Ontario

G.W.P. 80-00-00

HIGHWAY 401

From 0.9 km East of Essex Road 42 to Elgin County Boundary

PRELIMINARY DESIGN STUDY

MUNICIPALITY OF CHATHAM-KENT

CLASS ENVIRONMENTAL ASSESSMENT FOR PROVINCIAL TRANSPORTATION FACILITIES (2000)
GROUP 'B' PROCESS

TRANSPORTATION ENVIRONMENTAL STUDY REPORT

PART I OF II

September 2008

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GROUP 'B' PROCESS

TRANSPORTATION ENVIRONMENTAL STUDY REPORT

Prepared for the Ministry of Transportation by:
McCormick Rankin Corporation

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THE PUBLIC RECORD

Copies of this document have been submitted to the following office of the Ministry of the Environment to be placed in the Public Record:

Windsor Area Office
4510 Rhodes Drive
Unit 620
Windsor, Ontario
N8W 2G6

This Transportation Environmental Study Report is also available for review during regular business hours at:

Ministry of Transportation
West Region
Planning & Design Section
659 Exeter Road, 3rd Floor
London, Ontario
N6E 1L3

Ministry of Transportation
Operational Services – Chatham
870 Richmond Street
Chatham, Ontario
N7M 5L3

Municipality of Chatham-Kent
Clerk's Office, Civic Centre
315 King Street
Chatham, Ontario
N7M 2G6

Tilbury Municipal Service Centre
17 Superior Street
Tilbury, Ontario
N0P 2L0

Ridgetown Municipal Service Centre
45 Main Street East
Ridgetown, Ontario
N0P 2C0

Chatham Central Library
120 Queen Street
Chatham, Ontario
N7M 2G6

Tilbury Library
2 Queen Street
Tilbury, Ontario
N0P 2L0

Ridgetown Library
54 Main Street
Ridgetown, Ontario
N0P 2C0

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MINISTRY OF TRANSPORTATION ONTARIO (MTO)
CLASS ENVIRONMENTAL ASSESSMENT (EA)
AND PRELIMINARY DESIGN

HIGHWAY 401 IMPROVEMENTS (G.W.P. 80-00-00)
East of Essex Road 42 to Elgin County Boundary

NOTICE OF SUBMISSION

TRANSPORTATION ENVIRONMENTAL STUDY REPORT

THE STUDY

The Ministry of Transportation Ontario (MTO) has completed the Preliminary Design Study and Class Environmental Assessment to identify capacity, geometric and operational improvements along the Highway 401 corridor from 0.9 km east of Essex County Road 42 to the Elgin County Boundary within the Municipality of Chatham-Kent as shown in the Key Plan. The study has identified operational and capacity needs, evaluated alternatives and recommended a plan to address future needs.

The recommended plan includes:

- highway widening from four to six lanes and the addition of a median barrier wall
- interchange improvements
- the closure of roads in the vicinity of the interchanges to address operational needs, and the identification of alternate routes
- emergency access ramps

THE PROCESS

This study is subject to the Ontario *Environmental Assessment (EA) Act* and is being carried out in accordance with the requirements of the Class EA for Provincial Transportation Facilities (2000).

PUBLIC REVIEW OF TRANSPORTATION ENVIRONMENTAL STUDY REPORT

The EA of the project is documented in the Transportation Environmental Study Report (TESR) which describes the preferred design. The TESR will be available starting on **Wednesday September 24, 2008** for a minimum 30-day review period at the locations listed below.

Municipality of Chatham-Kent Clerk's Office, Civic Centre 315 King Street Chatham, Ontario N7M 5K8	Tilbury Municipal Service Centre 17 Superior Street Tilbury, Ontario N0P 2L0	Ridgetown Municipal Service Centre 45 Main Street East Ridgetown, Ontario N0P 2C0
Chatham Central Library 120 Queen Street Chatham, Ontario N7M 2G6	Tilbury Library 2 Queen Street Tilbury, Ontario N0P 2L0	Ridgetown Library 54 Main Street Ridgetown, Ontario N0P 2C0
Ministry of the Environment Windsor Area Office 4510 Rhodes Drive Unit 620 Windsor, Ontario N8W 5K5	Ministry of Transportation West Region Planning & Design Section 659 Exeter Road, 3rd Floor London, Ontario N6E 1L3	Ministry of Transportation Operational Services – Chatham 870 Richmond Street Chatham, Ontario N7M 5L3

Interested persons are encouraged to review this document and provide comments by **October 28, 2008**. If, after consulting with the Ministry's consultants and staff, you have serious unresolved concerns, you have the right to request the Minister of the Environment (12th Floor, 135 St. Clair Avenue West, Toronto, Ontario, M4V 1P5) to "bump-up" this project, thereby requiring an individual environmental assessment. A copy of the "bump-up" request should be forwarded to the Ministry of Transportation and McCormick Rankin Corporation at the addresses below. If there are no outstanding concerns after **October 28, 2008**, the project will be considered to have met the requirements of the Class EA.

COMMENTS

To obtain additional information or provide comments, please contact:

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Information will be collected in accordance with the *Freedom of Information and Protection of Privacy Act*. With the exception of personal information, all comments will become part of the public record.

Des renseignements sont disponibles en français en composant 1-877-562-7947 poste 313 (François Doyon).

Ontario

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LIST OF EXHIBITS

APPENDICES

GLOSSARY

AAQC -	Ambient Air Quality Criteria
ANSI -	Areas of Natural and Scientific Interest
CEAA -	Canadian Environmental Assessment Act
Class EA -	Class Environmental Assessment for Provincial Transportation Facilities (1999, as amended 2000)
CLI -	Canada Land Inventory
CO -	Carbon Monoxide
dBA -	Decibels (A-weighted)
DFO -	Department of Fisheries and Oceans, Canada
ESA -	Environmentally Sensitive Area
GPS -	Global Positioning System
GTA -	Greater Toronto Area
G.W.P. -	Group Work Project
INAC -	Indian and Northern Affairs Canada
LOS -	Level-of-Service
LSW -	Locally Significantly Wetland
LTVCA -	Lower Thames Valley Conservation Authority
MBCA -	Migratory Birds Convention Act
MCL -	Ontario Ministry of Culture
MDS -	Minimum Distance Separation
MNR -	Ontario Ministry of Natural Resources
MOE -	Ontario Ministry of the Environment
MPAC -	Municipal Property Assessment Corporation
MTO -	Ontario Ministry of Transportation
NAFTA -	North American Free Trade Agreement
NHIC -	Natural Heritage Information Centre
NO2 -	Nitrogen Dioxide
NRVIS -	Natural Resources and Values Information System
NSA -	Noise Sensitive Area
NWPA -	Navigable Waters Protection Act
OMAFRA -	Ontario Ministry of Agriculture, Food and Rural Affairs
OPP -	Ontario Provincial Police
OPSS -	Ontario Provincial Standard Specifications
PIC -	Public Information Centre
PSW -	Provincially Significant Wetland
PTTW -	Permit to Take Water
RFD -	Rural Freeway Divided
ROW -	Right-of-Way
SAR -	Species at Risk
SCL -	Speed Change Lanes
SPM -	Suspended Particular Matter
SWMP -	Storm Water Management Practices
TESR -	Transportation Environmental Study Report

1. THE ENVIRONMENTAL ASSESSMENT PROCESS

1.1 The Ontario Environmental Assessment Act

The Ministry of Transportation's Class Environmental Assessment for Provincial Transportation Facilities (MTO Class EA) was approved under the Ontario Environmental Assessment Act in the fall of 1999 and amended in 2000. This planning document defines the group of projects and activities, and the environmental assessment processes that MTO has committed to follow for these projects. Provided that the MTO Class EA process is followed and it requirements are met for a project, the requirements of the Ontario Environmental Assessment (EA Act) are fulfilled so a separate, individual approval under the EA Act is not required. The MTO Class EA process is principle based. This process replaces the former prescriptive process.

The following principles underlie the Class EA process for Group A, B and C projects:

- Transportation engineering principles;
- Environmental protection principles;
- External consultation principles;
- Evaluation principles that are intended to achieve the best overall balance of these principles;
- Documentation principles;
- Bump-up principles; and
- Environmental clearance principles to proceed.

This project is following the Class EA process for Group 'B' projects. Group 'B' projects are major improvements to provincial transportation facilities and generally include:

- Improvements to existing highways and freeways providing a significant increase in capacity;
- New interchanges or modifications to existing interchanges;
- Major realignments;
- New or modified water crossings or watercourse alterations; and
- New highway service facilities.

The Class EA process for Group 'B' projects is shown in **Exhibit 1-1**.

The Class EA process for a Group 'B' project includes submission of a Transportation Environmental Study Report (TESR). This TESR will be filed for a 30-day period of public and external agency review. If concerns are raised during this review period that cannot be resolved through discussions with MTO, members of the public, interested groups or technical agencies may request the Minister of the Environment to "bump-up" (i.e. make a Part II Order for) this project, thereby requiring an individual environmental assessment. This would require submission of a formal letter (as required by Section 5 (1) of the Ontario Environmental Assessment Act) to the Ministry of the Environment (MOE) for formal review and approval.

The decision whether a "bump-up" (i.e. Part II Order) is appropriate or necessary rests with the Minister of the Environment.

If no "bump-up" requests are outstanding by the end of the 30-day review period, the project is considered to have met the requirements of the Class EA, and MTO may proceed to tender and construct the project subject to resolving any commitments documented in this TESR during the subsequent design phases and obtaining any other outstanding environmental approvals. Resolution of commitments and minor changes from the Recommended Plan will be documented in a Design and Construction Report.

1.2 The Canadian Environmental Assessment Act

The Canadian Environmental Assessment Act (CEAA) is "triggered" by:

- Need for Federal funding
- Need for Federal lands (including First Nation lands)
- Issuance of a Federal approval identified on the Law List

This project will not require Federal funding, and will not affect any lands owned by the Federal Government or First Nations.

Regarding the third "trigger":

- The potential Federal approvals that apply to this project are:
  - Potential authorization under the Fisheries Act and the likely requirement for a permit from DFO under the Species at Risk Act. In accordance with the old (1993) MTO/Ministry of Natural Resources (MNR) Fisheries Protocol, MNR will make the determination as to whether any of the proposed culvert replacements, culvert extensions and bridge extensions, as well as the potential realignment of the McKoy Drain, will result in the Harmful Alteration, Disruption or Destruction (HADD) of fish habitat. Although the culvert works and the bridge extension works are minor in extent, it is anticipated that the realignment of the McKoy Drain and possibly some of the extension works may require authorization under the Fisheries Act, particularly because of the potential presence of listed Species at Risk. Although the issuance of a SARA permit does not trigger CEAA, a requirement for an Authorization is a trigger under CEAA. CEAA approval cannot be secured until the Authorization is approved.
  - Approval under the Navigable Waters Protection Act may be required for changes or improvements to Highway 401 that affect the watercourses within the study area. If required, an application for this work will be submitted to Transport Canada for review and approval as part of the detail design phase. An application will trigger a screening under CEAA.

Federal approvals and the CEAA process are normally addressed during the detail design phase, when design plans are developed to a point where specific mitigation measures have been developed.

1.3 Purpose of the Transportation Environmental Study Report

This Transportation Environmental Study Report (TESR) documents the environmentally significant aspects of the planning, design and construction for the improvements to 66.1 km of the Highway 401 corridor from 0.9 km east of Essex County Road 42 to the Elgin County Boundary within the Municipality of Chatham-Kent, as a Group 'B' project as defined in the Class Environmental Assessment for Provincial Transportation Facilities (1999, as amended 2000).

The TESR includes: a description of the project and its purpose; the existing natural, social, economic and cultural environmental factors; the analysis / evaluation of alternatives that were considered, the anticipated environmental effects and proposed mitigation measures; and commitments to further work, consultation, and monitoring associated with the implementation of the project.

Additional information about the Class Environmental Assessment process for Group 'B' projects is contained in the Class Environmental Assessment for Provincial Transportation Facilities (1999, as amended 2000). Readers interested in this information are encouraged to refer to that document.

As required under the class EA this TESR is being made available to the public, other interested parties and external agencies for a 30 day review. A notice of TESR submission was placed in local newspapers and letters were mailed to notify government agencies, affected property owners and members of the public on the Project Team's mailing list. During the review period, parties are encouraged to bring their project concerns to the attention of the Ministry of Transportation (MTO). If after consulting with MTO's consultants and staff, you have serious unresolved concerns, you have the right to request the Minister of the Environment (135 St Clair Avenue West, Toronto, Ontario, M4V 1P5) to "bump-up" (i.e. make a part II Order for) this project. A copy of the bump-up request should be sent to the Ministry of Transportation at the address below.

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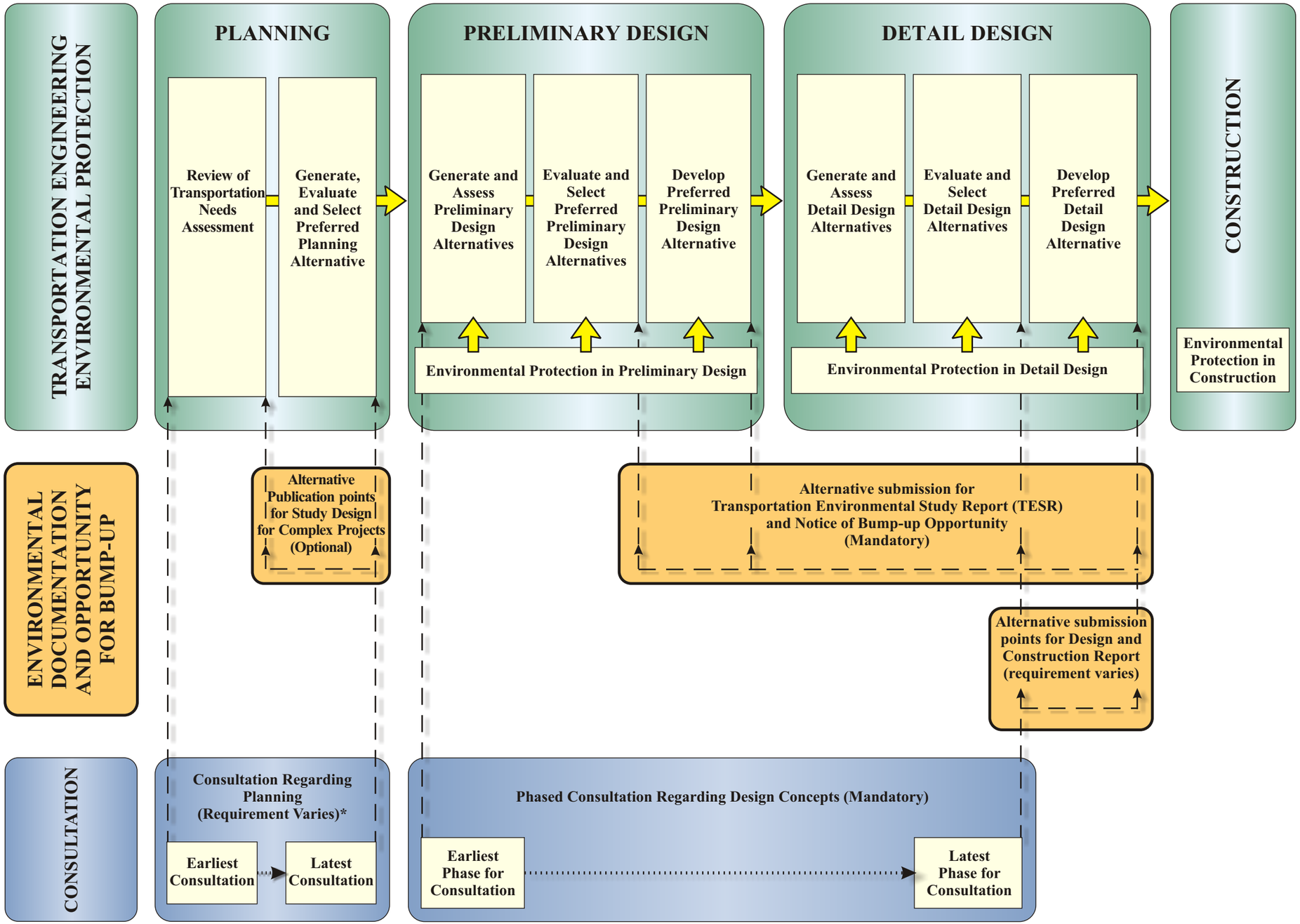


*Mandatory if a Study Design is prepared.

Source: Class Environmental Assessment for Provincial Transportation Facilities (2000)

G.W.P. 80-00-00: Highway 401
from 0.9 km East of Essex Road 42 to Elgin County Boundary
Preliminary Design Study and Class EA

OVERVIEW OF CLASS EA PROCESS FOR GROUP B PROJECTS

EXHIBIT 1-1

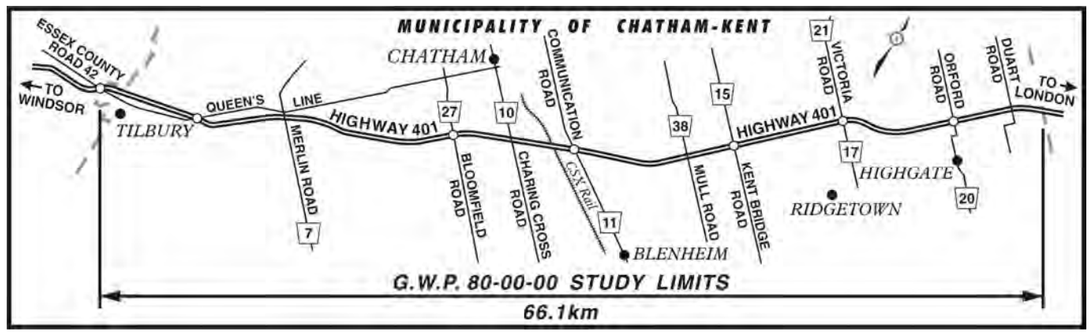
2. PROJECT SUMMARY

2.1 Description of Project

2.1.1 Project Location

The study area includes the Highway 401 corridor from 0.9 km east of Essex County Road 42 to the Elgin County Boundary within the Municipality of Chatham-Kent. The area includes the existing Highway 401 corridor, interchanges and immediate surrounding area for a total project length of 66.1 km. **Exhibit 2-1** displays the study area.

Exhibit 2-1: Study Area



2.1.2 Selected Design

Based on a comprehensive review and analysis of alternatives for the improvements to Highway 401 within the study limits, and comments received by external agencies, the Municipality of Chatham-Kent, local residents and members of the public, the selected design consists of:

- Widen Highway 401 from 4 general purpose lanes to six lanes;
- Install a median barrier to reduce the potential for cross median collisions;
- Upgrade horizontal curves to 120 km/h design standards;
- Upgrade two vertical sag curves and two vertical crest curves to 120 km/h design standards;
- Reconstruct significant sections of existing 4-lane highway to address deteriorated pavement condition with either rigid or flexible pavement;
- Improve crossing road vertical alignments where replacement of the structure crossing the highway is necessary;
- Reconstruct the interchanges at Queen's Line, Bloomfield Road, Highway 40 / Communication Road, Kent Bridge Road, Victoria Road and Orford Road to enhance safety performance;
- Close Jeannette's Creek Road at Queen's Line at present location along westbound ramp and realign to locate opposite westbound ramp terminal;
- Close McKinlay Road at Queen's Line at present location along eastbound ramp and realign to locate opposite eastbound ramp terminal;
- Close 7th Line East at Howard Road and provide alternate route along existing Howard Road and Sixth Line East;
- Close 7th Line West to Bloomfield Road (this is a Municipality of Chatham-Kent identified need under their Bloomfield Road Business Park project);
- Relocate the carpool parking lot at the Bloomfield Road interchange to accommodate interchange improvements;
- Close Pinehurst Road at Highway 40 to address operational concerns and provide a new road alignment from Pinehurst Road to Boundary Line;
- Protect for future closure of Spence Line at Victoria Road and Beechwood Road at Kent Bridge Road when warranted;
- Introduce measures to reduce blowing and drifting snow;
- Provide guide rail in accordance with MTO Roadside Safety Manual;
- Upgrade existing drainage including ditching and culverts; and
- Acquire property to accommodate the proposed improvements.

2.1.3 Related / Adjacent Studies and Projects

In 1998, MTO completed the Southwestern Ontario Frontier International Gateway Study. This study, referred to as the Gateway Study, examined the long-term transportation needs for the Windsor and Sarnia border crossings, as well as the highway infrastructure serving these crossings. The Gateway Study considered such factors as the effect of trade agreements (e.g. NAFTA) on the movement of goods and services between Canada and the U.S., co-ordination of Provincial and U.S. Interstate highway improvements and trends in traffic and economic growth between the two countries. The study identified that capacity improvements would be required between 2011 and 2021 along the Highway 401 corridor between Windsor and London.

During the summer of 1999, Highway 401 in general and Chatham-Kent in particular, came under intense media scrutiny due to an unusually high number of fatal collisions. This attention led MTO to conduct a review of this section of highway. The results of this review were compiled in a report entitled "A Review of Collisions and Highway Conditions on the Chatham- Kent Section of Highway 401", which was completed by MTO in August 1999. That report was released by the Minister at a September 17th, 1999 news conference in Chatham-Kent, along with the announcement of a comprehensive Action Plan for Safer Roads throughout Ontario. This Action Plan identified the need for planning for infrastructure improvements between Windsor and London. Implementation of the action plan began immediately, which included paving of the outside shoulder of Highway 401 from Windsor to London and the installation of reflective pavement markers on the centreline. The infrastructure components of the Action Plan were completed in 2001.

MTO completed Preliminary Design and Environmental Assessment study for the widening of Highway 401 to six lanes between Windsor and Tilbury (W.P. 60-00-00). Recommended improvements included:

- widening of Highway 401 from four to six lanes;
- median barrier and associated storm sewer drainage system;
- carpool parking lots in the vicinity of the interchanges at Manning Road, Belle River Road, Highway 77 and Essex County Road 42;
- modifications to interchanges at Dougall Avenue, Essex County Road 46 (Provincial Road), Essex County Road 19 (Manning Road), Essex County Road 27 (Belle River Road), Highway 77, and Essex County Road 42 (formerly Highway 2); and
- rehabilitation and replacement of structures, as required.

Construction work for the improvements to Highway 401 is underway between Windsor and Tilbury.

Three bridges were recently rehabilitated within the Highway 401 corridor in Chatham-Kent as follows:

- Mull Road Underpass (Site No. 13-237) – total deck, parapet walls and approach slabs replacement.
- Scane Road Underpass (Site No. 13-265) – total deck, parapet walls and approach slabs replacement.
- Orford Road Underpass (Site No. 13-263) – concrete overlay, parapet walls and approach slabs replacement.
- Harwich Road Underpass (Site No. 13-268) – concrete overlay, semi integral abutments, parapet walls and approach slabs replacement.
- Victoria Road Underpass (Site No. 13-266) – concrete overlay, semi integral abutments, flexible link slab at piers, cathodic protection system in substructure, parapet walls and approach slabs replacement.

Due to the poor condition, age and pavement performance, one section of the concrete pavement within the project has been rubblized. In 2000, under Contract 2000-0029, 26.8 km of the westbound lanes from 0.6 km east of the Bloomfield Road interchange easterly 0.1 km east of the Victoria Road interchange was reconstructed with 240 mm of asphalt and 225 mm of Granular A over the rubblized concrete. The reconstruction of the westbound lanes resulted in the approximate 325 mm grade raise.

The Municipality of Chatham-Kent (Municipality) designated lands as Business Park in July 2002 through an amendment to the Raleigh Official Plan (Official Plan Amendment #16 – By-Law 188-2002). The lands designated are located south of Highway 401 and north of 8th Line traversed by Bloomfield Road. The process the Municipality followed for designation of the Business Park lands included a public consultation process as set out in the Ontario Planning Act.

As part of the planning and consultation process that the Municipality undertook for the Bloomfield Business Park development, 7th Line West is to be realigned south of its present location to connect to Bloomfield Road approximately midway between the Highway 401 south ramp terminal and 8th Line. The Municipality has an understanding in principle with MTO for the timing for this realignment of 7th Line West. This understanding is premised on certain triggers related to traffic generation based on the recommendations of a Traffic Impact Study undertaken by others on behalf of the Municipality. This understanding pre-dates MTO's current Preliminary Design and Environmental Assessment Study for Highway 401 within the Municipality boundaries.

3. TRANSPORTATION NEEDS AND OPPORTUNITIES

Highway 401 is an essential part of the freeway network in MTO's West Region, linking the major cities and providing a corridor for international trade and economic development.

The current level of service (LOS) through Chatham-Kent on Highway 401 is 'A'. Growth projections show the need for additional capacity to be beyond the current planning horizon of 2031.

As mentioned in **Section 2.1.3**, Highway 401 in general and Chatham-Kent in particular, came under intense media scrutiny due to an unusually high number of fatal collisions. This attention led MTO to conduct a review of this section of highway. The results of this review were compiled in a report entitled "A Review of Collisions and Highway Conditions on the Chatham- Kent Section of Highway 401", which was completed by MTO in August 1999. That report was released by the Minister at a September 17th, 1999 news conference in Chatham-Kent, along with the announcement of a comprehensive Action Plan for Safer Roads throughout Ontario.

The existing cross-section has a 15 m rural median. There has been a history of fatal cross-median collisions on this section of Highway 401. These are attributable to vehicle speeds, weather conditions and the narrow median. The large percentage of truck volumes (40% trucks) also contribute to the potential for fatal collisions in that when a smaller vehicle hits or is hit by a truck the outcomes are often fatal.

The proposed widening strategy includes a median barrier which would substantially reduce the risks associated with the unprotected median. The longer the median is left unprotected the greater the potential for additional fatal cross median collisions.

There are also a number of operational and geometric issues associated with the interchange designs at the existing interchanges within the study. These issues are further discussed in **Section 4.5**

The Ministry of Transportation is continually monitoring the condition of the pavement throughout its system. This section of Highway 401, which was originally constructed in the late 1950s and early 1960s, is quickly reaching a point in its service life where major rehabilitation will be required. The various sections of Highway 401 in Chatham-Kent will reach the limit of their current service lives between 2010 and 2018. It is at this point that rehabilitation becomes cost effective.

Excluding the rubblized section for 26.8 km of the westbound lanes between 0.6 km east of the Bloomfield Road interchange easterly to 0.1 km east of the Victoria Road interchange (as noted in **Section 2.1.3**), the underlying problem is the rapidly deteriorating 50 year old concrete pavement which is not being addressed by the rehabilitation strategies. The next rehabilitation cycle will be the third one for this pavement structure and, because of the underlying concrete pavement problems, this next cycle will only provide about 10 years of service life.

Additionally, Highway 401 in Chatham-Kent currently undergoes heavy maintenance activity including patching, edge repairs and crack scaling. To address these conditions, pavement holding strategies have been implemented resulting in substantial annual investments of cash being spent on a holding strategy.

Based on current and projected traffic volumes, widening of Highway 401 to six lanes (three lanes in each direction) is required beyond the 20-year planning horizon. However, expansion of Highway 401 to six lanes is expected to address the operational, geometric and pavement issues as noted above. Given the foregoing, this study reviewed improvements to address the operational, geometric and pavement issues. These possible improvements include:

- Upgrading horizontal curves to 120 km/h design standards;
- Upgrading two vertical sag curves and two vertical crest curves to 120 km/h design standards;
- Modify median design to reduce potential for cross-median collisions;
- Reconstruct significant sections of existing 4-lane highway to address deteriorated pavement condition;
- Improving crossing road vertical alignments if replacement of the structure crossing the highway is necessary;
- Review of snow drifting needs;
- Reconstruction of the interchanges at Queen's Line, Bloomfield Road, Highway 40 / Communication Road, Kent Bridge Road, Victoria Road and Orford Road to enhance safety performance;
- Review of intersections that are in close proximity to interchange ramp terminals that may require closure and/or realignment; and
- Review of carpool parking lot needs.

4. EXISTING ENVIRONMENTAL FEATURES

Exhibits 4-1a and 4-1b illustrate the existing conditions of the study area. Existing features within the study area are described in the following sub-sections.

4.1 Natural Environment

4.1.1 Designated Areas

Background information was reviewed for the presence of designated areas within approximately 500 m of the project study area. Findings indicated that there are:

- no Areas of Natural and Scientific Interest (ANSI) - regionally / provincially significant or life science / earth science;
- no Provincially Significant Wetlands (PSW) or Locally Significant Wetlands (LSW);
- no Environmentally Significant Areas (ESAs);
- two (2) Conservation Areas (C.M. Wilson and Walter Devereux) (see **Section 4.1.2** for discussion); and
- Eighteen (18) woodlots identified in the Chatham-Kent Official Plan (Schedules C2-C5, C7 and Appendix 4.4) as over 2 hectares found adjacent to the highway right-of-way (see **Section 4.1.3** for discussion).

4.1.2 Conservation Areas and County Woodlots

There are two Conservation Areas operated by the Lower Thames Valley Conservation Authority (LTVCA) that fall within or in proximity to the study limits. These are listed below and are shown on **Exhibits 4-1a to 4-2b**.

- C.M. Wilson Conservation Area (recreation). This 30 ha park features campgrounds, a man-made lake, small woodlot and a memorial forest.
- Walter Devereux Conservation Area (demonstration farm / woodlots). This 35 ha area features both managed and unmanaged woodlots as well as a nursery of hardwoods and Carolinian tree species.

There is a County Woodlot, called Reynold's Tract, owned and managed by the Municipality of Chatham-Kent on the northeast quadrant of Highway 401 and Victoria Road.

4.1.3 Woodlots over 2 hectares

There are 18 woodlots adjacent to the Highway 401 right-of-way that have been identified in the Chatham-Kent Official Plan as 'greater than 2 hectares (ha)'. Due to the severely altered landscape of Chatham-Kent where forest cover is less than 5 percent, the Municipality of Chatham-Kent considers all woodlots greater than 2 ha as significant and a component of their Natural Heritage System. The 2 ha value was selected based on the Provincial Policy Statement Natural Heritage Reference Manual, which states that "where woodland is less than 5% of the land cover, woodlands 2 ha in size or larger should be considered of significance".

4.1.4 Vegetation

The Chatham-Kent study area lies in the Deciduous Forest Region (the Carolinian zone). Trees within this region are predominantly broad-leaved with common species including Sugar Maple, American Beech, White Elm, Basswood, Red Ash, White Oak and Butternut. While this region is widespread in the eastern United States, only a small portion extends into Canada. This Region is rich in species, largely due to the warmer climate of this area (when compared to the rest of Canada). As such, there are many species within this forest region that are rare or uncommon and at the northern limits of their range (e.g. Black Oak) (Rowe 1972, OMNR (Forests Division) 2006, Carolinian Canada 2007).

As previously mentioned, field investigations focused on specific areas where construction works are proposed; therefore investigations were focused within, and immediately adjacent to, the existing highway right-of-way.

As expected, vegetation within the right-of-way is dominated by cultural old field meadow communities that are common and tolerant to disturbance created by regular highway maintenance. Typical species associated with the communities include tolerant grasses, Goldenrod (*Solidago*) and Aster (*Aster*) species, Common Teasel (*Dipsacus fullonum ssp sylvestris*), Canada Thistle (*Cirsium arvense*), Spreading Dogbane (*Apocynum androsaemifolium*), Wild Carrot (*Daucus carota*), White Clover (*Trifolium repens*), and Bird's-foot Trefoil (*Lotus corniculatus*). Within roadside ditches and near culverts, localized pockets of tolerant wetland species were encountered. These areas were dominated by Cattail (*Typha* sp.), Reed Canary Grass (*Phalaris arundinacea*), Common Reed (*Phragmites australis*) and Purple Loosestrife (*Lythrum salicaria*). However other wetland plants, such as Blue Vervain (*Verbena hastata*), Common Boneset (*Eupatorium perfoliatum*), and Joe-pye-weed (*Eupatorium maculatum*) were also occasionally recorded.

A number of individual roadside trees both planted and naturally colonized, of various ages, sizes and conditions, are found within the project study area right-of-way. The most common tree species encountered are the non-native White Poplar (*Populus alba*), Manitoba Maple (*Acer negundo*), and White Elm (*Ulmus americana*). Additional roadside trees observed include Black Walnut (*Juglans nigra*), White Ash (*Fraxinus americana*), Red Cedar (*Juniperus virginiana*), White Cedar (*Thuja occidentalis*), Honey-Locust (*Gleditsia triacanthos*), Silver Maple (*Acer saccharinum*), Apple sp. (*Malus* sp.), Scotch Pine (*Pinus sylvestris*), Norway Maple (*Acer platanoides*), Sugar Maple (*Acer saccharum ssp. saccharum*), Austrian Pine (*Pinus nigra*), and various spruce (*Picea*) species. A variety of pioneer shrub species are also found scattered in the right-of-way including Hawthorn species (*Crataegus* sp.), Staghorn Sumac (*Rhus typhina*), Gray Dogwood (*Cornus racemosa*), Red-osier Dogwood (*Cornus stolonifera*), Willow sp. (*Salix* sp.), and White Mulberry (*Morus rubra*).

Hedgerows were found throughout the study area along the right-of-way boundary (both inside and outside this boundary). Hedgerows are not separately mapped or described, due to the long length of the study area, the common / tolerant species encountered, and that the proposed works are not anticipated to impact these features.

4.1.5 Wildlife

Given the scope of the project (i.e. widening of an existing highway) and the already disturbed nature of the study corridor, specific wildlife surveys were not conducted with the exception of a bird nest survey conducted at the culverts where works are proposed (see **Appendix E**). In general, wildlife habitat is limited within and immediately adjacent to the right-of-way and generally where works are proposed. However, all observations of wildlife and sign were recorded during the vegetation and aquatic surveys. A full list of species observed is provided in **Appendix E**.

Birds

Breeding bird information was obtained from the OBBA (Bird Studies Canada 2007) for 10 atlas squares (17LG88, 17LG87, 17LG98, 17MG08, 17MG09, 17MG19, 17MG29, 17MH20, 17MH30, 17MH31), portions of which encompass the project limits. As outlined previously, it should be emphasized that the OBBA 10 km squares cover a much larger area than the linear project length of 66 km, and therefore these data do not necessarily indicate occurrence in the immediate vicinity of the project area. The information was reviewed to provide a sense of what common breeding bird species might be expected in the general area. Based on the 2001-2005 OBBA database, a total of 125 bird species were recorded as exhibiting some level of breeding evidence within the atlas squares that encompass the project study area limits. A total of 88 of these were confirmed breeders.

Of the species exhibiting some level of breeding evidence within the 10 OBBA squares, 11 species of conservation concern were noted. None of these species was encountered during field surveys, noted in background data provided by MNR, or shown in Natural Heritage Resource Centre (NHIC) mapping. Habitat with high potential for nesting use was not identified within the right-of-way for any of the species. There may be potentially suitable habitat present for some species within natural areas immediately adjacent to the highway right-of-way, however it is unlikely that the proposed works would impact the species' habitat, since construction works will generally be limited to the existing right-of-way.

In general, and as shown in the bird species recorded from the OBBA and incidental wildlife observations by Ecoplans, the majority of the breeding bird species that are expected to be within the Highway 401 area are common in rural settings. Examples of these species include American Robin (*Turdus migratorius*), European Starling (*Sturnus vulgaris*), Red-winged Blackbird (*Agelaius phoeniceus*), Song Sparrow (*Melospiza melodia*), House Sparrow (*Passer domesticus*) and Eastern Phoebe (*Sayornis phoebe*).

Bird nests were observed at 7 bridges and 23 culverts, which are described in **Appendix E**. In upcoming seasons, there is a strong probability that nesting will continue in these areas where nests were observed by Ecoplans, as well as at other culvert locations. There is also potential for nesting to occur in woody vegetation along the Highway 401 right-of-way, by common and tolerant bird species, such as American Robin. Bird nesting represents a construction timing constraint that is best addressed during the subsequent detail design phase, and as such a comprehensive bird nest survey should be completed at that stage if clearing for construction cannot accommodate the required timing constraints.

Amphibians and Reptiles

Based on a review of the background information, and mapping, it is inferred that amphibian and reptile habitat would be generally present in the study area along the watercourses and associated riparian, wetland habitats, agricultural drains or dug agricultural ponds. These areas would provide habitat for localized breeding and movement of species such as American Toad (*Bufo americanus*), Northern Leopard Frog (*Rana pipiens*), and Green Frog (*Rana clamitans*). Northern Leopard Frog and Green Frog were confirmed within the project area by Ecoplans during field work completed in 2006.

In addition, a number of common reptiles are expected to occur in the study area. For example, Gartersnake (*Thamnophis sirtalis sirtalis*), Dekay's Brownsnake (*Storeria dekayi)* and Red-bellied Snake (*Storeria occipitomaculata)* are widely distributed species often found near human habitation in urban or suburban areas if suitable habitat is available.

Mammals

Mammals expected to inhabit the Highway 401 study area are habitat generalists that would be common in urban and rural areas throughout southern Ontario. Habitat characteristics are suitable for a number of common species typical of rural landscapes, including Grey Squirrel (*Sciurus carolinensis*), Woodchuck (*Marmota monax*), Raccoon (*Procyon lotor*), Eastern Cottontail (*Sylvilagus floridanus*), White-tailed Deer (*Odocoileus virginianus)* and Striped Skunk (*Mephitis mephitis*). Grey Squirrel, Racoon and White-tailed Deer were recorded during the field surveys by Ecoplans in 2006.

Significant Wildlife Habitat and Wildlife Movement

Based on a review of Natural Resources NRVIS mapping provided by MNR, there are no deer wintering areas or raptor nest sites, or any other mapped significant wildlife habitat, along the project limits or vicinity.

The closest deer wintering areas are located over 8 km north of the project study area and there are 3 deer wintering areas along Lake Erie over 10 km south of the project study area. There does not appear to be connections between these wintering areas and natural features adjacent to, or that are crossed by, the Highway 401 corridor.

Animal movement corridors are considered to be 'significant wildlife habitat'. These features may not necessarily be mapped by MNR. Potential of a feature to function as an important wildlife movement linkage can be assessed based on the general landscape composition, relative location of important habitat features, topographic and other physical features, and inferred or known animal movements at a local or regional scale.

The smaller creek corridors or agricultural drains that cross Highway 401 offer some potential in terms of wildlife movement opportunities however, the narrow, often discontinuous riparian vegetation cover along many of the creeks and drains in combination with the road crossings and other disturbances that reduce habitat quality and connectivity, limit the value of these creek corridors as wildlife linkages. The riparian systems along some of the larger drains/watercourses likely support movement of a variety of common wildlife, and the larger culverts and bridges that convey the drainage features under the highway facilitate movement by at least some species.

MUNICIPALITY OF CHATHAM-KENT OFFICIAL PLAN [1]

- Employment Area
- Residential Area
- Public Facility
- Downtown/Main St Area
- Golf Course
- Open Space / Conservation Area
- Highway Commercial
- Waste Management Facility
- Extractive Industrial Area
- Woodlot greater than 2 hectares
- Primary Urban Centre
- Hydro Electric Power Corridor
- Primary Urban Centre

[1] *As zoned in Municipality of Chatham-Kent Official Plan*

NATURAL ENVIRONMENT DATA

- Conservation Areas (LTVCA)
- Tallgrass Prairie Sites / Planting Area (MNR ; field surveys)
- Rare Plant Species (MNR; field surveys)
- Provincially Significant Wetland (MNR)

Municipal Drain Classifications
(Source: Municipal Drain Classification. Project LTVCA - Draft 2002)

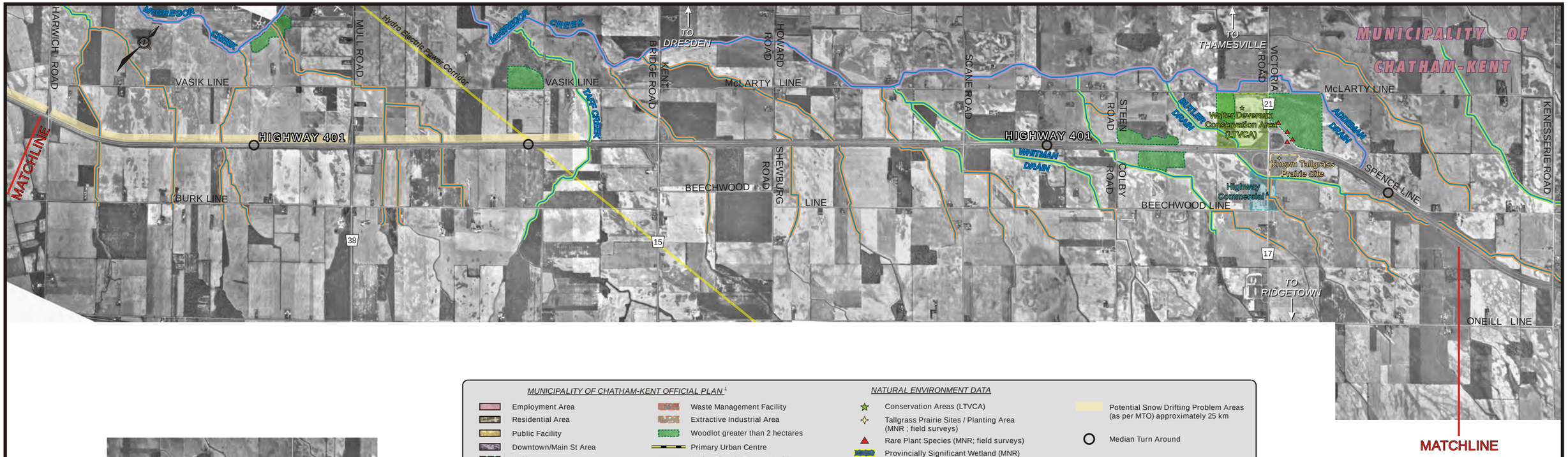
- Warmwater, with Top Predators
- Warmwater, with Top Baitfish
- Intermittent

- Potential Snow Drifting Problem Areas (as per MTO) approximately 25 km
- Median Turn Around

G.W.P. 80-00-00: Highway 401
from 0.9 km East of Essex Road 42 to Elgin County Boundary
Preliminary Design Study and Class EA

EXISTING CONDITIONS - WEST SECTION

EXHIBIT 4-1a



MUNICIPALITY OF CHATHAM-KENT OFFICIAL PLAN[1]

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NATURAL ENVIRONMENT DATA

- Conservation Areas (LTVCA)
- Tallgrass Prairie Sites / Planting Area (MNR ; field surveys)
- Rare Plant Species (MNR; field surveys)
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Municipal Drain Classifications
(Source: Municipal Drain Classification, Project LTVCA - Draft 2002)

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- Potential Snow Drifting Problem Areas (as per MTO) approximately 25 km
- Median Turn Around

G.W.P. 80-00-00: Highway 401
from 0.9 km East of Essex Road 42 to Elgin County Boundary
Preliminary Design Study and Class EA

EXISTING CONDITIONS - EAST SECTION

EXHIBIT 4-1b

Three tallgrass prairie sites were identified along the project limits. Tallgrass prairie is a rare community type in Ontario. It is ranked S1 meaning that it is 'critically imperiled in Ontario due to extreme rarity" (NHIC 2008). Due to its rarity, tallgrass prairie communities are considered 'Significant Wildlife Habitat' (OMNR 2000). This community type was previously more widespread but most of it has been converted to agriculture or developed. The 3 sites identified along the project limits are not considered native tallgrass communities because of their past disturbance (road and interchange construction) and supplementation of tallgrass prairie seed and are therefore not considered Significant Wildlife Habitat However, they do provide habitat for over 18 prairie indicator species including an SAR species (Dense Blazing Star is designated 'Threatened' by COSEWIC (SARA Schedule 1) and COSSARO (ESA Schedule 3)) and several S-rank species. However, the Dense Blazing Star is suspected to be introduced to this site because of known prairie seed introductions at this location and is not likely a native population (Allen Woodliffe pers comm).

At least 2 and probably all 3 sites were known to have some naturally occurring prairie species present since the early 1990s (Allen Woodliffe pers comm.). However, all sites are disturbed due to previous highway construction and maintenance. The prairie species present may have colonized or were introduced after the 401 interchanges were constructed and are not likely remnant tallgrass prairie communities. Some active management is known to have occurred at each site to encourage the growth of prairie species during the 1990s (Allen Woodliffe pers comm.). This includes the distribution of prairie species seed at all sites and a prescribed burn at the Victoria Road interchange (Allen Woodliffe pers comm.).

4.1.6 Fisheries and Aquatic Habitat

The watercourses within the study area lie within the Thames River watershed. The watercourses flow in a general northerly and westerly direction towards the Thames River or to smaller tributaries of the Thames. The Thames River flows westerly, just north of Highway 401, to its confluence with Lake St. Clair north of Tilbury. The main watercourses that cross the highway from west to east within the study limits are: Tilbury Creek, Little Baptiste Creek, Baptiste Creek, McDougall Drain, Government Drain 1, Government Drain 2, Government Drain 3, Waddick Drain, Flook & Hinton Drain, Lucas Drain, Proctor Drain and Taff Creek. These watercourses are conveyed through rigid frame bridges under Highway 401. At the majority of these locations, there is a westbound and an eastbound bridge with an open median. Proctor Drain is the only watercourse that is conveyed through a single structure under Highway 401. In addition to the bridge crossings listed above, 3 bridge crossings of Lucas Drain, McGregor Creek and Flook & Hinton Drain also lie within the study limits, within the vicinity of interchanges. All of these watercourses are permanent in nature.

There are also numerous drains and ditches crossing Highway 401 within the study area, most of which are intermittent. The majority of the watercourses are intermittent and part of the extensive agricultural drainage system that occurs in the poorly drained soils of the area. A total of 60 culvert locations cross Highway 401 within the study limits. At the majority of these locations, a single culvert conveys the drainage features under the highway. Of the 60 culvert crossings, 9 convey only localized highway drainage, with the remaining 51 conveying watercourses or drainage features that directly support fish use (seasonally or permanently) or are connected to surface water features supporting fish habitat.

The habitat conditions at all of the watercourses along project limits are considered 'warmwater', supporting various warmwater bait/forage fish (various minnow, darter and shiner species etc.) and panfish (Pumpkinseed). Some of the larger watercourses noted above also support sportfish species (Northern Pike, Largemouth Bass, White Bass) and coarse fish species including Black and Yellow Bullhead and Common Carp. There are two historical records of provincially rare fish species documented within the study area. Ghost Shiner (*Notropis buchanani*) (S2) was captured within Deary Drain and Waddick Drain and the River Darter (*Percina shumardi*) (S3) was captured within the Flook & Hinton Drain by the ROM in the 1980's (See Table 1 in *Fisheries and Ecosystems Technical Report,* which is provided in **Appendix F**).

