendon Drive/ Springfield Way *Unsignalized*	EB	Thru	Unopposed Movement							
		Right	Unopposed Movement							
	WB	Left	A	9	0.01	< 1	A	9	0.02	< 1
		Thru	Unopposed Movement							
	NB	Left/Right	C	17	0.12	3	D	27	0.20	5
Glendon Drive/ Jefferies Road-Vanneck Road *Signalized*	EB	Left	A	8	0.35	15	B	11	0.42	16
		Thru/Right	A	8	0.49	39	A	9	0.44	38
	WB	Left	A	7	0.11	7	A	9	0.21	13
		Thru/Right	A	9	0.38	35	B	13	0.59	64
	NB	Left	C	22	0.23	13	B	19	0.23	13
		Thru/Right	C	22	0.29	22	B	17	0.13	13
	SB	Left/Thru/Right	D	45	0.82	60	D	46	0.89	82
	Overall Intersection		***B***	***16***	***0.58***	***-***	***B***	***20***	***0.69***	***-***
Vanneck Road/ Coldstream Rd *Unsignalized*	EB	Left/Right	A	10	0.13	3	B	11	0.13	3
	NB	Left/Thru	A	2	0.06	2	A	3	0.06	2
	SB	Thru/Right	Unopposed Movement							
Glendon Drive/ Kilworth Park Drive *Unsignalized*	EB	Thru	Unopposed Movement							
		Right	Unopposed Movement							
	WB	Left	A	9	0.03	1	A	9	0.12	3
		Thru	Unopposed Movement							
	NB	Left/Right	C	20	0.38	13	C	25	0.34	11
Glendon Drive/ Old River Road *Unsignalized*	EB	Left/Thru	A	< 1	0.00	< 1	A	< 1	0.00	< 1
	WB	Thru/Right	Unopposed Movement							
	SB	Left/Right	D	35	0.35	11	E	43	0.46	16

[1] Level of Service, LOS E/F highlighted, if any; [2] Delay in seconds; [3] Volume to capacity ratio, 0.90 and higher highlighted, if any; [4] 95th Percentile queue in metres

The analysis indicates that under existing conditions generally all study area intersections currently operate at good levels of service with all movements well within their theoretical capacity. One exception would be at the intersection of Glendon Drive with Old River Road where the southbound/westbound stop controlled approach is shown to operate at LOS E (long delays). While long delays could be expected with the relatively high volume of through traffic

on Glendon Drive, the relatively low southbound traffic volume is well within the available capacity.

Safety Review – Collision Data

Collision information for the study area was provided by Middlesex County staff from 2010 to approximately mid-2015, inclusive, and included collision reports prepared by the Ontario Provincial Police. Since the 2015 collision reports does not represent a full year, it was not included in the analysis, which was completed using data from 2010-2014, inclusive.

A total of 68 recorded intersection collisions and 30 mid-block collisions were identified for the five-year period from 2010-2014. A full discussion of collisions within the study area is included in the Existing Conditions Transportation Memorandum in **Appendix E**.

The Glendon Drive/Old River Road intersection experienced the highest number of collisions for the five year period examined, with a collision rate of 1.3 per million vehicles entering (MVE). A collision rate of 1.0 MVE or higher is considered the benchmark for determining the potential need for safety-related improvements at an intersection. At this intersection, it was noted that rear-end collisions and angle/turning-movement collisions were ranked the highest. The rear-end collisions can be attributed in part to motorists attempting the prohibited eastbound left turn movement from Glendon Drive to Old River Road (prohibited by regulatory signage). The angle and turning movement related collisions are likely due to the effects of tree foliage and the nearby bridge structure over the Thames River, which were both observed to limit the available sight distance.

The intersection of Jefferies Road-Vanneck Road with Glendon Drive was ranked second in total number of intersection-related collisions. At this location, rear-end collisions were the highest recorded collision type. The collisions can be attributed to the closely spaced intersection of Coldstream Road, as well as the curved southbound approach of Vanneck Road, which both affect the available sight distance and the perception-reaction time by motorists.

Active Transportation Analysis

The Glendon Drive Corridor serves as an important pedestrian and cycling connection between the communities of Kilworth and Komoka, and the area is also heavily used by cycling groups in Middlesex and the City of London. The Corridor also provides access to the Komoka Wellness Centre and to the Komoka Provincial Park trails, for which there are few to no alternative routes available. Under existing conditions, it can be described as a rural corridor with relatively infrequent intersections, which accommodates a vehicle mix of approximately 5% to 9% heavy vehicles per day. The presence of heavy vehicles in addition to the speeds and volumes of traffic in shared traffic lanes have significant impacts on safety and comfort for active transportation users. Although there have been no reported collisions involving pedestrians or

cyclists between 2010 and 2015, this must be considered in the context of low levels of observed pedestrian and bicycle activity.

The County is currently completing a County-wide cycling strategy scheduled for completion in December 2018. In regards to the Glendon Drive Corridor, draft recommendations (April 2018) include proposed buffered paved shoulders from the Thames River Bridge to Jefferies Road, and a proposed multi-use trail from Jefferies Road to Komoka Road.

5.7.2 Old River Road

Old River Road runs northeast from its intersection with Glendon Drive approximately 30m west of the Thames River Bridge and contains 19 residences. It runs adjacent to the Thames River before winding north up a steep grade and east to its intersection with Pulham Road a few metres south of the CN Rail Line.

Based on the high intersection collision rates, poor intersection level of service (refer to **Table 5.9** above), and erosion concerns along the corridor identified in the 2011 Old River Road Class EA (Spriet Associates), additional traffic counts and analysis was undertaken to characterize the traffic operations along Old River Road. Automatic Traffic Recorders (ATRs) were used to determine a.m. and p.m. peak hour traffic volumes (refer to **Appendix E.1**). Trips generated by the existing residences along Old River Road and Pulham Road were estimated to determine the approximate percentage of through traffic utilizing the corridor. These numbers were refined through manual license plate tracking, which showed that between 83% and 96% of vehicles along the corridor over an 8-hour period consisted of through traffic, utilizing the corridor as a cut-through.

A summary of the operating conditions along Old River Road is provided below:

- The Old River Road corridor is operating within capacity, with an estimated daily traffic volume of approximately 1,030 vehicles per day.
- Between 83% and 96% of traffic along Old River Road over an 8-hour period consists of non-local through traffic.
- Peak hour traffic volumes indicate that if additional turning restrictions were implemented at the Old River Road intersection with Glendon Drive, or if Old River Road were closed as a through route (i.e. cul-de-sacs), the rerouting of peak hour traffic would have negligible impacts on other parts of the road network (i.e. the intersection of Glendon Drive/Jefferies Road/Vanneck Road).

The Old River Road Corridor was also subject to a previous Class EA, which was undertaken to address erosion and embankment instability, particularly in the middle section of the corridor (Spriet Associates 2011). Additional issues identified as part of the Class EA included substandard

road profile and cross section, improper position of the guardrail at the erosion location, road movement, drainage problems, and road flooding.

It is recommended that the issues along the corridor, including erosion and bank stability, poor level of service at the intersection with Glendon Drive (expected to worsen with future traffic volumes), and the high collision rates at the intersection, be considered as part of the Glendon Drive Class EA.

5.8 TRAFFIC FORECASTING AND FUTURE GROWTH

In order to understand future traffic conditions along the corridor, traffic forecasts were completed to a planning horizon of 2035, representing a 20 year planning period. Land use information for all active and/or known developments was provided by County planning staff, and where no specific development information was available, general OP land use information was used to identify the number of new vehicle trips along the Corridor. Figure 5.10 Future Development Areas identifies the potential future development areas considered during traffic forecasting, and details of the trips generated by future developments and their assignments along the corridor can be found in **Appendix E.**

Additionally, a background growth rate of 0.25% per annum, or 5% growth over the 20 year planning period was included to account for general population and employment growth outside of the study area. The resultant future growth in traffic was compared to the historical growth trends as determined by traffic data provided by County staff in order to confirm the accuracy of the forecasted traffic volumes. Forecasted traffic volumes were used as the basis for determining future operations along the corridor.

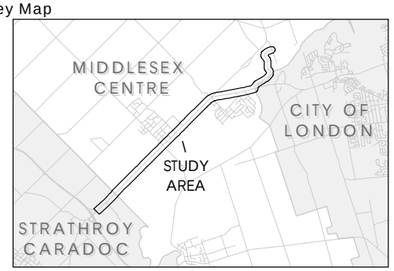
Glendon Drive
paving the way for an active community

middlesex centre
in the centre of it all

middlesex county

Legend
- Study Area
- Municipal Boundary
- Future Development Areas
- Watercourse (Permanent)
- Watercourse (Intermittent)

Key Map



Notes
1. Coordinate System: NAD 1983 UTM Zone 17N
2. Base features produced under license with the Ontario Ministry of Natural Resources © Queen's Printer for Ontario, 2016.
3. Orthoimagery © First Base Solutions, 2016

December 2016

Stantec

Figure No. **5.10**

Future Development Areas

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Revised: 2016-12-21 By: albrown

6.0 FUTURE ROADWAY CONDITIONS

Based on the forecasted traffic volumes for the 20-year planning period, future traffic conditions along the Glendon Drive Corridor were identified in terms of vehicle to capacity ratios (v/c) and intersection operational analysis. Future conditions along the Corridor provide the basis for identifying improvements to the transportation network and the evaluation of alternative solutions during Phases 2 and 3 of the Class EA planning process. Full vehicle trip generations and assignment along the Corridor are included in **Appendix E.**

6.1 FUTURE ROADWAY CAPACITY ANALYSIS

An analysis of future v/c ratios along the Glendon Drive corridor under the existing two-lane configuration shows that the existing two-lane roadway will operate at congested or very congested conditions during the a.m. and p.m. peak periods (v/c ratios from 0.80-1.67, where 1.0 represents an at-capacity condition). As in the existing conditions analysis in Section 5.7.1, the following colour coding was used:

Table 6.1 Volume/Capacity Criteria

Colour	V/C Ratio	Operation
Green	Less than 0.80	"Good" flow condition
Orange	0.80 – 0.90	"Unstable" flow condition
Red	0.90 – 1.00	"Congested" flow condition
Dark Red	Greater than 1.00	"Very Congested" flow condition

Table 6.2 Mid-Corridor Roadway Capacity Analysis- Future 2-Lane Roadway

Road Section	AM Peak Hour				PM Peak Hour			
	EB		WB		EB		WB	
	Vol	v/c[1]	Vol	v/c	Vol	v/c[1]	Vol	v/c
West of Amiens Road	871	0.97	719	0.80	843	0.94	983	1.09
Amiens Road – Komoka Road	904	1.00	876	0.97	983	1.09	991	1.10
Komoka Road – Queen Street	815	0.91	832	0.92	1,076	1.20	964	1.07
Queen Street – Tunks Lane	861	0.96	843	0.94	1,088	1.21	1,013	1.13
Tunks Lane – Crestview Drive (Kilworth Heights West)	843	0.94	843	0.94	1,029	1.14	1,016	1.13
Crestview Drive (Kilworth Heights West) – Springfield Way	1,144	1.27	804	0.89	1,139	1.27	1,368	1.52
Springfield Way - Jefferies Road-Vanneck Road	1,357	1.51	861	0.96	1,284	1.43	1,570	1.74
Jefferies Road-Vanneck Road – Kilworth Park Drive	1,284	1.43	806	0.90	1,183	1.31	1,412	1.57
Kilworth Park Drive – Old River Road	1,434	1.59	820	0.91	1,230	1.37	1,543	1.71

[1] v/c = two-way traffic/capacity of 900 vehicles per hour per lane

The traffic forecasts were re-analyzed assuming an improvement to a four-lane road. Results show that as a four-lane road, Glendon Drive would accommodate future traffic projections, with vehicle/capacity ratios generally below 0.80. Ratios were slightly higher in the westbound direction between Springfield Way and Jefferies Road, and Kilworth Park Drive to Old River Road, with ratios of 0.87 and 0.86 during the p.m. peak periods, respectively. These ratios represent potentially 'unstable' flow conditions, during which minor delays and/or queuing may occur.

Table 6.3 Glendon Drive Mid-Corridor Capacity Analysis - Future Four-Lane Roadway

Road Section	AM Peak Hour				PM Peak Hour			
	EB		WB		EB		WB	
	Vol	v/c[1]	Vol	v/c	Vol	v/c[1]	Vol	v/c
West of Amiens Road	871	0.48	719	0.40	843	0.47	983	0.55
Amiens Road – Komoka Road	904	0.50	876	0.49	983	0.55	991	0.55
Komoka Road – Queen Street	815	0.45	832	0.46	1,076	0.60	964	0.54
Queen Street – Tunks Lane	861	0.48	843	0.47	1,088	0.60	1,013	0.56
Tunks Lane – Crestview Drive (Kilworth Heights West)	843	0.47	843	0.47	1,029	0.57	1,016	0.56
Crestview Drive (Kilworth Heights West) – Springfield Way	1,144	0.64	804	0.45	1,139	0.63	1,368	0.76
Springfield Way - Jefferies Road-Vanneck Road	1,357	0.75	861	0.48	1,284	0.71	1,570	0.87
Jefferies Road-Vanneck Road – Kilworth Park Drive	1,284	0.71	806	0.45	1,183	0.66	1,412	0.78
Kilworth Park Drive – Old River Road	1,434	0.80	820	0.46	1,230	0.68	1,543	0.86

[1] v/c = two-way traffic/capacity of 900 vehicles per hour per lane (1,800 vphpl per direction with four lane roadway)

Refer to **Appendix E** for the full analysis of future traffic conditions.

6.2 FUTURE INTERSECTION OPERATIONS

To assess the operating conditions for the 2035 future weekday a.m. and p.m. peak hour forecasts, a level of service (LOS) analysis for future intersection operations was undertaken using the same methodology as in the analysis of existing intersection operations. The following improvements were assumed within the analysis of future conditions:

- Glendon Drive as a four-lane road from a point east of Highway 402 to a point east of the Glendon Drive/Kilworth park Drive intersection, auxiliary left turn and right turn lanes provided along Glendon Drive where required for either capacity or safety, and new traffic signals on Glendon Drive at the proposed Kilworth Heights West access (Crestview Drive) and Springfield way.

- Signal timing plans optimized within existing cycle lengths and phases at Glendon Drive/Komoka Road and the signal cycle length increased from the existing 60 seconds to 90 seconds at Glendon Drive/Jefferies Road/Vanneck Road intersection with advanced green phases added.

The results of the operational analysis for future conditions are presented by intersection or by pairs of intersections where appropriate (i.e. serving common land uses or closely spaced

together). As discussed in the analysis of existing traffic conditions in Section 5.7.1, the quality of intersection operations at signalized and unsignalized intersections is evaluated in terms of level of service (LOS) and volume to capacity (v/c) as defined by the *Highway Capacity Manual* (HCM). LOS is evaluated on the basis of average control delay per vehicle and includes deceleration delay, queue move-up time, stopped delay, and final acceleration delay. Capacity is evaluated in terms of ratio of demand flow to capacity with a capacity condition represented by a v/c ratio of 1.00 (i.e., volume demand equals capacity). The LOS criteria for signalized and unsignalized intersections is provided in Table 6.4 and Table 6.5.

Table 6.4 Level of Service Criteria for Signalized Intersections

Level of Service (LOS)	Delay (seconds / vehicle)
A	0 – 10 seconds
B	> 10 – 20 seconds
C	> 20 – 35 seconds
D	> 35 – 55 seconds
E	> 55 – 80 seconds
D	> 80 seconds

Table 6.5 Level of Service Criteria for Unsignalized Intersections

Level of Service (LOS)	Delay (seconds / vehicle)
A	0 – 10 seconds
B	> 10 – 15 seconds
C	> 15 – 25 seconds
D	> 25 – 35 seconds
E	> 35 – 50 seconds
D	> 50 seconds

The results of the operational analysis for future 2035 conditions are presented below by intersection or by pairs of intersections where appropriate (i.e. serving common land uses or closely spaced together).

Table 6.6 Future Conditions - Glendon Drive at Amiens Road

Future 2035 Conditions, Glendon Drive/Amiens Road Peak Hour Operational Analysis										
Intersection	**Approach/Movement**		**AM Peak Hour**				**PM Peak Hour**			
			LOS[1]	**Delay[2]**	**v/c[3]**	**Q[4]**	**LOS[1]**	**Delay[2]**	**v/c[3]**	**Q[4]**
	EB	Left	A	10	0.02	< 1	B	11	0.04	1
		Dual Thru	Unopposed Movement							

Future Roadway Conditions
August 3, 2018

Future 2035 Conditions, Glendon Drive/Amiens Road Peak Hour Operational Analysis										
Intersection	**Approach/Movement**		**AM Peak Hour**				**PM Peak Hour**			
			LOS[1]	**Delay[2]**	**v/c[3]**	**Q[4]**	**LOS[1]**	**Delay[2]**	**v/c[3]**	**Q[4]**
Glendon Drive/ Amiens Road *Unsignalized*	WB	Thru-Thru/Right	Unopposed Movement							
	SB	Left/Right	D	27	0.31	10	D	34	0.31	9
[1] Level of Service, LOS E/F highlighted, if any; [2] Delay in seconds; [3] Volume to capacity ratio, 0.90 and higher highlighted, if any; [4] 95th Percentile queue in metres										

Table 6.7 Future conditions - Glendon Drive at Komoka Road

Future 2035 Conditions, Glendon Drive/Komoka Road Peak Hour Operational Analysis										
Intersection	**Approach/Movement**		**AM Peak Hour**				**PM Peak Hour**			
			LOS[1]	**Delay[2]**	**v/c[3]**	**Q[4]**	**LOS[1]**	**Delay[2]**	**v/c[3]**	**Q[4]**
Glendon Drive/ Komoka Road *Signalized*	EB	Left	B	13	0.25	12	B	14	0.35	17
		Thru-Thru/Right	B	13	0.45	38	B	13	0.54	49
	WB	Left	B	11	0.15	8	B	17	0.43	19
		Dual Thru	B	13	0.49	43	B	12	0.45	40
		Right	B	10	0.05	6	A	9	0.07	7
	NB	Left	B	14	0.09	8	B	16	0.09	8
		Thru/Right	B	14	0.12	12	B	17	0.22	19
	SB	Left	B	16	0.23	17	B	18	0.30	21
		Thru/Right	B	15	0.20	17	B	16	0.13	13
	Overall Intersection		***B***	***13***	***0.38***	***-***	***B***	***13***	***0.45***	***-***
[1] Level of Service, LOS E/F highlighted, if any; [2] Delay in seconds; [3] Volume to capacity ratio, 0.90 and higher highlighted, if any; [4] 95th Percentile queue in metres										

Table 6.8 Future Conditions - Glendon Drive at Queen Street and Tunks Lane

Future 2035 Conditions, Glendon Drive at Queen Street and at Tunks Lane Peak Hour Operational Analysis										
Intersection	**Approach/Movement**		**AM Peak Hour**				**PM Peak Hour**			
			LOS[1]	**Delay[2]**	**v/c[3]**	**Q[4]**	**LOS[1]**	**Delay[2]**	**v/c[3]**	**Q[4]**
Glendon Drive/ Queen Street *Unsignalized*	EB	Left	A	10	0.01	< 1	B	12	0.01	< 1
		Dual Thru	Unopposed Movement							
	WB	Dual Thru	Unopposed Movement							
		Right	Unopposed Movement							
	SB	Left/Right	E	42	0.41	14	E	39	0.19	5
Glendon Drive/ Tunks Lane *Unsignalized*	EB	Left	B	12	0.03	1	B	11	0.12	3
		Dual Thru	Unopposed Movement							
	WB	Dual Thru	Unopposed Movement							
		Right	Unopposed Movement							
	SB	Left	E	39	0.17	5	F	72	0.32	9
		Right	B	12	0.02	1	B	13	0.09	2

[1] Level of Service, LOS E/F highlighted, if any; [2] Delay in seconds; [3] Volume to capacity ratio, 0.90 and higher highlighted, if any; [4] 95th Percentile queue in metres

Table 6.9 Glendon Drive at Crestview Drive (Kilworth Heights West) and Springfield Way

Future 2035 Conditions, Glendon Drive at Crestview Drive and at Springfield Way Peak Hour Operational Analysis										
Intersection	**Approach/Movement**		**AM Peak Hour**				**PM Peak Hour**			
			LOS[1]	**Delay[2]**	**v/c[3]**	**Q[4]**	**LOS[1]**	**Delay[2]**	**v/c[3]**	**Q[4]**
Glendon Drive/ Crestview Drive (Kilworth Heights West) *Signalized*	EB	Dual Thru	B	12	0.43	55	C	34	0.79	95
		Right	A	9	0.04	5	C	23	0.17	17
	WB	Left	C	26	0.51	31	D	36	0.80	127
		Dual Thru	C	20	0.36	58	A	7	0.39	59
	NB	Left	C	26	0.35	44	D	35	0.43	41
		Right	C	31	0.59	68	C	32	0.21	21
	Overall Intersection		***B***	***20***	***0.54***	**-**	***C***	***25***	***0.70***	**-**
Glendon Drive/ Springfield Way *Signalized*	EB	Dual Thru	A	8	0.54	41	C	31	0.72	105
		Right	A	4	0.02	1	C	35	0.02	2
	WB	Left	A	10	0.35	7	C	21	0.58	27
		Dual Thru	A	6	0.39	27	A	9	0.60	79
	NB	Left	C	25	0.03	7	C	30	0.08	11
		Right	C	30	0.41	28	C	30	0.11	16
	Overall Intersection		***A***	***10***	***0.50***	**-**	***C***	***20***	***0.55***	**-**

Future 2035 Conditions, Glendon Drive at Crestview Drive and at Springfield Way Peak Hour Operational Analysis										
Intersection	**Approach/Movement**		**AM Peak Hour**				**PM Peak Hour**			
			LOS[1]	**Delay[2]**	**v/c[3]**	**Q[4]**	**LOS[1]**	**Delay[2]**	**v/c[3]**	**Q[4]**
[1] Level of Service, LOS E/F highlighted, if any; [2] Delay in seconds; [3] Volume to capacity ratio, 0.90 and higher highlighted, if any; [4] 95th Percentile queue in metres										

Table 6.10 Future Conditions - Glendon Drive, Jefferies Road, Vanneck Road, and Coldstream Road

Future 2035 Conditions, Glendon Drive at Jefferies Road-Vanneck Road and at Coldstream Road Peak Hour Operational Analysis										
Intersection	**Approach/Movement**		**AM Peak Hour**				**PM Peak Hour**			
			LOS[1]	**Delay[2]**	**v/c[3]**	**Q[4]**	**LOS[1]**	**Delay[2]**	**v/c[3]**	**Q[4]**
Glendon Drive/ Jefferies Road-Vanneck Road *Signalized*	EB	Left	E	64	0.97	80	F	174	1.23	91
		Dual Thru	B	20	0.56	79	D	36	0.70	79
		Right	B	18	0.16	21	D	44	0.25	31
	WB	Left	D	54	0.80	59	F	181	1.31	115
		Dual Thru	C	25	0.49	57	C	32	0.80	105
		Right	B	20	0.06	8	C	20	0.07	11
	NB	Left	C	32	0.48	38	F	194	1.30	77
		Thru/Right	E	72	0.99	144	D	37	0.74	102
	SB	Left	C	30	0.53	23	C	30	0.56	25
		Thru/Right	C	21	0.35	42	F	123	1.16	192
	Overall Intersection		***D***	***36***	***0.84***	***-***	***F***	***80***	***1.20***	***-***
Vanneck Road/ Coldstream Rd *Unsignalized*	EB	Left/Right	B	11	0.17	5	C	16	0.23	7
	NB	Left/Thru	A	2	0.08	2	A	2	0.09	2
	SB	Thru/Right	Unopposed Movement							
[1] Level of Service, LOS E/F highlighted, if any; [2] Delay in seconds; [3] Volume to capacity ratio, 0.90 and higher highlighted, if any; [4] 95th Percentile queue in metres										

Table 6.11 Future Conditions Glendon Drive at Kilworth Park Drive and Old River Road

Table 19 Future 2035 Conditions Peak Hour Operational Level of Service Analysis										
Intersection	**Approach/Movement**		**AM Peak Hour**				**PM Peak Hour**			
			LOS[1]	**Delay[2]**	**v/c[3]**	**Q[4]**	**LOS[1]**	**Delay[2]**	**v/c[3]**	**Q[4]**
Glendon Drive/ Kilworth Park	EB	Dual Thru	Unopposed Movement							
		Right	Unopposed Movement							

Table 19
Future 2035 Conditions
Peak Hour Operational Level of Service Analysis

Intersection	Approach/Movement		AM Peak Hour				PM Peak Hour			
			LOS[1]	Delay[2]	v/c[3]	Q[4]	LOS[1]	Delay[2]	v/c[3]	Q[4]
Drive *Unsignalized*	WB	Left	B	13	0.08	2	B	14	0.27	8
		Dual Thru	Unopposed Movement							
	NB	Left/Right	D	25	0.51	21	C	24	0.38	13
Glendon Drive/ Old River Road *Unsignalized*	EB	Left/Thru	A	< 1	0.00	< 1	A	< 1	0.00	< 1
	WB	Thru/Right	Unopposed Movement							
	SB	Left/Right	F	586	1.75	54	F	Err[5]	4.40	Err[5]

[1] Level of Service, LOS E/F highlighted, if any; [2] Delay in seconds; [3] Volume to capacity ratio, 0.90 and higher highlighted, if any; [4] 95th Percentile queue in metres; [5] Err =Error cannot calculate

Refer to **Appendix E** for the full analysis of future traffic conditions.

6.3 IDENTIFICATION OF TRAFFIC NEEDS

Traffic forecasting and analysis indicate the need for improvements to roadway capacity along Glendon Drive to accommodate future traffic demands, along with operational improvements (e.g. auxiliary turning lanes) to improve intersection LOS at a number of intersections, which include the following:

- At Amiens Road: eastbound auxiliary left turn lane;
- At Komoka Road: optimize signal timings;
- At Queen Street: eastbound auxiliary left turn lane and westbound auxiliary right turn lane;
- At Tunks Lane: monitor for potential future need for traffic signals, and consider including traffic signal underground duct work as part of a future reconstruction of this intersection;
- At Crestview Drive (future access to Kilworth Heights West subdivision): traffic signals, and westbound auxiliary left turn lane and eastbound auxiliary right turn lane;
- At Springfield Way: traffic signals;
- At Jefferies Road-Vanneck Road: optimize signal timings, eastbound and westbound auxiliary right turn lanes, and southbound auxiliary left turn lane;

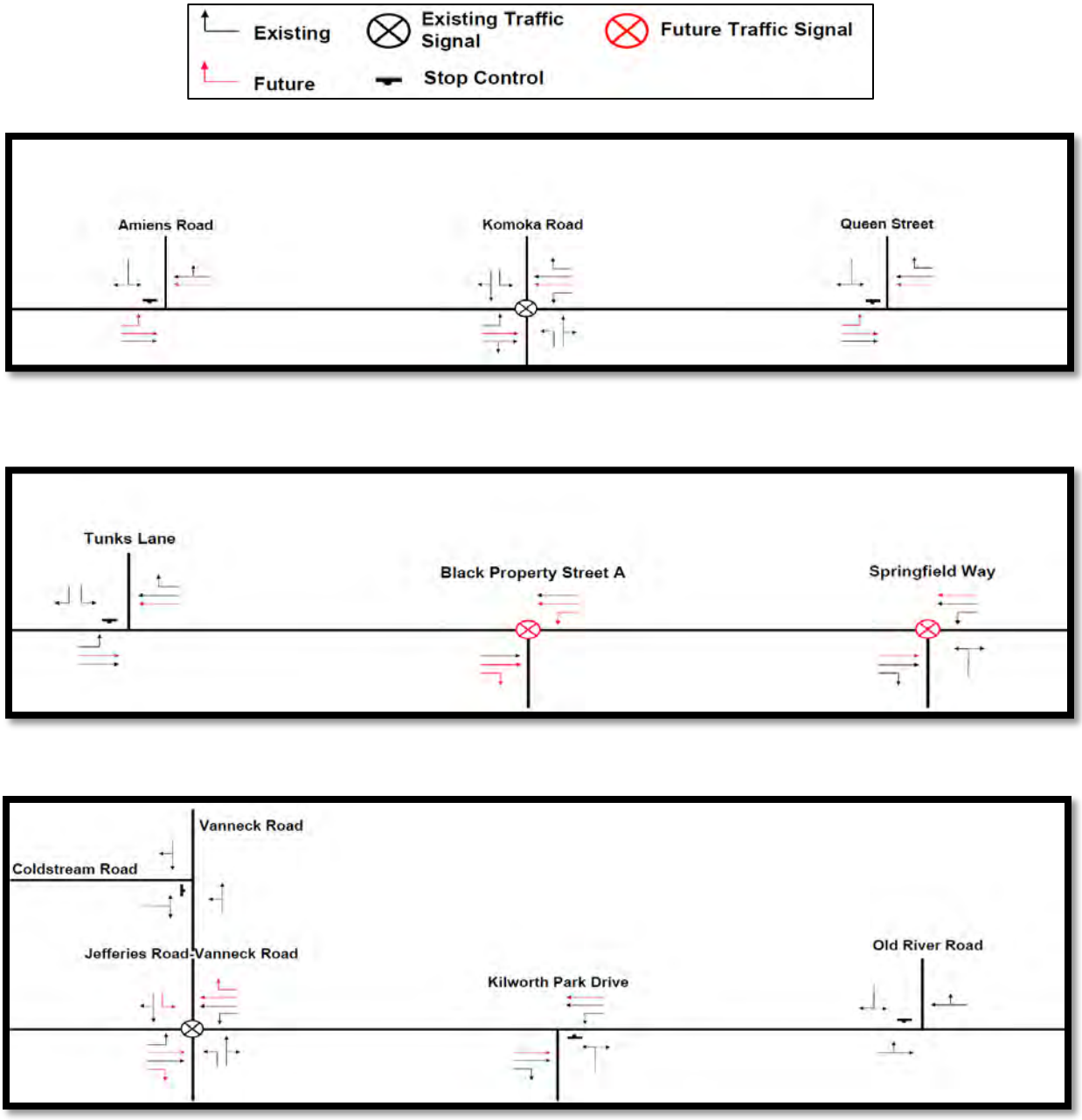
- At Kilworth Park Drive: monitor for potential future need for traffic signals, and consider including traffic signal underground duct work as part of a future reconstruction of this intersection;

- At Old River Road: from a geometric perspective, alternatives should be considered to address the operations and intersection geometry as an interim measure prior to the implementation of potential future traffic carrying capacity improvements to the Glendon Drive bridge structure over the Thames River (right in right out options, intersection closure, etc.).

Future Roadway Conditions
August 3, 2018

Future lane configurations identified through the traffic analysis are provided below.

Figure 6.1 Future Lane Configurations



7.0 PHASE 2 – ALTERNATIVE PLANNING SOLUTIONS

As part of Phase 2 of the Class EA process, all reasonable and feasible solutions to the problems and opportunities are identified and evaluated based on their ability to resolve the issues, and their impacts to the Social/Cultural, Natural, Technical, and Economic Environments.

7.1 PROBLEMS AND OPPORTUNITIES BEING ADDRESSED

While Glendon Drive is currently operating within capacity for a two lane rural roadway, traffic forecasting and analysis shows that with increased traffic volumes generated by future developments and community growth, Glendon Drive will operate at congested or very congested conditions during the a.m. and p.m. peak periods by the 2035 horizon.

Problems and opportunities to be addressed include:

- Safety at collision prone intersections;
- Roadway capacity deficiencies within the planning horizon;
- Active transportation network and safety improvement opportunities;
- Operational characteristics; and
- Intersection roadway traffic control opportunities.

7.2 ALTERNATIVE PLANNING SOLUTIONS

The following planning solutions were identified to address the problem and opportunities identified along the corridor:

- **Do Nothing –** No physical and/or operational changes would be made within the study corridor. This alternative is included to provide a base against which other alternatives can be compared.
- **Transportation Demand Management (TDM) and Expanded Pedestrian and Bicycle Use** – TDM includes diverting current vehicle traffic to other modes of transportation (transit, walking, cycling, etc.).
- **Operational Improvements –** Operational improvements could include traffic calming measures (lane widths, on-street parking, etc.), turning lanes, intersection

signalization/traffic management optimization, turn restrictions (right in, right out/intersection closures), and turn lanes with localized widening.

- **Road Widening –** Widening the study corridor from 2 lanes to improve capacity, safety, and incorporate active transportation modes.
- **Improvements to Parallel Roads –** Improvements to parallel roads including Oxbow Drive to the north, and Gideon Drive (County Road 3) to the south in order to divert and accommodate future traffic needs.
- **Urbanize Existing Road Cross Section to Include Active Transportation Facilities –** The existing road cross section is converted from a rural cross section to an urban cross section to incorporate sidewalks and/or bicycle facilities.

7.3 EVALUATION METHODOLOGY AND CRITERIA

As part of the Class EA process, defining the framework and criteria for evaluating the alternative planning solutions is undertaken. The environmental components considered as part of the evaluation process are discussed in Table 7.1.

Table 7.1 Environmental Components

Environmental Components	Discussion
Natural Environment	Component having regard for protecting significant natural and physical elements of the environment (i.e. air, land, water, and biota) including natural heritage and environmental features and functions
Social/Cultural	Component having regard for potential effects on residents, neighbourhoods, businesses, community character, social cohesion, community features, and historical/archaeological and heritage components
Technical	Component having regard for technical suitability and other engineering aspects of the alternative solutions
Economic/Financial	Potential effects on servicing costs

A qualitative evaluation was undertaken to assess the suitability of the planning solutions in addressing the identified problems and opportunities, along with identifying potential impacts to the Social/Cultural, Natural, Technical, and Economic Environments. The following evaluation criteria were identified.

Table 6.1 Evaluation Criteria

Environmental Component	Evaluation Criteria	Notes
Social/Cultural	Property Access	Impacts to existing and future property accesses
	Property Acquisition Requirements	Potential acquisition of additional land for construction
	Impacts to Emergency Response Times	Impacts on the ability for emergency response vehicles to navigate through the study area.
	Streetscape and Aesthetics	Impact to streetscape, including opportunities to implement enhanced landscaping features.
	Archaeological and Built Cultural Heritage Resources	Disruption to identified and unidentified Archaeological and/or Built Heritage resources
	Aboriginal/First Nations Treaty Rights	Impacts to treaty rights, land claims, or other concerns expressed by Aboriginal/First Nations communities.
Natural Environment	Impacts to Existing Vegetation	Impacts to existing vegetation including roadside trees.
	Terrestrial Resources	Includes impacts to identified aquatic and terrestrial features, rare species or species listed under the Endangered Species Act, or lands subject to Provincial, Municipal, or Conservation Authority Policy (i.e. Conservation Authority Regulated Land).
	Special Habitat Areas	Includes habitats protected by the Endangered Species Act (species identified on the Species at Risk in Ontario (SARO) list, Migratory Birds Act, Official Plan, and Conservation Authority Policy.
Technical/ Engineering	Corridor Capacity & Level of Service (LOS)	Effects on the capacity and level of service identified through the analysis of traffic data, which take into consideration the forecasted traffic volumes.
	Planning Objectives	Meets applicable municipal policies/guidelines, including road classifications, general

Environmental Component	Evaluation Criteria	Notes
		transportation policies, and additional study recommendations (Official Plan, Trails Master Plan, etc.).
	Network Connectivity	Impact to connectivity within the study area, and to other areas of the Municipality/County.
	Public Safety	Impact to collision frequency and overall safety conditions for motorists, pedestrians, and cyclists.
	Pedestrian & Cycling Accommodation	The ability to incorporate appropriate active transportation facilities.
	Surface Drainage	Impacts to existing drainage patterns, and increase in runoff.
	Servicing (sanitary/water)	Impacts to existing services, and opportunities to incorporate extension of future servicing.
	Utilities	Impacts to existing utilities within the corridor.
Economic	Initial Capital Costs	Relative costs associated with the implementation.
	Operation and Maintenance Costs	Impacts to operation and ongoing maintenance costs.

Table 7.2 Evaluation of Planning Solutions

Evaluation Criteria		**Alternative 1 - Do Nothing** No physical/operational changes would be made within the study corridor	**Alternative 2 – Traffic** Demand Management (TDM)	**Alternative 3 – Operational Improvements** (turning lanes, intersection signal optimization, etc.)	**Alternative 4 – Improvements to Parallel Roads** (Oxbow Drive/Gideon Drive)	**Alternative 5 – Arterial Road Widening** (from 2 lanes to 4 lanes)	**Alternative 6 – Urbanize Existing Road Cross Section to Include Active Transportation Facilities**
Socio-Economic Environment							
	Property Access	• Negative impacts to private/commercial property access with increased traffic volumes from new development without implementation of access management measures	• Negative impacts to property access with increased traffic volumes due to future development without implementation of access management measures	• Opportunity to facilitate property access with access management measures without implementation of access management measures	• No impact to property access, but potential for property impacts due to increased traffic on parallel roads	• Opportunities to facilitate property access during design (turn lanes, additional access management measures etc.)	• Negative impacts to property access with increased traffic volumes due to future development without access management measures
	Property Acquisition Requirements	• No property required	• No property required	• Little to no property required.	• No property required	• Minimal property required	• Minimal to no property required
	Impacts to Emergency Response Times	• Potential increase in response times due to increased traffic/corridor congestion	• Potential increase in response times due to increased traffic/corridor congestion	• Little to no impact	• No impact	• Potential improvement to emergency response times with increased corridor capacity	• No impact
	Streetscape and Aesthetics	• Limited opportunity to streetscape	• Limited opportunity to improving streetscape	• Limited opportunity to improve streetscape	• Limited opportunity to improve streetscape	• Opportunity to improve streetscape	• Limited opportunity to improve streetscape
Cultural Environment							
	Archaeological	• No impact to archaeological resources	No impact to archaeological resources	• No impact to archaeological resources	• No impact to archaeological resources	• Potential impact to archaeological resources; Stage 1&2 investigation may be required	• Potential impact to archaeological resources; stage 1& 2 investigation may be required
	Built Heritage/Cultural Landscape	• No impact	• No impact	• No impact	• No impact	• No impact	• No impact
Natural Environment							
	Impacts to Existing Vegetation and Terrestrial Resources	• No impact	• No impact	• No impact	• No impact	• Potential impact to existing vegetation; • Tree Preservation Plan and Ecological survey completed, mitigation measures to be identified	• Potential impact to existing vegetation; • Potential impact to existing vegetation; • Tree Preservation Plan and Ecological survey completed, mitigation measures to be identified
Transportation/Technical							
	Corridor Capacity & Level of Service	• Corridor would exceed capacity with future development, and would result in poor level of service	• Not sufficient to address forecasted traffic volumes, corridor would likely exceed capacity and result in poor level of service	• No increase in capacity to account for forecasted traffic increases; • Potential for slight improvement to level of service	• No improvement to corridor capacity on Glendon Drive and would likely have negative impact	• Increases capacity to address forecasted traffic volumes • Would improve corridor and intersection level of service	• No increase in capacity to account for forecasted traffic increases, and would result in poor level of service

Table 7.2 Evaluation of Planning Solutions

Evaluation Criteria		**Alternative 1 - Do Nothing** No physical/operational changes would be made within the study corridor	**Alternative 2 – Traffic** Demand Management (TDM)	**Alternative 3 – Operational Improvements** (turning lanes, intersection signal optimization, etc.)	**Alternative 4 – Improvements to Parallel Roads** (Oxbow Drive/Gideon Drive)	**Alternative 5 – Arterial Road Widening** (from 2 lanes to 4 lanes)	**Alternative 6 – Urbanize Existing Road Cross Section to Include Active Transportation Facilities**
	Planning Objectives and Network Connectivity	• Road would not comply with 4-lane arterial classification in County OP • Access to Highway 402 and City of London may be impeded with increased traffic volumes causing poor level of service	• Road would not comply with 4-lane arterial classification in County OP • Access to Highway 402 and City of London may be impeded with increased traffic volumes causing poor level of service	• Road would not comply with 4-lane arterial classification in County OP • Access to Highway 402 and City of London may be impeded with increased traffic volumes causing poor level of service	• Does not comply with 4-lane arterial classification for Glendon Drive. • Alternate routes do not provide efficient routes to Highway 402, or City of London • Oxbow Drive classified as Local Road, may not be sufficient •	• Complies with 4-Lane Arterial classification in County OP, • Facilitates access to Highway 402 and the City of London	• Does not comply with 4-lane arterial classification for Glendon Drive. • Access to Highway 402 and City of London may be impeded with increased traffic volumes causing poor level of service
	Pedestrian & Cycling Accommodation	• Unsafe conditions for pedestrians and cyclists, with increased risks due to increased traffic volumes	• TDM measures would encourage pedestrian and cycling traffic, however existing infrastructure is not sufficient for increased pedestrian/cycling use.	• No benefit to existing pedestrian/cyclist facilities	• No benefit to existing pedestrian/cyclist facilities – alternative routes not sufficient for access between and within communities.	• Opportunity to implement safe pedestrian and cyclist infrastructure and intersection crossings	• Provides safe facilities for pedestrians and cyclists
	Overall Safety	• Increased safety risk for pedestrians/cyclists and vehicles without corridor and intersection improvements to address increased volumes	• Increased safety risks for vehicles and pedestrians/cyclists without sufficient corridor improvements to address forecasted traffic volumes	• Limited potential for improvement to safety conditions through operational improvements	• Potential impacts to safety on alternate roads/intersections not designed for the additional traffic volumes	• Safety can be improved for all modes of traffic through intersection design and crossing treatments	• Improved safety for pedestrians and cyclists, • Increased safety risks for vehicles without corridor/ intersection improvements
	Existing Drainage Infrastructure	• No impact to existing drainage infrastructure	• No impact to existing drainage infrastructure	• No impact to existing drainage infrastructure	• No impact to existing drainage infrastructure	• Opportunity to urbanize cross section including storm sewers, and improve existing drainage conditions • Additional outlets may be required to address increased flows • Potential impacts to receiving water body with increased flows	• Opportunity to install storm sewers, and improve existing drainage conditions • Additional outlets may be required to address increased flows • Potential impacts to receiving water body with increased flows
Economic							
	Capital Costs	• No capital costs	• low capital costs	• Low capital costs	• Low capital costs	• Significant capital costs	• Moderate capital costs
	Operation & Maintenance Costs	• No costs	• No costs	• Standard maintenance costs	• Standard maintenance costs, including additional maintenance required for increased traffic volumes	• Standard maintenance costs	• Standard maintenance costs

7.4 EVALUATION SUMMARY

Based on the evaluation, three solutions have been carried forward. The following provides a summary of the evaluation and key rationale. Design concepts for implementing the recommended planning solutions are identified and evaluated during Phase 3 of the Class EA process:

Transportation Demand Management (TDM) and Expanded Pedestrian and Bicycle Use – TDM includes diverting current vehicle traffic to other modes of transportation (transit, walking, cycling, etc.). This alternative provides some improvement to the corridor, but as a stand-alone measure it does not efficiently and safely accommodate future travel demands.

Operational Improvements – Operational improvements could include traffic calming measures (lane widths, on-street parking, etc.), turning lanes, intersection signalization/traffic management optimization, turn restrictions (right in, right out/intersection closures), and turn lanes with localized widening. These alternatives will be incorporated into general widening in order to efficiently and safely accommodate adjacent land use changes, and future travel demands.

Road Widening – Widening the study corridor from 2 lanes to improve capacity, safety, and incorporate active transportation modes.

8.0 PHASE 2 PUBLIC CONSULTATION – PUBLIC INFORMATION CENTRE NO. 1

The information collected as part of Phase 1 and 2 of the study was presented to the public for review and comment at Public Information Centre No. 1 (PIC) held on November 26th, 2015 from 5:30-7:30pm at the Komoka Library (within the Wellness & Recreation Complex). The PIC was conducted in open house format, with staff from the Municipality of Middlesex Centre, Middlesex County, and Stantec on hand to answer questions. Display boards presented at the PIC are provided in **Appendix A.2**, and included:

Introductory boards identify the study area limits, the purpose and intent of the PIC, project scope and schedule, and relevant planning and policy documents;

- An overview of the Class EA process;
- Problems and opportunities identified along the corridor;
- Public input received thus far in the project;
- Maps outlining the existing land use, future development areas, and natural environment conditions;
- Existing transportation conditions including a summary of the results of capacity and operational analyses;
- An overview of the traffic forecasting methodology and recommendations based on future traffic demands;
- Alternative solutions considered, an overview of the evaluation process, and preliminary recommendations;
- Example cross sections, urban design considerations, and active transportation facilities.

PIC participants were encouraged to provide their comments on the information and alternatives presented. All comments received from the public have been documented in a Team Response and Commitment to Environmental Requirements (TRACER) table, included in **Appendix A.3.** Comments generally focused on known transportation deficiencies and the need for appropriate active transportation facilities.

The PIC display materials were also made available on glendondrive.mindmixer.com on November 27th, 2015, and site visitors were encouraged to review the material and provide

comment. All comments received from the Mindmixer website have been included in **Appendix A.3**, and are summarized by topic in Table 8.1.

Table 8.1 Comment Summary

Category	Comment Summary
Active Transportation	The high speed of traffic on Glendon is regarded as a barrier to Active Transportation along the corridor. Safe pedestrian access, specifically to the Wellness Centre from both communities should be considered. There are benefits to on-road cycling facilities for commuter traffic, but separated bicycle facilities should also be considered to include a wider range of cyclists of various skill levels (i.e. consider both on and off road facilities). One comment noted that cyclists come from London to train on neighbouring roads, and requested that Middlesex consider the impacts of global warming and encourage cycling traffic including cyclists commuting to London.
Urban Design	Comments reflect the desire of the community to ensure that development along the corridor includes a high level of urban design, since the character of development plays a large role in the aesthetic quality of the corridor and westerly entrance into the City of London. Residents are concerned about the impact of future developments on the rural/small-town character of the community. One comment specifically mentions prohibiting strip-development such as that along Wellington Road South (City of London), and the utilization of open/green space to retain the rural character of the communities.
Traffic Operations	Comments were generally in favour of the recommendation for widening Glendon Drive to accommodate future traffic volumes. The County Planner submitted comments expressing that traffic calming and speed reduction measures are crucial to the successful implementation of the land use concept shown in the Municipality's Official Plan. Conversely, verbal concerns were expressed at the PIC that posted speeds should not be reduced since the efficiency of the corridor

Category	Comment Summary
	as a route into London is important to those residents who chose to move outside of London. Comments reflect the need for improvements to the '5 corners' intersections (Jefferies Rd./Vanneck Rd./Coldstream Rd./Glendon Dr.), including several comments in favour of a roundabout. The comments speak to the theoretical improvement to traffic flow, but acknowledge the issue of incorporating the 5 road approaches, as well as safely addressing pedestrians and cyclists. The suggestion was also made for consideration of 'Michigan Lefts' i.e. treed boulevards allowing U-turns at certain intervals to minimize frequency of full-signalized intersection.

8.1 ADDITIONAL PUBLIC CONSULTATION – MINDMIXER ONLINE POLLS AND SURVEYS

To gain additional feedback from the public and incorporate into the alternative designs where appropriate, the following surveys and polls were posted to the glendondrive.mindmixer.com website.

Table 7.2 Mindmixer Polls and Surveys

Topic	Results
Urban vs. Rural Streetscapes – participants were asked to identify the elements they felt appropriate to the more urban, and rural sections along the Glendon Drive corridor	Landscaping, and boulevard trees were the top elements chosen for the urban areas, and the highest ranked options for the rural areas was to leave the areas as is, and boulevard trees, and naturalized landscapes. Based on the input and consistent with input received to-date, the community values the naturalized, rural character of the community with naturalized streetscape elements.

Active Transportation Facility Types – participants were asked whether off-road multi-use trail facilities, or on-street bicycle facilities would be most appropriate within the Glendon Drive corridor.	A total of 20 votes were cast on this instant poll, with 15 votes for off-road facilities, and 5 votes for on-street bicycle lanes.
Active Transportation between Kilworth and Komoka – participants were asked whether facilities should be provided on Glendon Drive between Jefferies Road and Kilworth Park Drive, or to direct pedestrians/cyclists to the existing local road network (Jefferies Road) would best help connect the Kilworth and Komoka communities.	A total of 10 votes were cast on this instant poll, and 7 votes were received for facilities on Glendon Drive, with 3 votes for utilizing the existing local road network.

9.0 PHASE 3 DESIGN ALTERNATIVES

In accordance with Phase 3 of the Class EA process, alternative designs were developed to implement the Preferred Planning Solutions including: Transportation Demand Management and Expansion of Pedestrian/Cyclist Facilities, Operational Improvements, and Road Widening.

To address the different transportation needs, land use, and character along the corridor, the study area was divided into four road sections identified in Figure 9.1:

1. Highway 402 interchange to West of Komoka Road;
2. West of Komoka Road to the Vanneck Road/Jefferies Road Intersection;
3. The Vanneck Road/Jefferies Road Intersection to Kilworth Park Drive;
4. Kilworth Park Drive to the Thames River Bridge.

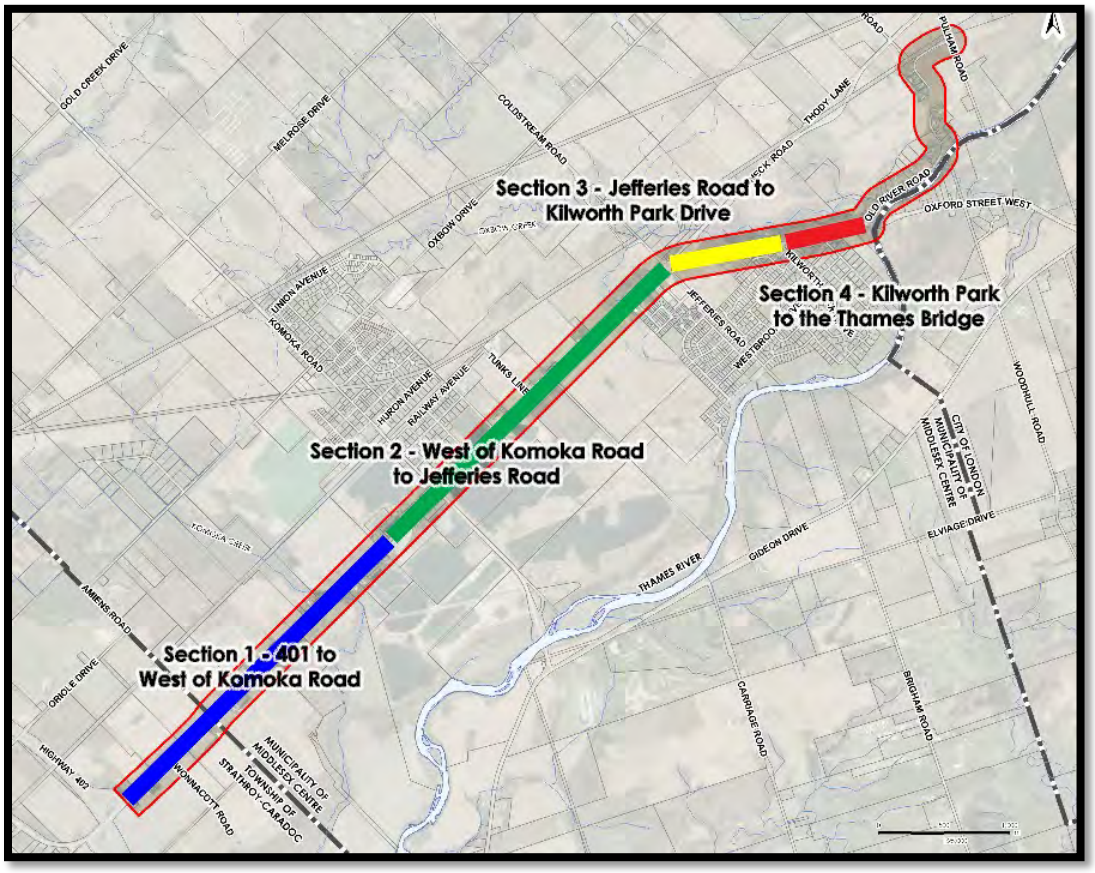


Figure 9.1 Study Area Sections

Phase 3 Design Alternatives
August 3, 2018

Alternative designs were identified for each of the four road sections listed above, along with the four intersection locations where the need for operational improvements was identified through the transportation analysis (Figure 9.2):

1. Komoka Road Intersection with Glendon Drive;

2. Mid-Corridor Intersections – Tunks Lane, Crestview Drive (future Kilworth Heights West subdivision access), and Springfield Way Intersections with Glendon Drive;

3. Jefferies Road/Vanneck Road/Coldstream Road Intersection with Glendon Drive;

4. Old River Road Intersection with Glendon Drive.

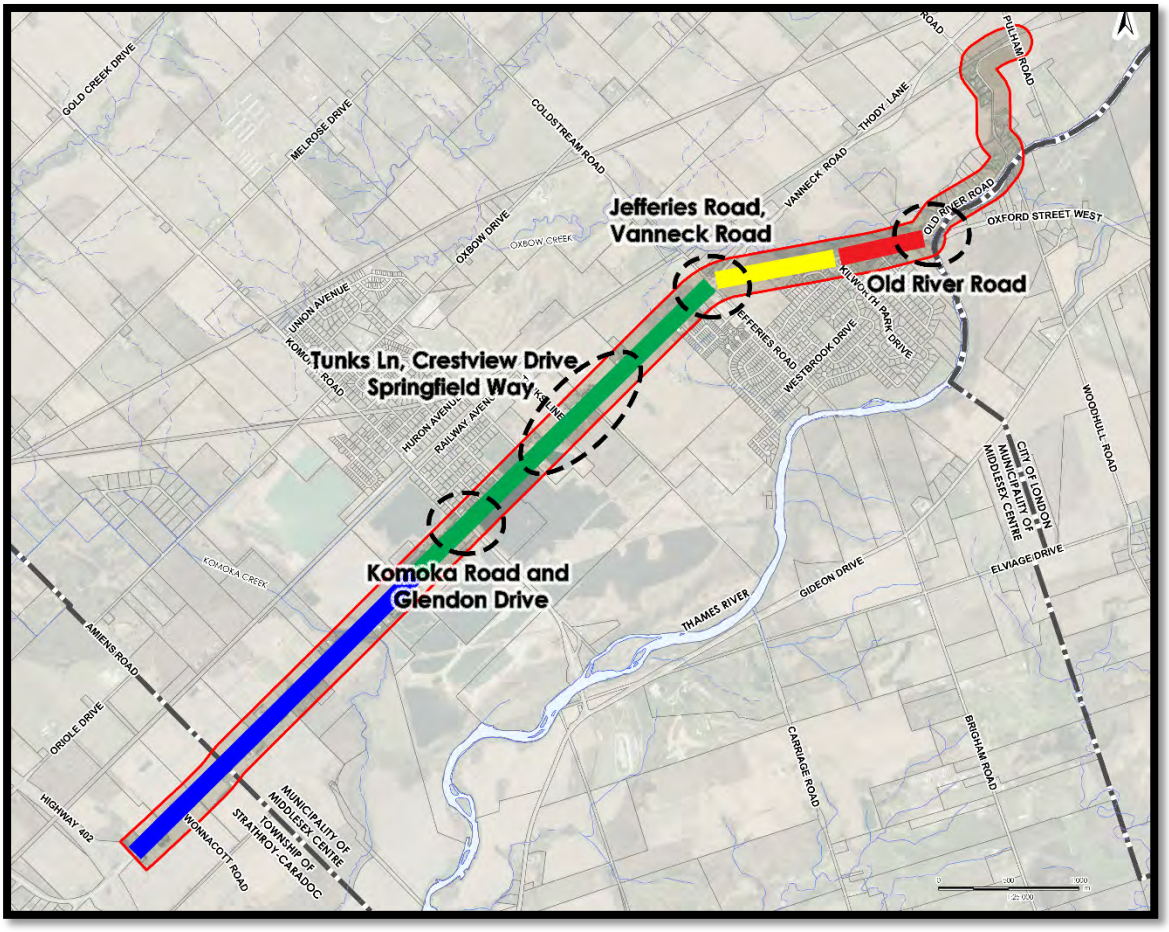


Figure 9.2 Study Area Intersections

9.1 DEVELOPMENT OF ALTERNATIVE DESIGNS

The following elements were considered during the development of alternative designs:

9.1.1 Access Management

Access Management is a term used to describe the process of providing appropriate access to abutting land uses while ensuring the efficient flow of traffic with regard to safety, capacity, and speeds. Access management is a particularly important element in the planning and design of arterial roads, and the lack of appropriate access management plans and policies can result in an increase in vehicle crashes, a greater number of conflict points with pedestrians and cyclists, increased congestion and poor levels of service.