There are also numerous watercourses along the project limits that have the potential to support aquatic Species at Risk (SAR) listed under the Species at Risk Act (SARA), based on the SAR Distribution Maps provided by DFO. Current SAR Distribution mapping (September 2007) displays reaches with potential habitat for fish and mussel SAR listed under Schedules 1, 2 or 3. It is important to note that not all segments have been sampled for fish and mussel species, therefore, the segments may extend further than the actual species distribution (DFO 2007) (or may not actually occur in some mapped segments). The following stream segments mapped as high risk for presence of SAR crossing Highway 401 within the study limits along various tributaries of the Thames River:

- Lake Chubsucker (*Erimyzon sucetta*) designated as Threatened by COSEWIC and listed under SARA on Schedule 1. Mapping includes Raleigh Plains Drain/Jeannette's Creek and tributaries-Waddick Drain, Chase Drain (C9) and West Drain (C10).
- Grass Pickerel (*Esox americanus vermiculatus*) is designated as Special Concern by COSEWIC and listed under SARA on Schedule 1. Mapping includes two small tributaries and one Drain; unnamed tributary of McGregor Creek (C40), unnamed tributary of C40 (C41) and the Addeman Drain (C42), which also eventually drains to McGregor Creek.
- Mapleleaf Mussel (*Quadrula quadrula*), designated as Threatened by COSEWIC, is not currently listed under SARA, however listing is pending following public consultation. Mapping includes McGregor Creek and several tributaries of McGregor Creek. These tributaries are associated with crossings C18, Huffman Drain (C22), White Drain (C23), C24, Tedford Drain (C25), McCallum Drain (C26) and McKoy Drain (C32).
- Bigmouth Buffalo (*Ictiobus cyprinellus*), designated as Special Concern by COSEWIC, is listed under SARA on Schedule 3. Mapping includes Baptiste Creek (B3) and includes highway drainage flowing through Queen's Line Interchange and B4a located east of Baptiste Creek. In addition, Bigmouth Buffalo has been sampled in the Flook & Hinton Drain at the Bloomfield Road interchange as outlined in background fisheries records (see Table 1 in the *Fisheries and Ecosystem Technical Report*, which is provided in **Appendix F**).

Although not outlined on the SAR Distribution Maps, background records also indicate the historical presence of Pugnose Minnow in Deary Drain (ROM 1984) as outlined in **Appendix F**. This species is designated as Special Concern by COSEWIC and listed under SARA on Schedule 1. DFO should be consulted to determine potential presence within the study limits.

4.1.7 Species of Conservation Concern

From a combination of background information and 2006 field surveys, 8 species of conservation concern were identified at 25 locations ('element occurrence records') within 500 m of the Highway 401 corridor. Species of conservation concern are defined here as federally (COSEWIC) and provincially (COSSARO/MNR) designated species at risk (including any that may be legally listed and protected under the Species at Risk Act and/or the Ontario Endangered Species Act), and provincially rare species (S1-S3 ranked). S-ranks are set NHIC to identify protection priorities for rare species in Ontario (these ranks are not legal designations). Ranks range from S1 (critically imperiled) to S5 (secure), with S1 to S3 (vulnerable) considered as rare.

Details of all (background and field survey) occurrences and locations are provided in **Appendix E**. Of the 8 species of conservation concern identified from background information and field surveys:

- 7 are plants - Whorled Milkweed (*Asclepia verticillata*), Sullivant's Milkweed (*Asclepias sullivantii*), Gray-headed Coneflower (*Ratibida pinnata*), Tall Ironweed (*Veronia altissima*), Paspalum (*Paspalum setaceum*), Long-styled Rush (*Juncus longistylus*), and Climbing Prairie Rose (*Rosa setigera*).
- 1 is a mammal - American Badger (*Taxidea taxus*).
- 2 are designated both federally (COSEWIC) and provincially (COSSARO); Badger is 'Endangered', and Climbing Prairie Rose is 'Special Concern'.
- All 8 are considered provincially rare species (ranked S1-S3). Five (5) of these were observed during field surveys.

Background Information Summary

Background information provided by MNR Chatham Office identified 16 records of species of conservation concern. Two additional records were provided but were not included as they are located greater than 500 m from the Highway 401 corridor. From the provided background data, the 16 records were of the 7 different plants species, and 1 mammal species listed above. The mammal record was of an American Badger road kill from 1982.

Based on a review of the breeding bird information from the OBBA for the 10 atlas squares, portions of which encompass the project limits, 11 avian species of conservation concern were noted as exhibiting some level of breeding evidence, with 6 being confirmed breeders (Bald Eagle, Black Tern, Chimney Swift, Forster's Tern, Red-headed Woodpecker and White-eyed Vireo).

Although the exact locations of the birds are not known, none of the species was encountered during field surveys, noted in background data provided by MNR, or shown in NHIC mapping. Habitat with high potential for nesting use was not identified within the right-of-way for any of the species. There may be potentially suitable habitat present for some species (e.g. Red-headed Woodpecker) within natural areas immediately adjacent to the highway right-of-way, however it is unlikely that the proposed works would impact the species' habitat, since this project is composed of widening an existing facility and impacts will be limited to the right-of-way and edge areas that have already been disturbed by the existing highway construction, maintenance and road operations.

It should be emphasized that the OBBA 10 km squares cover a much larger area than the linear project length of 66 km, and therefore these data do not necessarily indicate occurrence in the immediate vicinity of the project area. A review of the OBBA information is provided in **Appendix E**.

Terrestrial Field Surveys (2006)

Given the number of species of conservation concern within the study area, a site visit was conducted on August 17, 2006 with the District Ecologist at MNR, Chatham office. The purpose of the visit was to confirm and accurately map (using GPS) the species of conservation concern records provided by MNR. The area between Queen's Line and Victoria Road was covered. During the site visit, and in additional field surveys by Ecoplans, 11 of the 16 occurrence records originally provided by MNR were confirmed, and 9 additional (new) occurrences were identified. Therefore a total of 20 rare species occurrences were confirmed during field visits and surveys in 2006. Sixteen (16) of these occurrence were located in the 27 km stretch between Queen's Line near Tilbury and Highway 40 / Communication Road near Chatham.

All 20 occurrences observed during field surveys in 2006 were of 5 provincially rare (S1-S3) plant species. No provincially rare wildlife species were observed during field surveys in 2006. No provincially and federally designated species was observed during field surveys. Most of the observations were of populations of plant species, with between 5 and 500 individual plants in a population. MNR noted that some of the plants have been growing in these locations for at least 10 to 20 years.

During field surveys and site visits, 19 of the plant locations were confirmed to be within the existing ROW or at interchanges. The populations are scattered within the right-of-way, with most plants located approximately 10-15 m from the paved highway shoulder, but some plants were as close as approximately 3 m from the paved shoulder.

These data do not include additional occurrences of the above species, or additional potential species of conservation concern, found at the tallgrass prairies sites. The sites are found at 3 interchanges in the study area (Highway 40/Communication Road, Victoria Road, Orford Road), and are described further in **Appendix E**.

4.2 Groundwater

A groundwater assessment study was carried out to characterize the local hydrogeological conditions within the study area. The findings are the groundwater assessment study are provided in **Section 7.5** and **Appendix G**. The following summarizes the existing hydrogeological conditions within the study area.

Aquifers

The predominant groundwater source within and surrounding the study area is likely the overburden aquifer system. The overburden appears to be characterized by three main aquifer systems, each composed of varying quantities of sand and gravel. Since the upper overburden aquifer likely has sand and gravel deposits located at or near the surface, this aquifer would be considered unconfined. The intermediate and deep aquifer systems are both considered to be confined (i.e. separated by alternating layers of glacial silt and clay), and are less susceptible to surface contamination or construction impacts.

The bedrock aquifer system has lower permeability when compared to sand and gravel deposits within the overburden, and does not transmit groundwater as readily. Since the bedrock is overlain by significant deposits of overburden material, the likelihood of surface activities impacting the bedrock aquifer is considered to be low.

Groundwater Quality and Use

A majority of the study area relies on potable water supplies from Lake Erie or Lake St. Clair. Only the communities of Highgate and Ridgetown, located outside of the study area, rely solely on municipal groundwater systems. Approximately 82% of all water supplies are from surface water sources, with 18% coming from groundwater.

Groundwater quality typically exceeds the Provincial guidelines for parameters such as chloride, iron and fluoride. In addition, groundwater supplied from overburden aquifers can have high total dissolved solids. Bedrock aquifer water quality is reported to be generally good with 81% to 88% of MOE water well records reporting fresh water at the time of installation.

Groundwater Flow

The direction of regional groundwater flow is likely uniform, trending northwest towards the Thames River, and Lake St. Clair. In contrast to the regional groundwater flow trends, groundwater flow directions on a local scale will be variable; although shallow groundwater flow is expected to follow the topography moving from areas of high elevation to low elevation, and will be influenced by surface watercourses and other features (e.g. depressions, wetlands).

Groundwater Recharge and Discharge

The majority of the study area can be considered a recharge zone, relying on rainfall events to recharge underlying aquifers. Discharge areas mainly occur outside of the study area along the Thames River and the Lake Erie shoreline (primarily as baseflow). Some local discharge to drainage ditches and smaller surface watercourses will likely occur within the study area as a result of the tile drainage of agricultural fields.

Aquifer Susceptibility

A majority of the study area is considered to have a low susceptibility to groundwater contamination resulting from surface activities. This is largely due to the predominance of clayey and silt overburden covering most of the study area, which significantly restricts vertical groundwater migration. Generally, the area east of Chatham likely has a moderate to high groundwater susceptibility due to sand and gravel deposits located at or near the surface.

Wellhead Protection Areas

Wellhead protection refers to the process of identifying the area from which a well will potentially draw its water supply. No wellhead protection areas are identified within the study area.

4.3 Socio-Economic Environment

4.3.1 Project Location

The study area for Highway 401 is located within the boundaries of the Municipality of Chatham-Kent, which is located in the centre of Southwestern Ontario between Lake Erie, Lake Huron and Lake St. Clair. The study limits are shown previously in **Exhibit 2-1**. It encompasses the geographic Township of Tilbury North in the Town of Lakeshore, County of Essex and the geographic Townships of Tilbury East, Raleigh, Harwich, Howard and Orford in the Municipality of Chatham-Kent.

Chatham-Kent is comprised of several urban centres, hamlets, and rural communities, surrounded by an established agricultural base. The population of Chatham-Kent is 108,589 (Canada 2006 Census).

The project is located within the MTO's West Region.

4.3.2 Adjacent Land Uses

Adjacent land uses are shown previously in **Exhibits 4-1a and 4-1b**.

The majority of the adjacent land uses within the study area is agricultural with an emphasis on crop production. There are a few livestock farms observed during site investigations. There are some small urban communities adjacent to Highway 401, most notably in Tilbury, at the Charing Cross Road flyover and the Highway 40 / Communication Road interchange. A few existing highway interchanges are occupied by commercial properties, such as, truck storage and repair service centres and gasoline service stations. Rural residences and farming operations are dominate throughout the study area.

The following is specifically noted at the existing Highway 401 interchanges within the study area based on the review of the Municipality of the Chatham-Kent Official Plan and site investigations:

Queen's Line Interchange

The land uses in the vicinity of the Queen's Line interchange are primarily rural. No major industrial development exists here or is planned for the area. It is expected to continue as primarily rural uses.

Bloomfield Road Interchange

The Bloomfield Business Park is located in the southwest quadrant of the interchange, which is proposed as a prestige employment area to act as an economic catalyst and a new gateway to the Municipality. The Official Plan is trying to guide development in the Bloomfield Business Park as a prestige development to meet current standards so as to attract business and industry. Provision for future expansion has been made by designating lands to the west of the existing Bloomfield Business Park.

The Bloomfield Business Park is spread over 120 acres. Lots along 7th Line East, which runs parallel to Highway 401, provide high visibility and easy access to Highway 401. The park is zoned for manufacturing, fabrication, processing, finishing assembly, packaging, scientific research, business offices and call centres.

Currently one truckload carrier has operations in the Bloomfield Business Park; another trucking firm has shown interest in locating in the area.

Some existing light industrial and logistics industries occupy the lands along Bloomfield Road south of Highway 401. Agricultural and rural residential uses occupy the lands along Bloomfield Road north of Highway 401 and along 8th Line south of Highway 401.

Highway 40 / Communication Road Interchange

Lands located on the southeast of the interchange are zoned as Highway Commercial.

The focus of this interchange is tourism and commercial, located primarily on the south side of the interchange. A tourist attraction firm is located in the southeast quadrant of the interchange, and has high visibility to motorists on Highway 401.

Rural residential uses occur along Highway 40 and Pinehurst Road north of the interchange.

Kent Bridge Road Interchange

The areas in the northeast and southeast quadrants are zoned as Public Facility. The areas in the northwest and southwest are zoned for agricultural uses. No development is proposed in the vicinity of the interchange.

Victoria Road Interchange

Tourism commercial uses are planned for the southeast and southwest quadrants of the interchange. The Walter Devereaux Conservation Area is located in the northwest quadrant of the interchange. The woodlot in the northeast quadrant is designated under the Official Plan as a "Woodlot greater than 2.0 hectares".

Orford Road Interchange

The area in and around the interchange is zoned for agricultural uses and no development is proposed at this interchange.

4.3.3 Agriculture

An agricultural assessment was carried out to identify the existing agricultural uses within the study area and assess the potential impacts to agricultural lands. The *Agricultural Report* is provided in **Appendix K**. The following provides an overview of the agricultural features within the study area.

Physiography and Climate

The study area is located within the Bothwell Sand Plain and the St. Clair Clay Plain physiographic regions.

The Bothwell Sand Plain is described as a thin (1 – 1.5 m) sand layer over clay deposits. The sand plain is the delta of the Thames River in the Glacial Lake Warren. The soils within this area are generally poorer quality in contrast to the flatter areas to the south and west.

The St. Clair Plain is an extensive area adjacent to the Lake St. Clair (includes portions of the Essex and Kent Counties). There is little topography relief in this area, except for a moraine near Ridgetown and Blenheim. The clay soils are deep, with the parent material extending to depths of over 33 m overlying bedrock.

The study area is located within the 3100 – 3500 average accumulated Crop Heat Units available for warm season crops in Ontario. The Crop Heat Units (CHU) index was originally developed for field corn and has been use in Ontario for 30 years. CHU averages range between <2100 east of Parry Sound to over 3500 near Windsor. The higher the CHU value, the longer the growing season and greater are the opportunities for growing value crops.

Soil Capability for Agriculture

The Canada Land Inventory (CLI) system combines attributes of the soil to place the soils in a seven-class system of land use capabilities. The CLI soil capability classification systems group mineral soils according to their potentialities and limitations for agricultural use. The first three classes are considered capable of sustained production of common field crops, the fourth is marginal for sustained agriculture, the fifth is capable for use of permanent pasture and hay, the sixth for wild pasture and the seventh class is for soils or landforms incapable for arable culture or permanent pasture. Organic or Muck soils are not classified under this system.

The Canada Lank Inventory for the study area illustrates that the majority of the area is Class 1 – 3 lands. Smaller pockets of Class 5 lands, not mapped areas and some organic soils were noted within the study area and at the existing interchanges.

Exhibit 4-2 illustrates the CLI identified within the study area.

Agriculture Land Use

The study area consists of a variety of land uses including, but not limited to, agriculture, light industrial/commercial, government/institutional, aggregate operations, open field, residential estate, built up areas, recreational and woodlots.

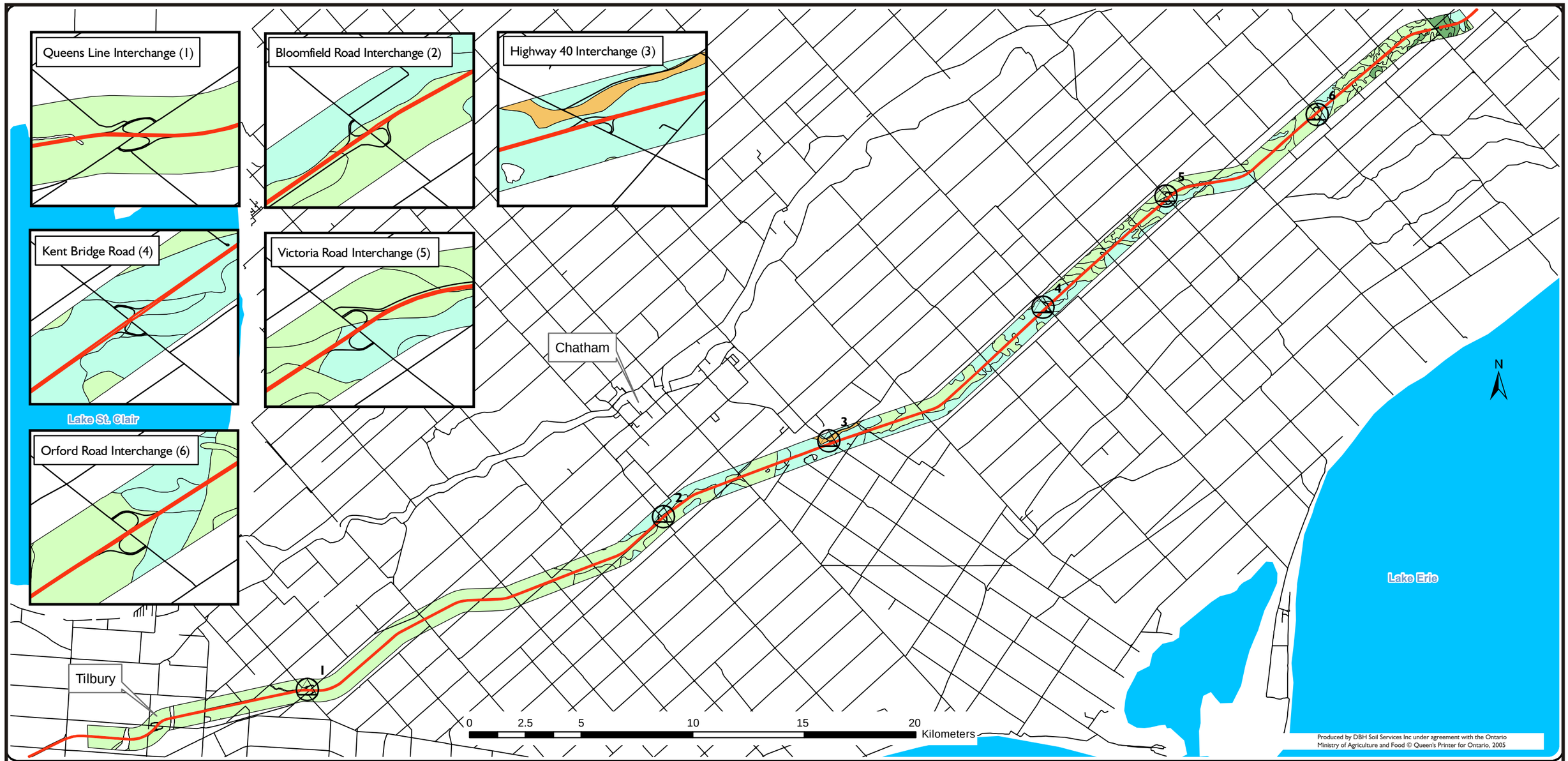
Exhibit 4-3 illustrates the agricultural land use within the study area and highlights small areas of 'speciality crops' (fruit trees, vegetables, tobacco). Ontario Ministry of Agriculture, Food and Rural Affairs (OMAFRA) datasets for agricultural land uses documents that most widespread use of lands within the study area is for the production of common field crop (corn, soybean). Pasture, hay and grazing systems were noted in sporadic locations. Additionally, built up, extraction, idle lands, mixed systems, not mapped and recreation uses were noted in the OMAFRA data.

Field survey observations indicate that the majority of the land within the study area and at the existing interchanges consisted of the production of common field crop, pasture, forage and wooded areas. No areas of speciality crop were observed during the field surveys for the 2006 cropping system.

Artificial Drainage

Artificial drainage involves the construction of or installation of tile drains in agricultural fields to reduce the excess water in the soil profile. The installation of tile drainage is an expense incurred by the landowner and as a result is considered an investment in agriculture.

Exhibit 4-4 illustrates the location of agricultural fields with artificial tile drainage systems.



Legend

- Interchange Location
- Highway 401
- Roads
- Lakes

Canada Land Inventory

- Not Mapped
- Class 1
- Class 2
- Class 3
- Class 5

DBH Soil Services Inc

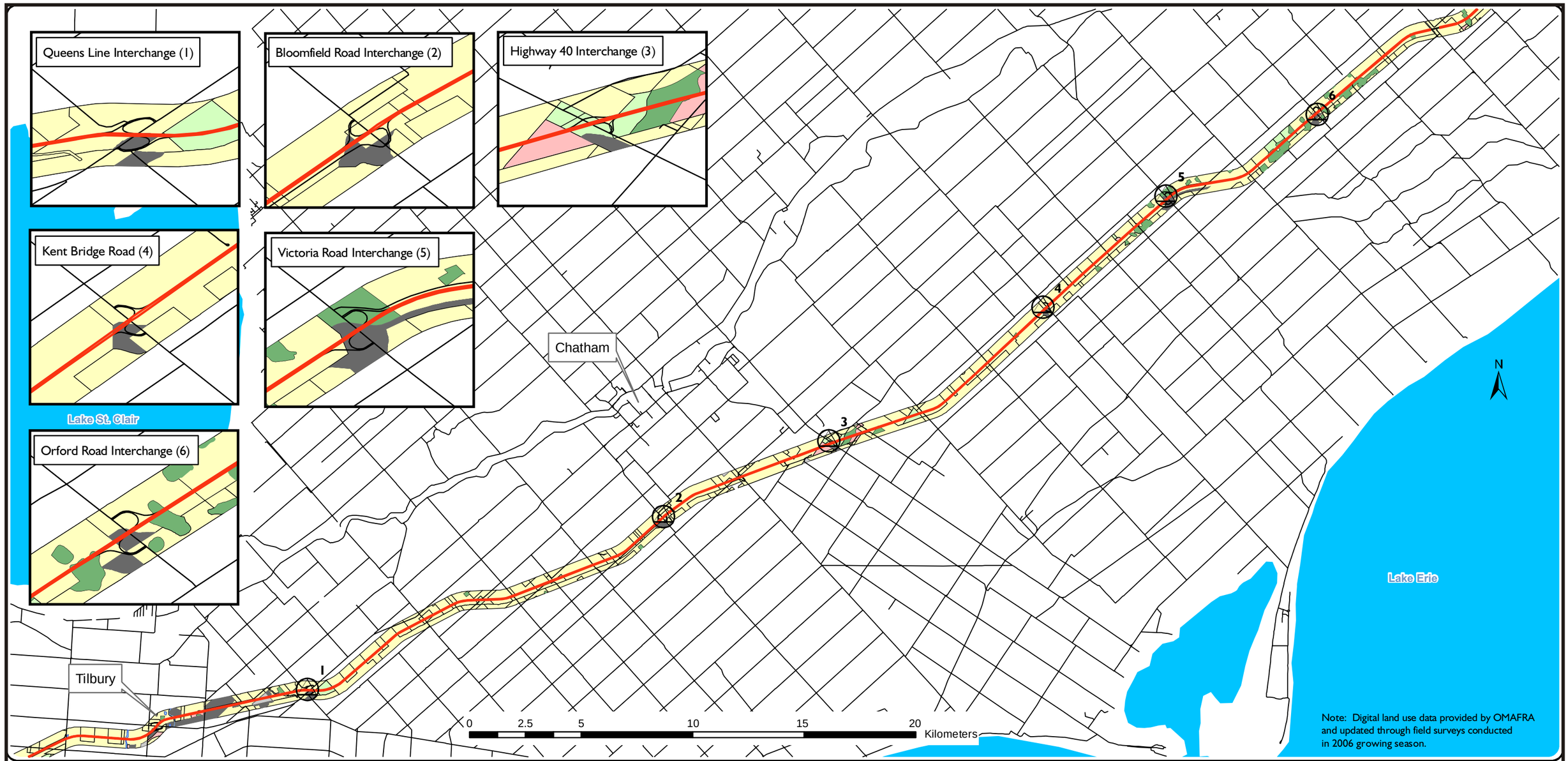
April 2008

2006/03/Figure 2 - CLI - April 2008

G.W.P. 80-00-00: Highway 401
from 0.9 km East of Essex Road 42 to Elgin County Boundary
Preliminary Design Study and Class EA

CANADIAN LAND INVENTORY (CLI) - SOIL CAPABILITY CLASSIFICATION

EXHIBIT 4-2



Legend

- Interchange Location
- Highway 401
- Roads
- Lakes

Land Use

- Built up/Urban Areas
- Common Field Crop
- Idle Agricultural Land
- Mixed Systems
- Not Mapped
- Recreational Areas
- Woodlots

DBH Soil Services Inc

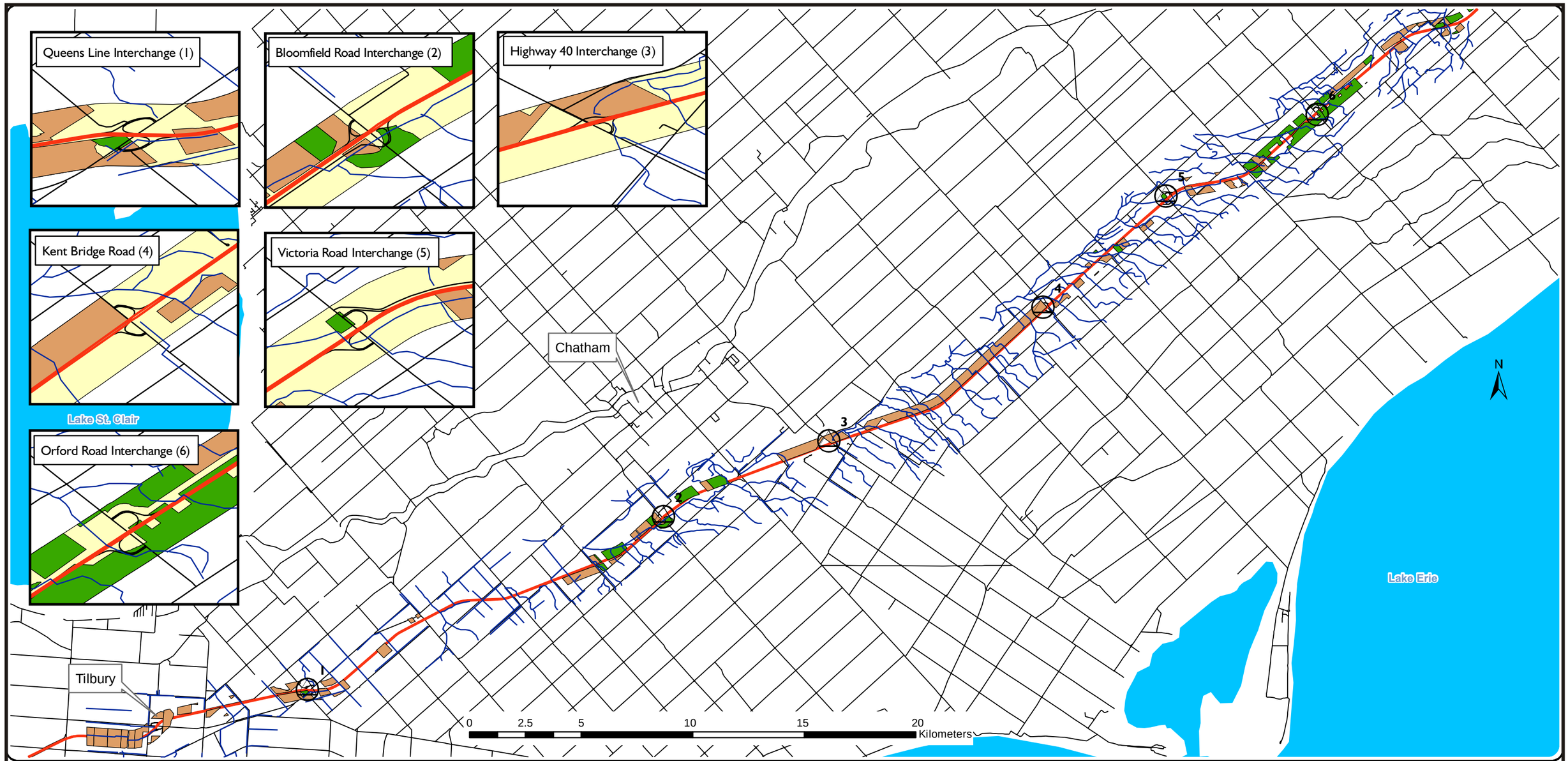
April 2008

file:2006/05/Figure 3 - land use april 2008

G.W.P. 80-00-00: Highway 401
from 0.9 km East of Essex Road 42 to Elgin County Boundary
Preliminary Design Study and Class EA

CANADIAN LAND INVENTORY LAND CLASS

EXHIBIT 4-3



Legend

- Interchange Location
- Highway 401
- Roads
- Lakes

Type of Drain (approximate location)

- Random
- Systematic
- Municipal Drain

DBH Soil Services Inc

April 2008

file:2006/05/Figure 5 - Artificial Tile Drainage april 2008

G.W.P. 80-00-00: Highway 401
from 0.9 km East of Essex Road 42 to Elgin County Boundary
Preliminary Design Study and Class EA

ARTIFICIAL TILE DRAINAGE

EXHIBIT
4-4

Two system types (systematic and random) were noted. Systematic tile drainage refers to a "system" approach to draining a field. In systematic tile drainage, drain lines are located at specific or preselected intervals to provide the most effective drainage for that field and the existing soil conditions. Random tile drainage refers to tile drains that exist to drain specific areas of a field and not the entire field.

Numerous registered drains were identified within the study area. A registered drain is used to provide a large outfall for water from agricultural fields. These drains are often constructed by the Municipality with agreements in place for the landowners affected by the construction and operation of such a facility. Many of these drains are named for the owners of the lands affected by the construction of the drain.

Irrigation

Irrigation equipment is used to provide water to crops in a timely fashion. Irrigation equipment may be owned by the farm operator or rented as required for the crop.

No areas of irrigation were noted within the study area or at the existing interchange locations.

Landforming

Landforming is a term applied to describe the physical movement of soil materials with the purpose to level fields or lessen slopes to accommodate the use of farm equipment. Large construction equipment is required for these operations.

No areas of landforming were noted within the study area or at the existing interchange locations.

Organic Farming

Organic farming is a production management system that is based on the minimal uses of off-farm inputs. Organic is a labelling term that denotes that a farm has been certified and adheres to standards that maintain the integrity of organic agricultural products.

Organic farms must go through a certification process to achieve the Organic Status. These farms are susceptible to wind blown contaminants and as such should be documented as to the proximity to the proposed undertaking.

No areas of areas of Organic Certified agricultural products were noted within the study area or at the existing interchange locations.

Minimum Distance Separation I

The Minimum Distance Separation (MDS) calculation is a tool provided by the OMAFRA, and used to determine a recommended distance between livestock operation and another land use. The objective is to prevent land use conflicts and to minimize nuisance complaints from odour (the MDS does not account for noise or dust issues). MDS I calculations are employed to determine the minimum distance separation for new development from existing livestock facilities, while MDS II calculations are used to determine the minimum distance separation for new or expanding livestock facilities from existing or approved development.

Discussion with staff from the OMAFRA indicates that the Minimum Distance Separation Calculations are not required for Environmental Assessments for road development or realignment. Given this, MDS calculations are not required for the proposed improvements to Highway 401.

4.3.4 Property Waste and Contamination

A Contamination Overview Study was carried out to identify areas of actual or potential property waste or contamination. Areas of actual contamination within the limits of the study area were not identified; however, the following land uses and/or features, which may represent potential sources of contamination, were located within the study area. The following highlights the areas with a high potential for site contamination within the study area where current or historical land uses (and activities) could impact soil and/or groundwater:

- Septic lagoons are located near the west limits of the study area, north of Highway 401;
- An industrial facility located to the south of Highway 401, west of Baptiste Road;
- An industrial park located along Industrial Park Road north of Highway 401, east of Baptiste Road;
- Fuel service stations located to the north and south of Highway 401, east of Baptiste Road;
- A historical spill occurrence located on Highway 401 near the Merlin Road crossing;
- Historical spill occurrences located at the Highway 401 / Bloomfield Road interchange, along with equipment storage company and a transportation company located in the southwest quadrant of the interchange and a transportation company located in the southeast quadrant of the interchange;
- A hydro corridor crossing the study between Charing Cross Road and the Highway 40 / Communication Road interchange.
- The CSX railway tracks cross under Highway 401 between Charing Cross Road and the Highway 40 / Communications Road interchange;
- Maintenance yards and commercial business area located in the southeast quadrant of the Highway 40 / Communication Road interchange;
- An open sewage lagoon located on the northwest quadrant of the Highway 401 / Kent Bridge Road interchange; and
- The active waste disposal site (Highgate Dump) located between Kenesserie Road and Oxford Road, south of Highway 401.

The locations of the above areas are shown in the Site Contamination Overview Study, which is provided in **Appendix H**.

4.3.5 Noise

Based on the MTO / MOE Noise Protocol and the new MTO Noise Guide, a Noise Sensitive Area (NSA) is defined as a noise sensitive land use (urban or rural) with an Outdoor Living Area (OLA) associated with the land use. NSAs include:

- private homes such as single family residences;

- townhouses;
- multiple unit buildings, such as, apartments with outdoor living areas for use by all occupants; and
- hospitals, nursing homes where there are outdoor living areas for the patients / residents.

There are some small communities with residential uses adjacent to the right-of-way, most notably in the Tilbury area, and in the vicinity of the Highway 40 / Communication Road interchange and the Charing Cross Road flyover. Rural residences and farming operations are scattered throughout the study area. Eighty-three noise receiver locations represent the NSAs within the study area, which are shown in the **Appendix I**.

Residential subdivisions have recently been developed and/or continue to be developed along the south side of the Highway 401, east and west of Queen Street in Tilbury. Where land has been developed for residential uses adjacent to an existing or planned Provincial Highway after February 8, 1977, the developer is required to prepare noise study reports as part of the subdivision approval process as per the MOE requirements under the Planning Act and submit them to MOE or the designated authority under the Planning Act. Based on MOE requirements, those who develop land for residential uses adjacent to an existing or planned noise generator (i.e. highway, roadway, factory, etc.) are responsible for ensuring that noise levels in the outdoor living area are consistent with the provincial objective of 55 dBA ten years after construction. In such cases, it is the responsibility of the developer to identify and implement indoor and outdoor attenuation (i.e. noise walls, air conditioning, forced ventilation, etc.). Even with noise attenuation measures, if the provincial objective of 55 dBA cannot be achieved ten years after construction, noise warning clauses are required title of those properties affected.

A noise warning clause is a formal notification that informs the purchaser or the tenant that noise may or will interfere with his or her daily activities. The warning clause must appear as a specific section of a registered agreement, such as a Subdivision Agreement, which stipulates that a prospective purchaser or tenant must be advised of the potential noise concern.

The Project Team undertook a review of the noise study completed by others in 1989 for the residential subdivision on the east side of Queen Street, which was provided by the Municipality of Chatham-Kent. The findings of this noise study are summarized below:

- Considered traffic noise from Highway 401.
- Recommended the provision of outdoor and indoor noise attenuation including:
  - Recommended that the lots along Highway 401 be orientated in a manner that houses themselves shield the outdoor living area from highway traffic noise, or, alternatively, provide acoustical barriers to ensure maximum shielding of the designated outdoor living area.
  - Installation of central air conditioning.
- Recommended noise warning clauses for the lots adjacent to Highway 401.

Site investigations of the residential development east of Queen Street determined that the houses adjacent to Highway 401 were not orientated so that the houses themselves shield the outdoor living areas from traffic noise on Highway 401, nor have acoustical barriers been provided to mitigate traffic noise from Highway 401. In summary, the outdoor living areas at the houses adjacent to Highway 401 are exposed to highway traffic noise with no mitigation as recommended by the developer's noise report. Given this, it was concluded that the responsibility for noise mitigation rests with the developer and the Municipality of Chatham-Kent. Nonetheless, this noise assessment for the Highway 401 improvements includes receiver locations within this development for the purposes of analysis to determine the potential noise impacts from the highway widening from four lanes to six lanes.

Noise mitigation was also the responsibility of the developer for the newer residential subdivision west of Queen Street. A noise report prepared by the developer has not been provided by the Municipality of Chatham-Kent. Discussions with local residents at the Public Information Centres indicate that a berm/wall combination was provided along the residential property lines adjacent to Highway 401; however, they indicated that the berm is too short to mitigate noise from Highway 401 since the highway is elevated adjacent to their houses. They also noted the wall is a typical wooden fence (i.e. not an acoustical barrier). Site investigations confirmed that this berm/wall combination would not mitigate traffic noise from Highway 401. Given that proper noise mitigation was not provided at these houses, it was concluded that the responsibility for noise mitigation rests with the developer and the Municipality of Chatham-Kent.

A noise assessment was carried out to assess the potential noise impacts at the NSAs noted above. The noise assessment followed the MTO / MOE Noise Protocol and the new MTO Noise Guide. The findings of the noise assessment are summarized in **Section 7.10**. The noise assessment is included in **Appendix I**.

4.4 Cultural Environment

4.4.1 Archaeological

A Stage I archaeological assessment was carried out to identify and assess the known and potential archaeological heritage resources within Highway 401 study area. The Stage I assessment is a background study carried out in accordance with guidelines established by the Ministry of Culture (MCL). The process includes:

- Examining the Ministry of Culture archaeological site registry to determine the presence of known archaeological sites in and around the project area, and
- Reviewing the land use history and the present condition of the study area.

The Stage I archaeological assessment also included a field review. The assessment also examines/documents the geomorphological history of the land during the period of possible human occupation, in order to evaluate the potential for buried cultural deposits, and documented any other historical, environmental, planning or archaeological data applicable for the subject lands.

The findings of the Stage I archaeological Assessment are summarized in **Section 7.12**. The Stage I Archaeological Assessment Report is included in **Appendix N**.

4.4.2 Heritage Resources

A cultural heritage resource assessment was carried out to identify built heritage resources and cultural heritage landscapes within the study area. The assessment identified several principal cultural heritage landscapes and above-ground, built heritage resources older than 40 years adjacent to the Highway 401 study corridor during the field survey work. They include seven (7) cultural heritage landscapes and thirty-two (32) built heritage resources. Of these, three (3) cultural heritage landscapes and thirty (30) built heritage resources are located within the right-of-way of Highway 401, and relate directly to highway construction. A brief description of the identified built heritage resources and cultural heritage landscapes are shown and described in **Appendix M**.

4.5 Transportation Features

4.5.1 Road Network

Chatham-Kent is serviced by an extensive network of local, collector and arterial roads as well as Highway 401. These roads provide linkages within the community, to other parts of Ontario and the United States. Highway 401 and Highway 40 are the currently the only roads under the jurisdiction of MTO within the study area, with the Municipality of Chatham-Kent being responsible for all other roads.

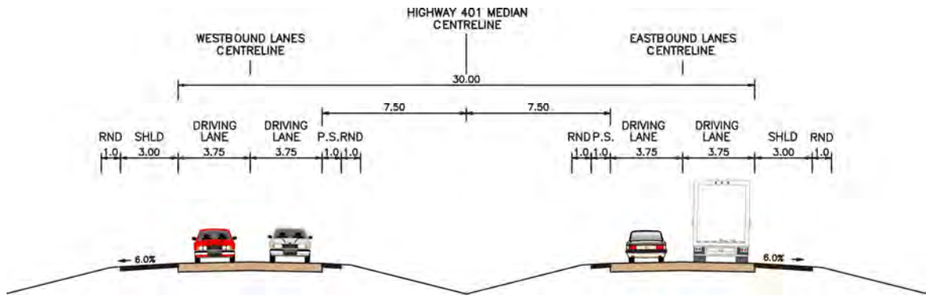
An overview of the key roadways within the study area is provided below.

<u>Highway 401</u>

The Highway 401 corridor through the Municipality of Chatham-Kent is classified as a Freeway under the MTO's Functional Classification System with a design speed classification of RFD 120 (Rural Freeway Divided Design Speed 120 km/h) with a posted speed limit of 100 km/h. Highway 401 is also classified as a Class I Freeway under MTO's Provincial Highway Access Control System and was designated a controlled-access highway under the *Public Transportation and Highway Improvement Act* circa 1955.

The highway right-of-way is 91.44 m (300 ft) within the study area except at interchange and service centre locations. The existing cross-section consists of two 3.75 m lanes in each direction, with a 15.0 m wide median. The outside shoulders are generally 3.0 m wide (fully paved) and the median shoulders are 1.0 m wide (fully paved) with 1.0 m rounding. Rumble strips have been placed on both the inside and outside shoulders throughout. See **Exhibit 4-5** for details.

Exhibit 4-5: Highway 401 – Typical Cross-Section



The westbound lanes from 0.6 km east of Bloomfield Road to 0.1 km east of Victoria Road were reconstructed in 2001 resulting in an approximate 325 mm grade raise within this highway section.

There are seventeen horizontal curves within the study area, which are shown in **Exhibits 4-1a and 4-1b**. The radii of these curves range from 873 m to 3493 m, which are all above the minimum design standard of 650 m for a design speed of 120 km/h. Fourteen of the seventeen curves do not contain spiral transitions. Spiral transitions provide a transition between tangents and curves and will be considered as part of any highway improvement.

The topography in the area is predominately flat and thus the Highway 401 vertical alignment has grades of mostly 0% to 1%. The only exceptions are at the two overpasses where Highway 401 goes over Queen Street in Tilbury and the CSX railway. The design standards for vertical alignment for the 120 km/h design speed are:

- Maximum grade of 3%
- Minimum crest curvature (K) of 120
- Minimum sag curvature (K) of 60

There are two less than desirable vertical crest curves within the study area, both having a 'K' value of 90, which corresponds to a design speed of 110 km/h. There are also two less than desirable vertical sag curves within the study area, both having a 'K' value of 50, which corresponds to a design speed of 110 km/h.

There are forty-three structures within the study limits. They include the following:

- Fifteen underpasses (Highway 401 under the crossing road)
- One Highway 401 overpass (2 structures)
- Twelve water crossings (24 structures)
- One railway crossing (2 structures) – Highway 401 crosses over

There are twenty-three concrete culverts within the limits of the study with spans equal to or greater than 3.0 m.

<u>Crossing Roads</u>

The majority of the roads that cross over Highway 401 have less than desirable vertical alignments as they cross over Highway 401. However, many of the crossing side roads have low volumes and therefore the existing vertical alignments can be tolerated. Consideration should be given to improving the alignments if replacement of the structure crossing the highway is necessary. The exception to this is at the interchanges where there are higher volumes and numerous traffic moves on and off Highway 401. All the interchange side roads are posted at 80 km/h and therefore have a theoretical design speed of 100 km/h.

There are six interchanges of varying design types within the study limits. See **Exhibit 4-6** for a schematic drawing of typical interchange types, along with their advantages and disadvantages.

The existing layouts of the six interchanges are shown previously in **Exhibits 4-1a and 4-1b**. All of the crossing roads at the interchanges cross over Highway 401. An overview of the existing conditions at each of the interchanges (west to east) is noted below.

Queen's Line Interchange

- Queen's Line is under the Municipality of Chatham-Kent jurisdiction. Queen's Line provides a connection between Tilbury and the Chatham urban area. The Queen's Line interchange is one of two interchanges that provide access to community of Tilbury from Highway 401.
- Queen's Line has a two-lane basic cross-section. However, Queen's Line widens to four lanes while crossing over Highway 401.
- This is a Parclo B-2 type interchange with single lane ramps in the northwest and southeast quadrants. There are a number of concerns at this interchange, including less than desirable ramp radii, less than desirable speed change lanes (SCL's), visibility issues as Queen's line crosses over Highway 401 including guide rail reducing east and westbound exit ramp visibility.
- Within the Queen's Line interchange, Jeannette's Creek Road connects to the 'North/South to West' (N/S-W) and 'East to North/South' (E-N/S) ramps and McKinlay Road connects to the 'North/South to East' (N/S-E) and 'West to North/South' (W-N/S) ramps, resulting in side road traffic merging with ramp traffic. These roads connecting to the interchange ramps raises a concern with driver expectancy, as motorists entering and exiting the interchanges ramps would not expect an intersection mid-way through the ramp.

Bloomfield Road Interchange

- Bloomfield Road is under the Municipality of Chatham-Kent jurisdiction. Bloomfield Road provides access to the urban area of Chatham from Highway 401.
- Bloomfield Road has a two-lane basic cross-section through the interchange.
- This is a Parclo B-2 type interchange with single lane ramps in the northwest and southeast quadrants. There are a number of concerns at this interchange, including less than desirable ramp radii, less than desirable speed change lanes and visibility concerns as Bloomfield Road crosses over Highway 401.
- Proximity of 7th Line East to the westbound ramp terminal creates operational concerns as traffic volumes, future growth and economic development increase.
- Proximity of 7th Line West and its future realignment is the responsibility of the Municipality of Chatham-Kent to support the Bloomfield Business Park (see **Sections 2.1.3 and 5.4.6**).

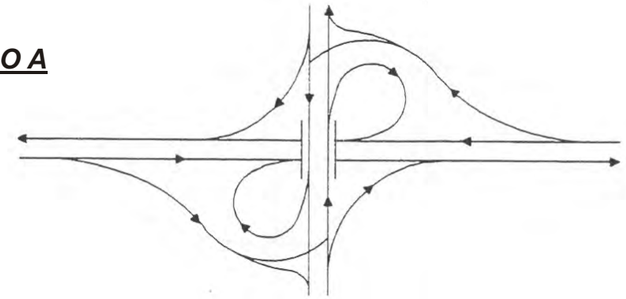
Highway 40/ Communication Road Interchange

- Highway 40 is under MTO jurisdiction. Highway 40 travels between with Highway 401 in Chatham-Kent to Highway 402 in Sarnia (approximately 91.km in length). Highway 40 provides access to the Chatham urban area from Highway 401.
- Communication Road is under the Municipality of Chatham-Kent jurisdiction. Communication Road provides access to the community of Blenheim from Highway 401.
- Highway 40 / Communication Road has a two-lane basic cross-section through the interchange.
- This interchange has diamond type ramps north of Highway 401 and Parclo B-2 ramps south of Highway 401.
- Concerns at this interchange include less than desirable ramp radii on the Parclo B-2 ramps, less than desirable eastbound speed change lanes and visibility concerns as Highway 40 / Communication Road crosses over Highway 401.
- Proximity of Pinehurst Road to the westbound ramp terminal creates operational concerns as traffic volumes, future growth and economic development increase.

Kent Bridge Road Interchange

- Kent Bridge Road is under the Municipality of Chatham-Kent jurisdiction. Kent Bridge Road provides access to the community of Dresden from its interchange from Highway 401.
- Kent Bridge Road has a two-lane cross-section through the interchange.
- This is a Parclo A-2 type interchange with single lane ramps in the northeast and southwest quadrants. Concerns at this interchange include less than desirable ramp radii and visibility concerns as Kent Road crosses over Highway 401. In addition, all the speed change lanes are less than desirable length.
- Proximity of Beechwood Line to the eastbound ramp terminal creates operational concerns as traffic volumes, future growth and economic development increase.

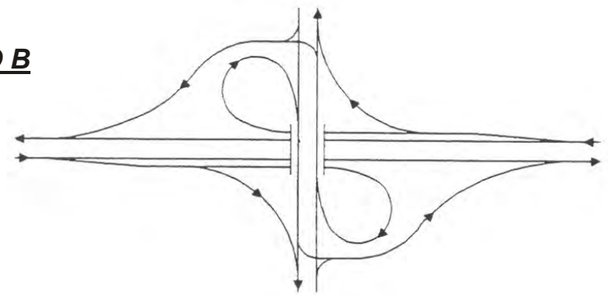
PARCLO A



Advantages:
- favours the fast freeway traffic by placing exit terminals on advance of structure.
- weaving is eliminated.
- single exit features simplifies signing of freeway.
- high capacity.

Disadvantages:
- requires additional property than diamond configuration.

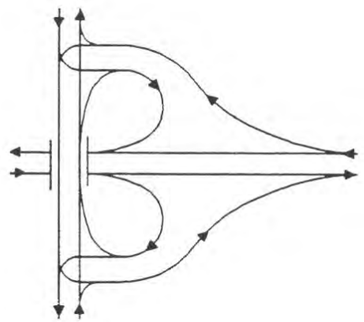
PARCLO B



Advantages:
- weaving is eliminated.
- not conducive to wrong way movement.

Disadvantages:
- high speed traffic must exit from freeway on a small radius loop.
- sight lines to exit loop ramp is restricted by structure.
- requires additional property than diamond configuration.

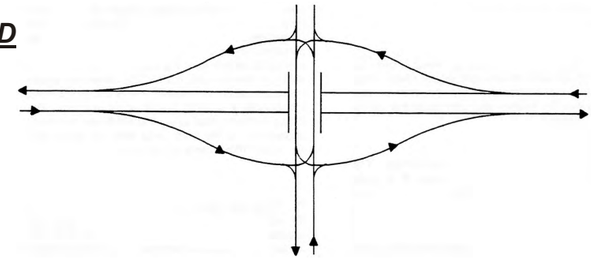
PARCLO A-B



Advantages:
- not conducive to wrong way movement.

Disadvantages:
- weaving section on crossing road.
- high speed traffic must exit from freeway on a small radius loop.
- sight lines to exit loop ramp is restricted by structure.
- requires additional property than diamond configuration.

DIAMOND



Advantages:
- high standard single exits in advance of the structure.
- high standard single entrances beyond the structure.
- economical in property use.
- no need for speed change lanes on or under the structure.
- no weaving on the freeway.

Disadvantages:
- lower capacity on the minor road due to left turning movements.
- difficulty of obtaining adequate visibility at the ramp terminals.
- many points of conflict on the minor road increase the collision potential of the design, unless signalized.
- possibility of wrong-way movements.
- limits possibility of allowing for future expansion of the interchange.

Victoria Road Interchange

- Victoria Road is under the Municipality of Chatham-Kent jurisdiction. Victoria Road provides access to the communities of Ridgetown and Thamesville from Highway 401.
- Victoria Road has a two-lane cross-section through the interchange.
- This is Parclo A-2 type interchange with single lane ramps in the northeast and southwest quadrants. This interchange generally meets MTO current design standards with only a few concerns that include visibility issues as Victoria Road crosses over Highway 401.
- Proximity of Spence Line to the westbound ramp terminal creates operational concerns as traffic volumes, future growth and economic development increase.

Orford Road Interchange

- Orford Road is under the Municipality of Chatham-Kent jurisdiction. Orford Road provides access to the community of Highgate from Highway 401.
- Orford Road has a two-lane cross section through the interchange.
- This is Parclo A-2 type interchange with single lane ramps in the northeast and southwest quadrants. This interchange generally meets MTO current design standards with only a few concerns that include visibility issues as Orford Road crosses over Highway 401.

4.6 Emergency Services

The Project Team met with Chatham-Kent emergency services and the Ontario Provincial Police (OPP) to discuss the project and gather information on emergency service within the study area. Representatives from the emergency services provided an overview of their coverage areas for responding to emergencies on Highway 401 as noted below:

Hospitals

- Hospitals that are used for emergency services in the Municipality of Chatham-Kent are as follows:
  - Chatham (mostly used for emergencies on Highway 401 within the study area)
  - Wallaceburg
  - Leamington (may be used for emergencies on Highway 401 near Tilbury)
  - Newbury (may be used from emergencies on Highway 401 near the east end of the study area)

Fire Services

- Fire emergency service is a municipal service and, thus, stays within the municipality.
- 5 Volunteer Fire Stations respond to emergencies on Highway 401 as follows:
  - Fire Station 19 (Tilbury) – West Municipal boundary to Merlin Road
  - Fire Station 15 (Sixth Line near Bloomfield Road) – Merlin Road to Charing Cross Road
  - Fire Station 12 (Maynard Line north of Highway 401) – Charing Cross Road to Kent Bridge Road
  - Fire Station 11 (Ridgetown) – Kent Bridge Road to Kenesserie Road
  - Fire Station 10 (Highgate) – Kenesserie Road to East Municipal Boundary
- Fire Station 17 (Merlin) has no access to Highway 401. If access could be provided at Merlin Road or Drake Road, Fire Station 17 could potentially respond to emergencies on Highway 401. However, firefighters that respond to emergencies on Highway 401 have special training and equipment to handle emergencies on Highway 401. If Fire Station 17 responds to emergencies on Highway 401, the volunteer firefighters at this station would require this special training and equipment.

Ambulance Services

- 6 ambulance bases are located within the Municipality, with three of these bases responding to emergencies on Highway 401 as follows:
  - Tilbury – West Municipal boundary to Drake Road
  - Chatham – Drake Road to just west of Kent Bridge Road
  - Ridgetown – Just west of Kent Bridge Road to Orford Road.
- Ambulance service from Elgin County covers the remaining section of Highway 401 within the study area (Orford Road easterly).
- Back-up service for the Chatham and Ridgetown bases is provided by the Blenheim base. Their stand-by location is Highway 40 just south of Highway 401. In addition, back-up service for the Ridgetown base is provided by the Thamesville base. Their stand-by location is Victoria Road just north of Highway 401.

Police Services

- OPP are responsible for Highway 401 and the interchange ramps.
- Chatham-Kent Police Services are responsible for the municipal roads that cross Highway 401.
- Chatham-Kent Police Services will only respond to the emergencies on Highway 401 if they are requested by OPP.

Exhibit 4-7 illustrates the emergency services' coverage areas.

There are fourteen median turnarounds within the study limits for emergency use. These turnarounds are shown on **Exhibits 4-1a and 4-1b**.

4.7 Carpool Parking

There is one existing carpool parking facility at Bloomfield Road interchange in the southwest quadrant. Carpool parking has been observed at the following various locations:

- Victoria Road – Using private properties on the south side of Highway 401
- Kent Bridge Road – On the gravel shoulders on the north side of Highway 401
- Merlin Road – On the gravel shoulders on the north side of Highway 401

4.8 Illumination and Traffic Signals

Decision lighting exists at all of the existing interchanges within the study limits.

There are no traffic signals located at the interchange ramp terminals within the study limits.

4.9 Drainage

Median drainage is facilitated by the open, depressed median and a series of ditch inlets with 250 to 300mm CSP outlets to the right-of-way highway ditches. These outlet pipes are spaced at 100 to 150 metre intervals. The extremely flat terrain within the study area results in some relatively deep ditching in order to ensure positive drainage. Sub-drains were originally installed (rolled in) at the four pavement edges throughout the study area in the 1970's. The eastbound median subdrains were replaced with a granular drainage layer from 0.8 km west of Bloomfield Road to 0.5 km east of Victoria Road under contract 98-18. In addition, new subdrains were installed in the eastbound lanes from 0.2 km east of Bloomfield Road to 0.1 km east of Victoria road under contract 2000-0029.

There are a number of watercourses / municipal drains that cross Highway 401 within the study limits. The more significant crossings include Trembley (Tilbury) Creek, Little Baptiste Creek, Baptiste Creek, McDougall Drain, Waddick Drain, Flock and Hinton Drain, McGregor Creek, Proctor Drain and Taff Creek.

4.10 Service Centres

There is one eastbound and one westbound service centre located directly across from each other just west of the Queen's Line interchange.

4.11 Snow Drifting

The Project Team met with MTO maintenance staff on June 14, 2006 to discuss snow drifting that occurs within the study area. MTO maintenance staff identified areas within study area that are susceptible to snow drifting and require specific attention during winter maintenance activities. In general, key areas susceptible to snow drifting are located between Tilbury and Bloomfield Road and between Proctor Drain and Mull Road. Drifting occurs on either the north or south side of the highway depending on the relationship between the alignment, prevailing winds and the surrounding lands. Potential snow drifting areas are also shown on **Exhibits 4-1a and 4-1b**.

4.12 Utilities

The following utilities and their approximate locations have been identified.

Union Gas Limited

There are several underground crossing locations within the study area. They are as follows:

- 0.36 km west of Queen Street overpass
- Just west of Little Baptiste Creek overpass 1.4 km west of Drake Road
- 1.91 km west of Dillon Road underpass
- Just south of Bloomfield Road underpass (PROPOSED)
- 0.3 km west of Kent Co. Road 10 underpass
- Just east of Kent Co. Road 10 underpass in Harwich twp
- 1.7 km west of Harwich Twp Bridge #I 3
- Just east of Mull Side Road underpass
- Just east of Scane Road underpass

Cogeco Cable Canada Inc.

There are no underground crossings of Highway 401 within the study limits.

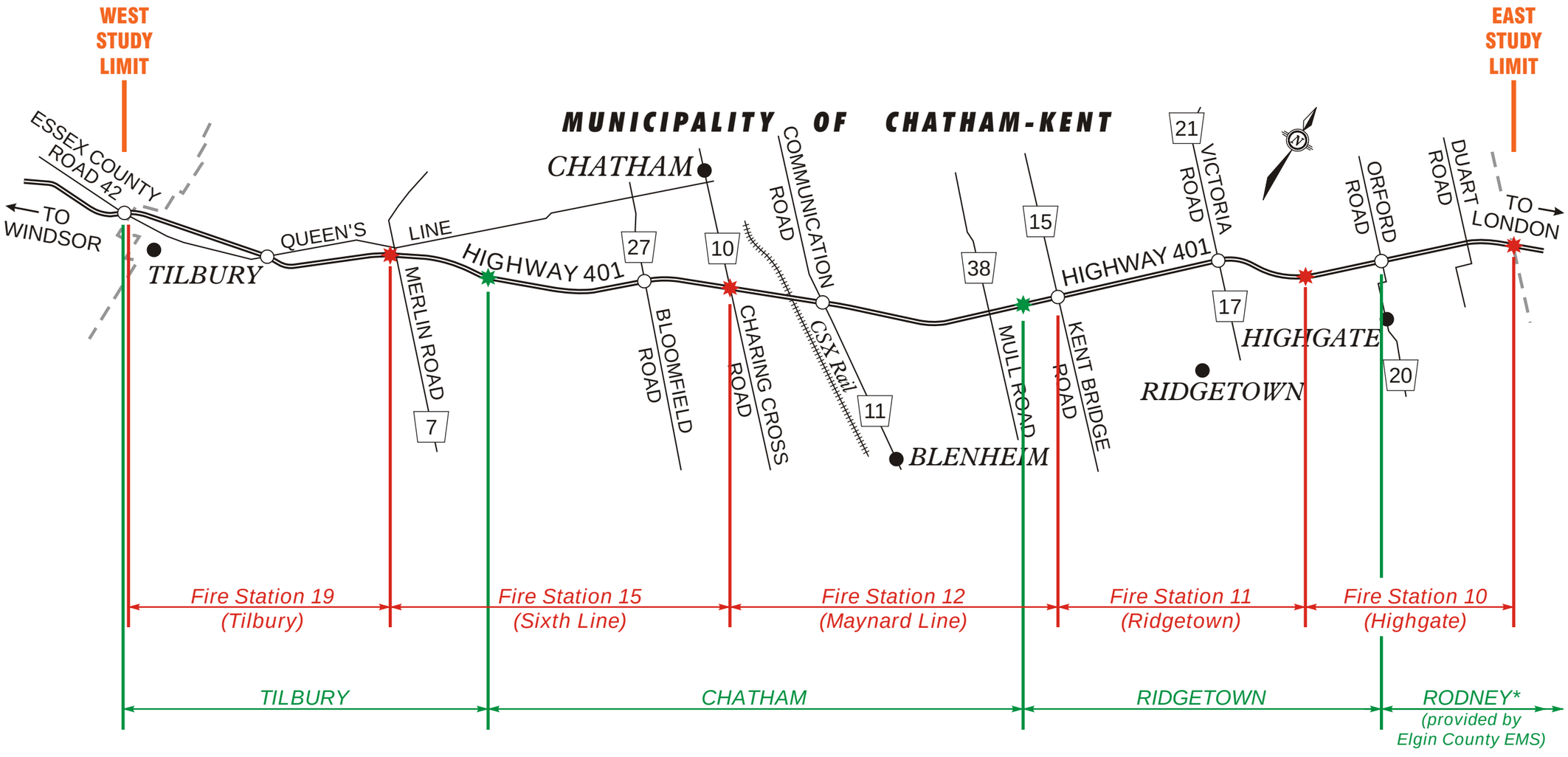
Chatham-Kent Hydro

There are two underground crossing locations within the study area. Both were proposed to be moved to an overhead position in Year 2003. The locations include just west of Queen Street overpass and at the Bloomfield Road interchange. At this location, it is proposed to run along Bloomfield Road over Highway 401 where it crosses Bloomfield Road along the east side of the Service Road to the Bloomfield Business Park.

Chatham-Kent PUC

West of Charing Cross Road, there are various sizes of underground water and sewer lines running parallel to Highway 401. These systems are located at various locations outside the highway right-of-way to the north and south. There are also several underground crossings, located to the west of Charing Cross Road. They are as follows:

- 0.4 km west of Queen Street overpass – 300 mm sewer forced main
- 0.15 km east of Queen Street overpass – 200 mm cast iron and a 400 mm cast iron (Tilbury feeder main)
- 2.35 km west of Queen's Line – 200 mm cast iron private main - exact location not given
- 0.025 km east of Merlin Road – 150 mm PVC water main
- 0.025 km west of Bloomfield Road – 400 mm PVC sewer force main
- 0.020 km west of Bloomfield Road – 400 mm PVC water main
- 0.020 km west of Charing Cross Road – 900 mm CPP raw water transmission main.



FIRE STATION - Coverage area on Highway 401

CHATHAM-KENT AMBULANCE EMS - Coverage area on Highway 401

CHATHAM-KENT POLICE SERVICE - Responsible for Municipal roads crossing Highway 401

ONTARIO PROVINCIAL POLICE - Responsible for Highway 401 and interchange ramps

✸ ✸ ***- Boundary located at existing median turnaround***

G.W.P. 80-00-00: Highway 401
from 0.9 km East of Essex Road 42 to Elgin County Boundary
Preliminary Design Study and Class EA

EMERGENCY SERVICES - COVERAGE AREA

EXHIBIT 4-7

Bell Canada

Throughout the entire study limits, there are underground lines located adjacent to the north ROW limits. Underground lines that cross Highway 401 are as follows:

- just east of Queen Street overpass
- 0.3 km east of Little Baptiste Creek Bridge
- just east and just west of Queen's Line interchange
- 1.56 km west of Drake Road underpass
- conduit crossings just east and west of Drake Road underpass
- just south of Bloomfield Road underpass
- just east of Charing Cross Road underpass
- just east of Highway 40 underpass
- just west of Mull Side Rd underpass
- just west of Scane Road underpass
- 1.92 km east of Victoria Road interchange
- just west of Highgate Road underpass
- just east of Muirkirk Road underpass

Hydro One Network Inc.

There is one overhead power line running parallel to Hwy. 401 within the south right-of-way beginning 0.30 km east of Dillon Road overpass to 1.90 km east of Charing Cross Road overpass. There are also 24 locations where overhead power lines that cross Highway 401; they are as follows:

- 0.375 km west of Queen Street underpass (2 lines)
- 0.175 km east of Queen Street underpass
- just west of Little Baptist Creek Bridge
- 0.525 km east of Little Baptist Creek Bridge
- 0.250 km west of Queen's Line interchange
- 0.075 km east of Queen's Line interchange
- 0.070 km west of Merlin Road underpass
- 1.925 km west of Dillon Road underpass
- 0.025 km west of Dillon Road underpass
- 0.035 km west of Bloomfield Road interchange
- 1.90 km east of Charing Cross Road underpass
- 2.05 km east of Charing Cross Road underpass
- 0.125 km east of Highway 40 interchange
- 0.025 km west of Mull Side Road underpass
- 0.125 km east of Mull Side Road underpass
- 0.025 km west of Kent Bridge Road interchange
- 0.030 km east of Scane Road underpass
- 0.030 km east of Victoria Road interchange
- 1.95 km east of Victoria Road interchange
- 0.01 km west of Kenesserie Road underpass

5. ALTERNATIVES AND EVALUATION

This section summarizes the process followed for the analysis and evaluation for alternatives for the improvements to Highway 401. Alternatives were reviewed to address the transportation needs for Highway 401, which includes:

- Widening of Highway 401 to six lanes (three lanes in each direction), with protection for an eight-lane cross-section.
- Improvements to the existing interchanges to address operational concerns and design deficiencies. These interchanges include:
  - Highway 401 / Queen's Line
  - Highway 401 / Bloomfield Road
  - Highway 401 / Highway 40 / Communication Road
  - Highway 401 / Kent Bridge Road
  - Highway 401 / Victoria Road
  - Highway 401 / Orford Road

Road closures and/or alternate routes in the vicinity of the interchanges were also reviewed to address operational concerns and meet access management best practices of MTO.

The analysis and evaluation process for the improvements to Highway 401 has been separated into two components:

1. Generation and Assessment of Planning Alternatives
2. Generation and Assessment of Preliminary Design Alternatives
   - Highway 401 Widening Alternatives.
   - Interchange Alternatives
   - Road Closures / Alternate Routes (where applicable)

The following sections describe the identified alternatives, and the analysis and evaluation process, in general terms.

5.1 Planning Alternatives

The MTO Class EA requires that "planning alternatives" be considered to ensure that there is reasonable and adequate justification to proceed with the improvements and that the need for the project is clearly demonstrated. The alternatives are assessed against their ability to reasonably address the identified transportation needs and opportunities, which are documented in **Section 3**.

The planning alternatives associated with the identified transportation needs are:

- Do Nothing
- Improve and expand rail/transit service
- Improve and expand municipal roads
- Improve and expand Highway 401
- Construct a new provincial roadway.

The assessments and conclusions for each planning alternative are summarized in **Exhibit 5-1**.

Exhibit 5-1: Assessment of Planning Alternatives

Planning Alternative	Assessment	Conclusion
Do Nothing	The "Do Nothing" alternative would maintain the existing four-lane cross-section for Highway 401 and the existing interchange ramp configurations. This is not a reasonable alternative because: • A number of existing interchange ramps do not meet current MTO design standards. • Does not address collision history related to cross median collisions.	The "Do Nothing" alternative does not address the identified transportation needs, but is **carried forward for comparison purposes only**.
Improve and Expand Rail / Transit Service	This alternative would involve expanding the inter-regional and inter-provincial rail and transit system in Southwestern Ontario, because: • Expansion of freight rail system may reduce some truck trips on Highway 401 in Chatham-Kent. • CP Rail and CN Rail both operate key lines within the study area, which link Windsor and the international border crossing with the Greater Toronto Area (GTA). Due to the high volume and wide variety of commercial trips ranging from inter-city and inter-regional delivery, to inter-provincial and international travel, additional rail service in Chatham-Kent is not expected to reduce the need for additional lanes on Highway 401. Expansion of passenger rail and/or the addition of an inter-regional transit system would not be expected to significantly reduce vehicle trips because: • Majority of the study area is rural. • Developed areas are confined to scattered communities throughout Chatham-Kent. • Majority of traffic using Highway 401 is travelling through the study area between major centres to the west (Windsor/U.S.) and east (London/GTA/U.S.). • The need for additional lanes on Highway 401 would likely not be reduced.	Does not address the identified transportation needs - **Set Aside**
Improve and Expand Municipal Roads	Design standards of municipal roads are not compatible with high volume, long distance inter-regional or inter-provincial trips. Furthermore: • A high percentage of vehicles using Highway 401 are commercial trucks, and it is not desirable to encourage these vehicles to use the local road system. • This alternative would also not address the design issues at the existing interchanges. Improving and expanding municipal roads is not considered a reasonable alternative due to the potential community impacts, and will likely not reduce the need for additional lanes on Highway 401.	Does not address the identified transportation needs - **Set Aside**

Improve and Expand Highway 401	This alternative will address the identified transportation needs by providing:
	• Improvements to the geometry of the interchange configurations as part of the construction project.
	• Provides opportunity to address:
	  • Cross-median collisions
	  • Poor pavement condition.
		This alternative addresses the identified transportation needs - **Carry Forward for Further Review**

Construct a New Provincial Roadway	A new provincial freeway would provide the needed capacity within the study area. However, the environmental, property and cost implications would be significant.	This alternative is not considered a reasonable alternative - **Set Aside**

5.2 Preferred Planning Alternatives

Based on the assessment described in **Exhibit 5-1**, the alternative 'Improve and Expand Highway 401' is the only alternative that addresses the identified transportation problems and opportunities. This alternative is therefore selected as the preferred planning alternative and was carried forward for further study.

The following sections describe the generation and assessment of the preliminary design alternatives for the Highway 401 widening and the interchange alternatives. For ease of reviewing, the following sections have been separating by:

1. Highway 401 Mainline – to present the analysis and evaluation of the Highway 401 widening alternatives
2. Interchanges – to present the analysis and evaluation of the interchange alternatives and associated road closures / alternate routes for each interchange.

HIGHWAY 401
MAIN LINE
(Widening Alternatives)

5.3 Generation and Assessment of Preliminary Design Alternatives – Highway 401 Widening

The previous section described the alternative methods of addressing the identified capacity, operational and geometric needs within the study area, and identified expanding and improving Highway 401 as the preferred planning alternative. This section describes the alternative preliminary design concepts for the range of improvements for Highway 401.

The process for identifying and evaluating these preliminary design alternatives is as follows:

- Identify Highway 401 widening alternatives.
- Undertake a detailed analysis and evaluation process on the widening alternatives leading to the identification of the preferred alternative for Highway 401.

5.3.1 Highway 401 Widening Alternatives

Based on the objective of addressing the needs for future highway widening, the following alternatives have been identified:

- *Do Nothing* (maintained for comparison purposes);
- *Alternative A:* Widen inward on existing median - Six-lane cross-section with median barrier;
- *Alternative B:* Widen outward and maintain existing median – Six-lane cross-section with a 15 m depressed median;
- *Alternative C:* Widen outward and widen median – Six-lane cross-section with a 22.5 m depressed median.
- *Alternative D:* Widen outward and widen median – Six-lane cross-section with a 30 m depressed median.

Typical cross-sections for the alternatives are shown in **Exhibit 5-2**.

5.3.2 Analysis / Evaluation of the Highway 401 Widening Alternatives

The Highway 401 widening alternatives have been subjected to an analysis and evaluation process, leading to the identification of the preferred widening alternative. The factors and criteria used by the Project Team to evaluate the widening alternatives were:

- *Highway Engineering*, including median treatment, compatibility with adjacent sections, impacts on interchanges, constructability and drainage;
- *Transportation*, including traffic operations, emergency vehicle access, safety, flexibility for staged construction and traffic impacts;
- *Structures*, including impacts to interchange and drainage structures;
- *Natural Environment*, including watercourses, habitats, vegetation and wildlife;
- *Socio-Economic Environment*, including property requirements, impacts on existing and future land uses and operations, utilities, site contamination and noise;
- *Cultural Environment*, including archaeological, built heritage, and cultural landscape resources; and
- *Preliminary Cost Estimate*, including construction and property costs.

The analysis and evaluation of the Highway 401 widening alternatives is provided in **Exhibits 5-3a and 5-3b**. The analysis / evaluation is based on a qualitative comparative analysis of the highway widening alternatives for each of the factors / indicators. The analysis and evaluation only reflects the highway widening alternatives.

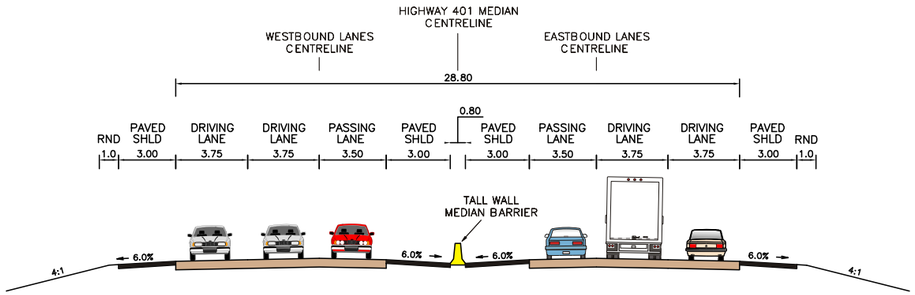
5.3.3 Preferred Highway 401 Widening Alternatives

Based on the analysis and evaluation, Alternative A (widen inward on existing median - six-lane cross-section with median barrier) is preferred for the following reasons:

- Addresses future traffic operations by widening to six lanes.
- Reduces potential for cross-median collisions by installing a tall wall median barrier.
- Provides flexibility to utilize the existing structures.
- Utilizes all previously reconstructed pavement.
- Does not require additional property to accommodate the highway widening.
- Avoids impacts to adjacent agricultural lands.
- Avoids impacts to adjacent woodlots.
- Avoids impacts to Hydro One high voltage towers within highway right-of-way.

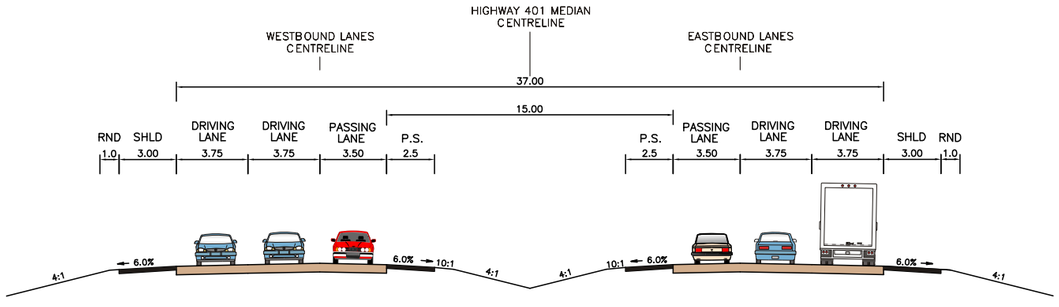
Four alternatives for widening Highway 401 to six lanes have been developed*:

Alternative A:
Additional lanes in the median and replace the open median with a tall wall concrete barrier.

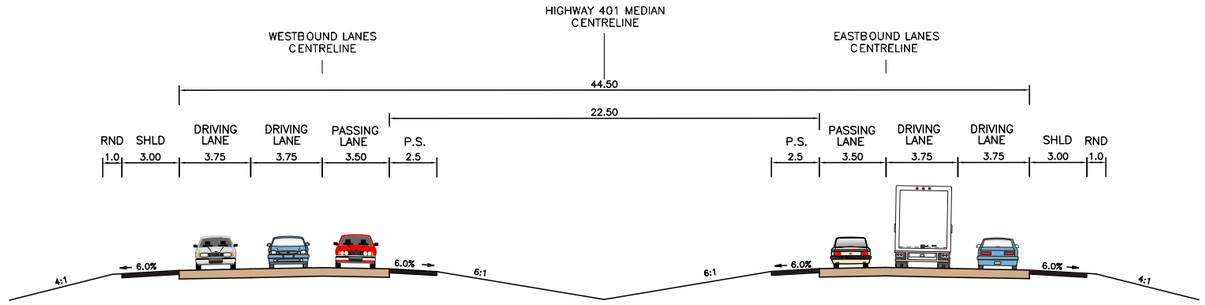


PREFERRED ALTERNATIVE

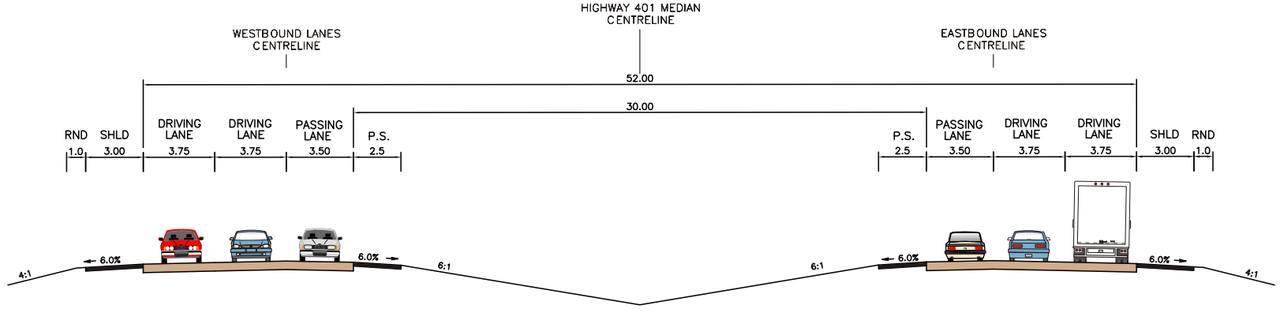
Alternative B:
Retain the existing 15 m open median and widen on the outside of the existing lanes.



Alternative C:
Reconstruct Highway 401 with a 22.5 m open median.



Alternative D:
Reconstruct Highway 401 with a 30 m open median.



* *measurements are shown in metres (m)*

G.W.P. 80-00-00: Highway 401
from 0.9 km East of Essex Road 42 to Elgin County Boundary
Preliminary Design Study and Class EA

HIGHWAY 401
WIDENING ALTERNATIVES

EXHIBIT
5-2

ANALYSIS & EVALUATION OF HIGHWAY 401 WIDENING ALTERNATIVES (Part 1 of 2)

Factor / Indicator	Key Measures	Do Nothing (maintained for comparison purposes)	Alternative A: Widen inward on existing median - Six-lane cross-section with median barrier	Alternative B: Widen outward and maintain existing median – Six-lane cross-section with a 15m depressed median	Alternative C: Widen outward and increase existing median – Six-lane cross-section with a 22.5m depressed median	Alternative D: Widen outward and increase existing median – Six-lane cross-section with a 30m depressed median

Highway Engineering	The key measures for 'Highway Engineering' are:
	• Median treatment
	• Impacts to structures – Number of existing structures:
	  • Overpasses – 28
	  • Underpasses – 15
	  • Culverts - 57
	• Utilization of the pavement reconstruction (which is required now)
	• Flexibility for future expansion to 8 lanes.
		• Does not improve existing median treatment.
		• Rehabilitate structures as required and replace at end of lifespan.
		• Requires full pavement reconstruction now.
		• Retains full flexibility to widen to 8 lanes.
			• Improves median treatment by installing tall wall barrier.
			• Minimizes impacts to existing structures:
			  • Widen 22 overpasses on inside, widen 6 overpasses on both sides
			  • Replace 5 underpasses, maintain 4 underpasses with acceptable substandard shoulder widths
			  • Extend 7 culverts
			• Minimizes impacts to the interchanges.
			• Maintains existing structure and median widths.
			• Utilizes all previously reconstructed pavement.
			• Widen outward to 8 lanes.
				• Does not improve median treatment by maintaining the existing 15 m median width.
				• Impacts existing structures:
				  • Widen 28 overpasses on both sides
				  • Replace 15 underpasses
				  • Extend 40 culverts
				• Requires realignment of interchange ramps to accommodate outside widening.
				• Utilizes all previously reconstructed pavement.
				• Widen inward to 8 lanes on depressed median and install tall wall barrier, or widen outward.
					• Improves median treatment by widening depressed median to 22.5 m.
					• Impacts existing structures:
					  • Replace 28 overpasses
					  • Replace 15 underpasses
					  • Extend 51 culverts
					• Requires realignment of interchange ramps to accommodate outside widening.
					• Partially utilizes previously reconstructed pavement.
					• Widen inward to 8 lanes on depressed median and provide a 15 m depressed median width, or widen outward and maintain a 22.5 m depressed median.
						• Improves median treatment by widening depressed median to 30 m.
						• Impacts existing structures:
						  • Replace 28 overpasses
						  • Replace 15 underpasses
						  • Extend 55 culverts
						• Requires realignment of interchange ramps to accommodate outside widening.
						• Maximizes flexibility for future expansion.
						• Does not utilize any previously reconstructed pavement.
						• Widen inward to 8 lanes on depressed median and provide a 22.5 m depressed median width, or widen outward and maintain a 30 m depressed median.

Transportation	The key measures for 'Transportation' are: • Future traffic operations • Emergency vehicle response times • Reducing the potential for cross-median collisions • Flexibility for staged construction.	• Does not address the safety and operational issues associated with the highway corridor, which are the basis for the study. • Maintains high potential for cross-median collisions.	• Addresses future traffic operations. • Requires removal of existing emergency turnarounds, which may increase emergency response times. • Improves highway safety by significantly reducing risk of severe collisions associated with cross-median collisions. • Requires standard construction staging/sequencing.	• Addresses future traffic operations. • Maintains emergency turnarounds. • Does not address safety concerns associated with cross-median collisions since the existing 15 m median width is maintained. • Requires straightforward staging/construction staging, although more difficult around interchanges.	• Addresses future traffic operations. • Maintains emergency turnarounds. • Improves highway safety by widening the median to 22.5 m, which reduces the risk of severe collisions associated with cross-median collisions. • Requires complex construction staging/sequencing.	• Addresses future traffic operations. • Maintains emergency turnarounds. • Improves highway safety by widening the median to 30 m, which significantly reduces the risk of severe collisions associated with cross-median collisions. • Less complex staging/construction sequencing than Alternative C.
Natural Environment	The key measures for 'Natural Environment' are: • Impacts to natural environment outside of the highway right-of-way (e.g. woodlots) • Impacts to wildlife movement. • *There are no significant wetlands within the study area, and vegetation within most of the study area has been previously disturbed by agricultural uses.*	• Avoids impacts to the existing natural environment.	• Avoids impacts to natural environment outside of highway right-of-way. • Impacts wildlife movement and increases wildlife mortality by installing median barrier.	• Avoids impacts to natural environment outside of highway right-of-way. • Maintains existing wildlife movement by maintaining open median.	• Potential to impact the natural environment outside of the highway right-of-way. • Maintains existing wildlife movement by maintaining open median.	• Greatest potential to impact the natural environment outside of the highway right-of-way. • Maintains existing wildlife movement by maintaining open median.

ANALYSIS & EVALUATION OF HIGHWAY 401 WIDENING ALTERNATIVES (Part 2 of 2)

Factor / Indicator	Key Measures	Do Nothing (maintained for comparison purposes)	Alternative A: Widen inward on existing median - Six-lane cross-section with median barrier	Alternative B: Widen outward and maintain existing median – Six-lane cross-section with a 15m depressed median	Alternative C: Widen outward and increase existing median – Six-lane cross-section with a 22.5m depressed median	Alternative D: Widen outward and increase existing median – Six-lane cross-section with a 30m depressed median
Socio-Economic Environment	The key measures for "Socio-Economic Environment' are: • Property acquisition • Impacts to agricultural lands • Potential noise impacts • Impacts to the existing Hydro One high voltage transmission line towers within the highway right-of-way.	• Does not require property outside highway right-of-way. • Constrains existing and future commercial and industrial operations by not addressing future traffic operations. • Does not impact existing utilities. • Results in deteriorated air quality as a result of increased traffic volumes and reduced levels of service. • Does not increase future noise levels.	• Does not require property outside highway right-of-way to accommodate widening. • Encourages increased commercial and industrial development by accommodating future traffic operations. • Avoids impacts to Hydro One high voltage transmission line towers. • Improves air quality due to improved traffic operations. • Minimizes future noise level increases by widening toward median (i.e. edge of pavement does not move closer to adjacent Noise Sensitive Areas).	• Does not require property outside highway right-of-way to accommodate widening, however property may be required where structures require replacement. • Encourages increased commercial and industrial development by accommodating future traffic operations. • Avoids impacts to Hydro One high voltage transmission line towers. • Improves air quality due to improved traffic operations. • Has greater potential increase in noise levels as edge of pavement moves closer to Noise Sensitive Areas in comparison to Alternative A.	• Requires property outside right-of-way at isolated locations with possible impacts to commercial and industrial developments, as well as agricultural lands. • Encourages increased commercial and industrial development by accommodating future traffic operations. • Impacts the Hydro One high voltage transmission line towers. • Improves air quality due to improved traffic operations. • Has greater potential increase in noise levels as edge of pavement moves closer to Noise Sensitive Areas in comparison to Alternatives A and B.	• Requires significant amount of property outside of right-of-way throughout the corridor, impacting agricultural lands and possible commercial and industrial developments. • Encourages increased commercial and industrial development by accommodating future traffic operations. • Impacts the Hydro One high voltage transmission line towers. • Improves air quality due to improved traffic operations. • Has the greatest potential increase in noise levels as edge of pavement is the closest to adjacent Noise Sensitive Areas.
Cultural Environment	The key measures for 'Cultural Environment' are: • Direct impacts to the originally constructed structures, as they have been identified as having heritage value (i.e. greater than 40 years old) • Archaeological impacts. *A Stage 1-2 archaeological assessment is being undertaken for all bridge replacement alternatives as part of this study.*	• Avoids impacts to archaeological, built heritage and cultural landscape resources.	• Minimizes potential impacts to archaeological resources due to previous disturbance of the median area. • Minimizes potential impacts to cultural landscape. • Minimizes potential impacts to the heritage significance of the originally constructed overpass structures.	• Minimizes potential impacts to archaeological resources due to previous disturbance within right-of-way. • Minimizes potential impacts to cultural landscape. • Impacts the heritage significance of the originally constructed overpass structures.	• Increases potential impacts to archaeological resources due to property requirements adjacent to the right-of-way. • Increases potential impacts to cultural landscape due to property requirement adjacent to the right-of-way. • Impacts the heritage significance of the originally constructed overpass structures.	• Has the greatest potential impacts to archaeological resources due to significant property requirements adjacent to the right-of-way. • Has the greatest potential impacts to cultural landscape due to significant property requirement adjacent to the right-of-way. • Impacts the heritage significance of the originally constructed overpass structures.
Preliminary Cost Estimate	The key measure for 'Preliminary Cost Estimate' is: • Construction cost. *Property costs are considered minor.*	• Requires full pavement reconstruction now. • Rehabilitate structures as required and replace at end of lifespan. • Does not require property outside highway right-of-way.	• Utilizes all previously reconstructed pavement. • Minimizes impacts to existing structures • Does not require property outside highway right-of-way.	• Utilizes all previously reconstructed pavement. • Significant impacts to existing structures. • Does not require property outside highway right-of-way to accommodate widening, however property may be required where structures require replacement.	• Partially utilizes previously reconstructed pavement. • Greater impacts to existing structures. • Requires property outside right-of-way at isolated locations.	• Does not utilize any previously reconstructed pavement. • Greatest impacts to existing structures. • Requires significant amount of property outside of right-of-way throughout the corridor.
OVERALL – HIGHWAY WIDENING ALTERNATIVES						

* The above analysis / evaluation only reflects the highway widening alternatives. Potential impacts from the interchange alternatives are not considered in the analysis / evaluation. The interchange alternatives will be assessed separately, which will be presented at the second round of Public Information Centres.

MOST PREFERRED **PREFERRED** **NOT PREFERRED**

G.W.P. 80-00-00: Highway 401
from 0.9 km East of Essex Road 42 to Elgin County Boundary
Preliminary Design Study and Class EA

ANALYSIS & EVALUATION OF HIGHWAY 401 WIDENING ALTERNATIVES (Part 2 of 2)

EXHIBIT 5-3b

HIGHWAY 401
INTERCHANGES

5.4 Generation and Assessment of Preliminary Design Alternatives – Interchange Alternatives and Road Closure Alternatives

This section discusses and summarizes the generation and assessment of the preliminary interchange alternatives and road closure alternatives.

Interchange alternatives have been developed for improvements to the interchanges at:

- Queens Line
- Bloomfield Road
- Highway 40 / Communication Road
- Kent Bridge Road
- Victoria Road
- Orford Road

The range of alternatives has been developed based on the preferred widening alternative.

Typical interchange configurations are shown previously in **Exhibit 4-6**

Intersections that are located within close proximity of the interchange ramp terminals are proposed to be closed in keeping with currently accepted access management practices to protect existing and future traffic operations in the vicinity of the interchanges. In all cases, the road closures will be undertaken in conjunction with either new road connections or using alternate routes along existing road networks to provide for the continuation and continuity of access to the interchange.

Access management is the process that manages entrances onto provincial highways and onto roads in the vicinity of a provincial highway. Access management helps to provide for a sustainable transportation network for the movement of people and goods and at the same time preserve the safety and efficiency of provincial highways.

The following intersections were reviewed for potential closure:

- Jeannette's Creek Road at the E-N/S and N/S-W ramps at the Queen's Line interchange
- McKinlay Road at the W-N/S and N/S-E ramps at the Queen's Line interchange
- 7th Line West at Bloomfield Road (Municipality of Chatham-Kent identified need under their Bloomfield Business Park project as discussed in **Sections 2.1.3 and 5.6.4**)
- 7th Line East at Bloomfield Road
- Pinehurst Road at Highway 40
- Beechwood Line at Kent Bridge Road
- Spence Line at Victoria Road

Although the 7th Line West realignment is not considered part of this Transportation Environmental Study Report as it is a municipal undertaking (as discussed in **Section 2.1.3 and 5.6.4**), MTO considered alternate routes for this realignment to meet MTO access management best practices.

The interchange alternatives as well as the proposed road closures and preferred connections / routes have been subjected to an analysis and evaluation process, leading to the identification of a preferred alternative for each interchange and for each proposed road closure.

The key measures used by the Project Team to evaluate the alternatives were:

- *Transportation*, including traffic operations, geometrics, access management, continuity of local road network, safety, and flexibility;
- *Structures*, specific impacts to existing structures, requirements for new structures;
- *Natural Environment*, including watercourses, habitats, vegetation, and wildlife;
- *Socio-Economic Environment*, including property requirements, impacts on existing and future land uses, utilities, emergency response, site contamination, and noise;
- *Cultural Environment*, including archaeological, built heritage, and cultural landscape resources; and
- *Preliminary Cost Estimate*, including construction and property costs.

The analysis / evaluation is based on a qualitative comparative analysis of the alternatives for each of the factors / indicators.

Interchange alternatives, the evaluation of interchange alternatives, alternative routes and closure evaluations, and the preferred plans, are grouped by the respective interchange in the following sections.

QUEEN'S LINE
INTERCHANGE

5.4.1 Queen's Line Interchange - Alternatives and Evaluation

The existing interchange conditions and the interchange alternatives for the Queen's Line interchange are shown in **Exhibit 5-4**.

Based on the analysis and evaluation undertaken in **Exhibit 5-5**, Interchange Alternative 1A is preferred over Alternative 1B for the following reasons:

- Provides a Parclo A interchange configuration;
- Simplifies construction staging/sequencing, as the new ramps are located in the opposite quadrants of the existing ramps;
- Avoids impacts to the existing Queen's Line underpass; and
- Has a lower construction cost in comparison to Alternative 1B.

5.4.2 McKinlay Road - Alternative Routes and Closure Evaluation

The existing McKinlay Road was proposed to be closed to address concerns associated with the connection of McKinlay Road to the N/S-E entrance ramp and E-N/S exit ramp. Alternate Route 1A and Alternate Route 1B are shown in **Exhibit 5-6**.

Based on the analysis and evaluation undertaken in **Exhibit 5-6** the preferred Alternate Route 1A is preferred over Alternate Route 1B for the following reasons:

- No new roadway construction;
- Avoids property impacts; and
- Minimal cost.

In response to concerns raised by the public at and after the 2nd round of Public Information Centres (PICs) held in November 2007, MTO reviewed additional access alternatives for McKinlay Road. Based on this review, MTO identified a revised version of the preferred alternate presented to the public in November 2007. The revised alternate route allows for McKinlay Road to intersect Queen's Line opposite the Highway 401 eastbound ramp terminal. This alternative eliminates out-of-way travel for road users, however, it does result in minor property impacts to agricultural land. The revised preferred alternate route is discussed in **Section 5.4.4**

5.4.3 Jeannette's Creek Road - Alternative Routes and Closure Evaluation

The existing Jeannette's Creek Road was proposed to be closed to address concerns associated with the connection of Jeannette's Creek Road to the N/S-W entrance ramp and W-N/S exit ramp. Alternate Route 1, Alternate Route 2A, and Alternate Route 2B are shown in **Exhibit 5-7**.

Based on the analysis and evaluation undertaken in **Exhibit 5-7**, Alternate Route 2A is preferred over the other alternate routes for several reasons, including:

- Minimizes disruption to road network;
- Minimizes out-of-way travel for road users; and
- Minimizes impacts to land parcels as the new roadway follows existing property lines.

In response to concerns raised by the public at and after the second round of PICs held in November 2007, MTO reviewed additional alternate routes for Jeannette's Creek Road. Based on this review, MTO identified a revised version of the preferred alternate route presented to the public in November 2007. The revised alternate route allows for Jeannette's Creek Road to intersect Queen's Line opposite the Highway 401 westbound ramp terminal. This alternate route avoids property requirements as well as reduces and/or eliminates the amount of out-of-way travel for road users. The revised alternate route is discussed in **Section 5.4.4**.