Examples of Access Management tools and techniques include:

- Centre medians which direct traffic to coordinated and consolidated property accesses;
- Limiting direct access onto County Roads (e.g. Middlesex County's County Road Access By-Law #5783), and appropriately spacing accesses from intersections;
- Appropriately designed auxiliary turn lanes; and
- Two-way centre turn lanes which maintain through traffic capacity while allowing property accesses.

The need for access management is determined based on the frequency of property accesses, the nature of adjacent land uses, and proximity to intersections. Access management needs will be identified along the corridor to ensure that the efficiency of the arterial road is maintained while providing safe and appropriate access to adjacent land uses.

9.1.2 Active Transportation

The importance of active transportation is being recognized throughout Canada and North America, not only for the benefit to the health and wellbeing of the community, but also as an economically and environmentally sustainable form of transportation.

While identifying the appropriate types of active transportation facilities to incorporate into the alternative designs, several factors were considered within each of the four road sections including:

- Traffic speeds and volumes;
- Pedestrian/cyclist destinations and adjacent land uses/future developments;
- Age and experience of potential active transportation users;
- Planned facilities, including the Multi-Use Trails identified in the OP and the Trails and Parks Master Plan.

The County of Middlesex is also undertaking a County-wide Cycling Strategy to identify a holistic approach to the implementation of cycling infrastructure throughout the County. Draft recommendations, including proposed buffered paved shoulders from the Thames River Bridge to Jefferies Road, and a proposed multi-use trail from Jefferies Road to Komoka Road have been incorporated into the design alternatives. The precise form of the active transportation facilities should be confirmed during detailed design and upon completion of the Cycling Strategy.

9.1.3 Roadway Cross Section

Urban and rural cross sections were considered for each section of the Glendon Drive corridor. Urban cross sections typically include curb and gutter, underground storm sewers, and sidewalks, and are typically used on lower speed roadways. Since drainage and stormwater management is addressed through underground storm sewers as opposed to roadside ditches, the overall road footprint of an urban cross section is reduced, which provides greater opportunities for streetscape improvements (grassed boulevards, street trees, etc.) and separated space for active transportation users while minimizing property requirements

Urban Cross Section Curb and Gutter

Rural cross sections typically consist of gravel or paved shoulders, and roadside ditches for stormwater management, and are typically used on higher speed roadways. While rural cross sections do not preclude the addition of sidewalks or streetscape elements, they are typically constrained by existing right of way limits.

The appropriate cross section for each of the road sections along the corridor was determined based on adjacent land use, active transportation considerations, and available right of way to minimize property requirements.

9.1.4 Physical Constraints

The identification of alternative designs considers the physical constraints of the corridor in terms of the following:

- Utilities (Union Gas, Bell, Rogers, etc.) and future infrastructure requirements (i.e. watermain extensions, storm and sanitary sewers).
- Environmental constraints – several significant environmental features are located along the corridor, including the Komoka Creek PSW west of Komoka Road, the Komoka Provincial Park woodlot located adjacent to Tunks Ln., and the Komoka ANSI located along the northeast of the corridor, south of Vanneck Road.
- Existing property accesses.

9.1.5 Horizontal Alignment

Widening along Glendon Drive was generally identified from the existing centre line to balance property requirements. Widening may be offset slightly to take into consideration natural features and other physical constraints that require mitigation.

9.2 CORRIDOR DESIGN ALTERNATIVES

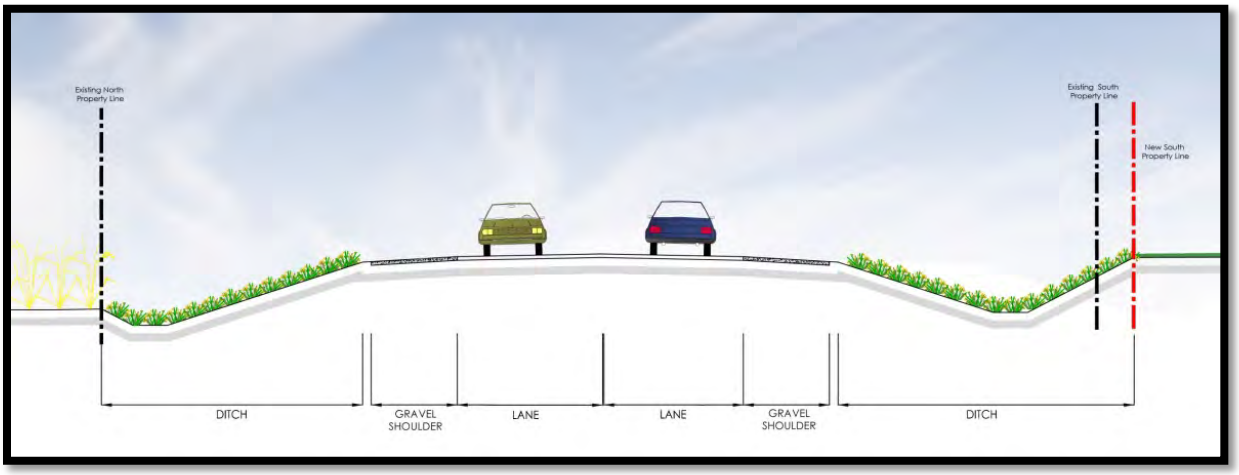
The following sections provide an overview of the road section, design alternatives, evaluation, and preliminary recommendations in terms of cross section and lane configuration.

9.2.1 Section 1 – Highway 402 to West of Komoka Road

This section of Glendon Drive represents the most rural portion of the corridor, adjacent to agricultural lands, existing residences, and future employment lands along the corridor. Traffic forecasting and analysis has shown that this portion of Glendon Drive will experience a lower volume of vehicle traffic compared to further east along the corridor, until future industrial/employment growth occurs. This section of the corridor also experiences the highest average vehicle speeds, attributed to the proximity of the Highway 402 interchanges and rural nature with fewer intersections/accesses. Additionally, 52% of single vehicle collisions reviewed as part of the study occurred within this section of the corridor. There are no identified pedestrian destinations in this portion of the corridor, but it could potentially function as part of an intra-county cycling network. Based on the existing drainage conditions and future land uses adjacent to the corridor, the design alternatives that were identified maintain a rural cross section, with stormwater addressed via roadside ditches. Three design alternatives were identified and evaluated to determine the preferred means of accommodating future traffic volumes and adjacent land uses.

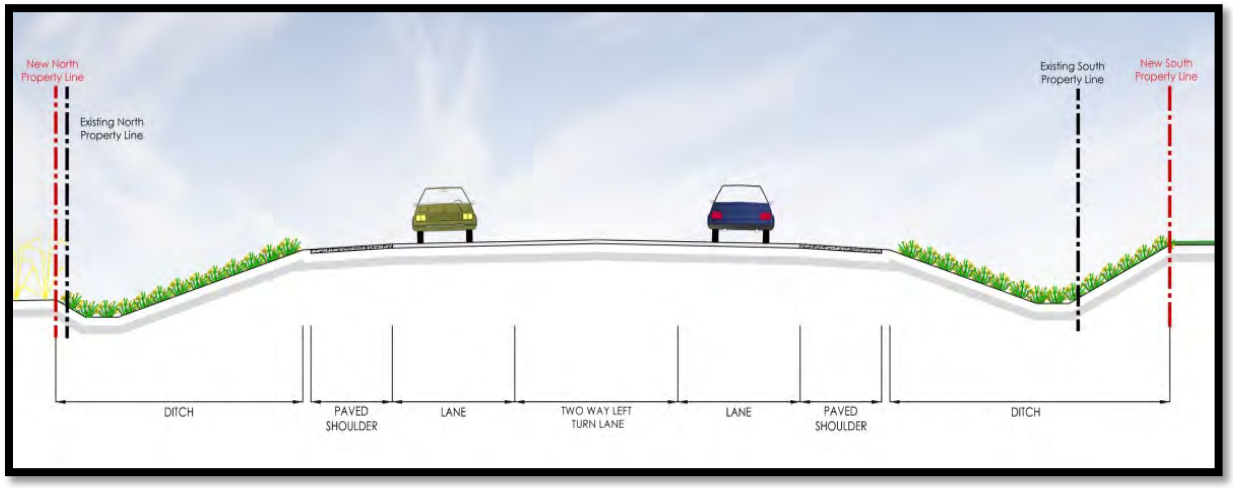
1. Two Lane Cross Section

This alternative generally represents the existing conditions, with some improvement to the drainage conditions along this section of the corridor. Drainage improvements may require a limited amount of property acquisition to accommodate grading of roadside ditches.



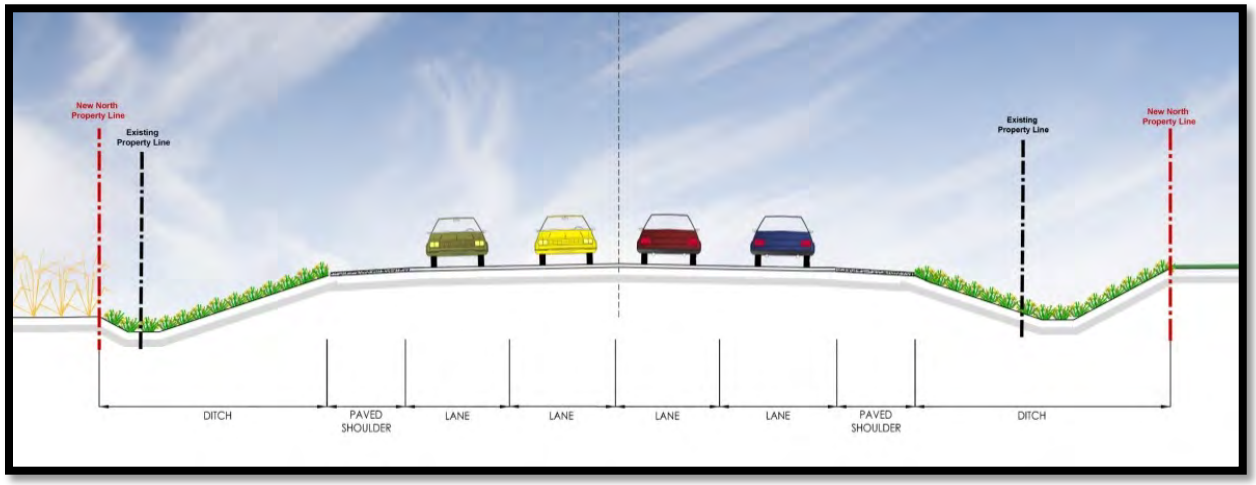
2. Three Lane Cross Section

This alternative involves widening Glendon Drive to incorporate a continuous, two-way centre turn lane to improve property access, with paved shoulders, and improvements to the roadside ditches for stormwater drainage. Slightly more property acquisition may be required to accommodate grading of the roadside ditches.



3. Four Lane Cross Section

This alternative involves widening Glendon Drive to include two westbound, and two eastbound lanes with paved shoulders, and improvements to the roadside ditches for stormwater drainage. Additional property acquisition would be required to accommodate widened cross section and roadside ditch improvements.



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Evaluation Summary and Preliminary Recommendations – Section 1

Based on the evaluation provided in Table 9.1, the Three Lane Cross Section was identified as the preferred cross section for this section of the corridor. This section of Glendon Drive is currently operating within vehicular volume capacity, and traffic forecasts show that it is anticipated to approach capacity nearing the 20-year planning period. Therefore, the three lane roadway will provide sufficient capacity for forecasted traffic volumes within the 20-year planning period, while balancing property requirements. The speed limit along this section would remain as 80 km/h. Existing observed vehicle speeds above the posted speed limit along this section of the corridor are expected to continue to be managed through enforcement, and the continuous turn lane is anticipated to improve the level of safety by providing a refuge for turning and merging vehicles. The road platform and paved shoulders will be designed to accommodate farming equipment. Glendon Drive crosses the Komoka Creek PSW within this section of the corridor, and the existing culvert will require widening. Mitigation and/or compensation measures shall be required for work within and adjacent to the environmental feature. Refer to the evaluation in Table 9.1 for more information.

Table 9.1 Evaluation of Alternative Solutions

Evaluation of Road Widening Alternatives	**Highway 402 to the Westerly limit of the Village of Komoka (Komoka Road)**		
Options	**OPTION 1** **2 lane Cross section "Do Nothing"**	**OPTION 2** **Three Lane Section**	**OPTION 3** **Four Lane Section**
Evaluation Criteria			
Social/Cultural • Property Acquisition Requirements; • Property Access; • Impacts to Emergency Response Times; • Streetscape and Aesthetics • Archeological and Cultural Heritage • Aboriginal/First Nations Lands, Treaty Rights	• No property acquisition required for corridor widening, some property may be required for ditch improvements (to bring to standard). • No change to property access, any future accesses as part of development would require road widening for auxiliary lanes as required. • No change to emergency response times as no improvements to existing traffic conditions would occur. • Some opportunity for streetscape improvements. • No impacts to archeological or cultural heritage features. • No impacts to Aboriginal/First Nations Lands, Treaty Rights.	• Some property required for rural 3-lane section. • Improvements to property access due to the implementation of a designated turn lane throughout this section of the corridor. • No anticipated change to emergency response times as no improvements to existing traffic conditions would occur. • Greater opportunity for streetscape improvements within the median where there are no access requirements. • No impacts to archeological or cultural heritage features. • No impacts to Aboriginal/First Nations Lands, Treaty Rights.	• More property required to accommodate a 4 lane section. • Improvements to property access due to the implementation of additional lanes throughout this section of the corridor resulting in additional gap opportunities to turn. • Anticipated change to emergency response times due to increased opportunities to turn and ability to improve traffic flow. • Greatest opportunity for streetscape improvements within the widened corridor. • No impacts to archeological or cultural heritage features. • No impacts to Aboriginal/First Nations Lands, Treaty Rights.

Natural Environmental
• Impacts to Existing Vegetation; and
• Terrestrial Resources.
  • aquatic habitats
  • terrestrial habitats
  • migratory/other birds: (e.g. waterfowl, songbirds)
  • special habitat areas (specially designated or protected habitats, migration routes, specific policies)
	• Lowest impact to natural environment since road widening would not be implemented.	• Komoka Creek and the Komoka/South Strathroy Creek Wetland (PSW) crosses Glendon Drive west of Komoka Road; potential impact to aquatic cold-water fish habitat and Silver Shiner SAR (THR). Mitigation measures to be identified.
		• Potential impact to PSW.
		• Standard construction impacts along the remainder of the road section (mitigation measures to be identified)
			• Komoka Creek and the Komoka/South Strathroy Creek Wetland crosses Glendon Drive west of Komoka Road; potential impact to aquatic cold-water fish habitat and Silver Shiner SAR (THR). Mitigation measures to be identified.
			• Standard construction impacts along the remainder of the road section (mitigation measures to be identified).

Options / ***Evaluation Criteria***	**OPTION 1** **2 lane Cross section "Do Nothing"**	**OPTION 2** **Three Lane Section**	**OPTION 3** **Four Lane Section**
Technical/ Engineering • Corridor Capacity & Level of Service • Planning Objectives • Public Safety • Surface drainage • Future servicing (Sanitary/water)	• Would reach level of service capacity in 2035 during peak hours. At present this section of the corridor is operating well within capacity (good level of service). • Does not fulfill the requirements of the Official Plan specific to four lane section at this time. However traffic is not anticipated to reach capacity until 2035 during peak hour. • Existing speed patterns anticipated to remain the same. No improvement to public safety. • No change to current drainage patterns or impervious surfaces. • No change to future servicing opportunities.	• Would improve level of service capacity up to 2035. At present this section of the corridor is operating well within capacity (good level of service). • Does not fulfill the requirements of the Official Plan specific to four lane section at this time. • Existing speed patterns anticipated to remain the same. However improvements are anticipated to improve the level of safety due to the implementation of a continuous turn lane to provide a refuge for turning and merging vehicles. • Increased impervious surface area due to additional lane which will slightly increase peak flow. • Limits the available boulevard for future servicing needs resulting in the potential for reconstruction of linear paved surface; or designated property acquisition required.	• Improved level of service up to 2035. • Does fulfill the requirements of the Official Plan specific to four lane section at this time and will address capacity passed 2035 during peak hour. • Existing speed patterns are anticipated to increase which may impact accessibility of Glendon Drive. Improvements to the level of service to reduce congestion would improve the level of safety. • Increased impervious surface area due to additional lanes which will slightly increase peak flow. • Right-of-way for future servicing needs would be considered as part of property acquisitions.
Economic • Initial Capital Cost • Operation And Maintenance Costs • Utility Impacts	• Lowest cost solution. • Maintains status quo for operation and maintenance. • Lowest potential for utility impacts. No relocation required.	• Moderate cost solution. Dependent on property requirements. • Increased O&M efforts and costs due to additional paved surface. • Potential need to relocated existing utilities to accommodate additional linear paved surface.	• Higher cost solution compared to Options 1&2. Dependent on property requirements. • Higher O&M efforts and costs compared to Options 1&2. • Utility relocation required to accommodate additional linear paved surface.

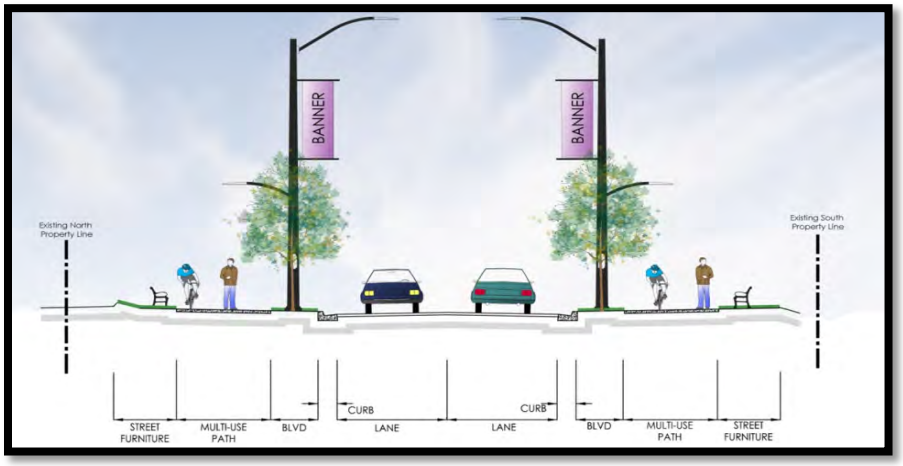
9.2.2 Section 2 – West of Komoka Road to Jefferies Road/Vanneck Road

This section of the corridor represents the most urban zone within the study area, which will experience the greatest intensity of future land use and development including a mix of existing and future residential and commercial developments. An urban road cross section with curb and gutter was identified as being appropriate for this section based on the adjacent future land uses, and in order to accommodate active transportation facilities and other streetscape elements while minimizing property requirements. Forecasted traffic volumes are higher within this section of the corridor than to the west, and while it currently operates within capacity, it is anticipated to operate under very congested conditions during peak hours within the 20 year planning period. The need for access management was identified to ensure safety and efficiency of traffic operations and property access. This section of the corridor will also experience the greatest amount of pedestrian and/or recreational cycling activity due to the proximity of the Komoka Wellness and Recreation Centre and adjacent Village Centre land uses.

Based on the existing conditions, future land use and identified transportation needs, the following design alternatives for this section of the corridor were identified and evaluated:

1. Two Lane Cross Section.

This alternative generally reconstructs the existing rural conditions to an urban cross section while maintaining including two travel lanes, but with the addition of two-way multi-use trails and streetscape elements to address future land uses along the corridor. Limited access management could be implemented within the existing road footprint (e.g. turning lanes, centre median), and the capacity of the roadway would be exceeded with the forecasted traffic volumes within the 20-year planning horizon.



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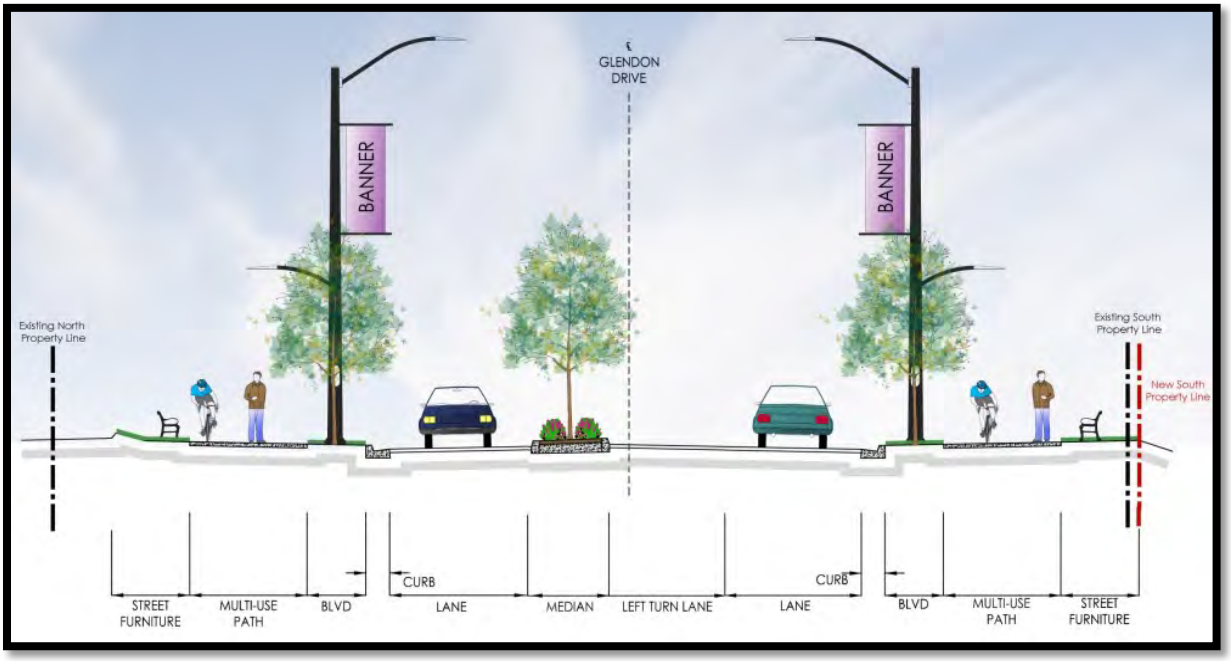
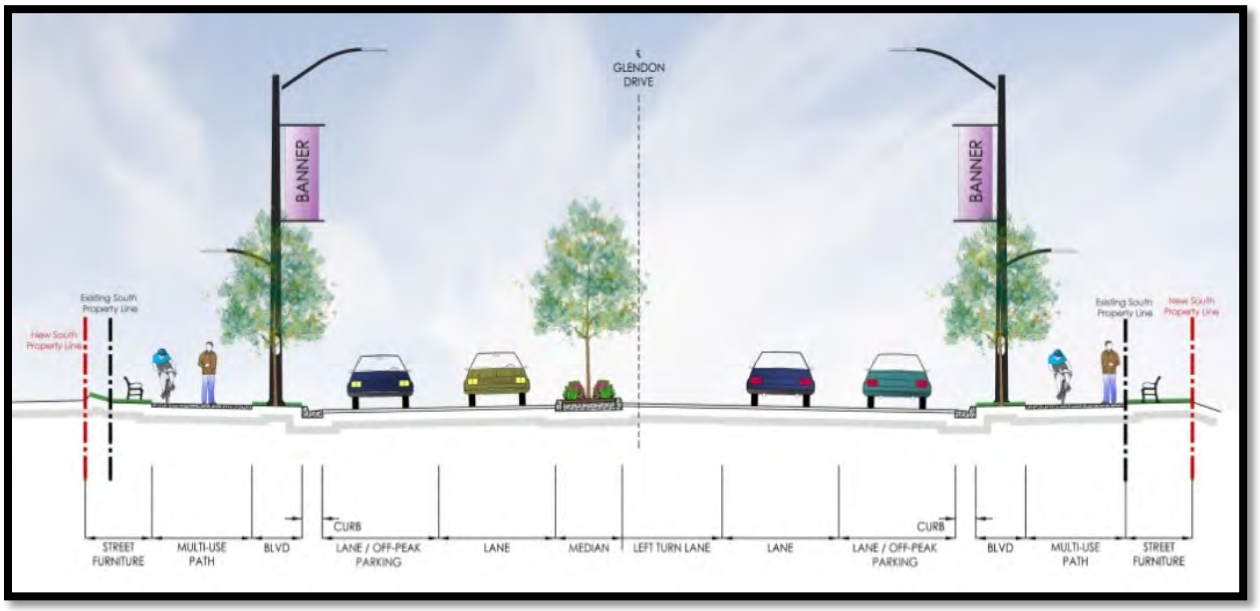
2. Three Lane Cross Section.

This alternative involves widening Glendon Drive to include one travel lane in each direction, a continual two-way centre turn lane/median/left turn lane, and an urbanized cross section including pedestrian/cycling facilities and storm sewers. Minimal property acquisition may be required. Some access management measures could be incorporated into this cross section (e.g. turn lanes, centre median), though the alternative inherently provides limited access management, but the capacity of the roadway would be exceeded with the forecasted traffic volumes within the 20-year planning horizon.



3. Five Lane Cross Section.

This alternative involves widening Glendon Drive to include two travel lanes in each direction, dedicated left turn lanes at key intersections and property accesses with a median, and an urbanized cross section including pedestrian/cycling facilities and storm sewers. This alternative provides the potential to utilize the additional lanes as on-street parking during off peak hours to both benefit the adjacent land owners and still provide volume capacity when needed. This alternative would provide access management to adjacent properties and sufficient through capacity to ensure efficient operations along the corridor. Property acquisition would be required along the corridor.



Evaluation Summary and Preliminary Recommendations – Section 2

Based on the evaluation provided in Table 9.2, the Five Lane Cross Section is preferred for this section of the corridor. While this section is currently operating within capacity, traffic forecasts show that it will operate under very congested conditions within the 20-year planning period. The existing speed limit within the Komoka area of 50 km/h would be maintained, and would extend with the implementation of the Five Lane Cross Section. This configuration will provide capacity up to and beyond 2035, and will improve the overall level of service to reduce congestion, improve traffic flow, while providing appropriate access to adjacent developments.

Table 9.2 Road Section 2 Evaluation of Alternative Solutions

Evaluation of Road Widening Alternatives	**Westerly limit of the Village of Komoka to Vanneck Jefferies Intersection**		
Options	**OPTION 1** **2 lane Cross section "Do Nothing"**	**OPTION 2** **Three Lane Section**	**OPTION 3** **Five Lane Section**
Evaluation Criteria			
Social/Cultural • Property Acquisition Requirements; • Property Access; • Impacts to Emergency Response Times; • Streetscape and Aesthetics • Archeological and Cultural Heritage • Aboriginal/First Nations Lands, Treaty Rights	• No property acquisition required for corridor widening. • No change to property access, any future accesses as part of development would require road widening for auxiliary lanes as required. • No change to emergency response times as no improvements to existing traffic conditions would occur. • Some opportunity for streetscape improvements. • No impacts to archeological or cultural heritage features. • No impacts to Aboriginal/First Nations Lands, Treaty Rights.	• Some property required for 3 lane section. • Improvements to property access due to the implementation of a designated turn lane throughout this section of the corridor. • No anticipated change to emergency response times as no improvements to existing traffic conditions would occur. • Greater opportunity for streetscape improvements within the median where there are no access requirements. • Less potential for impacts to areas of archaeological potential (areas outside of previously disturbed right of way). • No impacts to Aboriginal/First Nations Lands, Treaty Rights.	• Small amount of property required to accommodate a 5 lane section. • Improvements to property access due to the implementation of additional lanes throughout this section of the corridor resulting in additional gap opportunities to turn. • Anticipated improvement to emergency response times due to increased opportunities to turn and ability to improve traffic flow. • Greatest opportunity for streetscape improvements within the widened corridor. • Potential impact to areas of archaeological potential outside previously disturbed right of way. • No impacts to Aboriginal/First Nations Lands, Treaty Rights.

Natural Environmental
• Impacts to Existing Vegetation; and
• Terrestrial Resources.
  • aquatic habitats
  • terrestrial habitats
  • migratory/other birds: (e.g. waterfowl, songbirds)
  • special habitat areas (specially designated or protected habitats, migration routes, specific policies)
	• Lowest impact to natural environment since road widening would not be implemented.	• Unnamed tributary crosses Glendon Drive east of Springfield way; no channelized feature identified during aquatic assessment, and does not provide fish habitat.
		• Potential impact to candidate rare species habitat (Golden-Winged Warbler) (S1-3) in THDM2-11 community (in area of unnamed tributary).
		• Potential impact to can. Red Mulberry (Endangered) in THDM2-11 (in area of unnamed tributary).
		• Potential impact to can. Yellow-breasted Chat in THDM2-11 (in area of unnamed tributary).
			• Unnamed tributary crosses Glendon Drive east of Springfield way; no channelized feature identified during aquatic assessment, and does not provide fish habitat.
			• Potential impact to candidate rare species habitat (Golden-Winged Warbler) (S1-3) in THDM2-11 community (in area of unnamed tributary).
			• Potential impact to can. Red Mulberry (Endangered) in THDM2-11 (in area of unnamed tributary).
			• Potential impact to can. Yellow-breasted Chat in THDM2-11 (in area of unnamed tributary).

Table 9.2 Road Section 2 Evaluation of Alternative Solutions

Options / ***Evaluation Criteria***	**OPTION 1** **2 lane Cross section "Do Nothing"**	**OPTION 2** **Three Lane Section**	**OPTION 3** **Five Lane Section**
Technical/ Engineering • Corridor Capacity & Level of Service • Planning Objectives • Public Safety • Surface drainage • Future servicing (Sanitary/water)	• Reaching a very congested flow condition level of service in 2035 during peak hours. At present this section of the corridor is operating well within capacity (good level of service). • Does not fulfill the requirements of the Official Plan specific to four lane section at this time. However traffic is not anticipated to reach capacity prior to 2035 during peak hour. • Existing speed patterns anticipated to remain the same. No change to public safety. • No change to current drainage patterns or impervious surfaces. • No change to future servicing opportunities.	• Reaching a very congested flow condition level of service in 2035 during peak hours. At present this section of the corridor is operating well within capacity (good level of service). • Does not fulfill the requirements of the Official Plan specific to four lane section at this time. However traffic is not anticipated to reach capacity prior to 2035 during peak hour. • Existing speed patterns anticipated to remain the same. However improvements are anticipated to improve the level of safety due to the implementation of a continuous turn lane to provide a refuge for turning and merging vehicles. • Increased impervious surface area due to additional linear paved surface which will slightly increase peak flow. • Limits the available boulevard for future servicing (sanitary/water) needs, resulting in the potential for reconstruction of linear paved surface, or designated property acquisition requirements.	• Improved level of service up to 2035 and beyond. • Does fulfill the requirements of the Official Plan specific to four lane section at this time and will address capacity beyond 2035 during peak hour. • Existing speed patterns are anticipated to increase which may impact accessibility of Glendon Drive. Improvements to the level of service to reduce congestion would improve the level of safety. • Increased impervious surface area due to additional lanes which will slightly increase peak flow. • Right-of-way for future servicing needs would be considered as part of property acquisitions.
Economic • Initial Capital Cost • Operation And Maintenance Costs • Utility Impacts	• Lowest cost solution. • Maintains Status quo for operation and maintenance. • Lowest potential for utility impacts. No utility relocation required.	• Moderate cost solution. Dependent on property acquisition requirements. • Increased O&M efforts and costs due to additional paved surface. • Potential need to relocated existing utilities to accommodate additional linear paved surface.	• Higher cost solution compared to Options 1&2. Dependent on property requirements. • Higher O&M efforts and costs compared to Options 1&2. • Utility relocation required to accommodate additional linear paved surface.

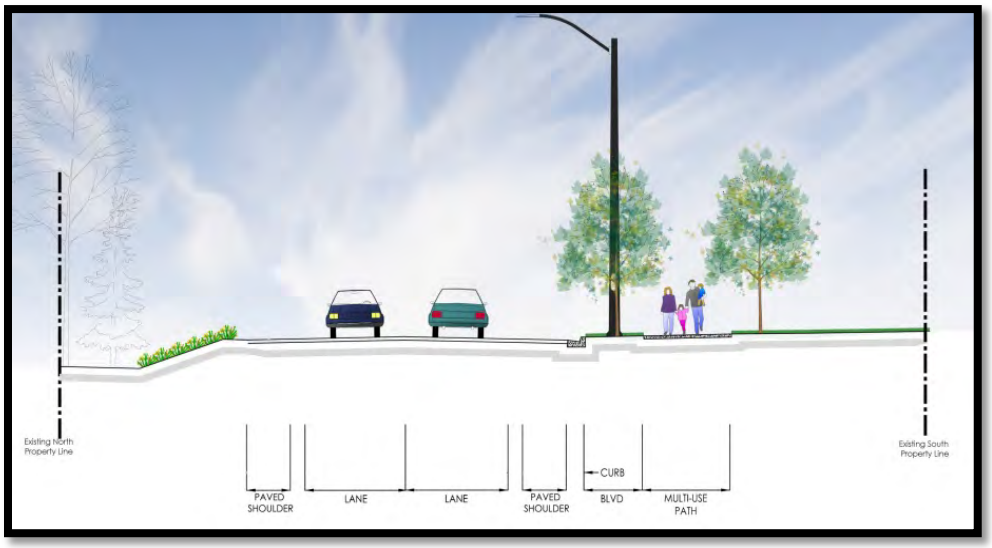
9.2.3 Section 3 – Jefferies Road/Vanneck Road to Kilworth Park Drive

This section of the corridor represents a transitional zone, with residential and commercial land uses to the south, and the Komoka Park Reserve Area of Natural and Scientific Interest (ANSI) along the north. While this section is currently operating within capacity, forecasted traffic volumes show that it will operate under very congested conditions during morning and afternoon peak periods within the 20-year planning period. A mix of an urban and rural cross section was identified as being appropriate, which consists of curb and gutter and storm sewer along the south, and maintaining the vegetated swale/buffer area along the north to minimize the potential for impacts to the ANSI. A multi-use trail was also identified to connect residential areas to the south to commercial properties and community amenities to the west.

Based on the existing conditions, future land use and identified transportation needs, the following design alternatives were identified and evaluated:

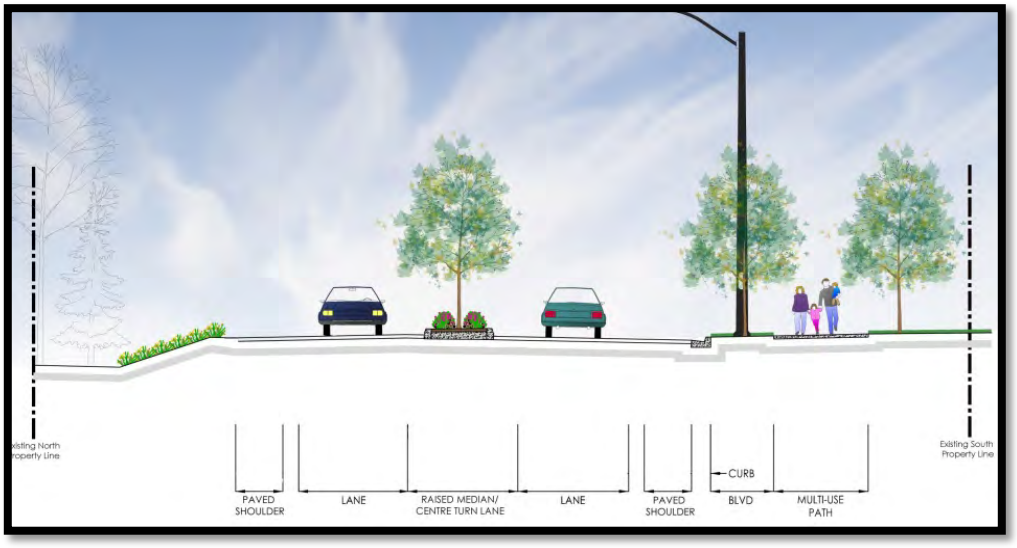
1. Two Lane Cross Section.

This alternative generally maintains the existing lane configuration, with the addition of curb and gutter and pedestrian/cyclist facilities along the south, and paved shoulders and minor improvements to the roadside ditch along the north. No property acquisition is required.



2. Three Lane Cross Section.

This alternative involves one travel lane in each direction, a centre median/left turn lane, curb and gutter and pedestrian/cyclist facilities along the south, and improvements to the roadside ditch along the north for storm drainage. No property acquisition is required.



3. Four Lane Cross Section.

This alternative involves two travel lanes in each direction, the addition of curb and gutter and pedestrian/cyclist facilities on the south, and minor improvements to the roadside ditches along the north for storm drainage. No property acquisition is required.

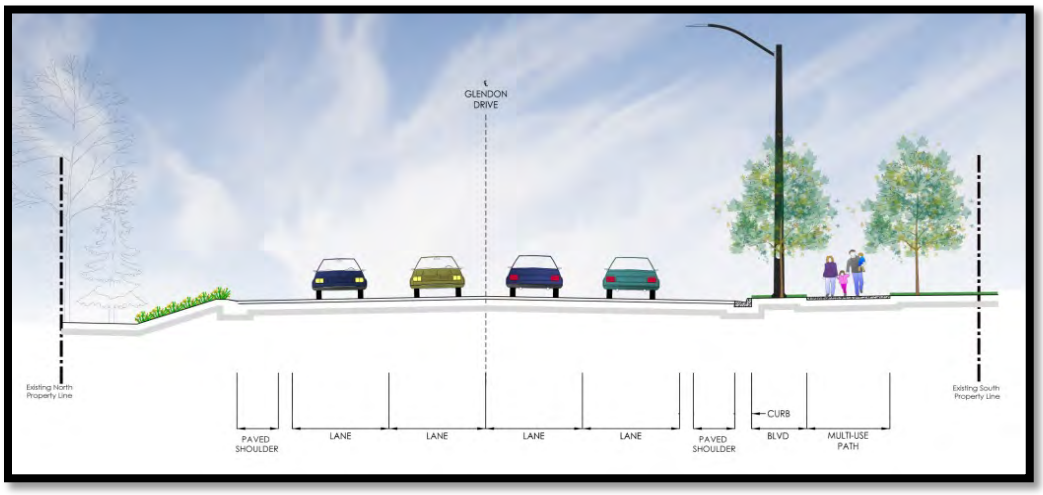


Table 9.3 Road Section 3 Evaluation of Alternative Solutions

Evaluation of Road Widening Alternatives	**Vanneck/ Jefferies Intersection to Kilworth Park Drive**		
Options / ***Evaluation Criteria***	**OPTION 1** **2 lane Cross section "Do Nothing"**	**OPTION 2** **Three Lane Section**	**OPTION 3** **Four Lane Section**
Social/Cultural • Property Acquisition Requirements; • Property Access; • Impacts to Emergency Response Times; • Streetscape and Aesthetics • Archeological and Cultural Heritage • Aboriginal/First Nations Lands, Treaty Rights	• No property acquisition required for corridor widening. • No change to property access. • No change to emergency response times as no improvements to existing traffic conditions would occur. • Some opportunity for streetscape improvements. • No impacts to archeological or cultural heritage features. • No impacts to Aboriginal/First Nations Lands, Treaty Rights.	• No property required to accommodate 3 lane section. • No change to property access. • No anticipated change to emergency response times as no improvements to existing traffic conditions would occur. • Greater opportunity for streetscape improvements within the continuous median. • No impacts to archaeological potential for widening south of Glendon Drive (areas of archaeological potential along the north of Glendon Drive). • No impacts to Aboriginal/First Nations Lands, Treaty Rights.	• No property required for 4 lane section. • No change to property access. • Anticipated change to emergency response times due to improved traffic flow. • Greater opportunity for streetscape improvements within the widened corridor. • No impacts to archaeological potential for widening south of Glendon Drive (areas of archaeological potential along the north of Glendon Drive). • No impacts to Aboriginal/First Nations Lands, Treaty Rights.

Natural Environmental
• Impacts to Existing Vegetation; and
• Terrestrial Resources.
  • aquatic habitats
  • terrestrial habitats
  • migratory/other birds: (e.g. waterfowl, songbirds)
  • special habitat areas (specially designated or protected habitats, migration routes, specific policies)
	• Lowest impact to natural environment since road widening would not be implemented.	• No impact to significant features identified to the north of Glendon Drive (Komoka Park Reserve ANSI).
		• No significant features identified along the south.
		• Standard construction impacts (mitigation measures to be identified)
			• No impact to significant features identified to the north of Glendon Drive (Komoka Park Reserve ANSI).
			• No significant features identified along the south.
			• Standard construction impacts (mitigation measures to be identified)

Options ***Evaluation Criteria***	**OPTION 1** **2 lane Cross section "Do Nothing"**	**OPTION 2** **Three Lane Section**	**OPTION 3** **Four Lane Section**
Technical/ Engineering • Corridor Capacity & Level of Service • Planning Objectives • Public Safety • Surface drainage • Future servicing (Sanitary/water)	• Reaching a very congested flow condition prior to 2035 during peak hours. At present this section of the corridor is operating well within capacity (good level of service). • Does not fulfill the requirements of the Official Plan specific to four lane section. • Existing speed patterns anticipated to remain the same. No change to public safety. • No change to current drainage patterns or impervious surfaces. • No change to future servicing opportunities.	• Reaching a very congested flow condition prior to 2035 during peak hours. At present this section of the corridor is operating well within capacity (good level of service). • Does not fulfill the requirements of the Official Plan specific to four lane section. • Existing speed patterns anticipated to remain the same. No change to public safety. • No significant change to impervious surface area. • Limits the available boulevard for future servicing needs resulting in the potential for reconstruction of linear paved surface; or designated property acquisition required.	• Improved level of service beyond 2035. • Does fulfill the requirements of the Official Plan specific to four lane section at this time and will address capacity beyond 2035 during peak hour. • Existing speed patterns are anticipated to increase which may impact accessibility of Glendon Drive at Kilworth Park Drive. Improvements to the level of service to reduce congestion would improve the level of safety. • Increased impervious surface area due to additional lanes which will slightly increase peak flow. • Right-of-way for future servicing needs would be considered as part of property acquisitions.
Economic • Initial Capital Cost • Operation And Maintenance Costs • Utility Impacts	• Lowest cost solution. • Maintains Status quo for operation and maintenance. • Lowest potential for utility impacts. No relocation required.	• Moderate cost solution. Dependent on property requirements. • Increased O&M efforts and costs due to additional paved surface. • Potential need to relocated existing utilities to accommodate additional linear paved surface.	• Higher cost solution compared to Options 1&2. Dependent on property requirements. • Higher O&M efforts and costs compared to Options 1&2. • Utility relocation required to accommodate additional linear paved surface.

Evaluation Summary and Preliminary Recommendations – Section 3

Based on the evaluation provided in Table 9.3**,** the Four Lane Cross Section is recommended within this section of the corridor. While this section is currently operating within capacity, forecasted traffic volumes show that it will operate under very congested conditions within the 20-year planning period. The four lane section will provide capacity up to and beyond 2035, and will improve the overall level of service to reduce congestion and improve traffic flow. The existing speed limit of 80 km/h would be reduced to 70 km/h to better align with the semi-urban configuration and to conform to the City of London's plan to post Oxford Street down from 80 km/h to 70 km/h in the future.

9.2.4 Section 4 – Kilworth Park Drive to the Thames River Bridge

This section represents a more rural section of the corridor, with existing residential areas to the south, and the Komoka Park Reserve ANSI to the north. This section leads to the Thames River Bridge, marking the division between Middlesex Centre and the City of London. As per the Municipal Act, ownership of the bridge is split evenly between the neighbouring municipalities. The bridge consists of a two-lane cross section with concrete barrier walls and metal railings. This section is generally operating within capacity, with the exception of the eastbound a.m. and westbound p.m. peak periods which are approaching capacity v/c ratios of 0.86 and 0.80 respectively. Under future conditions with forecasted traffic volumes, this section will operate under very congested conditions. The existing rural cross section with vegetated swales/ditches were identified as appropriate based on the adjacent land uses and to minimize impacts to the naturalized areas. There is very minimal existing and anticipated pedestrian activity within this section of the corridor, and the physical constraints at the bridge currently exist as an impediment to pedestrians and cyclists.

Based on the existing conditions, future land use and identified transportation needs, the following design alternatives were identified and evaluated:

Phase 3 Design Alternatives
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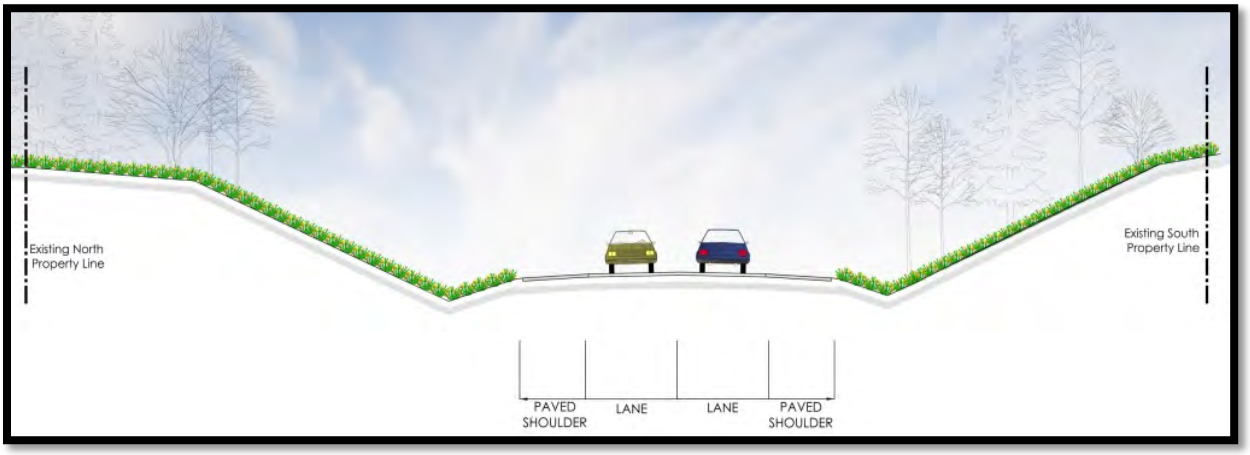
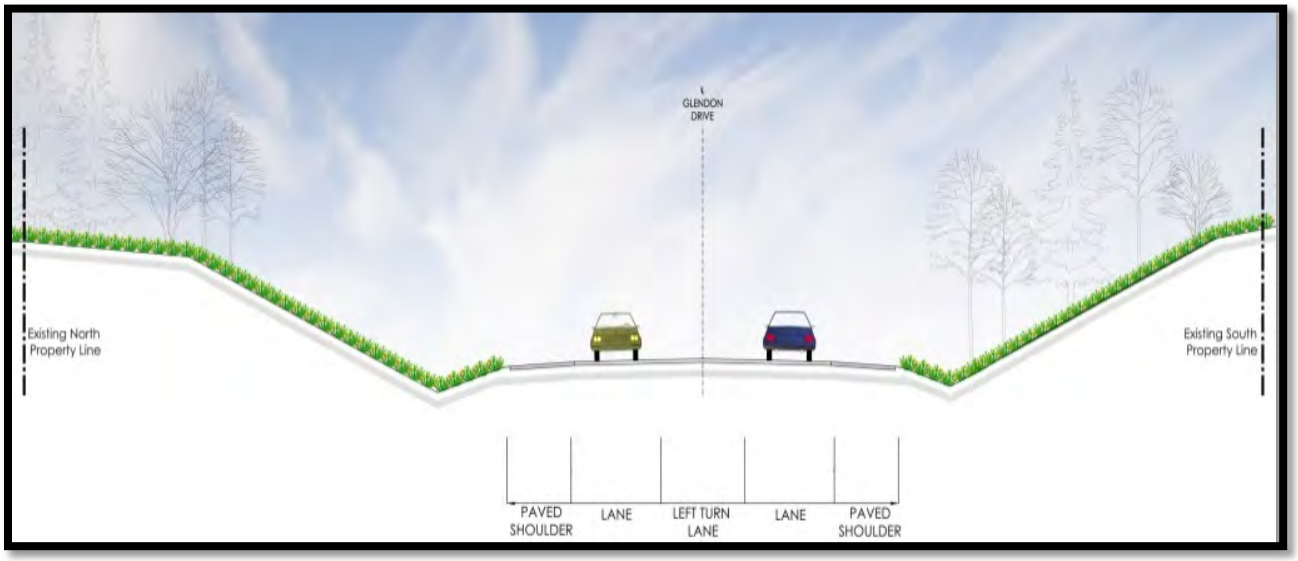
1. Two Lane Cross Section.

This alternative generally maintains the existing lane configuration, with paved shoulders and improvements to the roadside ditches for stormwater drainage. No property acquisition is required.



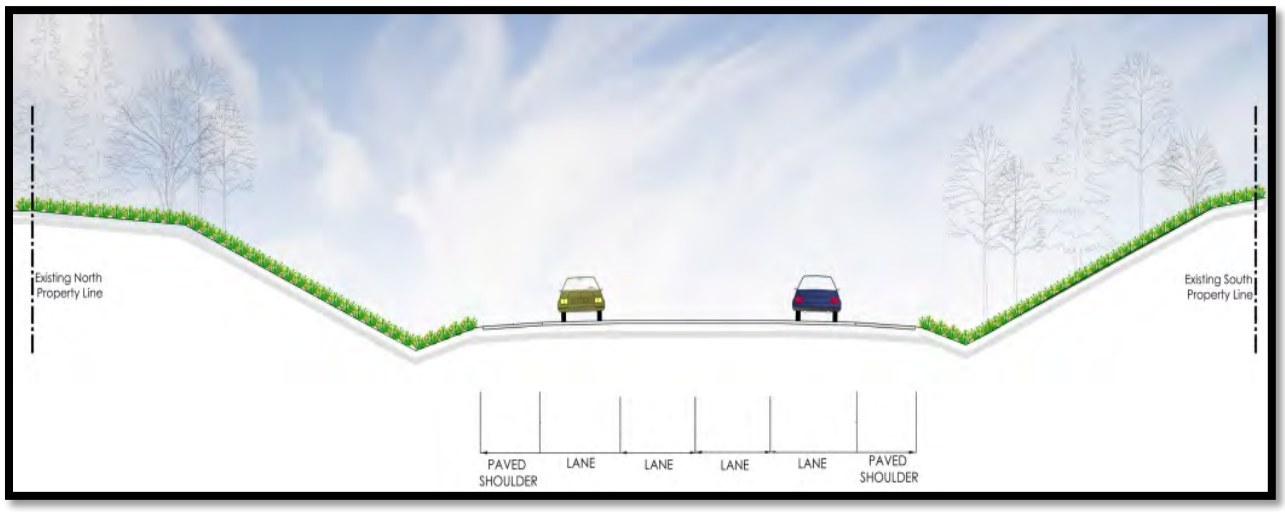
2. Three Lane Cross Section.

This alternative involves two travel lanes in each direction, with an eastbound left turn lane, and improvements to the roadside ditches for stormwater drainage. No property acquisition is required.



3. Four Lane Cross Section.

This alternative involves two travel lanes in each direction, and improvements to the roadside ditches for stormwater drainage. No property acquisition is required.



Evaluation Summary and Preliminary Recommendations

Based on the evaluation in Table 9.4 the Three Lane Cross Section is recommended within this section of the corridor. While this section is currently approaching capacity during peak periods and will operate under very congested conditions within the 20-year planning period, the constraints at the Thames River Bridge require a transition between the four-lane sections to the west and the two lane conditions at the bridge in this area. The existing speed limit of 80 km/h would be reduced to 70 km/h to better align with the City of London's plan to post Oxford Street down from 80 km/h to 70 km/h in the future.

Table 9.4 Evaluation of Alternative Solutions

Evaluation of Road Widening Alternatives	**Kilworth Park Drive to the Thames River Bridge**		
Options / ***Evaluation Criteria***	**OPTION 1** **2 lane Cross section "Do Nothing"**	**OPTION 2** **Three Lane Section**	**OPTION 3** **Four Lane Section**
Social/Cultural • Property Acquisition Requirements; • Property Access; • Impacts to Emergency Response Times; • Streetscape and Aesthetics • Archeological and Cultural Heritage • Aboriginal/First Nations Lands, Treaty Rights	• No property acquisition required for corridor widening. • No change to property access, any future accesses as part of development would require road widening for auxiliary lanes as required. • No change to emergency response times as no improvements to existing traffic conditions would occur. • Some opportunity for streetscape improvements. • No impacts to archeological or cultural heritage features. • No impacts to Aboriginal/First Nations Lands, Treaty Rights.	• No property required for 3 lane section. • Improvements to property access due to the implementation of a designated turn lane throughout this section of the corridor. • Anticipated change to emergency response times due to increased opportunities to turn. • Greater opportunity for streetscape improvements within the median where there are no access requirements. • Little-no impact to areas of potential archaeological material (potential impacts to small portions outside of right of way between Kilworth Park Drive/Elmhurst Street requiring Stage 2).	• No property required for 4 lane section. • Improvements to property access due to the implementation of additional lanes throughout this section of the corridor resulting in additional gap opportunities to turn. • Anticipated change to emergency response times due to increased opportunities to turn and ability to improve traffic flow. • Greatest opportunity for streetscape improvements within the widened corridor. • Little-no impact to areas of potential archaeological material (potential impacts to small portions outside of right of way between Kilworth Park Drive/Elmhurst Street requiring Stage 2). • No impacts to Aboriginal/First Nations Lands, Treaty Rights.

Natural Environmental
• Impacts to Existing Vegetation; and
• Terrestrial Resources.
  • aquatic habitats
  • terrestrial habitats
  • migratory/other birds: (e.g. waterfowl, songbirds)
  • special habitat areas (specially designated or protected habitats, migration routes, specific policies)
	• Lowest impact to natural environment since road widening would not be implemented.	• No impact to significant features to the north of Glendon Drive and approaching the Thames River Bridge (Komoka Park Reserve ANSI),
		• Standard construction impacts along the remainder of the road section (mitigation measures to be identified.)
			• No impact to significant features to the north of Glendon Drive and approaching the Thames River Bridge (Komoka Park Reserve ANSI)
			• Standard construction impacts along the remainder of the road section (mitigation measures to be identified).

Options / ***Evaluation Criteria***	**OPTION 1** **2 lane Cross section "Do Nothing"**	**OPTION 2** **Three Lane Section**	**OPTION 3** **Four Lane Section**
Technical/ Engineering • Corridor Capacity & Level of Service • Planning Objectives • Public Safety • Surface drainage • Future servicing (Sanitary/water)	• Reaching level of service capacity prior to 2035 during peak hours. At present this section of the corridor is operating within capacity. • Does not fulfill the requirements of the Official Plan specific to four lane section at this time. • Existing speed patterns anticipated to remain the same. No change to public safety. • No change to current drainage patterns or impervious surfaces. • No change to future servicing opportunities.	• Reaching level of service capacity prior to 2035 during peak hours. At present this section of the corridor is operating within capacity. • Does not fulfill the requirements of the Official Plan specific to four lane section at this time. • Existing speed patterns anticipated to remain the same. Implementation of a turn lane to provide a refuge for turning and merging vehicles will improve the level of safety. • Increased impervious surface area due to additional lane will slightly increase peak flow. • Limits the available boulevard for future servicing needs resulting in the potential for reconstruction of linear paved surface; or designated property acquisitions required.	• Improved level of service beyond 2035. • Does fulfill the requirements of the Official Plan specific to four lane section at this time and will address capacity beyond 2035 during peak hours. • Existing speed patterns are anticipated to increase which may impact accessibility of Glendon Drive. Reducing congestion would improve the level of safety. • Increased impervious surface area due to additional lanes will slightly increase peak flow. • Right-of-way for future servicing needs would be considered as part of property acquisitions.
Economic • Initial Capital Cost • Operation And Maintenance Costs • Utility Impacts	• Lowest cost solution. • Maintains Status quo for operation and maintenance. • Lowest potential for utility impacts. No relocation required.	• Moderate cost solution. Dependent on property requirements. • Increased O&M efforts and costs due to additional paved surface. • Potential need to relocated existing utilities to accommodate additional linear paved surface.	• Higher cost solution compared to Options 1&2. Dependent on property requirements. • Higher O&M efforts and costs compared to Options 1&2. • Utility relocation required to accommodate additional linear paved surface.