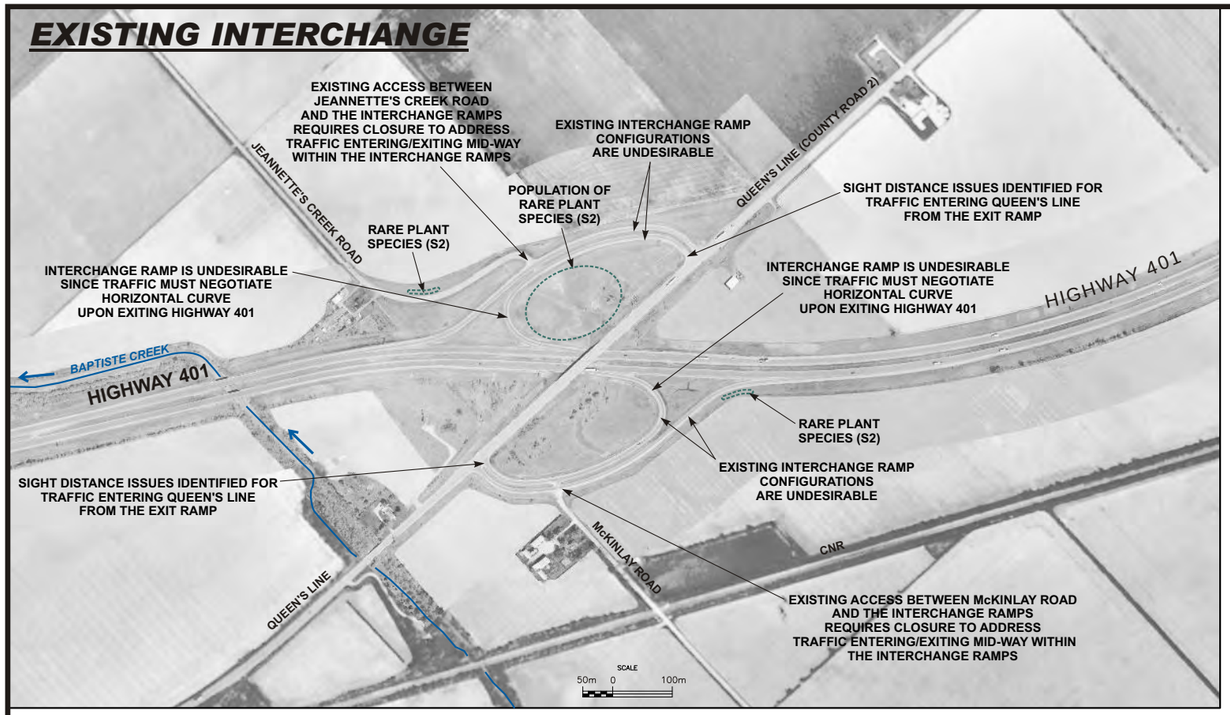
5.4.4 Queen's Line Interchange – Preferred Plan

The preferred plan for the Queen's Line interchange involves:

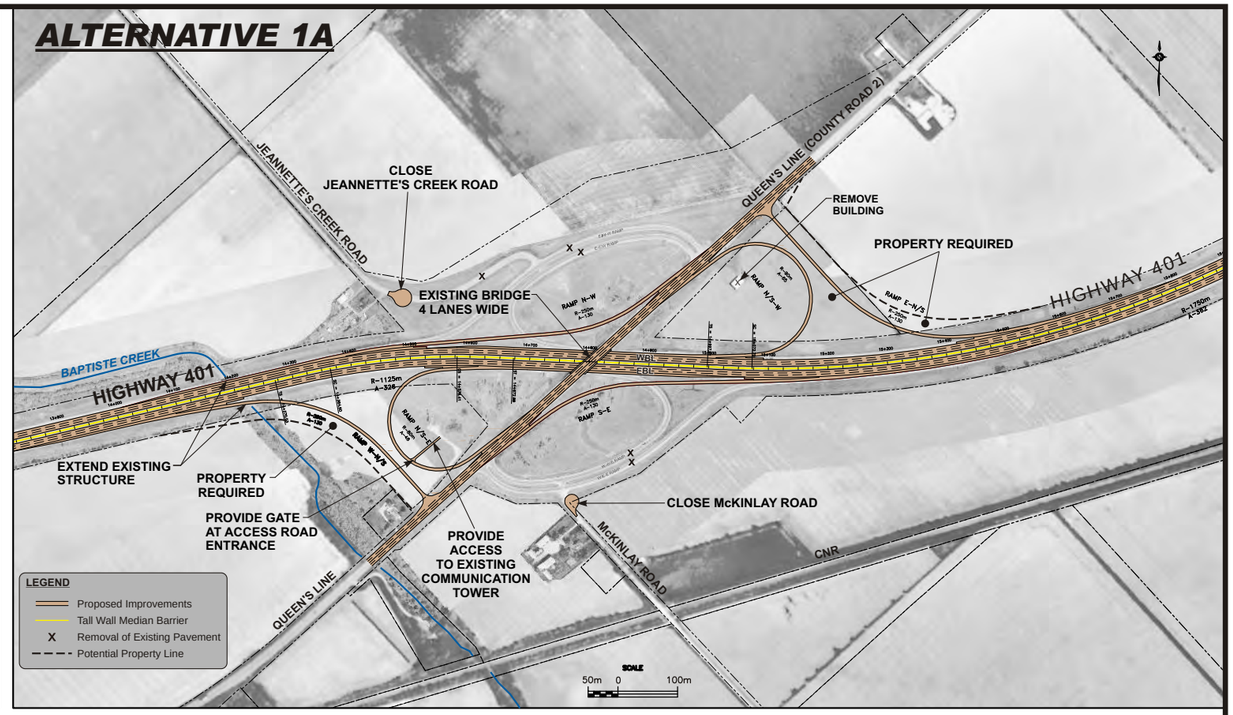
- Parclo A interchange configuration;
- realignment of McKinlay Road to connect to opposite the proposed eastbound ramp terminal; and
- realignment of Jeannette's Creek Road to connect to opposite the proposed westbound ramp terminal

The preferred plan is shown in **Exhibit 5-8**.

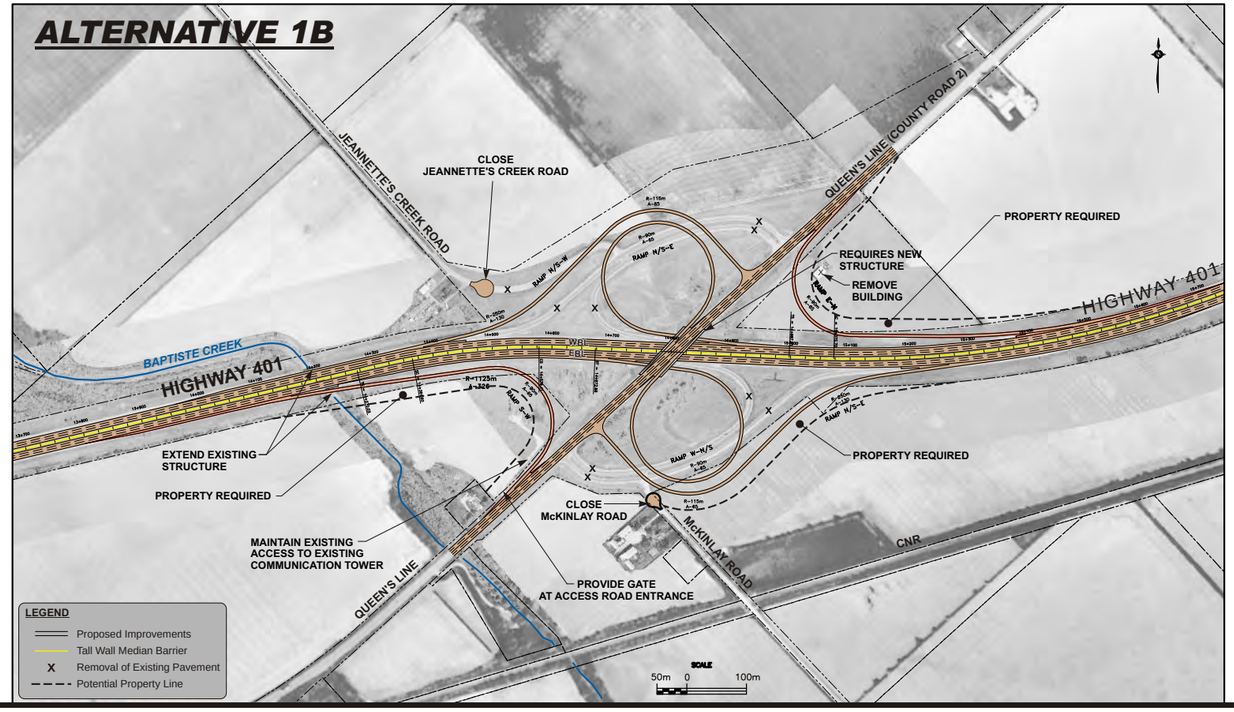
EXISTING INTERCHANGE



ALTERNATIVE 1A



ALTERNATIVE 1B



G.W.P. 80-00-00: Highway 401
from 0.9 km East of Essex Road 42 to Elgin County Boundary
Preliminary Design Study and Class EA

QUEEN'S LINE
INTERCHANGE ALTERNATIVES

EXHIBIT
5-4

ANALYSIS & EVALUATION OF QUEEN'S LINE INTERCHANGE ALTERNATIVES

Factor / Indicator	Do Nothing (For Comparison Purposes Only)	Alternative 1A	Alternative 1B
Transportation			
Interchange design (geometrics, safety).	× Maintains a Parclo B configuration. × Does not improve horizontal curves and speed change lanes at the interchange ramps, which are undesirable.	✓ Provides a Parclo A configuration. ✓ Improves interchange ramps.	× Maintains a Parclo B configuration. ✓ Improves interchange ramps.
Future traffic operations.	✓ Does not require traffic signals.	× Requires traffic signals at both ramp terminals.	✓ Does not require traffic signals.
Continuity of local road network.	× Has access management concerns. × Does not address the operational concern associated with the connection of Jeannette's Creek Road to the N/S-W entrance ramp and the E-N/S exit ramp. × Does not address the operational concern associated with the connection of McKinlay Road to the N/S-E entrance ramp and the E-N/S exit ramp. ✓ Maintains existing road network.	✓ *Both Jeannette's Creek Road and McKinlay Road are proposed to be closed to address concerns associated with the connection of Jeannette's Creek Road to the N/S-W entrance ramp/E-N/S exit ramp, and the connection of McKinlay Road to the N/S-E entrance ramp/E-N/S exit ramp. See alternate routes for Jeannette's Creek Road and McKinlay Road.*	
Flexibility for staged construction.	✓ Does not require traffic construction.	✓ Simplifies construction staging/sequencing, as the new ramps are located in the opposite quadrants of the existing ramps.	× Requires complex construction staging/sequencing, as the new ramps are located in the same interchange quadrants as the existing ramps.
Structures			
Impacts to the existing highway underpass.	✓ Avoids impacts to the existing Queen's Line underpass. The remaining service life of the bridge is limited and the vertical clearance is deficient by current standards.	✓ Avoids impacts to the existing Queen's Line underpass. The remaining service life of the bridge is limited and the vertical clearance is deficient by current standards.	× Requires replacement of the existing Queen's Line underpass with a wider and longer structure.
Impacts to other structures / culverts within the vicinity of the interchange.	✓ Avoids impacts to other structures / culverts	× Requires extension of one structure.	× Requires extension of one structure.
Need for new structures / culverts within the vicinity of the interchange.	✓ Does not require new structures / culverts.	✓ Does not require new structures / culverts.	✓ Does not require new structures / culverts.
Drainage			
Potential for storm water management options.	× Does not provide an opportunity for storm water management facilities to treat highway runoff.	✓ Provides an opportunity for storm water management facilities to treat highway runoff.	✓ Provides an opportunity for storm water management facilities to treat highway runoff.
Impacts on interchange drainage, flow conveyance and flood water elevations	✓ Has no impact to the existing interchange drainage.	× Has potential for hydraulic impacts due to extension of the Highway 401 crossing of Baptiste Creek.	× Has potential for hydraulic impacts due to extension of the Highway 401 crossing of Baptiste Creek.
Natural Environment			
Impacts to fisheries habitat.	✓ Avoids impacts to the natural environment.	× Has minimal impact to fisheries habitat associated with Baptiste Creek.	× Has minimal impact to fisheries habitat associated with Baptiste Creek.
Impacts to rare species in the northwest and southeast quadrants.		✓ Avoids impacts to one provincially rare plant species (S2 rank) that is located in the northwest and southeast quadrants.	× Has direct impact to one provincially rare plant species (S2 rank) that is located in the northwest and southeast quadrant of the interchange.
✓ *There are no significant wetlands within the study area.*			
✓ *Vegetation cover limited to disturbance tolerant species.*			
✓ *Limited wildlife habitat or movement potential.*			

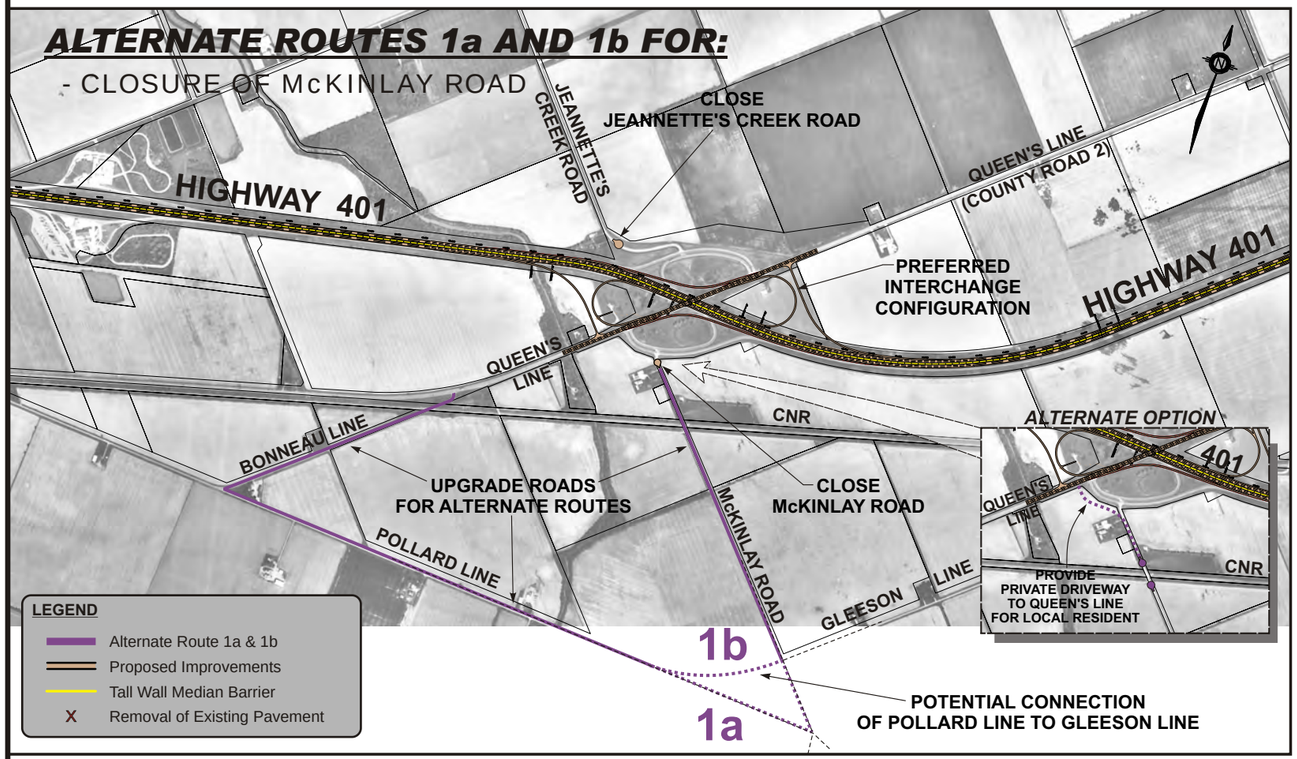
Factor / Indicator	Do Nothing (For Comparison Purposes Only)	Alternative 1A	Alternative 1B
Socio-Economic Environment			
Property acquisition.	✓ Does not require property outside highway right-of-way.	× Requires property in the northeast quadrant of the interchange (4.7 ha), and property in the southwest quadrant of the interchange (3.8 ha).	× Requires property in the northeast, southeast and southwest quadrants of the interchange.
Impacts to residences.	✓ Does not impact residences.	× Locates the W-N/S exit ramp and N/S-E entrance ramp adjacent to one residential house located in the southwest quadrant of the interchange.	× Locates the W-N/S exit ramp and N/S-E entrance ramp adjacent to residential house located in the southeast quadrant of the interchange.
There are no existing businesses located within the vicinity of the interchange.			
Impacts to agricultural lands.	✓ Does not impact agricultural lands.	× Has greater impact to agricultural lands and agricultural field tile drainage system in comparison to Alternative 1B. × Requires removal of storage barn in the northeast quadrant of the interchange.	✓ Has less impact to agricultural lands and agricultural field tile drainage system in comparison to Alternative 1A.
Impacts to existing utilities.	✓ Does not impact existing utilities.	× Minimal impacts to Bell and Hydro One facilities.	× Minimal impacts to Bell and Hydro One facilities.
Potential noise impacts.	✓ Does not increase future noise levels.	× Potential noise level increases at two residential houses on Queen's Line in the northeast quadrant of the interchange and one residential house on Queen's Line in the southwest quadrant of the interchange. However, these impacts are expected to be minor since traffic noise from Highway 401 will continue to be dominant noise source at these houses. ✓ Potential noise level decrease at the residential house located on McKinlay Road in the southeast quadrant of the interchange.	× Potential noise level increase at one residential house located on Jeannette's Creek Road and one residential house on McKinlay Road in the southeast quadrant of the interchange. However, these impacts are expected to be minor since traffic noise from Highway 401 will continue to be dominant noise source at these houses.
Site Contamination impacts.	✓ Has no site contamination issues.	✓ No significant impacts are anticipated.	✓ No significant impacts are anticipated.
Alternate routes for the closures of Jeannette's Creek Road and McKinlay Road are being reviewed separately from this analysis / evaluation.	✓ Does not close McKinlay Road and Jeannette's Creek Road at the interchange ramps.	× Results in loss of direct access to Queen's Line from Jeannette's Creek Road and McKinlay Road.	× Results in loss of direct access to Queen's Line from Jeannette's Creek Road and McKinlay Road.
Cultural Environment			
Impacts to the cultural heritage landscape.	Avoids impacts to archaeological, built heritage and cultural landscape resources.	× Increases potential impacts cultural landscape due to property requirement adjacent to the right-of-way.	× Increases potential impacts cultural landscape due to property requirement adjacent to the right-of-way.
Archaeological impacts.		× Increases potential impacts to archaeological resources due to the property requirements adjacent to the right-of-way.	× Increases potential impacts to archaeological resources due to the property requirements adjacent to the right-of-way.
Direct impacts to the existing Highway 401 underpass.		✓ Minimizes impacts to the existing Highway 401 underpass, as the existing structure can accommodate improvements.	× Requires the replacement of the existing Highway 401 underpass.
Preliminary Cost Estimate			
Construction cost	✓ Rehabilitate structures as required and replace at end of lifespan.	✓ Has lower construction cost in comparison to Alternative 1B	× Has higher construction cost in comparison to Alternative 1A
Property cost.	✓ Has no property cost.	× Has higher property cost.	✓ Has lower property cost.
OVERALL – QUEEN'S LINE INTERCHANGE ALTERNATIVES	*OVERALL ASSESSMENT IS NOT INCLUDED, AS 'DO NOTHING' DOES NOT IMPROVE THE ISSUES ASSOCIATED WITH THE EXISTING INTERCHANGE.*		

MOST PREFERRED **PREFERRED** **NOT PREFERRED**

G.W.P. 80-00-00: Highway 401
from 0.9 km East of Essex Road 42 to Elgin County Boundary
Preliminary Design Study and Class EA

ANALYSIS & EVALUATION OF QUEEN'S LINE INTERCHANGE ALTERNATIVES

EXHIBIT 5-5



ANALYSIS & EVALUATION OF McKINLAY ROAD ALTERNATE ROUTES

Factor / Indicator	Alternate Route 1A	Alternate Route 1B
Transportation		
Existing and future traffic operations (traffic volumes and road capacity)	✓ Protects existing and future traffic operations interchange by closing McKinlay Road at Highway 401 interchange ramp.	✓ Protects existing and future traffic operations at interchange by closing McKinlay Road at Highway 401 interchange ramp.
Access management	× Bonneau Line is approximately 670 m from south ramp terminal, therefore does not achieve MTO standard for access management of 800 m desirable distance from ramp terminal; however is acceptable as it is an improvement over existing conditions. ✓ Increases safety and better integrates MTO objectives at interchange.	× Bonneau Line is approximately 670 m from south ramp terminal, therefore does not achieve MTO standard for access management of 800 m desirable distance from ramp terminal; however is acceptable as it is an improvement over existing conditions. ✓ Increases safety and better integrates MTO objectives at interchange.
Road network to be used	✓ Utilizes existing road network (and a possible private driveway for local resident) to provide alternate route.	✓ Utilizes existing road network, new section of roadway, (and possible private driveway for resident) to provide alternate route.
Geometrics	× Acute angle turns required at two locations. × Heavily skewed railway crossing and intersection on Bonneau Line at Queen's Line	✓ Improved intersection geometrics at McKinlay Road, Gleeson Line and Pollard Line. × Acute angle turns required at one location. × Heavily skewed railway crossing and intersection on Bonneau Line at Queen's Line.
Length of new road required	× May require new private access driveway. ✓ No new roadway construction	× May require new private access driveway. × Requires approximately 0.46 km of new road for connection of Pollard Line to Gleeson Line.
Continuity of local road network	× Minimal disruption to road network for resident on McKinlay Road. × Results in minor out-of-way travel for other road users and a discontinuous road network.	× Minimal disruption to road network for resident on McKinlay Road. Results in minor out-of-way travel for other road users and a discontinuous road network.
Out-of-way travel	× Results in minor out-of-way travel for motorists travelling from intersection of Gleeson Line and McKinlay Road to Highway 401/Queen's Line interchange. × Results in ±3 minutes of out-of-way travel time.	× Results in minor out-of-way travel for motorists travelling from intersection of Gleeson Line and McKinlay Road to Highway 401/Queen's Line interchange. × Results in ±3 minutes of out-of-way travel time.
Structures		
Need for new structures/impacts to existing structures	✓ Does not require new structures. ✓ Does not impact any existing structures.	✓ Does not require new structures. ✓ Does not impact any existing structures.
Natural Environment		
Impacts to watercourses, including fisheries and aquatic habitat, wetlands, vegetation and wildlife	✓ Avoids impacts to existing natural environment.	✓ Minimizes impacts to existing natural environment by using previously disturbed agricultural land.
Socio-Economic Environment		
Property access	✓ Maintains access to properties on McKinlay Road.	✓ Maintains access to properties on McKinlay Road.
Property acquisition	✓ Does not require property.	× Requires 1.4 ha of private property to provide new roadway connecting Pollard Line to Gleeson Line.
Impact on emergency service response times	✓ No impacts to emergency service response times.	✓ No impacts to emergency service response times.
Impact on residential properties	× Potentially impacts residential property on McKinlay Road north of CNR due to change of driveway location.	× Potentially impacts residential property on McKinlay Road north of CNR due to change of driveway location.
Impact on commercial and industrial operations	✓ No impacts to commercial and industrial operations.	✓ No impacts to commercial and industrial operations.
Agricultural resources	× Minimal impacts to agricultural land and drainage infrastructure resulting from new private driveway for resident. × Introduces out-of-way travel for agricultural vehicles.	× Minimal impacts to agricultural land and drainage infrastructure resulting from new private driveway for resident. × Impacts agricultural land and drainage infrastructure due to new roadway. × Introduces out-of-way travel for agricultural vehicles.
Impact on land parcels	✓ Avoids impacts on land parcels.	× Impacts land parcel at McKinlay Road/Gleeson Line/Pollard Line and creates an oddly shaped parcel.
Utility facilities	✓ Does not impact existing utilities.	✓ Does not impact existing utilities.
Cultural Environment		
Direct impacts to archaeological resources	✓ Avoids impacts to archaeological resources.	× Minimizes potential impacts to archaeological resources due to existing agricultural disturbance.
Direct impacts to built heritage/cultural landscape resources	✓ Avoids impacts to built heritage and cultural landscape resources.	× Results in minor impacts to cultural landscape due to property requirement.
Preliminary Cost Estimate		
Construction cost	× Minor costs associated with closing McKinlay Road (i.e. signage, gates, potential private driveway for local resident on McKinlay Road). ✓ Does not require roadway construction.	× Minor costs associated with closing McKinlay Road (i.e. signage, gates, potential private driveway for local resident on McKinlay Road). × Construction costs associated with new road.
Property cost	✓ Has no property costs.	× Minor property costs (1.4 ha).
OVERALL - ALTERNATE ROUTES FOR CLOSURE OF McKINLAY ROAD	*	

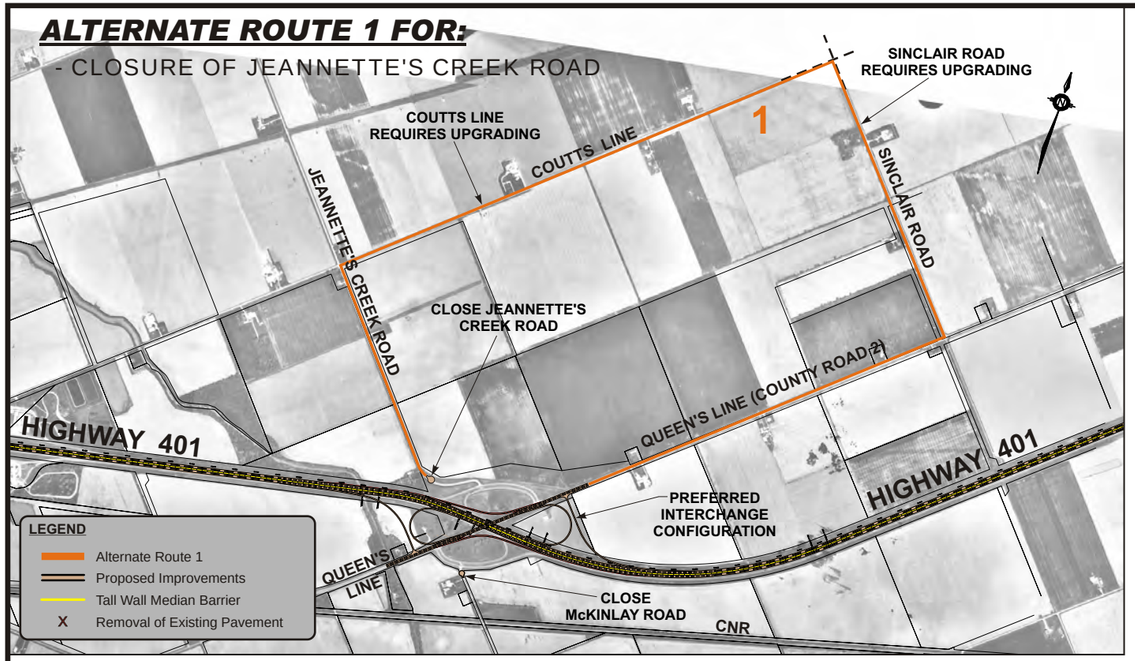
* *The preferred alternate route for McKinlay Road was revised to address comments from local residents and the public (see Exhibit _-_)*

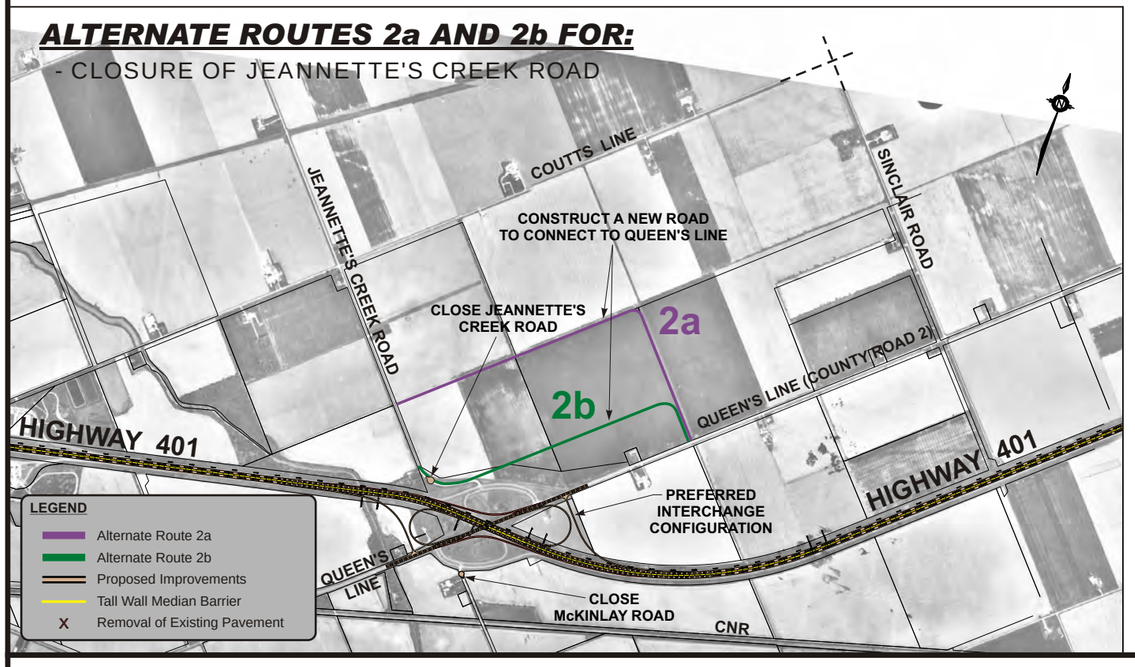
MOST PREFERRED PREFERRED NOT PREFERRED

G.W.P. 80-00-00: Highway 401
from 0.9 km East of Essex Road 42 to Elgin County Boundary
Preliminary Design Study and Class EA

McKINLAY ROAD ALTERNATE ROUTES / ANALYSIS & EVALUATION

EXHIBIT 5-6





ANALYSIS & EVALUATION OF JEANNETTE'S CREEK ROAD ALTERNATE ROUTES

Factor / Indicator	Alternate Route 1	Alternate Route 2A	Alternate Route 2B
Transportation			
Existing and future traffic operations (traffic volumes and road capacity)	✓ Protects existing and future traffic operations at interchange by closing Jeannette's Creek Road at Highway 401 interchange ramp.	✓ Protects existing and future traffic operations at interchange by closing Jeannette's Creek Road at Highway 401 interchange ramp.	✓ Protects existing and future traffic operations at interchange by closing Jeannette's Creek Road at Highway 401 interchange ramp.
Access management	✓ Achieves MTO standard for access management of 800 m desirable distance from ramp terminal. ✓ Improves safety and better integrates MTO objectives at interchange.	✓ Achieves MTO standard for access management of 800 m desirable distance from ramp terminal. ✓ Improves safety and better integrates MTO objectives at interchange.	✓ Achieves MTO standard for access management of 800 m desirable distance from ramp terminal. ✓ Improves safety and better integrates MTO objectives at interchange.
Geometrics	✓ Meets current design standard.	✓ Meets current design standard.	✓ Meets current design standard.
Length of new road required	✓ Does not require construction of new road, however, may require 3.8 km of road upgrades.	✗ Requires longer length of new road. (1.9 km)	✓ Requires shorter length of new road (1.2 km)
Continuity of local road network	✗ Greatest disruption to road network as new connecting road not provided.	✓ Minimizes disruption to road network.	✓ Minimizes disruption to road network.
Out-of-way travel	✗ Results in out-of-way travel for all road users. ✗ Results in 3 to 5 minutes of out-of-way travel time.	✓ Results in minor out-of-way travel for motorists. ✗ Results in 1 to 2 minutes of out-of-way travel time.	✓ Results in minor out-of-way travel for motorists. ✗ Results in 1 to 2 minutes of out-of-way travel time.
Structures			
Need for new structures/impacts to existing structures	✓ Does not require new structures. ✓ Does not impact any existing structures.	✓ Does not require new structures. ✓ Does not impact any existing structures.	✓ Does not require new structures. ✓ Does not impact any existing structures.
Natural Environment			
Impacts to watercourses, including fisheries and aquatic habitat, wetlands, vegetation and wildlife	✓ Avoids impacts to existing natural environment.	✓ Minimizes impacts to existing natural environment by using previously disturbed agricultural land.	✓ Minimizes impacts to existing natural environment by using previously disturbed agricultural land. ✗ May impact provincially rare plant species (S2).
Socio-Economic Environment			
Property access	✓ Maintains access to properties on Jeannette's Creek Road.	Maintains access to properties on Jeannette's Creek Road.	✓ Maintains access to properties on Jeannette's Creek Road.
Property acquisition	✓ Does not require acquisition of private property.	✗ Requires 5.6 ha of private property (30 m right-of-way) to provide new roadway.	✗ Requires 3.7 ha of private property (30 m right-of-way) to provide new roadway.
Impact on emergency service response times	✗ Greater increase to emergency service response times compared to Alternate Routes 2A and 2B. ✗ Creates a 'dead end' on Jeannette's Creek Road which is undesirable for emergency services.	✓ Minor increase to emergency service response times compared to Alternate Route 1. ✗ Creates a 'dead end' on Jeannette's Creek Road, which is undesirable for emergency services.	✓ Minor increase to emergency service response times compared to Alternate Route 1. ✓ Maintains Jeannette's Creek Road as a continuous road (i.e. no 'dead end'), which is more desirable for emergency services as compared to Alternate Routes 1 and 2A.
Impact on residential properties	✓ Avoids impacts to residential houses.	✓ Avoids direct impacts to residential houses.	✓ Avoids direct impacts to residential houses. ✗ Realigns road closer to one residential house.
Impact on commercial and industrial operations	✗ Results in out-of-way travel to industrial area north of Highway 401 in Tilbury.	✓ Minimizes out-of-way travel to industrial area north of Highway 401 in Tilbury.	✓ Minimizes out-of-way travel to industrial area north of Highway 401 in Tilbury.
Agricultural resources	✓ Avoids impacts to agricultural land and drainage infrastructure.	✗ Impacts agricultural land and drainage infrastructure.	✗ Impacts agricultural land and drainage infrastructure.
Impact on land parcels/development potential	✓ Avoids impacts on land parcels as existing roads are upgraded for use as alternate routes. ✗ Impacts land development potential by having greater out-of-way travel.	✓ Minimizes impacts on land parcels as new roadway follows existing property lines. ✓ Minimizes impact on land development potential of immediate area because new connection is provided.	✗ Greatest impacts on land parcels as new roadway does not follow existing property lines. ✓ Minimizes impact on land development potential of immediate area because new connection is provided.
Utility facilities	✓ Does not impact existing utilities.	✓ Does not impact existing utilities.	✓ Does not impact existing utilities.
Cultural Environment			
Direct impacts to archaeological resources	✓ Avoids impacts to archaeological resources.	✓ Minimizes potential impacts to archaeological resources due to existing agricultural disturbance.	✓ Minimizes potential impacts to archaeological resources due to existing agricultural disturbance.
Direct impacts to built heritage/cultural landscape resources	✓ Avoids impacts to built heritage and cultural landscape resources.	✗ Results in greater impacts to cultural landscape due to extent of property requirement.	✓ Results in minor impacts to cultural landscape due to property requirement.
Preliminary Cost Estimate			
Construction cost	✓ Lower construction costs than Alternate Route 2A.	✗ Greater constructions costs than both Alternate Routes 1 and 2B.	✓ Least construction costs.
Property cost	✓ Has no property costs	✗ Greater property costs than Alternate Route 2B (5.6 ha).	✓ Lower property costs than Alternate Route 2A (3.7 ha).
OVERALL - ALTERNATE ROUTES FOR CLOSURE OF JEANETTE'S CREEK ROAD		*	

* *The preferred alternate route for Jeannette's Creek Road was revised to address comments from local residents and the public (see Exhibit _-_)*

MOST PREFERRED **PREFERRED** **NOT PREFERRED**

G.W.P. 80-00-00: Highway 401
from 0.9 km East of Essex Road 42 to Elgin County Boundary
Preliminary Design Study and Class EA

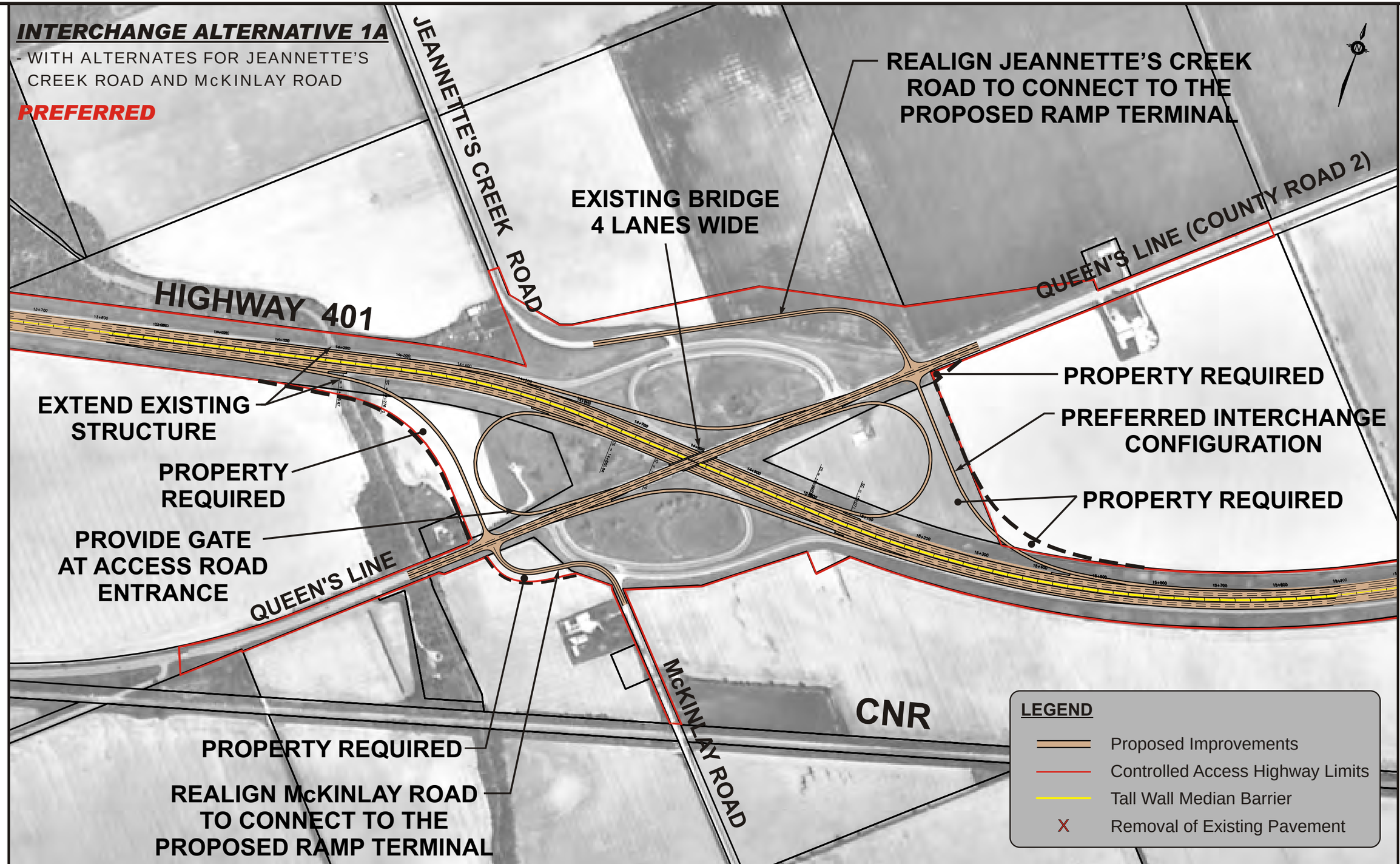
JEANNETTE'S CREEK ROAD ALTERNATIVE ROUTES / ANALYSIS & EVALUATION

EXHIBIT 5-7

INTERCHANGE ALTERNATIVE 1A

- WITH ALTERNATES FOR JEANNETTE'S CREEK ROAD AND McKINLAY ROAD

PREFERRED



G.W.P. 80-00-00: Highway 401
from 0.9 km East of Essex Road 42 to Elgin County Boundary
Preliminary Design Study and Class EA

QUEEN'S LINE INTERCHANGE - PREFERRED PLAN

EXHIBIT
5-8

BLOOMFIELD ROAD
INTERCHANGE

5.4.5 Bloomfield Road Interchange - Alternatives and Evaluation

Interchange alternatives for the Bloomfield Road interchange are shown in **Exhibits 5-9a, 5-9b,** and **5-9c**. Although the 7th Line West realignment is not considered part of this Transportation Environmental Study Report as it is a municipal undertaking, MTO considered alternate routes for this realignment to meet MTO access management best practices. Three interchange alternatives were initially developed, and each interchange alternative was then paired with three access options to the Bloomfield Business Park, for a total of nine alternatives. To address concerns identified by the public at the 1st round of PICs held in October 2006, two additional interchange alternatives (Interchange Alternatives 2D and 2E) were developed as a result of the Value Engineering Study undertaken in March 2007. Overall, eleven interchange alternatives were developed and assessed.

Based on the analysis and evaluation undertaken in **Exhibits 5-10a and 5-10b**, Alternative 2A with Option 1 to the Bloomfield Business Park is preferred over the other interchange alternatives for the following reasons:

- Provides a Parclo A interchange configuration;
- Does not increase traffic on 8th Line;
- Avoids property impacts along 8th Line;
- Simplifies construction staging/sequencing;
- Avoids impacts to Hydro One high tower transmission power line along Highway 401; and
- Has lower construction cost.

5.4.6 Bloomfield Road Interchange – Preferred Plan

The preferred plan for the Bloomfield Road interchange, as shown on **Exhibit 5-11**, provides the following:

- Parclo A interchange configuration;
- Full access to Bloomfield Road to/from the Bloomfield Business Park;
- Additional lanes on Bloomfield Road to accommodate Bloomfield Business Park traffic volumes (municipal undertaking);
- New structure to accommodate additional lanes on Bloomfield Road and interchange ramp improvements (funding partnership to be negotiated between MTO and Chatham-Kent); and
- Closure of 7th Line East at Howard Road.

The Municipality of Chatham-Kent (Municipality) designated lands as Business Park in July 2002 through an amendment to the Raleigh Official Plan (Official Plan Amendment #16 – By-Law 188-2002). The lands designated are located south of Highway 401 and north of 8th Line traversed by Bloomfield Road. The process the Municipality followed for designation of the Business Park lands included a public consultation process as set out in the *Ontario Planning Act*.

As part of the planning and consultation process that the Municipality undertook for the Bloomfield Business Park development, 7th Line West is to be realigned south of its present location to connect to Bloomfield Road approximately midway between the Highway 401 south ramp terminal and 8th Line. The Municipality has an understanding in principle with MTO for the timing for this realignment of 7th Line West. This understanding is premised on certain triggers related to traffic generation based on the recommendations of a Traffic Impact Study undertaken by others on behalf of the Municipality. This understanding pre-dates MTO's current Preliminary Design and Environmental Assessment Study for Highway 401 within the Municipality boundaries.

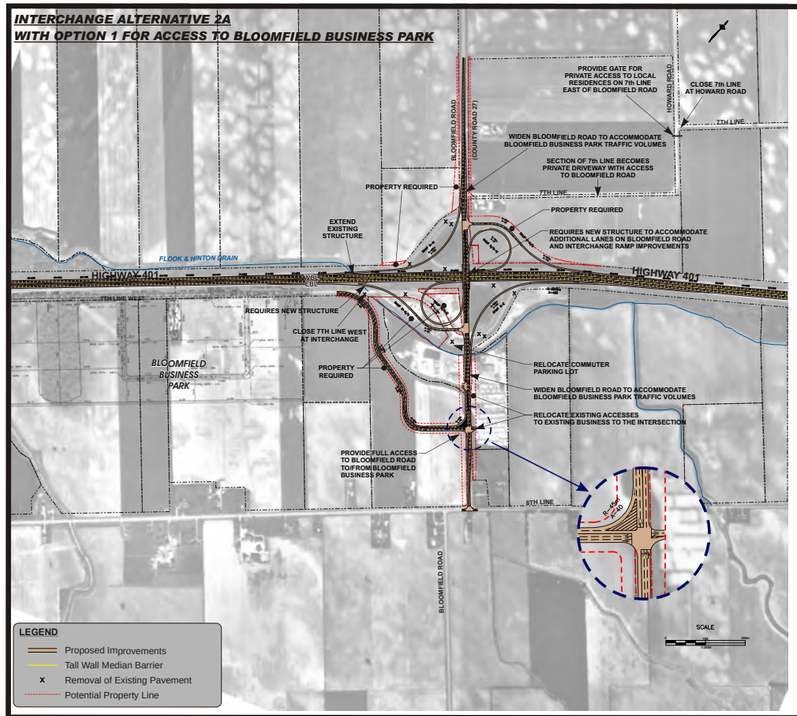
The relocation of 7th Line West and improvements to the Bloomfield Road interchange corridor and the Bloomfield Road corridor (i.e. widening), attributable to the Bloomfield Business Park, are acknowledged as a responsibility of the Municipality. Future construction by the Municipality for the realignment of 7th Line West, including improvements to the Bloomfield Road Interchange and the Bloomfield Road corridor, would proceed under the applicable Municipal Engineer's Association (MEA) Class Environmental Assessment subject to the requirements and triggers identified in the Traffic Impact Study and subsequent amendments prepared for the Bloomfield Business Park and in accordance with an agreement to be entered into with MTO. The agreement will include appropriate cost sharing allocation between MTO and the Municipality where appropriate. **Exhibit 5-11** also shows the EA responsibility of MTO and the Municipality for the proposed works at the Bloomfield Road interchange.

It is acknowledged that should MTO require improvements to the Bloomfield Road interchange following receiving Environmental Assessment approval for the proposed improvements to Highway 401 within Chatham-Kent, but prior to the Municipality's Bloomfield Business Park development triggering the realignment of 7th Line West or development of the portion of the Bloomfield Business Park east of Bloomfield Road, then:

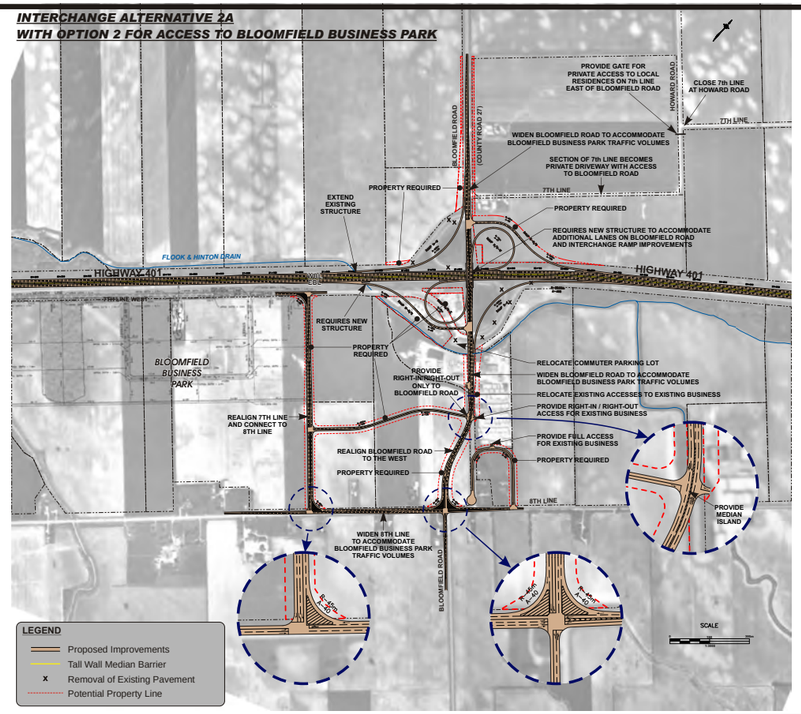
- the Municipality would be responsible to complete the MEA Class Environmental Assessment for the realignment of 7th Line West and the east Bloomfield Business Park access with the understanding that MTO would support a full access intersection to adequately service both the east and west sides of the Bloomfield Business Park at Bloomfield Road at a point southerly from the 'T' intersection identified in MTO's TESR, if set out in the approved MEA Class Environmental Assessment; and.
- the MTO would construct the realignment of 7th Line West or other improvements required in accordance with the Municipality's approved MEA Class Environmental Assessment and in accordance with the cost-sharing agreement developed between the Municipality and MTO.

7th Line East has been identified for closure to address sight distance concerns and to provide access management best practices with respect to the proximity of the 7th Line East/Bloomfield Road intersection to the north ramp terminal. There is an agricultural/cattle operation on 7th Line East with a number of residential houses, which is owned by one property owner. The preferred plan for the Bloomfield Road interchange includes the closure of 7th Line East at Howard Road and the section of 7th Line East between Bloomfield Road and Howard Road becoming a private driveway. Private access from/to these residential houses and agricultural operation will be maintained from Bloomfield Road to minimize out-of-way travel. A gate will be provided at Howard Road to prevent motorists using the section of 7th Line East becoming a private driveway.

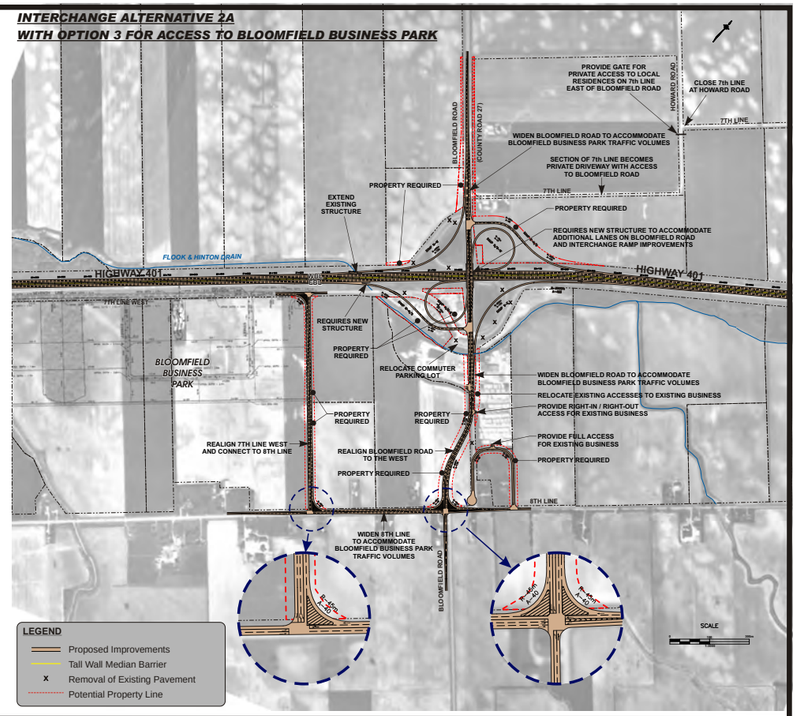
INTERCHANGE ALTERNATIVE 2A
WITH OPTION 1 FOR ACCESS TO BLOOMFIELD BUSINESS PARK



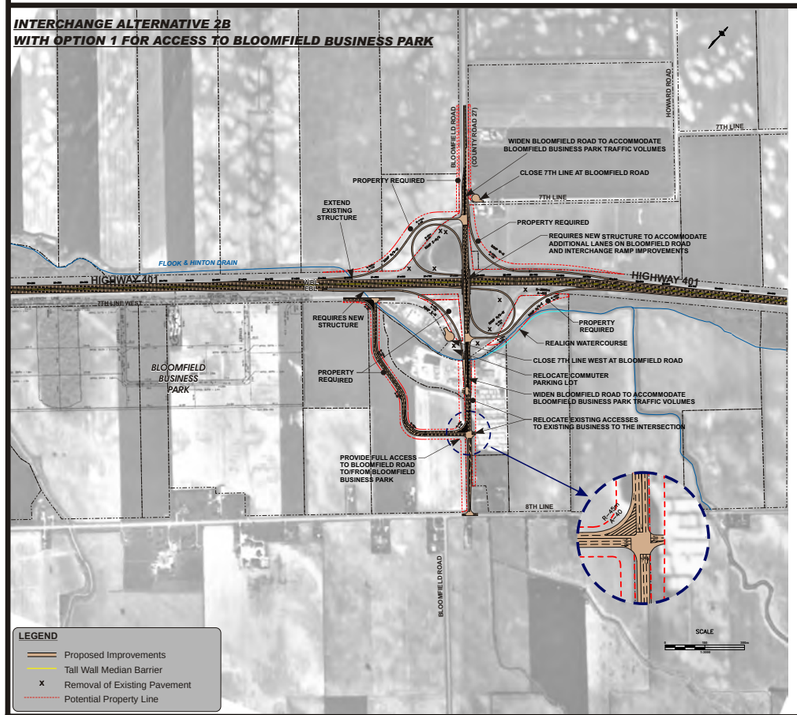
INTERCHANGE ALTERNATIVE 2A
WITH OPTION 2 FOR ACCESS TO BLOOMFIELD BUSINESS PARK



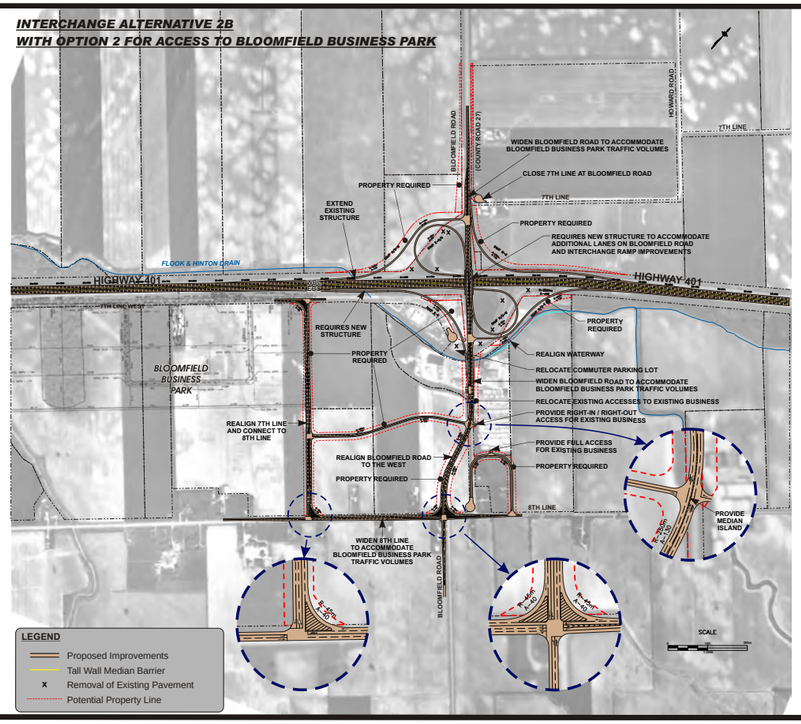
INTERCHANGE ALTERNATIVE 2A
WITH OPTION 3 FOR ACCESS TO BLOOMFIELD BUSINESS PARK



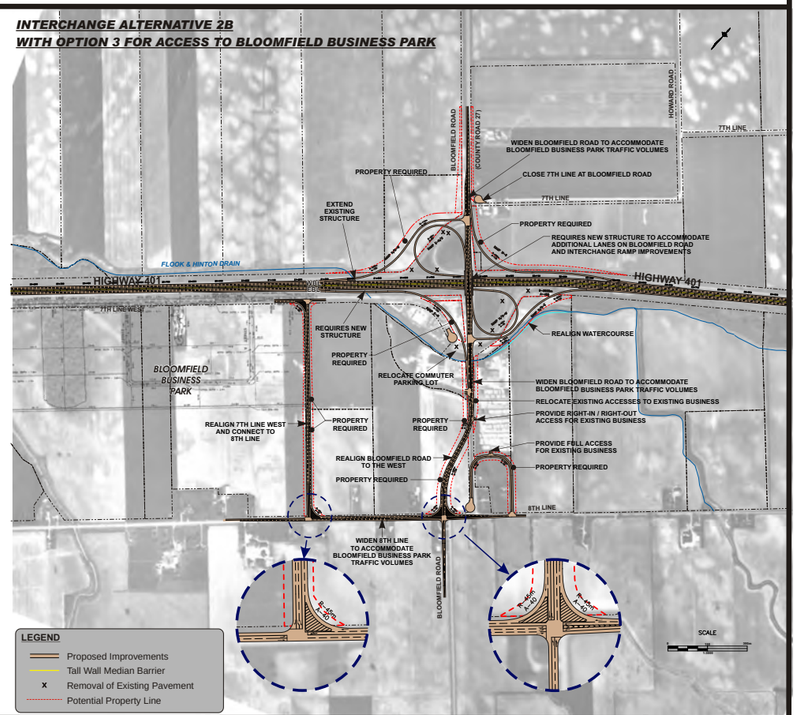
INTERCHANGE ALTERNATIVE 2B
WITH OPTION 1 FOR ACCESS TO BLOOMFIELD BUSINESS PARK



INTERCHANGE ALTERNATIVE 2B
WITH OPTION 2 FOR ACCESS TO BLOOMFIELD BUSINESS PARK



INTERCHANGE ALTERNATIVE 2B
WITH OPTION 3 FOR ACCESS TO BLOOMFIELD BUSINESS PARK

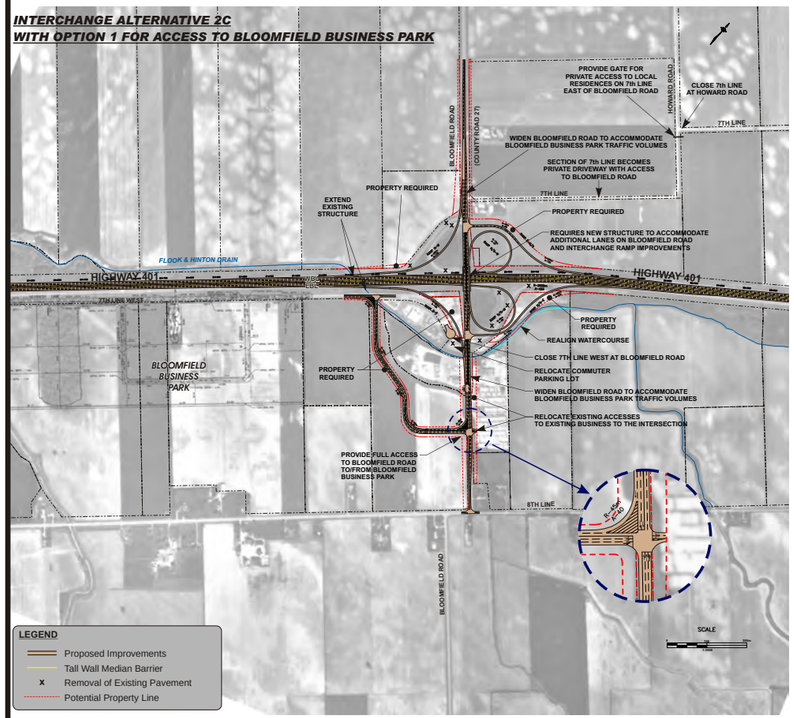


G.W.P. 80-00-00: Highway 401
from 0.9 km East of Essex Road 42 to Elgin County Boundary
Preliminary Design Study and Class EA

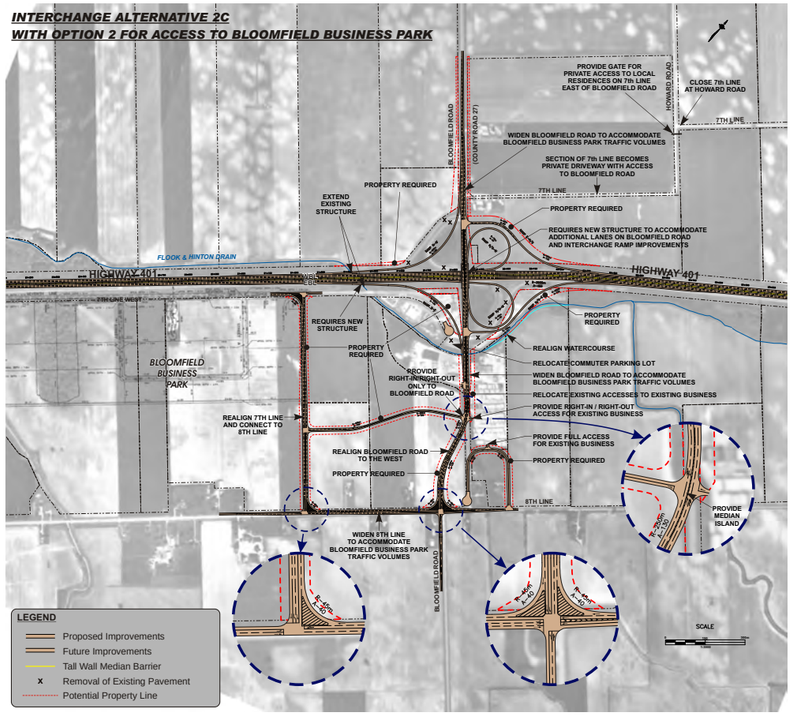
BLOOMFIELD ROAD
INTERCHANGE ALTERNATIVES
(Part 1 of 3)

EXHIBIT
5-9a

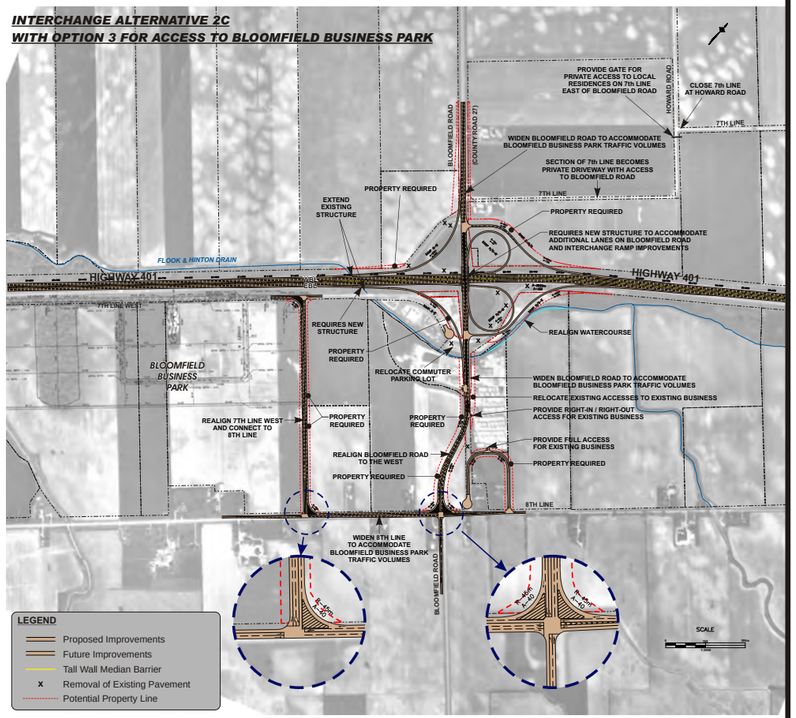
INTERCHANGE ALTERNATIVE 2C
WITH OPTION 1 FOR ACCESS TO BLOOMFIELD BUSINESS PARK



INTERCHANGE ALTERNATIVE 2C
WITH OPTION 2 FOR ACCESS TO BLOOMFIELD BUSINESS PARK



INTERCHANGE ALTERNATIVE 2C
WITH OPTION 3 FOR ACCESS TO BLOOMFIELD BUSINESS PARK

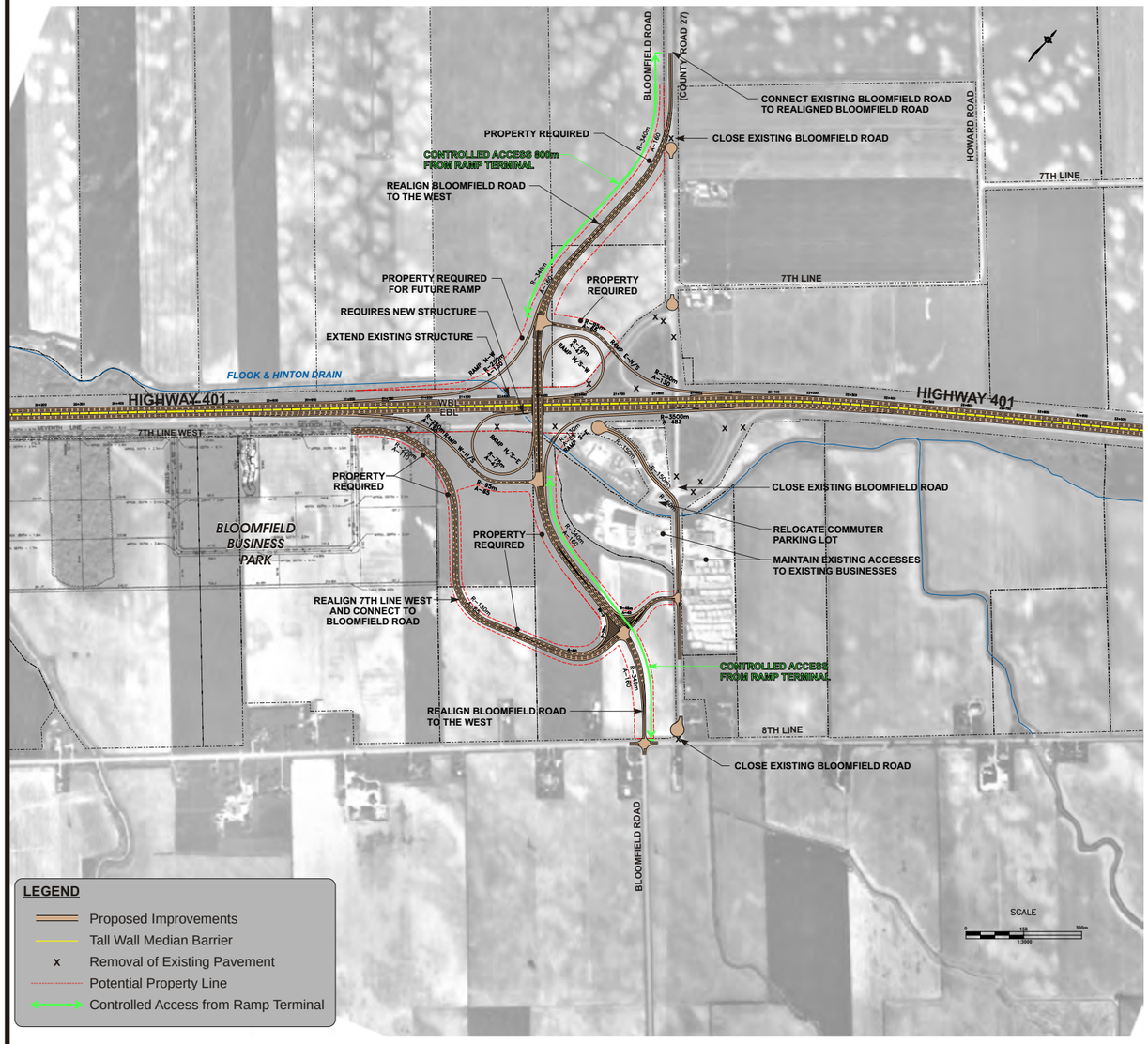


G.W.P. 80-00-00: Highway 401
from 0.9 km East of Essex Road 42 to Elgin County Boundary
Preliminary Design Study and Class EA

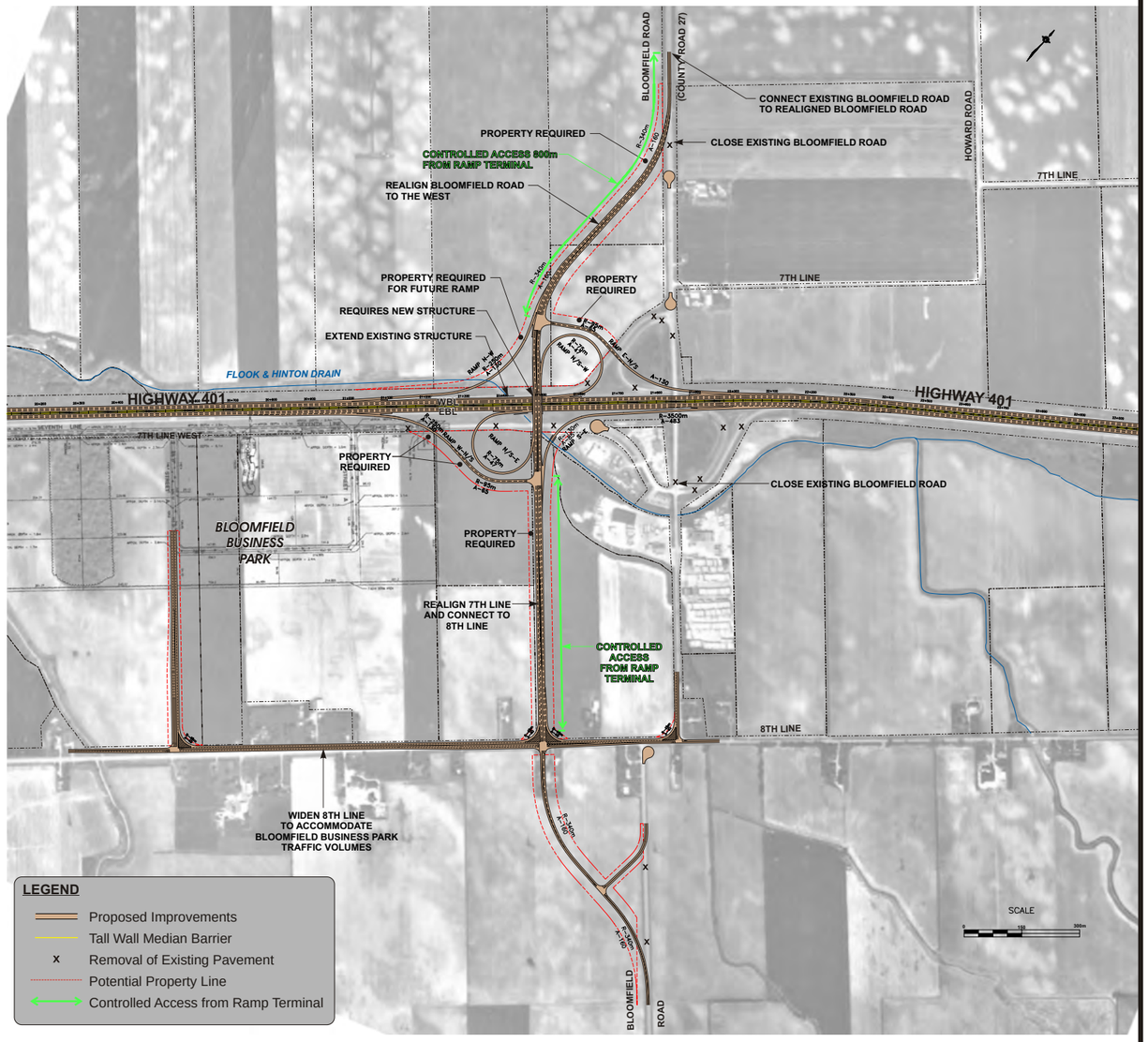
BLOOMFIELD ROAD
INTERCHANGE ALTERNATIVES
(Part 2 of 3)

EXHIBIT
5-9b

INTERCHANGE ALTERNATIVE 2D



INTERCHANGE ALTERNATIVE 2E



G.W.P. 80-00-00: Highway 401
from 0.9 km East of Essex Road 42 to Elgin County Boundary
Preliminary Design Study and Class EA

BLOOMFIELD ROAD
INTERCHANGE ALTERNATIVES
(Part 3 of 3)

EXHIBIT
5-9c

ANALYSIS & EVALUATION OF BLOOMFIELD ROAD INTERCHANGE ALTERNATIVES (Part 1 of 2)

Factor / Indicator	Do Nothing (maintained for comparison purposes)	Alternative 2A			Alternative 2B			Alternative 2C			Alternative 2D	Alternative 2E
		With Option 1	With Option 2	With Option 3	With Option 1	With Option 2	With Option 3	With Option 1	With Option 2	With Option 3		
Transportation												
Interchange design (geometrics, safety).	× Maintains a Parclo B configuration. × Does not improve horizontal curves and speed change lanes at the interchange ramps, which are undesirable.	✓ Provides Parclo A configuration. ✓ Improves interchange ramps.			× Maintains a Parclo B configuration ✓ Improves interchange ramps			× Provides a Parclo A-B configuration. ✓ Improves interchange ramps.			✓ Provides Parclo A configuration. ✓ Improves interchange ramps.	✓ Provides Parclo A configuration. ✓ Improves interchange ramps.
Future traffic operations.	× Provides unacceptable future traffic operations.	✓ Traffic operations along Bloomfield Road within the Study Area are good to very good throughout the plannning period (to 2026), including the full acccess intersection to the Business Park ✓ Existing commercial entrances on Bloomfield Road to be maintained do not impact operations on Bloomfield Road ✓ No impact to 8th Line.	✓ Traffic operations along Bloomfield Road within the Study Area are good to very good throughout the plannning period (to 2026), including the partial acccess intersection to the Business Park . ✓ Distributes traffic between two access connections. ✓ Existing commercial entrances on Bloomfield Road to be maintained do not impact operations on Bloomfield Road × Increases traffic on 8th Line. × Requires widening of 8th Line.	✓ Traffic operations along Bloomfield Road within the Study Area are good to very good throughout the plannning period (to 2026) ✓ Existing commercial entrances on Bloomfield Road to be maintained do not impact operations on Bloomfield Road. × Increases traffic on 8th Line. × Requires widening of 8th Line.	✓ Traffic operations along Bloomfield Road within the Study Area are good throughout the plannning period (to 2026), including the full acccess intersection to the Business Park. ✓ Some existing commercial entrances on Bloomfield Road will be impacted by B-4 ramp in southwest quadrant. ✓ No impact to 8th Line.	✓ Traffic operations along Bloomfield Road within the Study Area are good throughout the plannning period (to 2026), including the partial acccess intersection to the Business Park. ✓ Distributes traffic between two access connections. ✓ Some existing commercial entrances on Bloomfield Road will be impacted by B-4 ramp in southwest quadrant. × Increases traffic on 8th Line. × Requires widening of 8th Line.	✓ Traffic operations along Bloomfield Road within the Study Area are good throughout the plannning period (to 2026). ✓ Some existing commercial entrances on Bloomfield Road will be impacted by B-4 ramp in southwest quadrant. × Increases traffic on 8th Line. × Requires widening of 8th Line.	✓ Traffic operations along Bloomfield Road within the Study Area are good throughout the plannning period (to 2026), including the full acccess intersection to the Business Park. ✓ Some existing commercial entrances on Bloomfield Road will be impacted by B-4 ramp in southwest quadrant. ✓ No impact to 8th Line.	✓ Traffic operations along Bloomfield Road within the Study Area are good throughout the plannning period (to 2026), including the partial acccess intersection to the Business Park . ✓ Distributes traffic between two access connections. ✓ Some existing commercial entrances on Bloomfield Road will be impacted by B-4 ramp in southwest quadrant × Increases traffic on 8th Line. × Requires widening of 8th Line.	✓ Traffic operations along Bloomfield Road within the Study Area are good throughout the plannning period (to 2026). ✓ Some existing commercial entrances on Bloomfield Road will be impacted by B-4 ramp in southwest quadrant × Increases traffic on 8th Line. × Requires widening of 8th Line.	✓ Provides protection for existing and future traffic operations of the interchange and Bloomfield Road. ✓ Avoids increased traffic on 8th Line.	✓ Provides protection for existing and future traffic operations of the interchange and Bloomfield Road. ✓ Avoids increased traffic on 8th Line.
Continuity of local road network	✓ Maintains existing road network.	✓ Maintains existing road network.	✓ Provides for realignment of Bloomfield Road at 8th Line. ✓ Provides for private road access to service properties on east side of Bloomfield Road off of 8th Line.	✓ Provides for realignment of Bloomfield Road at 8th Line. ✓ Provides for private road access to service properties on east side of Bloomfield Road off of 8th Line.	✓ Maintains existing road network.	✓ Provides for realignment of Bloomfield Road at 8th Line. ✓ Provides for private road access to service properties on east side of Bloomfield Road off of 8th Line.	✓ Provides for realignment of Bloomfield Road at 8th Line. ✓ Provides for private road access to service properties on east side of Bloomfield Road off of 8th Line.	✓ Maintains existing road network	✓ Provides for realignment of Bloomfield Road at 8th Line. ✓ Provides for private road access to service properties on east side of Bloomfield Road off of 8th Line.	✓ Provides for realignment of Bloomfield Road at 8th Line. ✓ Provides for private road access to service properties on east side of Bloomfield Road off of 8th Line.	× Requires out-of-way travel for the existing businesses on Bloomfield Road south of the interchange. ✓ Provides for realignment of Bloomfield Road at 8th Line.	× Requires out-of-way travel for the existing businesses on Bloomfield Road south of the interchange. ✓ Provides for realignment of Bloomfield Road at 8th Line.
Access Management	× Has access management concern associated with 7th Line East connecting to Bloomfield Road. × Has access management concern associated with Business Park access connecting to 8th Line. • Discontinuation of 7th Line West, west of Bloomfield Road is included as part of the development plan for the Bloomfield Business Park.	✓ 7th Line East and 7th Line West are proposed to be closed to meet MTO access management needs. × Does not meet desirable/minimum intersection spacing criteria on Bloomfield Road (800 m desirable / 400 m minimum). × Results in 1 to 2 minutes of out-of-way travel time for motorists traveling from 7th Line East. × Results in ±1 minute of out-of-way travel time for motorists traveling from 7th Line West.	× Does not provide desirable / minimum intersection spacing on Bloomfield Road (800 m desirable / 400 m minimum).	✓ Utilizes existing 8th Line, which meets the minimum intersection spacing criteria along Bloomfield Road. ✓ Minimizes access connections along Bloomfield Road	× Does not provide desirable / minimum intersection spacing on Bloomfield Road (800 m desirable / 400 m minimum).	× Does not provide desirable / minimum intersection spacing on Bloomfield Road (800 m desirable / 400 m minimum).	✓ Utilizes existing 8th Line, which meets the minimum intersection spacing criteria along Bloomfield Road. ✓ Minimizes access connections along Bloomfield Road.	× Does not provide desirable/minimum intersection spacing on Bloomfield Road (800 m desirable / 400 m minimum).	× Does not provide desirable / minimum intersection spacing criteria on Bloomfield Road (800 m desirable / 400 m minimum).	✓ Utilizes existing 8th Line, which meets the minimum intersection spacing criteria along Bloomfield Road. ✓ Minimizes access connections along Bloomfield Road.	✓ Increases intersection spacing on Bloomfield Road (compared to Alternatives 2A - Option 1). ✓ Meets minimum access management spacing of 400 m. ✓ Fully controlled access corridor along new Bloomfield Road - residential and/or commercial entrances within the controlled access limits will not be permitted. ✓ Maintains access for properties along existing Bloomfield Road.	✓ Increases intersection spacing on Bloomfield Road (compared to Alternatives 2A - Option 1). ✓ Meets minimum access management spacing of 400 m. ✓ Fully controlled access corridor along new Bloomfield Road - residential and/or commercial entrances within the controlled access limits will not be permitted. ✓ Maintains access for properties along existing Bloomfield Road.
Flexibility for staged construction.	NA	✓ Simplifies construction staging/sequencing.			× Requires complex construction staging/sequencing.			× Requires complex construction staging/sequencing in the southeast quadrant, however, simplifies construction staging/sequencing the northeast quadrant.			✓ Simplifies construction staging/sequencing.	
Structures												
Impacts to the existing highway underpass.	× Avoids impacts to the existing Bloomfield Road underpass. However, there is a need to replace the structure in the long-term future.	× Requires a replacement structure.									× Requires a new structure for the Bloomfield Road underpass with the relocated interchange to the west. × Requires removal of existing Bloomfield Road underpass.	
Impacts to other structures / culverts within the vicinity of the interchange.		× Requires extension of two culverts.										
Need for new structures / culverts within the vicinity of the interchange.		✓ Does not require new structures within the vicinity of the interchange.									× Requires three new structures.	
Drainage												
Potential for storm water management options.	× Does not provide an opportunity for storm water management facilities to treat highway runoff.	✓ Provides an opportunity for storm water management facilities to treat highway runoff.										
Impacts on interchange drainage, flow conveyance and flood water elevations	✓ Has no impact to the existing interchange drainage.	× Has potential to impact flood elevations.			× Has potential to impact flood elevations. × May require additional property in the southeast quadrant if channel re-alignment is required to minimize adverse hydraulic impacts.			× Has potential to impact flood elevations. × May require additional property in the southeast quadrant if channel re-alignment is required to minimize adverse hydraulic impacts.			× Has potential to impact flood elevations.	× Has potential to impact flood elevations.
Natural Environment												
Impacts to fisheries habitat	✓ Avoids impacts to the existing natural environment.	✓ Avoids realignment of Flook & Hinton Drain.			× Impacts fish habitat and potentially rare fish species (Special Concern & S3) associated with realignment of Flook & Hinton Drain. × Requires removal of vegetation along the realignment section of Flook & Hinton Drain.			× Impacts fish habitat and potentially rare fish species (Special Concern & S3) associated with realignment of Flook & Hinton Drain. × Requires removal of vegetation along the realignment section of Flook & Hinton Drain.			× Avoids realignment of Flook & Hinton Drain. × Requires three new crossings of Flook & Hinton Drain.	✓ Avoids realignment of Flook & Hinton Drain. × Requires three new crossings of Flook & Hinton Drain.
Impacts to rare plant species and other vegetation		× Impacts large rare plant species population (S2/S3) located between existing 7th Line and Highway 401 in the southwest quadrant of the interchange.			× Impacts to large rare plant species population (S2/S3) in SW quadrant of interchange limited to future ramps. × Has potential to have indirect effects to plantation located east of southeast quadrant of the interchange.			× Impacts to large rare plant species population (S2/S3) in SW quadrant of interchange limited to future ramps. × Has potential to have indirect effects to plantation located east of southeast quadrant of the interchange.			× Impacts large rare plant species population (S2/S3) in the southwest quadrant of the interchange to accommodate future S-E ramp.	× Impacts large rare plant species population (S2/S3) in the southwest quadrant of the interchange to accommodate future S-E ramp.
Impacts to groundwater (i.e. water wells)		× Impacts water well in northeast quadrant. × May impact two other water wells.			× May impact two water wells.			× May impact two water wells.			✓ No water wells are anticipated to be impacted.	
Impacts to wildlife habitat or movement potential.		✓ No significant impacts are anticipated.			× May result in impacts to wildlife habitat due to the removal of vegetation along the realignment section of Jeannette?s Creek.			× May result in impacts to wildlife habitat due to the removal of vegetation along the realignment section of Jeannette?s Creek.			✓ No significant impacts are anticipated.	
There are no significant wetlands within the study area.												

ANALYSIS & EVALUATION OF BLOOMFIELD ROAD INTERCHANGE ALTERNATIVES (Part 2 of 2)

Factor / Indicator	Do Nothing (maintained for comparison purposes)	Alternative 2A			Alternative 2B			Alternative 2C			Alternative 2D	Alternative 2E
		With Option 1	With Option 2	With Option 3	With Option 1	With Option 2	With Option 3	With Option 1	With Option 2	With Option 3		
Socio-Economic Environment												
Impacts to residences.	✓ Avoids displacement of local residences.	✓ Avoids displacement of local residences. × Realigns interchange ramps closer to residences on 7th Line. ✓ Avoids property impacts along 8th Line.	✓ Avoids displacement of local residences. × Realigns interchange ramps closer to residences on 7th Line. × Increases traffic on 8th Line. × Requires widening on 8th Line. × Property requirements along Bloomfield Road, 8th Line and on the east side of Bloomfield Road.	✓ Avoids displacement of local residences. × Realigns interchange ramps closer to residences on 7th Line. × Increases traffic on 8th Line. × Requires widening on 8th Line. × Property requirements along Bloomfield Road, 8th Line and on the east side of Bloomfield Road.	✓ Avoids displacement of local residences. ✓ Avoids property impacts on 8th Line.	✓ Avoids displacement of local residences. × Property requirements along Bloomfield Road, 8th Line and on the east side of Bloomfield Road.	✓ Avoids displacement of local residences. × Property requirements along Bloomfield Road, 8th Line and on the east side of Bloomfield Road.	✓ Avoids displacement of local residences. × Realigns interchange ramps closer to residences on 7th Line. ✓ Avoids property impacts on 8th Line.	✓ Avoids displacement of local residences. × Realigns interchange ramps closer to residences on 7th Line. × Property requirements along Bloomfield Road, 8th Line and on the east side of Bloomfield Road.	✓ Avoids displacement of local residences. × Realigns interchange ramps closer to residences on 7th Line. × Property requirements along Bloomfield Road, 8th Line and on the east side of Bloomfield Road.	× Potential displacement of one residence on 8th Line. ✓ Minimizes property impacts on 8th Line.	× Requires displacement of one local residence. ✓ Minimizes property impacts on 8th Line.
Impacts to businesses.	✓ Avoids displacement of local businesses.	× Displaces two businesses in the southwest quadrant of the interchange. × May impact sustainability of the interchange to support future growth and development objectives.	× Displaces two businesses in the southwest quadrant of the interchange. × Impacts sustainability of the interchange to support future growth and development objectives.	× Displaces two businesses in the southwest quadrant of the interchange. ✓ Provides for future sustainability of the interchange to support growth and development objectives.	× Displaces one business in the southwest quadrant of the interchange. × May impact sustainability of the interchange to support future growth and development objectives.	× Displaces one business in the southwest quadrant of the interchange. × Impacts sustainability of the interchange to support future growth and development objectives.	× Displaces one business in the southwest quadrant of the interchange. ✓ Provides for future sustainability of the interchange to support growth and development objectives.	× Displaces one business in the southwest quadrant of the interchange. ✓ May impact sustainability of the interchange to support future growth and development objectives.	× Displaces one business in the southwest quadrant of the interchange. ✓ Impacts sustainability of the interchange to support future growth and development objectives.	× Displaces one business in the southwest quadrant of the interchange. ✓ Provides for future sustainability of the interchange to support growth and development objectives.	✓ Avoids displacement of local businesses. × Creates out-of-way travel to access businesses on Bloomfield Road south of the interchange.	✓ Avoids displacement of local businesses. × Creates out-of-way travel to access businesses on Bloomfield Road south of the interchange.
Impacts to agricultural lands.	✓ Does not impact agricultural lands.	✓ Minimizes impacts to agricultural lands in southeast quadrant. × Impacts agricultural lands in northeast quadrant due to location of ramps.	× Impacts agricultural lands due to roadway connecting to 8th Line. × Impacts agricultural lands in northeast quadrant due to location of ramps.	× Impacts agricultural lands due to roadway connecting to 8th Line. × Impacts agricultural lands in northeast quadrant due to location of ramps.	✓ Minimizes impacts to agricultural lands in southwest quadrant. × Impacts agricultural lands in northeast and northwest quadrant due to location of ramps.	× Impacts agricultural lands due to roadway connecting to 8th Line. × Impacts agricultural lands in northeast and northwest quadrant due to location of ramps.	× Impacts agricultural lands due to roadway connecting to 8th Line. × Impacts agricultural lands in northeast and northwest quadrant due to location of ramps.	✓ Minimizes impacts to agricultural lands in southwest quadrant. × Impacts agricultural lands in northeast quadrant due to location of ramps.	× Impacts agricultural lands due to roadway connecting to 8th Line. × Impacts agricultural lands in northeast quadrant due to location of ramps.	× Impacts agricultural lands due to roadway connecting to 8th Line. × Impacts agricultural lands in northeast quadrant due to location of ramps.	× Has highest impact to agricultural lands.	× Has higher impact to agricultural lands, but slightly less than Alternative 2D.
Impacts to existing utilities.	✓ Does not impact existing utilities.	✓ Avoids impacts to Hydro One high tower transmission power line along Highway 401. × Has potential impacts to Chatham-Kent sewer force main and water main along Bloomfield Road. × Has minor impact to Bell facilities located along the north side of the highway right-of-way.			✓ Avoids impacts to Hydro One high tower transmission power line along Highway 401. ✓ Minimizes impacts to Chatham-Kent sewer force main and water main along Bloomfield Road. × Has minor impact to Bell facilities located along the north side of the highway right-of-way.			✓ Avoids impacts to Hydro One high tower transmission power line along Highway 401. ✓ Minimizes impacts to Chatham-Kent sewer force main and water main along Bloomfield Road. × Has minor impact to Bell facilities along the north side of the highway right-of-way.			× Requires potential relocation of six Hydro One high tower transmission power lines along Highway 401. ✓ Avoids impacts to Chatham-Kent sewer force main and water main along Bloomfield Road. × Has minor impact to Bell facilities located along the highway right-of-way.	× Requires potential relocation of six Hydro One high tower transmission power lines along Highway 401. ✓ Avoids impacts to Chatham-Kent sewer force main and water main along Bloomfield Road. × Has minor impact to Bell facilities located along the highway right-of-way.
Potential noise impacts.	✓ Does not increase future noise levels.	× Has potential noise increase at four residential houses located in the northeast quadrant of the interchange. This impact is expected to be minor since traffic noise from Highway 401 will continue to be the dominant noise source at these houses. ✓ Minimizes noise impacts at residential houses on 8th Line.	× Has potential noise increase at four residential houses located in the northeast quadrant of the interchange. This impact is expected to be minor since traffic noise from Highway 401 will continue to be the dominant noise source at these houses. × Has potential noise increase at residential houses on 8th Line.	× Has potential noise increase at four residential houses located in the northeast quadrant of the interchange. This impact is expected to be minor since traffic noise from Highway 401 will continue to be the dominant noise source at these houses. × Has potential noise increase at residential houses on 8th Line.	✓ No potential noise increase is expected from the interchange ramps at four residential houses located in the northeast quadrant of the interchange. This impact is expected to be minor since traffic noise from Highway 401 will continue to be the dominant noise source at these houses. ✓ Minimizes noise impacts at residential houses on 8th Line.	✓ No potential noise increase is expected from the interchange ramps at four residential houses located in the northeast quadrant of the interchange. This impact is expected to be minor since traffic noise from Highway 401 will continue to be the dominant noise source at these houses. × Has potential noise increase at residential houses on 8th Line.	✓ No potential noise increase is expected from the interchange ramps at four residential houses located in the northeast quadrant of the interchange. . This impact is expected to be minor since traffic noise from Highway 401 will continue to be the dominant noise source at these houses. × Has potential noise increase at residential houses on 8th Line.	× Has potential noise increase at four residential houses located in the northeast quadrant of the interchange. This impact is expected to be minor since traffic noise from Highway 401 will continue to be the dominant noise source at these houses. ✓ Minimizes noise impacts at residential houses on 8th Line.	✓ Has potential noise increase at four residential houses located in the northeast quadrant of the interchange. This impact is expected to be minor since traffic noise from Highway 401 will continue to be the dominant noise source at these houses. × Has potential noise increase at residential houses on 8th Line.	× Has potential noise increase at four residential houses located in the northeast quadrant of the interchange. This impact is expected to be minor since traffic noise from Highway 401 will continue to be the dominant noise source at these houses. × Has potential noise increase at residential houses on 8th Line.	✓ Has potential noise decrease at four residential houses located in the northeast quadrant of the interchange with Bloomfield Road realigned further away from these houses. This potential decrease is expected to be minor since traffic noise from Highway 401 will continue to be the dominant noise source at these houses. ✓ Minimizes noise impacts at residential houses on 8th Line.	✓ Has potential noise decrease at four residential houses located in the northeast quadrant of the interchange with Bloomfield Road realigned further away from these houses. This potential decrease is expected to be minor since traffic noise from Highway 401 will continue to be the dominant noise source at these houses. ✓ Minimizes noise impacts at residential houses on 8th Line.
Site Contamination impacts.	✓ Has no site contamination impacts	× Has potential for site contamination issues associated with the removal of the two trucking companies in the southwest quadrant of the interchange.			✓ No significant impacts are anticipated.							
Cultural Environment												
Impacts to the cultural heritage landscape.	✓ Avoids impacts to archaeological, built heritage and cultural landscape resources.	× Increases potential impacts to cultural landscape due to property requirement adjacent to the right-of-way.									× Has higher potential impact to cultural landscape due to the realignment of Bloomfield Road.	× Has higher potential impact to cultural landscape due to the realignment of Bloomfield Road.
Archaeological impacts.		× Increases potential impacts to archaeological resources due to the property requirements adjacent to the right-of-way.									× Has the highest potential impact to archaeological resources due to greatest property impacts outside of the right-of-way.	× Has the highest potential impact to archaeological resources due to greatest property impacts outside of the right-of-way.
Direct impacts to the existing Highway 401 underpass.		× Impacts the existing Highway 401 underpass.										
Preliminary Cost Estimate												
Construction cost	✓ Rehabilitate structures as required and replace at end of lifespan.	✓ Has lower construction costs	× Has higher construction costs compared to Option 1.	× Has higher construction costs compared to Option 1.	✓ Has lower construction costs	× Has higher construction costs compared to Option 1.	× Has higher construction costs compared to Option 1.	✓ Has lower construction costs.	× Has higher construction costs compared to Option 1.	× Has higher construction costs compared to Option 1.	× Has highest construction cost due to realignment of Bloomfield Road.	× Has highest construction cost due to realignment of Bloomfield Road.
Property cost.	✓ Has no property cost.	× Has higher property cost due to displacement of two existing businesses. × Requires 13.3 ha	× Has higher property cost due to displacement of two existing businesses. × Requires 17.1 ha	× Has higher property cost due to displacement of two existing businesses. × Requires 15.2 ha	× Has medium property cost due to displacement of one existing business. × Requires 12.6 ha	× Has medium property cost due to displacement of one existing business. × Requires 16.9 ha	× Has medium property cost due to displacement of one existing business. × Requires 14.8 ha	× Has medium property cost due to displacement of one existing business. × Requires 12.7 ha	× Has medium property cost due to displacement of one existing business. × Requires 16.6 ha	× Has medium property cost due to displacement of one existing business. × Requires 14.4 ha	✓ Has a lower property cost due to avoidance of displacing of existing businesses. × Requires 20.8 ha	✓ Has lower property costs due to avoidance of displacing of existing businesses × Has a property cost associated with displacement of one existing house. × Requires 21.5 ha
OVERALL - BLOOMFIELD ROAD INTERCHANGE ALTERNATIVES	*OVERALL ASSESSMENT IS NOT INCLUDED, AS "DO NOTHING" DOES NOT IMPROVE THE ISSUES ASSOCIATED WITH THE EXISTING INTERCHANGE.*											

G.W.P. 80-00-00: Highway 401
from 0.9 km East of Essex Road 42 to Elgin County Boundary
Preliminary Design Study and Class EA

ANALYSIS & EVALUATION OF BLOOMFIELD ROAD INTERCHANGE ALTERNATIVES (Part 2 of 2)

EXHIBIT 5-10b

INTERCHANGE ALTERNATIVE 2A

- WITH OPTION 1 FOR ACCESS TO BLOOMFIELD BUSINESS PARK

PREFERRED

6TH LINE

PROVIDE GATE FOR PRIVATE ACCESS TO LOCAL RESIDENCES ON 7th LINE EAST OF BLOOMFIELD ROAD

HOWARD ROAD

CLOSE 7th LINE AT HOWARD ROAD

7TH LINE

BLOOMFIELD ROAD (COUNTY ROAD 27)

WIDEN BLOOMFIELD ROAD TO ACCOMMODATE BLOOMFIELD BUSINESS PARK TRAFFIC VOLUMES

SECTION OF 7th LINE BECOMES PRIVATE DRIVEWAY WITH ACCESS TO BLOOMFIELD ROAD

PROPERTY REQUIRED

7TH LINE

PROPERTY REQUIRED

EXTEND EXISTING STRUCTURE

REQUIRES NEW STRUCTURE TO ACCOMMODATE ADDITIONAL LANES ON BLOOMFIELD ROAD AND INTERCHANGE RAMP IMPROVEMENTS

FLOOK & HINTON DRAIN

HIGHWAY 401

WBL

EBL

HIGHWAY 401

7TH LINE WEST

REQUIRES NEW STRUCTURE

CLOSE 7TH LINE WEST AT INTERCHANGE

REQUIRES A REALIGNMENT OF BLOOMFIELD ROAD TO THE WEST TO ACCOMMODATE CONSTRUCTION STAGING OF THE NEW STRUCTURE

POPULATION OF PROVINCIALLY RARE (S2/S3 RANKED) PLANT SPECIES

BLOOMFIELD BUSINESS PARK

PROPERTY REQUIRED

RELOCATE COMMUTER PARKING LOT

WIDEN BLOOMFIELD ROAD TO ACCOMMODATE BLOOMFIELD BUSINESS PARK TRAFFIC VOLUMES

RELOCATE EXISTING ACCESSES TO EXISTING BUSINESS TO THE INTERSECTION

PROVIDE SECONDARY ACCESS TO COMMERCIAL PROPERTY (REQUIRES FURTHER DISCUSSION WITH PROPERTY OWNER)

MUNICIPALITY OF CHATHAM-KENT IS CURRENTLY REVIEWING ACCESS TO PROPERTY EAST OF BLOOMFIELD ROAD

PROVIDE FULL ACCESS TO BLOOMFIELD ROAD TO/FROM BLOOMFIELD BUSINESS PARK

8TH LINE

BLOOMFIELD ROAD

R=45m A=40

SCALE 0 150 300m 1:3000

LEGEND

- Proposed Improvements
- Controlled Access Highway Limits
- Tall Wall Median Barrier
- x Removal of Existing Pavement
- Potential Property Line

INTERCHANGE ALTERNATIVE 2A

ENVIRONMENTAL ASSESSMENT (EA) RESPONSIBILITY

PREFERRED

BLOOMFIELD ROAD (COUNTY ROAD 27)

7TH LINE

RAMP N-W

RAMP N/S-W

RAMP E-N/S

HIGHWAY 401

WBL

EBL

R=5500m A=500

RAMP W-N/S

RAMP N/S-E

RAMP S-E

8TH LINE

LEGEND

- MTO EA Responsibility
- Municipality of Chatham-Kent EA Responsibility

G.W.P. 80-00-00: Highway 401
from 0.9 km East of Essex Road 42 to Elgin County Boundary
Preliminary Design Study and Class EA

BLOOMFIELD ROAD INTERCHANGE - PREFERRED PLAN

EXHIBIT 5-11

HIGHWAY 40 /
COMMUNICATION ROAD
INTERCHANGE

5.4.7 Highway 40 / Communication Road - Interchange Alternatives and Evaluation

The existing interchange conditions and the interchange alternatives for the Highway 40 / Communication Road interchange are shown in **Exhibits 5-12a and 5-12b**. Five interchange alternatives were considered for this location.