9.3 INTERSECTION DESIGN ALTERNATIVES

Traffic forecasting and analysis indicated the need for operational improvements at several intersections and groups of intersections along the Corridor to address forecasted traffic volumes, adjacent land uses, and to ensure efficient operations along the corridor.

For the major intersections and groups of intersections along the corridor, the following improvements were considered:

Traffic Signals

Traditional signalized intersections, with additional through lanes and auxiliary turn lanes where required, are one of the most common types of traffic control. They can provide timed and dedicated space for both vehicles and pedestrians, and can enhance traffic movement via dedicated turn phases and cycle lengths.

Roundabouts

Traffic Operation: Roundabout intersections are being constructed in municipalities throughout Southern Ontario in growing numbers. Traffic circulates through them counter-clockwise to the right of a centre island. In general, roundabouts require all traffic to slow down at all times of the day whereas at a signalized intersection, some traffic can pass uninterrupted while other drivers must stop and wait for a green phase. Consequently, where there is very little crossroad traffic, signalized intersections can often be more efficient on the main road. In the case of intersections with a high percentage of left-turning traffic and/or through traffic on a crossroad, a roundabout can often result in less overall delay. The traffic efficiency of roundabouts is partially due to slower speeds that allow drivers to take advantage of smaller gaps in traffic.

Roundabouts can be designed to accommodate vehicles of all sizes including buses, tractor trailers, farm vehicles, and emergency vehicles, and new research is being conducted to assess roundabouts' potential to reduce impacts of vehicle emissions based on reduced idling times.

Safety: While public opinion on roundabouts is mixed and many potential users express concern over the safety conditions at roundabouts, studies show that when designed appropriately, roundabouts can significantly reduce the frequency and the severity of vehicle collisions. Due to our better understanding of the strong causal relationship between speed and collision severity, a distinguishing characteristic of modern roundabout intersections is that they are designed to achieve an optimal speed regime through geometric design. On a straight section of road, the speed through a conventional intersection is limited only by the top speed of the vehicle – i.e. drivers can potentially go though at 200 km/h. Whereas, at a roundabout, a driver cannot risk going much faster than 40-50 km/h without risking losing control.

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A significant advantage of modern roundabouts is that, compared to alternative intersection types, by reducing the speed of the vehicles and removing the turning conflicts, they greatly reduce the potential for fatal collisions, and significantly reduce injury collisions. Though the frequency of property-damage-only collisions may be higher than some other intersection control alternatives – which may give the impression that overall collision rates are not very different – weighing collision frequency by severity reveals a different picture. The Region of Waterloo, a leader in the practical application of roundabout intersections, applies the following comprehensive social costs:

- $5,000 for a property-damage-only collision;
- $82,000 for a non-fatal injury collision; and
- $13,600,000 for a fatal collision.

With a fatal collision having a weight of 2,720 times that of a property-damage-only collision, the potential safety benefits of a well-designed roundabout can be immense.

Active Transportation: There is a perception that roundabouts do not provide safe and efficient passage for active transportation users (cyclists, pedestrians, etc.) when compared to signalized intersections due to the absence of a positive exchange of right of way priority, i.e. a dedicated pedestrian signal. Statically, however, pedestrians are less likely to be involved in a crash at a roundabout than a single lane roundabout noting the following:

- Traffic speeds are lower, giving pedestrians and drivers more time to judge gaps and react to each other (also making crashes that do happen less severe);
- Crossing distances are significantly shorter, and pedestrians are only required to cross single-direction of traffic before a refuge island is provided; i.e., pedestrians are watching for traffic in one direction at a time;
- Crosswalks are typically located approximately one vehicle's length from the vehicle's entry into the roundabout. This separates the driver's task of looking for pedestrians and looking for oncoming roundabout traffic. One of the most common causes of pedestrian-vehicle collisions at signalized intersections is drivers looking left while turning right. Roundabouts significantly improve this condition, since the crosswalks are located prior to the vehicles entry into the roundabout, where drivers are more likely to be looking in the direction of pedestrians instead of looking up at signals or looking left while turning right.

While the benefits of roundabouts can be many, they are not necessarily suitable at every intersection location. It is important to evaluate their suitability in the context of the roadway, adjacent land uses, traffic patterns, collision patterns, cost, and property impacts.

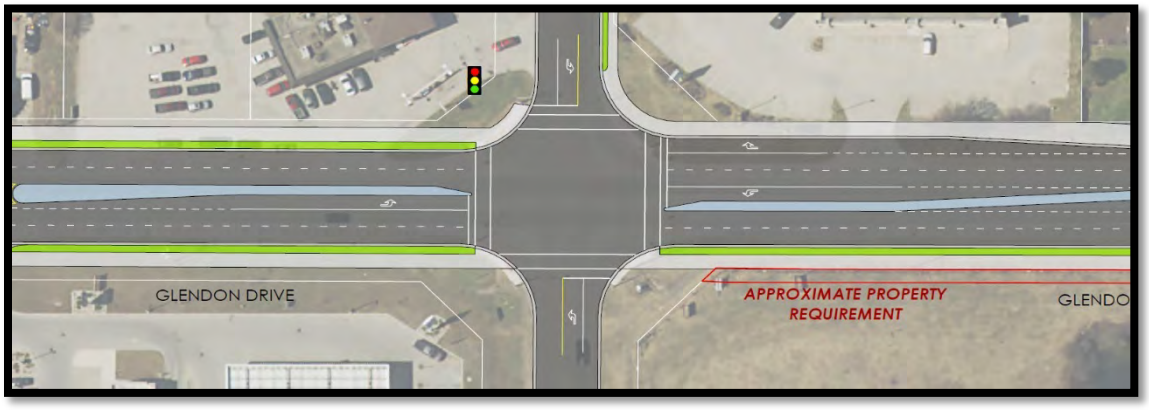
9.3.1 Glendon Drive at Komoka Road

The signalized intersection of Komoka Road and Glendon Drive currently operates at a good overall level of service, with all movements operating at a LOS C or above. Based on the forecasted traffic volumes within the 20-year planning period, however, additional capacity is required. This intersection generally represents the transition from the rural section of the corridor from the Highway 402 access, to the more urban section of the corridor. This intersection experiences a relatively high frequency of collisions (37% of rear end intersection collisions reported in the study area), which may be attributable to the high speeds of traffic along the road section to the west. There are currently several commercial property accesses in proximity to the intersection.

The following design alternatives were identified to address future operations at the intersection.

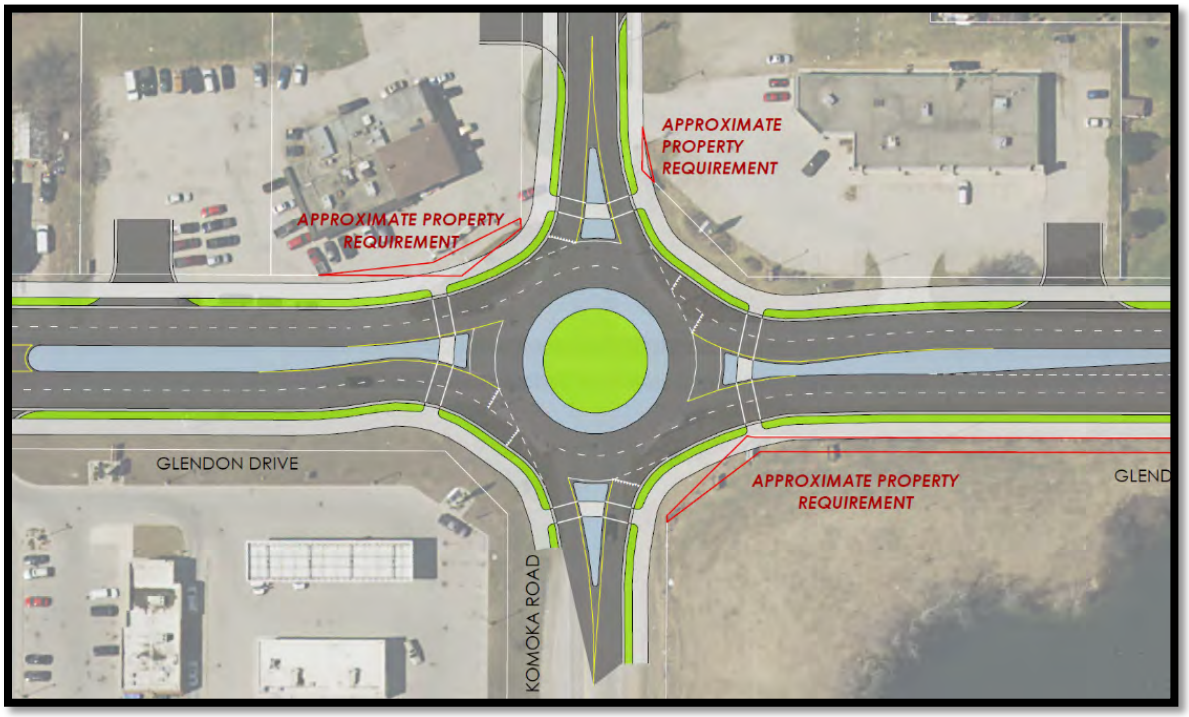
1. Signalized Intersection with Additional Through Lanes.

This alternative maintains the existing signalized intersection, increasing the capacity of the intersection by providing additional through lanes and auxiliary turns lanes to accommodate future traffic growth. Modification to existing commercial accesses may be required, and some property is required.



2. Roundabout

This alternative involves modification of the signalized intersection to a roundabout. Property acquisition may be required to accommodate the roundabout, and existing commercial entrances would require modification.



Evaluation Summary and Preliminary Recommendations – Komoka Road Intersection

Based on the evaluation provided in Table 9.5, the Roundabout configuration is recommended at this location. While some property acquisition and modification/relocation of the commercial entrances may be required, the roundabout provides significant benefits in terms of transportation operations by improving the overall level of service at the intersection and maintaining the flow of traffic along Glendon Drive, as well as improvements to safety conditions at the intersection and reducing speeds at the entry-point to the future land uses forming the centre of the Komoka and Kilworth communities.

Table 9.5 Komoka Road Intersection Evaluation

	Komoka Road Intersection with Glendon Drive		
Options	**OPTION 1** **Do Nothing**	**OPTION 2** **Signalize with Additional Through Lanes**	**OPTION 3** **Roundabout**
Evaluation Criteria			
Social/Cultural Impacts • Property Access; • Property Acquisition Requirements; • Impacts to Emergency Response Times; • Streetscape and Aesthetics • Public Safety • Archeological and Cultural Heritage • Aboriginal/First Nations Lands, Treaty Rights	• No change or improvements to access. Intersection operates at status quo. • No property acquisition requirements as there are will be no changes or improvements made to the intersection. • No improvements to streetscape, aesthetics will not change, maintains status quo. • No impact to archaeological or cultural heritage features. • No impacts to Aboriginal lands or treaty rights.	• Potential to impact existing commercial access off Glendon Drive. • Property acquisition would be required. • Improve emergency response time by incorporating EMS priority (preemption). • Potential for Streetscape enhancement. Signalized intersections are typically more comfortable for pedestrians and cyclists, due to the defined right of way provided by pedestrian signals. • Potential for archaeological impacts. • No impacts to Aboriginal lands or treaty rights. •	• Impacts to existing commercial access off Glendon Drive. • Property acquisition would be required. • Improve emergency response time by eliminating stop condition. • Opportunity for streetscape enhancement. • Roundabouts can greatly increase motorist safety since traffic is forced to slow down, the possibility for head-on collisions is eliminated, and car crashes are less frequent than at traditional intersections. • Pedestrians and cyclists tend to have more difficulty navigating a roundabout compared to a signalized intersection; signalized intersections provide a greater perception of safety by providing a clearly defined right of way with pedestrian signals; however, roundabout studies have proven that they provide a safe environment for pedestrians by lowering the speeds of vehicles, and by improving sightlines. For example, right angle collisions involving pedestrians at intersections are caused by drivers looking left while turning right. At roundabouts, pedestrians cross prior to the vehicle's entry into the roundabout, which greatly improve sightlines. Also, pedestrian crossing distances are typically shorter, and they are only crossing one direction of traffic at a time, with a refuge island between the two crossings. • Cyclists are given two choices for navigating a roundabout – continuing as a vehicle through the roundabout, or dismounting and following the pedestrian crossings. • Potential for archaeological impacts. • No impacts to Aboriginal lands or treaty rights.
Natural Environmental • Impacts to Terrestrial/ Aquatic Resources	• No significant aquatic or terrestrial features identified. • No Impact to terrestrial or aquatic habitats/resources as there will be no changes or improvements made to the intersection.	• No significant aquatic or terrestrial features identified. • Standard construction impacts to surrounding area	• No significant aquatic or terrestrial features identified. • Standard construction impacts to surrounding area

Table 9.5 Komoka Road Intersection Evaluation

Options / ***Evaluation Criteria***	**OPTION 1** **Do Nothing**	**OPTION 2** **Signalize with Additional Through Lanes**	**OPTION 3** **Roundabout**
Technical/ Engineering • Intersection Capacity & Level of Service • Planning Objectives • Overall Safety • Pedestrian & Cycling Accommodation	• Maintains status quo. Intersection will still operate at an acceptable level of service beyond 2035. • This intersection does not meet current AODA standards (cross walks & tactile plate orientation). • No sidewalk connectivity.	• Widen intersection to accommodate additional through lanes. Operate at an improved level of service as compared to do nothing. • No change to Komoka Road. • Improved capacity level of service compared to option 1 due to additional through lane • Improve the active transportation connectivity and infrastructure to meet AODA standards. • Straight forward road construction practices. • Vehicles less likely to slow down through Komoka if there is a green light at the intersection. • This option does not permit flexibility of phasing construction since additional auxiliary lanes are not required.	• Widen intersection to accommodate roundabout. • Intersection will operate at an improved level of service as compared to option1 and option 2. • Improve the active transportation connectivity and infrastructure to meet AODA standards compared to option 1. But less than option 2? If so explain why? I don't think that roundabouts comply with AODA standards/they have not specifically been addressed in AODA, and I don't think they meet AODA crossing standards. • Most complex construction staging. Explain why? • Can be phased in two a two lane when capacity requires. Initially constructed as a single lane roundabout. • Commercial entrances to be reconfigured/relocated. (Northwest/northeast for safety and accessibility. • Potential impacts to the existing shell gas station. Possible reconfiguration of gas bar/ and pumps to accommodate proposed MUT. As part of detailed design recommends reviewing potential design configurations and roundabout alignment for MUT at this location to reduce impact to gas bar. • Geometrics of a roundabout slow vehicles down as they approach the urban areas of Komoka.
Economic • Initial Capital Cost • Operation And Maintenance Costs • Utility Impacts	• No capital cost. • O&M costs maintain status quo. • No impact to utilities.	• Moderate capital cost. • Generally maintains current O&M costs. • Potential reconfiguration/relocation of utilities due to lane widening - hydro, communications, gas water	• Marginally higher capital cost than option 1. • Net Increase in landscaping O&M costs due to center median island, but a reduction in electrical maintenance cost. (hydro not required). • Potential reconfiguration/relocation of utilities due to lane widening - hydro, communications, gas water.

9.3.2 Mid-Corridor Intersections – Tunks Line, Crestview Drive (Future Kilworth Heights West Access), and Springfield Way

While the forecasted traffic volumes assigned to the Tunks Line approaches to Glendon Drive do not meet traffic signal warrants within the 20-year planning period, the intersections would be characterized by long delays for the southbound approaches during the a.m. and p.m. peak periods. The long delays would be related to having fewer and shorter gaps in traffic along Glendon Drive with the higher traffic volumes along the corridor. While the projected volumes do not meet signal warrant thresholds, the poor level of service experienced by the southbound approaches as well as the opportunity to provide pedestrian and cyclist access to the Komoka Wellness and Recreation Centre justifies the need for improvements at this intersection.

Based on the forecasted traffic volumes and traffic analysis undertaken as part of adjacent development applications, both Crestview Drive (providing access to the future Kilworth Heights West subdivision) and Springfield Way will meet thresholds for signalization within the 20-year planning period. Analysis also identified the need for auxiliary turn lanes to address access requirements and reduce impacts to through traffic operations along the corridor.

Based on the future conditions identified at these three intersections, the following alternatives were identified.

1. **Signalized Intersections.**

This alternative would involve the installation of traffic signals when warranted by traffic volumes and future developments. Pedestrian signals and pavement markings would also be included.

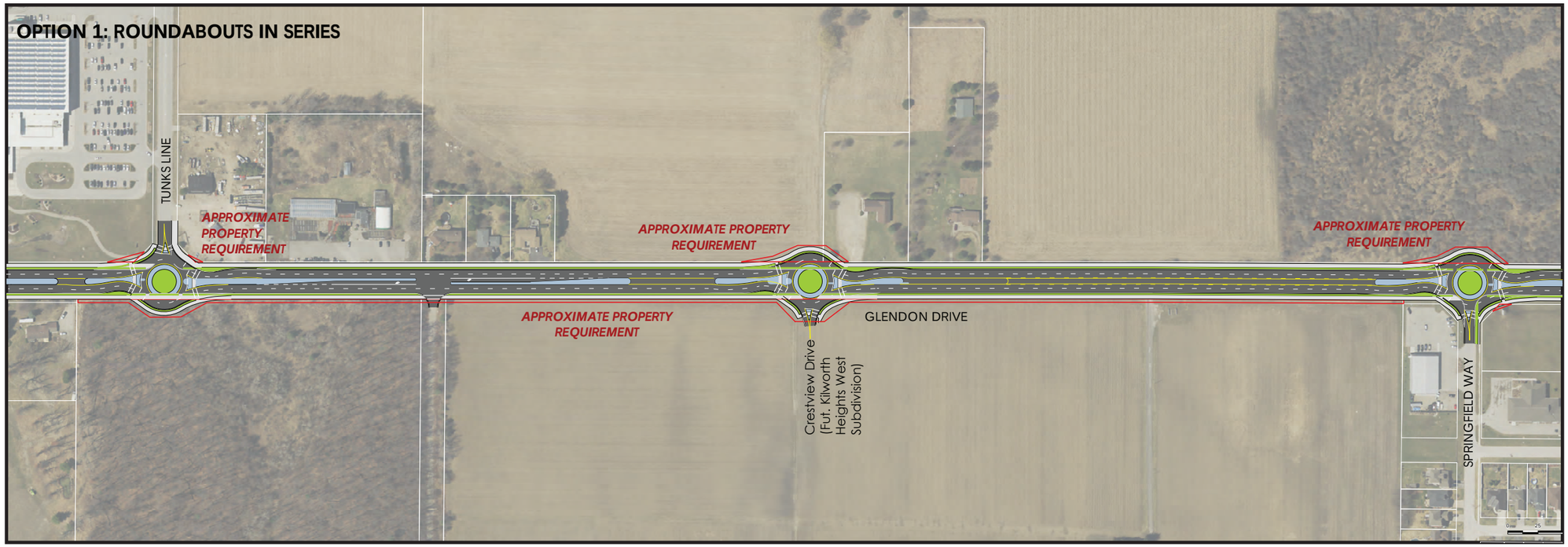
2. **Roundabouts in Series**

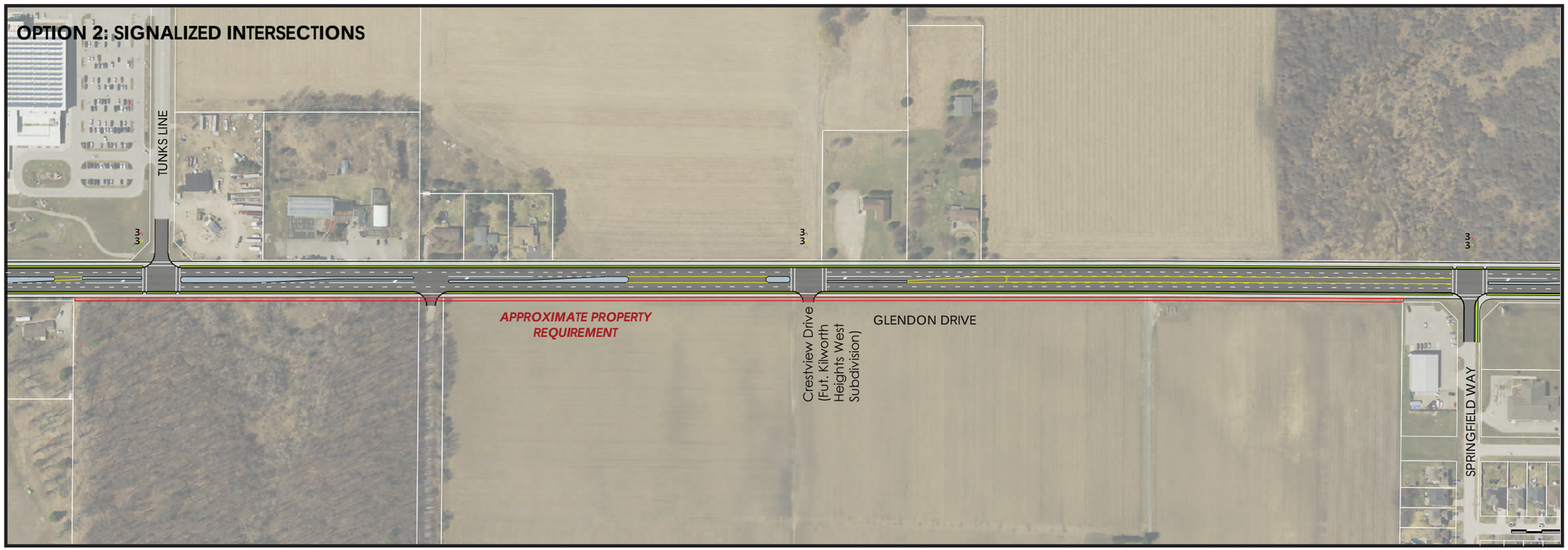
This alternative involves construction of a roundabout at each intersection. Roundabouts are often implemented to improve intersection operations while maintaining efficient through traffic flow. Appropriate roundabout design can also provide crossings for pedestrians and cyclists, which are shown to reduce the frequency and severity of collisions by lowering vehicle speeds, and enhancing driver awareness.

Evaluation Summary and Preliminary Recommendations

Based on the evaluation provided in Table 9.6, signalized control of the intersections is recommended at these locations. The installation of the three roundabouts would require significantly more property acquisition compared to traditional intersections along with more impacts to adjacent woodlots and terrestrial habitats. In general, roundabouts require all traffic to slow down at all times of the day whereas, at a signalized intersection, some traffic can pass uninterrupted while other drivers must stop and wait for a green phase. Since the cross street traffic volumes are significantly lower than through traffic on Glendon Drive, the operational

benefits that may result from roundabouts in these locations would not be realized, and may negatively impact operations along Glendon Drive. Therefore, the additional costs and environmental impacts of the roundabout are not justified, and traditional signalized intersections are recommended in these locations.





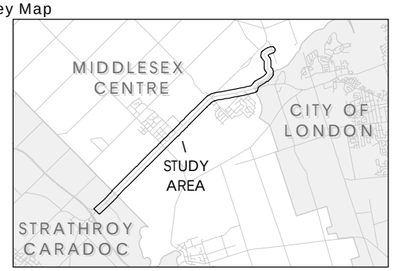
Glendon Drive

paving the way for an active community

middlesex centre — in the centre of it all

middlesex county

Key Map



Notes

1. Coordinate System: NAD 1983 UTM Zone 17N
2. Base features produced under license with the Ontario Ministry of Natural Resources © Queen's Printer for Ontario, 2016.
3. Orthoimagery © First Base Solutions, 2016

December 2016

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Figure No. **9.3**

Mid-Corridor Intersections

Table 9.6 Mid-Corridor Intersection Evaluation of Alternative Solutions

TITLE	**Intersections between Komoka Road and Jefferies Road: Tunks Line, Street A (Black Property), and Springfield Way**		
Options / ***Evaluation Criteria***	**OPTION 1** **Do Nothing**	**OPTION 2** **Signalize Intersections**	**OPTION 3** **Roundabouts in Series**
Social/Cultural Impacts • Property Access; • Property Acquisition Requirements; • Impacts to Emergency Response Times; • Streetscape and Aesthetics • Public Safety • Archeological and Cultural Heritage • Aboriginal/First Nations Lands, Treaty Rights	• No change or improvements to access. Intersections operate at status quo. • Minor property may be required in conjunction with corridor widening. • No improvements to streetscape, aesthetics will not change, maintains status quo. • No impact to archaeological or cultural heritage features; • No impacts to Aboriginal lands or treaty rights.	• Existing property accesses remain the same; • Minor property may be required in conjunction with corridor widening; • Improve emergency response time by incorporating EMS priority (preemption). • Opportunity to incorporate enhanced streetscape elements; • No impact to archaeological or cultural heritage features; • No impacts to Aboriginal lands or treaty rights.	• Impacts to existing property access northwest of Tunks Line. • Additional property required. • Roundabouts can improve EMS times by maintaining traffic flow (vehicles do not need to come to a stop to ensure intersection is clear). • Streetscape can be enhanced with centre island plantings/features. • They can greatly increase motorist safety since traffic is forced to slow down, the possibility for head-on collisions is eliminated, and car crashes are less frequent than at traditional intersections. • Roundabouts have a good overall safety level, but pedestrians and cyclists may find navigating the crossings difficult. • No impacts to aboriginal lands or treaty rights.
Natural Environmental • Impacts to Terrestrial/ Aquatic Resources	• No impacts to terrestrial or aquatic habitats/resources as there will be no changes or improvements made to the intersection.	• Potential impact to Komoka Park woodlot adjacent to Tunks Lane with corridor widening.	• Potential impact to Komoka Park woodlot adjacent to Tunks Lane with corridor widening.
Technical/ Engineering • Intersection Capacity & Level of Service • Planning Objectives • Overall Safety • Pedestrian & Cycling Accommodation • Construction staging/flexibility	• Intersections would operate at decreased/poor level of service for southbound/northbound turning movements with forecasted traffic volumes prior to 2035; • No controlled pedestrian/cyclist crossing would be provided between Komoka Rd and Jefferies Rd, which includes the Wellness and Recreation Centre and future pedestrian-oriented land uses.	• All intersections will operate at good level of service with forecasted traffic volumes (LOS C or better). • Pedestrian signals and appropriate crossing treatments (high visibility pavement markings, tactile strips) can be incorporated into design to provide connectivity for active transportation modes and to meet AODA standards. • Intersections can be monitored for signal warrants (traffic volumes) and signals can be implemented in stages in conjunction with future developments and safety considerations (i.e. to provide a controlled crossing for active transportation modes at the Wellness and Recreation Centre/Tunks Line). • Opportunity to install underground signal duct work prior to signalization, during road improvements.	• No improvement to intersection level of service over signalized intersection, based on lower cross-street traffic volumes; all traffic would be required to slow down for a relatively low volume of cross-street traffic. • Generally roundabouts may improve vehicle safety and intersection collision severity by lowering speeds. This section of the corridor contains more commercial accesses, which will also aid in reducing speeds in this section, i.e. safety improvement may not be realized in this section of the corridor. • High visibility pedestrian crossings can be incorporated into the design, however pedestrians and cyclists may find it difficult to navigate roundabout crossing;

Table 9.6 Mid-Corridor Intersection Evaluation of Alternative Solutions

Options / ***Evaluation Criteria***	**OPTION 1** **Do Nothing**	**OPTION 2** **Signalize Intersections**	**OPTION 3** **Roundabouts in Series**
Economic • Initial Capital Cost • Operation And Maintenance Costs • Utility Impacts	• No capital cost. • O&M costs maintain status quo. • No impact to utilities.	• Moderate cost option, with the potential for phasing. • Standard operation and maintenance.	• Highest cost option. • Increased operation and maintenance costs for centre median planter. • Utility relocations required.

9.3.3 Jefferies Road/Vanneck Road Intersection

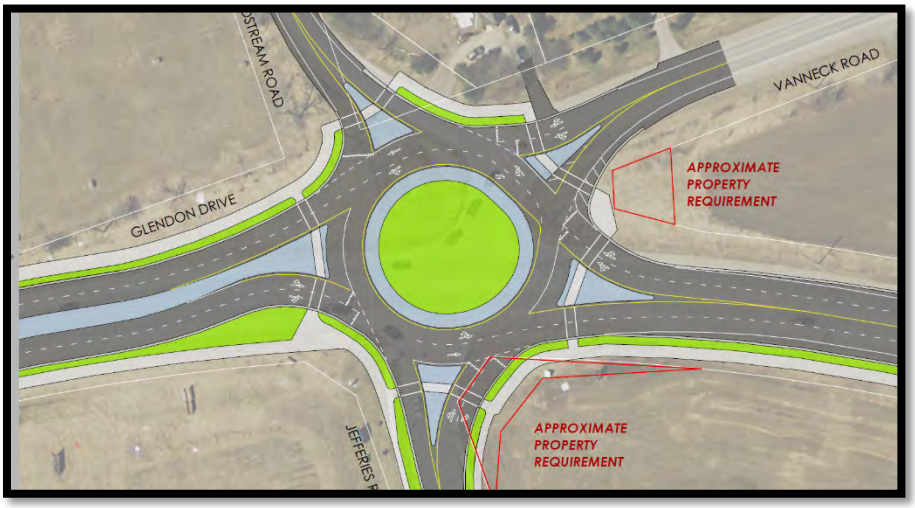
The geometry of the road approaches results in an unconventional intersection of Glendon Drive, Jefferies Road and Vanneck Road, including Coldstream Road less than 50m from the intersection. Under existing conditions, traffic analysis shows that the intersection operates at an acceptable level of service, with the southbound movements from Vanneck Road experiencing greater delays and approaching capacity. It is also noted that the unconventional geometry of the intersection and the proximity of the Coldstream Road intersection can result in driver confusion and temporary delays related to traffic travelling between Glendon Drive and Coldstream Road. Vehicle queues southbound on Vanneck Road occasionally block access to Coldstream Road (despite signage advising motorists not to block the intersection). These conditions represent a safety concern, especially to motorists who are unfamiliar with the characteristics of the intersection.

There are existing residential areas south of Glendon Drive off Jefferies Road, as well as commercial accesses off of Jefferies Road. Lands to the southeast of the intersection are also designated for Commercial development within the Middlesex Centre Official Plan, and future development applications on the subject property will be subject to the Middlesex County's County Road Access Bylaw for determination of appropriate access locations.

Based on the existing and future conditions at the intersection, the following design alternatives were identified.

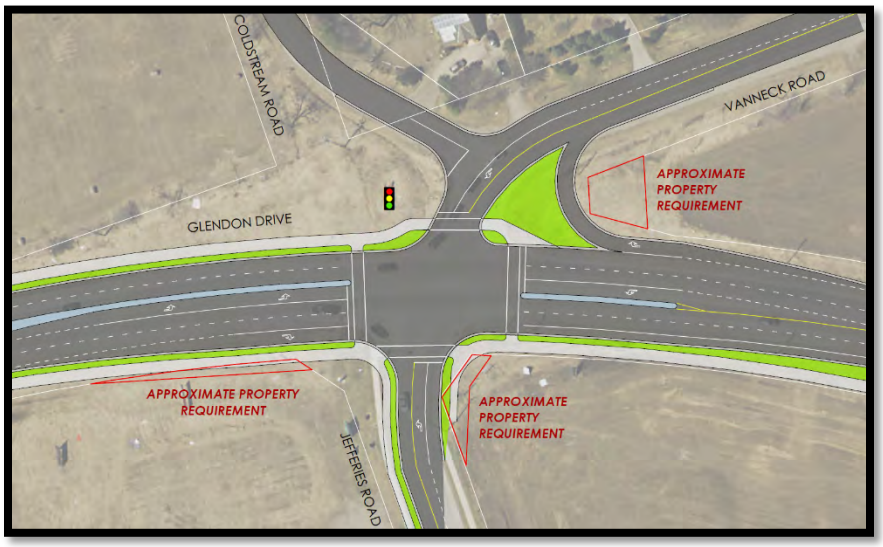
1. Roundabout

This alternative involves modification of the existing intersection into a five-leg roundabout intersection, incorporating the nearby intersection of Coldstream Road.



2. Traditional Signalized Intersection with Additional Through Lanes and Auxiliary Turn Lanes

This alternative generally maintains the existing configuration of the intersection while incorporating the widening along the corridor, and additional auxiliary lanes identified through the traffic analysis.



Evaluation Summary and Preliminary Recommendations

Based on the evaluation presented in Table 9.7**,** the roundabout concept is recommended at this location. The roundabout has the benefit of allowing all roads to come to one intersection, and facilitates turning traffic while not excessively delaying through traffic on Glendon Drive. During the forecasted 2035 peak-hour traffic scenario, a 5-leg roundabout would operate with relatively moderate delay and queue, with an overall Level of Service (LOS) of 'A' to 'B' during the am and pm peak hours, respectively. This is an improvement over the analysis of the Jefferies Road, Vanneck Road and Glendon Drive intersection under signal control, which resulted in poor LOS and at-capacity conditions for several turning movements, and an overall level of service of D and F for the am and pm peak hours, respectively. Property acquisition is required for construction of the roundabout concept.

The roundabout will also improve safety conditions at the intersection by reducing the severity of collisions. Refer to **Section 9.3** of this report for more information on roundabout safety statistics. While several models have been developed to estimate total societal costs of modern roundabouts, none directly consider 5-leg roundabouts in Canada or the United States. In the absence of a very extensive calculations to quantify a precise number, it could still be estimated that a 5-leg, partial multilane roundabout in this location could be roughly 5 times safer than the alternative (two closely-spaced, skewed intersections, one of which is signalized).

Table 9.7 Jefferies Road/Vanneck Road Intersection

Vanneck Road Jefferies Road Intersection with Glendon Drive			
Options *Evaluation Criteria*	**OPTION 1** **Do Nothing**	**OPTION 2** **Signalize with Additional Through Lanes and Auxiliary Lanes**	**OPTION 3** **Roundabout**
Social/Cultural Impacts • Property Access; • Property Acquisition Requirements; • Impacts to Emergency Response Times; • Streetscape and Aesthetics • Public Safety • Archeological and Cultural Heritage • Aboriginal/First Nations Lands, Treaty Rights	• No change or improvements to access. Intersection operates at status quo. • No property acquisition requirements as there will be no changes or improvements made to the intersection. • No improvements to streetscape, aesthetics will not change, maintains status quo. • No impact to archaeological or cultural heritage features. • No impacts to Aboriginal lands or treaty rights.	• Potential property requirements to incorporate improved intersection geometry. • Improve emergency response time by incorporating EMS priority (preemption). • Typically more comfortable for pedestrians/cyclists to navigate signalized intersections; however, statistically pedestrians are more likely to be involved in a serious collision at a signalized intersection. The most common pedestrian-vehicle collisions occur when pedestrians are crossing while right turning vehicles are looking left. Speeds through signalized intersection can also be much higher than roundabout intersections, increasing collision severity. • Signalized intersections are initially more familiar to drivers and more comfortable to navigate (when compared to new roundabout installations); however, both frequency and severity of collisions are greater at signalized intersections due to poor speed control, and more conflict points as compared to a roundabout intersection. • Potential for archaeological impacts; stage 2 required. • No impacts to Aboriginal lands or treaty rights. • Opportunity to incorporate streetscape improvements.	• Potential relocation of private driveway entrances; • Opportunities for relocation of Coldstream Road (further assessment required). • Property acquisition would be required. • Improve emergency response time by eliminating stop condition. • Opportunity for streetscape enhancement with centre median plantings/features. • A roundabout can greatly increase motorist safety since traffic is forced to slow down, the possibility for head-on collisions is eliminated, and car crashes are less frequent than at traditional intersections. • Roundabouts tend to reduce the severity of intersection collisions through speed reduction, eliminating head on collisions. • Pedestrians and cyclists tend to have more difficulty navigating a roundabout compared to a signalized intersection. Signalized intersections provide a greater perception of safety by providing a clearly defined right of way with pedestrian signals; however, roundabout studies have proven that they provide a safe environment for pedestrians by lowering the speeds of vehicles, and by improving sightlines. For example, right angle collisions involving pedestrians at intersections can be caused by drivers looking left while turning right. At roundabouts, pedestrians cross prior to the vehicle's entry into the roundabout, which greatly improves sightlines. Also, pedestrian crossing distances are typically shorter, and they are only crossing on direction of traffic at a time with a refuge island between the two crossings. • Cyclists are given two choices for navigating a roundabout – continuing as a vehicle through the roundabout, or dismounting and following the pedestrian crossings. • Potential for archaeological impacts. Stage 2 required. • No impacts to Aboriginal lands or treaty rights.

Table 9.7 Jefferies Road/Vanneck Road Intersection

Vanneck Road Jefferies Road Intersection with Glendon Drive			
Options *Evaluation Criteria*	**OPTION 1** **Do Nothing**	**OPTION 2** **Signalize with Additional Through Lanes and Auxiliary Lanes**	**OPTION 3** **Roundabout**
Natural Environmental • Impacts to Terrestrial/ Aquatic Resources	• No Impact to terrestrial or aquatic habitats/resources as there will be no changes or improvements made to the intersection.	• No significant terrestrial/aquatic features identified. • Standard construction impacts to surrounding agricultural/cultural vegetation communities (vegetation removal, etc.)	• No significant terrestrial/aquatic features identified. • Standard construction impacts to surrounding agricultural/cultural vegetation communities (vegetation removal, etc.)
Technical/ Engineering • Intersection Capacity & Level of Service • Planning Objectives • Overall Safety • Pedestrian & Cycling Accommodation • Construction staging/flexibility	• Maintains status quo. Intersection will operate at a poor level of service prior to 2035. • Does not improve collision trend. • This intersection does not meet current AODA standards (cross walks & tactile plate). • No sidewalk connectivity.	• Widened intersection to accommodate additional through lanes would operate at an improved level of service as compared to the Do Nothing, but poor LOS (F-E) and at-capacity conditions for several turning movements (eastbound left, westbound left, northbound through/right, southbound through right during peak periods). • Existing Coldstream Road intersection conflicts with widened signalized intersection. Opportunities could be identified for realigning Coldstream Road. • Greater perception of safety for active transportation users due to dedicated pedestrian signals, however statistically less safe than roundabout intersections. See above within Social evaluation. • Can be designed to AODA standards. • Phasing of construction available by constructing the auxiliary lanes in advance of the additional through lanes if intersection level of service decreases prior to implementation of the additional through lanes. Implementation timing could also be affected by development.	• Widened intersection to accommodate roundabout. • Intersection will operate at an improved level of service compared to Do Nothing, and Signalized Intersection (A and B during am/pm peak periods). • Improves the active transportation connectivity and infrastructure to meet AODA standards compared to Option 1, but roundabouts are often perceived as more difficult to maneuver for pedestrians and cyclists, and are not currently addressed by AODA standards (studies currently underway to address roundabouts as part of AODA standards). See information within Social evaluation. • Most complex construction staging to maintain through traffic during construction. • Improves overall intersection geometry. • Coldstream Road can be incorporated into the roundabout to address the collision trends (historical rear-end collisions at Coldstream Road). Opportunities can be identified for realignment of Coldstream to result in a more traditional roundabout configuration. • Can be phased (1 lane to 2 lane roundabout) as traffic volumes increase. Single lane roundabout would improve the existing level of service and could be implemented in advance of the 4 lane widening should the level of service at the intersection decline due to the timing of development.
Economic • Initial Capital Cost • Operation And Maintenance Costs • Utility Impacts	• No capital cost. • O&M costs maintain status quo. • No impact to utilities.	• Moderate to high capital cost, with less property acquisition compared to roundabout concept. • Minimal net change in O&M costs over roundabout intersection (roundabout lighting vs. traffic signal operations, etc.). • Potential for utility impacts.	• High capital cost including property acquisition. • Minimal net change in O&M costs compared to signalized intersection (roundabout lighting vs. traffic signals, etc.) • Impacts to existing utilities.

9.3.4 Old River Road and Glendon Drive

The intersection of Old River Road and Glendon Drive is located approximately 30m from the Thames River Bridge structure. The intersection has experienced a high collision rate (1.3 MVE) for the period examined (2010-2014), where a collision rate of 1.0 MVE represents the benchmark indicating the need for safety improvements. The higher than expected collision rate may be attributed both to the proximity of the intersection to the Thames River Bridge structure which impedes driver sightlines, as well as vehicles attempting the prohibited left turns onto Old River Road from Glendon Drive. Based on the analysis of existing traffic operations, while the intersection is operating within capacity, turning movements onto Glendon Drive from Old River Road operate at a poor level of service (LOS E), and drivers attempting to access Glendon Drive from Old River Road will experience longer and longer delays as traffic volumes continue to increase within the 20-year planning period. The result of further analysis indicates that between 83%-96% of traffic along the corridor over an 8-hour period consists of cut-through traffic. The volume of traffic (approximately 1000 AADT) is such that a diversion or closure of Old River Road would have a negligible impact on other parts of the road network (i.e. the Jefferies Road/Vanneck Road intersection with Glendon Drive).

In addition to the operational issues and safety concerns identified at the intersection, erosion and bank stability issues have also been identified along the corridor as part of a previous Class EA undertaken in 2011. Thus, the following long list of alternatives was identified to address the concerns along the corridor.

1. Right in/full out at the intersection of Glendon Drive/Old River Road (Do Nothing). This alternative maintains the existing operations at the intersection. Southbound left turns from Glendon Drive would remain prohibited by signage, and both left and right turns out of Old River Road would be permitted.

2. Right in/right out at the intersection of Glendon Drive/Old River Road, full access at Pulham Road. Under this scenario, left turns from Old River Road would be prohibited through the construction of a channelizing island ('porkchop' island). All vehicles wishing to head east on Glendon Drive will be directed to the proposed roundabout at the Jefferies Road/Vanneck Road/Glendon Drive intersection.

3. Full access to Old River Road from Glendon Drive and full access from Pulham Road.

   3A. Full access to Old River Road from Glendon Drive, and Full access from Pulham Road – Realign the Old River Road intersection westward to provide appropriate auxiliary turn lanes on Glendon Drive. Under this scenario, the left turn restriction from Glendon Drive is removed, and full access to Old River Road is permitted. A left turn lane is provided on Glendon Drive to minimize impacts to through traffic. The intersection is

realigned westward to improve sight distances to the Thames River Bridge structure, and to provide sufficient runout for the left turn lane on Glendon Drive.

3B. Full access to Old River Road from Glendon Drive and full access from Pulham Road – Modify existing intersection configuration to provide left turn lane on Glendon Drive. Under this scenario, the left turn restriction from Glendon Drive is removed, and full access to Old River Road is permitted. A left turn lane is provided on Glendon Drive; however, there is insufficient distance to the Thames River Bridge structure for a sufficient left turn lane runout, which introduces hazards to through traffic on Glendon Drive.

4. Restrict through traffic by constructing two cul-de-sacs on Old River Road.

4A. Restrict through traffic by constructing two cul de sacs on Old River Road - Right in, full out (existing intersection figuration). Under this scenario, the intersection of Glendon Drive and Old River Road would be maintained in the existing location. Turnarounds would be constructed, creating two cul de sacs. Properties located in the south/west portion would be accessed solely via Glendon Drive, and properties in the north/east would be accessed via Pulham Road and Vanneck Road. The locations of the cul de sac turnarounds are conceptual, and were identified based on the findings of the 2011 Old River Road Class EA, to mitigate erosion and bank stability concerns within the middle section of the Old River Road corridor. All through traffic would be directed to the Vanneck Road/Jefferies Road/Glendon Drive intersection.

4B. Restrict through traffic by constructing two cul de sacs on Old River Road - Full access from Glendon Drive to Old River Road, intersection is realigned westward to provide appropriate auxiliary turn lanes on Glendon Drive. As with the Alternative 4A discussed above, turnarounds would be constructed creating two cul de sacs. Additionally, the intersection of Old River Road with Glendon Drive would be realigned westward in order to provide sufficient left and right turn lanes on Glendon Drive, to improve sightlines to the Thames River Bridge structure, and to provide sufficient left turn lane runout to minimize impacts to through traffic on Glendon Drive.

4C. Restrict through traffic by constructing two cul de sacs on Old River Road – Full access from Glendon Drive, with modifications to the existing intersection configuration to incorporate a left turn lane on Glendon Drive, with 2 cul-de-sacs on Old River Road. Similar to Alternatives 4A and 4B, turnarounds are constructed creating two cul de sacs. The intersection of Old River Road and Glendon Drive is maintained in its existing location, and a left turn lane is provided on Glendon Drive; however, there is insufficient distance to the Thames River Bridge structure for a sufficient left turn lane runout, which introduces hazards to through traffic on Glendon Drive.

5. Full closure of the Glendon Drive/Old River Road intersection, with access from Pulham Road only. Under this scenario, a berm would be constructed at the intersection of Glendon Drive and Old River Road. All properties on Old River Road would be accessed via Vanneck Road/Pulham Road.

6. Full closure of the Glendon Drive/Old River Road intersection, with access provided by a new connection to Vanneck Road. Under this scenario, a new roadway connection would be constructed between Vanneck Road and Old River Road. A turnaround would be constructed on Old River Road, and properties located north/east of the turnaround would be accessed via Vanneck Road/Pulham Road.

Evaluation Summary and Preliminary Recommendations

Based on the evaluation in Table 9.8, **Alternatives 3A Realign Old River Road intersection westward to provide auxiliary turn lanes on Glendon Drive** and **4B Full access from Glendon Drive to Old River Road, with the intersection realigned westward to provide auxiliary turn lanes on Glendon Drive, and 2 cul de sacs created on Old River Road** were brought forward as the most feasible alternatives. Alternative 3A, Full Access to Old River Road and a Realignment of the Intersection improves upon existing sightlines to the Thames River Bridge, and provides adequate left and right turn lanes on Glendon Drive, mitigating impacts to through traffic on Glendon Drive. This alternative helps to address the highest frequency collision movement at the intersection (left turns onto Glendon Drive), and does not impact through traffic volumes on Old River Road. Alternative 4B including a realigned intersection with full access, and restricting through traffic by creating two cul de sacs was identified as the preliminary recommendation, since it addresses a number of issues at the intersection and along the Old River Road corridor. Construction of the turnarounds and cul de sacs eliminates 100% of through traffic, which in turn significantly reduces the frequency of collisions at the intersection with Glendon Drive. While the exact location of the turnarounds would be determined during detailed design, this alternative provides the opportunity to place turnarounds such that vehicle loading onto the road within the middle portion of the corridor is reduced/eliminated, mitigating erosion and bank stability concerns identified in the 2011 Old River Road Municipal Class EA and reducing long term maintenance requirements due to ongoing erosion concerns. Property acquisition would be required for the construction of the turnarounds; however, the costs and construction impacts associated with the proposed turnarounds are offset by the costs and impacts associated with improvements identified in the 2011 Old River Road Class EA, involving a realignment of the middle portion of the corridor. Under this configuration, properties west of the turnarounds would be accessed via the Glendon Drive intersection, and properties east would be accessed via Pulham Road/Vanneck Road.

Table 9.8 Evaluation of Alternative Solutions

Old River Road Intersection with Glendon Drive (Options 1-3)				
			Option 3 Full access to Old River Road from Glendon Drive and full access from Pulham Road	
Evaluation Criteria	**Option 1 Right in/Full out at the intersection of Glendon Drive/Old River Road (Do Nothing)**	**Option 2 Right in/Right out at the intersection of Glendon Drive/Old River Road, full access at Pulham Road**	**OPTION 3A Realign Old River Road Intersection westward to provide appropriate auxiliary turn lanes on Glendon Drive**	**OPTION 3B Modify existing intersection configuration to provide left turn lane on Glendon Drive**
Social/Cultural • Property Acquisition Requirements; • Property impacts; • Impacts to Emergency Response Times; • Local/through traffic travel times • Streetscape and Aesthetics • Archeological and Cultural Heritage • Aboriginal/First Nations Lands, Treaty Rights	• No change or improvements to access; intersection operates at status quo. • No property acquisition requirements as there will be no changes or improvements made to the intersection. • No improvements to streetscape, aesthetics will not change, maintains status quo. • No impact to archaeological or cultural heritage features. • No impacts to Aboriginal lands or treaty rights.	• Does not impact access to property on Old River Road, prevents southbound left turns onto Glendon Drive (towards London); • No property required; • No impacts to emergency response times; • Potential modification to aesthetics with potential installation of channelizing island (porkchop island); • No impacts to archaeological or cultural heritage features; • No impacts to Aboriginal lands or treaty rights.	• Maintains access to Properties on Old River Road, allows eastbound access to Old River Road (for vehicles which would normally be required to use Vanneck Rd/Pulham Rd.) and facilitates through traffic to Pulham Road. • Impacts to streetscape including tree removal, compensation through enhancement. • No impact to emergency response times. • Potential impact to archaeological resources; Stage 2 required.	• Maintains access to Properties on Old River Road, allows eastbound access to Old River Road (for vehicles which would normally be required to use Vanneck Rd/Pulham Rd.) and facilitates through traffic to Pulham Road. • Impacts to streetscape including tree removal, compensation through enhancement. • No impact to emergency response times. • Low potential for impact to archaeological or cultural heritage features. • No impacts to Aboriginal lands or treaty rights.
Natural Environmental • Impacts to existing vegetation and terrestrial resources. • Aquatic habitats • Migratory/other birds: (e.g. waterfowl, songbirds) • Special habitat areas (specially designated or protected habitats, migration routes, specific policies)	• No impacts to surrounding natural features as intersection conditions remain unchanged. • In water works required for implementation of slope stabilization measures identified as part of 2011 EA.	• No impacts to surrounding natural features due to restriction of left turn movements onto Glendon Drive. • In water works required for implementation of slope stabilization measures identified as part of 2011 EA.	• Realignment would impact Komoka ANSI, protected under the Provincial Policy Statement. If recommended, justification would be required for recommendation, and that significant efforts were made to minimize impacts. • In water works required for implementation of slope stabilization measures identified as part of 2011 EA.	• Potential impact to Komoka ANSI; • In water works required for implementation of slope stabilization measures identified as part of 2011 EA.
Technical/ Engineering • Corridor Capacity & Level of Service • Public Safety • Flood Risk/ slope stabilization	• Maintains status quo – intersection currently operates at a poor level of service for vehicles accessing Glendon Drive from Old River Road, worsening with forecasted increase in traffic volumes along	• Restricting left turns onto Glendon Drive will impact a relatively small amount of vehicle trips; • Slightly mitigates safety concerns associated with left turning movements, but does not fully	• Intersection would operate at an improved level of service and increased capacity with the provision of auxiliary turn lanes • Improves existing collision frequency with the provision of auxiliary turn lanes on Glendon	• Intersection would operate at an improved level of service with the provision of auxiliary turn lanes; however operations at the intersection cause safety concerns associated with southbound left turns and the

Table 9.8 Evaluation of Alternative Solutions

Old River Road Intersection with Glendon Drive (Options 1-3)				
			Option 3 Full access to Old River Road from Glendon Drive and full access from Pulham Road	
Evaluation Criteria	**Option 1 Right in/Full out at the intersection of Glendon Drive/Old River Road (Do Nothing)**	**Option 2 Right in/Right out at the intersection of Glendon Drive/Old River Road, full access at Pulham Road**	**OPTION 3A Realign Old River Road Intersection westward to provide appropriate auxiliary turn lanes on Glendon Drive**	**OPTION 3B Modify existing intersection configuration to provide left turn lane on Glendon Drive**
	Glendon Drive, and intersection will operate over-capacity. • Intersection currently experiences highest collision rate in the study area, due to poor compliance with turning restrictions, and poor sight lines due to foliage and Thames River bridge structure just east of the intersection. • Constructability and staging can be accommodated. • UTRCA concerns noted as part of the 2011 Old River Road EA could be addressed as part of detailed design. • Potential realignment of Old River Road will have an impact on property requirements.	address high collision rates at the intersection. • Constructability and staging can be accommodated.	Drive. (Absence of auxiliary lanes and poor sight lines existing conditions). • Relocated intersection improves sightlines at bridge. • Improvements identified in the 2011Old River Road Draft EA are still required (realignment of Old River Road). • Does not address the flooding issues noted by UTRCA as part of the 2011 old river road EA. However road alignment could be addressed as part of detailed design, which ultimately will have a greater impact on property requirements. • Constructability and staging can be accommodated.	proximity to the Thames River Bridge structure. • Auxiliary lane runout does not meet intersection design standards. • Constructability and staging can be accommodated. • Some improvement to existing collision patterns anticipated due to implementation of new left turn lane on Glendon. However substandard left turn lane runout may pose some risk. • No improvement to left turn movement onto Glendon Drive due to sightlines at the bridge. • Does not address the flooding issues noted by UTRCA as part of the 2011 old river road EA. However road alignment could be addressed as part of detailed design, which ultimately will have a greater impact on property requirements. • Constructability and staging can be accommodated.
Economic • Initial Capital Cost • Operation and Maintenance Costs • Utility Impacts	• No capital cost. • O&M maintains status quo. • No impact to utilities.	• Small capital costs associated with reconfiguring centre median and accompanying signage; • O&M maintains status quo. • No impacts to existing utilities.	• Moderate capital costs associated with intersection realignment (grading) and natural environment mitigation/ compensation measures. • Moderate- high cost associated with the reconstruction of Old River Road and bank stabilization works.	• Costs associated with intersection modifications. Less than option 3A. • Moderate- high cost associated with the reconstruction of Old River Road and bank stabilization works. • O&M remains status quo.

Table 9.8 Evaluation of Alternative Solutions

Old River Road Intersection with Glendon Drive (Options 1-3)				
			Option 3 Full access to Old River Road from Glendon Drive and full access from Pulham Road	
Evaluation Criteria	**Option 1 Right in/Full out at the intersection of Glendon Drive/Old River Road (Do Nothing)**	**Option 2 Right in/Right out at the intersection of Glendon Drive/Old River Road, full access at Pulham Road**	**OPTION 3A Realign Old River Road Intersection westward to provide appropriate auxiliary turn lanes on Glendon Drive**	**OPTION 3B Modify existing intersection configuration to provide left turn lane on Glendon Drive**
			• O&M remains status quo. • Potential utility relocations required.	• Potential utility relocations required.