Based on the analysis and evaluation undertaken in **Exhibit 5-13**, Interchange Alternative 3A is preferred for the following reasons:

- Provides a Parclo A interchange configuration;
- Does not require traffic signals at ramp terminals; and
- Minimizes impacts to McGregor Creek.

5.4.8 Pinehurst Road - Alternative Routes and Closure Evaluation

Pinehurst Road at Highway 40 is proposed to be closed to address sight distance concerns and to provide access management best practices with respect to the proximity of the existing Pinehurst Road/Highway 40 intersection to the north ramp terminal. Alternate Routes 1, 2, and 3 are shown in **Exhibit 5-14**.

Based on the analysis and evaluation undertaken in **Exhibit 5-14**, Alternate Route 2 is preferred over Alternate Routes 1 and 3 for the following reasons:

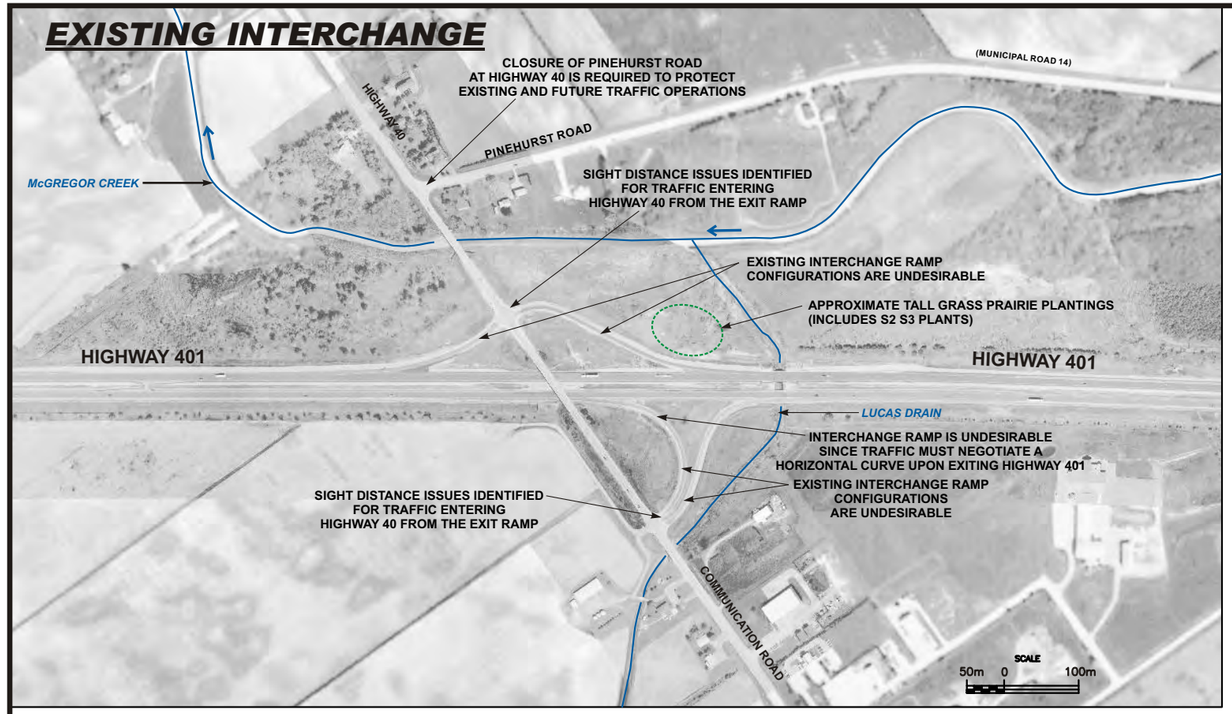
- Minimizes disruption to road network by providing new connection;
- Minimizes impact to agricultural land and drainage infrastructure by generally following existing property lines and utilizing the existing access driveway to the Hydro One transformer station; and
- Minimizes impact to land parcels as the new route follows existing property lines.

5.4.9 Highway 40 / Communication Road Interchange – Preferred Plan

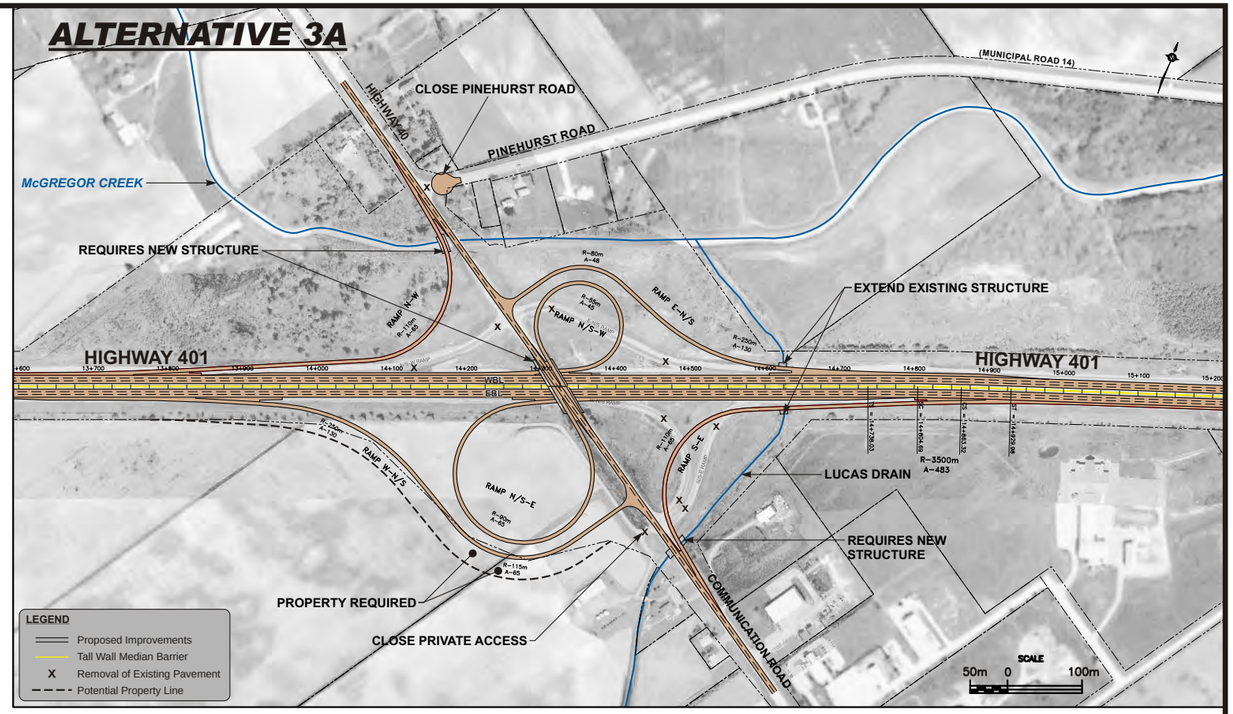
The preferred plan for the Highway 40 / Communication Road interchange is shown on **Exhibit 5-15**. The preferred plan provides the following:

- Parclo A interchange configuration;
- Closure of existing intersection of Pinehurst Road at Highway 40 to address sight distance concerns and access management issues;
- Provision of a new connection between Pinehurst Road and Boundary Line to minimize out-of-way travel for motorists on Pinehurst Road; and
- Upgrades to Boundary Line and the Highway 40 / Boundary Line intersection.

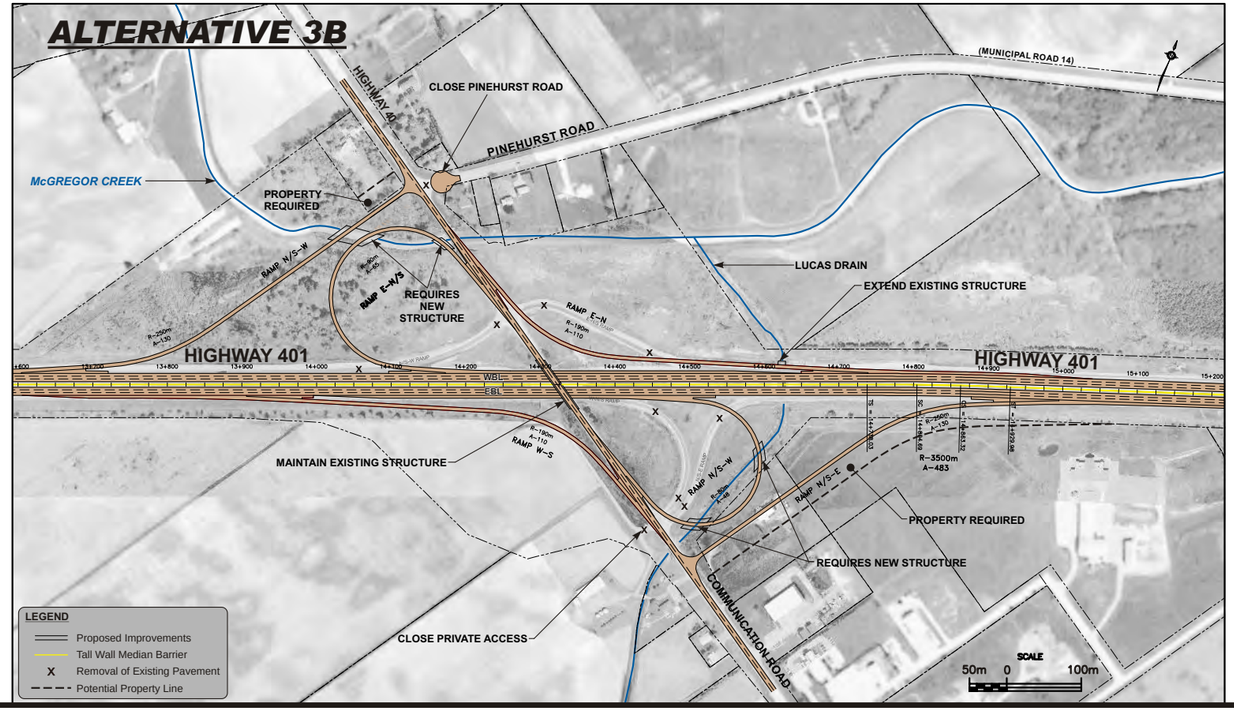
EXISTING INTERCHANGE



ALTERNATIVE 3A



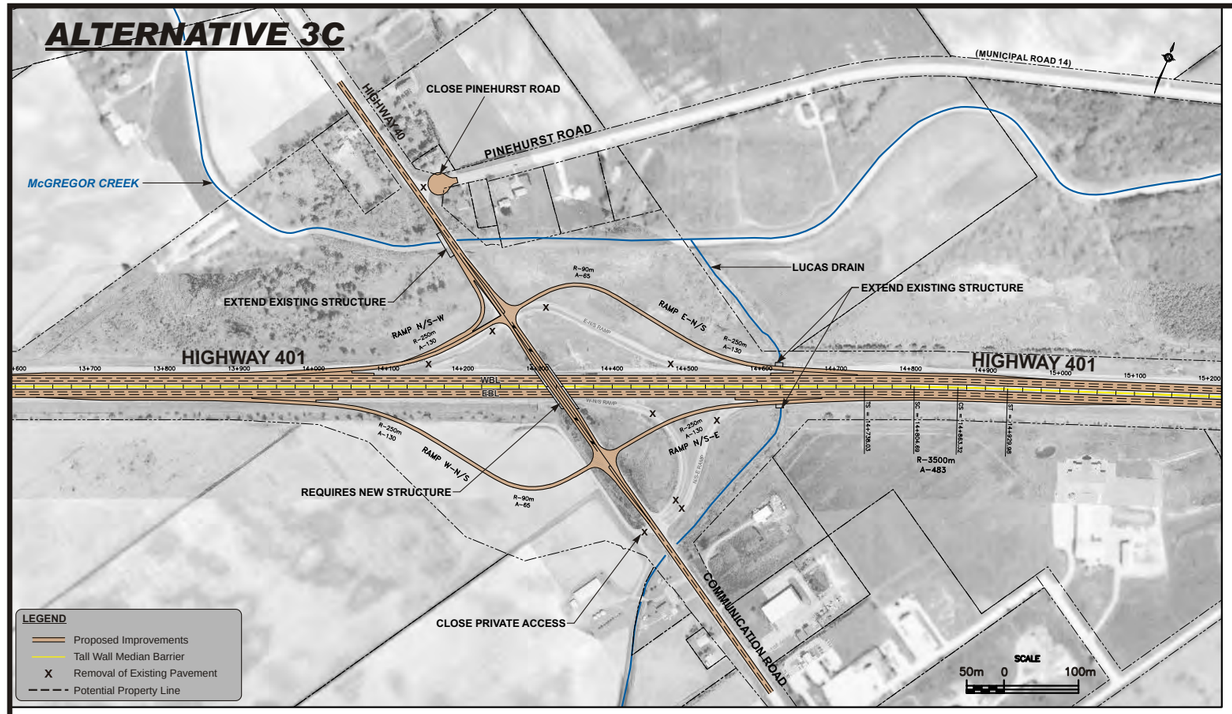
ALTERNATIVE 3B

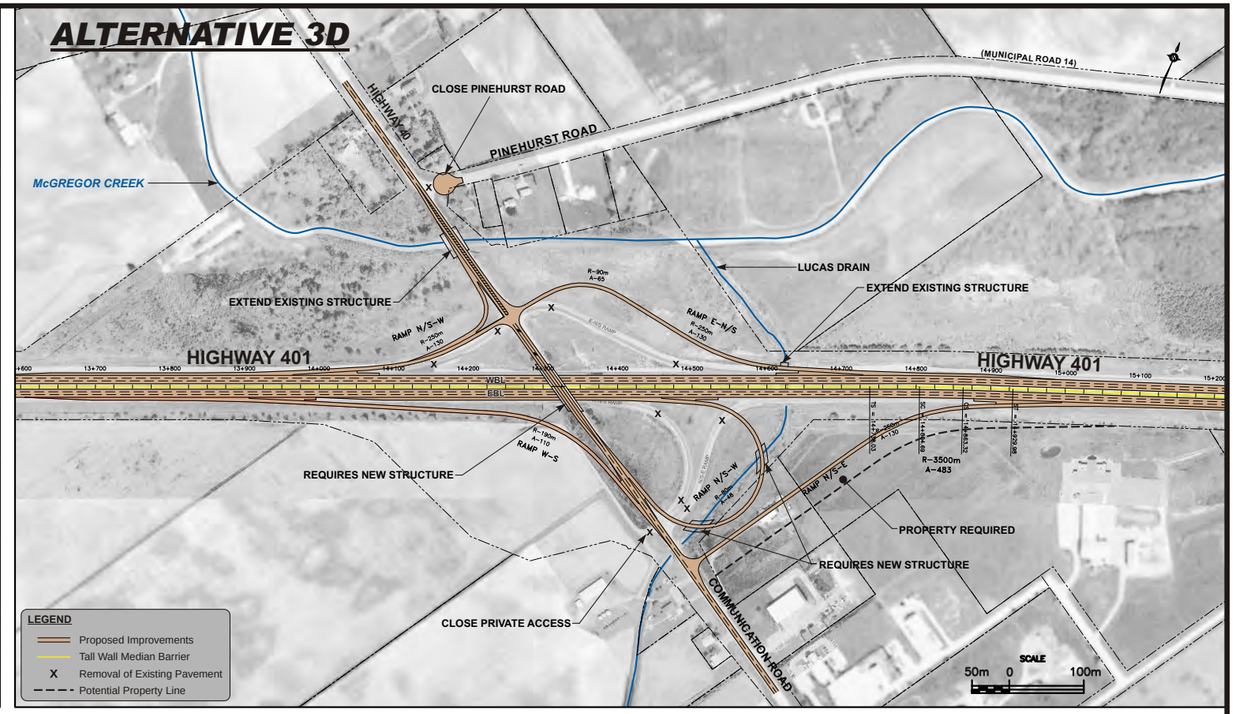


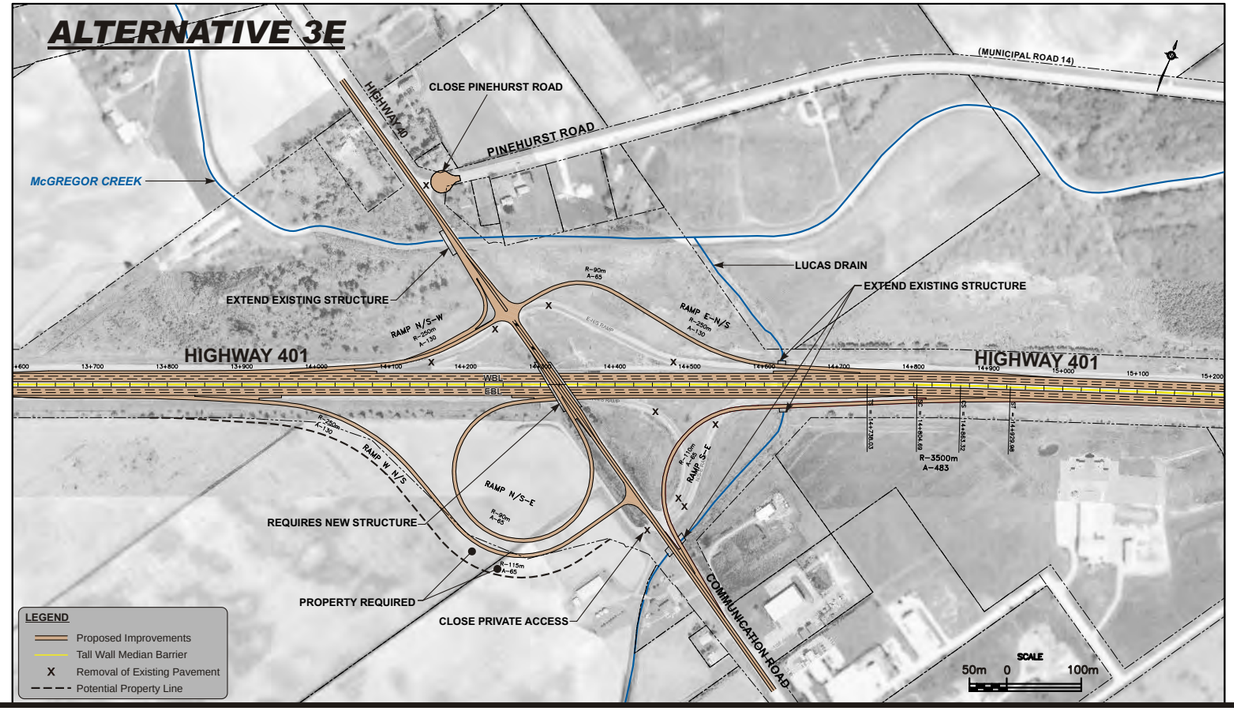
G.W.P. 80-00-00: Highway 401
from 0.9 km East of Essex Road 42 to Elgin County Boundary
Preliminary Design Study and Class EA

HIGHWAY 40 / COMMUNICATION ROAD INTERCHANGE ALTERNATIVES
(Part 1 of 2)

EXHIBIT
5-12a







G.W.P. 80-00-00: Highway 401
from 0.9 km East of Essex Road 42 to Elgin County Boundary
Preliminary Design Study and Class EA

HIGHWAY 40 / COMMUNICATION ROAD INTERCHANGE ALTERNATIVES
(Part 2 of 2)

EXHIBIT
5-12b

ANALYSIS & EVALUATION OF HIGHWAY 40 / COMMUNICATION ROAD INTERCHANGE ALTERNATIVES

Factor / Indicator	Do Nothing (maintained for comparison purposes)	Alternative 3A	Alternative 3B	Alternative 3C	Alternative 3D	Alternative 3E
Transportation						
Interchange design (geometrics, safety).	× Maintains Parclo B configuration on south side. × Maintains diamond configuration on north side.	✓ Provides Parclo A configuration.	× Provides a Parclo B configuration.	× Provides a diamond configuration.	× Provides a Parclo B configuration on the south side. × Maintains diamond configuration on the north side.	✓ Provides Parclo A configuration on the south side. × Maintains diamond configuration on the north side.
Future traffic operations.	× Requires traffic signals at both ramp terminals.	✓ Does not require traffic signals.	× Requires traffic signals at both ramp terminals.	× Requires traffic signals at both ramp terminals.	× Requires traffic signals at both ramp terminals.	× Requires traffic signals at both ramp terminals.
Continuity of local road network.	*Pinehurst Road is proposed to be closed to address concerns associated with the e•isting Highway 40 / Pinehurst Road intersection to the north ramp terminal. See alternate routes for Pinehurst Road.*					
Flexibility for staged construction	✓ Does not require construction staging.	× Requires complex construction staging.	× Requires complex construction staging/sequencing in the southeast quadrant. ✓ Simplifies construction staging/sequencing the northwest quadrant.	× Requires complex construction staging/sequencing	× Requires complex construction staging/sequencing.	× Requires complex construction staging/sequencing in the northwest quadrant. ✓ Simplifies construction staging/sequencing the southwest quadrant.
Structures						
Impacts to the existing highway underpass.	✓ Avoids impacts to the existing Highway 40 underpass. × The remaining service life is limited.	× Requires a replacement structure.	✓ Maintains the existing structure. × The remaining service life is limited.	× Requires a replacement structure.	× Requires a replacement structure	Requires a replacement structure.
Impacts to other structures / culverts within the vicinity of the interchange.	✓ Does not impact other structures / culverts.	× Requires widening of one structure. × Requires extension of one culvert.	× Requires widening of one structure.	× Requires widening of one structure. × Requires extension of one culvert.	× Requires widening of one structure. ×	Requires widening of one structure. Requires extension of two culverts.
Need for new structures / culverts within the vicinity of the interchange.	✓ Does not require new structures / culverts.	× Requires one new structure.	× Requires three new structures.	✓ Does not require new structures.	× Requires three new structures.	Requires one new structure.
Drainage						
Potential for storm water management options.	× Does not provide an opportunity for storm water management facilities to treat highway runoff.	✓ Provides an opportunity for storm water management facilities to treat highway runoff.	✓ Provides an opportunity for storm water management facilities to treat highway runoff.	✓ Provides an opportunity for storm water management facilities to treat highway runoff.	✓ Provides an opportunity for storm water management facilities to treat highway runoff.	✓ Provides an opportunity for storm water management facilities to treat highway runoff.
Impacts on interchange drainage, flow conveyance and flood water elevations	✓ Has no impact to the existing interchange drainage.	× Has the potential to impact flood elevations with the extension of the existing Highway 401 structure over the Lucas Drain, thus, may require larger extensions and/or headwalls / wingwalls.	× Has the potential to impact flood elevations with the extension of the existing Highway 401 structure over the Lucas Drain, thus, may require larger extensions and/or headwalls / wingwalls. × Requires filling of floodplain along the south side of McGregor Creek and the east side of the Lucas Drain.	× Has the potential to impact flood elevations with the extension of the existing Highway 401 structure over the Lucas Drain, thus, may require larger extensions and/or headwalls / wingwalls.	× Has the potential to impact flood elevations with the extension of the existing Highway 401 structure over the Lucas Drain, thus, may require larger extensions and/or headwalls / wingwalls. × Requires filling of floodplain along the south side of McGregor Creek and the east side of the Lucas Drain.	× Has the potential to impact flood elevations with the extension of the existing Highway 401 structure over the Lucas Drain, thus, may require larger extensions and/or headwalls / wingwalls. × Requires filling of floodplain along the south side of McGregor Creek and the east side of the Lucas Drain.
Impacts to culverts / need for new culverts.	✓ Has no impact to culverts.	× Requires widening of one structure. × Requires extension of one culvert.	× Requires widening of one structure. × Requires three new structures.	× Requires widening of one structure. × Requires extension of one culvert.	× Requires widening of one structure. × Requires three new structures.	× Requires widening of one structure. × Requires extension of two culverts. × Requires one new structure.
Natural Environment						
Impacts to fisheries habitat.	✓ Avoids impacts to the existing natural environment by maintaining the existing condition.	× Requires a new crossing of McGregor Creek for future N-W ramp ✓ Has minimal impact to fisheries habitat associated with McGregor Creek and the Lucas Drain.	× May require localized channel realignments of McGregor Creek and Lucas Drain associated with new crossings at oblique angles.	✓ Minimizes impacts to fisheries habitat by avoiding new crossings of McGregor Creek and the Lucas Drain.	× May require localized channel realignment of Lucas Drain associated with 2 new crossings at oblique angles.	✓ Minimizes impacts to fisheries habitat by avoiding new crossings of McGregor Creek and the Lucas Drain.
Impacts to tall grass prairie site (and rare plant species) in northeast quadrant.		× May impact tall grass prairie site on the north side of the existing E-N/S ramp.	× Minimizes impact to tall grass prairie site on the north side of the existing E-N/S ramp.	× May impact tall grass prairie site on the north side of the existing E-N/S ramp.	× May impact tall grass prairie site on the north side of the existing E-N/S ramp.	× May impact tall grass prairie site on the north side of the existing E-N/S ramp.
Impacts to riparian/ woodland area in northwest quadrant.		× Impacts the woodland in the northwest quadrant.	× Has the greatest impact on the woodland in the northwest quadrant, fragmenting it, as well as removing the most wooded vegetation.	✓ Avoids impacts to the woodland in the northwest quadrant.	✓ Avoids impacts to the woodland in the northwest quadrant.	✓ Avoids impacts to the woodland in the northwest quadrant.
Impacts to wildlife.		× May have minor impacts.	× Has the greatest impact on potential wildlife habitat and movement opportunities (due to woodland impacts).	✓ Minimizes impacts on potential wildlife habitat and movement opportunities (by avoiding woodland impacts).	✓ Minimizes impacts on potential wildlife habitat and movement opportunities (by avoiding woodland impacts).	✓ Minimizes impacts on potential wildlife habitat and movement opportunities (by avoiding woodland impacts).

✓ *There are no significant wetlands within the study area*

Factor / Indicator	Do Nothing (maintained for comparison purposes)	Alternative 3A	Alternative 3B	Alternative 3C	Alternative 3D	Alternative 3E
Socio-Economic Environment						
Property acquisition.	✓ Does not require property outside highway right-of-way.	× Has minor property impacts (1.3 ha).	× Has minor property impacts (2.4 ha).	✓ Avoids property requirements.	× Has minor property impacts (1.3 ha).	× Has minor property impacts (1.3 ha).
Impacts to residences.	✓ Does not displace any existing residences.	✓ Does not displace any existing residences.	✓ Does not displace any existing residences.	✓ Does not displace any existing residences.	✓ Does not displace any existing residences.	✓ Does not displace any existing residences.
Impacts to businesses.	✓ Does not displace any existing businesses.	✓ Does not displace any existing businesses.	× Displaces one business in the southeast quadrant of the interchange.	✓ Does not displace any existing businesses.	× Displaces one business in the southwest quadrant of the interchange.	✓ Does not displace any existing businesses.
Impacts to agricultural lands.	✓ Avoids impacts to agricultural lands.	× Has minor impact to agricultural lands, most of which is located on MTO property.	✓ Avoids impacts to agricultural lands.	× Has minor impact to agricultural lands, most of which is located on MTO property.	✓ Avoids impacts to agricultural lands.	✓ Has minor impact to agricultural lands, most of which is located on MTO property.
Impacts to existing utilities.	✓ Does not impact existing utilities.	× Has minor impact to Bell facilities located along the north side of the highway right-of-way and west side of Highway 40.	× Has minor impact to Bell facilities located along the north side of the highway right-of-way and west side of Highway 40.	× Has minor impact to Bell facilities located along the north side of the highway right-of-way and west side of Highway 40.	× Has minor impact to Bell facilities located along the north side of the highway right-of-way and west side of Highway 40.	× Has minor impact to Bell facilities located along the north side of the highway right-of-way and west side of Highway 40.
Potential noise impacts.	✓ Does not increase future noise levels.	× Has potential noise level increase at six residential houses. ✓ These impacts are expected to be minor since traffic noise from Highway 401 will continue to be the dominant noise source.	× Has potential noise level increase at six residential houses. ✓ These impacts are expected to be minor since traffic noise from Highway 401 will continue to be the dominant noise source.	✓ Has potential noise level decrease at two residential houses located in the southwest quadrant of the interchange. × Has potential noise level increase at four residential houses. ✓ These impacts are expected to be minor since traffic noise from Highway 401 will continue to be the dominant noise source.	× Has potential noise level increase at six residential houses located in the southwest quadrant of the interchange. ✓ These impacts are expected to be minor since traffic noise from Highway 401 will continue to be the dominant noise source.	× Has potential noise level increase at six residential houses. These impacts are expected to be minor since traffic noise from ✓ Highway 401 will continue to be the dominant noise source.
Site Contamination impacts.	✓ Does not have any impacts.	✓ No significant impacts are anticipated.	✓ No significant impacts are anticipated.	✓ No significant impacts are anticipated.	✓ No significant impacts are anticipated.	✓ No significant impacts are anticipated.

- *Alternate routes for the closure of Pinehurst Road are being reviewed separately from this analysis / evaluation. See alternate routes.*
- *Any new development or re-development (change in land use) of properties along Chatham-Kent Road 11 (Communications Road), south of Highway 401, between the interchange ramps and Horton Line, must obtain access from Horton Line. No new or upgraded access connections for development of lands will be available from Chatham-Kent 11 (Communications Road)*

Cultural Environment						
Impacts to the cultural heritage landscape.	✓ Avoids impacts to archaeological, built heritage and cultural landscape resources.	× Increases potential impacts cultural landscape due to property requirement outside of the highway right-of-way.	× Increases potential impacts cultural landscape due to property requirement outside of the highway right-of-way.	✓ Minimizes potential impacts cultural landscape due to property requirement adjacent to the right-of-way.	✓ Increases potential impacts cultural landscape due to property requirement outside of the highway right-of-way.	✓ Increases potential impacts cultural landscape due to property requirement outside of the highway right-of-way.
Archaeological impacts.		✓ Increases potential impacts to archaeological resources due to the property requirements outside of highway right-of-way.	✓ Increases potential impacts to archaeological resources due to the property requirements outside of highway right-of-way.	✓ Increases potential impacts to archaeological resources due to the property requirements outside of highway right-of-way.	× Minimizes potential impacts to archaeological resources, as proposed improvements can be accommodated within MTO property.	✓ Increases potential impacts to archaeological resources due to the property requirements outside of highway right-of-way.
Direct impacts to the existing Highway 401 underpass.		× Impacts the existing Highway 401 underpass.	× Impacts the existing Highway 401 underpass. Although the existing structure can accommodate improvements associated with Alternative 3B, the remaining service life of the existing structure is limited and the vertical clearance is deficient by current MTO design standards.	× Impacts the existing Highway 401 underpass.	× Impacts the existing Highway 401 underpass.	× Impacts the existing Highway 401 underpass.
Preliminary Cost Estimate						
Construction cost	✓ Rehabilitate structures as required and replace at end of lifespan.	✓ Has similar construction costs in comparison to Alternative 3B.	✓ Has lowest construction costs.	× Has higher construction costs in comparison to Alternative 3B.	× Has highest construction costs.	✓ Has similar construction costs in comparison to Alternative 3B.
Property cost.	✓ Has no property cost.	× Has property cost in the southwest quadrant of the interchange.	× Has property cost in the northwest quadrant and southwest quadrant of the interchange. × Requires displacement of one business in the southwest quadrant of the interchange.	✓ Has no property cost.	× Has property cost in the southwest quadrant of the interchange. × Requires displacement of one business in the southwest quadrant of the interchange.	× Has property cost in the southwest quadrant of the interchange.
OVERALL - HIGHWAY 40 INTERCHANGE ALTERNATIVES	*OVERALL ASSESSMENT IS NOT INCLUDED, AS 'DO NOTHING' DOES NOT IMPROVE THE ISSUES ASSOCIATED WITH THE EXISTING INTERCHANGE.*					

MOST PREFERRED **PREFERRED** **NOT PREFERRED**

G.W.P. 80-00-00: Highway 401
from 0.9 km East of Essex Road 42 to Elgin County Boundary
Preliminary Design Study and Class EA

ANALYSIS & EVALUATION OF HIGHWAY 40 / COMMUNICATION ROAD INTERCHANGE ALTERNATIVES

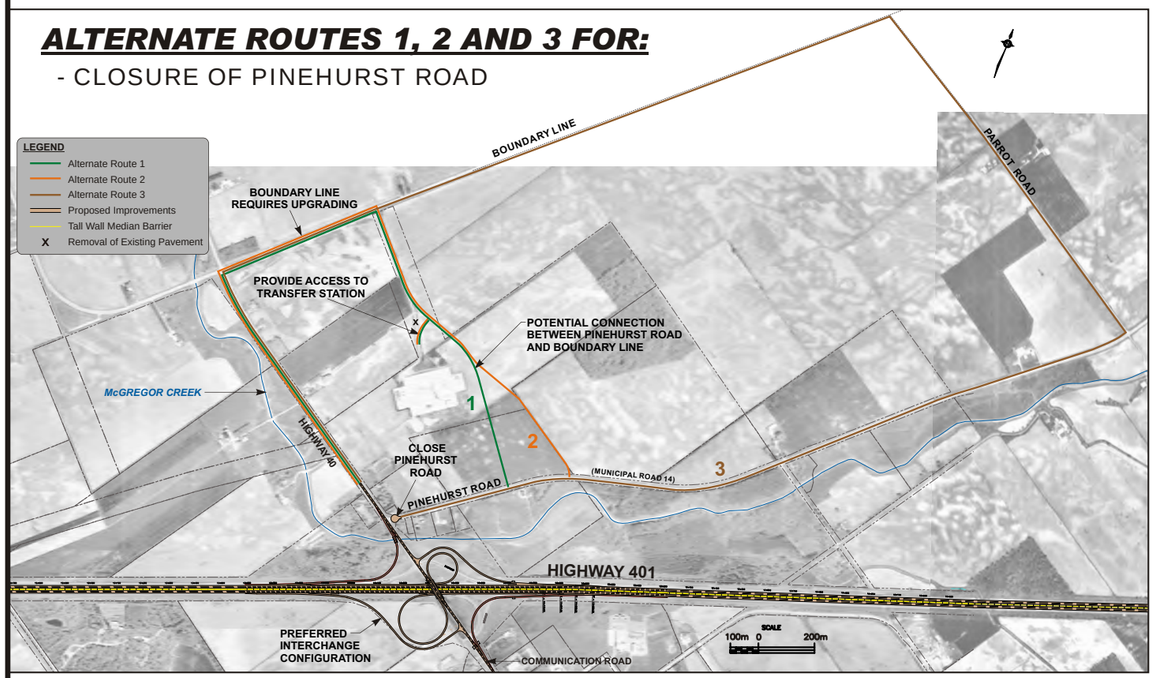
EXHIBIT 5-13

ANALYSIS & EVALUATION OF ALTERNATE ROUTES FOR PINEHURST ROAD ALTERNATE ROUTES

Factor / Indicator	Alternate Route 1	Alternate Route 2	Alternate Route 3
Transportation			
Existing and future traffic operations (traffic volumes and road capacity)	✓ Protects existing and future traffic operations at interchange by closing Pinehurst Road at Highway 40.	✓ Protects existing and future traffic operations at interchange by closing Pinehurst Road at Highway 40.	✓ Protects existing and future traffic operations at interchange by closing Pinehurst Road at Highway 40.
Access management	✓ Achieves MTO standard for access management of 800 m desirable distance from ramp terminal. ✓ Improves safety and better integrates MTO objectives at interchange.	✓ Achieves MTO standard for access management of 800 m desirable distance from ramp terminal. ✓ Improves safety and better integrates MTO objectives at interchange.	✓ Achieves MTO standard for access management of 800 m desirable distance from ramp terminal. ✓ Improves safety and better integrates MTO objectives at interchange.
Road network to be used	✗ Changes existing road network by providing new connection between Pinehurst Road and Boundary Line.	✗ Changes existing road network by providing new connection between Pinehurst Road and Boundary Line.	✓ Utilizes existing road network.
Geometrics	✓ Meets current design standard.	✓ Meets current design standard.	✓ Meets current design standard.
Length of new road required	✗ Requires 0.9 km of new road and 1.0 km of upgrades to existing road.	✗ Requires 0.96 km of new road and 1.0 km of upgrades to existing road.	✗ May require 7.3 km of road upgrades.
Continuity of local road network	✓ Minimizes disruption to road network and road users by providing new connection.	✓ Minimizes disruption to road network and road users by providing new connection.	✗ Greatest disruption to road network and road users.
Out-of-way travel	✓ Has lower out-of-way travel for residents on Pinehurst Road near Highway 40. ✗ Results in 3 to 4 minutes out-of-way travel time.	✓ Has lower out-of-way travel for residents on Pinehurst Road near Highway 40.	✗ Results in significant out-of-way travel for residents on Pinehurst Road near Highway 40. ✗ Results in 6 to 9 minutes out-of-way travel time.
Structures *(not a determining factor)*			
Need for new structures/impacts to existing structures	✓ Does not require new structures. ✓ Does not impact any existing structures.	✓ Does not require new structures. ✓ Does not impact any existing structures.	✓ Does not require new structures. ✓ Does not impact any existing structures.
Natural Environment			
Impacts to watercourses, including fisheries and aquatic habitat, wetlands, vegetation and wildlife	✗ Improvements at Boundary Line and Highway 40 will impact low area west of intersection. ✗ Improvements to Boundary Line must avoid municipal drain along north and south side of Boundary Line. ✓ Minimizes impacts to existing natural environment by using previously disturbed land.	✗ Improvements at Boundary Line and Highway 40 will impact low area west of intersection. ✗ Improvements to Boundary Line must avoid municipal drain along north and south side of Boundary Line. ✓ Minimizes impacts to existing natural environment by using previously disturbed land.	✗ Improvements at Boundary Line and Highway 40 will impact low area west of intersection. ✗ Improvements to Boundary Line must avoid municipal drain along north and south side of Boundary Line. ✓ Avoids impacts to existing natural environment by using existing road network.
Socio-Economic Environment			
Property access	✓ Maintains access to properties on Pinehurst Road.	✓ Maintains access to properties on Pinehurst Road.	✓ Maintains access to properties on Pinehurst Road.
Property acquisition	✗ Requires 2.6 ha of private property (30 m right-of-way).	✗ Requires 2.9 ha of private property (30 m right-of-way).	✓ Does not require acquisition of private property.
Impact on emergency service response times	✓ Minimizes impacts to emergency service response times compared to Alternate Route 3.	✓ Minimizes impacts to emergency service response times as compared to Alternate Route 1.	✗ Increases emergency service response times compared to Alternate Routes 1 and 2.
Impact on residential properties	✓ Does not displace residential houses.	✓ Does not displace residential houses.	✓ Does not displace residential houses.
Impact on commercial and industrial operations	✗ Requires out-of-way travel for travelling between Highway 40 and Pinehurst Road.	✗ Requires out-of-way travel for travelling between Highway 40 and Pinehurst Road.	✗ Requires out-of-way travel for travelling between Highway 40 and Pinehurst Road.
Agricultural resources	✗ Increases impact to agricultural land and drainage infrastructure.	✓ Minimizes impact to agricultural land and drainage infrastructure.	✓ Avoids impacts to agricultural land and drainage infrastructure.
Impact on land parcels	✗ Increases impact to land parcels as new route does not follow existing property lines.	✓ Minimizes impact to land parcels as new route follows e•isting property lines, as compared to Alternate Route 1.	✓ Avoids impacts to land parcels.
Utility facilities (impacts to transformer station requires discussions with Hydro One)	✓ Avoids direct impact to utilities. ✗ Requires realignment of entrance to Hydro One facility.	✓ Avoids direct impact to utilities. ✗ Requires realignment of entrance to Hydro One facility.	✓ Does not impact utilities.
Cultural Environment			
Direct impacts to archaeological resources	✓ Minimizes potential impacts to archaeological resources due to existing agricultural disturbance.	✓ Minimizes potential impacts to archaeological resources due to existing agricultural disturbance.	✓ Avoids impacts to archaeological resources.
Direct impacts to built heritage/cultural landscape resources	✗ Impacts cultural landscape due to property requirements and closure of Pinehurst Road at Highway 40.	✗ Impacts cultural landscape due to property requirements and closure of Pinehurst Road at Highway 40.	✗ Impacts cultural landscape due to closure of Pinehurst Road at Highway 40.
Preliminary Cost Estimate			
Construction cost	✓ Lowest construction costs compared to Alternate Routes 2 and 3.	✓ Lower construction costs than Alternate Route 3.	✗ Greater construction costs than Alternate Routes 1 and 2.
Property cost	✗ Similar property costs to Alternate Route 2 (2.6 ha).	✗ Similar property costs to Alternate Route 1 (2.9 ha).	✓ Has no property costs.
OVERALL - ALTERNATE ROUTES FOR CLOSURE OF PINEHURST ROAD			

ALTERNATE ROUTES 1, 2 AND 3 FOR:

- CLOSURE OF PINEHURST ROAD



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from 0.9 km East of Essex Road 42 to Elgin County Boundary
Preliminary Design Study and Class EA

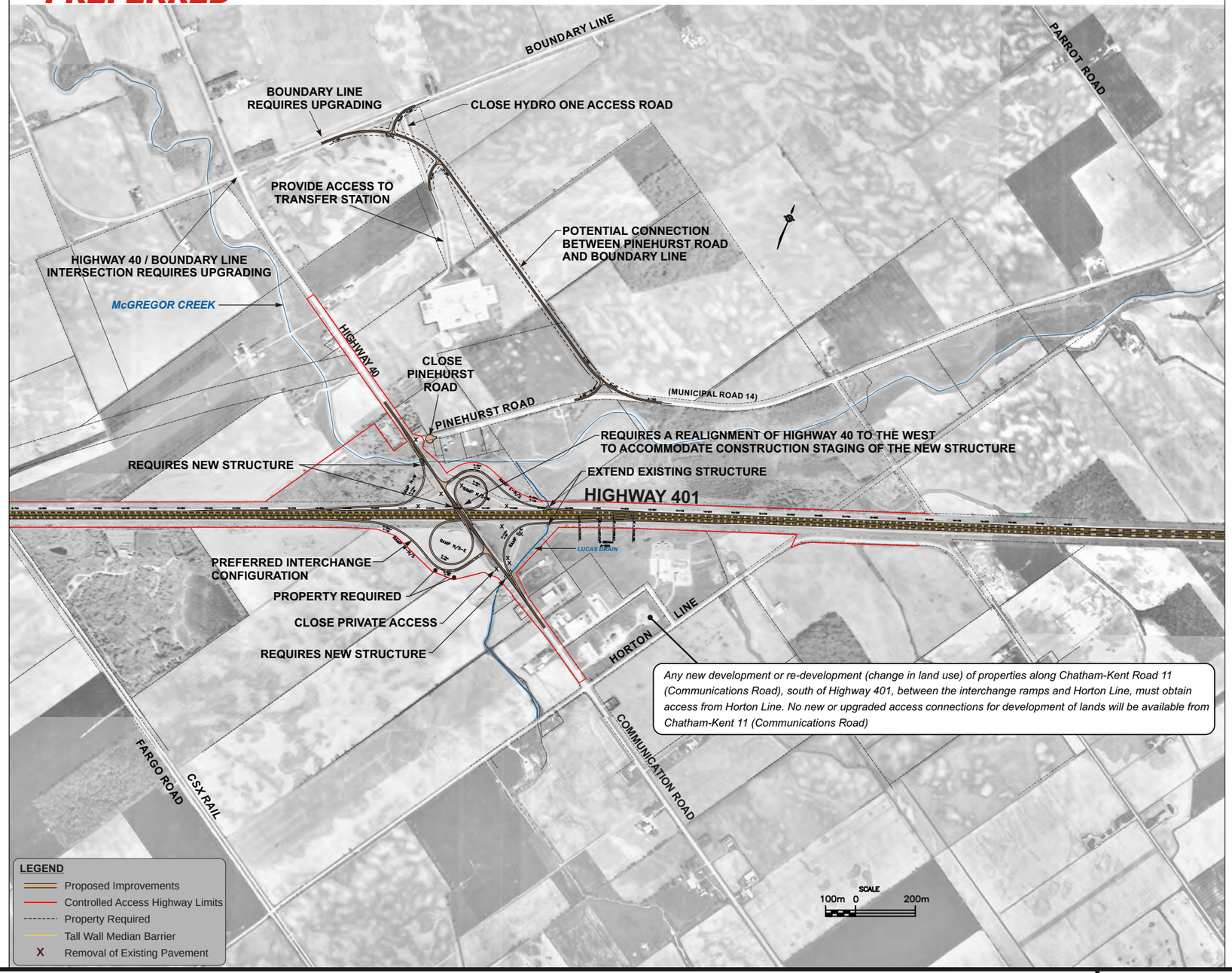
PINEHURST ROAD
ALTERNATE ROUTES /
ANALYSIS & EVALUATION

EXHIBIT
5-14

INTERCHANGE ALTERNATIVE 3A

- WITH ALTERNATE ROUTE 2 FOR CLOSURE OF PINEHURST ROAD

PREFERRED



G.W.P. 80-00-00: Highway 401
from 0.9 km East of Essex Road 42 to Elgin County Boundary
Preliminary Design Study and Class EA

HIGHWAY 40 / COMMUNICATION ROAD INTERCHANGE - PREFERRED PLAN

EXHIBIT
5-15

KENT BRIDGE ROAD
INTERCHANGE

5.4.10 Kent Bridge Road Interchange - Alternatives and Evaluation

The existing conditions and the interchange alternatives for the Kent Bridge Road interchange are shown in **Exhibit 5-16**. Three interchange alternatives were considered for this location.

Based on the analysis and evaluation undertaken in **Exhibit 5-17**, Alternative 4A is preferred over the other interchange alternatives for the following reasons:

- Maintains a Parclo A interchange configuration;
- Requires the least amount of private property; and
- Minimizes impacts to agricultural lands.

5.4.11 Beechwood Line - Alternative Routes and Closure Evaluation

Beechwood Line at Kent Bridge Road is protected for future closure to address concerns related to its close proximity to the south ramp terminal of the interchange. Alternate Routes 1 and 2 are shown in **Exhibit 5-18**.

Based on the analysis and evaluation undertaken in **Exhibit 5-18**, Alternate Route 1 is preferred over Alternate Route 2 for the following reasons:

- Minimizes disruption to road network and road users by providing new connection;
- Avoids out-of-way travel time and distance; and
- No anticipated impacts to emergency service response times.

Future closure of Beechwood Line is dependent on the following:

- Future development in the area;
- An increase in traffic volumes triggering the need for closure; or
- Traffic operational concerns determined by MTO in order to protect the safety and efficiency of future operations at the interchange.

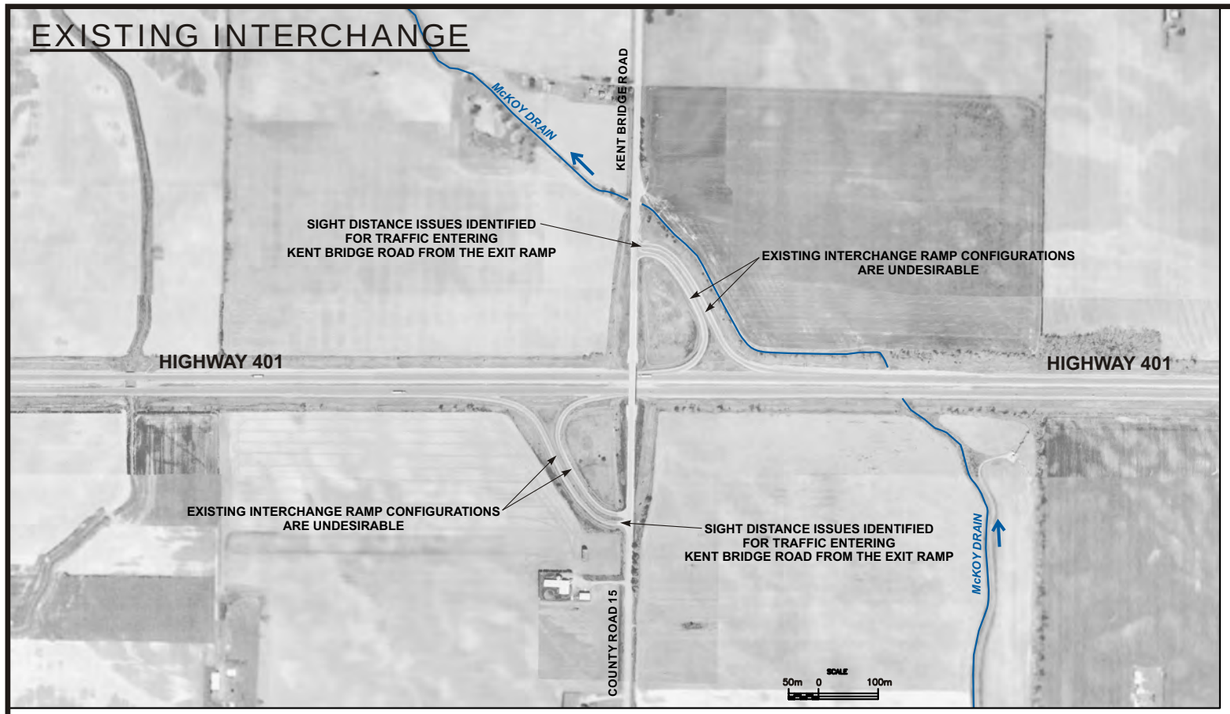
Although Beechwood Line will continue to connect to Kent Bridge Road as part of the initial improvements identified in this study, MTO will monitor the Kent Bridge Road interchange to determine if the above conditions warrant a future closure of Beechwood Line and the construction of a new road to connect Beechwood Line to the intersection of Kent Bridge Road and Burk Line.

5.4.12 Kent Bridge Road Interchange – Preferred Plan

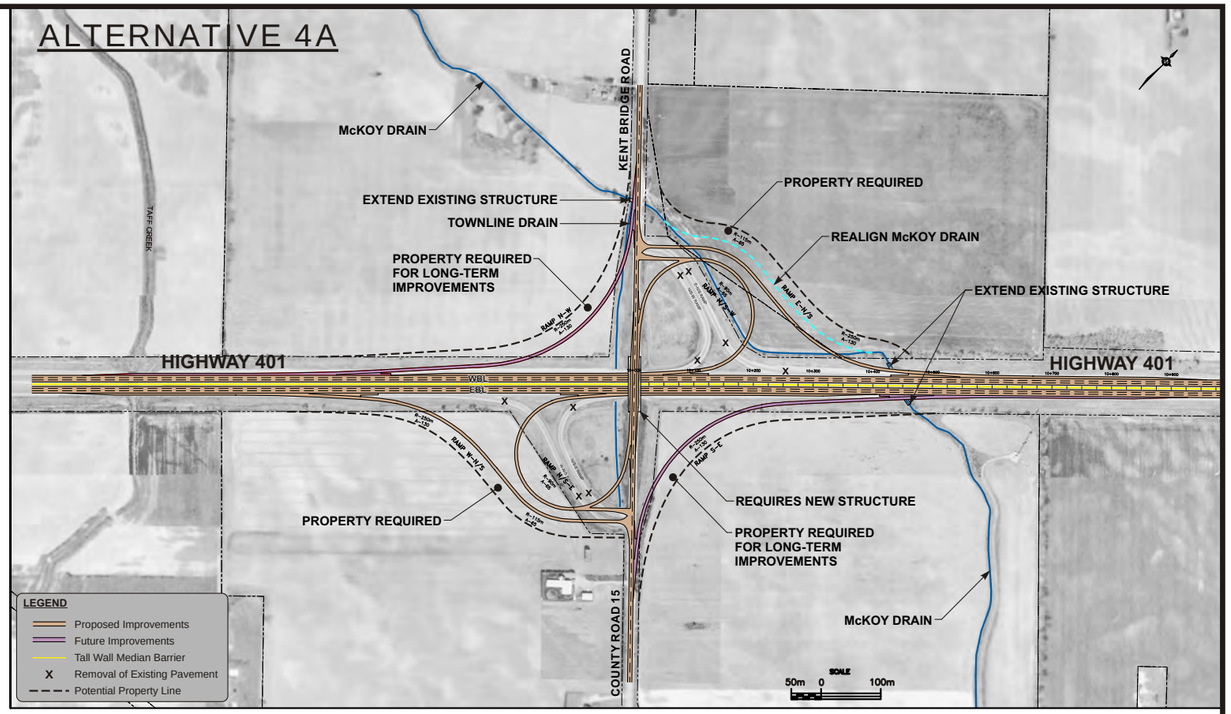
The preferred plan for the Kent Bridge Road interchange is shown on **Exhibit 5-19.** The preferred plan involves the following:

- Parclo A interchange configuration;
- Protection for the future closure of Beechwood Line at Kent Bridge Road, which is dependent on future development in the area, an increase in traffic volumes triggering the need for future closure, or traffic operational concerns determined by MTO to protect the safety and efficiency of future operations at the interchange; and
- Protection for future construction of a new road connecting Beechwood Line to Kent Bridge Road should closure of the existing Beechwood Line connection to Kent Bridge Road be warranted for closure.

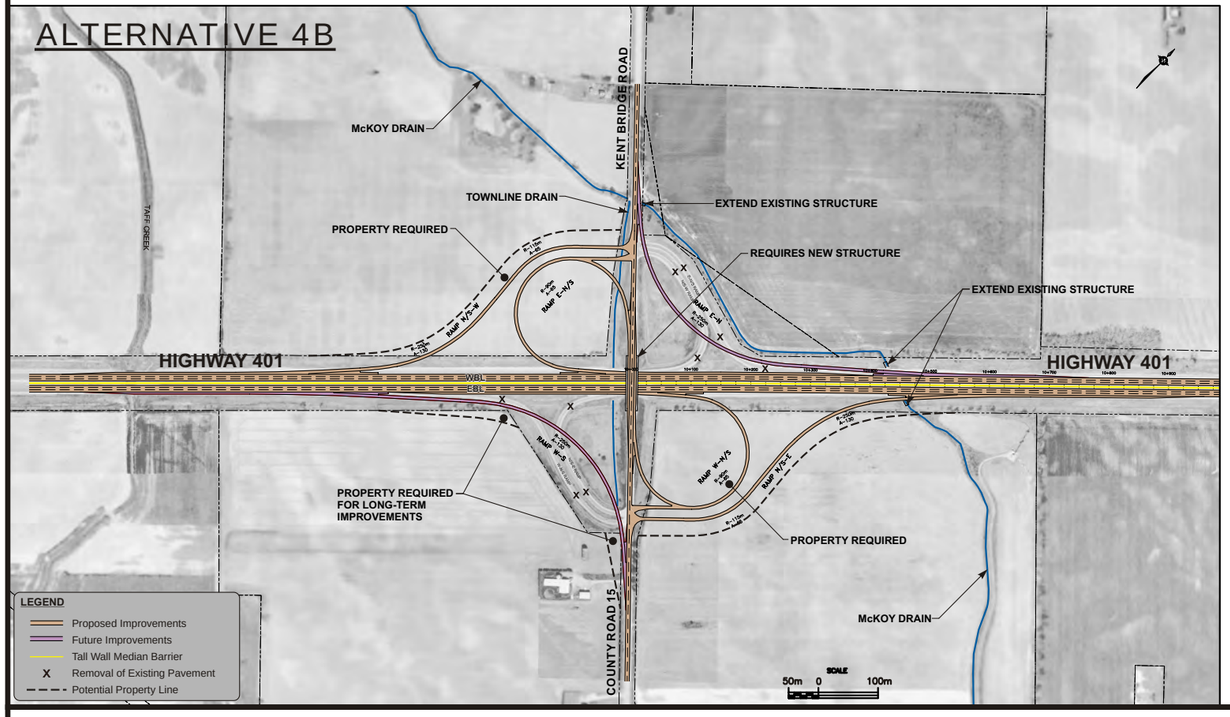
EXISTING INTERCHANGE



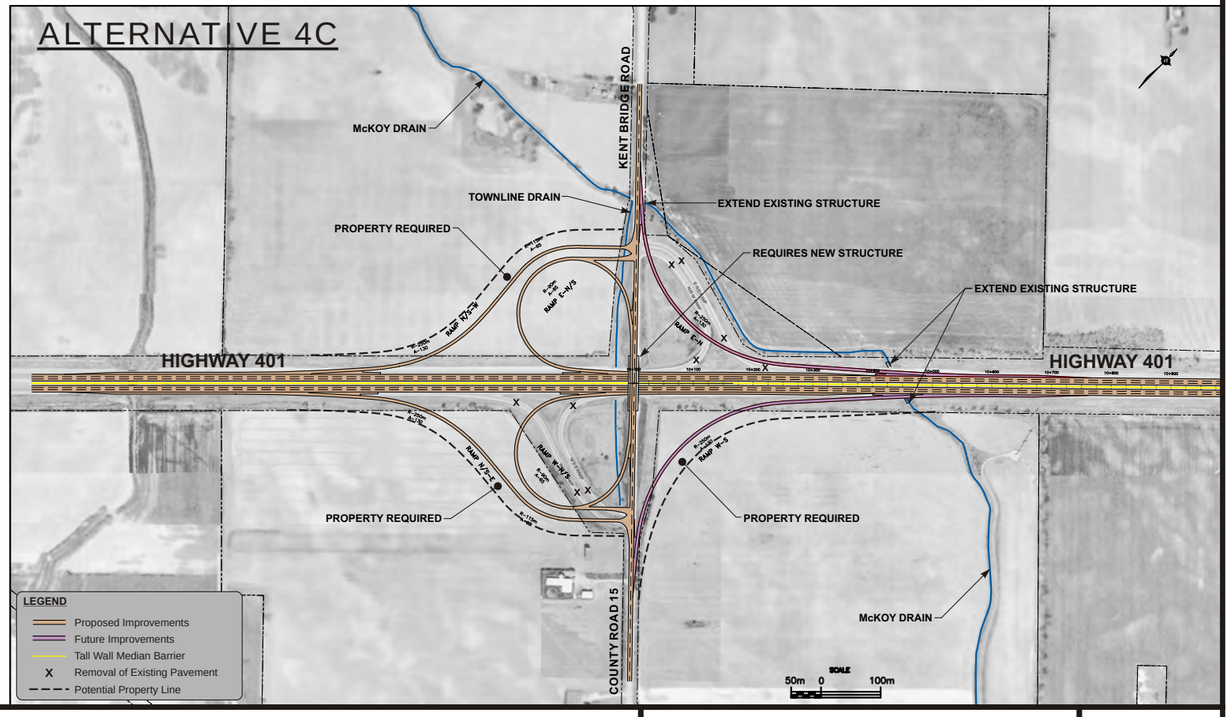
ALTERNATIVE 4A



ALTERNATIVE 4B



ALTERNATIVE 4C



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KENT BRIDGE ROAD INTERCHANGE ALTERNATIVES

EXHIBIT 5-16

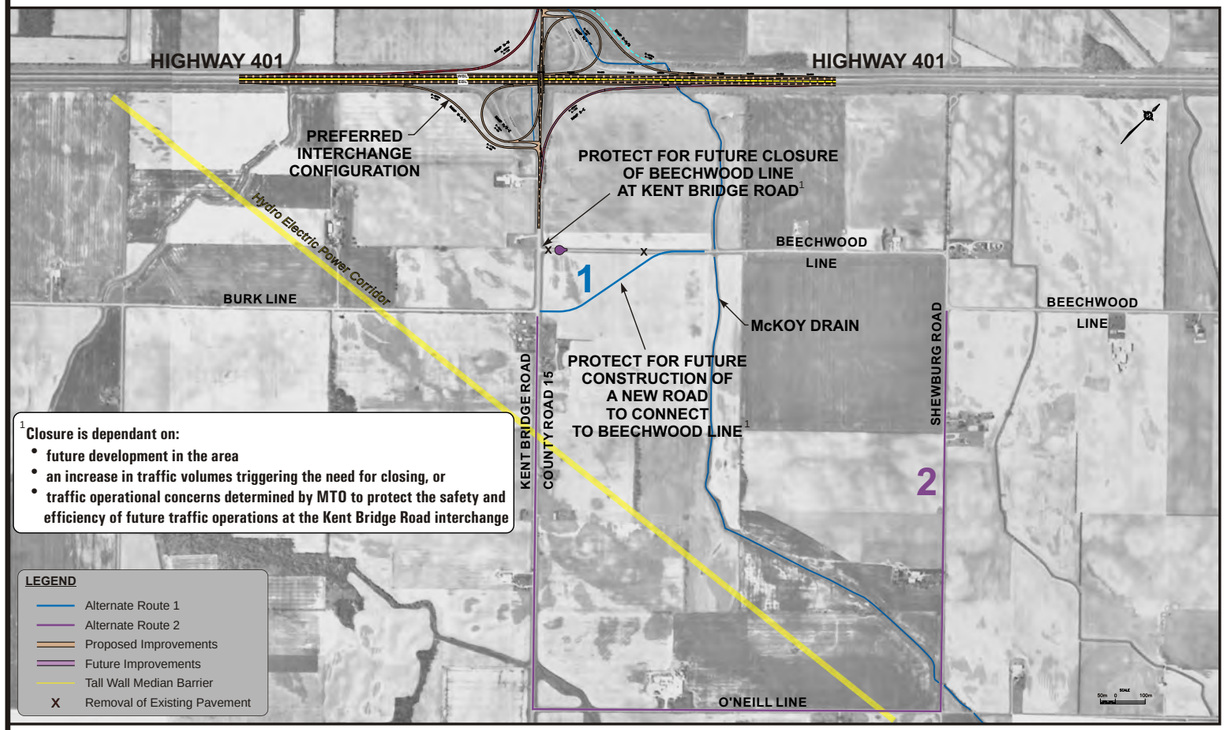
ANALYSIS & EVALUATION OF KENT BRIDGE ROAD INTERCHANGE ALTERNATIVES

Factor / Indicator	Do Nothing (maintained for comparison purposes)	Alternative 4A	Alternative 4B	Alternative 4C
Transportation				
Interchange design (geometrics, safety).	✓ Maintains Parclo A configuration. × Does not improve horizontal curves and speed change lanes at the interchange ramps, which are undesirable.	✓ Maintains Parclo A configuration ✓ Improves interchange ramps	× Provides a Parclo B configuration ✓ Improves interchange ramps	× Provides a Parclo A-B configuration ✓ Improves interchange ramps
Future traffic operations.	✓ Provides acceptable future traffic operations.	✓ Provides acceptable future traffic operations.	✓ Provides acceptable future traffic operations.	✓ Provides acceptable future traffic operations.
Continuity of local road network.	× Has access management concern associated with Beechwood Line connecting to Kent Bridge Road.	✓ *Beechwood Line is protected for future closure at Kent Bridge Road, which is dependent on:* *- Future development in the area,* *- An increase in traffic volumes triggering the need for future closure, or* *- Traffic operational concerns determined by MTO to protect the safety and efficiency of future operations at these interchange.* *See alternate routes for Beechwood Line.*		
Flexibility for staged construction.	✓ Does not require construction.	× Requires complex construction staging/sequencing in the northeast and southwest quadrants.	✓ Simplifies construction staging/sequencing, as the new ramps are located in the opposite quadrants of the existing ramps.	× Requires complex construction staging/sequencing in the southwest quadrant, however, simplifies construction staging/sequencing the northwest quadrant.
Structures				
Impacts to the existing highway underpass.	✓ Avoids impacts to the existing Highway 401 / Kent Bridge Road underpass.	× Requires replacement structure for the Highway 401 / Kent Bridge Road underpass. × May be possible to widen existing structure if the interchange is reconstructed in the near future.	× Requires replacement structure for the Highway 401 / Kent Bridge Road underpass. × May be possible to widen existing structure if the interchange is reconstructed in the near future.	× Requires replacement structure for the Highway 401 / Kent Bridge Road underpass. × May be possible to widen existing structure if the interchange is reconstructed in the near future.
Impacts to other structures / culverts within the vicinity of the interchange.	✓ Does not impact other structures / culverts.	× Requires widening of two culverts.	× Requires widening of two culverts.	× Requires widening of two culverts.
Need for new structures / culverts within the vicinity of the interchange.	✓ Does not require new structures / culverts.	✓ Requires extension of one culvert. Requires three new ramp culverts.	✓ Requires extension of one culvert. Requires three new ramp culverts.	✓ Requires three new ramp culverts.
Drainage				
Potential for storm water management options.	× Does not provide an opportunity for storm water management facilities to treat highway runoff.	✓ Provides an opportunity for storm water management facilities to treat highway runoff.	✓ Provides an opportunity for storm water management facilities to treat highway runoff.	✓ Provides an opportunity for storm water management facilities to treat highway runoff.
Impacts on interchange drainage, flow conveyance and flood water elevations	✓ Has no impact to the existing interchange drainage.	× Requires realignment of McKoy Drain in the northeast quadrant.	× Minimizes impacts to the McKoy Drain.	× Minimizes impacts to the McKoy Drain.
Natural Environment				
Impacts to fisheries habitat.	✓ Avoids impacts to the existing natural environment.	× Requires the realignment of McKoy Drain in the northeast quadrant. × Requires localized alteration of possible fish habitat associated with the construction of three new ramp culverts for the Townline Drain, and the extension of Highway 401 over the McKoy Drain.	✓ Avoids realignment of the McKoy Drain × Requires local alteration of fish habitat associated with the construction of three new ramp culverts for the Townline Drain, and the extension of Highway 401 over the McKoy Drain.	✓ Avoids realignment of the McKoy Drain × Requires local alteration of fish habitat associated with the construction of three new ramp culverts for the Townline Drain.
Impacts to natural environment outside of the highway right-of-way (e.g. riparian vegetation).		× May result in impacts to wildlife habitat due to the removal of vegetation along the realignment section of the McKoy Drain.	✓ No impacts anticipated.	✓ No impacts anticipated.
Limited vegetation cover of tolerant species and low botanical diversity as most of the interchange area is currently agricultural lands.				
There are no significant wetlands within the study area.				
Limited wildlife habitat or movement potential.				

Factor / Indicator	Do Nothing (maintained for comparison purposes)	Alternative 4A	Alternative 4B	Alternative 4C
Socio-Economic Environment				
Property acquisition.	✓ Does not require property outside highway right-of-way.	× Requires property in the northeast quadrant (2.9 ha), and property in the southwest quadrant (2.8 ha).	× Requires property in the northwest quadrant (4.9 ha), and property in the southeast quadrant (5.0 ha).	× Requires property in the northwest quadrant (4.9 ha), and property in the southwest quadrant (2.7 ha).
Impacts to residences.	✓ Does not displace existing residences.	✓ Does not displace existing residences.	✓ Does not displace existing residences.	✓ Does not displace existing residences.
There are no existing businesses in the immediate vicinity of the interchange.				
Impacts to agricultural lands.	✓ Does not impact agricultural lands.	✓ Minimizes impacts to agricultural lands in comparison to Alternative 4B and 4C.	× Has the greatest impact to agricultural lands.	× Has greater impacts to agricultural lands compared to Alternative 4A, but fewer impacts compared to Alternative 4B.
Impacts to existing utilities.	✓ Does not impact existing utilities.	× Minor impact to Bell facilities located along the north side of the highway right-of-way and east side of Kent Bridge Road.	× Minor impact to Bell facilities located along the north side of the highway right-of-way and east side of Kent Bridge Road.	× Minor impact to Bell facilities located along the north side of the highway right-of-way and east side of Kent Bridge Road.
Potential noise impacts.	✓ Does not increase future noise levels.	× Potential noise increase at two residential houses located in the southwest quadrant.	✓ Potential noise decrease at two residential properties in the southwest quadrant, × Potential noise level increase at one residential house located in the northwest quadrant.	× Potential noise increase at two residential houses located in the southwest quadrant and at one residential house in the northwest quadrant.
Site Contamination impacts.	✓ Does not have site contamination impacts.	✓ No signficant impacts are anticipated.	✓ No signficant impacts are anticipated.	✓ No signficant impacts are anticipated.
Cultural Environment				
Impacts to the cultural heritage landscape.	✓ Avoids impacts to archaeological, built heritage and cultural landscape resources.	× Increases potential impacts cultural landscape due to property requirement adjacent to the right-of-way.	× Increases potential impacts cultural landscape due to property requirement adjacent to the right-of-way.	× Increases potential impacts cultural landscape due to property requirement adjacent to the right-of-way.
Archaeological impacts.		× Increases potential impacts to archaeological resources due to the property requirements adjacent to the right-of-way.	× Increases potential impacts to archaeological resources due to the property requirements adjacent to the right-of-way.	× Increases potential impacts to archaeological resources due to the property requirements adjacent to the right-of-way.
Direct impacts to the existing Highway 401 underpass.		× Impacts the existing Highway 401 underpass.	× Impacts the existing Highway 401 underpass.	× Impacts the existing Highway 401 underpass.
Preliminary Cost Estimate				
Construction cost (construction costs are approximate and are used for comparison purposes only – to be reviewed and confirmed).	✓ Rehabilitate structures as required and replace at end of lifespan.	× Has similar construction costs in comparison to Alternatives 4B and 4C.	× Has similar construction costs in comparison to Alternatives 4A and 4.	× Has similar construction costs in comparison to Alternatives 4A and 4B.
Property cost.	✓ Has no property cost.	× Has property cost.	× Has property cost.	× Has property cost.
OVERALL – KENT BRIDGE ROAD INTERCHANGE ALTERNATIVES	*OVERALL ASSESSMENT IS NOT INCLUDED, AS 'DO NOTHING' DOES NOT IMPROVE THE ISSUES ASSOCIATED WITH THE EXISTING INTERCHANGE.*			

MOST PREFERRED **PREFERRED** **NOT PREFERRED**

EVALUATION OF ALTERNATE ROUTES FOR CLOSURE OF BEECHWOOD LINE



Factor / Indicator	Alternate Route 1	Alternate Route 2
Transportation		
Existing and future traffic operations (traffic volumes and road capacity)	✓ Protects existing and future traffic operations at interchange by closing Beechwood Line at Kent Bridge Road.	✓ Protects existing and future traffic operations at interchange by closing Beechwood Line at Kent Bridge Road.
Access management	✓ Maximizes distance between south ramp terminal and next intersection on Kent Bridge Road (i.e. Burk Line). ✓ Improves safety and better integrates MTO objectives at interchange.	✓ Maximizes distance between south ramp terminal and next intersection on Kent Bridge Road (i.e. Burk Line). ✓ Improves safety and better integrates MTO objectives at interchange.
Geometrics	✓ Meets current design standard.	✓ Meets current design standards.
Length of new road required	× Requires approximately 0.65 km of new road.	✓ Does not require construction of new roadway.
Continuity of local road network	✓ Minimizes disruption to road network and road users by providing new connection.	× Disrupts access to residences and properties on Beechwood Line.
Out-of-way travel	✓ Avoids out-of-way travel time.	× Results in out-of-way travel for motorists travelling from Beechwood Line/Shewburg Road to the Highway 401/Kent Bridge Road interchange. × Results in 4 to 5 minutes of out-of-way travel time.
Structures *(not a determining factor)*		
Need for new structures/impacts to existing structures	✓ Does not require new structures. ✓ Does not impact any existing structures.	✓ Does not require new structures. ✓ Does not impact any existing structures.
Natural Environment		
Impacts to watercourses, including fisheries and aquatic habitat, wetlands, vegetation and wildlife	✓ Avoids impacts to existing natural environment, as impacted lands previously disturbed by agricultural uses.	✓ Avoids impacts to existing natural environment.
Socio-Economic Environment		
Property access	✓ Maintains access to properties on Beechwood Line.	✓ Maintains access to properties on Beechwood Line.
Property acquisition	× Requires approximately 1.95 ha of private property (30 m right-of-way).	✓ Does not require acquisition of private property.
Impact on emergency service response times	✓ No anticipated impacts to emergency service response times.	× Minimal impacts to emergency service response times. × Creates a 'dead end' on Beechwood Line, which is undesirable for emergency services.
Impact on residential properties	✓ No impacts to residential properties.	✓ No impacts to residential properties.
Impact on commercial and industrial operations	✓ Avoid impacts to commercial and industrial operations	✓ Avoids impacts to commercial and industrial operations
Agricultural resources	× Impacts agricultural land (approximately 1.95 ha) and drainage infrastructure. ✓ Provides an opportunity to convert removed section of Beechwood Line to agricultural land.	✓ Avoids impacts to agricultural land and drainage infrastructure.
Impact on land parcels	× Severs existing land parcel.	✓ Avoids impacts to land parcels.
Utility facilities	✓ Does not impact existing utilities.	✓ Does not impact existing utilities.
Cultural Environment		
Direct impacts to archaeological resources	✓ Minimizes potential impacts to archaeological resources due to existing agricultural disturbance.	✓ Avoids impacts to archaeological resources.
Direct impacts to built heritage/cultural landscape resources	× Minor impacts to cultural landscape due to property requirement and realignment of Beechwood Line at Kent Bridge Road.	× Minor impacts cultural landscape due to closure of Beechwood Line at Kent Bridge Road.
Preliminary Cost Estimate		
Construction cost	× Has construction costs associated with new road.	✓ Minor costs associated with closure of Beechwood Line (i.e. construction of cul-de-sac, signage) ✓ No upgrades to road network anticipated.
Property cost	× Has property cost.	✓ Has no property cost.
OVERALL - ALTERNATE ROUTES FOR CLOSURE OF BEECHWOOD LINE		

MOST PREFERRED PREFERRED NOT PREFERRED

G.W.P. 80-00-00: Highway 401
from 0.9 km East of Essex Road 42 to Elgin County Boundary
Preliminary Design Study and Class EA

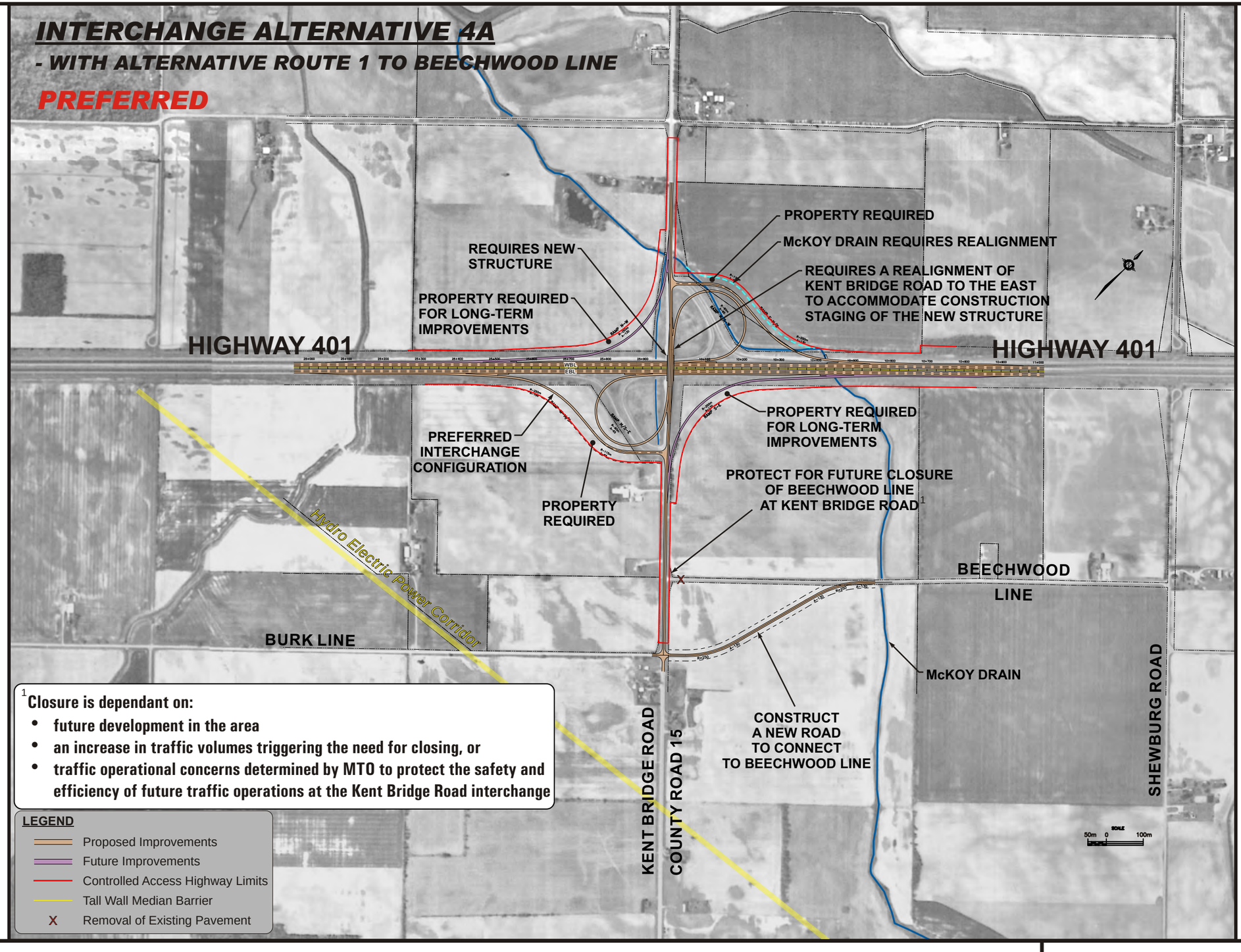
BEECHWOOD LINE
ALTERNATE ROUTES / ANALYSIS & EVALUATION

EXHIBIT
5-18

INTERCHANGE ALTERNATIVE 4A

- WITH ALTERNATIVE ROUTE 1 TO BEECHWOOD LINE

PREFERRED



[1] **Closure is dependant on:**

- **future development in the area**
- **an increase in traffic volumes triggering the need for closing, or**
- **traffic operational concerns determined by MTO to protect the safety and efficiency of future traffic operations at the Kent Bridge Road interchange**

LEGEND

- Proposed Improvements
- Future Improvements
- Controlled Access Highway Limits
- Tall Wall Median Barrier
- X — Removal of Existing Pavement

G.W.P. 80-00-00: Highway 401
from 0.9 km East of Essex Road 42 to Elgin County Boundary
Preliminary Design Study and Class EA

KENT BRIDGE ROAD INTERCHANGE
PREFERRED PLAN

EXHIBIT
5-19

VICTORIA ROAD
INTERCHANGE

5.4.13 Victoria Road Interchange - Alternatives and Evaluation

The existing interchange conditions and the interchange alternatives for the Victoria Road interchange are shown in **Exhibit 5-20**. Two interchange alternatives were considered for improvements to this interchange.

The analysis and evaluation undertaken in **Exhibit 5-21** identifies Alternative 5A as preferred over Alternative 5B for the following reasons:

- Maintains a Parclo A interchange configuration;
- Avoids impacts to the Walter Deveraux Conservation Area;
- Requires the least amount of private property;
- Minimizes impacts to agricultural lands; and
- Has a lower construction cost.

5.4.14 Spence Line - Alternate Routes and Closure Evaluation

Spence Line at Victoria Road is protected for future closure to address concerns related to its proximity to the north ramp terminal of the interchange. Alternate Routes 1, 2, and 3 are shown in **Exhibit 5-22**.

Based on the analysis and evaluation undertaken in **Exhibit 5-23**, the preferred alternate route is Alternate Route 3 for the following reasons:

- Does not require construction of a new road;
- Avoids impacts to the existing natural environment;
- Does not require acquisition of private property;
- Avoids physical impacts to residential property;
- Avoids physical impacts to agricultural land and drainage infrastructure; and
- Minimal construction cost.

Future closure of Spence Line is dependent on the following:

- Future development in the area;
- An increase in traffic volumes triggering the need for closure; or
- Traffic operational concerns determined by MTO in order to protect the safety and efficiency of future operations at the interchange.

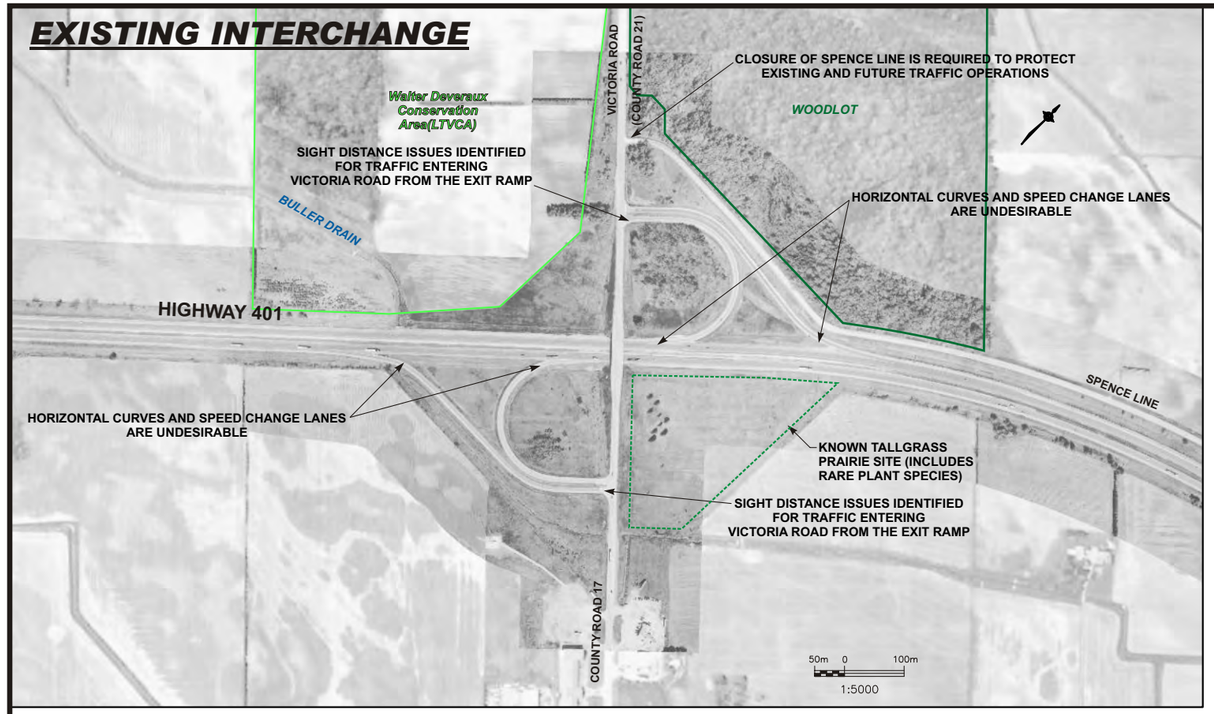
Although Spence Line will continue to connect to Victoria Road as part of the proposed improvements identified in this study, MTO will monitor the Victoria Road interchange to determine if the above conditions warrant a future closure of Spence Line at Victoria Road.

5.4.15 Victoria Road Interchange – Preferred Plan

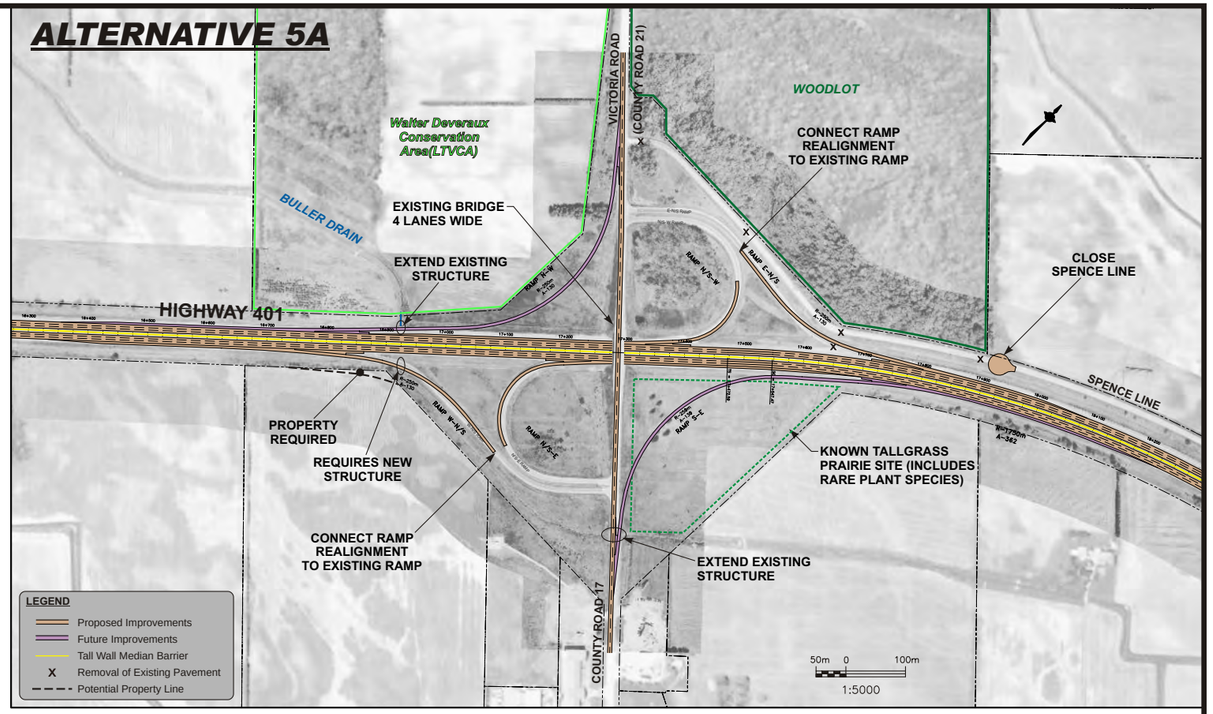
The preferred plan for the Victoria Road interchange is shown on **Exhibit 5-24.** The preferred plan involves:

- Maintaining a Parclo A interchange configuration with improvements to interchange ramps;
- Protect for the future closure of Spence Line at Victoria Road, which is dependent on future development in the area, an increase in traffic volumes triggering the need for future closure, or traffic operational concerns determined by MTO to protect the safety and efficiency of future operations at the interchange.

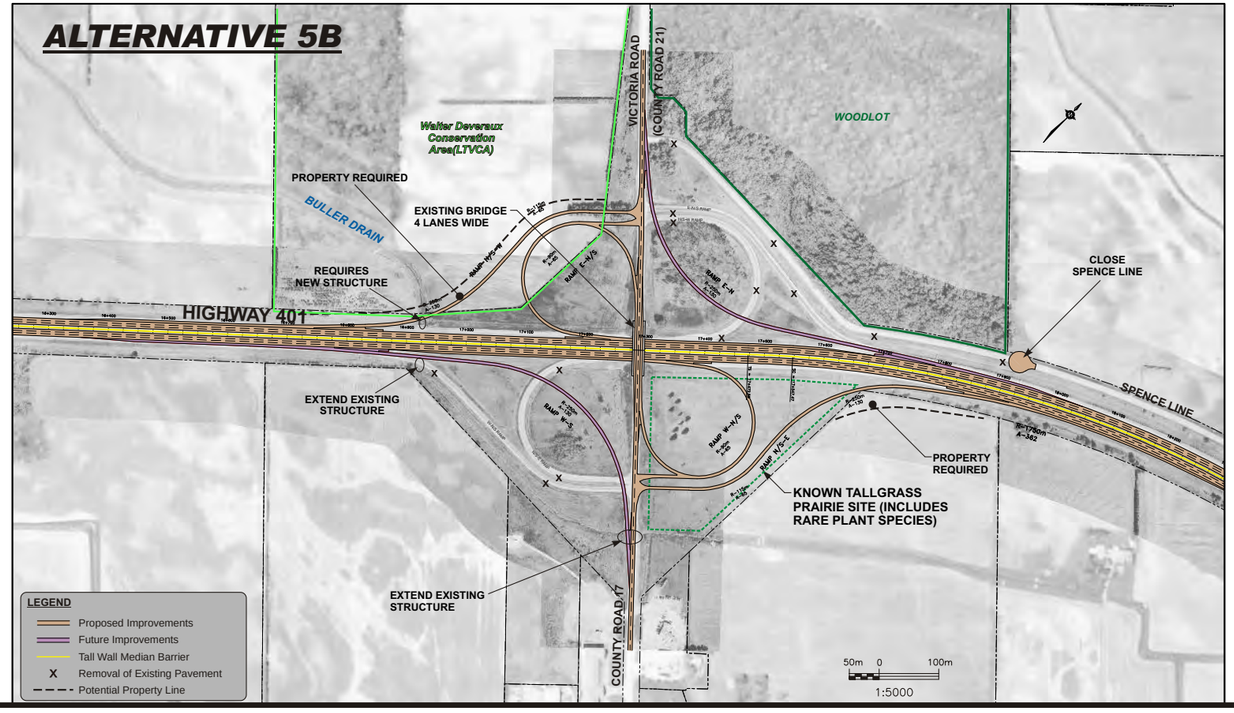
EXISTING INTERCHANGE



ALTERNATIVE 5A



ALTERNATIVE 5B



G.W.P. 80-00-00: Highway 401
from 0.9 km East of Essex Road 42 to Elgin County Boundary
Preliminary Design Study and Class EA

VICTORIA ROAD INTERCHANGE ALTERNATIVES

EXHIBIT 5-20

ANALYSIS & EVALUATION OF VICTORIA ROAD INTERCHANGE ALTERNATIVES

Factor / Indicator	Do Nothing (maintained for comparison purposes)	Alternative 5A	Alternative 5B
Transportation			
Interchange design (geometrics, safety)	✓ Maintains Parclo A configuration. × Does not improve horizontal curves and speed change lanes at the interchange ramps, which are undesirable.	✓ Provides Parclo A configuration. ✓ Improves interchange ramps.	× Provides a Parclo B configuration. ✓ Improves interchange ramps.
Future traffic operations	✓ Provides acceptable future traffic operations.	✓ Provides acceptable future traffic operations.	✓ Provides acceptable future traffic operations.
Continuity of local road network	× Has access management concern associated with Spence Line connecting to Victoria Road.	✓ *Spence Line is protected for future closure at Victoria Road, which is dependent on:* *- Future development in the area,* *- An increase in traffic volumes triggering the need for future closure, or* *- Traffic operational concerns determined by MTO to protect the safety and efficiency of future operations at these interchange.* *See alternate routes for Spence Line.*	
Flexibility for staged construction	✓ Does not require construction.	× Requres construction staging / sequencing in northeast and southwest quadrants.	✓ Simplifies construction staging by relocating loop ramps in opposite quadrants.
Structures			
Impacts to the existing highway underpass.	✓ Avoids impacts to the existing Highway 401 / Victoria Road underpass.	✓ Avoids impacts to the existing Highway 401 / Victoria Road underpass.	✓ Avoids impacts to the existing Highway 401 / Victoria Road underpass. × Right shoulder adjacent to sidewalk (east side) on bridge would be substandard (1.25m).
Impacts to other structures / culverts within the vicinity of the interchange.	✓ Does not impact structures / culverts.	× Requires extension of two culverts.	× Requires extension of two culverts.
Need for new structures / culverts within the vicinity of the interchange.	✓ Does not need new structures / culverts.	× Requires one new structure.	× Requires one new structure.
Drainage			
Potential for storm water management options.	× Does not provide an opportunity for storm water management facilities to treat highway runoff.	✓ Provides an opportunity for storm water management facilities to treat highway runoff.	✓ Provides an opportunity for storm water management facilities to treat highway runoff.
Impacts on interchange drainage, flow conveyance and flood water elevations.	✓ No impacts.	✓ No signficant impacts are anticipated.	× Potential hydraulic impactss due to loop ramps relocating in opposite quadrants.
Natural Environment			
Impacts to the Walter Deveraux Conservation Area.	✓ Avoids impacts to the natural environment.	✓ Avoids impacts to the Walter Deveraux Conservation Area.	× Impacts the Walter Deverau• Conservation Area.
Impacts to the woodlot in the northeast quadrant of the interchange.		✓ Avoids impacts to the woodlot in the northeast quadrant.	✓ Avoids impacts to the woodlot in the northeast quadrant.
Impacts to tallgrass prairie site in the southeast quadrant of the interchange.		× May impact tall grass prairie site due to potential long-term improvement.	× Impacts tall grass prairie site.
Impacts to wildlife movements.		✓ No significant impacts are anticipated.	✓ No signficant impacts are anticipated.
Impacts to fisheries habitat		× Requires new crossing of Buller Drain	✓ Minimizes impacts to fisheries habitat by avoiding new crossing of Buller Drain.
There are no significant wetlands within the study area.			