Table 9.8 Evaluation of Alternative Solutions

Old River Road Alternatives CONTINUED (Options 4-6)					
	Option 4 Restrict Through Traffic by Creating Two Cul de Sacs on Old River Road			Option 5 Full closure of the Glendon Drive/Old River Road intersection, with access from Pulham Road only	Option 6 Full closure of the Glendon Drive/Old River Road intersection, restrict through traffic by constructing two cul de sacs, with full access from Pulham Road and the construction of a new access from Vanneck Road
Evaluation Criteria	**Option 4A Right in, full out (existing intersection configuration) with 2 cul de sacs on Old River Road**	**Option 4B Full access from Glendon Drive to Old River Road, intersection realigned westward to provide appropriate auxiliary turn lanes on Glendon Drive, with 2 cul-de-sacs on Old River Road**	**Option 4C Full access from Glendon Drive with modifications to existing intersection configuration including left turn lane on Glendon Drive, with 2 cul-de-sacs on Old River Road**		
Social/Cultural • Property Acquisition Requirements; • Property impacts; • Impacts to Emergency Response Times; • Local/through traffic travel times • Streetscape and Aesthetics • Archeological and Cultural Heritage • Aboriginal/First Nations Lands, Treaty Rights	• Property acquisition required for vehicle turn-arounds at cul-de-sacs on Old River Road. • Significantly less traffic volume on Old River Road therefore a reduction in noise, and increase in safety for property access. • Restricts through movement from Glendon Drive and Pulham Road. • Anticipated delays compared to existing conditions for vehicles traveling to Glendon Drive. • Slightly less delay for some local traffic than option 6. • Emergency through-access to be maintained via emergency gates. • Low potential for archeological and cultural heritage impacts. • Properties along the east/north portion of Old River Road would be accessed via Vanneck Road and Pulham Road (slight increase in travel time), and properties to the west/south portion would be accessed via Glendon Drive;	• Property required through Komoka ANSI; and property required for vehicle turn-arounds at cul-de-sacs on Old River Road • Significantly less traffic volume on Old River Road therefore a reduction in noise, and increase in safety for property access. • Restricts through movement from Glendon Drive and Pulham Road. • Anticipated delays compared to existing conditions for vehicles traveling to Glendon Drive. • Slightly less delay for some local traffic than option 6. • Emergency through-access to be maintained via emergency gates. • Impacts to streetscape including tree removal; compensation through enhancements and opportunity to naturalize existing intersection. • Potential archaeological impacts • Properties along the east/north portion of Old River Road would be accessed via Vanneck	• Property acquisition required for vehicle turn-arounds at cul-de-sacs on Old River Road. • Significantly less traffic volume on Old River Road therefore a reduction in noise, and increase in safety for property access. • Restricts through movement from Glendon Drive and Pulham Road. • Anticipated delays compared to existing conditions for vehicles traveling to Glendon Drive. • Slightly less delay for some local traffic than option 6. • Emergency through-access to be maintained via emergency gates. • No impacts to archaeological material. • Properties along the east/north portion of Old River Road would be accessed via Vanneck Road and Pulham Road (slight increase in travel time), and properties to the west/south portion would be accessed via Glendon Drive;	• Increased travel times for properties on Old River Road closest to Glendon Drive, who would be required to access Old River Road via Vanneck Rd. and Pulham Rd. • No property required. • Significantly less traffic volume on Old River Road therefore a reduction in noise, and increase in safety for property access. • Potential impact to emergency response times (emergency access gates may be included). • Anticipated delays compared to existing conditions for vehicles traveling to Glendon Drive. Greatest for local traffic. • No impacts to archaeological or cultural heritage. • No impacts to Aboriginal lands or treaty rights.	• Land acquisition required for new road right of way; • Restricts through movement from Glendon Drive. • Significantly less traffic volume on Old River Road therefore a reduction in noise, and increase in safety for property access. • Anticipated delays compared to existing conditions for vehicles traveling to Glendon Drive. Slightly less delay for some local traffic than option 5. • No impact to emergency response times. • Opportunity to enhance streetscape with naturalization of the intersection at Glendon Drive. • Potential impacts to archaeological or cultural heritage (archaeological assessment required). • No impacts to Aboriginal lands or treaty rights.

Table 9.8 Evaluation of Alternative Solutions

Old River Road Alternatives CONTINUED (Options 4-6)					
	Option 4 Restrict Through Traffic by Creating Two Cul de Sacs on Old River Road			**Option 5 Full closure of the Glendon Drive/Old River Road intersection, with access from Pulham Road only**	**Option 6 Full closure of the Glendon Drive/Old River Road intersection, restrict through traffic by constructing two cul de sacs, with full access from Pulham Road and the construction of a new access from Vanneck Road**
Evaluation Criteria	**Option 4A Right in, full out (existing intersection configuration) with 2 cul de sacs on Old River Road**	**Option 4B Full access from Glendon Drive to Old River Road, intersection realigned westward to provide appropriate auxiliary turn lanes on Glendon Drive, with 2 cul-de-sacs on Old River Road**	**Option 4C Full access from Glendon Drive with modifications to existing intersection configuration including left turn lane on Glendon Drive, with 2 cul-de-sacs on Old River Road**		
	• No impacts to Aboriginal lands or treaty rights.	Road and Pulham Road (slight increase in travel time), and properties to the west/south portion would be accessed via Glendon Drive; • No impacts to Aboriginal lands or treaty rights.	• No impacts to Aboriginal lands or treaty rights.		
Natural Environmental • Impacts to existing vegetation and terrestrial resources. • Aquatic habitats • Migratory/other birds: (e.g. waterfowl, songbirds) • Special habitat areas (specially designated or protected habitats, migration routes, specific policies)	• Mitigates the potential for impacts to sensitive areas along the Thames River due to existing erosion concerns (prohibiting through traffic). • Direct impact to adjacent woodland associated with Glendon Drive corridor improvement. No additional impacts anticipated. Mitigation and compensation can be provided through enhancements. • In water works required for implementation of slope stabilization measures identified as part of 2011 EA.	• Mitigates the potential for impacts to sensitive areas along the Thames River due to existing erosion concerns (prohibiting through traffic). • Direct impact to Komoka ANSI, and potential SAR habitats in addition to impacts associated with the Glendon Drive corridor improvements. • In water works required for implementation of slope stabilization measures identified as part of 2011 EA.	• Mitigates the potential for impacts to sensitive areas along the Thames River due to existing erosion concerns (prohibiting through traffic). • Direct impact to adjacent woodland associated with Glendon Drive corridor improvement. No additional impacts anticipated. Mitigation and compensation can be provided through enhancements. • In water works required for implementation of slope stabilization measures identified as part of 2011 EA.	• No impacts to existing vegetation; • Opportunity to enhance vegetation/naturalize the intersection. • Mitigates the potential for impacts to sensitive areas along the Thames River due to existing erosion concerns (prohibiting through traffic). • In water works required for implementation of slope stabilization measures identified as part of 2011 EA.	• Impacts to significant woodlot, ANSI, and potential species at risk/significant habitats. • Opportunity to enhance vegetation/naturalize the existing intersection with Glendon Drive. • In water works required for implementation of slope stabilization measures identified as part of 2011 EA.
Technical/ Engineering • Corridor Capacity & Level of Service • Public Safety	• Removes through traffic (avg. 89% of existing trips through intersection), mitigating safety concerns	• Removes through traffic (avg. 89% of existing trips through intersection), mitigating safety concerns	• Removes through traffic (avg. 89% of existing trips through intersection), mitigating safety concerns	• All residents would access Old River Road from Pulham Road; • Eliminates turning movements at Glendon	• Residents would access Old River Road from Pulham Road and Vanneck Road;

Table 9.8 Evaluation of Alternative Solutions

Old River Road Alternatives CONTINUED (Options 4-6)					
	Option 4 Restrict Through Traffic by Creating Two Cul de Sacs on Old River Road			Option 5 Full closure of the Glendon Drive/Old River Road intersection, with access from Pulham Road only	Option 6 Full closure of the Glendon Drive/Old River Road intersection, restrict through traffic by constructing two cul de sacs, with full access from Pulham Road and the construction of a new access from Vanneck Road
Evaluation Criteria	**Option 4A Right in, full out (existing intersection configuration) with 2 cul de sacs on Old River Road**	**Option 4B Full access from Glendon Drive to Old River Road, intersection realigned westward to provide appropriate auxiliary turn lanes on Glendon Drive, with 2 cul-de-sacs on Old River Road**	**Option 4C Full access from Glendon Drive with modifications to existing intersection configuration including left turn lane on Glendon Drive, with 2 cul-de-sacs on Old River Road**		
• Flood Risk/ slope stabilization	at the Glendon Drive/Old River Road intersection. • Left turn movement onto Glendon Drive will operate at a poor LOS with increased future traffic volumes on Glendon Drive. • All traffic diverted to the Vanneck Rd/Jefferies/Glendon intersection can be accommodated as improvements are being recommended to address future traffic volumes. • Less traffic through intersection will reduce frequency of collisions. • Cul-de-sac reduces the risk to river related hazards. • Low potential for the need to relocate the remaining portions of Old River Road away from the river - dependent on detailed design. Potential for property impacts. • Profile adjustments to the cul-de-sacs could reduce flooding risk in lower section.	at the Glendon Drive/Old River Road intersection. • Intersection would operate at an improved level of service and increased capacity with the provision of auxiliary turn lanes • All traffic diverted to the Vanneck Rd/Jefferies/Glendon intersection can be accommodated as improvements are being recommended to address future traffic volumes. • Improves existing collision frequency with the provision of auxiliary turn lanes on Glendon Drive. (Absence of auxiliary lanes and poor sight lines existing conditions). • Relocated intersection improves sightlines at bridge. • Low potential for the need to relocate the remaining portions of Old River Road away from the river - dependent on detailed design. Potential for property impacts. • Profile adjustments to the cul-de-sacs could reduce	at the Glendon Drive/Old River Road intersection. • Intersection would operate at an improved level of service with the provision of auxiliary turn lanes; however operations at the intersection cause safety concerns associated with southbound left turns and the proximity to the Thames River Bridge structure. • All traffic diverted to the Vanneck Rd/Jefferies/Glendon intersection can be accommodated as improvements are being recommended to address future traffic volumes. • Does not meet intersection design standards. • Constructability and staging can be accommodated. • Some improvement to existing collision patterns anticipated due to implementation of new left turn lane on Glendon. However substandard left turn lane runout may pose some risk.	Drive and Old River Road to create the safest condition on Glendon compared to other options. • All traffic diverted to the Vanneck Rd/Jefferies/Glendon intersection can be accommodated as improvements are being recommended to address future traffic volumes. • Improvements identified in the 2011Old River Road Draft EA are still required (realignment of Old River Road). • Greatly reduces vehicular loading at the location of soil instability and river bank erosion. (middle sections as per 2011 EA) • UTRCA concerns noted as part of the 2011 old river road EA. could be addressed as part of detailed design. • Potential realignment ultimately will have an impact on property requirements.	• Removes intersection with Glendon Drive and associated safety concerns at intersection. • All traffic diverted to the Vanneck Rd/Jefferies/Glendon intersection can be accommodated as improvements are being recommended to address future traffic volumes. • Reduces the risk to river related hazards. Low potential to relocate the remaining portions of Old River Road away from the river dependent on detailed design ie further property impacts. • Profile adjustments to the cul-de-sacs could reduce flooding risk in lower section. • Geometric and grade challenges for new road construction.

10.0 PHASE 3 PUBLIC CONSULTATION AND DESIGN REFINEMENTS

10.1 PUBLIC INFORMATION CENTRE NO. 2

As part of Phase 3 of the Class EA process, the design alternatives, evaluation, and preliminary recommendations were presented for public review and comment at a Public Information Centre (PIC) on Monday June 27th, 2016 from 6:00-8:00pm at the Komoka Wellness and Recreation Centre.

The PIC was held in open house format, with display boards providing background information on the study, public comments received to-date, corridor and intersection design alternatives, an overview of the evaluation process, and preliminary recommendations (refer to **Appendix A.2** for PIC presentation materials). Staff from Stantec, the Municipality of Middlesex Centre, and Middlesex County were in attendance to answer questions. 33 people signed in and 11 comment sheets were submitted at the PIC (refer to **Appendix A.2** and **A.3**). All comments received were recorded on the TRACER table found in **Appendix A.3**.

A wide range of comments were received. Table 10.1 provides a summary of comments received by topic.

Table 10.1 PIC 2 Comment Summary

Topic	Comment Overview
Roundabouts	Many comments in favour of roundabouts as a way to slow down traffic while maintaining traffic flow, but an education campaign should be undertaken to familiarize drivers. Roundabouts improve intersection operations and safety over signalized intersections, and resident is concerned about the recommendations to signalize the three mid-corridor intersections (Tunks Ln, Crestview Drive, and Springfield Way). Resident believes that since roundabouts increase safety at intersections, installing signalized intersections poses undue risks.
Natural Environment	Native species should be used to restore all disturbed areas to combat invasive species. Concerns over environmental management measures during construction. An inventory of wildlife species in study limits should be

Topic	Comment Overview
	conducted directly prior to construction to determine appropriate mitigation.
Active Transportation	Several comments excited about creating bicycle and pedestrian paths along the corridor. Several concerns regarding on-street cycling facilities, due to the high volume and speeds of traffic. Roundabouts will not likely reduce speeds enough to create comfortable cycling conditions. Several comments in favour of off-road multi-use paths. On-street bicycle facilities should have clear pavement markings and rumble strips so that vehicles know they are entering a designated bicycle travel lane.
Coldstream Road	Resident just north of the intersection of Coldstream Road and Vanneck Road expressed concern over the speeds of traffic heading north from the proposed roundabout. Sightlines from driveway to the intersection are poor under existing conditions, with cars coming around the bend very quickly. This causes concerns for the safety of the school bus stop, and Canada Post drivers have also expressed safety concerns. Residents would like considerations for the future of Coldstream Road, including rerouting, or closing the road and creating cul-de-sacs as in the Old River Road situation.

10.2 MINDMIXER ONLINE COMMUNITY

All presentation materials from PIC 2 were posted to the glendondrive.mindmixer.com online community, and participants were encouraged to review the information and provide comment. 13 conversations were initiated. All Mindmixer comments are included **Appendix A.3**, and an overview is provided below:

- It was stated that more consultation could be undertaken with the entire population of Middlesex Centre to inform of proposed plans that potentially impact the entire Municipality (i.e. tax payers).

- 5- corners intersection (Jefferies Road/Vanneck Road/Coldstream Road/Glendon Drive intersection) – roundabout is a good solution to improve operations and safety at the intersection since serious accidents are imminent based on the intersection geometry and vehicle volumes/speeds.

- Comments expressed that Coldstream Road is largely the cause of the situation at the 5-corners intersection, and if it were realigned there would be no reason for the roundabout at the intersection.

- It is perceived that roundabouts are not safe on a busy road like Glendon Drive, and may cause serious accidents. A redirection of Coldstream Road and advanced traffic signals at Jefferies Road would be sufficient to maintain traffic flow. A roundabout at Komoka Road is also not appropriate based on the number of business in the area.

- It was expressed that five travel lanes are not necessary between Komoka Road and Jefferies Road and fewer travel lanes would cost much less in taxpayer dollars.

- A business owner at the Komoka Road intersection expressed concerns over property access and impacts with the installation of the roundabout.

10.3 JEFFERIES ROAD/GLENDON DRIVE COMMERCIAL PROPERTY

There is a vacant property designated for future commercial development located on the southeast corner of Glendon Drive and Jefferies Road. While no formal planning applications have been submitted for the property, correspondence was received from the developers including a preliminary Traffic Impact Study (TIS) for a mixed use commercial development on the property (F.R. Berry April 2016, refer to **Appendix A.3**). The property currently has access to Jefferies Road, with a 0.3 metre reserve identified along the Glendon Drive frontage as a condition of Draft Plan Approval.

The trip-generation identified for the preliminary land use concept within the TIS was incorporated into the traffic analysis undertaken as part of this Class EA as an update to the more general land use methodology typically used within the traffic analysis when no specific site plan information is available.

The TIS analyzed a number of access configurations, and recommended a right-in, right-out access onto Glendon Drive in addition to the Jefferies Road access. Several communications were received from the property owners/developers with respect to the desire for the right-in, right out access (**Appendix A.3**).

It was communicated to the property owners/developers that consideration has been made for the future development of the subject property based on the land use concept and policies in place, along with the specific site-generated traffic volumes reported in the April 2016 TIS.

Phase 3 Public Consultation and Design Refinements
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Improvements are recommended at the intersection of Glendon Drive with Jefferies Road and Vanneck Road, which address capacity and operational deficiencies at the intersection also noted in the TIS. The proposed roundabout improves the level of service for turning movements at the intersection, and reduces queue lengths that might impact the property's access on Jefferies Road.

Site specific property access considerations shall be determined through a site plan application under the Planning Act, and access configuration will be assessed based on Middlesex County Bylaw #5783 – *Regulating the use, construction, or alterations of any entrance ways, private roads, or access to a county highway.*

11.0 '5-CORNERS' – JEFFERIES ROAD, COLDSTREAM ROAD, VANNECK ROAD, GLENDON DRIVE REFINEMENT

This section of the ESR outlines the revisions to the roundabout concept at the Jefferies Road, Coldstream Road, and Vanneck Road intersection with Glendon Drive (four-leg and five-leg roundabout concepts), as well as the alternatives investigated for a realignment of Coldstream Road in association with the four-leg roundabout concept.

A number of questions and concerns were identified with the information presented at PIC 2 with respect to the Jefferies Road, Coldstream Road, Vanneck Road, and Glendon Drive roundabout concept.

Concerns were expressed regarding the operations of the roundabout (refer to **Appendix A.3** for correspondence). Poor sightlines to the intersection potentially create safety concerns for residents exiting their driveway and the school bus stop located north of the intersection. With the proposed roundabout concept presented at PIC 2, concerns were expressed that speeds of traffic heading north on Coldstream Road would increase based on the entry/exit angles, and in turn increase safety concerns at private driveways and potentially increase collisions north on Coldstream Road at the sharp bend before the railway bridge. The resident requested that consideration be made for the future of Coldstream Road, noting opportunities to reroute the road, or create cul de sacs with reference to the Old River Road example. Similar comments were also submitted regarding the alignment of Coldstream Road on glendondrive.mindmixer.com, and the conditions at the rail underpass (narrow underpass structure and tight road geometry) have been a long-standing concern within the Municipality and County.

11.1 MODIFIED ROUNDABOUT DESIGNS

The roundabout concept at this location is constrained by a number of factors including right of way limitations and property acquisition, and the unique geometry of the five road approaches. Roundabout designs often have trade-offs, which can be unavoidable when retrofitting existing intersections. Roundabout Design A (Figure 11.1) was created to improve upon the operational safety aspects of the five-leg roundabout by increasing approach angles for better speed control (i.e. reducing the fastest path speeds). The design results in a larger overall footprint to accommodate the revised approach angles, and a designated westbound right turn bypass from Glendon to Vanneck needed to be introduced. The design also allows for future expansion of a northbound right-turn by-pass on Jefferies, which is likely to be warranted after the study horizon year. These revisions introduce more significant additional property impacts, with the potential for full acquisition of the northeast corner residence.

'5-Corners' – Jefferies Road, Coldstream Road, Vanneck Road, Glendon Drive Refinement
August 3, 2018

With the public comments and concerns with the Coldstream Road connection and safety at the rail underpass to the north, the team revisited the intersection to see how the intersection could function should Coldstream Road be closed at Vanneck. Roundabout Design B (Figure 11.2) was designed as a more traditional four leg roundabout. The roundabout footprint is shifted slightly further westward to help with the approach angles, and would still require the westbound right turn bypass from Glendon to Vanneck. This configuration requires less overall property than the previousl 5 leg versions, and improves upon the technical standards and geometry of the first 5 leg roundabout presented at PIC 2. This design concept would require further consideration for either a realignment or partial closure of Coldstream Road before it could be implemented.

While the four-leg roundabout is recommended from a technical, safety, and property impact perspective, the recommendation is dependant on the feasibility of realigning Coldstream Road to access Glendon Drive further west of its current intersection with Vanneck Road. For this reason, additional environmental field studies and consultation with property owners was undertaken to determine the feasibility, and preferred realignment of Coldstream Road.

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Revised: 2017-02-28 By: kbuchanan

February 2017
161413164

Glendon Drive
paving the way for an active community

middlesex centre
in the centre of it all

middlesex county

Legend

- Signalized Intersection
- Proposed Sanitary
- Existing Sanitary
- Proposed Storm
- Existing Storm
- Proposed Watermain
- Existing Watermain
- Potential Property Requirement
- Asphalt
- Curb
- Gravel
- Concrete Median
- Boulevard
- Sidewalk/Path
- Enhanced Ditch

Notes

1. Coordinate System: NAD 1983 UTM zone 17N
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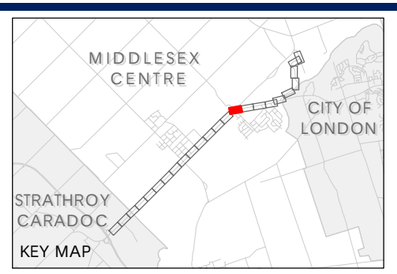

Stantec

Figure No.
11.1

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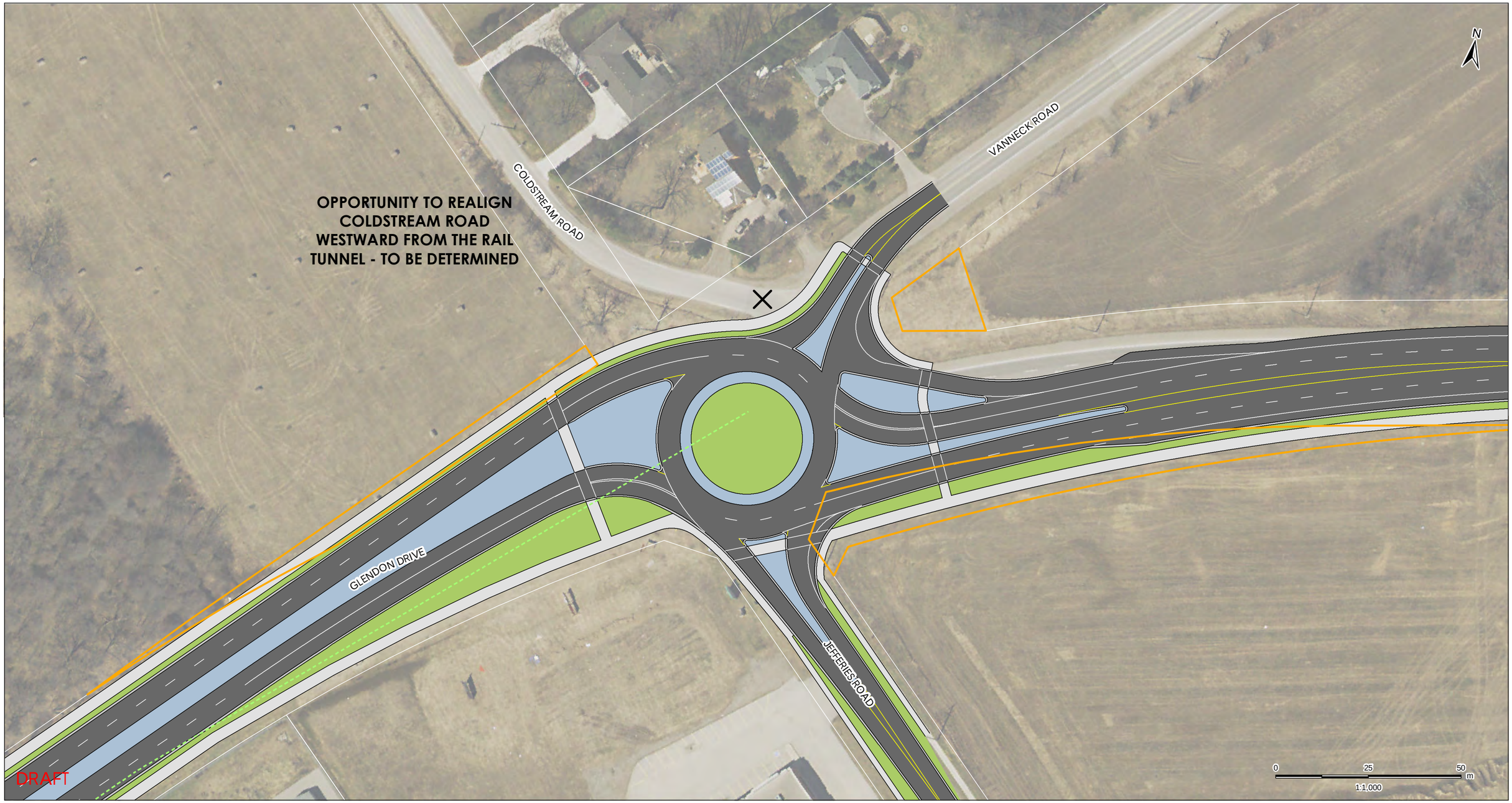
Roundabout A



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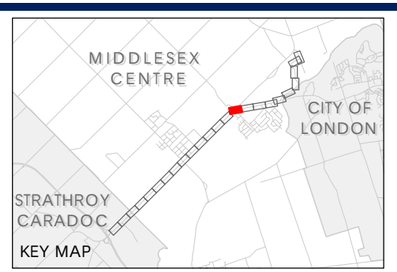

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Figure No.
10.2

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Roundabout Design B

11.2 COLDSTREAM ROAD REALIGNMENT

The four-leg roundabout concept with the closure of Coldstream Road at Vanneck provided a potential opportunity to address the non-conventional alignment of the Coldstream Road approach to Glendon Drive, as well as improving upon the existing conditions at the narrow rail underpass on Coldstream Road north of Glendon Drive. In order to determine the feasibility, properly identify impacts, and find a preferred configuration for the potential realignment, existing conditions in the area were investigated in more detail and further consultation was undertaken with local land owners.

11.3 COLDSTREAM ROAD EXISTING CONDITIONS – TRANSPORTATION

Coldstream Road is a local rural road that runs northwest from its intersection with Vanneck Road. Based on traffic volumes at the intersection, the road carries roughly 900 vehicles a day. The posted speed limit in the section between Vanneck Road to roughly 500m north of the rail underpass is 50km/h. Warning signs advising a speed of 30 km/h are posted south of the railway underpass.

The approach to the Vanneck Road intersection is skewed, and forms a close intersection with Vanneck and Glendon, and helps form the intersection commonly referred to as "5-Corners." The geometry of the intersection is a main contributor to poor sightlines to the intersection when approaching from the north, and to the driveways when approaching from the south.

North of Vanneck Road and Glendon Drive, the road snakes to the west and north, and travels under a narrow CN Rail subway roughly 3.5m wide, with 3.4m vertical clearance. Signs are in place advising northbound motorists to yield to oncoming traffic. However, the alignment of Coldstream Road and narrow rail underpass create very restricted sightlines in both directions, and based on existing signage, impeding the gap and timing judgement of those vehicles needing to yield to the southbound vehicles.

CN Rail indicated that they have no planned improvements in this location (see correspondence in **Appendix A.4**).

11.4 COLDSTREAM ROAD EXISTING CONDITIONS – SOCIO-ECONOMIC

On Schedule A-2 of the Middlesex Centre Official Plan (OP), lands directly west of Coldstream Road, northwest of the "5-Corners" intersection, consist of vacant lands designated as Settlement Commercial, Natural Environment, and Natural Heritage Enhancement Area. A Community Gateway is identified at the intersection of Glendon Drive, Coldstream Road, Vanneck Road, and Jefferies Road. Hazard Lands associated with a tributary to Oxbow Creek

are also located west of Coldstream Road. Future Multi-Use Trails are identified along Coldstream Road and the CN Rail line within Schedule A-2 of the Middlesex Centre OP.

Settlement Commercial areas are subject to the policies of Section 5.4 and 5.7.5 of the Middlesex Centre OP, and where Community Gateway locations overlay the commercial designation as in this case, the design of development proposals shall enhance the street corner in terms of building orientation, location of parking, landscape treatments, and an overall high quality design character that contributes to the identity of the Kilworth-Komoka communities.

Natural Environment, Natural Heritage Enhancement, and Natural Hazard Area designations are subject to policies of Section 5.7.9 of the Official Plan, along with Natural Environment policies within Section 3. Policies encourage the filling of these areas with native trees and shrubs, the acquisition of adjacent properties by the Municipality for increasing corridor links along stream corridors and significant vegetation patches as well as for compatible land uses such as public parks, open space, and multi-use trails.

The parcel northwest of the "5-Corners" intersection is currently owned by Drewlo Holdings Inc., and there are no open development applications on the site. As an important stakeholder in the potential realignment of Coldstream Road, a meeting was held on Friday March 24th, 2017 to discuss the inclusion of the Coldstream Road realignment within the current Glendon Drive Class EA. Information was also provided to the landowner during the identification and evaluation of alternative solutions.

'5-Corners' – Jefferies Road, Coldstream Road, Vanneck Road, Glendon Drive
Refinement August 3, 2018

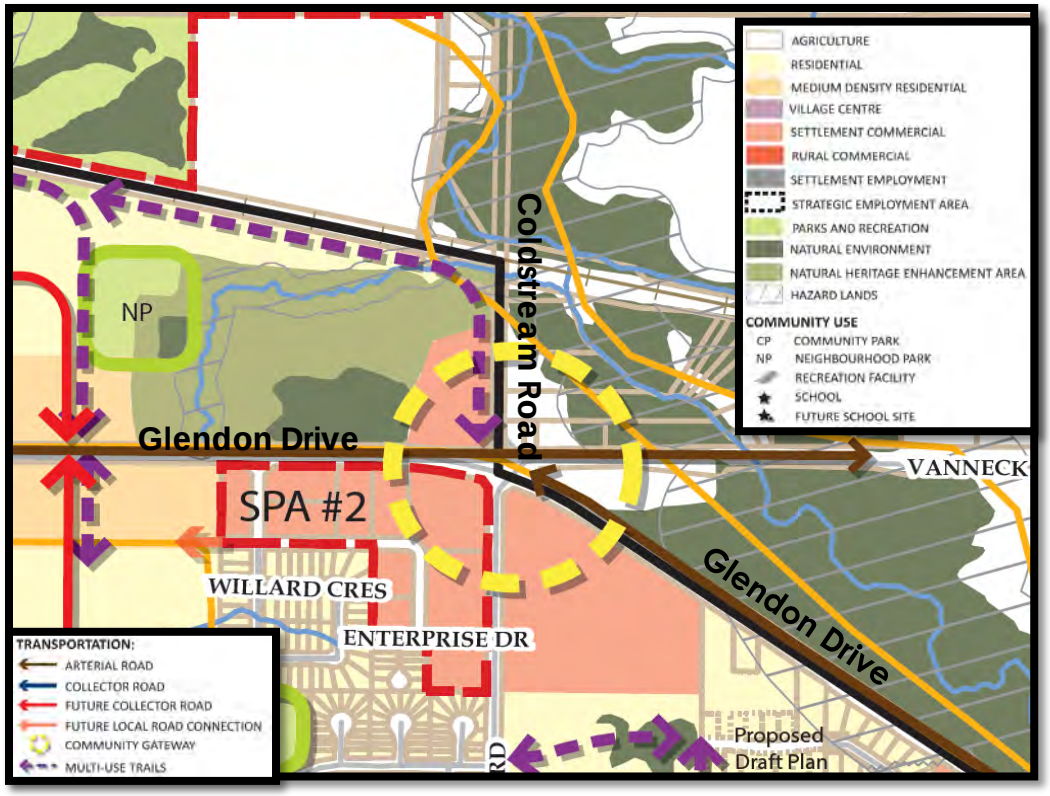


Figure 11.3 Schedule A-2 Middlesex Centre Official Plan

11.5 COLDSTREAM ROAD EXISTING CONDITIONS – NATURAL ENVIRONMENT

To supplement the information collected along the Glendon Drive right of way and to determine site specific conditions associated with the potential realignment of Coldstream Road, field investigations were undertaken in May, June, and July 2017. Field surveys included Ecological Land Classification (ELC), botanical inventory, wildlife habitat assessment, incidental wildlife and plant observations, breeding bird surveys, amphibian egg mass searches, and wetland delineation. An overview of the results is provided below, and more detailed information and methodology is provided in a memorandum included in **Appendix D**. An overview of environmental conditions is shown on Figure 11.4 .

Vascular Plant Species

The following is a floristic summary for the study area. A detailed list with all scientific plant names and species statuses is provided in **Appendix D.**

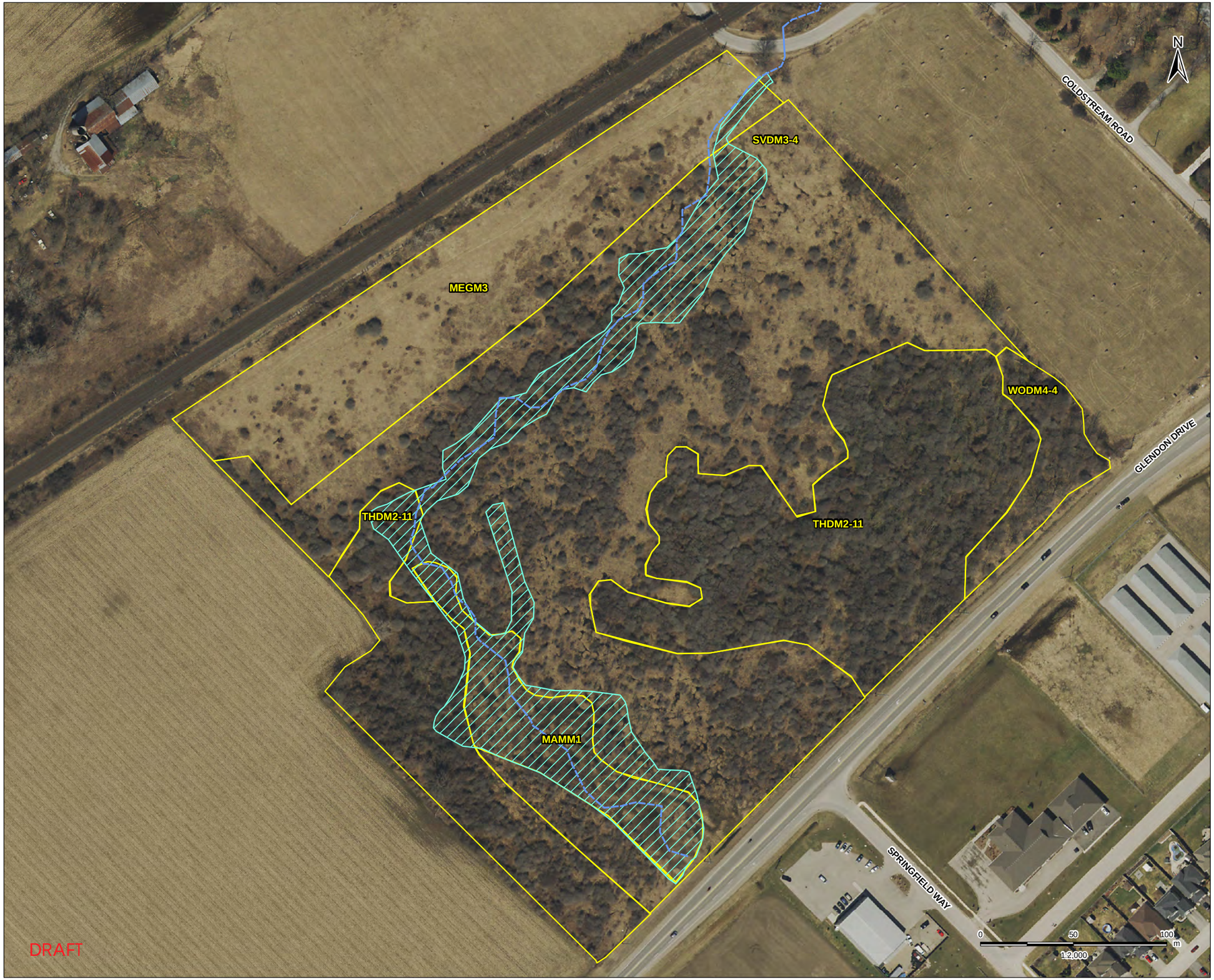
- A total of 142 species of vascular plants were recorded. This total includes taxa identified to species, subspecies (ssp.) and variation (var.) levels.
- 99 of the 142-recorded species are native to Ontario, while 43 are exotic species not native to Ontario.
- 89 native species have a provincial rank of S5, indicating they are common with a secure population in Ontario.
- 9 native species have a provincial rank of S4, indicating they are uncommon, but not rare in the province and populations are apparently secure.
- 1 native species, a wildflower (*Mirabilis nyctaginea*, heart-leaved four-o' clock), has a provincial rank of "S2", indicating this species is rare in Ontario. Although this species is rare in other parts of Ontario, it is an introduced species in the Carolinian Zone (Oldham 2017) and therefore, its presence in the study area is non-significant.
- No Butternut or other Species at Risk (SAR) flora were observed in the study area.
- 1 native species (*Carex grayi*, Gray's sedge) has a *C* (Conservation) value of 8 indicating this species has a high level of sensitivity to habitat disturbance. It is scattered throughout the wetland portion of the study area.
- 3 native species (*Carex formosa, Carex pallescens* and *Eleocharis palustre*) are regionally Rare (R) in Middlesex County. All three species are sedges. *Carex formosa* is common in the Hawthorn Deciduous Savanna (SVDM3-4), except in the driest areas. Carex pallescens and Eleocharis are restricted to the Graminoid Mineral Meadow Marsh (MAMM1).

Wildlife

Breeding bird surveys documented a total of 29 birds, 27 of which are likely to be breeding in the study area.

Two Species at Risk were recorded during breeding bird surveys: Barn Swallow (threatened) and Eastern Meadowlark (threatened). Barn swallow was observed foraging over the MEGM3 unit at the north end of the site (Figure 1) on June 28, and is not considered a breeding occurrence. Eastern Meadowlark was recorded singing from the hayfield immediately west of Coldstream Road on May 28, and in the hayfield north of the train tracks on June 28 (Figure 1).

Amphibian egg mass surveys did not document larval or adult amphibians in areas of pooling water. Pools were present in May, but dry by the June surveys; therefore, the duration of pooling water was too short for amphibian transformation, and pools were not suitable for amphibian breeding. One adult Northern Leopard Frog was observed as an incidental observation; however, suitable breeding habitat was not documented.white

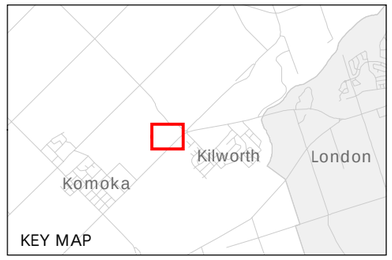


Stantec

Legend

- Watercourse (Permanent)
- Watercourse (Intermittent)
- ELC Boundary
- Wetland (Stantec 2017)

ELC	Description
MAMM1	Graminoid Mineral Meadow Marsh
MDGM3	Dry - Fresh Graminoid Meadow
SVDM3-4	Hawthorn Deciduous Savanna
THDM2-11	Hawthorn Deciduous Shrub Thicket
WODM4-4	Dry - Fresh Black Walnut Deciduous Woodland



Notes

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September 2017
161413164

Client/Project

Middlesex Centre/Middlesex County
Glendon Drive Streetscape Improvements
Master Plan Municipal Class EA

Figure No.

1

Title

Preliminary Ecological Land Classification
Coldstream Road Realignment

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Revised: 2017-09-01 By: kbuchanan

11.6 COLDSTREAM ROAD OPPORTUNITIES AND CONSTRAINTS

There are a number of opportunities and constraints associated with the potential realignment of Coldstream Road to connect with Glendon Drive further west. Realignment would provide the opportunity to improve the geometric design and sightlines along Coldstream Road itself, in addition to improving the geometric design and operations of the proposed roundabout at the Glendon Drive intersection with Coldstream Road, Vanneck Road, and Jefferies Road.

Constraints associated with the Coldstream Road realignment include:

- The existing single-lane rail underpass structure and rail corridor;
- The wetland feature and tributary to Oxbow Creek;
- Intersection spacing along Glendon Drive; and
- Future development of lands to the west of Coldstream Road.

11.7 COLDSTREAM ROAD ALTERNATIVE PLANNING SOLUTIONS

In order to identify a preferred solution for addressing the issues identified along Coldstream Road in coordination with the recommended four leg roundabout at the "5-Corners" intersection, the following planning solutions were identified:

- **Alternative 1 Do Nothing: maintain existing rail underpass and existing Coldstream Road alignment**. Under this alternative, the four-leg roundabout is installed, and there would be no access to Glendon Drive from Coldstream Road. All properties along Coldstream Road would be accessed from the north, i.e. Oxbow Drive. With no connection to Glendon Drive, through traffic on Coldstream Road would be eliminated.

- **Alternative 2 Maintain existing underpass, with realignment of Coldstream Road westward.** Under this alternative, the four-leg roundabout is installed and Coldstream Road is realigned to meet Glendon Drive further west. All properties along Coldstream Road would be accessed via the new alignment, and a turnaround would be installed at the north and south ends of the existing Coldstream Road south of the rail underpass.

- **Alternative 3 Improve/widen the rail underpass, with realignment of Coldstream Road westward.** Under this alternative, the four-leg roundabout is installed and Coldstream Road is realigned to meet Glendon Drive further west. All properties along Coldstream Road would be accessed via the new alignment, and a turnaround would be installed at the north and south ends of the existing Coldstream Road south of the rail underpass. The CN Rail structure would be widened to accommodate two lanes of traffic, and active transportation facilities could also be included. Partnership with CN Rail would be required to undertake the improvements.

- **Alternative 4 Improve/Widen the rail underpass without realignment of Coldstream Road.** Under this alternative, the four-leg roundabout is installed and there would be no access to Glendon Drive from Coldstream Road. All existing and future properties along Coldstream Road would be accessed from the north, i.e. Oxbow Drive. With no connection to Glendon Drive, through traffic on Coldstream Road would be eliminated.

- **Alternative 5 Maintain existing rail underpass crossing for pedestrians and cyclists only, and realign Coldstream Road.** Under this alternative, the four-leg roundabout is installed and Coldstream Road would be realigned to provide a connection to Glendon Drive for existing properties and future development. A connection from Glendon Drive through to Oxbow Road at this location would be eliminated. Through traffic on Coldstream Road would be eliminated, and existing and future properties south of the rail underpass would be accessed via a new connection to Glendon Drive westward. The existing underpass would be converted to a multi-use trail crossing.

- **Alternative 6 Close structure crossing for all modes of traffic and realign Coldstream Road.** Under this alternative, the four-leg roundabout is installed and Coldstream Road would be realigned to provide a connection to Glendon Drive for existing properties and future development. Through traffic on Coldstream Road would be eliminated, and existing and future properties south of the rail underpass would be accessed via a new connection to Glendon Drive westward.

11.7.1 Coldstream Road Consultation

In advance of PIC 3, information on the alternatives being considered was provided to property owners along Coldstream Road (letters sent via registered mail March 2017 and October 2017), as well as UTRCA (September 2017). Correspondence is included in **Appendix A.3.5**. Property owners who responded were generally concerned with the options that close the rail underpass to vehicle traffic, noting that the alternative routes would increase travel times, and impede access to destinations such as Firerock Golf Club. Coldstream Road residents who responded who live south of the rail underpass were pleased with the consideration for realigning Coldstream Road and relocating the existing access to Glendon Drive as it would eliminate through traffic and address safety concerns associated with speeds of traffic and sightlines to the existing Vanneck Road intersection.

UTRCA noted concerns with the potential closure of the underpass related to flood events impacting the Coldstream Road bridge crossing over Oxbow Creek north of the rail underpass and noted that more information would be required on the hydraulic capacity of the bridge to determine impacts. In addition, UTRCA noted that consideration should be made for compensation of the footprint of the roadworks to achieve a net environmental gain. UTRCA also requested information regarding the water regime of the wetland feature. During detailed

design, a water balance study should be undertaken to ensure the water balance to the feature is maintained.

Evaluation and Recommendations

The recommended planning solution is **Alternative 2: to maintain the existing underpass and realign Coldstream Road westward.** While improving (widening) the rail structure would also address the identified problems and opportunities, it is not preferred based on capital costs, additional environmental impacts, and the required CN Rail contribution. Improvements to the rail structure should be considered over the long term in coordination with CN Rail. The evaluation of planning solutions is provided in Table 11.1.

Table 11.1 Coldstream Road Planning Solutions Evaluation

Criteria	Alt 1 – Do Nothing – Maintain existing underpass, with no realignment	Alt 2 – Maintain existing underpass, with realignment of Coldstream Road	Alt 3 – Improve/widen the rail structure with realignment of Coldstream Road	Alt 4 – Improve/widen the rail structure without realignment of Coldstream Road	Alt 4 – Maintain structure crossing for pedestrians and cyclists only	Alt 5 – Close structure crossing for all modes of traffic
Social • **Property Access (existing and future)** • **Official Plan/Secondary Plan Policies** • **Access to major corridors** • **Property Impacts/ Acquisition** • **Community Impacts (noise, traffic, etc.)** • **EMS/Fire Services** • **Impacts to Student Transportation** • **Municipal services: garbage collection, snow removal, etc.** • **Recreational Impacts/ Opportunities** • **Public safety**	• Existing residences can only be accessed from the north (i.e. Oxbow Drive); no suitable access to future development lands from Glendon Drive; • Does not meet policy objective within OP for providing property access through local roads; • No access to Glendon Drive via Coldstream Road; through traffic and local trips diverted to Komoka Road in the west or Nairn Road/Gainsborough Road to the east. • No property acquisition beyond planned roundabout; • Through traffic on Coldstream Road eliminated – i.e. less traffic, reduces	• No change to existing property access; access to Glendon Drive provided via realignment. • Property acquisition required through future development lands for realignment to Glendon Drive; Can be incorporated into site layout (i.e. internal road/access required for future development land); • Meets policy objectives by directing property access to local roads (i.e. Coldstream Road realignment); • Reduced traffic volume on existing residential stretch of Coldstream Road;	• No change to existing property access; access to Glendon Drive provided via realignment. • Potential temporary/permanent property acquisition required to accommodate rail structure improvements; • Property acquisition required through future development lands for realignment to Glendon Drive; Can be incorporated into site layout (i.e. internal road/access required for future development land); • Meets policy objectives by directing property access to local roads (i.e. Coldstream Road realignment);	• Existing residences can only be accessed from the north (i.e. Oxbow Drive); • No access to Glendon Drive via Coldstream Road. • Potential temporary/permanent property acquisition required to accommodate rail structure improvements; • Does not meet policy objective within OP for providing property access through local roads; • Through traffic on Coldstream Road eliminated – i.e. less traffic, reduces existing concerns with speeds and volumes of traffic; • Increase in emergency response times – Coldstream Road is a	• Properties north of the rail underpass would be accessed via Oxbow Drive; properties south of the rail underpass would be accessed via new alignment to Glendon Drive further west; • Property acquisition required through future development lands for realignment to Glendon Drive; • Meets policy objectives by directing property access to local roads (i.e. Coldstream Road realignment); • Increase in emergency response times – Coldstream Road is a main access road	• Properties north of the rail underpass would be accessed via Oxbow Drive; properties south of the rail underpass would be accessed via new alignment to Glendon Drive further west; • Property acquisition required through future development lands for realignment to Glendon Drive; • Meets policy objectives by directing property access to local roads (i.e. Coldstream Road realignment); • Increase in emergency response times – Coldstream Road is a main access road

Table 11.1 Coldstream Road Planning Solutions Evaluation

Criteria	Alt 1 – Do Nothing – Maintain existing underpass, with no realignment	Alt 2 – Maintain existing underpass, with realignment of Coldstream Road	Alt 3 – Improve/widen the rail structure with realignment of Coldstream Road	Alt 4 – Improve/widen the rail structure without realignment of Coldstream Road	Alt 4 – Maintain structure crossing for pedestrians and cyclists only	Alt 5 – Close structure crossing for all modes of traffic
	existing concerns with speeds and volumes of traffic; • Increase in emergency response times – Coldstream Road is a main access road from Coldstream Fire Station; • Impacts existing school bus routes – school busses currently access via Glendon Drive, and cannot pass under rail underpass; • Impacts existing garbage pickups – trucks currently access via Glendon Drive and do not pass under underpass; • Limited opportunities to incorporate recreational amenities/facilities	• No impact to existing EMS/Fire services. • No change to garbage pick-up routes (garbage trucks currently turn around in last driveway before underpass). Opportunity to incorporate appropriate turnarounds; • Ability to incorporate active transportation/ recreation amenities along Coldstream Road realignment; • Opportunity to improve existing road radii and sightlines at the rail underpass; • Potential for increased speeds due to unobstructed	• Reduced traffic volume on existing residential stretch of Coldstream Road; • No impacts to existing EMS/Fire services. • Upgraded design may facilitate school bus access; • Upgraded design may facilitate access for garbage pick-up; • Ability to incorporate active transportation/ recreation amenities along Coldstream Road realignment; • Opportunity to improve existing road radii and sightlines at the rail underpass; • Potential for increased speeds due to unobstructed views at the rail underpass, however speed reduction measures can be incorporated to transition from	main access road from Coldstream Fire Station; • Impacts existing school bus routes – school busses currently access via Glendon Drive, and cannot pass under rail underpass; • Impacts existing garbage pickups – trucks currently access via Glendon Drive and do not pass under underpass; • Limited opportunities to incorporate recreational amenities/facilities along the existing Coldstream Road corridor; • Eliminates majority of traffic on Coldstream Road, which reduces safety concerns associated with	from Coldstream Fire Station; • No impact to existing bus routes- buses are not able to use the underpass; • No impact to garbage truck routes – trucks are unable to use the underpass; • Underpass structure to be converted to multi-use pathway crossing, in line with future trails identified in the Middlesex Centre OP; • Eliminates safety concerns for vehicles at the underpass due to the poor sightlines and curve radii. • Eliminates through traffic along the	from Coldstream Fire Station; • No impact to existing bus routes – buses are unable to use the underpass; • No impact to garbage truck routes – trucks are unable to use the underpass; • No access for pedestrians/cyclists is provided; • Eliminates safety concerns for vehicles at the underpass due to the poor sightlines and curve radii. • Eliminates through traffic along the corridor, reducing traffic volumes, addresses conflicts and poor site lines for residents' driveways, and

Table 11.1 Coldstream Road Planning Solutions Evaluation

Criteria	Alt 1 – Do Nothing – Maintain existing underpass, with no realignment	Alt 2 – Maintain existing underpass, with realignment of Coldstream Road	Alt 3 – Improve/widen the rail structure with realignment of Coldstream Road	Alt 4 – Improve/widen the rail structure without realignment of Coldstream Road	Alt 4 – Maintain structure crossing for pedestrians and cyclists only	Alt 5 – Close structure crossing for all modes of traffic
	along the existing Coldstream Road corridor; • Eliminates majority of traffic on Coldstream Road, which reduces safety concerns associated with speeds and volumes of traffic; does not address road radii.	views at the rail underpass, however speed reduction measures can be incorporated to transition from rural area to community area (including future developments along Coldstream and Glendon Drive).	rural area to community area (including future developments along Coldstream and Glendon Drive)	speeds and volumes of traffic;	corridor, reducing traffic volumes, addresses conflicts and poor site lines for residents' driveways, and improved conditions for pedestrians, cyclists, residents.	improved conditions for pedestrians, cyclists, residents.
Natural • **Impacts to terrestrial/aquatic features, species at risk, etc.** • **Climate Change impacts**	• Least impact to natural features as no physical improvements undertaken. • Increase in travel times for access to Glendon Drive for trips originating on Coldstream Road, resulting in minor increase in CO2 emissions.	• Impacts associated with construction of Coldstream Road realignment, including 1 water crossing. Can be mitigated through standard construction mitigation. • Potential impacts to wetland area – can be mitigated or avoided through road realignment design and	• Potential for significant impacts to natural features beyond the Coldstream Road study area with construction of rail track diversion. • Impacts associated with construction of Coldstream Road realignment, including 1 water crossing. Can be mitigated through standard construction mitigation.	• Potential for significant impacts to natural features beyond the Coldstream Road study area with construction of track diversion.	• Least overall impact with limited construction required. • Impacts associated with construction of Coldstream Road realignment, including 1 water crossing. Can be mitigated through standard construction mitigation. • Potential impacts to wetland area – can be mitigated or	• Least overall impact with limited construction required. • Impacts associated with construction of Coldstream Road alignment, including 1 water crossing. Can be mitigated through standard construction mitigation. • Potential impacts to wetland area – can be mitigated or

Table 11.1 Coldstream Road Planning Solutions Evaluation

Criteria	Alt 1 – Do Nothing – Maintain existing underpass, with no realignment	Alt 2 – Maintain existing underpass, with realignment of Coldstream Road	Alt 3 – Improve/widen the rail structure with realignment of Coldstream Road	Alt 4 – Improve/widen the rail structure without realignment of Coldstream Road	Alt 4 – Maintain structure crossing for pedestrians and cyclists only	Alt 5 – Close structure crossing for all modes of traffic
		construction mitigation.	• Potential impacts to wetland area – can be mitigated or avoided through road realignment and construction mitigation.		avoided through road realignment and construction mitigation.	avoided through road realignment and construction mitigation.
Technical/Engineering • **Impacts to traffic patterns** • **Impacts to travel times** • **Geometry/curve radii** • **Sight lines** • **Speed patterns**	• Through traffic eliminated with no access to Glendon Drive; • Existing through traffic (less than 1000 vehicles a day) diverted to alternate routes including Komoka Road, Nairn Road/Gainsborough Road; minimal impact on adjacent road network; • Increase in travel times for trips originating on Coldstream Road; potential for minor increase in travel times for non-local	• No impact to existing traffic patterns. Through traffic can continue to use the corridor for access to Glendon Drive, which would be provided at Springfield Way via a controlled intersection; • No significant impact to travel times; • Significantly improves sightlines and curve radii at the rail underpass. • Potential for increased speeds due to new	• No impact to existing traffic patterns. Through traffic will continue to use the corridor for access to Glendon Drive; • No impacts to existing travel times; • No impact to existing road geometry/radii; • Some improvement to sight lines; • No improvement to existing speed patterns; potential to increase speeds due to unimpeded, two-way traffic through the underpass.	• Through traffic eliminated with no access to Glendon Drive; • Existing through traffic (less than 1000 vehicles a day) diverted to alternate routes including Komoka Road, Nairn Road/Gainsborough Road; minimal impact on adjacent road network; • Increase in travel times for trips originating on Coldstream Road; potential for minor increase in travel times for non-local	• Through traffic eliminated with no access to Glendon Drive; • Existing through traffic (less than 1000 vehicles a day) diverted to alternate routes including Komoka Road, Nairn Road/Gainsborough Road; minimal impact on adjacent road network; • Increase in travel times for trips originating on Coldstream Road; potential for minor increase in travel times for non-local	• Through traffic directed to Komoka Road to the west, or Nairn Road/Gainsborough Road in the east. • Increase in travel times for trips originating at Coldstream Road/Oxbow Drive (~5 min to southwest London) • Eliminates curve, radii, and sight line concerns for vehicles; • Reduces speed patterns with the removal of through traffic - local resident traffic only

Table 11.1 Coldstream Road Planning Solutions Evaluation

Criteria	Alt 1 – Do Nothing – Maintain existing underpass, with no realignment	Alt 2 – Maintain existing underpass, with realignment of Coldstream Road	Alt 3 – Improve/widen the rail structure with realignment of Coldstream Road	Alt 4 – Improve/widen the rail structure without realignment of Coldstream Road	Alt 4 – Maintain structure crossing for pedestrians and cyclists only	Alt 5 – Close structure crossing for all modes of traffic
	trips not originating on Coldstream Road; • No improvement to road geometry/radii; • No improvement to existing sightlines at the rail underpass; • No impacts to speed patterns	alignment and unobstructed sight lines, however speed mitigation can be incorporated to enhance the transition from rural to community areas.		trips not originating on Coldstream Road; • Potential improvements to road geometry/radii/ and sightlines with design of the underpass.	trips not originating on Coldstream Road; • Eliminates curve, radii, and sight line concerns for vehicles; • Reduces speed patterns with the removal of through traffic - local resident traffic only	
Economic • **Capital Costs** • **Operations and Maintenance Costs**	• Least capital costs as no physical improvements undertaken; • No change to operations and maintenance costs.	• Capital costs associated with Coldstream Road realignment; • Additional operations and maintenance costs associated with new roadway connection to Glendon Drive; however minimal increase in cost over existing proposed Coldstream Road alignment.	• Significant capital costs in excess of $5M for rail structure improvements. • Potential increase in operations and maintenance costs for new structure • Additional operations and maintenance costs associated with new roadway connection to Glendon Drive.	• Significant capital costs in excess of $5M for rail structure improvements. • Potential increase in operations and maintenance costs for new structure.	• Minimal capital costs associated with closing underpass – construction of turnarounds may be required. • Capital costs associated with connection to Glendon Drive for existing residences. • Additional operations and maintenance costs associated with new roadway	• Minimal capital costs associated with closing underpass – construction of turnarounds may be required. • Additional operations and maintenance costs associated with new roadway connection to Glendon Drive.

Table 11.1 Coldstream Road Planning Solutions Evaluation

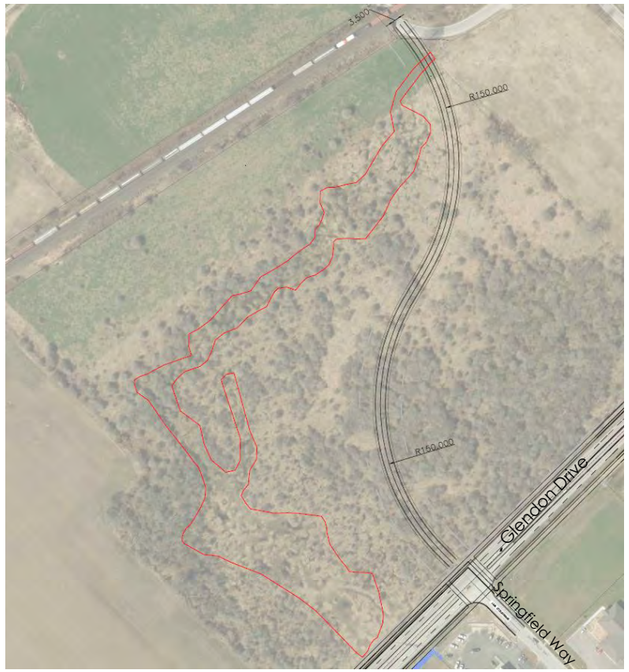
Criteria	Alt 1 – Do Nothing – Maintain existing underpass, with no realignment	Alt 2 – Maintain existing underpass, with realignment of Coldstream Road	Alt 3 – Improve/widen the rail structure with realignment of Coldstream Road	Alt 4 – Improve/widen the rail structure without realignment of Coldstream Road	Alt 4 – Maintain structure crossing for pedestrians and cyclists only	Alt 5 – Close structure crossing for all modes of traffic
					connection to Glendon Drive.	

11.8 COLDSTREAM ROAD DESIGN ALTERNATIVES AND RECOMMENDATIONS

Considering the existing environmental conditions including wetland feature, future land uses, and technical components such as sightlines, road geometry, and intersection spacing along Glendon Drive, a number of designs were identified for the recommended planning solution. Realignment options were restricted to intersecting with Glendon Drive at Springfield Way and Crestview Drive (future access to Kilworth Heights West subdivision) in order to reduce the frequency of road accesses along the corridor, consistent with County and Municipal policy.

Alternative designs are identified on Figure 11.5 and the evaluation of designs is included on Table 11.2.

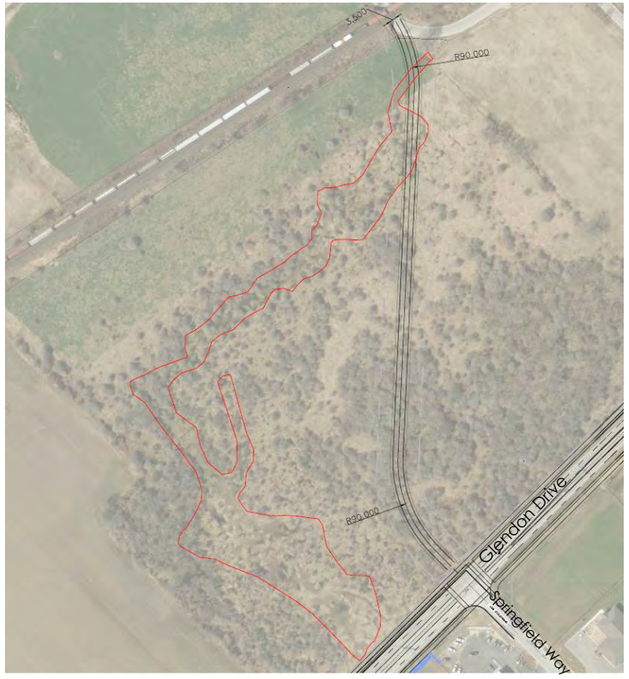
Alternative Design 2 is identified as the recommended design. This alignment improves the existing sightlines at the rail underpass, provides an appropriate connection to the future development lands, and overall provides the most efficient network connection to Glendon Drive for through traffic, trips generated by future commercial development, and existing Coldstream Road properties. This realignment is consistent with the policies of the Middlesex Centre Official Plan and Komoka-Kilworth Secondary Plan which directs property access away from Arterial Roads (i.e. Glendon Drive).



Alternative Design 1

Alternative Design 2

Alternative Design 3



Alternative Design 4

Alternative Design 4

Glendon Drive
paving the way for an active community

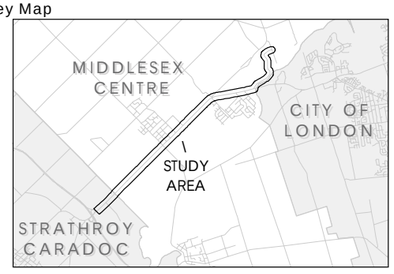
middlesex centre
in the centre of it all

middlesex county

Legend

Wetland (Delineated Aug 2017)

Key Map



Notes

1. Coordinate System: NAD 1983 UTM Zone 17N
2. Base features produced under license with the Ontario Ministry of Natural Resources © Queen's Printer for Ontario, 2016.
3. Orthoimagery © First Base Solutions, 2016

December 2016

Stantec

Figure No. **11.5**

Coldstream Road Realignment Designs

Table 11.2 Coldstream Road Design Alternatives Review

Criteria	Alternative Design 1	Alternative Design 2	Alternative Design 3	Alternative Design 4	Alternative Design 5
Social • **Access to future development lands and site layout** • **Consistent with Official Plan/Secondary Plan Policies** • **Property Impacts/ Acquisition** • **Public safety**	• Future development lands accessed via existing Coldstream Road; less direct access from Glendon Drive; • Consistent with OP/SP policies by directing property access to local roads as opposed to Glendon Drive; encourages orientation toward Glendon Drive, with interior parking. • Approximately 12,695m2 of property acquisition required; • Improves safety conditions along existing Coldstream Road alignment, and provides appropriate connection to Glendon Drive at Springfield Way.	• Provides easy connection to future development lands via east/west connection; access can be provided via a T intersection with connection to existing Coldstream Road; Most direct access from Glendon Drve; • Consistent with OP/SP policies by directing property access to local roads as opposed to Glendon Drive; encourages orientation toward Glendon Drive, with interior parking. • Approximately 10,200m2 of property acquisition required; • Curve radii/stop condition can contribute to speed control and road safety • Improves safety conditions along existing Coldstream Road alignment, and provides appropriate connection to Glendon Drive at Springfield Way.	• Access to future development land would be provided via the existing Coldstream Road alignment; less direct access from Glendon Drive; • Consistent with OP/SP policies by directing property access to local roads as opposed to Glendon Drive; encourages orientation toward Glendon Drive, with interior parking. • Approximately 27,220m2 of property acquisition required; • No improvement to public safety with poor sightlines at the rail underpass and tight curve radii;	• Access to future development lands would be provided via the existing Coldstream Road; less direct access from Glendon Drive; • Consistent with OP/SP policies by directing property access to local roads as opposed to Glendon Drive; encourages orientation toward Glendon Drive, with interior parking. • Approximately 12,120m2 of property required; • Some improvement to sightlines and curve radii at the rail underpass, road geometry likely to contribute to high speeds.	• Access to future development lands would be provided via the existing Coldstream Road alignment; less direct access from Glendon Drive. • Consistent with OP/SP policies by directing property access to local roads as opposed to Glendon Drive; encourages orientation toward Glendon Drive, with interior parking. • Approximately 17,200m2 of property acquisition required; • No improvement to public safety with poor sightlines at the rail underpass and tight curve radii.

Table 11.2 Coldstream Road Design Alternatives Review

Criteria	Alternative Design 1	Alternative Design 2	Alternative Design 3	Alternative Design 4	Alternative Design 5
Natural • **Impacts to identified wetland area and water crossing;** • **Overall environmental impact;** • **Climate Change impacts**	• 1 water/wetland crossing immediately south of existing culvert crossing; • 12,695m2 overall roadway footprint	• 1 water/wetland crossing immediately south of existing culvert crossing; • 10,200 m2 overall roadway footprint	• No water/wetland crossing • 27,220 m2 overall footprint (MEGM3 community and cultivated agricultural fields)	• 1 water crossing, and encroaches into wetland area. • 12,120 m2 overall footprint	• 1 water/wetland crossing • 17,200 m2 overall footprint
Technical/Engineering • **Road geometry** • **Sightlines** • **Speed patterns** • **Rail Considerations**	• Challenging superelevation due to curve approaching Springfield Way; • Improves sightlines through rail underpass; • Potential for increases in speed due to unobstructed views and wider turn radii;	• Improves existing sight lines; • Potential for increased speeds due to unobstructed views approaching rail tunnel; Speed mitigated through curve radii/potential stop conditions; provides transition from rural to urban area along Glendon Drive	• Tight curve radii and poor sightlines – no improvement over existing Coldstream Road alignment; • Potential rail setback impacts.	• Challenging superelevation due to curve approaching Springfield Way; • Minor improvement to sightlines at the rail bridge. • Potential for increases in speed due to unobstructed views and wider turn radii;	• Tight curve radii and poor sightlines – no improvement over existing Coldstream Road alignment; • Potential rail setback impacts. • Speed control provided by tight curve radii/potential stop condition.
Economic • **Capital Costs** • **Operations and Maintenance Costs**	• $$ • Operations and maintenance costs consistent across alternatives	• $$$ • Operations and maintenance costs consistent across alternatives	• $$$$$ • Operations and maintenance costs consistent across alternatives	• $$ • Operations and maintenance costs consistent across alternatives	• $$$ • Operations and maintenance costs consistent across alternatives

11.9 '5-CORNERS' – PRELIMINARY RECOMMENDATIONS

Installing a four-leg roundabout and realigning Coldstream Road is preferred over the five-leg roundabout. This recommendation addresses the geometric and safety concerns along Coldstream Road, the geometric conditions at the roundabout in terms of operations and safety, and provides access to future development lands in accordance with the Middlesex Centre Official Plan and Komoka-Kilworth Secondary Plan. While the combined four leg roundabout and realignment of Coldstream Road represent a higher capital cost solution, with a greater impact footprint, it will result in a greater overall improvement to the traffic operations in the area that will be increasingly more important as development occurs and traffic volumes increase.

12.0 OLD RIVER ROAD INTERSECTION WITH GLENDON DRIVE

It was identified during Phase 2 of the Class EA process that alternatives should be investigated for addressing the safety concerns and operational issues at the intersection of Old River Road and Glendon Drive. The opportunity was also identified to potentially incorporate improvements identified in the Class EA conducted in 2011 to address the slope stability, erosion, and flooding concerns. As some alternatives identified impacted all residents along Old River Road, letters were hand delivered to residents along Old River Road (June 9th, 2016) to invite them to attend PIC 2 (June 27th, 2016) in order to review and provide input on the alternatives initially being considered and preliminary recommendations. Alternatives presented at PIC 2 are discussed in Section 9.3.4 above.

While there was general agreement over the need to address the concerns at the Old River Road intersection and along Old River Road, the majority of residents were not in favour of the proposed cul-de-sacs to eliminate the large amount of through traffic. Issues identified by the residents specific to the Old River Road corridor include:

- **Traffic volumes and speeds along the Old River Road corridor (i.e. non-local through traffic):** it was suggested that through traffic is not only a major contributor to the collision frequency at the intersection with Glendon Drive, but high vehicle speeds and the nature of the roadway often causes cars to lose control and veer off into the roadside ditches or private yards. Residents are also concerned over safety conditions for children and pedestrians along the corridor from the high vehicle speeds and restricted sightlines along the corridor. Residents stated that the roadway has also been deemed unsafe by the local school boards, and bus service is not available.

- **Sightlines at the intersection with Glendon Drive:** The intersection geometry, proximity to the Thames River bridge, and the existing railing on the bridge create a feeling of very poor sightlines for vehicles exiting Old River Road.

- **Winter roadway conditions and the steep grade raise:** Many residents noted that the steep road grade in the middle/upper portions of Old River Road make it difficult to traverse the hill during poor road conditions. Residents expressed concern about EMS/Fire access during winter road conditions.

The preliminary recommendation presented for public review and comment (Section **9.3.4**) included the creation of two cul de sacs, where properties to the north would be accessed via Vanneck Road/Pulham Road and residents to the south/west of the cul de sacs would be accessed via Glendon Drive, with a designated left turn lane and right turn taper on Glendon Drive and a realigned intersection to improve sightlines and reduce conflicts on Glendon Drive. With respect to cul de sacs presented at PIC 2, the following comments were received:

- Sightlines at the intersection could be improved by cutting the existing railing on the Thames River Bridge;
- Speed bumps/traffic calming measures could reduce the volume of cut-through traffic and send them westward to the 5-corners intersection.
- The preliminary recommendations will require a lot of construction, property acquisition, and will upset some residents;
- During poor road conditions, a number of residents may not be able to traverse the hill, particularly with the placement of the cul de sacs, and with the proposed cul de sacs, will not have the option of heading south to Glendon Drive. The same concerns exist for EMS/Fire vehicles who may not be able to traverse the hill.
- The CP and CN railways, which cross Pulham Road just north of Old River Road, are very busy tracks, and cause significant delays through the day for traffic accessing Old River Road from Pulham/Vanneck Road. Residents are concerned over response times for emergency services if this access is the only access to some of the properties along Old River Road (i.e. emergency services would be delayed by railway operations, and would not have a secondary access from Glendon Drive), or during emergency situations such as a train derailment.
- Flooding in the lower section does not occur often.
- Private gates/controlled access could be installed at either end to allow resident/guest access but prevent through traffic.
- Constructing cul de sacs would eliminate through traffic and improve safety conditions along the corridor.

Old River Road Community Group

Old River Road Intersection with Glendon Drive
August 3, 2018

A letter dated August 12, 2016 was received by the project team from the law firm of Patton Cormier Ferreira, on behalf of 16 residents of Old River Road. The letter expressed the residents' concern over the proposed cul de sac alternative, and concerns over the adequacy of consultation undertaken thus far with respect to Old River Road residents as part of the Glendon Drive Class EA. A response was forwarded by the project team, which reiterated the intent of the Notice (June 9th, 2016) and PIC (June 27th, 2016), which was to make residents aware of the project, the alternatives being considered, and to provide a forum to discuss potential impacts and local sensitivities from residents themselves. A meeting was scheduled with residents of Old River Road for Thursday September 29th, 2016 at the Komoka Wellness and Recreation Centre from 6:00-8:00pm. Correspondence was received from Patton, Cormier, Ferreira Lawyers, dated September 26th requesting that the meeting be postponed to provide residents additional time to prepare for attendance at the meeting. Notification that the meeting was rescheduled to Thursday October 27th at the Komoka Wellness and Recreation Centre was couriered to all Old River Road residents on September 27thth, 2016.

A community group was initiated by Old River Road residents and included the majority of Old River Road landowners (approximately 18 properties). A package was delivered to the Stantec offices on October 25th, 2016 that contained the following (refer to **Appendix A.3.3**):

- A cover letter detailing the formation of the group and concerns with the preliminary recommendations presented at PIC 2.
- A report prepared by F.R. Berry & Associates, Transportation Planning Consultants which outlined a number of considerations including traffic calming measures and recommended a right in, right out configuration for the intersection of Glendon Drive and Old River Road.
- The report was accompanied by a sketch showing a right-in, right-out intersection, with a right turn/acceleration lane/merge lane onto Glendon Drive. The sketch and accompanying F. Berry report represented the community group's preferred intersection and corridor configuration.

A meeting was held with representatives of the Old River Road community group on October 25th 2016 to discuss the contents of the report, and to better understand residents' concerns. Based on the information provided to the project team, the meeting scheduled for October 27th was postponed to allow the project team time to properly review and address the information provided.

Through conversation with residents at PIC 2 and representatives of the Old River Road community group between October-November 2016, it was confirmed that the primary concerns associated with the preliminary recommendations brought forward at PIC 2 (2 cul de sacs along Old River Road to restrict through traffic) were identified as follows:

- Winter road conditions – During inclement winter weather events, residents located on or near the bottom of the hill are often not able to traverse the steep grade raise, and are forced to head south/west to exist via Glendon Drive. Should the cul de sacs be introduced as per the preliminary recommendations, there would be no alternate egress for properties located north of the cul de sac.

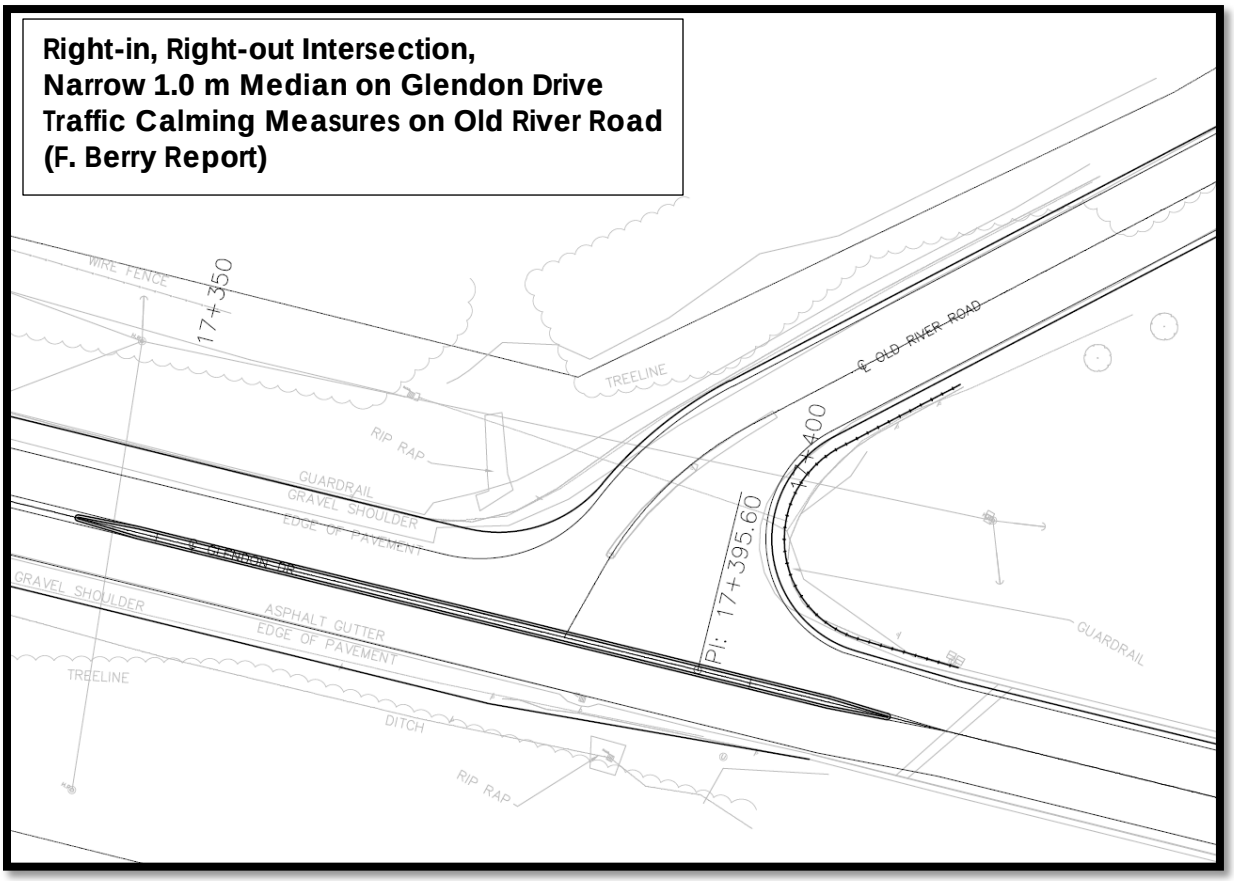
- Increased travel times – For trips originating north of the cul de sacs, travel times for trips heading south east (City of London, Delaware, etc.) would be required to head west to the intersection of Vanneck Road and Glendon Drive. Similarly, travel times for trips originating south of the cul de sacs heading north east would be required to travel via Glendon Drive to Vanneck Road.

12.1.1 Revised Old River Road Alternatives

Following consultation with the public and representatives of the Old River Road community group, the study team assessed the concepts put forward by the community group along with developing additional options to address the identified issues. The options are described below.

Old River Road Intersection with Glendon Drive
August 3, 2018

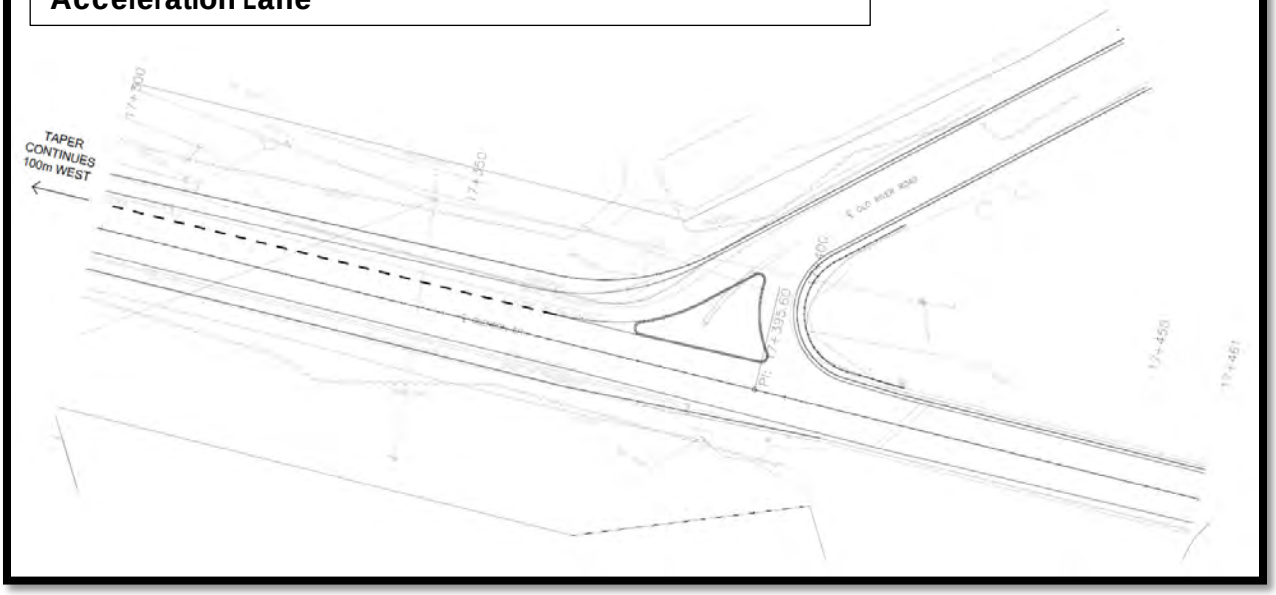
Revised Alternatives



This alternative was proposed within the F. Berry report commissioned by the Old River Road community group. It involves maintaining the intersection in its existing location and creating a right-in, right-out intersection with the construction of a 1.0 metre median along Glendon Drive. Properties would be accessed via Glendon Drive westbound for vehicles coming from the east, or alternatively via Vanneck Road for vehicles coming from the west. All vehicles heading east from Old River Road would be directed to the proposed Vanneck Road/Glendon Drive roundabout or alternatively to Gainsborough Road. The impacts associated with this option include poor visibility of the narrow median in a rural setting with higher vehicle speeds, poor compliance for left turn movements both to and from Old River Road, and poor sightlines to the east. The potential also exists for disruption to through traffic and safety risks on Glendon Drive due to anticipated U-turn attempts for vehicles wishing to head east on Glendon Drive and not willing to drive the 3km round trip to the proposed roundabout at the Jefferies Road/Vanneck Road intersection.

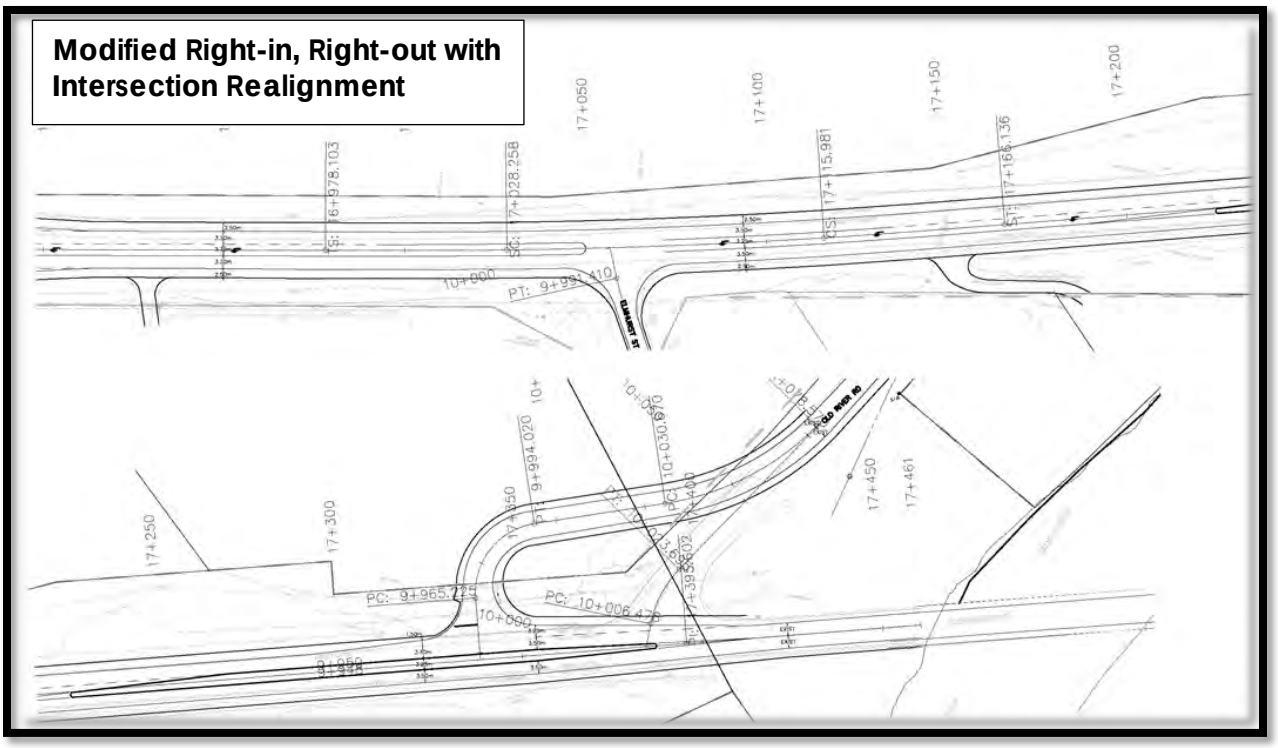
Old River Road Intersection with Glendon Drive
August 3, 2018

Right-in, Right-out Intersection, with Porkchop Island and Acceleration Lane



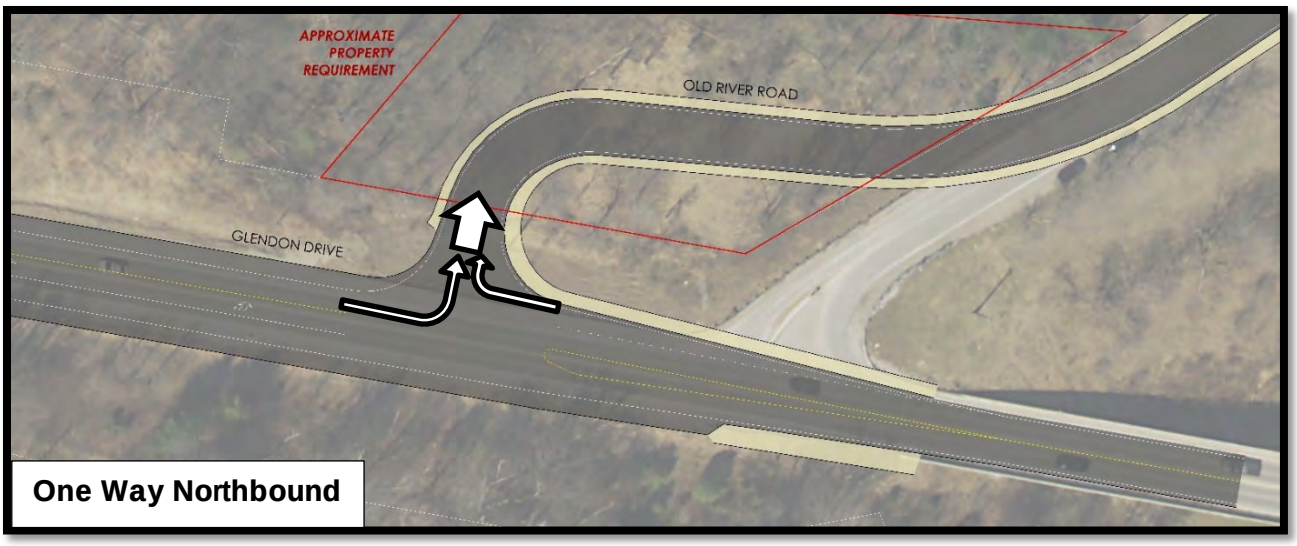
This alternative was developed based on a sketch provided by the Old River Road community group. It involves a modification of the existing intersection to a right-in, right-out configuration by constructing a 'porkchop'/diverter island. Traffic heading south/west on Old River Road would merge with Glendon Drive via an acceleration/taper lane on Glendon Drive. Properties would be accessed via Glendon Drive westbound for vehicles coming from the east, or alternatively via Vanneck Road/Pulham Road for vehicles coming from the west. All vehicles heading east (toward London) from Old River Road would be directed to the proposed Vanneck Road/Glendon Drive roundabout intersection to access Glendon Drive eastbound, or alternatively to Gainsborough Road via Vanneck Road. Impacts associated with this alternative include poor compliance for left turn movements both to and from Old River Road, severity of non-compliances due to the free flow/yield condition, and poor sightlines to the east. The potential also exists for disruption to through traffic and safety risks on Glendon Drive due to anticipated illegal U-turn attempts for vehicles wishing to head east on Glendon Drive.

Old River Road Intersection with Glendon Drive
August 3, 2018



This alternative represents a modification/amalgamation of options in an attempt to address the technical shortcomings of the previous right-in, right-out alternatives. The intersection of Glendon Drive and Old River Road is realigned westward to improve sightlines to the Thames River Bridge and a 3.25 metre median is constructed to prohibit left turns to and from Glendon Drive. The median transitions to a left turn lane on Glendon Drive in order to improve access to private driveways and Elmhurst Drive. Properties on Old River Road would be accessed via Glendon Drive westbound for vehicles coming from the east, or alternatively via Vanneck Road/Pulham Road for vehicles coming from the west. All vehicles heading east (toward London) from Old River Road would be directed to the proposed Vanneck Road/Glendon Drive roundabout to turn around or alternatively to Gainsborough Road via Vanneck Road. The potential also exists for disruption to through traffic and safety risks on Glendon Drive due to anticipated illegal unsafe U-turn attempts for vehicles wishing to head east on Glendon Drive. Signing for no U-turns can be installed where they are not safe due to sightlines, but poor compliance is anticipated to be an issue based on historical observance.

Old River Road Intersection with Glendon Drive
August 3, 2018



This alternative involves the reclassification of Old River Road as a one-way street heading northbound to reduce the volume of through traffic at the intersection and eliminate the left turn onto Glendon Drive as the highest historical collision movement. All property owners along Old River Road would access their properties via Glendon Drive, and exist via Pulham Road/Vanneck Road. The intersection would be realigned westward to provide a right turn taper and a left turn lane on Glendon Drive. Benefits of the alternative include the elimination of left out condition, the ability to provide a left turn lane and right turn taper on Glendon Drive, and the option reduces a portion of through traffic (southbound traffic wishing to use Old River Road will be redirected to the Jefferies Road/Vanneck Road intersection. Non-compliance is a potential concern with this alternative, which would pose a greater risk due to the road curvature and sightlines.

One Way Southbound

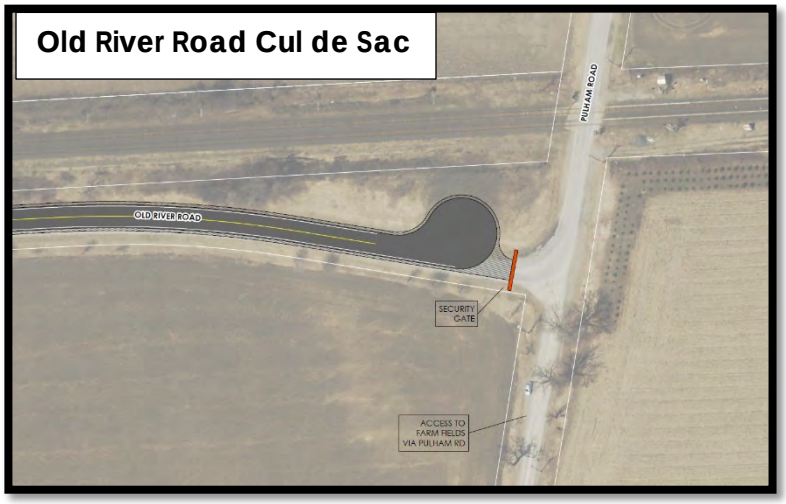
This alternative involves eliminating all turns onto Old River Road from Glendon Drive, resulting in a one-way southbound road approaching the intersection. All Old River Road residents would access their properties via Vanneck Road and Pulham Road. All traffic, local and through traffic, would exit via the Glendon Drive intersection. Realignment of the intersection westward would be considered as part of this alternative in order to improve sightlines and intersection geometry for left and right turns. This alternative has the benefit of reducing right turns from Glendon Drive, non-compliant left-turning vehicles, and a portion of non-local through traffic along Old River Road; however, non-local southbound traffic still represents a significant percentage of traffic exiting the intersection and turning onto Glendon Drive, and does not significantly reduce the turning movements onto Glendon Drive when compared to other alternatives.

Old River Road Intersection with Glendon Drive
August 3, 2018

This alternative involves the creation of a cul de sac turn around on Pulham Road south of its intersection with Vanneck Road to eliminate through traffic on Old River Road (below left). A secured emergency gate would be installed at the cul de sac, and north of the intersection with Old River Road. This gate would be operated in an emergency situation to provide access to Old River Road from Vanneck Road. All residences on Old River Road and properties on Pulham Road south of its intersection with Old River would be accessed via the Glendon Drive intersection. This alternative was developed as a modification to the original cul de sac alternative presented at PIC 2, to address comments received from residents specific to hill access during poor weather conditions for properties along the hill and emergency response times. Consultation was undertaken with CN Rail staff and the local school bus line to confirm the feasibility of the alternative. The alternative was also forwarded to the representatives of the Old River Road community group, and based on input provided, the location of the cul de sac was moved to Old River Road at its intersection with Pulham Road. This location maintains access to the farm fields off of Pulham Road.

Pulham Road Cul de Sac

Old River Road Cul de Sac



Recommended

12.1.2 Evaluation of Revised Old River Road Alternatives

Evaluation criteria established to assess all options for Old River Road are identified in Table 12.1.

Table 12.1 Old River Road Evaluation Criteria

Environmental Component	Criteria	Description
Social	Property access on Glendon	Impacts to property accesses on Glendon Drive
	Property access on Old River Road and Vanneck Road	Impacts to property access on Old River Road
	Impacts to School Bus Operations	Impacts to school bus operations based on consultation with Student Transportation Services and bus companies
Safety	Intersection sight lines	Impacts to sight lines from the intersection of Glendon Drive and Old River Road to the Thames Bridge in the east and the hill to the west
	Non-compliance	Opportunities for non-compliance
	Intersection collision frequency	Impacts to observed collision patterns at the intersection of Glendon Drive and Old River Road (Left turns onto Glendon Drive being the most frequent), including consequences of non-compliances
	Intersection collision severity	Impact to the severity of collisions, including consequences of non-compliances
	Corridor collision severity	Impacts to collision patterns/potential change in collision patterns along Glendon Drive
	Indirect impacts to local residents	Overall impacts to the Old River Road corridor including safety for pedestrians, cyclists, children, etc.

Environmental Component	Criteria	Description
	EMS/Fire services	Impacts to emergency response times, including during inclement weather events
Natural	Environmental impacts	Impacts to the woodlot/ANSI northwest of the intersection with Old River Road
Technical	General impacts to traffic patterns	Impacts to function and operation of Old River Road, and impacts to surrounding transportation network
	Intersection Operations	Level of service analysis accounting for forecasted traffic volumes
	Intersection geometry	Opportunities to improve existing intersection geometry
	Design standards	Ability to design to standards for turn lanes, tapers, runout, etc.
	Erosion/Bank Stability	Opportunities to address erosion, and bank stability
Economic	Capital and operation costs	Estimated costs associated with construction, and longer term operations/maintenance costs

The qualitative evaluation of alternatives is identified in Table 12.2. For assessment purposes, the alternatives are grouped based on intersection configurations providing Right-In/Right-Out, One Way, and Full Access (includes cul de sac options). Each set of alternatives has advantages and disadvantages.

RIGHT-IN/RIGHT-OUT ALTERNATIVES

A right-in/right-out (RIRO) intersection would reduce approximately half of the through traffic volumes on Old River Road. All RIRO configurations introduce opportunities for non-compliances, which vary in potential collision severity (i.e. introduction for the potential for a head on collisions).

It is recognized that the RIRO alternatives introduce the potential for disruption to the mainstream traffic on Glendon Drive. Based on the observed driver behaviour and turning

movements, vehicles who currently turn left onto Glendon would be forced to turn right towards the proposed roundabout at Vanneck Road and Jefferies Road. It is anticipated that a number of these vehicles would instead choose to attempt a U-turn, either at the Old River Road intersection, at mid-block locations, at private driveways, or local roads off of Glendon Drive, instead of traveling approximately 3km round trip to the proposed roundabout. The sightlines for westbound vehicles making the U-turn and for eastbound vehicles cresting the hill to be able to see and react to the U-turning vehicles is below standard, and introduces a potential hazard. It is felt that the introduction of these maneuvers pose a safety risk to the Glendon Drive corridor.

More specifically, the RIRO with a Narrow Median on Glendon Drive is not recommended due to the poor median visibility in a higher speed, rural setting. Additionally, due to the close proximity of the Thames River Bridge structure, a shorter median will be required which does not meet standard, and could potentially invite non-compliant turns around the median.

The RIRO with the Porkchop and Acceleration lane is not a preferred configuration since non-compliance left turns from Glendon Drive would be an easy maneuver and could result in head-on collisions at higher speeds, due to the free-flow acceleration lane condition.

The Modified RIRO with Realignment of the Intersection westward would improve upon intersection geometrics, sightlines, and severity of collisions resulting from non-compliances at the intersection, but the potential still exists for safety and operational impacts to Glendon Drive traffic due to the high likelihood of U-turn attempts for drivers not wishing to travel to the roundabout at Vanneck Road and Jefferies Road.

ONE WAY ALTERNATIVES

The One-Way (Northbound or Southbound) alternatives would eliminate approximately half of the through traffic on Old River Road, though only the one-way northbound would reduce the highest frequency collision movement (left turns onto Glendon Drive). A consideration with this alternative is that since all properties would exit via Pulham Road/Vanneck Road, this alternative does not address the residents' concerns relating to inclement weather conditions, and all northbound traffic would be subject to frequent and/or extended rail closures.

Both of these alternatives, however, have a higher likelihood of non-compliance, with no physical barriers to prevent wrong way movements (deliberate or accidental). For both alternatives, in order to improve the safety conditions at the intersection with Glendon Drive, consideration would be made for realigning the intersection westward to provide a dedicated left turn lane and right turn taper on Glendon Drive.

FULL ACCESS ALTERNATIVES (Including Cul de Sacs/Gate)

The full access alternatives eliminate all non-local through traffic by constructing cul de sacs. The original cul de sac option presented at PIC 2 was modified in response to the concerns

expressed by residents, including the traversability of the steep crest during severe winter weather events. The revised alternative involving a cul de sac turn around on Pulham Road north of the tracks/on Old River Road at its intersection with Pulham Road meets the objective of reducing the highest frequency collision movement at the intersection with Glendon Drive by eliminating the high volumes of through traffic (on average ~90% of vehicles). Properties south of the CN rail tracks on Pulham Road would be accessed via Glendon Drive. The realignment of the intersection with Glendon Drive will provide dedicated left turn lane and right turn taper on Glendon Drive. While the elimination of through traffic on Old River Road significantly reduces the number of vehicles entering and exiting the intersection, the poor level of service for left turn movements onto Glendon Drive will not be improved (>500 second delays during peak hours) due to the projected increase in traffic along Glendon Drive.

Table 12.2 Evaluation of Alternative Solutions

Options	One Way Intersection (northbound)		One Way Intersection (southbound)		Right in, Right Out Intersection				Full Access Intersection	
Criteria	In Existing Location	With Realigned Intersection	In Existing Location	With Realigned Intersection	Modified 3A Realigned Right In, Right Out Intersection with Wider Median on Glendon Dr.	Median on Glendon, with Intersection in Existing Location (F. Berry)	Porkchop/ Acceleration Lane present location (ORR Safety Committee)	Original Right in, Right out via Porkchop Island (PIC2 Option 2)	PIC 2 Recommendations 4B Full Access from Glendon Dr., Restrict Through-Traffic with Two Cul-de-Sacs	Restrict Through Traffic via Pulham Road/ORR emergency gate, with Realignment of Intersection with Glendon Drive
Social • Property Access on Glendon • Property Access on ORR • Property Acquisition • Impacts to school bus operations	• No impacts to property access along Glendon; • Impacts to egress for a portion of the residents along ORR (south end); all properties accessed via Glendon Drive • No property acquisition required. • No impact to school bus operations (only vans sent to Old River Road)	• No impacts to property access along Glendon; • All properties accessed via Glendon Drive. • Property acquisition required at intersection. • No impact to school bus operations (only vans sent to ORR)	• No impacts to property access along Glendon; • Impacts to egress for a portion of residents along ORR (north end); all properties accessed via Vanneck/ Pulham Road. • No property acquisition required; • No impact to school bus operations (only vans sent to ORR)	• No impacts to property access along Glendon; • Impacts to egress for a portion of residents along ORR (north end); • Property acquisition required at intersection. • No impact to school bus operations (only vans sent to ORR)	• Potential impacts to property access on Glendon Drive; • All properties on Old River Road access via Vanneck/ Pulham Road; • Property acquisition required at intersection. • No impact to school bus operations (only vans sent to ORR)	• No impacts to property access along Glendon; • All properties on ORR accessed via Vanneck/ Pulham Road. • No property acquisition required; • No impact to school bus operations (only vans sent to ORR)	• No impacts to property access along Glendon; • All properties on ORR accessed via Vanneck/ Pulham Road; • Property acquisition required at intersection for acceleration lane; • No impact to school bus operations (only vans sent to ORR)	• No impacts to property access along Glendon; • All properties on ORR accessed via Vanneck/ Pulham Road; • No property acquisition; • No impact to school bus operations (only vans sent to ORR)	• No impacts to property access along Glendon; • Impacts to property access along ORR – northern properties access via Pulham, southern/western properties access from Glendon; • Property acquisition required at intersection and along corridor for cul-de-sacs; • Potential impacts to existing municipal addresses (ORR North and South); • No impact to school bus operations (only vans sent to ORR)	• No impacts to property access on Glendon; • All properties on ORR accessed via Glendon Drive. • Property acquisition required at Glendon Drive intersection for realignment. • No impact to school bus operations (only vans sent to ORR)
Public Safety • Intersection Collision frequency (Left turns onto Glendon Drive being the most frequent); • Intersection Collision severity; • Corridor Collision Frequency; • Corridor Collision Severity	• Removes left turn movements onto Glendon Drive; • Removes existing left turn restriction and introduces safety concerns for left turn movements onto ORR and for through traffic on Glendon; a left turn lane runout cannot be provided due to proximity to bridge structure.	• Removes left turn movements onto Glendon Drive; • Provides a dedicated lane for left turns onto ORR with left turn lane and turn lane runout; • Provides right turn taper on Glendon to benefit right turn movements; • Lower collision frequency, with high potential for non-compliances.	• Removes approximately half of left turn movements onto Glendon Drive; • Potentially reduces collision frequency by approximately 50%; • High potential for non-compliance; • Maintains poor sightlines to the east for left turns	• Removes approximately half of left turn movements onto Glendon Drive; • Potentially reduces collision frequency by approximately 50%; potential for greater improvement to collision frequency through improvement to sightlines to	• Physically restricts left turn movements onto Glendon via a wider median; • Potential for non compliance and u-turns on Glendon Drive, but mitigated by extending median further from the intersection. • Lower collision frequency, lower severity	• Physically restricts left turn movement onto Glendon; however median length does not meet general best practices (due to proximity to the bridge) to prevent non-compliance – i.e. greater potential for non-compliance. • Lower collision frequency,	• Restricts left turn movements onto Glendon; however, geometry permits high potential for non-compliance left turn movements; • Potential for greater severity collisions caused by non-compliances with free flow right turn	• Restricts left turn movements onto Glendon; however, geometry permits highest potential for non-compliance left turn movements; • Similar potential for collisions caused by non-compliance in relation to other two RIRO options, but not	• Improves safety conditions for left hand turns onto Glendon (significantly reduces turning volumes, improves sightlines, with minimal left turn runout) • Lower collision frequency, no change to severity; • Less opportunity for non-compliance, since all	• Significantly reduces collision frequency at Glendon Drive intersection. • Potential to reduce collision frequency along the Glendon Drive corridor through left turn lane and right turn taper. • “No Exit” signage required at intersection to inform through traffic. Potential for non compliances, resulting in vehicles

Table 12.2 Evaluation of Alternative Solutions

Options	One Way Intersection (northbound)		One Way Intersection (southbound)		Right in, Right Out Intersection				Full Access Intersection	
Criteria	In Existing Location	With Realigned Intersection	In Existing Location	With Realigned Intersection	Modified 3A Realigned Right In, Right Out Intersection with Wider Median on Glendon Dr.	Median on Glendon, with Intersection in Existing Location (F. Berry)	Porkchop/ Acceleration Lane present location (ORR Safety Committee)	Original Right in, Right out via Porkchop Island (PIC2 Option 2)	PIC 2 Recommendations 4B Full Access from Glendon Dr., Restrict Through-Traffic with Two Cul-de-Sacs	Restrict Through Traffic via Pulham Road/ORR emergency gate, with Realignment of Intersection with Glendon Drive
• Opportunities for Non-Compliance; • Intersection Sight lines; • Indirect impacts to local residents (pedestrians, cyclists, children, etc.) • EMS/Fire Services	• Lower collision frequency without the left turns from ORR but increased potential for collisions due to left turns to ORR without a left turn lane, with high potential for non-compliances. • Removes turning movements associated with existing poor sightlines. • Reduction in portion of through-traffic due to one-way traffic (approx. 50%). • Does not physically restrict EMS/fire access/ no impacts to response times.	• Removes turning movements associated with existing poor sightlines. • Reduction in portion of through-traffic due to one-way traffic. • Does not physically restrict EMS/Fire access/ no impacts to response times.	onto Glendon Drive; • Does not physically restrict EMS/Fire access/no impacts to response times. •	the east. • High potential for non-compliance. • Does not physically restrict EMS/Fire access/ no impacts to response times.	for right in/right out intersection under stop control (lower severity in relation to free-flow conditions); • Improves sightlines at intersection for right turns due to intersection relocation. • Reduction in portion of through-traffic due to left turn restriction (approximately 50%). • Does not physically restrict EMS/Fire access/ no impacts to response times.	lower severity for right in/right out intersection. Due to substandard median length and potential for non-compliance, introduces additional collision patterns. • Introduces collision risks due to narrow median – visibility hazard. • Potential to introduce u-turn hazards on Glendon Drive. • Existing sightlines conditions maintained (no improvement for right turn movement, removes left turn movement). • Reduction in portion of through-traffic due to left turn restriction (approx.50%.), but high potential for non-compliance. • Does not physically restrict EMS/Fire access/ no impacts to	movements (both left turns from Glendon, and to Glendon). • Sightlines for turning movements improved with dedicated acceleration lane; • Introduces merge location along Glendon (though low volume); • Potential to introduce u-turn hazards on Glendon Drive. • Reduction in portion of through-traffic due to left turn restriction (better compliance anticipated compared to existing signed restriction). • Does not physically restrict EMS/Fire access/ no impacts to response times.	as severe in relation to free flow and median options. • Existing sightlines conditions improved due to left turn restriction (no improvement for right turn movement, removes left turn movement). • Potential to introduce u-turn hazards on Glendon Drive. • Does not physically restrict EMS/Fire access/ no impacts to response times. •	movements permitted; • Improvement to east sightlines with realignment of intersection. West sightlines still meet minimum standard to the speed limit. • Removes through traffic along corridor. • No impact to emergency response times – emergency vehicles typically coming from the west, Emergency access can be maintained between turnarounds via gates.	turning around at Pulham Road. Emergency gate placement to provide adequate space for vehicle and truck turnarounds at ORR and Pulham intersection. • Improves sightlines at Glendon Drive intersection for left and right turns.. • Eliminates through traffic on ORR, reducing collision frequency along the ORR corridor. • Does not restrict EMS/Fire access; no impact to response times.

Table 12.2 Evaluation of Alternative Solutions

Options / Criteria	One Way Intersection (northbound)		One Way Intersection (southbound)		Right in, Right Out Intersection				Full Access Intersection	
	In Existing Location	With Realigned Intersection	In Existing Location	With Realigned Intersection	Modified 3A Realigned Right In, Right Out Intersection with Wider Median on Glendon Dr.	Median on Glendon, with Intersection in Existing Location (F. Berry)	Porkchop/ Acceleration Lane present location (ORR Safety Committee)	Original Right in, Right out via Porkchop Island (PIC2 Option 2)	PIC 2 Recommendations 4B Full Access from Glendon Dr., Restrict Through-Traffic with Two Cul-de-Sacs	Restrict Through Traffic via Pulham Road/ORR emergency gate, with Realignment of Intersection with Glendon Drive
						response times. •				
Natural • Impacts to woodlot/ ANSI; • Climate change impacts (CO2 emissions,	• No impact.	• Some tree/vegetation removal required (edge impacts); mitigation/ compensation to be provided (consultation required with MNRF).	• No impact.	• Some tree/vegetation removal required (edge impacts); mitigation/ compensation to be provided (consultation required with MNRF).	• Some tree/vegetation removal required (edge impacts); mitigation/ compensation to be provided (consultation required with MNRF).	• No impact.	• Some tree/vegetation removal required (edge impacts); mitigation/ compensation to be provided (consultation required with MNRF).	• No impact.	• Greater overall impacts with intersection realignment and grading required for cul-de-sacs. Mitigation/ compensation to be provided.	• Some tree/vegetation removal required (edge impacts); mitigation/ compensation to be provided (consultation required with MNRF).
Technical • General Impacts to Traffic Patterns • Intersection Geometry • Impacts to Glendon Corridor • Design Standards (turn lane taper and runout) • Intersection Operations (LOS) • Erosion/Bank Stability/ Flooding	• Reduces a portion of through traffic on ORR (approx. 50%); • No significant impact to surrounding transportation network. • Potential for disruption to traffic flow along Glendon by permitting left turn movements onto Glendon Drive with no dedicated left turn lane. • Concerns expressed regarding grade traversability during winter months (for properties located on the northern section); • No improvement to intersection geometrics. Conflicts	• Reduces a portion of through traffic on ORR (approx. 50%). • No significant impact to surrounding transportation network. • No impact to traffic flow along Glendon Drive. • Improvement to intersection geometrics and sightlines (to the east); sightlines to the west within standard. • Concerns expressed regarding grade traversability during winter months (for properties located on the northern section); • Acceptable level of service for right turn movements onto Glendon Drive (left turn movements	• Reduces a portion of through traffic on ORR (approx. 50%). • No significant impact to surrounding transportation network. • Potential for impact to Glendon Drive traffic flow with traffic volumes turning right and left onto Glendon Drive; • No improvement to intersection geometrics. • Acceptable LOS for right turns onto Glendon Drive, delays for left turns onto Glendon Drive.	• Reduces a portion of through traffic on ORR (approx. 50%). • No significant impact to surrounding transportation network. • Potential for impact to Glendon Drive traffic flow with traffic volumes turning right and left onto Glendon Drive. • Improvement to intersection geometrics and sightlines (to the east); sightlines to the west within standard. • Acceptable LOS for right turns onto Glendon Drive, delays for left turns onto Glendon Drive.	• Reduces a portion of through traffic on ORR (approx. 50%) intersection); • No significant impact to surrounding transportation network. • Improvement to existing geometry (sightlines); • Stop condition at intersection versus freeflow right turns; • Median length and width more in-line with design standards by moving intersection further west of the bridge structure. • Acceptable level of service for right turn movements onto Glendon	• Reduces a portion of through traffic on ORR (approx. 50%) • No significant impact to surrounding transportation network. • Maintains existing geometry (no improvement to sightlines); • Stop conditions at intersection versus freeflow right turns; • Risk to through traffic on Glendon due to visibility of narrow median; • Median length deficient due to Bridge structure (based on best practices); • Acceptable level of service for right turn	• Reduces a portion of through traffic on ORR (approx. 50%); • No significant impact to surrounding transportation network. • Provides dedicated acceleration lane for relatively low volume movement; • Improvement to existing geometric conditions (sightlines); • Introduces merge condition/ hazard on Glendon Drive • Acceptable level of service for right turn movements onto Glendon Drive (left turn movements	• Reduces a portion of through traffic on ORR (approx. 50%); • No significant impact to surrounding transportation network. • Maintains existing geometry (no improvement to sightlines); • Acceptable level of service for right turn movements onto Glendon Drive (left turn movements prohibited).	• Eliminates through-traffic via two cul-de-sacs; cut through traffic diverted to Vanneck/ Glendon intersection; • No significant impact to surrounding transportation network. • Improvement to intersection geometrics and sightlines (to the east); sightlines to the west within standard. • Minimal impact to traffic along Glendon; dedicated left turn lane and right turn taper provided (local trips only); • Left turn lane/ right turn taper designed to applicable standards and storage lengths.	• Eliminates through traffic on ORR via gate at Old River Road/Pulham Road. • Improvement to geometry at Glendon Drive intersection with realignment westward, and provision of left turn lane and right turn taper on Glendon Drive. • Left turn lane right turn taper designed to applicable standards and storage lengths. • Concerns expressed regarding grade traversability during winter months (for properties located on the northern section); gate can be opened during extreme weather events. • Significantly

Table 12.2 Evaluation of Alternative Solutions

Options	One Way Intersection (northbound)		One Way Intersection (southbound)		Right in, Right Out Intersection				Full Access Intersection	
Criteria	In Existing Location	With Realigned Intersection	In Existing Location	With Realigned Intersection	Modified 3A Realigned Right In, Right Out Intersection with Wider Median on Glendon Dr.	Median on Glendon, with Intersection in Existing Location (F. Berry)	Porkchop/ Acceleration Lane present location (ORR Safety Committee)	Original Right in, Right out via Porkchop Island (PIC2 Option 2)	PIC 2 Recommendations 4B Full Access from Glendon Dr., Restrict Through-Traffic with Two Cul-de-Sacs	Restrict Through Traffic via Pulham Road/ORR emergency gate, with Realignment of Intersection with Glendon Drive
	introduced with unprotected left turns onto ORR. • Acceptable LOS	prohibited). • Acceptable LOS			Drive (left turn movements prohibited).	movements onto Glendon Drive (left turn movements prohibited).	prohibited).		• Concerns expressed by residents regarding grade traversability during inclement weather with respect to road profile at cul-de-sacs. • Significant grading required for construction of cul de sacs. • Left tern movements onto Glendon Drive will operate at a poor level of service, impacting a significantly lower number of vehicles trips due to the restriction of through traffic.	reduces traffic volumes at the Glendon Drive/ORR intersection. • Poor level of service for left turn movements onto Glendon Drive during peak times; trips heading east can utilize roundabout during peak hours; maintains flexibility for left turns for local trips during non-peak times. • Significantly reduces vehicle loading on middle section of corridor susceptible to erosion and bank stability concerns.
Economic • Capital Costs • Operations and maintenanc e	• Lowest capital costs • No significant change in operations and maintenance costs	• Moderate-high capital cost • No significant change in operations and maintenance costs	• Low capital cost • No significant change in operations and maintenance costs	• Moderate-high capital costs • No significant change in operations and maintenance costs	• Moderate-high capital costs • No significant change in operations and maintenance costs	• Low capital cost. • No significant change in operations and maintenance costs	• Moderate capital costs • No significant change to operations and maintenance costs	• Low capital cost. • No significant change to operations and maintenance costs	• Highest capital costs with the most property acquisition required. • Reduced maintenance costs by removing vehicle loading on unstable middle section of ORR.	• Moderate capital costs; • Reduced maintenance costs by removing majority of vehicle loading on unstable middle section of ORR.

12.1.3 Summary of Old River Road Community Group Consultation

On-going discussions were held with representatives of the Old River Road community group, as well as residents not a part of the group, between PIC 2, and January 2018 (see **Appendix A.3.3**). The following provides a brief overview of the discussions that took place:

- October 25, 2016, Stantec Offices
  - Representatives introduced the Old River Road community group, and presented the F. R. Berry report and preferred intersection concept sketch.
  - Stantec staff and Old River Road community group representatives discussed concerns with the preliminary recommendations brought forward at PIC 2.
- November 3rd, 2016 Stantec Offices
  - Stantec staff and Old River Road community group representatives discussed erosion and bank stability concerns identified within the 2011 Class EA.
- November 11th, 2016, Stantec Offices
  - Stantec staff and Old River Road community group representatives discussed status of the project, and preliminary evaluation.
- December 21st, 2016, Stantec Offices
  - Stantec and the Municipality of Middlesex Centre staff provided an overview of the revised alternatives, preliminary evaluation, and recommendations.
- January 4th, 2017 – On-site (Old River Road)
  - Stantec Staff and Old River Road residents discussed concerns and alternatives being considered.
- March 2017
  - Stantec staff provided updates on the study, including preliminary recommendations. Written comments were submitted by representatives of the safety group dated March 16th, 2017.
  - Letters were distributed to all property owners along Old River Road and Pulham Road with information on the proposed recommendations, and inviting all residents to attend a discussion with the project team on April 18th, 2017 at the Komoka Library.
- April 18th, 2017 – Old River Road, Pulham Road Community Meeting
  - Stantec, Municipal, and County staff provided an overview of study and options considered, and detailed the benefits of the proposed recommendations and how residents' concerns have been addressed (refer to **Appendix A.3.3** for presentation and meeting minutes).
- November 30th, 2017 – Public Information Centre No. 3 – Komoka Library
  - Provided an overview of all study recommendations including Coldstream Road alignments, and updated Old River Road recommendations.

The table below summarizes the concerns received regarding the proposed recommendations and how they can be addressed.

Table 12.3 Overview of Old River Road Comments

Comments expressed regarding Old River Road and recommended alternative	How comments/concerns have been addressed
Traffic calming measures (speed humps, turning a portion of the road to gravel, etc.)/Community Safety Zone can be implemented to reduce the volume of through traffic along Old River Road and its intersection with Glendon Drive.	Traffic calming measures such as speed humps/cushions (vertical deflection) are not traditionally effective in diverting any significant volume of traffic, and are intended to reduce speeds of traffic. Nonetheless, an initial phase has been recommended to implement and monitor traffic calming measures and their effectiveness in diverting traffic from Old River Road. With respect to turning portions of the road to gravel, this would introduce a number of concerns related to road runoff, roadway maintenance, and sedimentation in the Thames River, and is not a recommended traffic calming measure in this context. The Municipality may consider establishing a Community Safety Zone in conjunction with the traffic calming measures. See Section 14.9.1 for more information.
Recommended a right in, right out intersection through the construction of a one metre wide median on Glendon Drive at its intersection with Old River road	Additional analysis undertaken of options proposed for a right in right out intersection, as well as a one-way intersections. See Section 12.1.1 for discussion of alternatives considered.
Recommended a right out only intersection	Similar to the RIRO intersections, a right out only intersection at Glendon Drive would likely be subject to a high occurrence of non-compliance, and would likely result in vehicles attempting to make U-turns west of the intersection. This option would also add travel time for residents along Old River Road, who would only be able to access their properties from Vanneck Road/Pulham Road. By only being able to access their properties from Pulham Road, emergency situations (flooding, rail crossing) would have a more significant impact to the accessibility to Old River Road and its residents.
Difficult and unsafe left turns onto Glendon Drive from Old River Road	Realigning the intersection westward will improve sight lines to the east (Thames River Bridge). Since the recorded vehicle maneuvers associated with a large proportion of collisions at the intersection trend toward the turning movement that would be impacted by this sightline, it can be reasoned that realigning the intersection will improve this collision trend. Instead of turning left during peak hours, similar to the right-in, right-out configuration, vehicles have the option to utilize the proposed roundabout at Jefferies Road/Vanneck

	Road/Glendon Drive. By not forcing the right turn condition, this allows for flexibility to turn left during off-peak hours.
In favour of stopping up/closing the road in order to eliminate the through traffic on the road and create safer space for pedestrians/cyclists, and reduce the amount of accidents along the Old River Road corridor.	Noted.
Insufficient sight lines to the west and east	Realignment of intersection significantly improves sightlines to the east by bringing the intersection further from the bridge structure in addition to raising the intersection's elevation. Sightlines to the west (to the crest of the hill on Glendon Drive) are within accepted standards.
Travel times to vital services (i.e. London/Strathroy hospitals) will be significantly increased.	During standard road and traffic conditions, differences in travel times to the Strathroy hospital between the Vanneck Road vs. Glendon Drive intersections are negligible. Travel times to London area hospitals are also negligible, and are more likely to be impacted by factors such as train delays.
Design standards for cul-de-sac length – Old River Road is too long to have a cul-de-sac	Design standards speak to subdivision design with houses off of a cul-de-sac, and do not apply in an existing rural environment. In addition, Old River Road is not being formally closed at Pulham Road. Access is provided via the emergency gate.
School transportation will be impacted and will not be able to service the residents	Consultation has been undertaken directly with Student Transportation Services and the bus company. Each stakeholder identified that the proposed alternative will not cause issues with student pick up and drop offs.
Access for emergency vehicles will be impeded	Consultation has been undertaken directly with Middlesex-London Emergency Medical Services and Middlesex Centre Fire Services, and residents' concerns have been forwarded to each. Each have indicated that a simple gate configuration will not impact emergency access, The gate can be operated in emergency situations.

Heavy/Large delivery vehicles may not be able to access properties at the top of the hill.	There is an existing weight restriction on Old River Road of 5 tonnes per axel, which restricts heavy trucks. Permitted trucks should not have difficulty traversing the hill under normal weather conditions. For special circumstances, the County and Municipality should be contacted to discuss exceptions to the weight restriction.
Access to properties at the top of the hill during inclement weather	Old River Road is currently identified as a priority road within the Municipality's winter maintenance program, and this will be maintained. It should be noted that all alternatives available for addressing the issues along Old River Road require some properties to either traverse up and/or down the hill.
Train delays on Pulham Road during emergencies /maintenance	Gate will be operable during any scheduled maintenance or unexpected extended rail delays.
Truck traffic utilizing Old River Road	There is currently a weight restriction on Old River Road (5 tonnes per axel). Additional warning signage can be incorporated into intersection improvements to warn of no exit and no truck traffic.
Access to farm fields for equipment will be cut off with installation of gate on Pulham Road	The location of gate was modified from Pulham Road to Old River Road to limit impacts to farm accesses. Farm accesses will be provided via Vanneck Road and/or Pulham Road.

12.1.4 Upper Thames River Conservation Authority

Old River Road Flooding

Information on the study was forwarded to UTRCA throughout the project. UTRCA previously submitted concerns during the 2011 Old River Road Class EA related to flooding in the lower portion of the corridor (refer to Figure 12.1) (refer to **Appendix A.4** for correspondence). A meeting was held on Friday January 13th, 2017 to discuss UTRCA's concerns in the context of the Glendon Drive Class EA and the alternatives being considered for Old River Road. Raising the road profile out of the flood limit (approx. 1m) to address flooding impacts within the lower section of the corridor was not recommended as part of the 2011 Class EA due to the significant property impact and costs. Opportunities for addressing the

Figure 12.1 2011 Old River Road Class EA

issue were explored during the development of alternative solutions for Old River Road, and a similar conclusion was reached regarding the extensive property impacts and costs.

UTRCA provided updated information on approximate frequency/depth of flooding over the lower section of Old River Road, which was extrapolated from on-going flood modeling updates being undertaken by UTRCA (**Appendix A.4**).

Based on the updated flood information provided by UTRCA, the approximate depth of the 5-year storm at the roadway is approximately 0.75 m. It was determined that raising the roadway to accommodate a 5-year storm would necessitate shifting of the roadway alignment and would result in significant property impacts and acquisition. The premium cost for this raised reconstruction would be approximately $375,000 (or 175% of the standard reconstruction cost) excluding property acquisition costs (2011 dollars, from Old River Road Class EA). Based on the existing elevation of the lower road section and approximate right of way limit, it was determined that the road could be raised approximately 0.25 m before property impacts would be incurred.

Thus, it was determined that raising the road profile within the existing right of way limit would not result in any significant benefit to flooding frequency or depth. Additionally, since costs associated with the grade raise to accommodate a 5-year storm represent a 175% increase to road reconstruction costs, with only a minor benefit to flood frequency and depth, raising the road profile in the lower portion of Old River Road was not carried forward as part of this study's recommendations. Through the reconstruction of Old River Road in its current alignment as part of normal maintenance practices, pavement strengthening needs could raise the grade by approximately 150-250 mm, giving some minor benefit without requiring property.

Cul de Sac Turnaround/Emergency Gate

An update was provided to UTRCA with respect to preliminary recommendations for the construction of a cul de sac turnaround on Pulham Road with emergency access gates to restrict through traffic. Several concerns were identified (refer to **Appendix A.4**):

- Construction of the cul de sac turnaround and emergency gates may complicate maintenance operations, i.e. how would maintenance be undertaken to ensure egress in the event of a flood.

- Properties may be subject to future development restrictions as there would be no flood free/safe access in accordance with provincial policy (Provincial Policy Statement 3.1).

The location of the cul de sac turnaround from Pulham Road to Old River Road at its intersection with Pulham Road will improve maintenance operations and the municipality has committed to maintaining the current maintenance program and ensuring the gate is operable at all times (refer to **Appendix C.3** for the current maintenance program for Old River Road).

A Gate Management Plan will be prepared to clearly identify roles and responsibilities with respect to the operations of the gate. The intent of the emergency gate system is to eliminate through traffic, and the design of the gate will ensure simple and fast operations during emergency situations. A similar solution has been applied within a subdivision in Belmont, located southeast of the City of London. A gate has been installed to provide emergency access to a cul de sac with approximately 27 residences was constructed in a lower lying area, and an alternate emergency access was installed with a simple gate as shown in Figure 12.2.

Figure 12.2 Belmont Emergency Access Route Gate

12.1.5 Student Transportation Services/Langs Bus Lines

Based on concerns expressed by residents along Old River Road regarding impacts to school pick up and drop off, Student Transportation Services and Langs Bus Lines were contacted directly to discuss the alternatives being considered for Old River Road. It was identified that due to the existing conditions along Old River Road, it is their policy not to send standard size busses along the Old River Road corridor. Smaller vans are dispatched for pick-up along this road only. The alternatives and preliminary recommendations were discussed with staff, and they indicated that the emergency gate would not impact their ability to pick-up and drop off along Old River Road. It was noted that a turnaround at Old River Road and Vanneck Road would be beneficial to bus services. Correspondence is included in **Appendix A.3.3**.

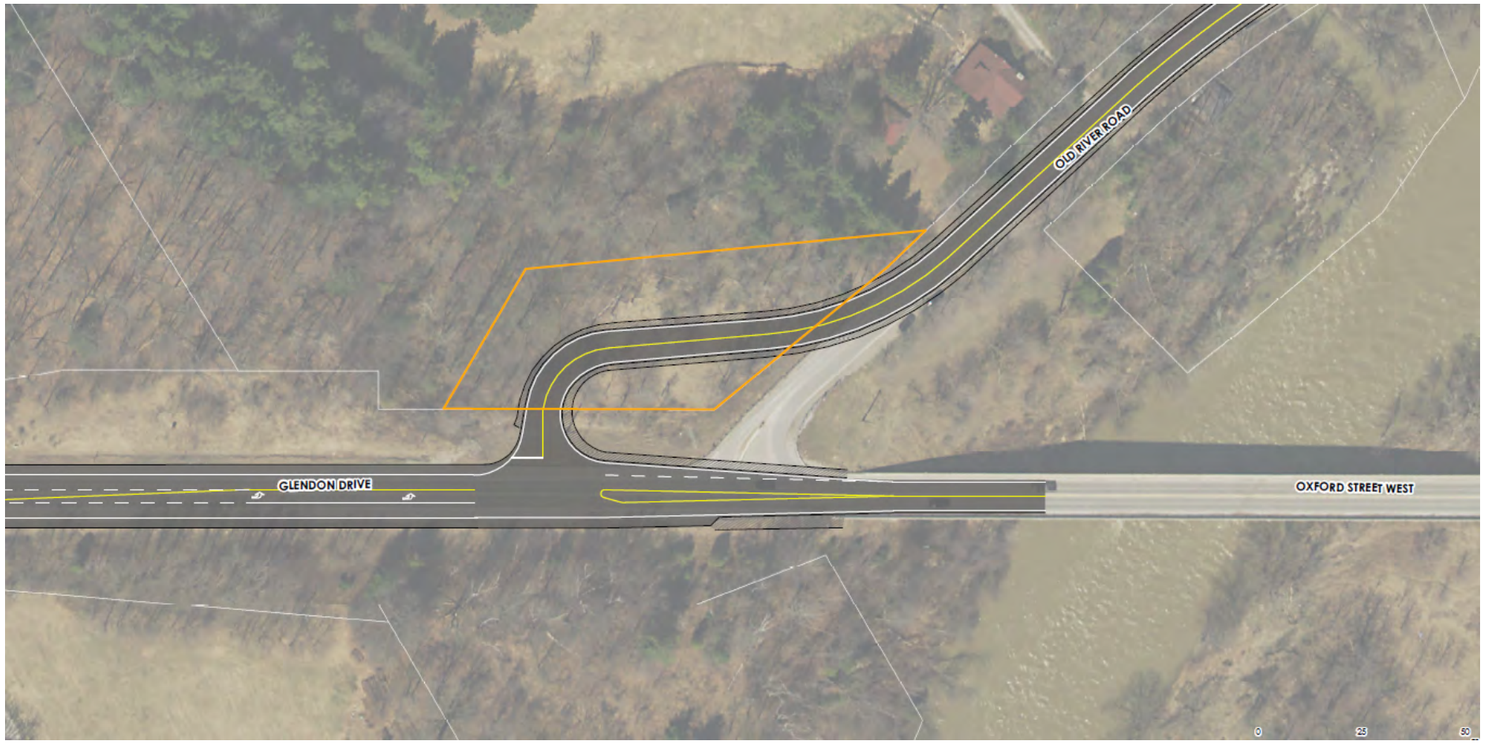
12.1.6 Emergency Services

Consultation was undertaken with Fire and Emergency Medical Services (EMS) throughout the study. Concerns were expressed by residents regarding the impact to emergency response times resulting from the installation of the gate at Old River Road/Pulham Road. The concerns were brought directly to Fire and EMS staff, and it was noted that there were no concerns with the emergency gate option. It was noted that due to the likely hood of encountering a train at Pulham Road, emergency services would typically enter and exit via Glendon Drive.

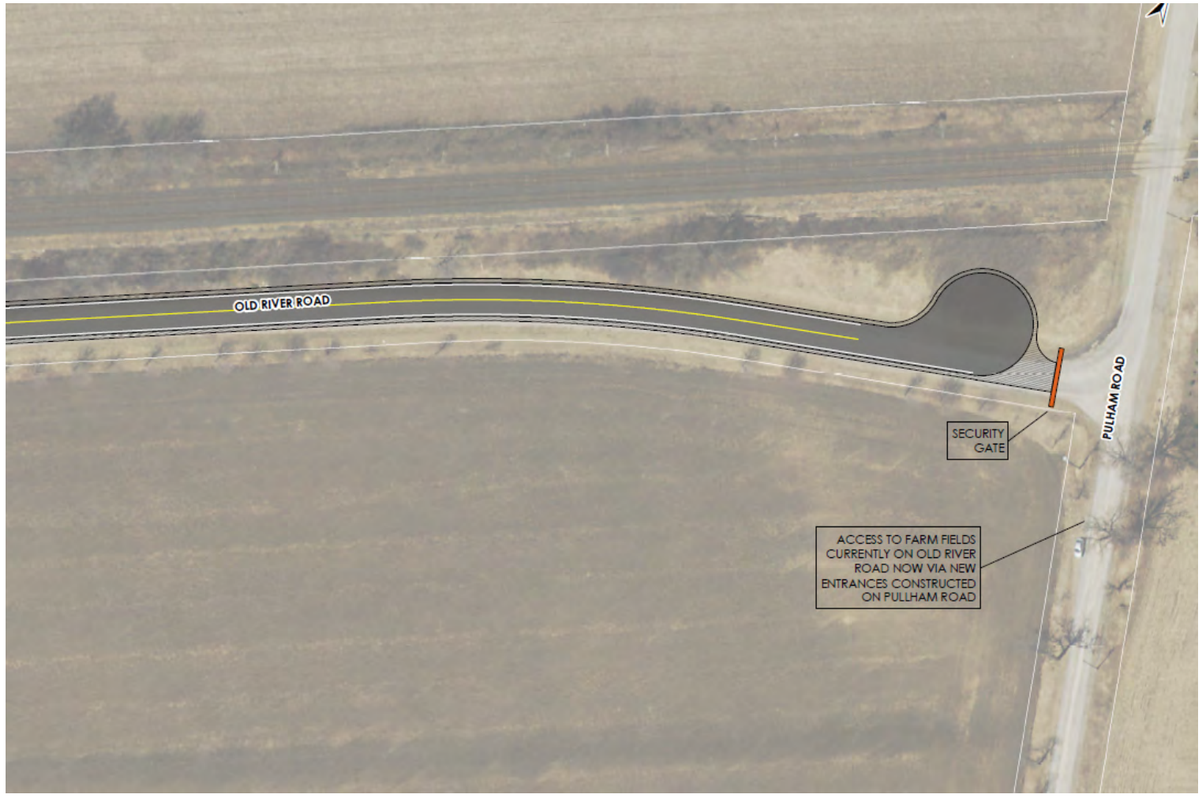
Old River Road Intersection with Glendon Drive
August 3, 2018

12.1.7 Preliminary Recommendations

The preliminary recommendations with respect to Old River Road include a full access intersection with Glendon Drive, realigned westward to provide a left turn lane and right turn taper, and to improve sightlines beyond the Thames River Bridge to the east. Through traffic from Vanneck Road/Pulham Road will be restricted by the construction of an emergency gate on Old River Road at its intersection with Pulham Road. The location of the emergency gate was modified from Pulham Road to Old River Road to maintain access to several farming properties along Pulham Road. The location of the emergency gate and turnaround also improves maintenance operations (i.e. there are no un-travelled sections of the roadway) to ensure that the intersection is clear in the event of an emergency. This has been identified as the most effective way of eliminating through traffic along Old River Road and at its intersection with Glendon Drive. The recommendations are further discussed in Section 14.8 below.



Intersection Improvements



Emergency Gate

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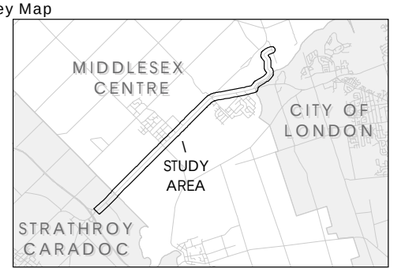
Key Map



Notes

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December 2016

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Figure No. **12.3**

Old River Road

13.0 PUBLIC INFORMATION CENTRE NO. 3

Due to a number of updates to the study, a third Public Information Centre (PIC) was held on November 30th, 2017 at the Komoka Library (Komoka Wellness and Recreation Centre). Notices were published in the Middlesex Banner and Londoner newspapers, the glendondrive.mindmixer.com website, and mailed to all those on the study mailing list.

The intent of PIC No. 3 was to provide an overview of the study's recommendations presented at PIC No. 2, as well as to present the changes that have been made with respect to Coldstream Road, the Jefferies Road, Vanneck Road, and Glendon Drive intersection, as well as Old River Road. PIC presentation materials are provided in **Appendix A.2**.

The PIC was held in open house format, and staff from Stantec, the Municipality of Middlesex Centre, and Middlesex County were in attendance to answer questions. 37 individuals signed in at the PIC, however attendance was estimated at approximately 50-60. Comment sheets were made available at the PIC, and presentation materials were posted to the glendondrive.mindmixer.com website the following day. One comment sheet was returned at the PIC, and several comments were submitted to the glendondrive.mindmixer.com website. An overview of comments received is provided below.

Topic	Comment
Old River Road	Opposed to closing (gating) Old River Road. Gating would cause residents to travel up and down the hill during inclement weather, which can get very slippery. Additional pavement could be added to Old River Road to increase the height of the intersection and improve sightlines. A "No Left Turn" sign could be installed at the Old River Road intersection with Glendon Drive to attempt to reduce the amount of left turns. Turning a portion of Old River Road to gravel would help deter through traffic and lower vehicle speeds. The Old River Road/Glendon Drive intersection should be closed, and minor improvements may not improve the situation.

Speeds on Glendon Drive	Posted speeds could be lowered on Glendon Drive to mitigate collisions around Old River Road.
Glendon Drive Bridge over the Thames River	Signage should be installed at the east side of the Glendon Drive (Oxford Street) Bridge over the Thames River saying "No Passing on Bridge." Drivers become impatient behind vehicles turning right onto Old River Road, and pass on the left along the narrow bridge onto oncoming traffic.
Komoka Road intersection and area	Recommendations for a five lane cross section and roundabout in this location is not necessary. Roundabout not appropriate for this intersection. Cars, bicycles and pedestrians all use this intersection.
Multi-use Trails	Pleased to see the multi-use trails and paved shoulders along the corridor.
Coldstream Road	Pleased to see the removal of the blind corner leading up to the CN Rail tracks on Coldstream Road.

14.0 RECOMMENDATIONS

The Recommended Design Concepts for the four Glendon Drive corridor sections and four intersection improvement areas are described in the following sections, including cross sections, servicing, active transportation, property requirements, and urban design/streetscape improvements.

Both existing and future conditions within the Glendon Drive corridor include a dynamic and diverse range of land uses such as agricultural, residential, commercial, industrial, parkland and woodland. Komoka and Kilworth are distinctive and vibrant communities that interact with Glendon Drive. They currently exist as two separate urban nodes but as each community continues to grow, they are envisioned to ultimately expand to form a continuous residential/urban streetscape corridor. Through public consultation and technical study, a preferred design concept for Glendon Drive has been developed. This design concept, along with the streetscape opportunities and themes identified, create a functional and attractive streetscape that accommodates the existing and future corridor needs, while ensuring safe and efficient circulation of pedestrians, cyclists, and motorists.

To guide the future detailed design process, a number of opportunities have been developed for each corridor section and intersection improvement areas to create a sense of place, highlight the community nodes, and maintain continuity throughout the corridor. Theme options have also been identified to maintain consistency, and should be consulted during detailed design (refer to **Appendix F**).

14.1 SECTION 1 HIGHWAY 402 TO WEST OF KOMOKA ROAD

14.1.1 Cross Section

The western most section of Glendon Drive is to consist of a three lane cross section including 3.75 m lanes with a center two-way left turn lane (5.0 m), and 2.5 m paved shoulders (Figure 14.1 and Figure 14.2). The centre two way left turn lane helps to improve safety and access management for the existing properties along Glendon Drive, as well as provide some flexibility for future development needs. Drainage ditches will be implemented with flat bottoms to help improve area drainage.

The curves at the Amiens Road intersection include up to 6% superelevation and transition through the intersection.

The concrete box culvert at the Komoka Creek crossing with require either extension or replacement to accommodate the new cross section. The need for replacement versus

extension will be determined through a condition assessment at the time of detailed design. No realignment of the creek is being proposed.

The existing speed limit of 80 km/h would be maintained with the proposed conditions.

14.1.2 Water, Sanitary, and SWM Servicing

Water and sanitary servicing infrastructure is required to service future Strategic Employment Lands as identified in the Middlesex Centre OP, west of Komoka Road. The watermain is proposed to be located on the north side of Glendon Drive at a standard location and depth; considerations have been made towards the watermain maintenance, and the location will result in a minimized corridor restoration cost and disturbance to traffic.

Sanitary servicing infrastructure within this section of the Glendon Drive right of way is likely to include both a sanitary trunk sewer as well as a forcemain, since existing topography will make it difficult to service future developments via a gravity sewer. Pending confirmation through a servicing study, it is likely that the area west of Komoka Road will require two pump stations to split flows and thus minimize the depth of the sanitary trunk sewer; otherwise, the sanitary trunk sewer could be in excess of 10 m deep spanning approximately 500 m due to a highpoint 1.5 km west of Komoka Road. The location of the sanitary trunk sewer and forcemain has been identified based on the maximum depth of sanitary sewer such that the open cut trench limits to not result in multiple lane closures during future maintenance.

Proposed infrastructure placements are shown on **Figure 14.2**, and more information is provided in **Appendix C**. Timing of water and sanitary servicing needs is currently unknown and will be triggered by future development.

The SWM strategy for the Glendon Drive corridor is included in **Appendix C**. Similar to existing conditions, it is proposed that runoff from the Glendon Drive right of way would be collected and conveyed by flat bottom roadside ditches to the Highway 402 roadside ditch. Enhanced level water quality treatment is required for Catchment Area 203 outletting to Komoka Creek, which will be provided via enhanced grassed swales. Check dams located in the proposed roadside ditches will provide temporary stormwater detention to achieve the necessary water quantity control targets. Pre-treatment shall be provided to the runoff from the paved surface by narrow vegetated filter strips, or other similar linear best management practices (BPM).

14.1.3 Utilities

Overhead hydro runs along the south right-of way throughout this section of Glendon Drive. Underground Bell runs from the Highway 402 interchange easterly to approximately 775 m east of Amiens Road, where it then runs aerial to Komoka. It is anticipated that the ditches can be designed such that the poles can be maintained. This will be confirmed in detail design. Union Gas has plant which runs along the south right-of-way, from the Hwy 402 interchange to Amiens

Road. East of Amiens, distribution pipe runs along both the north and the south side of the right-of-way to Municipal Number (MN) 9581 (Camp Kee-Mo-Kee), where it branches off and one run continues easterly along the north right-of-way to Komoka Road. Union Gas is proposing a second line west of Komoka Road along the south boulevard to service the new developments in the area. The depth of the gas line will be determined through detail design and impacts to cover from the revised ditch location.

14.1.4 Property Requirements

A narrow band of property may be required along the south right of way to accommodate ditch improvements; however, these property requirements may be reduced or eliminated during detailed design. Three other areas along the corridor (MN 9334, MN 9501, and MN 9817) will require property to accommodate the proposed ditching. Property impacts may be mitigated through detailed design by the use of culverts and/or subdrains.

Property requirements may also be obtained through development applications to implement a standard right-of-way width.

14.1.5 Active Transportation

The Draft Middlesex County Cycling Strategy (April 2018) does not identify cycling facilities within this section of the corridor. While no designated on- or off-road cycling facilities have been identified in this section of the corridor, paved shoulders have been included to make provisions for potential cycling facilities pending the final recommendations of the Cycling Strategy.

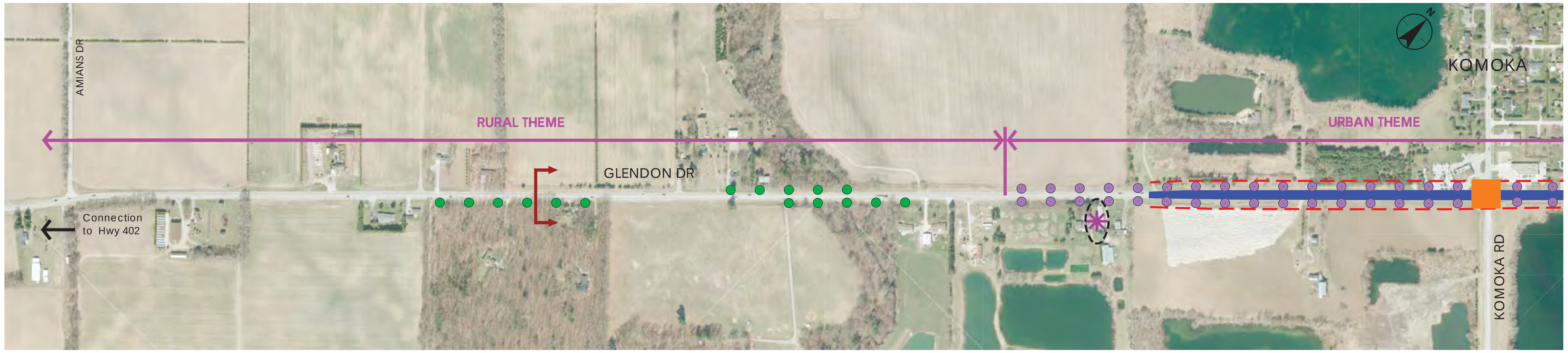
14.1.6 Streetscape/Urban Design

The following streetscape opportunities have been identified for this section of the corridor, and should be considered during detailed design:

- Implement a Komoka community entry sign at the west community boundary.
- Enhance the Komoka community entry sign with decorative paving, ornamental tree and landscaping to create a gateway feature.
- Plant large, native shade trees at select locations along Glendon Drive from the west limit of Komoka to Highway 402. In addition, add groupings of native shrub species where practical.

More information on Streetscape/Urban Design elements and themes can be found in **Appendix F**.

Plan



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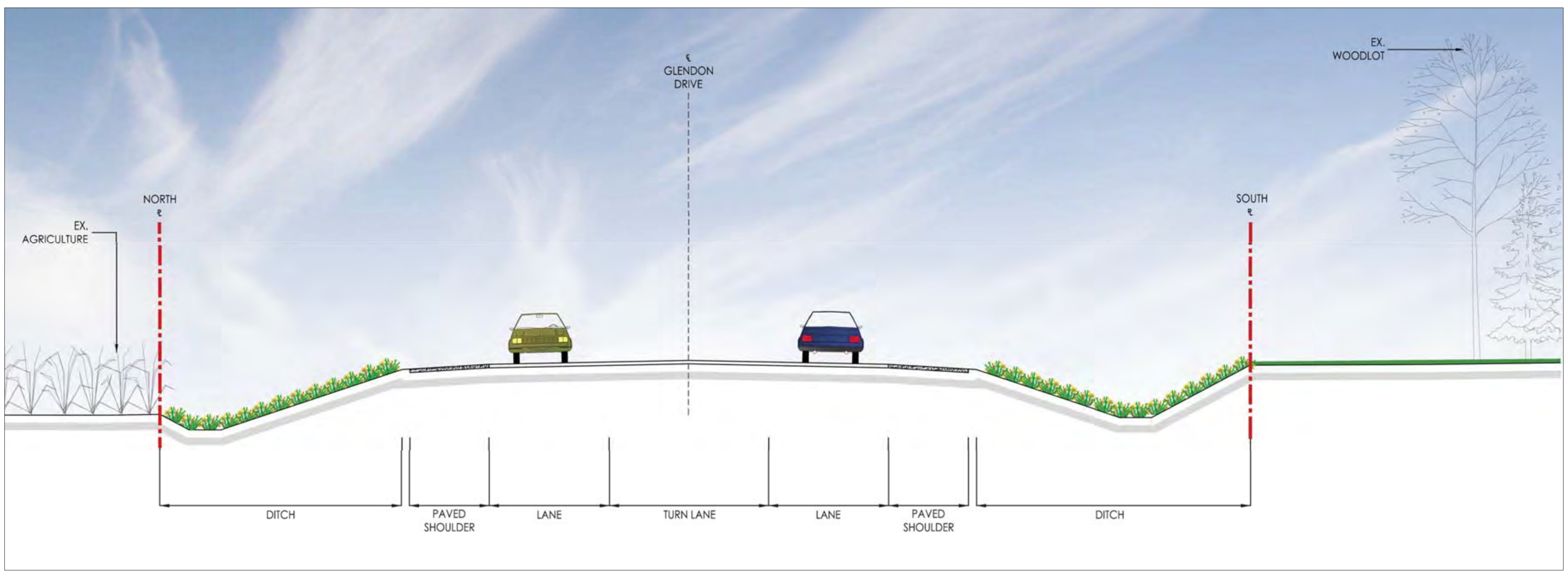
Typical Cross Section



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Legend

- MUNICIPAL ENTRY SIGN
- COMMUNITY ENTRY SIGN
- FEATURE / ORNAMENTAL PLANTING AREA
- INTERSECTION IMPROVEMENT
- LANDSCAPED MEDIAN
- ORNAMENTAL STREET TREE
- LARGE NATIVE STREET TREE
- MULTI-USE TRAIL
- MAINTAIN EX. WOODLAND EDGE
- APPROXIMATE LOCATION OF TYPICAL CROSS SECTION
- DELINEATION OF THEME ZONES

Notes

Figure 14.1

June 2016

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Urban Design Concept Highway 402 to Komoka Road

ORIGINAL SHEET - ANSI D

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Revised: 2018-02-14 By: kbuchanan

February 2018
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Legend

- Signalized Intersection
- Proposed Sanitary
- Existing Sanitary
- Proposed Storm
- Existing Storm
- Proposed Watermain
- Existing Watermain
- Potential Property Requirement
- Asphalt
- Boulevard
- Enhanced Ditch

Notes

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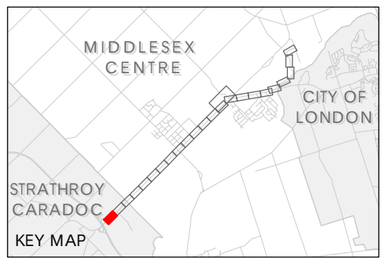

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Figure No.
14.2 (Sheet 1 of 24)

Section 1 - Hwy 402 Interchange to West of Komoka Road Recommended Corridor Design

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Legend

- Signalized Intersection
- Proposed Sanitary
- Existing Sanitary
- Proposed Storm
- Existing Storm
- Proposed Watermain
- Existing Watermain
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- Asphalt
- Enhanced Ditch

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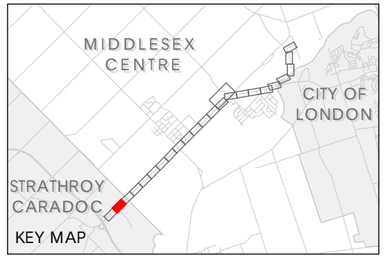

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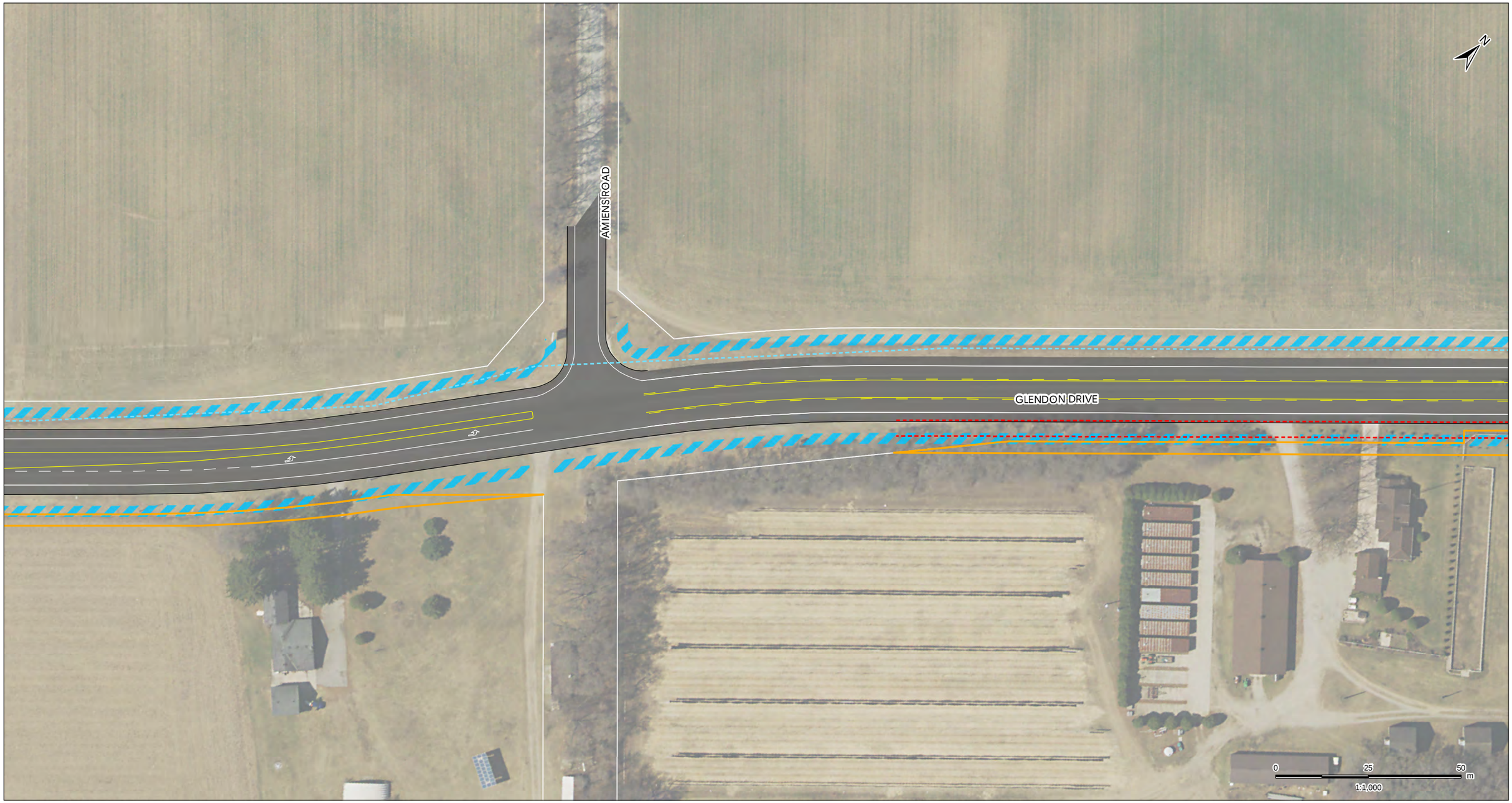
Figure No.
14.2 (Sheet 2 of 24)

Section 1 - Hwy 402 Interchange to West of Komoka Road Recommended Corridor Design



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Legend

- Signalized Intersection
- Proposed Sanitary
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- Proposed Storm
- Existing Storm
- Proposed Watermain
- Existing Watermain
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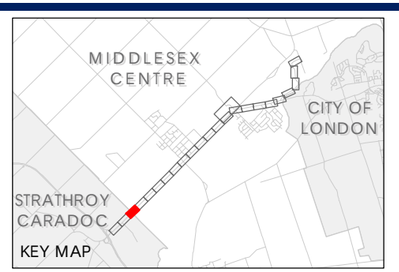

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Figure No.
14.2 (Sheet 3 of 24)

Section 1 - Hwy 402 Interchange to West of Komoka Road Recommended Corridor Design

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Legend

- Signalized Intersection
- Proposed Sanitary
- Existing Sanitary
- Proposed Storm
- Existing Storm
- Proposed Watermain
- Existing Watermain
- Potential Property Requirement
- Asphalt
- Enhanced Ditch

Notes

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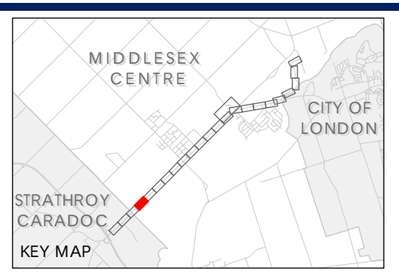

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Figure No.
14.2 (Sheet 4 of 24)

Section 1 - Hwy 402 Interchange to West of Komoka Road Recommended Corridor Design

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Legend

- Signalized Intersection
- Proposed Sanitary
- Existing Sanitary
- Proposed Storm
- Existing Storm
- Proposed Watermain
- Existing Watermain
- Potential Property Requirement
- Asphalt
- Enhanced Ditch

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Figure No.
14.2 (Sheet 5 of 24)

Section 1 - Hwy 402 Interchange to West of Komoka Road Recommended Corridor Design

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Legend

- Signalized Intersection
- Proposed Sanitary
- Existing Sanitary
- Proposed Storm
- Existing Storm
- Proposed Watermain
- Existing Watermain
- Potential Property Requirement
- Asphalt
- Enhanced Ditch

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Figure No.
14.2 (Sheet 6 of 24)

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Legend

- Signalized Intersection
- Proposed Sanitary
- Existing Sanitary
- Proposed Storm
- Existing Storm
- Proposed Watermain
- Existing Watermain
- Potential Property Requirement
- Asphalt
- Curb
- Sidewalk/Path
- Enhanced Ditch

Notes

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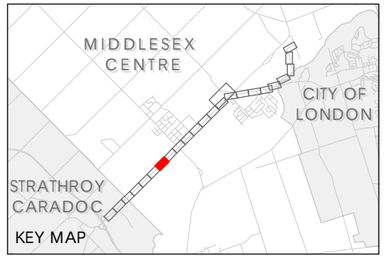

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Figure No.
14.2 (Sheet 7 of 24)

Section 1 - Hwy 402 Interchange to West of Komoka Road Recommended Corridor Design

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Legend

- Signalized Intersection
- Proposed Sanitary
- Existing Sanitary
- Proposed Storm
- Existing Storm
- Proposed Watermain
- Existing Watermain
- Potential Property Requirement
- Asphalt
- Curb
- Concrete Median
- Boulevard
- Sidewalk/Path

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Figure No.
14.2 (Sheet 8 of 24)

Section 1 - Hwy 402 Interchange to West of Komoka Road Recommended Corridor Design

14.2 SECTION 2 – WEST OF KOMOKA ROAD TO JEFFERIES ROAD/VANNECK ROAD

14.2.1 Cross Section

The four lane urban cross section proposed consists of 3.5 m lanes and a full median. The median area includes left turn lanes (3.0 m) as warranted adjacent to a 2.0 m median (refer to Figure 14.4 and Figure 14.5). In the areas with no left turn lanes, the median is a full 5.0 m wide. Curb and gutter with storm sewers are proposed, and the boulevard will provide a multi-use pathway along both the north and south sides of the corridor. Based on the projected traffic volumes, a four lane cross section is recommended to accommodate the peak hour traffic volumes (early morning and early evening). During the off peak hours, two travel lanes can accommodate the traffic. With the future development and vision for Village Centre land uses fronting Glendon Drive, the two lanes providing limited benefit during off peak hours can be converted to on street parking to enhance the accessibility to the community.

The existing speed limit within the Komoka area of 50 km/h would be maintained, and would extend with the implementation of the Five Lane Cross Section and help to reduce traffic speeds approach each of the proposed roundabouts.

14.2.2 Water, Sanitary, and SWM Servicing

Based on the existing infrastructure and future infrastructure requirements, this section of the corridor is further broken down into sub-Section 2A (approx. 425 m west of Komoka Road eastward to Komoka Road), and Section 2B (Komoka Road eastward toward Jefferies Road).

Section 2A (approx. 425 m west of Komoka Road eastward to Komoka Road) - An existing 200 mm sanitary sewer and a 150 mm watermain currently exist in the north side of the corridor. It is anticipated that the watermain may be upsized in the future and extended westward to service the future Strategic Employment Lands. Sanitary servicing infrastructure will also be required as discussed in Section 1 above.

The SWM strategy within this section of the corridor includes a storm sewer eastward to Komoka Road, and conveyed south on Komoka Road to a future SWM Facility. The municipally-owned Komoka Wastewater Treatment Facility property has been identified as a potential location for the proposed SWM Facility, which will be confirmed through subsequent study and stormwater EA (refer to **Appendix C** for details on the SWM strategy).

The location of the forcemain, sanitary, and storm sewers have been preliminarily identified (refer to servicing placements in **Appendix C**) based on the maximum depth supported by the proposed right of way before disturbing the median and closing eastbound and westbound traffic lanes in the event of future maintenance or repair.

Section 2B (Komoka Road eastward toward Jefferies Road) – East of Komoka Road towards Springer Street there is existing sanitary infrastructure and water infrastructure in the north side of the right of way that will remain. The location of the service would permit future maintenance to avoid requiring a full road closure, as the open cut trench limits would be contained to a single lane. East of Springer Street to Queens Street an existing watermain will be present in the north side of the corridor. Maintenance will likely not impact the Glendon Drive paved surface. Further east from Queen Street to Jefferies Road the existing watermain in the north side of the right of way may be twinned to account for increased flows from future development. As a result, provisions have been made in selecting the location of this future watermain to minimize open trench impact to a single lane during construction and maintenance works (refer to **Appendix C**).

Under existing conditions, runoff from this portion of Glendon Drive flows to existing privately owned ponds located south of the right of way. While there is limited available information regarding the pond outlets, discharges from these ponds are likely conveyed across downstream privately owned lands. Downstream landowners are not obligated to accept runoff from upstream lands unless it is conveyed within a watercourse. Thus, the existing ponds should not be used as outlets for the Glendon Drive improvements since downstream landowners could potentially alter their lands to prevent flows from entering their properties.

A storm sewer is proposed to collect minor flows from Glendon Drive between Komoka Road and Tunks Lane (and potentially external drainage areas comprised of existing and future development lands) and to convey flows southward from the Glendon Drive/Komoka Road intersection. A proposed ditch on the east side of Komoka Road conveys runoff from Glendon Drive to a proposed SWM facility as discussed above (refer to **Appendix C**).

For drainage areas roughly between Tunks Line and Jefferies Road (Catchment Area 205), a proposed storm sewer collects and conveys minor flows from Glendon Drive to the existing Kilworth Heights Subdivision via the Springfield Way storm sewer. Existing design drawings indicate that the existing drainage works have capacity to accommodate the runoff from the proposed Glendon Drive improvements, with the addition of approximately 130 m of storm sewer on Springfield Way to connect the proposed Glendon Drive storm sewer to the existing system on Springfield Way and Doan Drive.

Infrastructure within this section of the corridor is included on Figure 14.4 and additional information on the water, sanitary, and SWM strategy can be found in **Appendix C**.

14.2.3 Utilities

Overhead hydro runs along the south right-of-way from Komoka to Tunks Lane, then crosses Glendon and runs along the north right-of-way to Vanneck Road.

Rogers has overhead cable to the west of Komoka Road, with sections of underground cable east of Komoka Road to east of Tunks Lane, where it transitions to aerial again to the north side of the intersection with Vanneck Road / Jefferies Road. Underground Rogers cable is present through this intersection before continuing south and east.

Bell runs underground from Komoka Road easterly to Tunks Lane, where it transitions to aerial and runs east to Vanneck Road. Bell is also present on the south right-of-way from Springfield Way easterly to Jefferies Road.

Union Gas runs along the south right-of-way to approximately MN 10246 (Covenant Church) where it crosses to the north. Union Gas has a distribution pipe proposed for the south right of way from the location easterly to the intersection with Vanneck Road / Jefferies Road. Union Gas also has plans for a station and associated gas main located at the southwest corner of the Wellness Centre property, the timing of which will be determined based on developments to the south. During detailed design, consultation should be undertaken with Union Gas to determine opportunities for coordination.

With the recommendation of an urban streetscape with multi-use pathways and new underground infrastructure, the existing utilities will require relocation. Discussion into the cost benefit of burying the overhead hydro versus maintaining an overhead pole line will be required in detail design. If the hydro was to remain overhead, it is envisioned that the line would be relocated to the south right-of-way within the newly acquired property.

14.2.4 Property Requirements

Property acquisition along the south side of the corridor, and at the major intersections (Glendon Drive and Komoka Road, and at Glendon Drive and Jefferies Road / Vanneck Road) will be required in order to accommodate the proposed cross section and multi-use trail. Property acquisition may be primarily acquired through development applications, and /or reduced-eliminated during detailed design.

14.2.5 Active Transportation

A multi-use trail is recommended along both the south side and north side of the corridor, which will service a wide range of cycling users, and provide pedestrian connectivity between the Komoka and Kilworth communities, as well as providing connectivity to the Komoka Wellness and Recreation Centre. These recommendations are consistent with the recommendations within the County's draft Cycling Strategy (April 2018).

14.2.6 Streetscape/Urban Design

The following streetscape opportunities have been identified for this section of the corridor, and should be considered during detailed design:

Figure 14.3 Landscaped Centre Median

- Add landscaped medians. Medians, in conjunction with the Kilworth community entry sign and associated gateway features will visually communicate 'you are entering a community' to vehicular, cyclist and pedestrian traffic.
- Highlight the Middlesex Centre Community Wellness & Recreation Complex with decorative paving, ornamental tree and landscaping. Consider adding a unique pavement material, pattern and/or colour in front of the Complex to further emphasize the community and Municipal brand (i.e. blue and green to compliment the community signage program).
- Add a distinctive streetscape treatment to the Tunks Lane and Glendon Drive intersection to facilitate and highlight pedestrian connectivity, including decorative paving of the crosswalks.
- Provide for safe and efficient multi-use trail connections.
- Connect existing and make provision for future multi-use trails creating an active transportation-focused linkage between the Komoka-Kilworth communities.
- Plant a continuous row of ornamental trees as part of the west gateway feature, at key intersections and along the Komoka-Kilworth corridor to create a continuous, aesthetically connected streetscape. Ornamental trees could be flowering, have a unique fall colour and/or distinctive form.
- In addition to the proposed ornamental street trees, use of streetscape design to provide visual cues to vehicular traffic to slow speed in areas where flexible parking is implemented.
- Implement distinctive street lighting and street furniture along the Komoka-Kilworth streetscape corridor.

More information on Streetscape/Urban Design elements and themes can be found in **Appendix F**.

Glendon Drive

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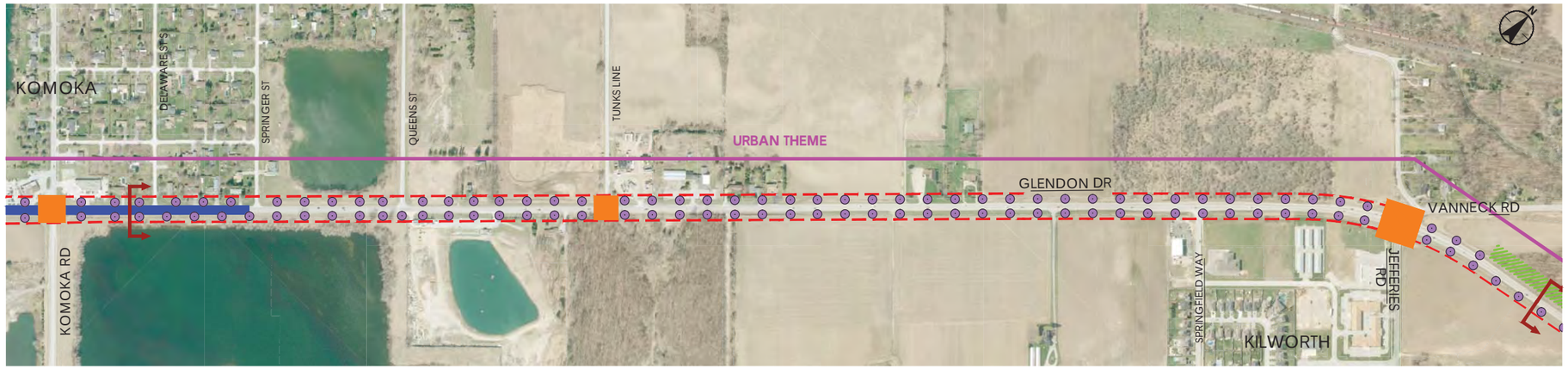
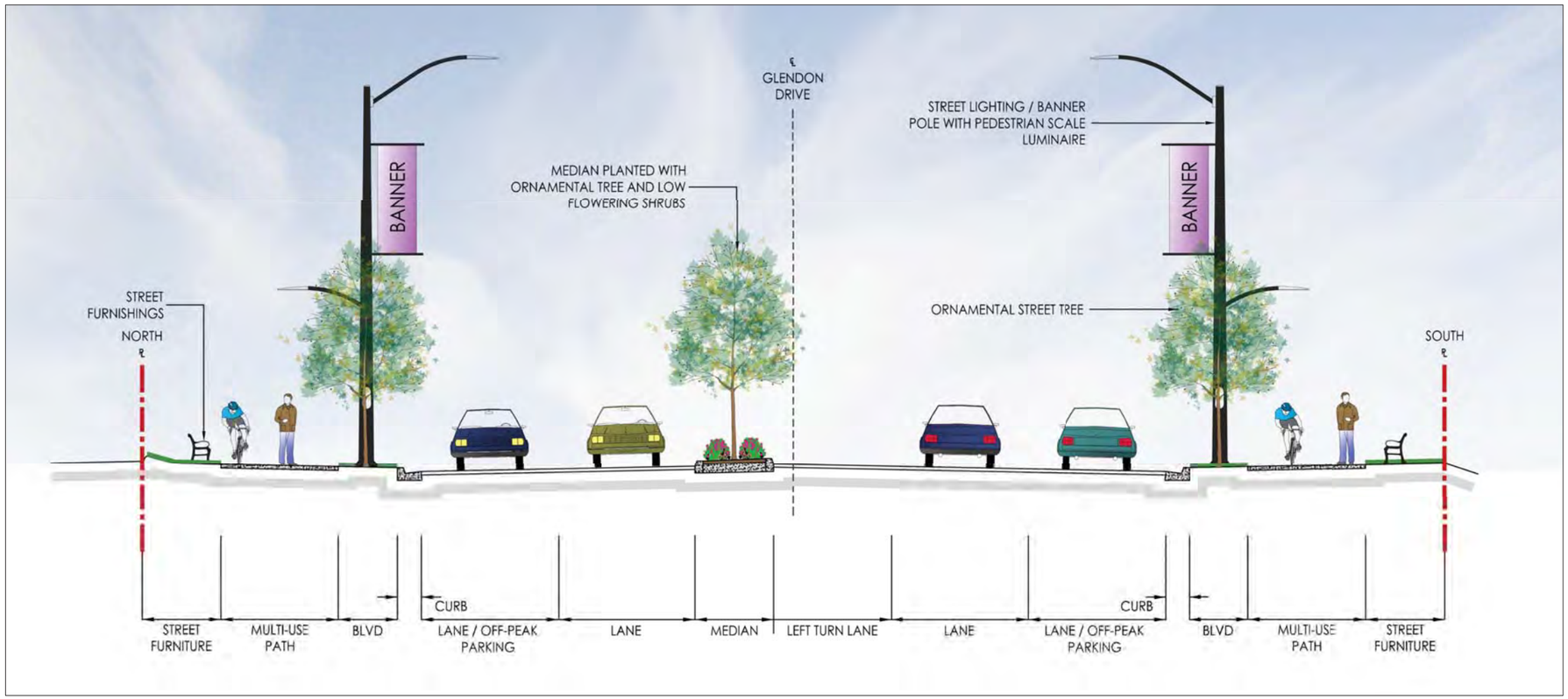
middlesex county

Plan



Typical Cross Section



Legend

- MUNICIPAL ENTRY SIGN
- COMMUNITY ENTRY SIGN
- FEATURE / ORNAMENTAL PLANTING AREA
- INTERSECTION IMPROVEMENT
- LANDSCAPED MEDIAN
- ORNAMENTAL STREET TREE
- LARGE NATIVE STREET TREE
- MULTI-USE TRAIL
- MAINTAIN EX. WOODLAND EDGE
- APPROXIMATE LOCATION OF TYPICAL CROSS SECTION
- 50 DELINEATION OF THEME ZONES

Notes

Figure 14.4

June 2016

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Urban Design Concept
Komoka Road to Vanneck Road

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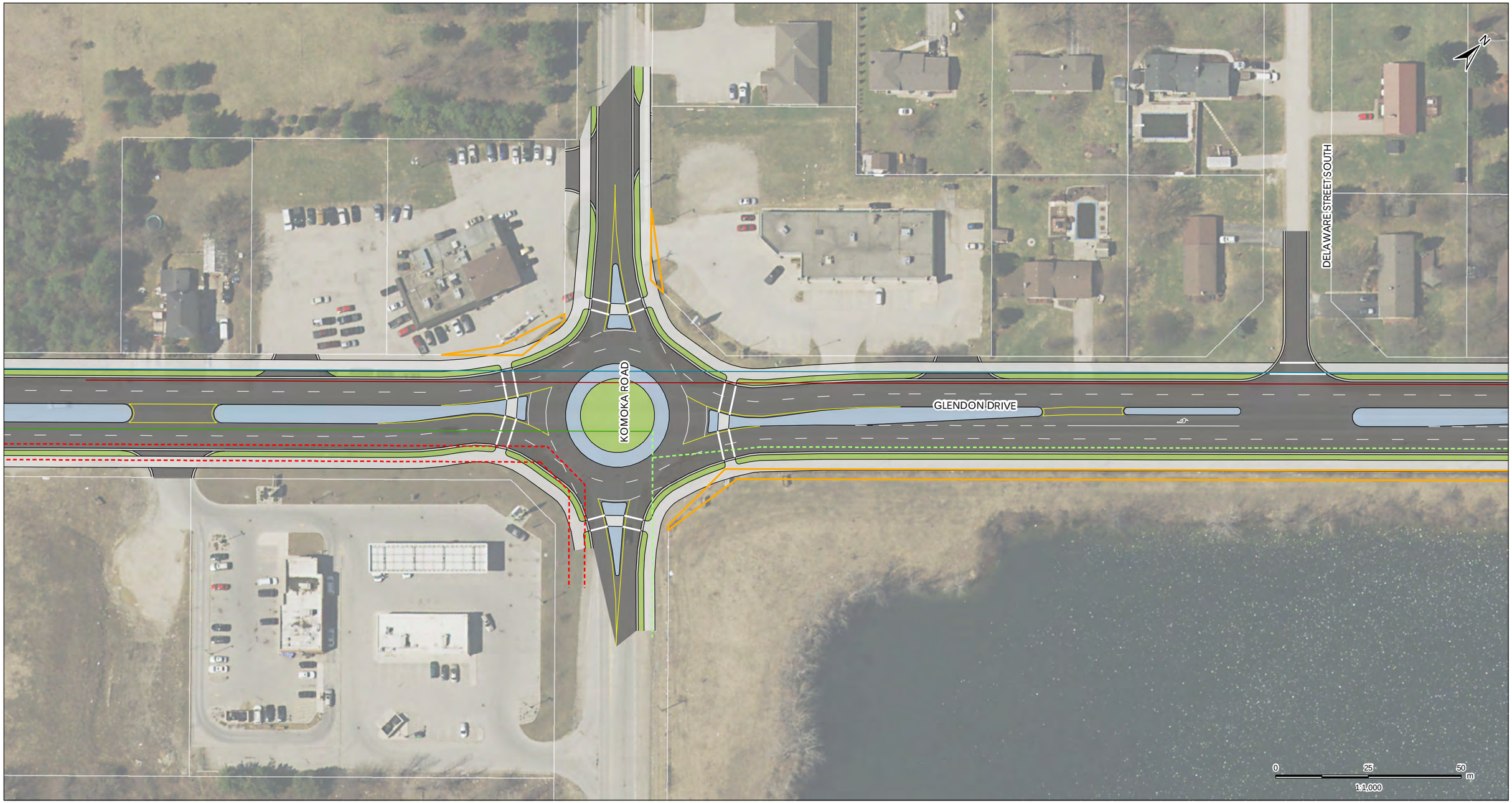

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Legend

- Signalized Intersection
- Proposed Sanitary
- Existing Sanitary
- Proposed Storm
- Existing Storm
- Proposed Watermain
- Existing Watermain
- Potential Property Requirement
- Asphalt
- Curb
- Concrete Median
- Boulevard
- Sidewalk/Path

Notes

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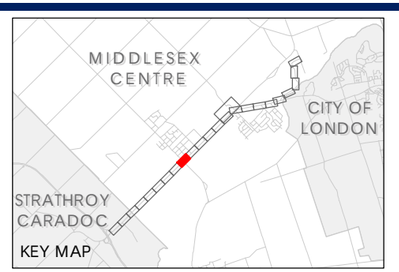

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Figure No.
14.5 (Sheet 9 of 24)

Section 2 - Komoka Road to Jefferies Road/Vanneck Road Recommended Corridor Design

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Legend

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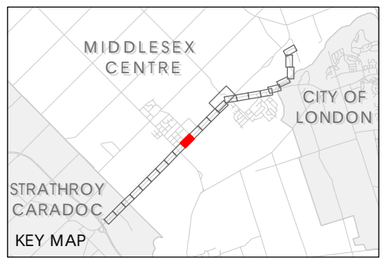

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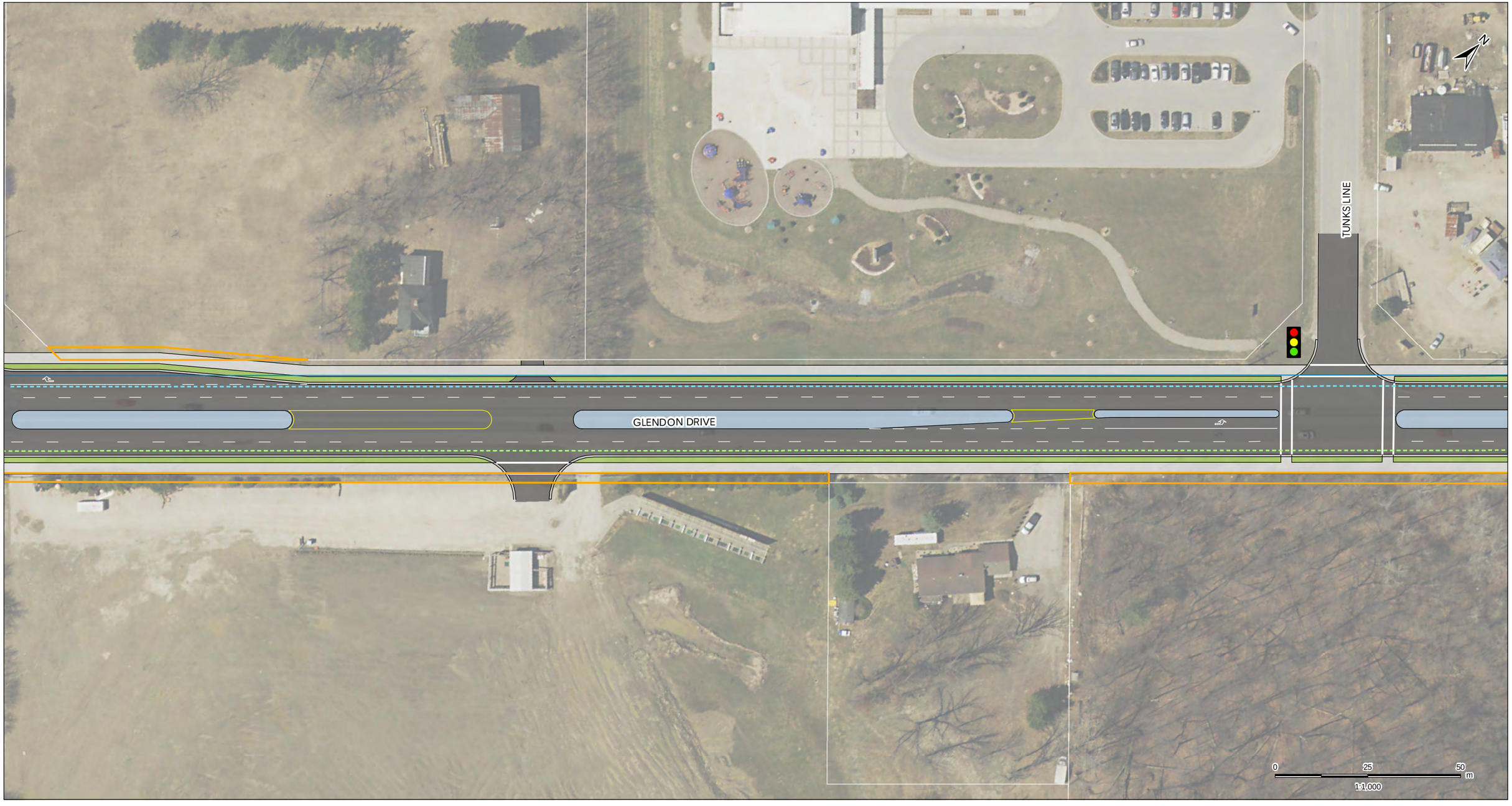
Figure No.
14.5 (Sheet 10 of 24)

Section 2 - Komoka Road to Jefferies Road/Vanneck Road Recommended Corridor Design



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Legend

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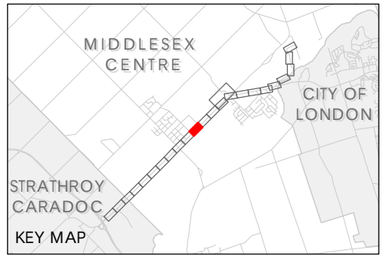

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Figure No.
14.5 (Sheet 11 of 24)

Section 2 - Komoka Road to Jefferies Road/Vanneck Road Recommended Corridor Design

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Legend

- Signalized Intersection
- Proposed Sanitary
- Existing Sanitary
- Proposed Storm
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Figure No.
14.5 (Sheet 12 of 24)

Section 2 - Komoka Road to Jefferies Road/Vanneck Road Recommended Corridor Design

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Legend

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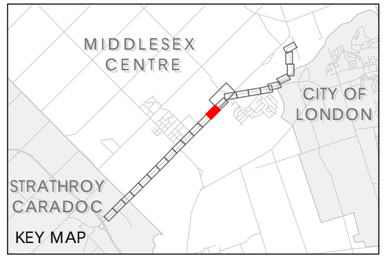

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Figure No.
14.5 (Sheet 13 of 24)

Section 2 - Komoka Road to Jefferies Road/Vanneck Road Recommended Corridor Design

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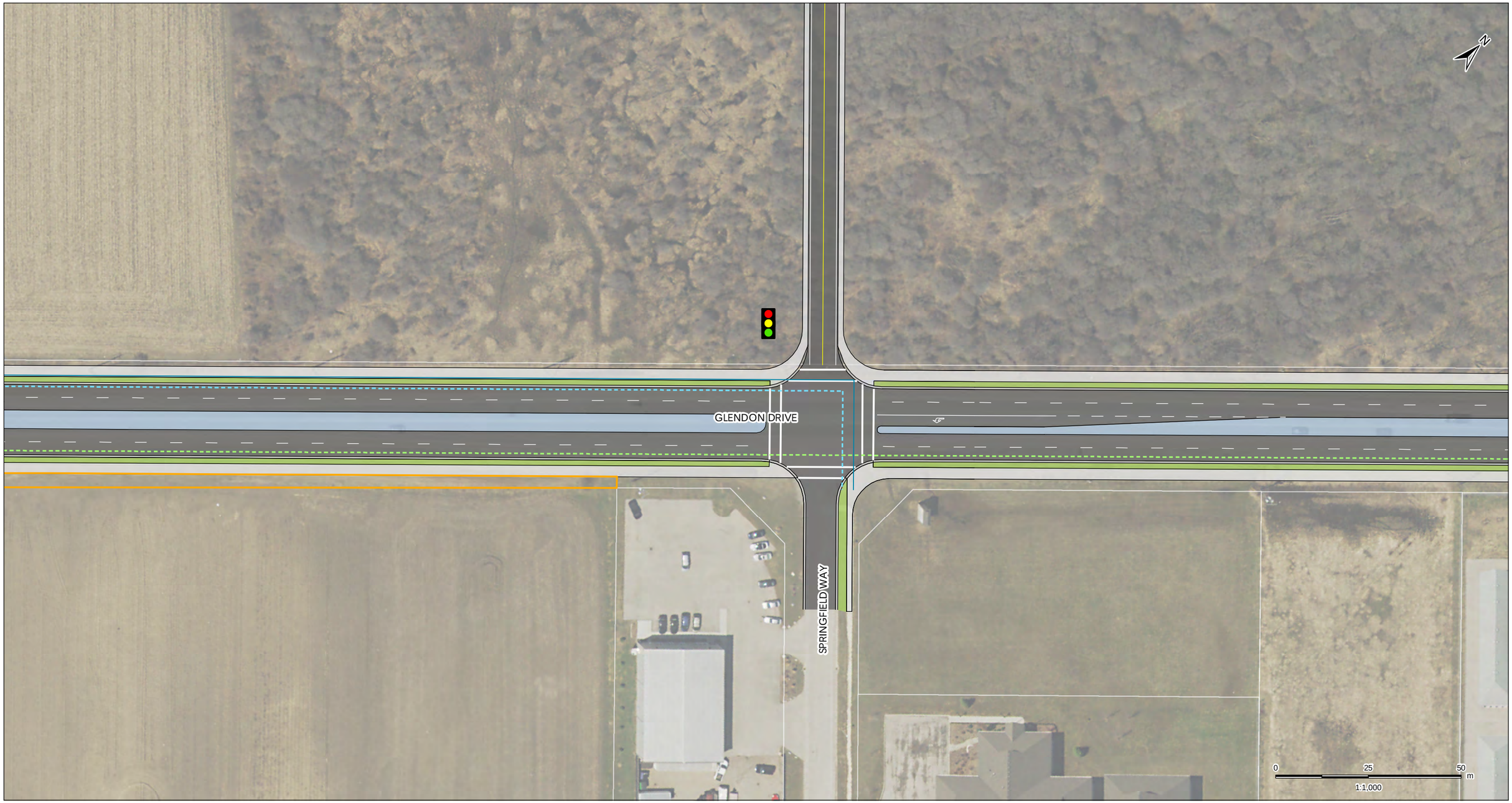

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Legend

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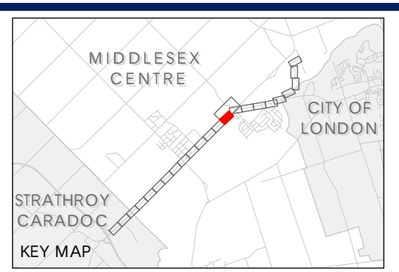

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Figure No.
14.5 (Sheet 14 of 24)

Section 2 - Komoka Road to Jefferies Road/Vanneck Road Recommended Corridor Design

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Legend

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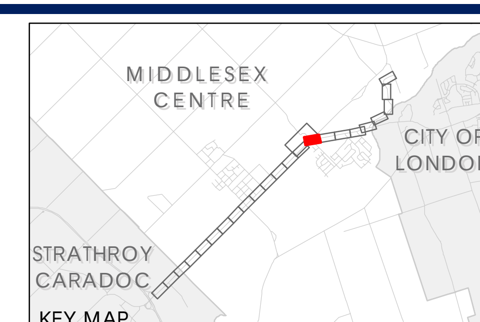

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Figure No.
14.5 (Sheet 15 of 24)

Section 2 - Komoka Road to Jefferies Road/Vanneck Road Recommended Corridor Design

14.3 SECTION 3 – JEFFERIES ROAD TO KILWORTH PARK DRIVE

14.3.1 Cross Section

A continuation of the four lane cross section is recommended between the Vanneck Road / Jefferies Road intersection and the Kilworth Park Drive intersection (refer to Figure 14.6 and Figure 14.7). As this section does not currently have any access points to Glendon Drive, a median is not recommended for any turning lanes or controlled access. The four 3.50 m lanes will include 2.5 m paved shoulders, and will match to the existing foreslope on the north side of Glendon Drive. The south edge of pavement will have curb and gutter, a boulevard, and a multi-use pathway to connect pedestrians and cyclists from Kilworth west to Komoka.

The existing speed limit of 80 km/h would be reduced to 70 km/h to better align with the semi-urban configuration and to conform to the City of London's plan to post Oxford Street down from 80 km/h to 70 km/h in the future.

14.3.2 Water, Sanitary, and SWM Servicing

There is currently no water or sanitary infrastructure within this section of the Glendon Drive corridor and no planned water or sanitary infrastructure. All future developments shall be serviced by extensions to existing systems outside of the Glendon Drive right of way.

Runoff from this section of Glendon Drive is collected and conveyed by an improved roadside ditch on the north side of the right of way. The proposed ditch will be designed in accordance with MOECC criteria for enhanced grassed swales to provide water quality treatment to the Glendon Drive runoff. Check dams located in the proposed roadside ditch will provide temporary stormwater detention to achieve the necessary water quantity control targets. Pre-treatment is provided to the runoff from the paved surface by narrow vegetated filter strips, or other similar linear best management practices. Similar to existing conditions, the Glendon drive runoff is conveyed northward to Oxbow Creek by the existing overland flow route through the ANSI woodlot.

14.3.3 Utilities

Overhead hydro runs along the south side of the corridor between the Vanneck Road / Jefferies Road intersection and Kilworth Park Drive. This line will require relocation further towards the south right-of-way to avoid conflict with the proposed multi-use pathway.

Aerial Rogers cable also runs along the south side of the corridor on the hydro poles. The Rogers cable goes underground through the intersection of Glendon Drive and Kilworth Park Drive before resuming along the poles.

Recommendations
August 3, 2018

Union Gas and Bell both have plant along the Glendon Drive south right-of-way from Jefferies Drive to Kilworth Park Drive. The location and depth of these lines will be confirmed during detail design to establish a relocation plan and/or confirmation of acceptance of the plant being located within the boulevard and under the multi-use pathway.

14.3.4 Property Requirements

Property acquisition along the corridor is not anticipated in order to accommodate the proposed cross section and multi-use trail. Isolated property will be required at the intersections to accommodate the additional lanes and improvements. In addition, one localized area approximately 300 m west of Kilworth Park Drive on the south right-of-way will require property acquisition. Property requirements may be reduced during detailed design.

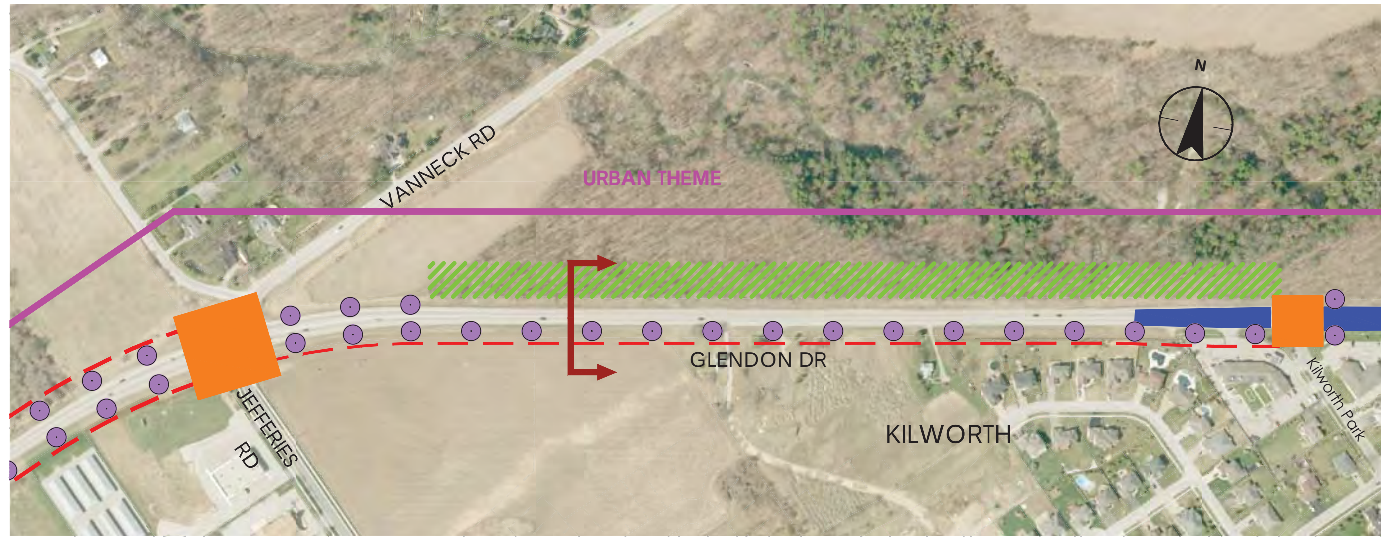
14.3.5 Streetscape/Urban Design

The following streetscape opportunities have been identified for this section of the corridor, and should be considered during detailed design:

- Add a distinctive streetscape treatment to the newly signalized Kilworth Park Drive and Glendon Drive intersection to facilitate and highlight pedestrian connectivity.
- Plant a continuous row of ornamental trees as an extension of the community gateway feature, at key intersections and along the Komoka-Kilworth corridor to create a continuous, aesthetically connected streetscape. Ornamental trees could be flowering, have a unique fall colour and/or distinctive form.
- Preserve and emphasize the natural edge of the existing woodlot located on the north side of Glendon Drive.
- Implement distinctive street lighting along the Komoka-Kilworth streetscape corridor.

More information on Streetscape/Urban Design elements and themes can be found in **Appendix F**.

Plan



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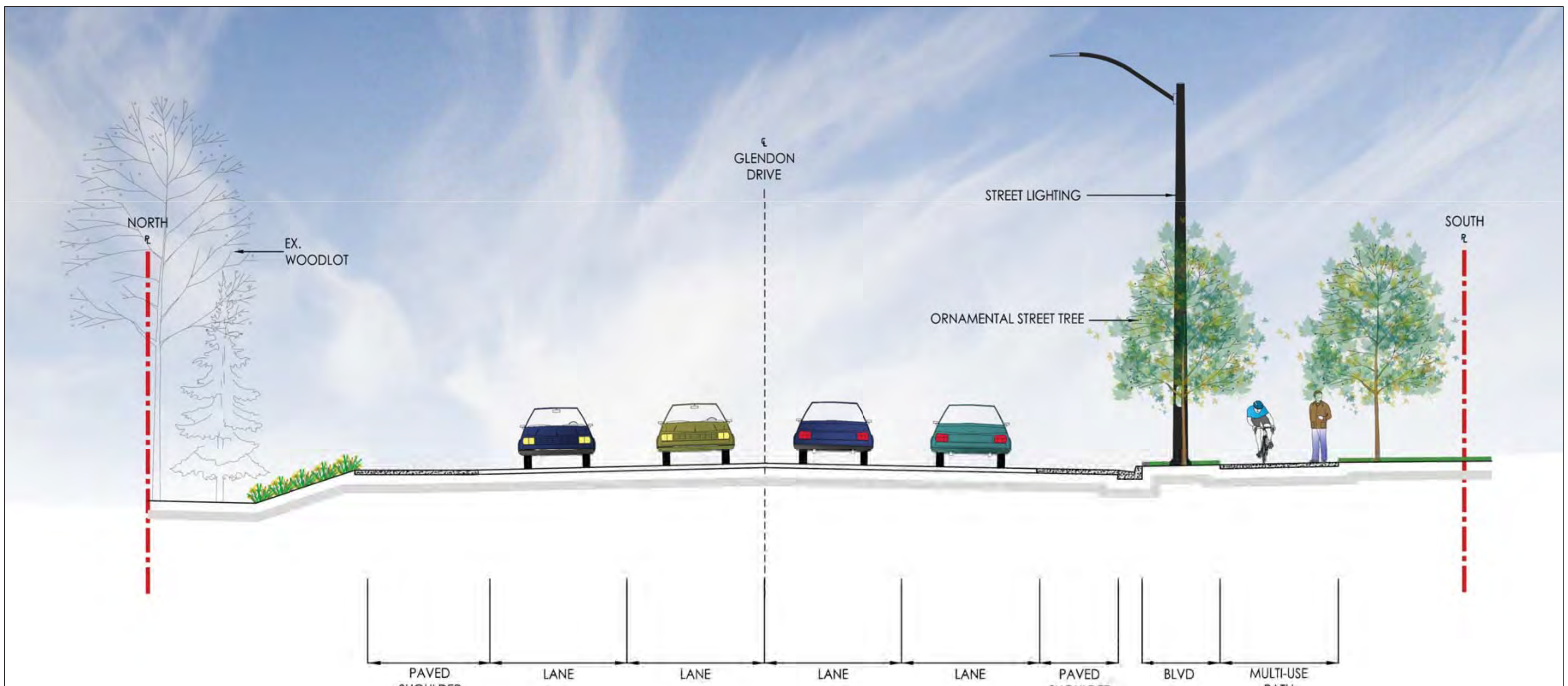
Typical Cross Section



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Legend

- MUNICIPAL ENTRY SIGN
- COMMUNITY ENTRY SIGN
- FEATURE / ORNAMENTAL PLANTING AREA
- INTERSECTION IMPROVEMENT
- LANDSCAPED MEDIAN
- ORNAMENTAL STREET TREE
- LARGE NATIVE STREET TREE
- MULTI-USE TRAIL
- MAINTAIN EX. WOODLAND EDGE
- APPROXIMATE LOCATION OF TYPICAL CROSS SECTION
- DELINEATION OF THEME ZONES

Notes

Figure 14.6

June 2016

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Urban Design Concept
Vanneck Road to Kilworth Drive

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Legend

- Signalized Intersection
- Proposed Sanitary
- Existing Sanitary
- Proposed Storm
- Existing Storm
- Proposed Watermain
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- Potential Property Requirement
- Asphalt
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- Boulevard
- Sidewalk/Path

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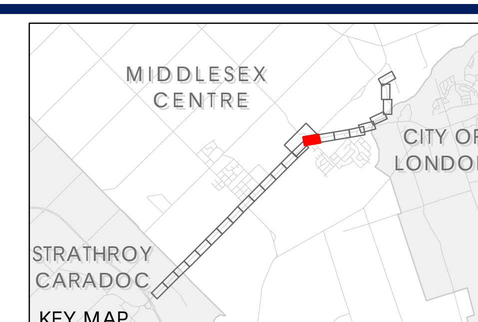

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Figure No.
14.5 (Sheet 15 of 24)

Section 2 - Komoka Road to Jefferies Road/Vanneck Road Recommended Corridor Design

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Legend

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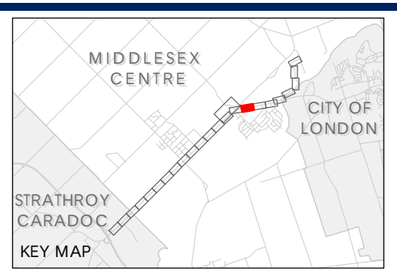

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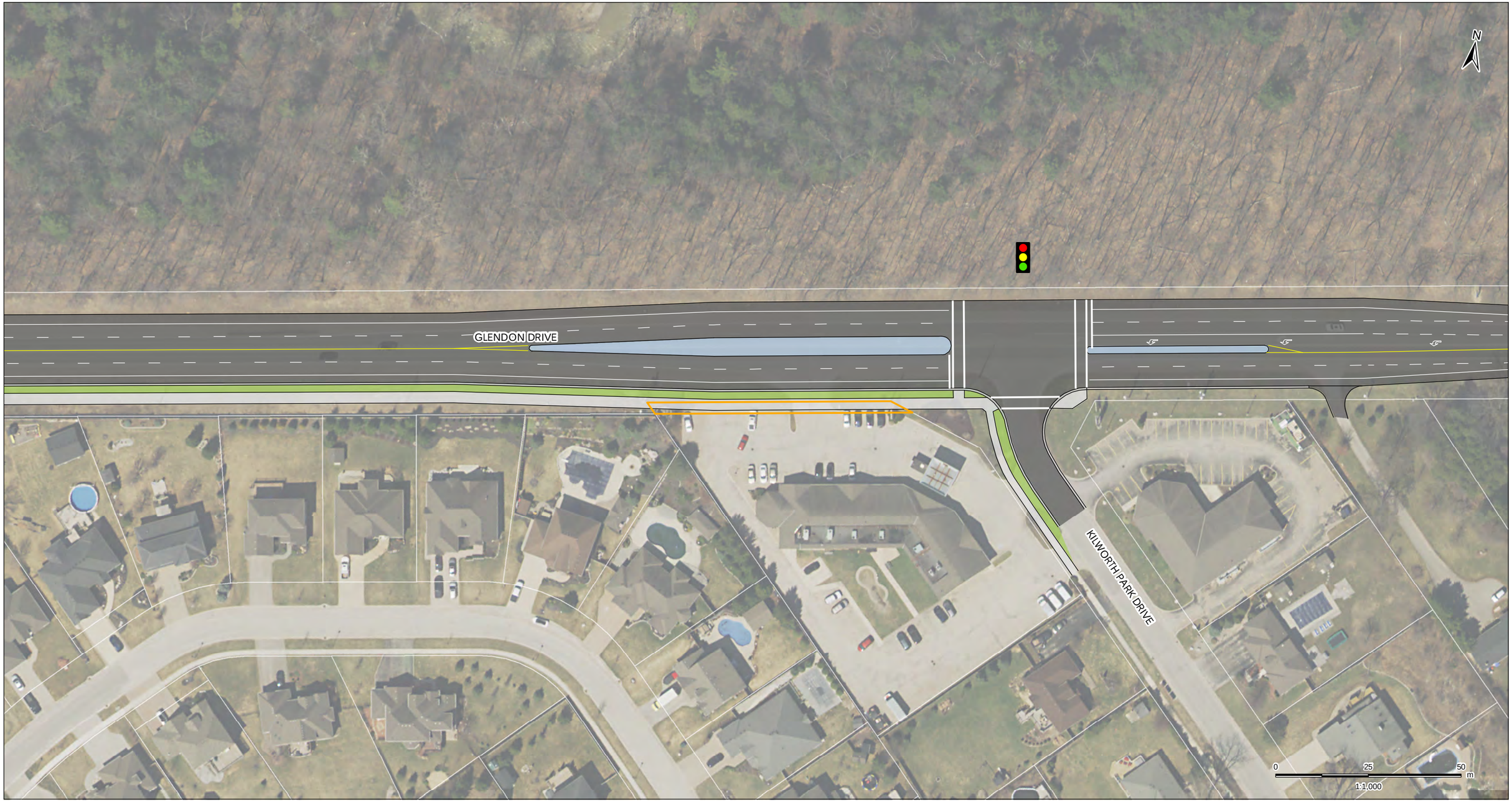
Figure No.
14.7 (Sheet 16 of 24)

Section 3 - Jefferies Road/Vanneck Road to Kilworth Park Drive Recommended Corridor Design



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Legend

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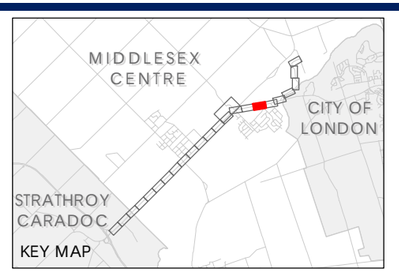

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Figure No.
14.10 (Sheet 17 of 24)

Section 3 - Jefferies Road/Vanneck Road to Kilworth Park Drive Recommended Corridor Design

14.4 SECTION 4 KILWORTH PARK DRIVE TO THE THAMES RIVER BRIDGE

14.4.1 Cross Section

This section is proposed to remain a rural cross section with two lanes of traffic to tie into the two lane structure crossing the Thames River. The cross section will consist of two 3.5 m lanes and incorporate a 3.25 m left turn lane to promote safe accessibility to the properties along the south side of Glendon Drive. In addition, 2.5 m paved shoulders are included (refer to Figure 14.9 and Figure 14.10). As identified in the County's draft Cycling Strategy (April 2018), these paved shoulders may be identified for cycling purposes, and should be confirmed during detailed design in accordance with the final Cycling Strategy recommendations.

The existing rural ditches are to be shifted to accommodate the widened road platform. The design of the ditches should minimize the cut / fill needs that will be created with the platform modifications.

The existing speed limit of 80 km/h would be reduced to 70 km/h to conform to the City of London's plan to post Oxford Street down from 80 km/h to 70 km/h in the future.

14.4.2 Water, Sanitary, and SWM Servicing

There is currently no water or sanitary infrastructure within this section of the Glendon Drive corridor and no planned water or sanitary infrastructure.

Similar to existing conditions, runoff from this section of the corridor is conveyed to the Thames River by an improved roadside ditch on the north side of the right of way. The proposed ditch will be designed in accordance with MOECC criteria for enhanced grassed swales to provide water quality treatment to the Glendon Drive runoff. Check dams located in the proposed roadside ditch provide temporary stormwater detention to achieve the necessary water quantity control targets. Pre-treatment is provided to the runoff from the paved surface by narrow vegetated filter strips, or similar linear best management practices.

14.4.3 Utilities

Overhead hydro is present on the south side from Kilworth Park Drive easterly to Old River Road. The overhead line then transitions across Glendon and continues northerly along Old River Road. Rogers has aerial cable that shares these poles and follows this route, though it crosses Glendon Drive just east of Elmhurst Street.

Similarly, Bell's underground plant in the area follows the south right-of-way and crosses the road near Elmhurst, then continues eastward and then along Old River Road.

Union Gas has distribution pipes along the south right-of-way that continue to Old River Road, then follow Old River Road to the north.

14.4.4 Property Requirements

No additional property is anticipated in this section, with the exception of the property required for the proposed realignment of the Old River Road intersection (refer to **Section 14.8**).

14.4.5 Streetscape/Urban Design

The following Streetscape/Urban Design opportunities have been identified for this section of the corridor, and should be considered during detailed design:

- Enhance the Kilworth community entry sign with decorative paving, ornamental tree and landscaping to create a gateway feature.
- Create a Middlesex Centre gateway feature on the west side of the bridge including a significant signage feature, ornamental trees and landscaping.
- Plant a continuous row of ornamental trees as part of the gateway feature, at key intersections and along the Komoka-Kilworth corridor to create a continuous, aesthetically connected streetscape. Ornamental trees could be flowering, have a unique fall colour and/or distinctive form.

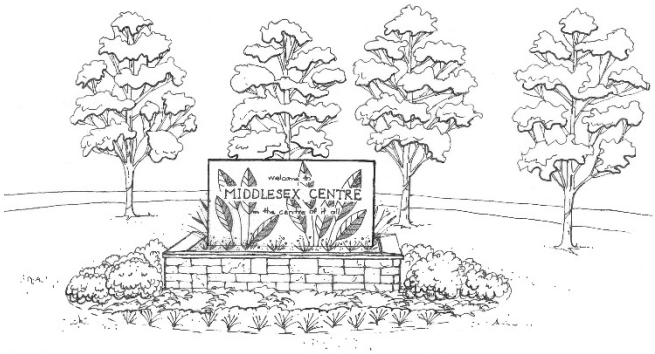


Figure 14.8 Middlesex Centre Gateway Feature Concept

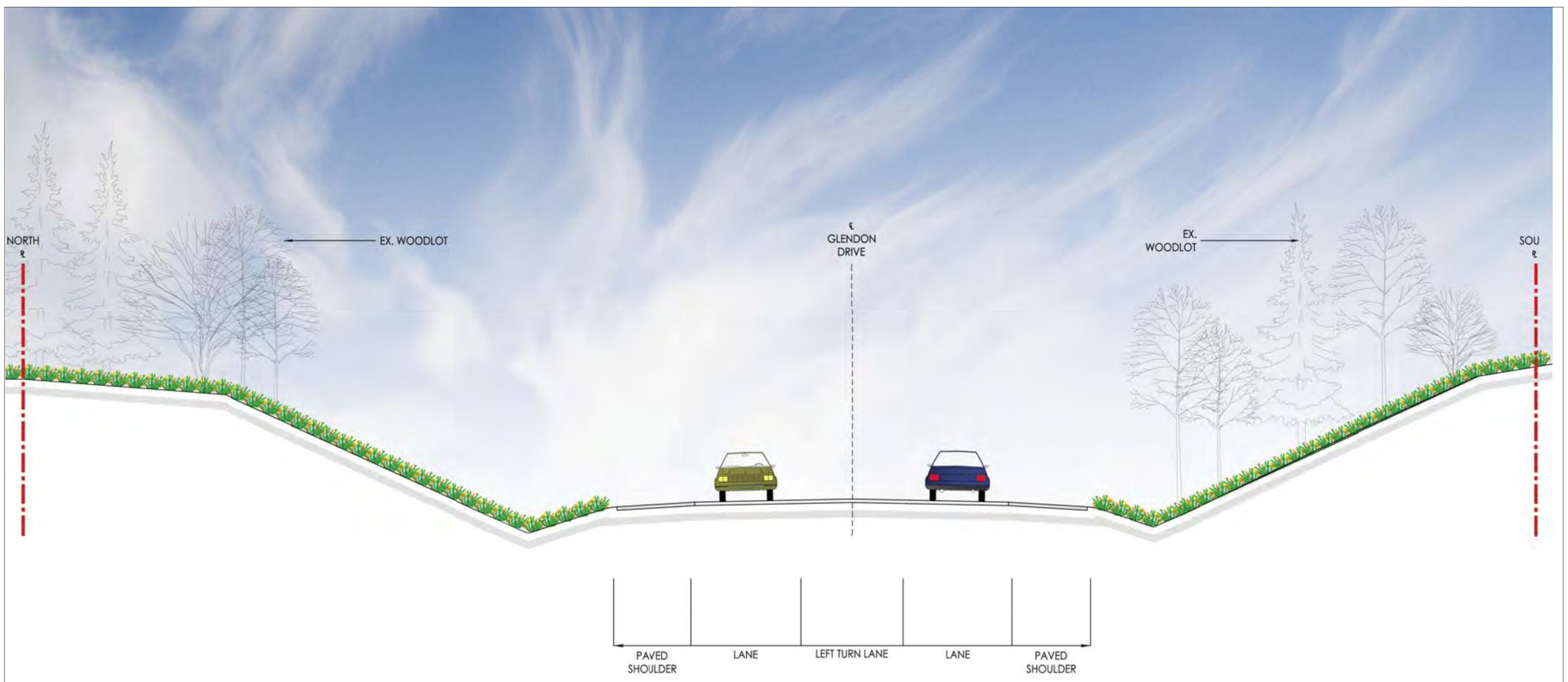
- Preserve and emphasize the natural edge of the existing woodlot located on the north side of Glendon Drive.
- Plant large, native shade trees along Glendon Drive from the east limit of Kilworth to the bridge. In addition, add groupings of native shrub species where feasible.

More information on Streetscape/Urban Design elements and themes can be found in **Appendix F**.

Plan

HORZ – 1 : 5000
50 0 100m

Typical Cross Section



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Legend

- MUNICIPAL ENTRY SIGN
- COMMUNITY ENTRY SIGN
- FEATURE / ORNAMENTAL PLANTING AREA
- INTERSECTION IMPROVEMENT
- LANDSCAPED MEDIAN
- ORNAMENTAL STREET TREE
- LARGE NATIVE STREET TREE
- MULTI-USE TRAIL
- MAINTAIN EX. WOODLAND EDGE
- APPROXIMATE LOCATION OF TYPICAL CROSS SECTION
- DELINEATION OF THEME ZONES

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Figure 14.9

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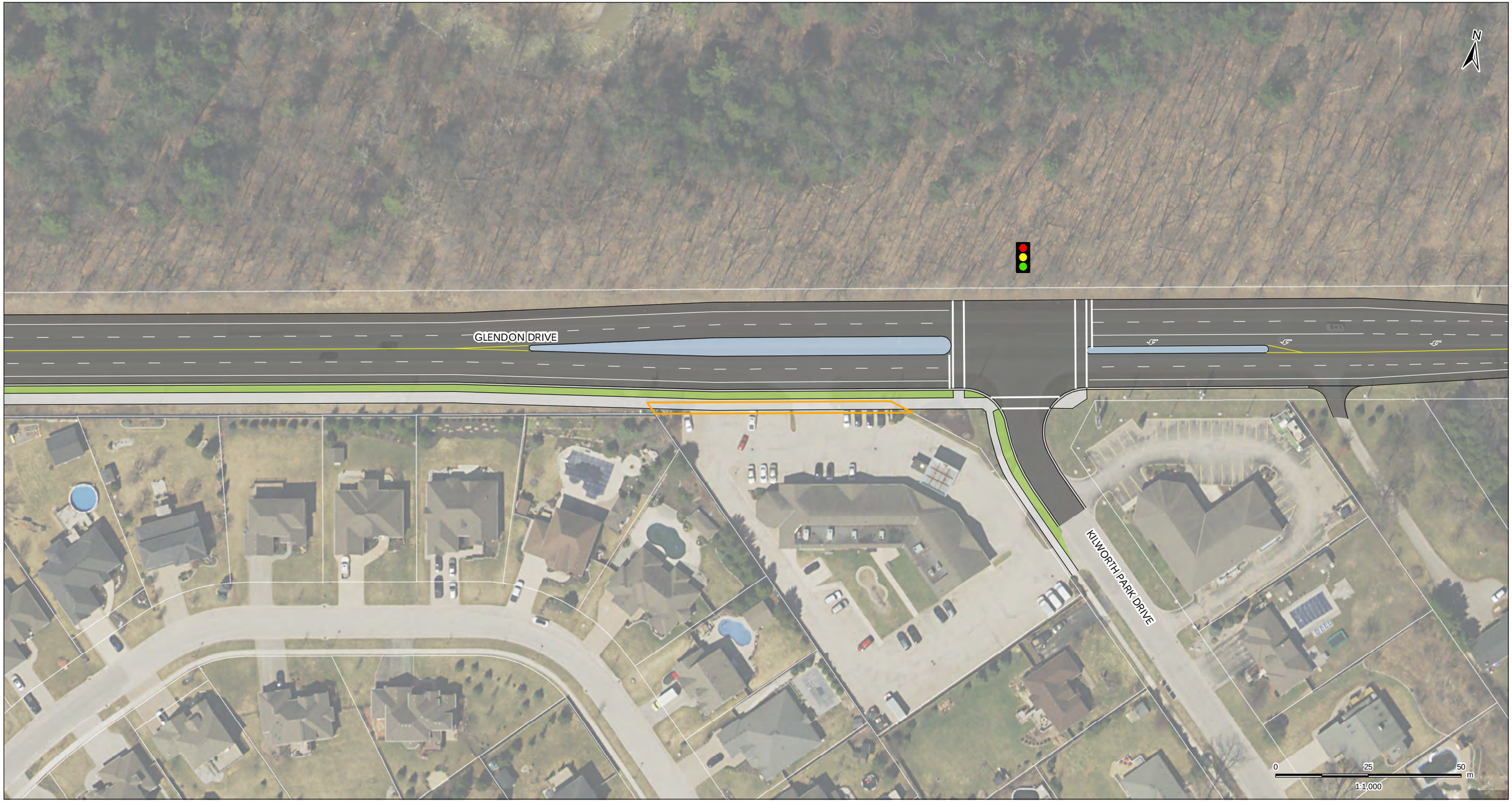
Urban Design Concept
Kilworth Drive to the Bridge

ORIGINAL SHEET - ANSI D



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Legend

- Signalized Intersection
- Proposed Sanitary
- Existing Sanitary
- Proposed Storm
- Existing Storm
- Proposed Watermain
- Existing Watermain
- Potential Property Requirement
- Asphalt
- Curb
- Concrete Median
- Boulevard
- Sidewalk/Path

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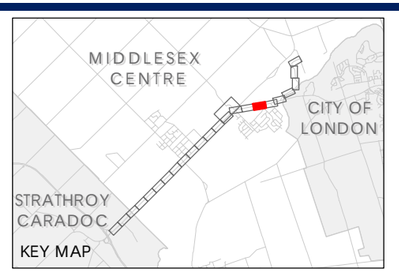

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Figure No.
14.10 (Sheet 17 of 24)

Section 3 - Jefferies Road/Vanneck Road to Kilworth Park Drive Recommended Corridor Design

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Legend

- Signalized Intersection
- Proposed Sanitary
- Existing Sanitary
- Proposed Storm
- Existing Storm
- Proposed Watermain
- Existing Watermain
- Potential Property Requirement
- Asphalt

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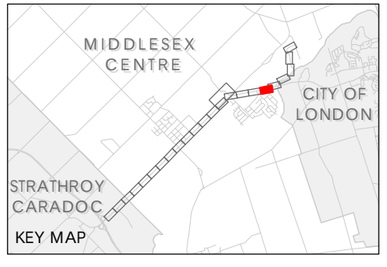

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Figure No.
14.10 (Sheet 18 of 24)

Section 4 - Kilworth Park Drive to the Thames River Bridge Recommended Corridor Design

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Legend

- Signalized Intersection
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- Existing Sanitary
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- Existing Storm
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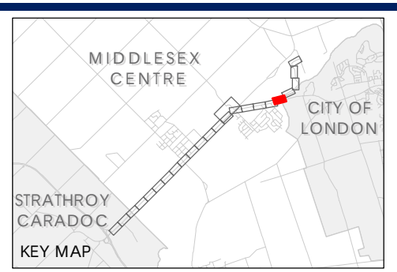

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Figure No.
14.10 (Sheet 19 of 24)

Section 4 - Kilworth Park Drive to the Thames River Bridge Recommended Corridor Design

14.5 KOMOKA ROAD INTERSECTION

14.5.1 Intersection Control

A roundabout is being proposed for the Komoka Road intersection to increase intersection capacity, improve level of service and promote traffic flow, and improve safety by lessening the severity of potential collisions (refer to Figure 14.11).

The multi-use pathways would form a connection across all legs to tie in Komoka Road to the Glendon Drive corridor.

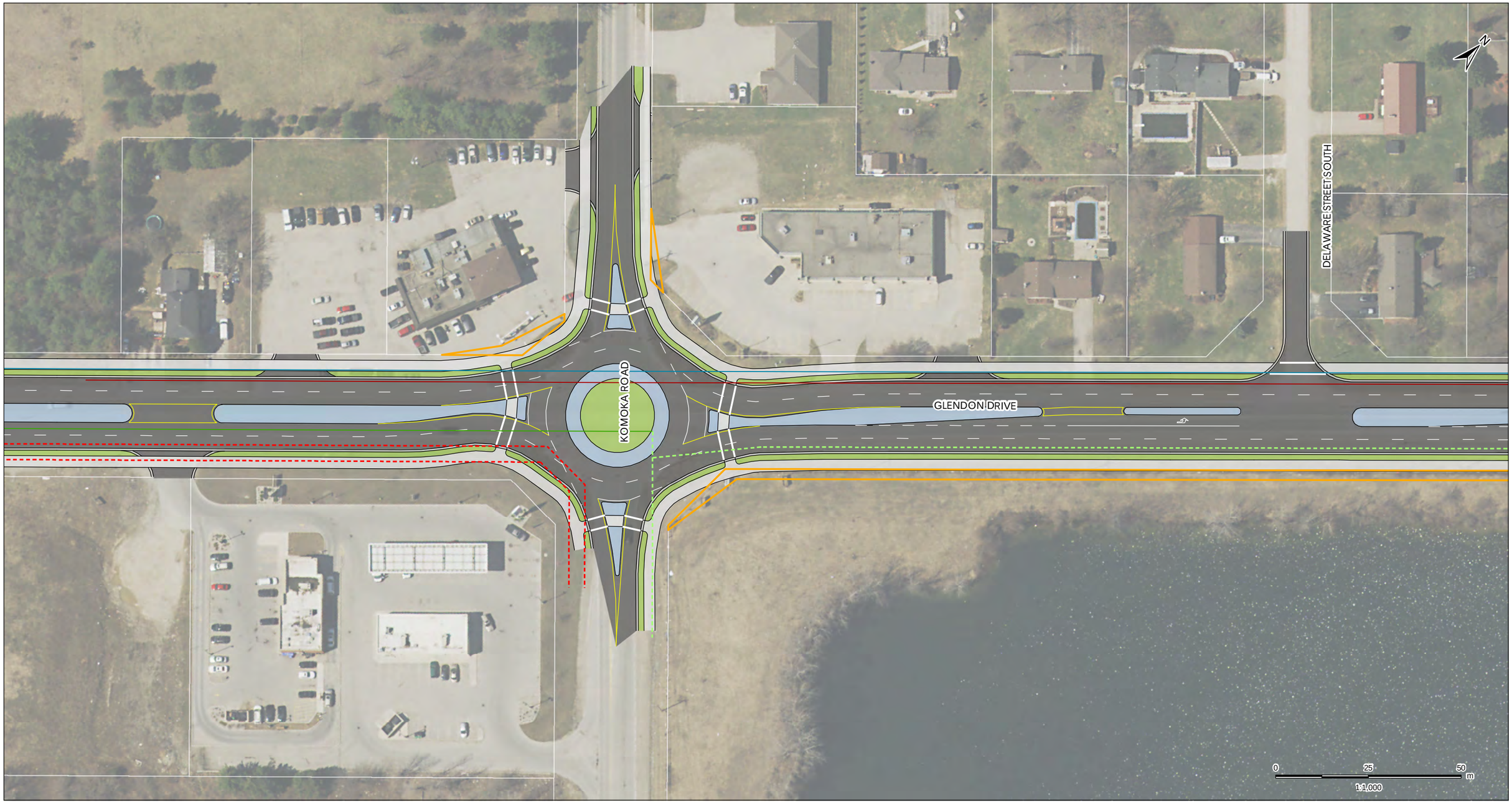
14.5.2 Property Requirements

This roundabout will require property on three of the four quadrants and impact the entrance configuration of the two commercial properties on the north side of Glendon Drive. During the detailed design phase, modifications to the roundabout conceptual design could mitigate the potential impacts to the gas bar on the northwest quadrant.

14.5.3 Streetscape/Urban Design

A distinctive streetscape treatment should be incorporated into the proposed roundabout, similar to the design applied to key intersections, to facilitate and highlight pedestrian connectivity and maintain continuity within the Komoka-Kilworth streetscape corridor.

The centre island design should be low maintenance/maintenance free, and plantings or other features must consist of low cover on the outside and high cover in middle to maintain sight lines. The centre island should be designed such that pedestrians are not attracted to it (i.e. avoid plaques, statues, etc.).



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Legend

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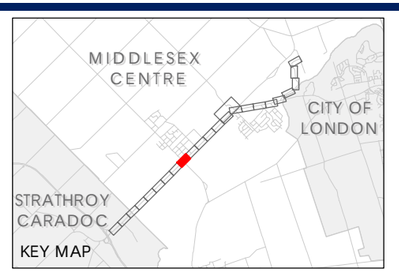

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Figure No.
14.11 (Sheet 9 of 24)

Section 2 - Komoka Road to Jefferies Road/Vanneck Road Recommended Corridor Design

14.6 MID-CORRIDOR INTERSECTIONS – TUNKS LANE, CRESTVIEW DRIVE, AND SPRINGFIELD WAY

14.6.1 Intersection Control

There are three intersections between Komoka Road and Vanneck Road/Jefferies Road that are recommended for signalization (refer to Figure 14.13): Tunks Line, Crestview Drive (future Kilworth Heights West subdivision access) and Springfield Way (including the recommended Coldstream Road realignment). Signalization is preferred over a series of roundabouts in this location due the disproportionate traffic volumes on the Glendon Drive legs compared to the side roads, resulting in an overall negative impact to the level of service, and traffic flow. Left turn lanes are recommended to promote the level of service at the intersections.

These intersections will serve as controlled crossing locations for the multi-use pathways along Glendon Drive and will help connect the communities of Komoka and Kilworth.

14.6.2 Streetscape/Urban Design

A distinctive streetscape treatment should be applied to the Tunks Line intersection with Glendon Drive to facilitate and highlight active transportation connectivity. The Komoka Wellness and Recreation Centre should also be highlighted at the intersection of Tunks Lane with decorative paving, ornamental trees and landscaping, which also serve to enhance the pedestrian realm (Figure 14.12). A unique pavement material, pattern, and/or colour could be considered at the intersection to further emphasize the community and Municipal brand (i.e. blue and green to compliment the community signage program).

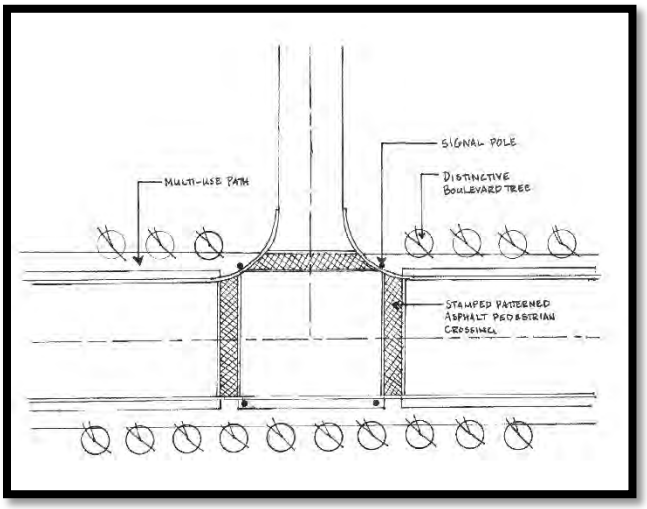
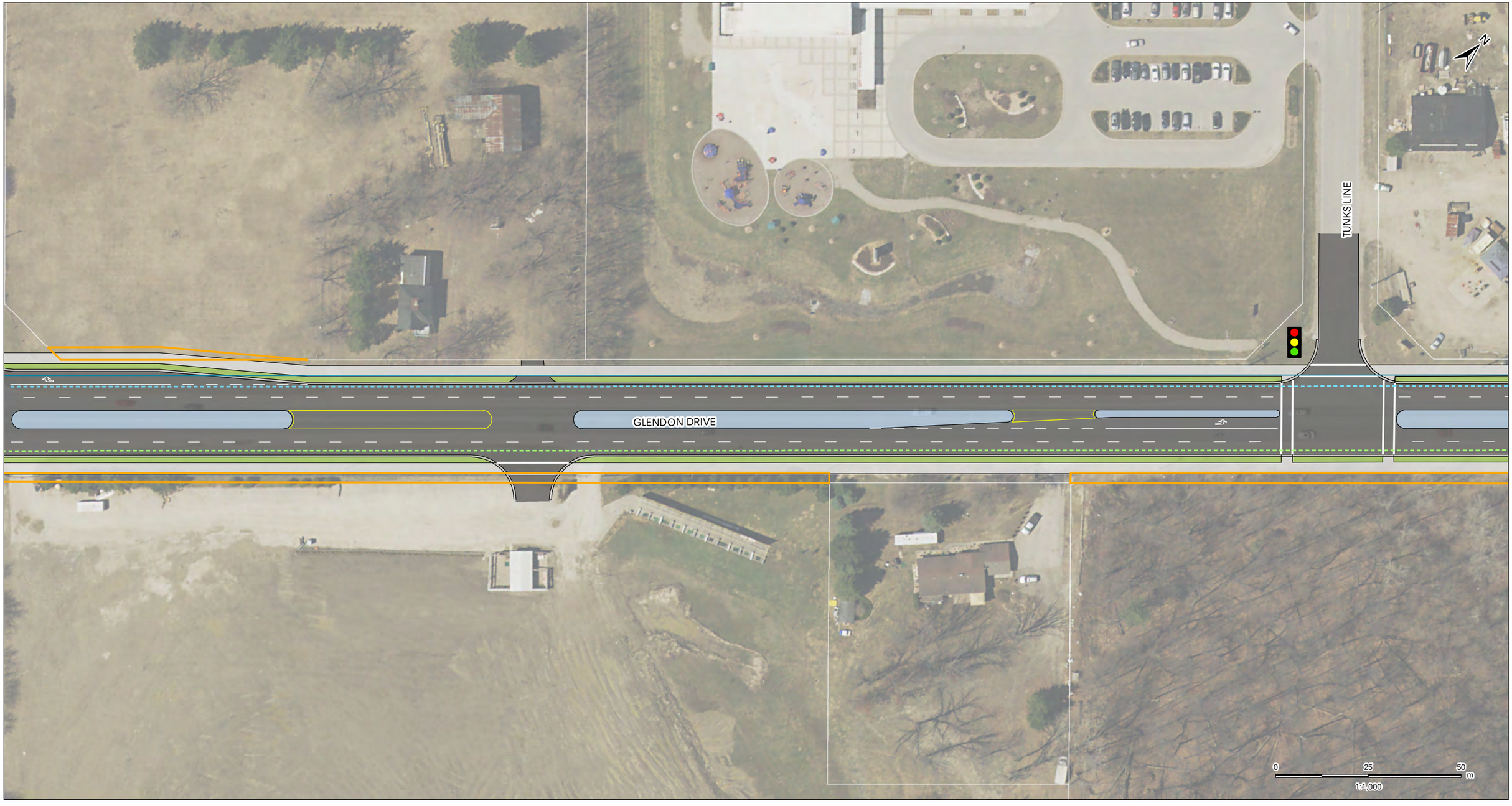


Figure 14.12 Enhanced Pedestrian Realm Intersection Treatment



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Legend

- Signalized Intersection
- Proposed Sanitary
- Existing Sanitary
- Proposed Storm
- Existing Storm
- Proposed Watermain
- Existing Watermain
- Potential Property Requirement
- Asphalt
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- Boulevard
- Sidewalk/Path

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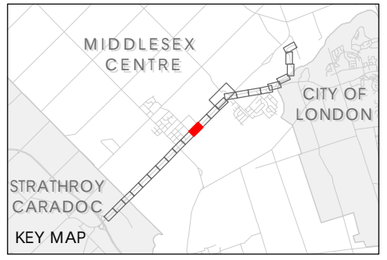

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Figure No.
14.**13** (Sheet 11 of 24)

Section 2 - Komoka Road to Jefferies Road/Vanneck Road Recommended Corridor Design

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Figure No.
14.**13** (Sheet 12 of 24)

Section 2 - Komoka Road to Jefferies Road/Vanneck Road Recommended Corridor Design

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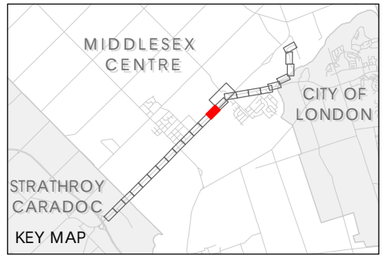

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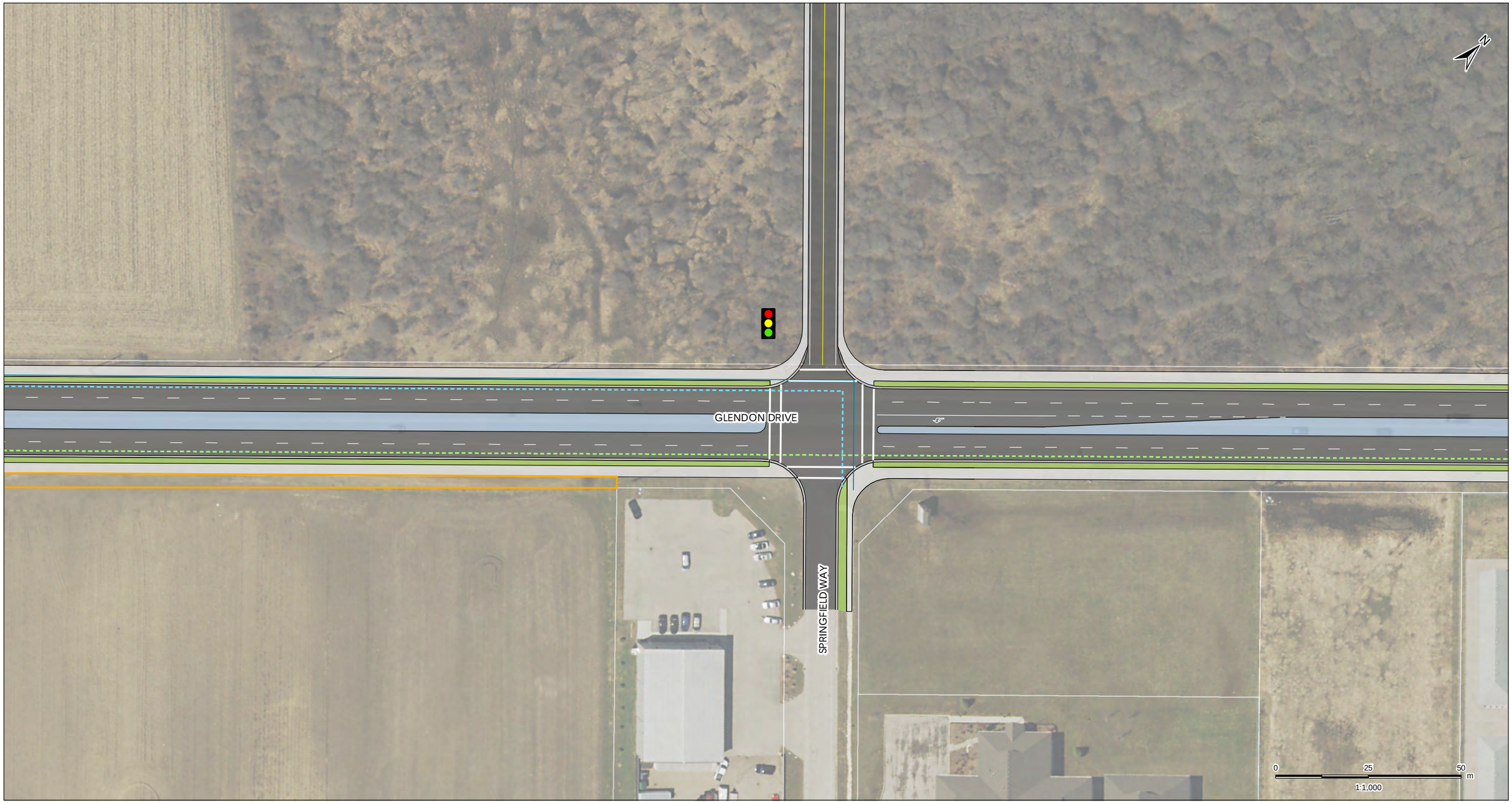
Figure No.
14.**13** (Sheet 13 of 24)

Section 2 - Komoka Road to Jefferies Road/Vanneck Road Recommended Corridor Design



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Legend

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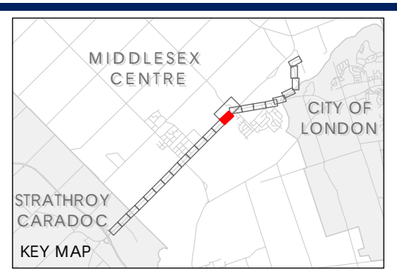

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Figure No.
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Section 2 - Komoka Road to Jefferies Road/Vanneck Road Recommended Corridor Design

14.7 JEFFERIES ROAD/VANNECK ROAD INTERSECTION

A four leg roundabout, in conjunction with the realignment of Coldstream Road, is proposed for the intersection of Glendon Drive, Vanneck Road and Jefferies Road. A roundabout will provide a greater level of service and safety when compared to a signalized intersection, primarily due to the curve on Glendon Drive with the existing geometrics of the intersecting roadways.

The recommended roundabout concept (refer to Figure 14.14) includes dual lane entries and a westbound right turn by-pass from Glendon Drive to Vanneck Road to best accommodate the geometry of the road approaches. The details of the roundabout concept will be confirmed during detailed design.

14.7.1 Streetscape/Urban Design

Similar to the roundabout proposed at the Komoka Road intersection with Glendon Drive, a distinctive streetscape treatment should be incorporated that is in line with the design applied to key intersections, to facilitate and highlight pedestrian connectivity and maintain continuity within the Komoka-Kilworth streetscape corridor.

The centre island design should be low maintenance/maintenance free, and plantings or other features should consist of low cover on the outside and high cover in middle to maintain sightlines. The centre island should be designed such that pedestrians are not attracted to it (i.e. avoid plaques, statues, etc.).

A high level of design should be employed at this intersection, in keeping with the vision for the Community Gateway as identified within the Middlesex Centre Official Plan Schedule A-2.

14.7.2 Property Requirements

Property is required along the east, southeast, and northwestern quadrants of the four leg roundabout to facilitate the proposed footprint and multi-use pathways. Property requirements shall be confirmed during detailed design with any design refinements to the roundabout, and the property requirements may be reduced to the extent feasible.

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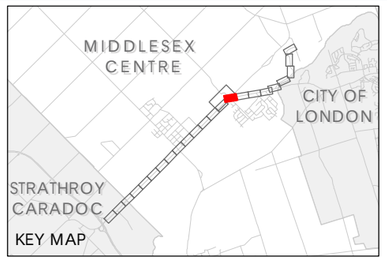

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Figure No.
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Section 2 - Komoka Road to Jefferies Road/Vanneck Road Recommended Corridor Design

14.8 COLDSTREAM ROAD REALIGNMENT

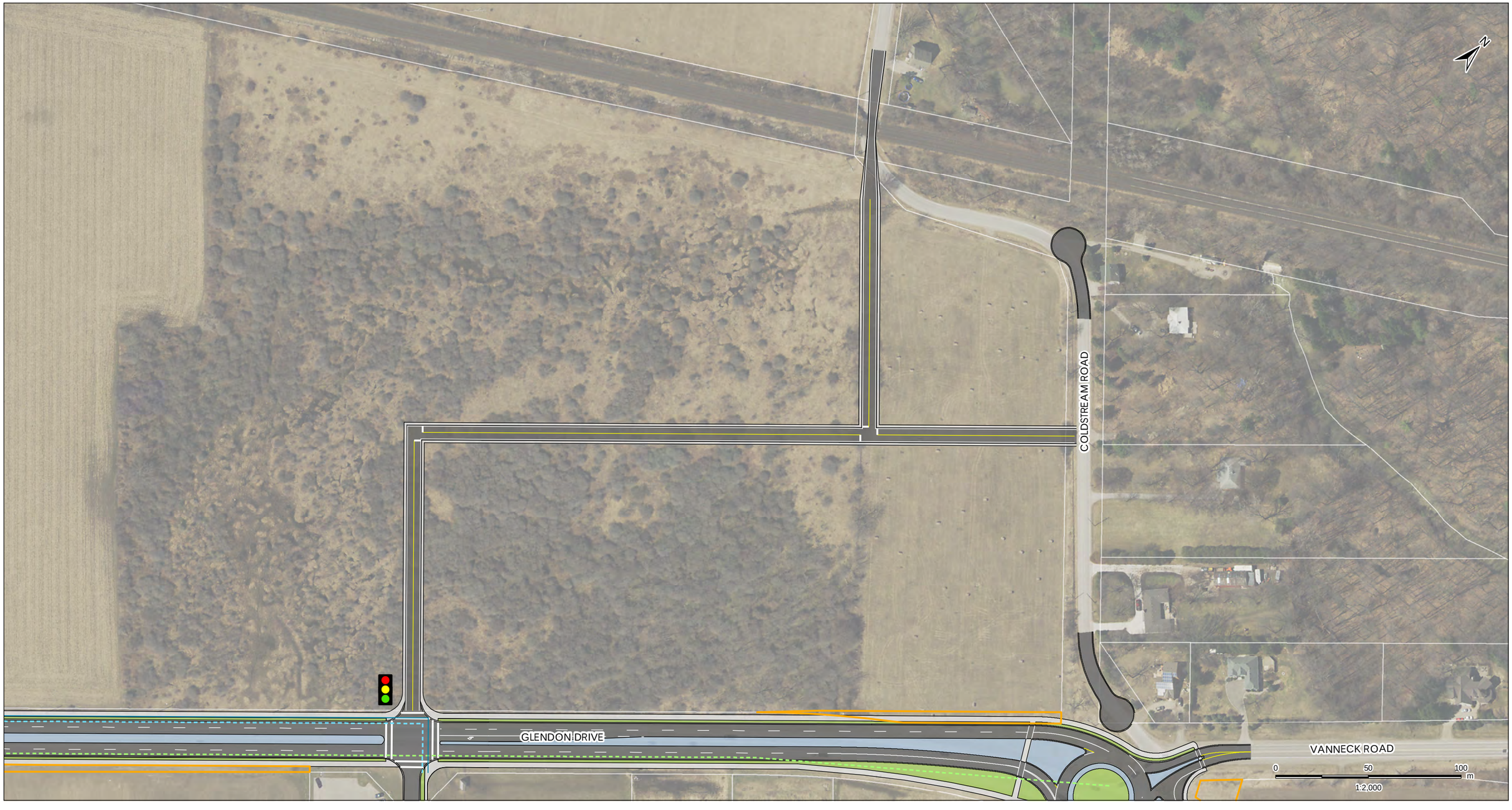
In conjunction with the recommended roundabout concept the Glendon Drive, Jefferies Road, and Vanneck Road intersection, it is recommended that Coldstream Road be realigned westward to meet Glendon Drive at Springfield Way (refer to Figure #). This intersection control and realignment of Coldstream Road will improve overall operations and safety at the existing "5 Corners" intersection. The recommended design has been identified based on existing environmental features, future development, the existing CN Rail underpass constraint, and considering a transition between a more rural area to the future built up area of the Kilworth-Komoka communities. This concept may be modified during detailed design, provided that a sufficient buffer is provided to the wetland feature, speed control measures are identified, future development is accommodated, and an appropriate connection is provided to the existing Coldstream Road segment with appropriate sightlines to the CN Rail underpass structure.

14.8.1 Streetscape/Urban Design

This road realignment provides the opportunity to implement a high quality of urban design within a gateway to the Kilworth-Komoka communities, and effect a transition from the rural to more built up areas of the community. Landscaping along the corridor should be designed to preserve and enhance the surrounding vegetation communities.

14.8.2 Property Acquisition

Property is required for the extent of the realignment. This property required could be allocated as part of a future development application.



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Legend

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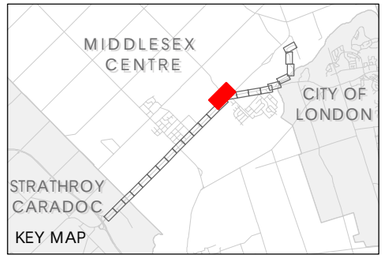

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Coldstream Road Realignment

14.9 OLD RIVER ROAD

The goal of the Glendon Drive EA with respect to Old River Road is to address the significant safety concerns with the intersection as noted in the existing conditions section of this report. A significant portion of traffic volume along Old River Road is identified as non-local through traffic i.e. not originating from or having a destination along Old River Road. This traffic, in addition to the existing intersection geometry and sightlines relative to the adjacent bridge, significantly increases the probability of a collision occurring at the Glendon Drive and Old River Road intersection.

Considering the input received from residents along the corridor throughout the study, and specifically the concerns expressed regarding the recommended emergency gate at Old River Road/Pulham Road, a phased approach can be taken to addressing concerns at Old River Road. These improvements would be done in conjunction with the recommended roundabout at Glendon Drive/Vanneck Road and Jefferies Road. The first phase involves the implementation and monitoring of traffic calming measures, to identify the effectiveness of the measures in addressing the volume of non-local through traffic at the intersection with Glendon Drive. The traffic volumes and characteristics (local traffic vs through commuter traffic) would be monitored. Once the municipality has deemed that the traffic calming measures alone are no longer sufficient to maintain the nature of Old River Road as a local road, based on their Traffic Calming policies (currently under development), the second phase would be implemented, and a gate would be installed.

In conjunction, the recommendations from the 2011 Class EA for the road reconstruction and bank stabilization would also be implemented. This work includes reconstruction of Old River Road with a partial road realignment at the base of the hill to shift the road platform away from the river bank. Bank stabilization elements would be introduced to improve the erosion protection currently in place, and to protect the currently unprotected sections of the bank. Storm drainage would be improved along the hill though the installation of catch basin inlets and curb and gutter. An overall grade raise of the lower portion of Old River Road is not being proposed, and is documented in Section 12.1.4. See the 2011 Class EA documentation for more details.

14.9.1 Phase 1 – Traffic Calming Measures

Traffic calming measures would potentially include temporary measures that can be removed during the winter months such that winter maintenance is not impacted, such as speed cushions and additional signage (including ‘no through traffic’ and ‘no trucks’ signage). Traffic calming measures will be implemented and monitored in accordance with the Municipality’s Traffic Calming Policy, currently under development.

While speed reduction measures are not traditionally effective in significantly reducing traffic volumes, the objective of the first phase will be to monitor the peak hour traffic volumes at the Old River Road intersection with Glendon Drive. The results would be compared with traffic volumes collected during the Glendon Drive Class EA study. The objective is to reduce traffic volumes at the intersection of Glendon Drive to within volumes and trip usage consistent with the Local (Rural) Road classification.

To accurately measure the effectiveness of the traffic calming measures in reducing traffic volumes on Old River Road, the additional network improvements should be in place, including the roundabout at the intersection of Glendon Drive, Jefferies Road, and Vanneck Road. The intersection improvements at this location will play an important role in the overall transportation network, and in diverting cut-through traffic on Old River Road.

14.9.2 Phase 2 – Intersection Realignment and Emergency Gate

To improve the high collision rate observed at the intersection, an intersection realignment approximately 50 m westward is recommended (refer to Figure 14.16). This realignment will allow for an eastbound left turn lane and will shift the intersection up the hill and away from the Thames River Bridge structure to improve sightlines. Operational analysis of the intersection under future conditions shows that the left turn movement onto Glendon Drive will operate at a poor level of service during peak times, and similar to a right-in, right-out configuration, residents will have the option of heading westward to the proposed roundabout at the Jefferies Road/Vanneck Road intersection in order to head eastward toward the City of London.

A full movement intersection is being proposed in conjunction with an emergency gate at the intersection of Old River Road and Pulham Road. The turnaround and emergency gate will restrict all through traffic along the corridor reducing the number of vehicles entering the intersection with Glendon Drive by approximately 95%.

The emergency gates will be operated by Middlesex Centre/Middlesex County staff and emergency services staff in the event of an emergency and/or a portion of Old River Road becomes impassible from the south (i.e. ice conditions at the steep Old River Road hill, or due to roadway flooding). The Municipality is committed to ensuring appropriate access and egress for residents and emergency services along Old River Road.

The recommended design concept for Old River Road is identified in Figure 14.16, which includes road reconstruction as part of regular maintenance activities, and a realignment of the middle section as identified in the 2011 Old River Road Class EA to address erosion and bank stability concerns.

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Legend

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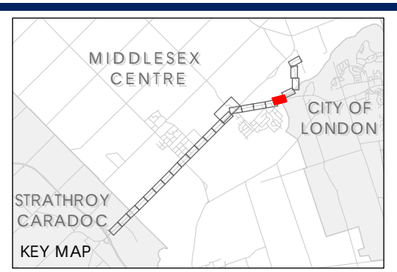

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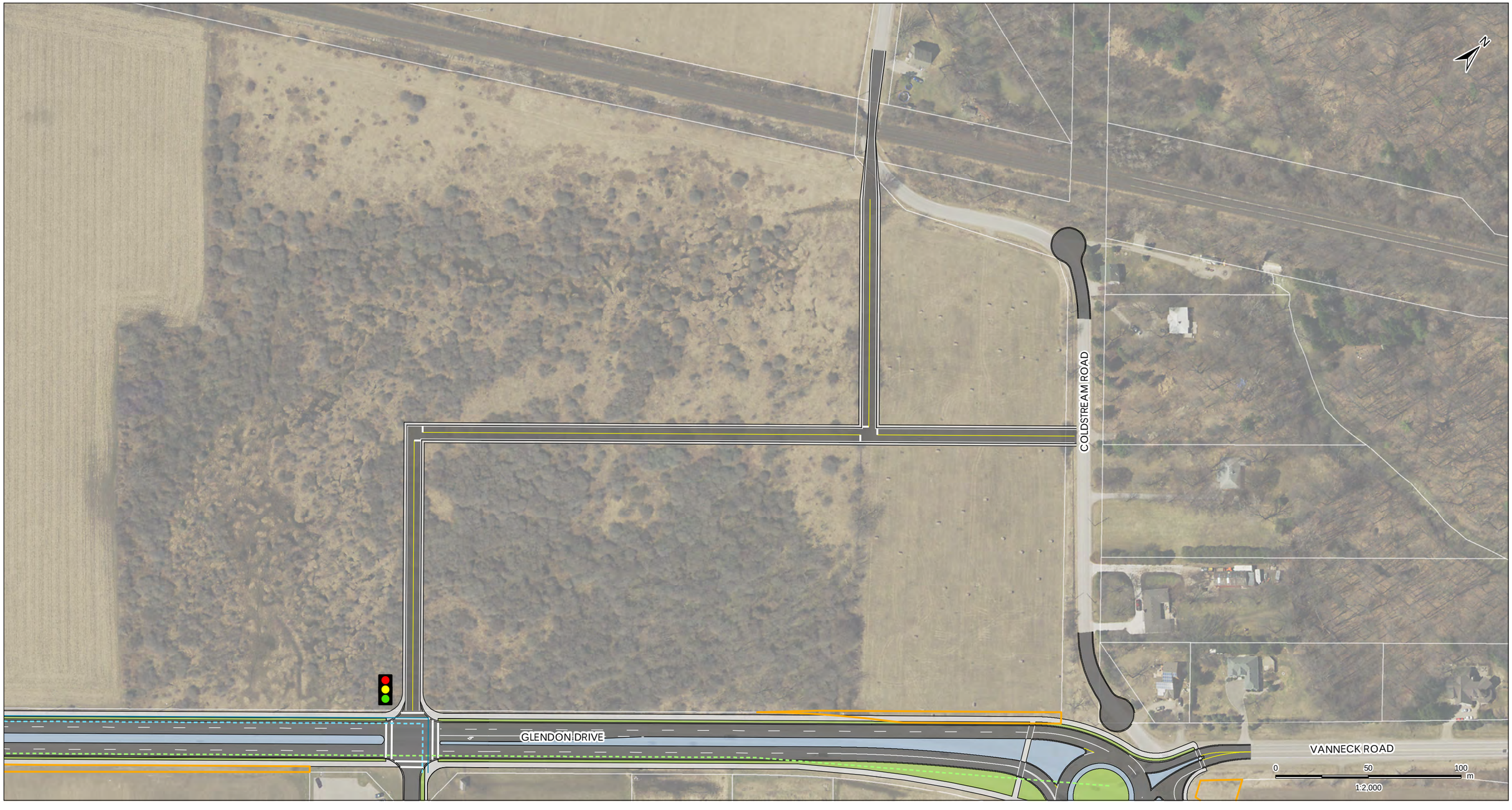
Section 4 - Kilworth Park Drive to the Thames River Bridge Recommended Corridor Design



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February 2018
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Glendon Drive

paving the way for an active community

middlesex centre — in the centre of it all

middlesex county

Legend

- Signalized Intersection
- Proposed Sanitary
- Existing Sanitary
- Proposed Storm
- Existing Storm
- Proposed Watermain
- Existing Watermain
- Potential Property Requirement
- Asphalt
- Curb
- Gravel
- Concrete Median
- Boulevard
- Sidewalk/Path

Notes

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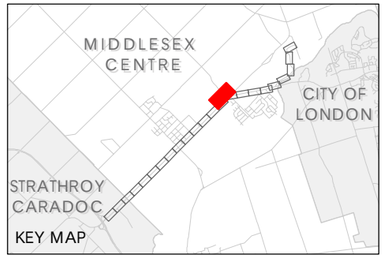

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Figure No.
14.15 (Sheet 20 of 24)

Coldstream Road Realignment

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Legend

- Signalized Intersection
- Proposed Sanitary
- Existing Sanitary
- Proposed Storm
- Existing Storm
- Proposed Watermain
- Existing Watermain
- Potential Property Requirement
- Asphalt
- Gravel

Notes

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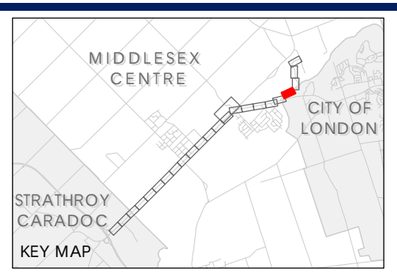

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Figure No.
14.16 (Sheet 21 of 24)

Old River Road Corridor

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Legend

- Signalized Intersection
- Proposed Sanitary
- Existing Sanitary
- Proposed Storm
- Existing Storm
- Proposed Watermain
- Existing Watermain
- Potential Property Requirement
- Asphalt
- Gravel

Notes

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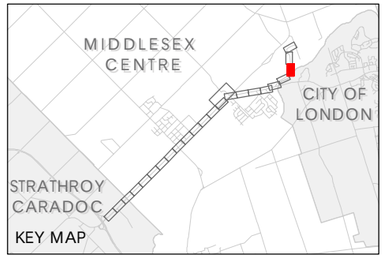

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Figure No.
14.16 (Sheet 22 of 24)

Old River Road Corridor

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Legend

- Signalized Intersection
- Proposed Sanitary
- Existing Sanitary
- Proposed Storm
- Existing Storm
- Proposed Watermain
- Existing Watermain
- Potential Property Requirement
- Asphalt
- Gravel

Notes

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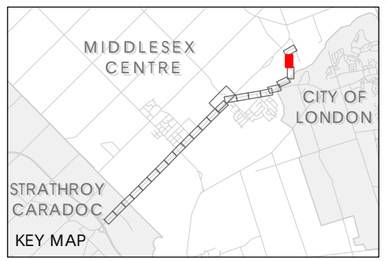

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Figure No.
14.16 (Sheet 23 of 24)

Old River Road Corridor

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Legend

- Signalized Intersection
- Proposed Sanitary
- Existing Sanitary
- Proposed Storm
- Existing Storm
- Proposed Watermain
- Existing Watermain
- Potential Property Requirement
- Gate
- Asphalt
- Gravel

Notes

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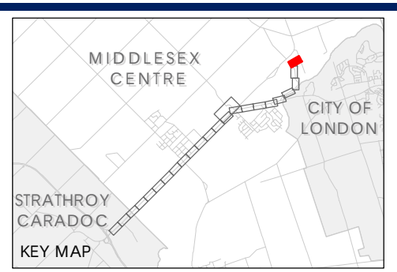

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Figure No.
14.16 (Sheet 24 of 24)

Old River Road Corridor

Figure 14.16 Old River Road and Pulham Road (19-24)

15.0 COST AND IMPLEMENTATION TIMEFRAME

The Recommended Strategy proposes improvements that will benefit Middlesex County and the Municipality of Middlesex Centre by providing a more versatile traffic network and promoting active transportation within the community.

The implementation of the improvements is dependent on both the background traffic growth and the rate of development improvements. The implementation timeline below is primarily based on the forecasted traffic volumes in the area. As development progresses, servicing needs may drive some of these improvements to avoid duplicate reconstruction costs.

The primary focus of the improvement phasing is to follow a timeline that alleviate congestions when required and prioritize the needed safety improvements.

The Recommended Strategy involves a number of interconnected projects. Table 15.1 provides an outline of the recommended improvements, scope, implementation timeframe, and opinion of probable cost.

Table 15.1 Cost and Implementation Timing

Improvement	Scope	Implementation Timeframe	Cost (excludes contingency & engineering)
Highway 402 easterly to west of Komoka Road	Three lane reconstruction and widening, rural cross section with enhanced ditches. Provision for future watermain and sanitary sewer(s).	10 – 15 years for road works; servicing timing to meet development needs long term.	$8,700,000
Komoka Rd intersection improvements	Reconstruction of the intersection with a two lane entry roundabout with pedestrian and cyclist connections. Landscape of the centre island.	5 – 10 years and be implemented with the road works. Depending on the final rate of development in the area, the roundabout could be implemented as a single lane with the corridor expansion and use of parking lanes. Once volumes warrant the conversion of the	$1,400,000

Cost and Implementation Timeframe
August 3, 2018

Improvement	Scope	Implementation Timeframe	Cost (excludes contingency & engineering)
		parking lanes to travel lanes during peak time, the roundabout can be expanded to the ultimate two lane entry.	
East of Komoka Rd easterly to Jefferies Rd	Four lane reconstruction and widening with an urban cross section, storm sewers, illumination and utility relocations. Implementation of water and sanitary services (as needs warrant). Multi-use pathways on both sides of the corridor and signalized control at the intersections of Tunks Lane, Future Street 'A' and Springfield Way. Localized landscape features and street furniture.	5 – 10 years for road works; servicing to be implemented with road widening to minimize road reconstruction costs. Interim servicing may be required due to progression of localized development. The corridor can be widened to provide parking lanes in the interim, then converted over to travel lanes as volumes warrant.	$13,000,000
Jefferies Rd / Vanneck Rd / Coldstream Rd intersection improvements	Reconstruction of the intersection with a two lane entry roundabout with pedestrian and cyclist connections. Landscape of the centre island. Design of the roundabout would incorporate the realignment of Coldstream Road and connection to Springfield Way.	0 – 5 years to improve safety of the intersection as a phased in single lane roundabout and Coldstream Road realignment. Two lane entry roundabout to be implemented in 5 – 10 year timeframe as adjacent sections are developed to four lanes.	$2,750,000
Jefferies Rd easterly to Kilworth Park Dr	Four lane reconstruction with semi-urban cross section, with curb and gutter on the south and rural shoulders on the westbound and eastbound lanes. Storm sewers and centerline culverts implemented as required for road drainage. Multi-use	5 – 10 years for road works; active transportation within corridor could potentially be implemented in advance of road reconstruction by reconfiguring the ditch on the south side and	$2,250,000

Cost and Implementation Timeframe
August 3, 2018

Improvement	Scope	Implementation Timeframe	Cost (excludes contingency & engineering)
	pathway implemented on south side of corridor, along with illumination and utility relocations. Traffic signals at Kilworth Park Drive. South boulevard to include localized landscape features.	implementing the multi-use pathway between the utility lines and the right-of-way.	
Kilworth Park Dr easterly to Thames River bridge	Three lane reconstruction and widening, rural cross section with ditches.	0 – 5 years with the implementation of the improvements to the road platform for the Old River Road intersection being phased first.	$1,050,000
Old River Road intersection improvements	Reconstruction and relocation of the intersection westerly to improve safety. Widening the Glendon Drive platform to accommodate a new left turn lane and runout with shoulders. Partial intersection illumination to be included.	0 – 5 years with a priority to relocate the intersection westerly in order to implement the left turn lane on Glendon Drive and improve the safety.	$350,000
Old River Road Corridor	Implement 2011 Class EA recommendations to reconstruct with a partial road relocation and bank stabilization. Reconstruct the intersection of Old River Road and Pulham Road to prevent access across the CN tracks through the use of a security barrier. Pullham Road to have cul de sac south of residence north of track crossing (MN 20636) to maintain full access to Vanneck Road. Establish section of Pulham Road as new service road.	0 – 5 years in conjunction with the implementation of the Old River Road and Glendon Drive relocation and left turn lane reconstruction.	$2,100,000
		Corridor Subtotal	$31,600,000.00

Cost and Implementation Timeframe
August 3, 2018

Cost estimates are considered planning level estimates, based on elemental units using historical costs for similar projects, and standard estimating references, and will be updated during detailed design to reflect more project-specific information. The cost estimates provided for the recommended design concepts include roadworks, storm sewers, watermains, and sanitary sewers (where identified), electrical (signals, illumination, etc.), and traffic control. Estimates exclude engineering, contingency, and property acquisition costs.

15.1 FUNDING

Improvements have been identified to address increased traffic volumes and to appropriately incorporate the development of lands adjacent to the Glendon Drive corridor in a manner consistent with the County and Municipal Official Plan policies and other design guidelines. It is anticipated that a portion of costs associated with the proposed improvements will be funded by development charges in accordance with the Development Charges Act and the Municipality's current Development Charges Bylaw.

16.0 ENVIRONMENTAL IMPACTS AND MITIGATION

The recommended improvements have been identified to minimize environmental impacts; however, as with any construction project, the potential exists for minor environmental impacts. The sections below outline commitments to be carried forward prior to and/or during detailed design and construction to avoid, mitigate, and/or compensate for potential environmental impacts.

16.1 SOCIAL/CULTURAL ENVIRONMENT

16.1.1 Archaeology

A stage 1 archaeological assessment was conducted along the Glendon Drive corridor to identify areas of archaeological potential subject to further investigation. Prior to disturbance of the areas identified by the stage 1 assessment, a stage 2 assessment must be conducted by an archaeologist licensed in Ontario. Refer to **Appendix D** for areas subject to a stage 2 assessment. In addition, a Stage 1 assessment should be conducted for the entirety of the Coldstream Road realignment.

Prior to undertaking the stage 2 assessment, Chippewas of the Thames First Nation and Walpole Island First Nation should be contacted as requested during consultation activities for this Class EA.

16.1.2 Built Cultural Heritage/Cultural Heritage Landscapes

The MTCS Checklist for Determining Built Heritage Resources and Cultural Heritage Landscapes was completed with respect to the Glendon Drive corridor including areas impacted by the proposed improvements (refer to **Appendix B**). Since improvements are generally limited to the existing County road right of way, no additional Cultural Heritage assessments are required with respect to the Glendon Drive corridor.

A separate Checklist was also completed with respect to improvements identified along Old River Road. Based on the potential for un-designated heritage resources, it is recommended that a Cultural Heritage Evaluation Report be completed by a qualified heritage consultant prior to implementation of the improvements along Old River Road.

16.2 NATURAL ENVIRONMENT MITIGATION AND MONITORING

The recommended improvements within the study area should result in minimal environmental impacts, which can be mitigated through the implementation of best management practices.

Environmental Impacts and Mitigation
August 3, 2018

Based on the features identified within the desktop and field reconnaissance, a number of recommended mitigation measures have been identified to offset the potential for environmental impacts to identified features during and after construction. During detailed design, a certified ecologist should review the proposed mitigation and permitting requirements with respect to detailed road design and impact areas, and all mitigation measures should be incorporated into contract documentation and specifications. Mapping of features referenced in Table 16.1 is identified on Figure 16.1.

With respect to the Komoka Park Reserve ANSI located at northwest of the intersection of Glendon Drive and Old River Road, edge impacts have been identified as a result of the realignment of the Old River Road intersection. During detailed design, consultation with the Ministry of Natural Resources and Forestry should be undertaken, and a collective mitigation and/or restoration plan should be developed.

Table 16.1 Environmental Mitigation

Feature	Ecosite/Habitat	Recommended Mitigation
Designated Natural Areas		
Komoka Park Reserve ANSI	n/a	**Protection of Natural Areas:** • Avoid encroachment into features to the extent possible during detailed design • Clearly delineate / demarcate work areas to avoid encroachment and incidental damage to native trees and areas of natural vegetation • Educate workers on the requirements for and importance of avoiding entrance to the demarcated area • Inspectors should ensure construction vehicles and personnel stay within the work area, thereby limiting the disturbance of natural vegetation • All maintenance activities, vehicle refueling or washing, as well as the storage of chemical and construction equipment should be located >30m from natural areas. In the event of an accidental spill, the MOE Spills Action Centre should be contacted and emergency spill procedures implemented immediately • Accidental damage to trees, or unexpected vegetation removal, should be replaced / restored with native species • Install, monitoring and maintain proper muffling and maintenance of machinery and equipment to mitigate noise impacts to wildlife **Erosion and Sediment Control:**
Komoka Provincial Park	n/a	
Komoka Park PSW	n/a	
Komoka/South Strathroy Creek PSW	n/a	
Significant Woodlands	n/a	
Significant Vegetation Patches (Middlesex Natural Heritage Systems)	n/a	

Feature	Ecosite/Habitat	Recommended Mitigation
		• Erosion and sediment control structures (i.e., silt fencing) should be installed, monitored and maintained regularly to ensure that they are fully functional • Additional silt fence should be available on site, prior to grading operations, to provide a contingency supply in the event of an emergency • Steep slopes (>3:1) should have erosion blankets • Erosion control berms/swales should be located in appropriate (critical) areas to divert flows to the sediment basins • Controls are to be removed only after the soils of the construction area have been stabilized and adequately protected or until vegetation cover is re-established • All sediment and erosion controls should be monitored regularly and properly maintained, as required. Controls are to be removed only after the soils of the construction area have been stabilized and adequately protected until area is re-vegetated. Where evidence of sedimentation or erosion exists, corrective action should be taken as soon as conditions permit **Post-construction Restoration:** • Disturbed areas should be restored using only native species where appropriate, including areas disturbed during construction and parts of the Old River Road that will be removed as part of the preferred plan • Seed mixes and other planting lists should be designed to include only native species adapted to the site conditions, including soil type, moisture and sun exposure. Seed and other material should be from local sources where possible. Exceptions may include plantings in harsh urban environments. In these areas, invasive non-native species should not be used to prevent introduction into adjacent natural areas • Seed mixes should include fast-growing, short-lived perennial cover crop to stabilize soil and reduce competition from weeding exotics

Feature	Ecosite/Habitat	Recommended Mitigation
		• Newly created forest edges should be planted with a mix of large woody stock, including trees and shrubs to protect the forest interior from exposure to the sun, wind and invasive species
Significant Wildlife Habitat		
Candidate Bat Maternity Colonies (cBMC)	FOM, FOD	• Protection of natural areas and post-construction restoration (see above) • Tree removal should occur outside the bat maternity window (May 1 to August 1) • Bat boxes may also be installed in retained portions of suitable habitat if deemed appropriate via consultation with MNRF
Candidate Turtle Wintering Areas (cTWA)	Thames River	• Protection of natural areas and post-construction restoration (see above) • Erosion and Sediment Control (see above)
Candidate Amphibian Breeding Habitat (cABH)	OA, FOD, FOM, FOD	• Protection of natural areas and post-construction restoration (see above) • Erosion and Sediment Control (see above)
Candidate Habitat for Special Concern and Rare Wildlife Species – Common Nighthawk (cSOCC1)	ME, MEG	• Protection of natural areas and post-construction restoration (see above) • Timing of vegetation clearing should occur outside of the April 1 – August 15 (as described from Migratory Birds Convention Act)
Candidate Habitat for Special Concern and Rare Wildlife Species – forest birds (Wood Thrush, Eastern Wood-Pewee) (cSOCC2)	FOD, FOM	• Protection of natural areas and post-construction restoration (see above) • Timing of vegetation clearing should occur outside of the April 1 – August 15 (as described from Migratory Birds Convention Act)
Candidate Habitat for Special Concern and Rare Wildlife Species – Golden-winged Warbler (cSOCC3)	THDM2-11	• Protection of natural areas and post-construction restoration (see above) • Timing of vegetation clearing should occur outside of the April 1 – August 15 (as described from Migratory Birds Convention Act)
Candidate Habitat for Special Concern and Rare Wildlife Species –	Consideration provided via cTWA	• A thorough visual search of the area should be conducted by construction contractors before work commences each day to avoid

Feature	Ecosite/Habitat	Recommended Mitigation
turtles (snapping turtle and map turtle) (cSOCC4)		interaction with turtles, particularly during the active season (April 15 to November 1) • If reptiles are encountered during construction, work at that location should stop and reptiles should be permitted reasonable time to leave the area on their own • Factsheets should be provided to all construction staff to assist in identification of Species at Risk reptiles with the potential to occur in the project area. Any observations should be reported to MNRF within 48 hours
Candidate Habitat for Special Concern and Rare Wildlife Species - woodland vole (cSOCC5)	FOD	• Protection of natural areas and post-construction restoration (see above)
Candidate Habitat for Special Concern and Rare Wildlife Species – butterflies (Hackberry Emperor and Tawny Emperor) (cSOCC6)	FODM11 (west of the Strathroy-Caradoc Middlesex Centre Line)	• Protection of natural areas and post-construction restoration (see above)
	Species Protected by the Endangered Species Act	
Butternut	One tree (north side of Glendon Drive, opposite Elmhurst Street)	• Avoid work within 25 m of Butternut trees, or seek authorization under the Endangered Species Act, 2007 from the Ministry of Natural Resources and Forestry
	Migratory Birds	
Nests of species protected by the Migratory Birds Convention Act (MBCA)	Nests may occur in vegetation or on structures	• To avoid damaging or disturbing bird nests and contravening the MBCA, the timing of vegetation clearing should occur outside of the April 1 – August 15 • If vegetation clearing must proceed during the restricted period, a qualified biologist may be able to search the area and establish activity setbacks around active nests
	Aquatic Resources	
Fish Habitat	Oxbow Creek, Komoka Creek	• Protection of natural areas and post-construction restoration (see above) • Erosion and Sediment Control (see above)

Feature	Ecosite/Habitat	Recommended Mitigation
		• Avoid in-water work or observe timing restrictions to protect fish and fish habitat • Minimize duration of in-water work to the extent possible • Conduct instream work during periods of low flow to further reduce the risk to fish and their habitat or to allow work in water to be isolated from flows • Restore banks to pre-existing condition or better by matching pre-existing grades and vegetation cover • Any change to fish habitat may require review or Authorization under the federal *Fisheries Act*

16.2.1 Coldstream Road Realignment

Environmental mitigation recommendations specific to the Coldstream Road realignment are identified below.

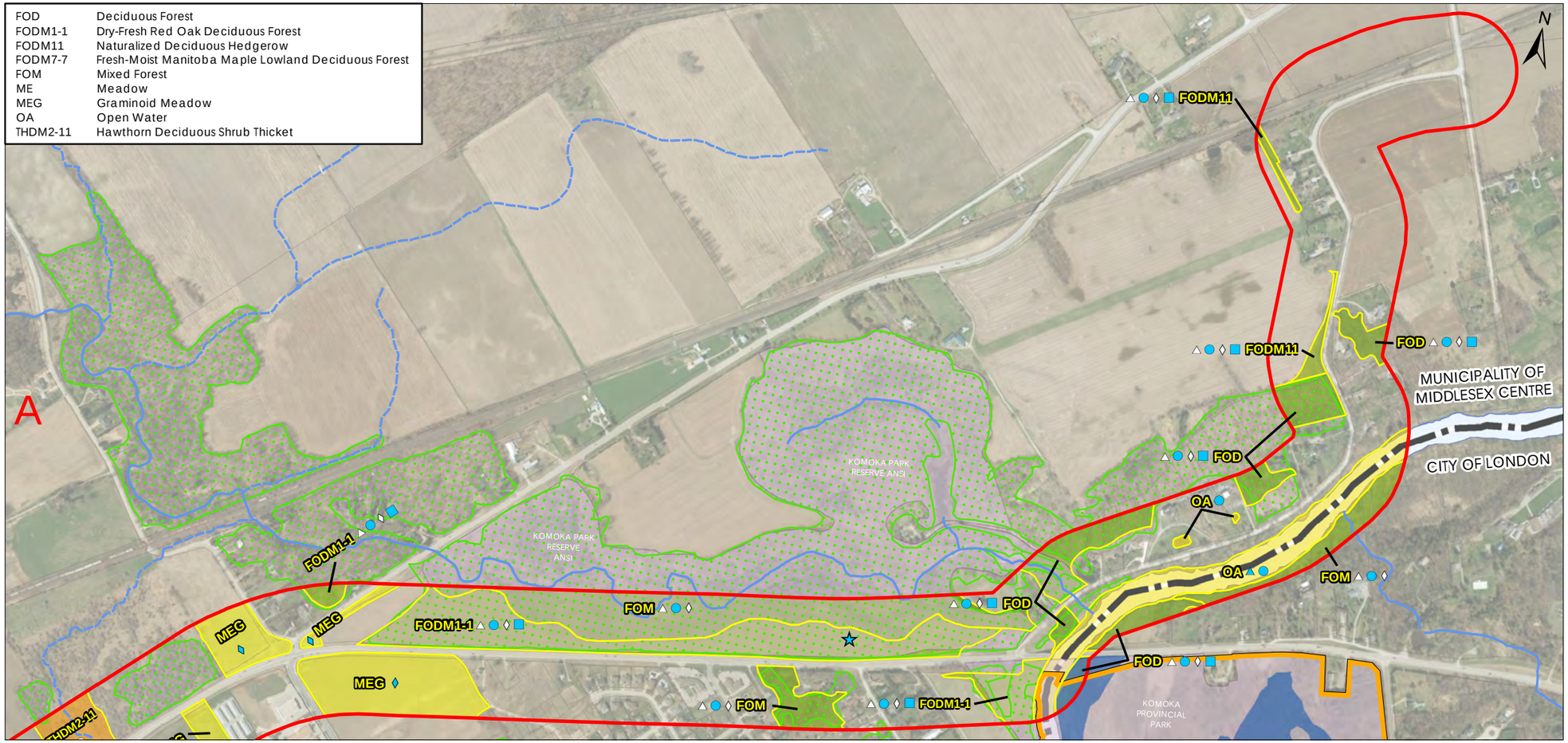
Feature	Location	Recommended Mitigation
Candidate Significant Wildlife Habitat (Crayfish Chimneys)	Wetland Feature	• Direct loss of the wetland feature is not anticipated. • If during detailed design direct loss or impact to wetland feature is anticipated, species use surveys should be undertaken to confirm Candidate Significant Wildlife Habitat as per the Draft Significant Wildlife Habitat Criterion for Ecoregion 7E (MNR 2014)
Candidate Significant Wlidlife Habitat (SAR - Monarch Butterfly Habitat)	Milkweed (throughout)	• No Monarch were observed during field surveys; • If vegetation clearing will proceed when Monarch larvae may be present (April 1 to September 30), milkweed plants should be inspected for Monarch larvae prior to their removal. If larvae are present, they may be moved to a location that is suitable and safe under the direction of a qualified professional. Monarch caterpillars may be moved to other milkweed plants; for other larval stages (i.e., eggs and chrysalis), entire milkweed plants should be transplanted.
Candidate Bat Maternity Colonies (cBMC)	FOM, FOD	• Protection of natural areas and post-construction restoration (see above) • Tree removal should occur outside the bat maternity window (May 1 to August 1)

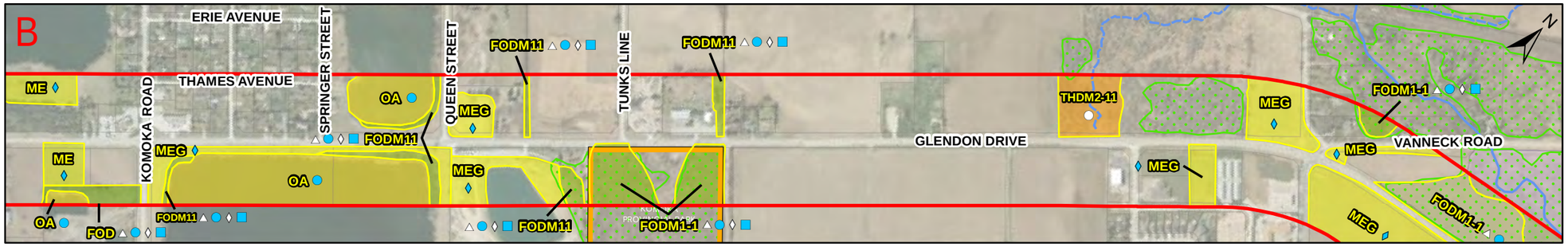
		• Bat boxes may also be installed in retained portions of suitable habitat if deemed appropriate via consultation with MNRF
Tributary to Oxbow Creek Wetland	1 crossing located south of CN Rail Underpass	• All erosion and sediment control measures identified above should be incorporated into contract specifications. • A water balance study should be completed during detailed design to ensure base flow to the wetland feature is maintained.

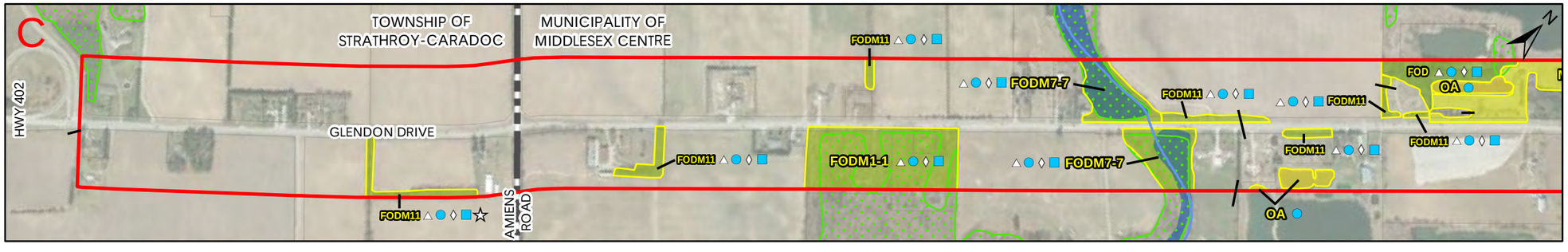
16.2.2 Tree Management

A Tree Inventory and Preservation Report was undertaken within the study area, included in **Appendix D.1**. Once detailed design drawings are finalized, it is recommended that a Tree Management Plan be completed to identify tree removals, preservation areas, and recommendations for management and Tree Protection Fence locations.

FOD	Deciduous Forest
FODM1-1	Dry-Fresh Red Oak Deciduous Forest
FODM11	Naturalized Deciduous Hedgerow
FODM7-7	Fresh-Moist Manitoba Maple Lowland Deciduous Forest
FOM	Mixed Forest
ME	Meadow
MEG	Graminoid Meadow
OA	Open Water
THDM2-11	Hawthorn Deciduous Shrub Thicket







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Legend

- Study Area
- Municipal Boundary
- Watercourse (Permanent)
- Watercourse (Intermittent)
- Provincial Park
- Significant Woodland (OP)
- Provincially Significant Wetland
- Provincially Significant Life Science ANSI

Candidate Habitat for Special Concern and Rare Wildlife Species

- Bat Maternity Colonies
- Turtle Wintering Area
- Golden-Winged Warbler
- Amphibian Breeding Habitat
- Forest Birds (Wood Thrush, Eastern Wood-Pewee)
- Common Nighthawk
- Woodland Vole
- Butterflies (Hackberry & Tawny Emperor)

Species Protected by The Endangered Species Act

- Butternut Tree

0 250 500 m

1:10,000

Key Map

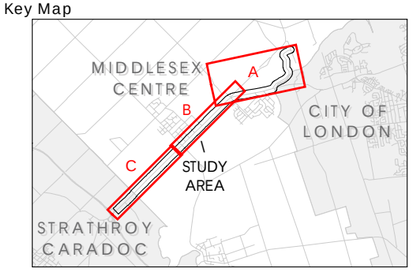

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Figure No. 16.1

Candidate Significant Wildlife Habitat

16.3 CLIMATE CHAGE

Climate change is a real and growing problem that impacts the wellbeing of the entire planet. The province of Ontario has adopted a coordinated approach to identifying and addressing the effects of climate change, and proponents are required to consider its effects under the *Environmental Assessment Act.* This Class EA has had regard for climate change through the identification of an efficient transportation network and through the provision of facilities that encourage active forms of transportation. In addition, the design of stormwater management facilities throughout the corridor should have regard impacts of increased precipitation based on the most up-to-date Intensity/duration/frequency (IDF) curves.

16.4 PERMITTING AND APPROVALS

Prior to implementation of the recommendations identified herein, the following permits/approvals may be required. Permitting requirements should be confirmed during detailed design:

- Upper Thames River Conservation Authority – *Development, Interference with Wetlands and Alterations to Shorelines and Watercourses Permit* (O. Reg. 97/04) will be required for construction activities within or adjacent to the Regulated Limit. During detailed design, consultation with UTRCA should be undertaken to obtain the most recent Regulated Limit mapping.

- For all sewage and water works associated with the road improvements, a Certificate of Approval/Drinking Water Works Permit will be required from the MOECC.

- For construction activities adjacent to the Highway 402 ramp terminal, an MTO Encroachment Permit will be required.

- Consultation should be undertaken with Ontario Parks to determine permitting requirements with respect to the Komoka Park Lands located along the Glendon Drive corridor (at Tunks Lane).

- Clearance from the MTCS will be required based on the recommendations of the Stage 1 archaeological assessment (**Appendix B.1**), and based on the recommendations of the Cultural Heritage Evaluation Report to be undertaken prior to road reconstruction along Old River Road.

16.5 ESR FILING PROCEDURE

By the publication of the Notice of Completion on Wednesday June 27 in the Banner Newspaper, and Thursday June 28-Thursday July 5, 2018 in the Londoner Newspaper the draft ESR for the Glendon Drive Streetscape Municipal Class Environmental Assessment shall be made available for the 30-day public review period commencing on June 28 2018 and ending on August 3, 2018 at the following locations:

- Municipality of Middlesex Centre Offices – 10227 Ilderton Road, Ilderton Ontario (Coldstream) N0M 2A0 and online – www.middlesexcentre.on.ca;
- Middlesex County Offices – 399 Ridout St. North, London ON N6A 2P1 and online – www.middlesex.ca;
- Komoka Public Library – 1 Tunks Lane, Komoka ON N0L 1R0;
- www.glendondrive.mindmixer.com online community

The Notice of Completion shall be mailed to each of the previously identified review agencies, special interest groups, members of the public, and First Nations Communities who have expressed interest in the project. The Notice is included in **Appendix G**, and identifies the study recommendations, provides an overview of the Class EA process followed, identifies the 30-day public review period, and provides information on the public appeal process, known as a Part II Order.

16.5.1 Part II Order Process

Significant consultation with affected parties has been undertaken throughout the study; however, if any member of the public, special interest group, review agency, or First Nations community feels that their concerns have not been adequately addressed, they may submit a request to the Minister or delegate to require a proponent to comply with Part II of the Environmental Assessment Act by elevating the status of the project (to an individual EA) before proceeding with the proposed undertaking. The Minister or delegate determines whether the request is justified and then determines the course of the undertaking. This decision is considered final.

A request to the Minister or delegate must be in writing and must address the following issues as they relate to the identified concerns:

- Environmental impacts of the project and their significance;
- The adequacy of the planning process;
- The availability of other alternatives for the project;

- The availability of the public consultation program and the opportunities for public participation;
- The involvement of the person or party in the planning of the project;
- The nature of the specific concern which remains unresolved;
- Details of any discussions held between the person or party and the proponents;
- The benefits of requiring the proponent to undertake an Individual EA; and
- Any other important matters considered relevant.

The person requesting the Part II Order shall forward a copy of the request to the proponent at the same time as submitting it to the Minister of the Environment and Climate Change or delegate, and must be received before the end of the 30-day review period (August 3, 2018).

The Minister has four options for a decision on a Part II Order (bump-up) request:

- Deny the request;
- Deny the request with conditions;
- Refer to mediation; or
- Grant the request and require the proponent to undergo an individual EA.

The review of Part II Order requests will commence after the end of the 30-day review period, and upon receipt of all necessary and satisfactory information from the requester, the proponent, other government agencies and/or interested persons. The Minister will review the documentation and provide a response within a target of 45 days from receipt of all information.

17.0 CLOSING

The work undertaken in preparing this report represents the completion of the Municipal Class EA process for the Glendon Drive Streetscape Schedule C project. Subject to approval of the recommendations identified herein, the Municipality of Middlesex Centre and Middlesex County may proceed to design and implementation.

APPENDICES

Appendix A CONSULTATION

A.1 CONTACT LIST AND NOTICES

A.2 PIC PRESENTATION MATERIALS

A.3 PUBLIC INPUT

A.3.1 Public Comments

A.3.2 Mindmixer

A.3.3 Old River Road

A.3.4 Jefferies Commercial

A.3.5 Coldstream Road

A.4 AGENCY

A.5 FIRST NATIONS

Appendix B CULTURAL HERITAGE

B.1 STAGE 1 ARCHAEOLOGICAL ASSESSMENT

B.2 BUILT CULTURAL HERITAGE MTCS CHECKLISTS

Appendix C SERVICING

C.1 SWM SERVICING

C.2 SERVICING PLACEMENTS

C.3 MUNICIPAL MAINTENANCE REPORT

Appendix D NATURAL ENVIRONMENT

D.1 TREE INVENTORY

Appendix E TRAFFIC ANALYSIS

E.1 OLD RIVER ROAD

Appendix F URBAN DESIGN

Appendix G NOTICE OF COMPLETION AND 30-DAY REVIEW