Factor / Indicator	Do Nothing (maintained for comparison purposes)	Alternative 5A	Alternative 5B
Socio-Economic Environment			
Property acquisition.	✓ Does not require property.	× Requires property in southwest quadrant.	× Requires property in northeast quadrant (3.0 ha) × Requires property in southeast quadrant (0.3 ha).
Impacts to businesses.	✓ Avoids impacts to businesses.	✓ Avoids impacts to businesses south of interchange.	✓ Avoids impacts to businesses south of interchange.
Impacts to agricultural lands.	✓ Avoids impacts to agricultural lands.	× Minor impacts to agricultural lands in southwest quadrant.	× Impacts agricultural lands in northeast and southeast quadrants.
Impacts to existing utilities.	✓ Does not impact existing utilities.	× Minimal impacts to Bell and Hydro One facilities.	× Requires relocation of Bell fibre optic line in northeast quadrant.
There are no residences in the immediate vicinity of the interchange.			
No properties with actual or potential site contamination are encountered at the interchange.			
Alternate routes for the closure of Spence Line are being reviewed separately from this analysis / evaluation.	NA	× Minimal impacts to Bell and Hydro One facilities.	× Requires relocation of Bell fibre optic line in northeast quadrant.
Cultural Environment			
Impacts to the cultural heritage landscape.	✓ Avoids impacts to archaeological, built heritage and cultural landscape resources.	✓ Minimizes potential impacts to cultural landscape due to property requirement adjacent to the right-of-way.	× Increases potential impacts to cultural landscape due to property requirement adjacent to the right-of-way.
Archaeological impacts.		✓ Minimizes potential impacts to archaeological resources due to previous disturbance within the right-way.	× Increases potential impacts to archaeological resources due to the property requirements adjacent to the right-of-way.
Direct impacts to the existing Highway 401 underpass.		✓ Minimizes impacts to the existing Highway 401 underpass, as the existing structure can accommodate improvements.	× Minimizes impacts to the e•isting Highway 401 underpass, as the e•isting structure can accommodate improvements.
Preliminary Cost Estimate			
Construction cost (construction costs are approximate and are used for comparison purposes only - to be reviewed and confirmed).	✓ Rehabilitate structures as required and replace at end of lifespan.	✓ Has lower construction cost in comparison to Alternative 5B.	× Has higher construction cost in comparison to Alternative 5A.
Property cost.	✓ Has no property cost.	✓ Has no property cost.	× Has property cost.
OVERALL - VICTORIA ROAD INTERCHANGE ALTERNATIVES	*OVERALL ASSESSMENT IS NOT INCLUDED, AS 'DO NOTHING' DOES NOT IMPROVE THE ISSUES ASSOCIATED WITH THE EXISTING INTERCHANGE*		

MOST PREFERRED **PREFERRED** **NOT PREFERRED**

G.W.P. 80-00-00: Highway 401
from 0.9 km East of Essex Road 42 to Elgin County Boundary
Preliminary Design Study and Class EA

ANALYSIS & EVALUATION OF VICTORIA ROAD INTERCHANGE ALTERNATIVES

EXHIBIT 5-21

McLARTY LINE

VICTORIA ROAD (COUNTY ROAD 21)

WOODLOT

Walter Deveraux Conservation Area(LTVCA)

1

2

3

X

PREFERRED INTERCHANGE CONFIGURATION

PROTECT FOR FUTURE CLOSURE OF SPENCE LINE[1]

KNOWN TALLGRASS PRAIRIE SITE (INCLUDES RARE PLANT SPECIES)

COUNTY ROAD 17

BEECHWOOD LINE

HIGHWAY 401

SPENCE LINE

KENESSERIE ROAD

EXISTING KENESSERIE ROAD FLYOVER

ALTERNATE ROUTES 1, 2 AND 3 FOR:

- CLOSURE OF SPENCE LINE

LEGEND

- Alternate Route 1
- Alternate Route 2
- Alternate Route 3
- Proposed Improvements
- Future Improvements
- Tall Wall Median Barrier
- X Removal of Existing Pavement

[1] **Closure is dependant on:**

- **future development in the area**
- **an increase in traffic volumes triggering the need for closing, or**
- **traffic operational concerns determined by MTO to protect the safety and efficiency of future traffic operations at the Victoria Road interchange**

SCALE
100m 0 200m

O'NEILL LINE

TO RIDGETOWN

G.W.P. 80-00-00: Highway 401
from 0.9 km East of Essex Road 42 to Elgin County Boundary
Preliminary Design Study and Class EA

SPENCE LINE ALTERNATE ROUTES

EXHIBIT
5-22

ANALYSIS & EVALUATION OF SPENCE LINE ALTERNATE ROUTES

Factor / Indicator	Alternate Route 1	Alternate Route 2	Alternate Route 3
Transportation			
Existing and future traffic operations (traffic volumes and road capacity)	✓ Protects existing and future traffic operations at interchange by closing Spence Line at Victoria Road.	✓ Protects existing and future traffic operations at interchange by closing Spence Line at Victoria Road.	✓ Protects existing and future traffic operations at interchange by closing Spence Line at Victoria Road.
Access management	✓ Maximizes distance between north ramp terminal and Victoria Road/McLarty Line intersection Improves safety and better integrates MTO objectives at interchange.	✓ Maximizes distance between north ramp terminal to Victoria Road/McLarty Line intersection. Improves safety and better integrates MTO objectives at interchange.	✓ Maximizes distance between north ramp terminal and the Victoria Road/McLarty Line intersection. Improves safety and better integrates MTO objectives at interchange.
Geometrics	✓ Meets current design standard.	✓ Meets current design standard.	✓ Meets current design standard.
Length of new road required	✗ Requires approximately 0.7 km of new road.	✗ Requires approximately 1.0 km of new road.	✓ Does not require construction of new road.
Continuity of local road network	✓ Minimizes disruption to road network and road users by providing new connection.	✓ Minimizes disruption to road network and road users by providing new connection.	✗ Greatest disruption to road network and road users travelling to/from points west.
Out-of-way travel	✓ Results in minor out-of-way travel for motorists travelling from Spence Line to the Highway 401/Victoria Road interchange. ✗ Results in 2 to 3 minutes of out-of-way travel time.	✓ Results in minor out-of-way travel for motorists travelling from Spence Line to the Highway 401/Victoria Road interchange. ✗ Results in 2 to 3 minutes of out-of-way travel time.	✗ Has greater out-of-way travel for motorists travelling from Spence Line to the Highway 401 / Victoria Road interchange. ✗ Results in 8 to 10 minutes of out-of-way travel time.
Structures			
Need for new structures/impacts to existing structures	✗ May require new crossing of watercourse east of woodlot. ✗ May impact existing structure on McLarty Line for watercourse east of woodlot.	✓ Does not require new structures. ✓ Does not impact existing structures.	✓ Does not require new structures. ✓ Does not impact existing structures.
Natural Environment			
Impacts to watercourses, including fisheries and aquatic habitat, wetlands, vegetation and wildlife	✗ Impacts edge vegetation and habitat of woodlot.	✗ Loss of hedgerow and fence line vegetation / habitat if route directly follows property line; impacts edge vegetation and habitat of woodlot.	✓ Avoids impacts to existing natural environment.
Socio-Economic Environment			
Property access	✓ Maintains access to properties on Spence Line.	✓ Maintains access to properties on Spence Line.	✓ Maintains access to properties on Spence Line.
Property acquisition	✗ Requires 2.1 ha of private property (30 m right-of-way).	✗ Requires 2.9 ha of private property (30 m right-of-way).	✓ Does not require acquisition of private property.
Impact on emergency service response times	✓ Minimal impacts to emergency service response times.	✓ Minimal impacts to emergency service response times.	✓ Minimal impacts to emergency service response times.
Impact on residential properties	✗ Indirect impact on residential properties located near new intersection of Spence Line at McLarty Line.	✓ Avoids impacts to residential houses.	✓ Avoids impacts to residential properties.
Impact on commercial and industrial operations	✓ Minimizes impacts to commercial operations.	✓ Minimizes impacts to commercial operations.	✗ Some impact to commercial operations due to out-of-way travel for customers/suppliers arriving from Victoria Road.
Agricultural resources	✗ Impacts agricultural land and drainage infrastructure.	✗ Impacts agricultural land and drainage infrastructure.	✓ Avoids impacts to agricultural land and drainage infrastructure.
Impact on land parcels	✓ New route follows existing property line.	✓ New route follows existing property line.	✓ Does not impact land parcels.
Utility facilities	✓ Does not impact existing utilities.	✓ Does not impact existing utilities.	✓ Does not impact existing utilities.
Cultural Environment			
Direct impacts to archaeological resources	✓ Minimizes potential impacts to archaeological resources due to existing agricultural disturbance.	✓ Minimizes potential impacts to archaeological resources due to existing agricultural disturbance.	✓ Avoids impacts to archaeological resources.
Direct impacts to built heritage/cultural landscape resources	✗ Impacts cultural landscape due to property requirement and closure of Spence Line at Victoria Road.	✗ Impacts cultural landscape due to property requirement and closure of Spence Line at Victoria Road.	✗ Impacts cultural landscape due to closure of Spence Line at Victoria Road.
Preliminary Cost Estimate			
Construction cost	✗ Has higher construction costs than Alternate Route 2. ✗ Minor cost for closure of Spence Line (i.e. signage, construction of cul-de-sac).	✗ Has highest construction costs. ✗ Minor cost for closure of Spence Line (i.e. signage, construction of cul-de-sac)	✓ Minimal construction cost. ✗ Minor cost for closure of Spence Line (i.e. signage, construction of cul-de-sac)
Property cost	✗ Similar property costs to Alternate Route 2 (2.1 ha).	✗ Similar property costs to Alternate Route 1 (2.9 ha).	✓ Has no property cost.
OVERALL - ALTERNATE ROUTES FOR CLOSURE OF SPENCE LINE			

MOST PREFERRED **PREFERRED** **NOT PREFERRED**

G.W.P. 80-00-00: Highway 401
from 0.9 km East of Essex Road 42 to Elgin County Boundary
Preliminary Design Study and Class EA

ANALYSIS & EVALUATION OF SPENCE LINE ALTERNATE ROUTES

EXHIBIT 5-23

INTERCHANGE ALTERNATIVE 5A

- WITH ALTERNATE ROUTE 3 FOR CLOSURE OF SPENCE LINE

PREFERRED

PROTECT FOR FUTURE CLOSURE OF SPENCE LINE AT VICTORIA ROAD[1]

McLARTY LINE

WOODLOT

Walter Deveraux Conservation Area(LTVCA)

VICTORIA ROAD (COUNTY ROAD 21)

EXISTING BRIDGE 4 LANES WIDE

EXTEND EXISTING STRUCTURE

PROPERTY REQUIRED

REQUIRES NEW STRUCTURE

PREFERRED INTERCHANGE CONFIGURATION

CLOSE SPENCE LINE[1]

KNOWN TALLGRASS PRAIRIE SITE (INCLUDES RARE PLANT SPECIES)

EXTEND EXISTING STRUCTURE

COUNTY ROAD 17

BEECHWOOD LINE

3

HIGHWAY 401

SPENCE LINE

KENESSERIE ROAD

EXISTING KENESSERIE ROAD FLYOVER

ONEILL LINE

TO RIDGETOWN

LEGEND

- Alternate Route 3
- Proposed Improvements
- Future Improvements
- Controlled Access Highway Limits
- Tall Wall Median Barrier
- X Removal of Existing Pavement

SCALE 100m 0 200m

[1] Closure is dependant on:

- future development in the area
- an increase in traffic volumes triggering the need for closing, or
- traffic operational concerns determined by MTO to protect the safety and efficiency of future traffic operations at the Victoria Road interchange

When closure of Spence Line is triggered, the geomatics of Alternate Route 3 and private driveways will be reviewed

G.W.P. 80-00-00: Highway 401
from 0.9 km East of Essex Road 42 to Elgin County Boundary
Preliminary Design Study and Class EA

VICTORIA ROAD INTERCHANGE
PREFERRED PLAN

EXHIBIT
5-24

ORFORD ROAD
INTERCHANGE

5.4.16 Orford Road Interchange - Alternatives and Evaluation

The existing interchange conditions and the interchange alternatives for the Orford Road interchange are shown in **Exhibit 5-25**. Two interchange alternatives were considered for this location.

Based on the analysis and evaluation undertaken in **Exhibit 5-26**, Alternative 6B is preferred over Alternative 6A for the following reasons:

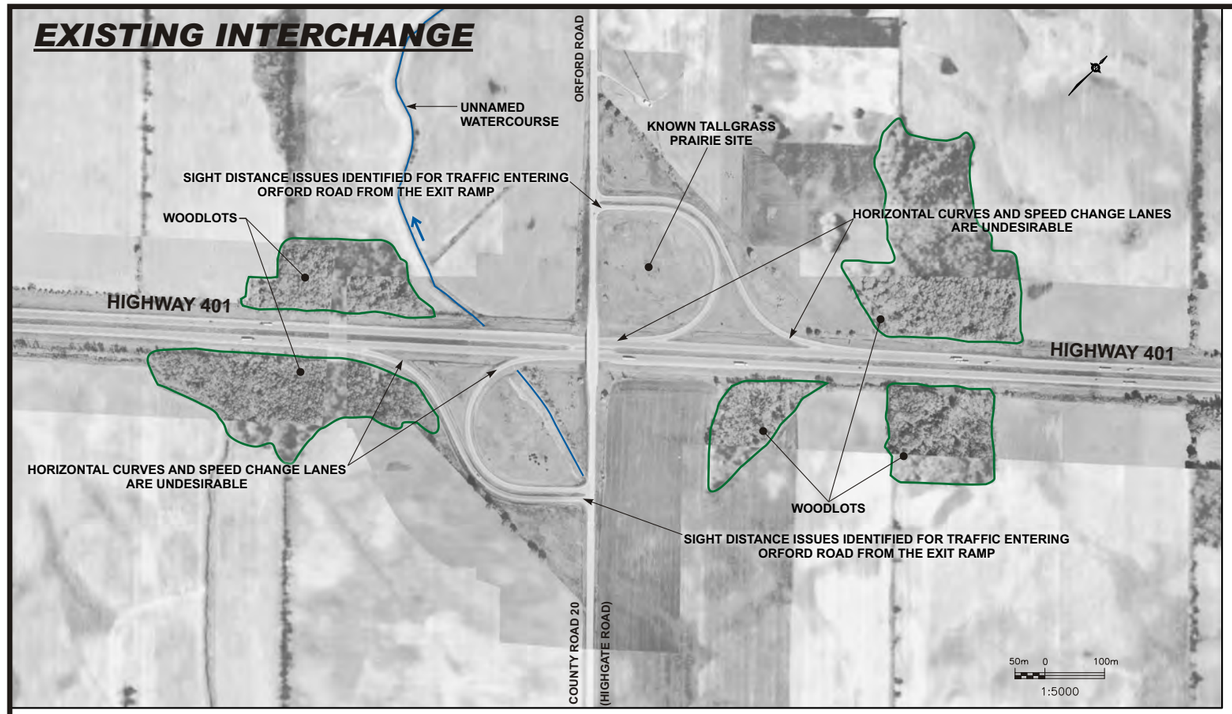
- Simplifies construction/sequencing due to reduced scope of work; and
- Has lower construction cost.

5.4.17 Orford Road Interchange – Preferred Plan

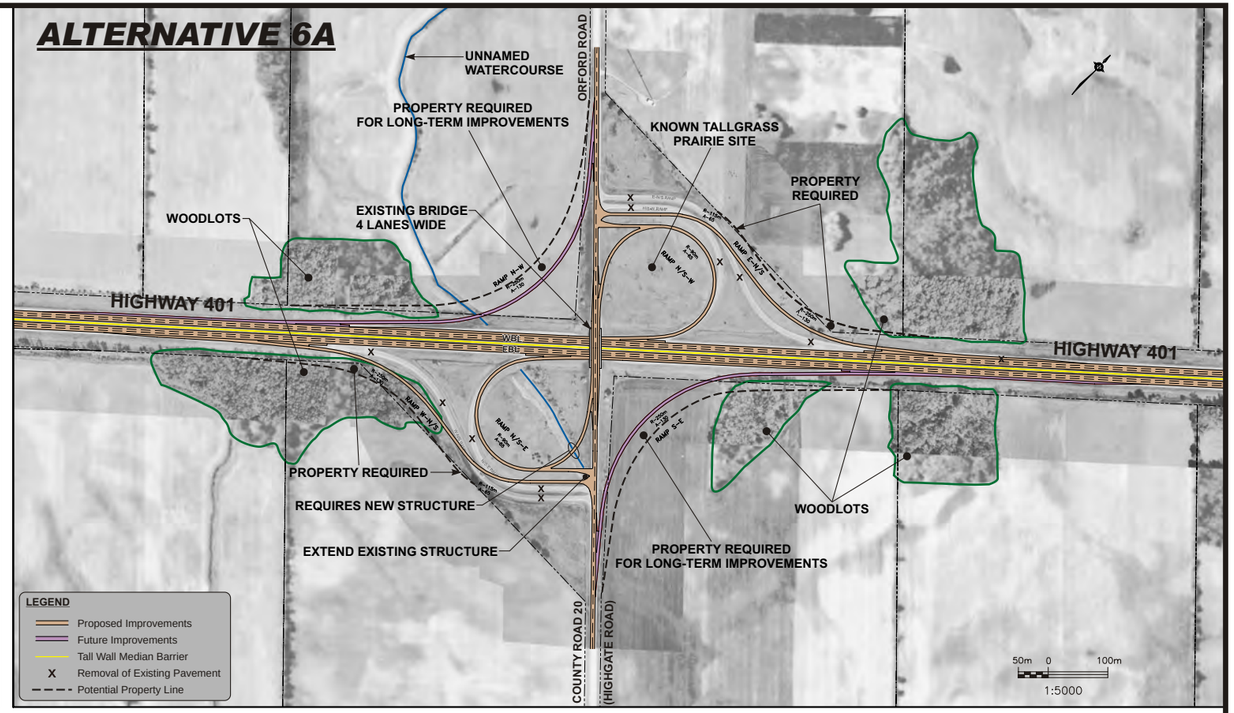
The preferred plan for the Orford Road interchange, as shown on **Exhibit 5.27**, will provide the following:

- Maintain a Parclo A interchange configuration with improvements to interchange ramps; and
- Protection of property for long-term improvements.

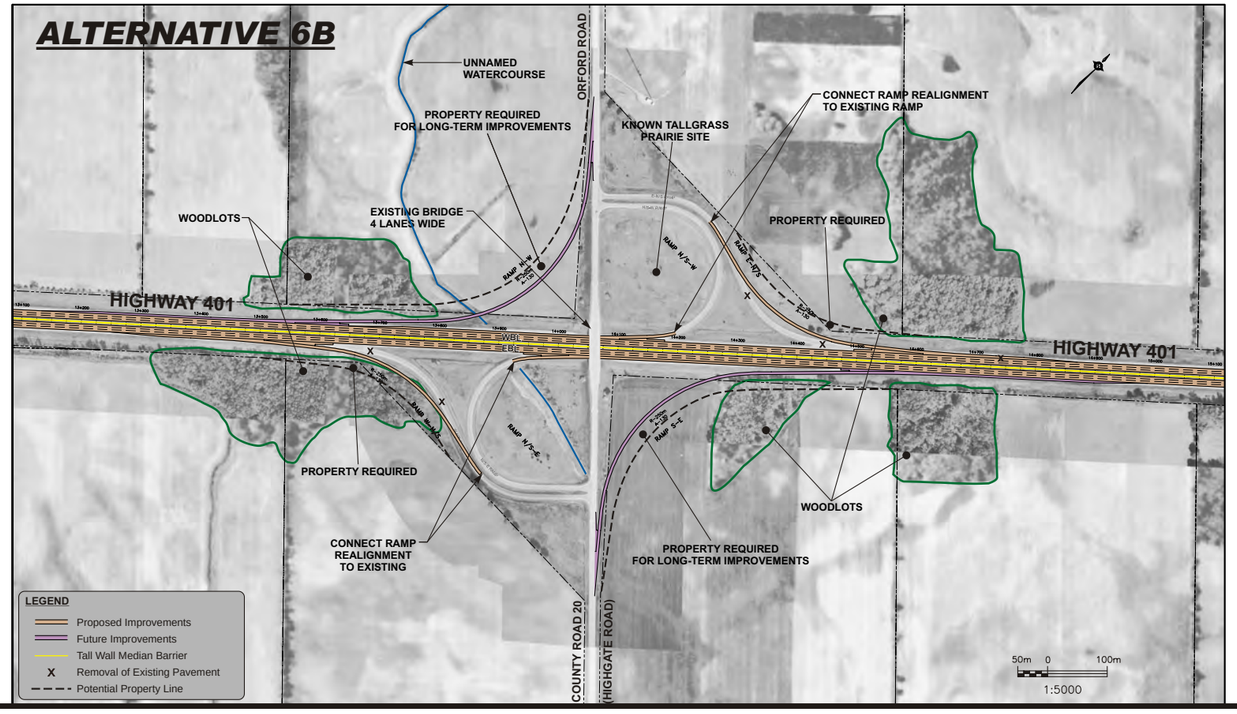
EXISTING INTERCHANGE



ALTERNATIVE 6A



ALTERNATIVE 6B



G.W.P. 80-00-00: Highway 401
from 0.9 km East of Essex Road 42 to Elgin County Boundary
Preliminary Design Study and Class EA

ORFORD ROAD
INTERCHANGE ALTERNATIVES

EXHIBIT
5-25

ANALYSIS & EVALUATION OF ORFORD ROAD INTERCHANGE ALTERNATIVES

Factor / Indicator	Do Nothing (maintained for comparison purposes)	Alternative 6A	Alternative 6B
Transportation			
Interchange design (geometrics, safety).	✓ Maintains Parclo A configuration. ✗ Does not improve horizontal curves and speed change lanes at the interchange ramps, which are undesirable.	✓ Maintains Parclo A configuration. ✓ Improves interchange ramps.	✓ Maintains Parclo A configuration. ✓ Improves interchange ramps
Future traffic operations.	✓ Provides acceptable future traffic operations.	✓ Provides acceptable future traffic operations.	✓ Provides acceptable future traffic operations.
Continuity of local road network.	✓ Maintains existing road network.	✓ Maintains existing road network.	✓ Maintains existing road network.
Flexibility for staged construction.	✓ Does not require construction.	✗ Requires complex construction staging/sequencing.	✓ Simplifies construction/sequencing due to reduced scope of work
There are no access management concerns at the existing Highway 401 / Orford Road interchange.			
Structures			
Impacts to the existing highway underpass.	✓ Avoids impacts to the existing Orford Road underpass.	✓ Avoids impacts to the existing Orford Road underpass.	✓ Avoids impacts to the existing Orford Road underpass.
Impacts to other structures / culverts within the vicinity of the interchange.	✓ Does not impact other structures/culverts.	✗ Requires extension of one culvert.	✓ Does not impact other structures / culverts.
Need for new structures / culverts within the vicinity of the interchange.	✓ Does not require new structures/culverts.	✗ Requires three new culverts.	✓ Does not need new structures / culverts.
Drainage			
Potential for storm water management options.	✗ Does not provide an opportunity for storm water management facilities to treat highway runoff.	✓ Provides an opportunity for storm water management facilities to treat highway runoff.	✓ Provides an opportunity for storm water management facilities to treat highway runoff.
Impacts on interchange drainage, flow conveyance and flood water elevations	✓ Has no impact to the existing interchange drainage.	✗ Has potential for hydraulic impacts due to new culverts.	✗ Has potential for hydraulic impacts due to extension of or a new culvert.
Natural Environment			
Impacts to fisheries habitat.	✓ Avoids impacts to the existing natural environment.	✗ Requires localized alteration of possible fish habitat associated with the construction of three new ramp culverts	✗ Requires localized alteration of habitat associated with the extension of a new ramp culvert for the N/S-E ramp.
Impacts to natural environment outside of the highway right-of-way (e.g. woodlots).		✗ Impacts to woodlot edges in the southwest quadrants, within and beyond e•isting right-of-way. ✗ Has potential for indirect effects to woodlot features beyond the right-of-way.	✗ May impact woodlot edges in the southwest quadrants within and beyond the e•isting right-of-way. ✗ Has potential for indirect effects to woodlot features beyond the right-of-way.
Impacts to tall grass prairie site in northeast quadrant.		✗ Greater potential for disturbance to tall grass prairie site.	✗ Minimal potential for disturbance to tall grass prairie site.
Impacts to wildlife movements.		✗ Increases potential effects on habitat and wildlife associated with the removal of wooded area edges outside the existing highway right-of-way.	✗ Increases potential effects on habitat and wildlife associated with the removal of wooded area edges outside the existing highway right-of-way.
There are no significant wetlands within the study area.			

Factor / Indicator	Do Nothing (maintained for comparison purposes)	Alternative 6A	Alternative 6B
Socio-Economic Environment			
Property acquisition.	✓ Does not require property.	✗ Has similar property impacts to Alternative 6B (5.0 ha)	✗ Has similar property impacts to Alternative 6A (5.0 ha)
Impacts to agricultural lands.	✓ Does not impact agricultural lands.	✗ Impacts agricultural lands in northeast quadrant of the interchange.	✗ Impacts agricultural lands in the northeast quadrant of the interchange.
Impacts to existing utilities.	✓ Does not impact existing utilities.	✗ Has minimal impact to Bell facilities located along the north side of the highway right-of-way.	✗ Has minimal impact to Bell facilities located along the north side of the highway right-of-way.
There are no residences or businesses in the immediate vicinity of the interchange.			
No properties with actual or potential site contamination are encountered at the interchange.			
Cultural Environment			
Impacts to the cultural heritage landscape.	✓ Avoids impacts to archaeological, built heritage and cultural landscape resources.	✗ Increases potential impacts cultural landscape due to property requirement adjacent to the right-of-way.	✗ Increases potential impacts cultural landscape due to property requirement adjacent to the right-of-way.
Archaeological impacts.		✗ Increases potential impacts to archaeological resources due to property requirements.	✗ Increases potential impacts to archaeological resources due to property requirements.
Direct impacts to the existing Highway 401 underpass.		✓ Minimizes impacts to the existing Highway 401 underpass, as the existing structure can accommodate improvements.	✗ Minimizes impacts to the existing Highway 401 underpass, as the existing structure can accommodate improvements.
Preliminary Cost Estimate			
Construction cost (construction costs are approximate and are used for comparison purposes only – to be reviewed and confirmed).	✓ Rehabilitate structures as required and replace at end of lifespan.	✗ Has higher construction cost in comparison to Alternative 6B.	✓ Has lower construction cost in comparison to Alternative 6A.
Property cost.	✓ Has no property cost.	✗ Has property cost.	✗ Has property cost.
OVERALL - ORFORD ROAD INTERCHANGE ALTERNATIVES	*OVERALL ASSESSMENT IS NOT INCLUDED, AS 'DO NOTHING' DOES NOT IMPROVE THE ISSUES ASSOCIATED WITH THE EXISTING INTERCHANGE.*		

MOST PREFERRED **PREFERRED** **NOT PREFERRED**

ALTERNATIVE 6B
PREFERRED

G.W.P. 80-00-00: Highway 401
from 0.9 km East of Essex Road 42 to Elgin County Boundary
Preliminary Design Study and Class EA

ORFORD ROAD INTERCHANGE
PREFERRED PLAN

EXHIBIT
5-27

6. CONSULTATION PROCESS

6.1 External Agency Participation

Review agencies, interest groups, and utility companies were notified at the beginning of the study by letter on February 6, 2006 informing them of the study and soliciting their comments. Individuals and groups that expressed an interest in the project were kept informed throughout the project. Also, the agencies that expressed an interest in this project were notified of Public Information Centre #1 held on October 3, 4, and 5, 2006 and of Public Information Centre #2 held on November 27, 28, and 29, 2007 (see **Sections 6.3.1** and **6.3.4** for summary of Public Information Centres). They were also notified of the additional Public Information Centre held on June 19, 2007 to present additional interchange alternatives at the Bloomfield Road interchange (see **Section 6.3.2**). The agencies that were contacted are as follows:

Provincial & Federal Government Agencies

Indian & Northern Affairs Canada

Transport Canada

Fisheries and Oceans Canada

Ministry of Agriculture, Food and Rural Affairs

Ministry of Economic Development and Trade

Ministry of the Environment

Ministry of Culture

Ministry of Natural Resources

Ministry of Municipal Affairs and Housing

Ministry of Tourism and Recreation

Ontario Secretariat for Aboriginal Affairs

Ontario Realty Corporation

Local Member of Provincial Parliament

Municipalities

Municipality of Chatham-Kent

Emergency Services

Ontario Provincial Police

Chatham-Kent Police

Chatham-Kent Fire Department

Chatham-Kent Emergency Medical Services / Sun Parlour Ambulance

Thames Emergency Medical Services – Elgin / St. Thomas

Chatham-Kent Health Unit

Utilities

Bell Canada Access Network

Chatham-Kent Hydro

Chatham-Kent Public Utilities Commission

Cogeco Cable

Hydro One Networks

Union Gas Limited

Other Agencies / Stakeholders

Lower Thames Valley Conservation Authority

CN Rail

CSX Rail Transport – Sarnia Subdivision

Association of Iroquois and Allied Indians

Caldwell First Nation

Delaware First Nation (Moravian of the Thames)

Walpole Island First Nation

Chatham & District Chamber of Commerce

St. Clair Catholic District School Board

Lambton Kent District School Board

Conseil scolaire de District des Ecole Catholiques du Sud-Ouest

St. Clair College (Thames Campus)

University of Guelph (Ridgetown Campus)

Ontario Trucking Association

Ontario Cycling Association

A summary of External Participation is provided in **Exhibit 6-1**. Relevant correspondence is found in **Appendix A.**

The Project Team met the Municipality of Chatham-Kent, the Ontario Provincial Police, and Chatham-Kent emergency services (police, ambulance and fire department) on several occasions throughout the study. The Project Team also presented the project to the Municipality of Chatham-Kent Council at key study milestones. The timing of these meetings and presentations are outlined in **Exhibit 6-2**. Notes of meetings and the presentation material are included in **Appendix A**.

Exhibit 6-1: External Agency Participation

AGENCY / PARTICIPANT	COMMENTS RECEIVED	ACTION TAKEN / RESPONSE
Federal Government Agencies		

Transport Canada
Programs and Divestiture
 	
Contact:
Rebecca Earl
Environmental Officer
	• In a letter dated February 16, 2006, Transport Canada noted the following:
	  • Transport Canada is responsible for the administration of the *Navigable Waters Protection Act (NWPA)*, indicating that the NWPA application process should be directed to Ms. Suzanne Shea, NWP Officer, at (519) 383-1866;
	  • Transport Canada is responsible for the administration of the *Railway Safety Act (RSA)* to ensure the safe operation of railways, indicating that approval may be required for certain railway works that depart from engineering standards set under the regulations or where an objection has been filed against the work;
	  • Inquiries about the *Railway Safety Act* and the Notice of *Railway Works Regulations* should be directed to Mr. Denis Galarneau, Manger of Engineering, at (416) 973-2326;
	  • Advised that the Act and Regulations can be accessed at the following websites:
	  Railway Safety Act: http:www.tc.gc.ca/acts-regulations/GENERAL/R/rsa/act/rsa/html
	  Notice of Railway Works Regulations: http://www.tc.gc.ca/acts-regulations/GENERAL/R/rsa/regulations/020/rsa026/rsa26.html
	  • Also advised that certain approvals under the NWPA or RSA trigger the requirement for a federal environmental assessment under the Canadian Environmental Assessment Act (CEAA), therefore consideration might be given to include CEAA requirements into the provincial environmental assessment;
	  • A Navigable Waters Protection Act Application Guide was provided.
		• Comments noted and mailing list updated;
		• Transport Canada was kept informed of study activities.

Transport Canada
Environment and Engineering
 	
Contact:
Rebecca Earl
Environmental Officer
	• Email received October 3, 2006, Transport Canada indicated:
	  • All responses would be coordinated through the Environment and Engineering Office
	  • Remove Transport Canada Navigable Waters Protection from contact list
	  • The following contact to be included:
	  Ms. Monique Mousseau
	  Regional Manager, Environment and Engineering
	  Transport Canada
	  4900 Yonge Street
	  Toronto, ON M2N 6A5
		• Comments noted and mailing list updated as requested.

Transport Canada
Marine – Navigable Waters Protection
 	
Contact:
Suzanne Shea
Navigable Waters Protection Officer
	• In a letter dated February 27, 2006, Transport Canada, Marine – Navigable Waters Protection, noted the following:
	  • The department is responsible for the administration of the Navigable Waters Protection Act;
	  • Advised that no construction shall take place without approval under the Act;
	  • A Navigable Waters Protection Act Application Guide was provided.
		• Comments noted and mailing list updated;
		• Transport Canada, Marine – Navigable Waters Protection, was kept informed of study activities.

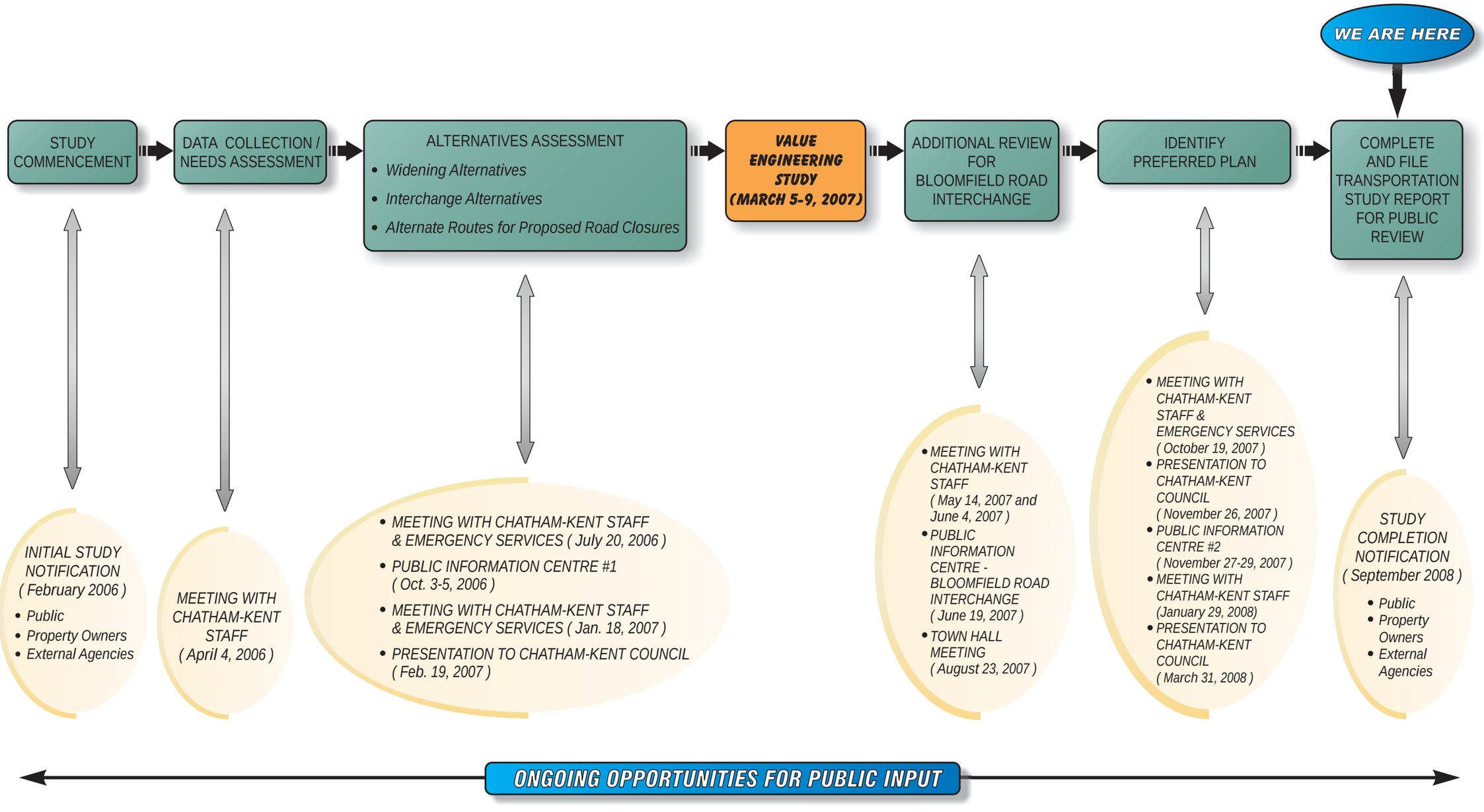
Indian and Northern Affairs Canada
 	
Contact:
Jonathan Allen
A/Litigation Team Leader
Litigation Portfolio Operations East
Litigation Management and Resolution Branch
	• In a letter dated July 19, 2007 received by mail July 23, 2007, the Litigation Management and Resolution Branch of INAC indicated, in response to the letter of Notice of Public Information Centre on June 1, 2007:
	  • Advise that there are active litigation cases in the vicinity of the Bloomfield Road Interchange.
	  • Walpole Island First Nation, Bkejwanong Territory v. Attorney General of Canada, Her Majesty the Queen in Right of Ontario, Ontario Superior Court of Justice, court file reference #00-CV-189329, and Corporation of the Municipality of Chatham-Kent v. Her Majesty the Queen in Right of Canada as represented by Minister of Indian Affairs and Northern Development, Department of Indian Affairs and Northern Development, Caldwell First Nation, Federal Court of Canada, court file reference #T-4-00.
	  • Unable to comment with respect to the possible effect of these claims as the cases have not yet been adjudicated and any statement regarding the outcome of the litigation would be speculative at this point. It is recommended that legal counsel be consulted as to the effect these actions could have on the lands associated with the undertaking.
	  • Further details about the claims etc. can be obtained from the Courts for a fee.
	  • INAC, Litigation Management and Resolution Branch, cannot make any comments regarding potential future claims, or claims filed under other departmental policies.
	  • For information on any claims, contact Luc Lavigne of the Specific Claims Branch at (819) 953-2228, and Guy Morin of the Comprehensive Claims Branch at (819) 956-0325.
		• The following First Nations were contacted throughout the study:
		  – Association of Iroquois and Allied Indians
		  – Caldwell First Nation
		  – Delaware First Nation (Moravian of the Thames)
		  – Walpole Island First Nation
		• No comments were received during the study.

AGENCY / PARTICIPANT	COMMENTS RECEIVED	ACTION TAKEN / RESPONSE
Indian and Northern Affairs Canada Contact: Daniel Johnson Environmental Officer Environmental Unit INAC – Ontario Region	In a letter dated November 27, 2007, INAC noted the following: • For the proposed project, INAC is not likely to require an environmental assessment under S. 5(1) of the Canadian Environmental Assessment Act and will not be a responsible authority. Additionally, INAC will not be an expert federal authority and further involvement is not necessary. • Noted that it is very important to contact all potentially interested First Nation communities directly. • Noted, based on MTO/MRC letter, that CNSC recognizes there are First Nations who are interested in the design and results of the program and that MTO plans to invite such First Nations to participate in the review. • Provided several information sources, including the Chiefs of Ontario website. • Advised that for enquiries regarding land claims within the project area, contact the Director General of the Comprehensive Claims Branch, and the Director General of Litigation Management and Resolution Branch.	
Provincial Government Agencies		
Ministry of Natural Resources Aylmer District Contact: Allen Woodliffe District Ecologist	An email was received by Sherri Flegel, Ecoplans, from Al Woodliffe at the MNR regarding Species at Risk (SAR). In a follow-up conversation on February 13, 2006, the following comments were noted: • The MNR had approval from MTO at the Hwy 21 I/C to manage the area for prairie tallgrass. A prescribed burn occurred at the site in the late 1990s (1998-1999); • Nancy Cain was the previous MTO employee contact regarding this. N.Cain has since left, however A. Woodliffe will forward Ecoplans the information, so that contact can be made with N.Cain regarding what exactly was done, etc; • It was also noted that a roadside native plantings project was undertaken along other stretches of the Highway, including at the Hwy 401/40 I/C, in the northeast corner; • Regarding the tallgrass prairie community EO, A.Woodliffe was unsure who would have identified it. It may have been Mike Oldham (NHIC biologist), as he used to commute that corridor and would stop and check things out; • All plant observations were post 1990 (i.e. they are current records); • Generally the plants were observed on the initial down slope and some in the less frequently mowed part; • It was noted that in the past there was a desire for MNR to have a more concerted effort with MTO in undertaking a more thorough inventory of the area; • The Whorled Milkweed population is well established and has been known since 1970s, although it is being taken over in part by Phragmites.	• Comments noted; • Ecoplans followed-up with MNR during the study.
• A site visit between Allen Woodliffe, District Ecologist, MNR and Ecoplans was conducted on August 17, 2006 of the study area between Interchange 63 and Interchange 109. The purpose of the site visit was to confirm and accurately map (using GPS) the rare species occurrences found in the right-of-way along this stretch of the Highway 401.		• MNR was kept in informed as the project progresses. • Ecoplans Ltd. completed an impact assessment of the preferred widening and interchange alternatives, and recommend mitigation measures that may include a commitment to MNR that the rare plants will be considered and impacts to them will be avoided or minimized wherever possible.
Ms. Tammy Ryall, Planner Ministry of Municipal Affairs and Housing Municipal Services Office – Southwestern 659 Exeter Road, 2nd Floor London, ON N6E 1L3	In a letter dated June 12, 2007, received from the Ministry of Municipal Affairs and Housing, Municipal Services Office – Southwestern Region, the following comments were noted: • Address land use planning and development issues covered under the Planning Act. Section 2 of the Planning Act speaks to matters of provincial interest. This section directs decision-making bodies to be consistent with the policy statements issued under Section 3 of the Planning Act in exercising any authority that affects a planning matter. The current policy on land use planning matters in Ontario is the "Provincial Policy Statement 2005" (PPS). • The requirements of the Planning Act apply to applications for planning approvals under this legislation; these applications include official plan amendments and zoning bylaw amendments. • From MMAH's review of the particular undertaking, it appears that no such approvals are being sought in this case. However, this project may have implications with respect to those matters covered by the PPS as noted above, and it is recommended that these policies be considered in the review of this undertaking. • Environmental Assessments that examine infrastructure and transportation services should incorporate provisions that allow the infrastructure to be provided in a coordinated, efficient and cost-effective manner, shall be integrated with planning for growth so that it meets current and projected needs, shall utilize existing facilities where possible before considering new infrastructure services and be strategically located to support cost effectiveness and facilitate service integration. • Should ensure that the Official Plan policies of the Chatham-Kent Official Plan regarding infrastructure and transportation are integrated into the assumptions regarding the preferred solution recommended under this evaluation process. • Request that the Ministry of Municipal Affairs and Housing, Municipal Services Office – Southwestern Region, continue to be circulated information on the project.	• Comments noted. • MMAH was kept informed of the study activities.
Municipalities		
Municipality of Chatham-Kent Engineering and Traffic Division	• A letter and fax-back form were received from Gary Northcott, P.Eng., Director of Engineering and Traffic at the Municipality of Chatham-Kent on February 28, 2006. The following comments were noted: • The Municipality of Chatham-Kent would like to be included in the mailings and EA process and welcome the opportunity	• Comments noted and mailing list updated; • The Municipality of Chatham-Kent was kept informed of study activities, including meetings with staff and presentations to Municipal Council at key milestones in the

AGENCY / PARTICIPANT	COMMENTS RECEIVED	ACTION TAKEN / RESPONSE
Contact: Gary Northcott, P.Eng. Director, Engineering and Traffic Division	to meet with the Ministry and its consultant to dialogue issues and concerns; • Currently the Municipality of Chatham-Kent has interests in ensuring access for economic opportunities, development issues at the interchanges, roads along the corridor, servicing access (as the Hwy 401 east-west corridor divides the Municipality) and drainage issues; • Provided contact information for future mailings – Director of Engineering and Traffic, Director of Planning Services, Director of Economic Development Services, and Director of Water/Wastewater Services; • Noted that a Transportation Master Plan for Chatham-Kent is in the process of being initiated (a meeting has been scheduled with the MTO-Southwest Region Office by Chatham-Kent's consultant, Delcan Corporation);	study (see **Exhibit 6-2**)
Municipality of Chatham-Kent Public Works Division Contact: Pat Bruette	• In a fax-back form received on February 27, 2006, the Chatham-Kent Public Works Division indicated that they wish to be involved in this project. It was noted that they have no concerns at this time, however they will want to be involved as the project moves closer to tender.	
Municipality of Chatham-Kent Infrastructure and Engineering Services Public Works South Division Contact: Pat Bruette, Director, Public Works South	• A Comment Sheet was received by fax on October 25, 2006, from the Director, Public Works South, for the Municipality of Chatham Kent. Concerns noted were: • Jeanette's Creek Road requires access from Queen's Line • Jeanette's Creek Road should be located approximately 250 east of the westbound Highway 401 access in proposal 1B for the Queen's Line interchange to be effective and service the Municipality's targeted user group (commercial traffic to Tilbury) • The adjacent property owner is willing to participate in negotiation for property purchase to facilitate the relocation of Jeanette's Creek Road. • The elimination of access to Jeanette's Creek Road from Queen's Line would also impact the Public Works Winter Control responses with road graders increasing response times. • Bonneau Line access from Queen's Line requires upgrading if it is expected to safely handle agricultural traffic due to the closing of McKinlay Road at Highway 401. •	
Municipality of Chatham-Kent Infrastructure and Engineering Services Public Works South Division Contact: Pat Bruette, Director, Public Works South	• A Comment Sheet received at the Tilbury PIC on November 28, 2007, noted: • When Pinehurst Line is relocated (Alternative Route 2 for closure of Pinehurst), ensure the new road is located on the west side of windbreak. • Proper setback from windbreak is allowed for snow storage.	
First Nations		
Association of Iroquois and Allied Indians Contact: Adriana Poulette Senior Policy Analyst and Government Relations Advisor	A letter was received by fax on June 13, 2007, from the Association of Iroquois and Allied Indians. Comments noted include: • The Association of Iroquois and Allied Indians are not mandated to consult on behalf of member nations. Involvement as a representative for the First Nations occurs when invited by a member First Nation to do so. • Consideration should be put towards treaty boundary lines, real and potential land claims, and First Nations communities in the surrounding area. • Suggest that First Nations be directly involved to accommodate for any potential First Nation intervention or interests. This approach would be ideal for addressing any First Nation issues that may arise: i.e. where there may be archaeological discoveries at a site, First Nations customs vary and the Proponent should be ready to address that situation with the appropriate First Nations, in an innovative or other culturally appropriate manner.	• Comments noted; • MTO contacted First Nations in vicinity of the study area directly.
Conservation Authority		
Lower Thames Valley Conservation Authority Contact: Valerie Towsley Resource Technician	Comment sheet from PIC #2 was received by fax on December 14, 2007, noting: • LTVCA lands (Pt Lot 12, Con. 6, Howard, Chatham-Kent) noted as potential carpool lot is undesirable – not something the Authority would like to see on these lands. • Staff would be willing to assign any naturalization projects on MTO lands (i.e. Merlin Road emergency exit/entrances).	• Comments noted and mailing list updated; • During the subsequent detail design phase, a detailed landscaping/naturalization plan will be developed for appropriate interchange and right-of-way areas. As part of the process of developing an appropriate naturalization plan, LTVCA will continue to be included in the subsequent phases of the project.
Lower Thames Valley Conservation Authority Contact: Randall Van Wagner Environmental Project Coordinator	Comment sheet from PIC #2 was received December 27, 2007, noting: • LTVCA has met with MTO regarding tree plantings in finished interchanges and right-of-ways. • LTVCA definitely would like to be involved in species selection/plantings etc. – believe that they can provide the proper species at a much lower cost than post plantings. • Would like to be kept informed for future partnerships. • Chatham-Kent Council recently approved a "Greening Strategy" for the region and the above noted activity complements future plans.	

AGENCY / PARTICIPANT	COMMENTS RECEIVED	ACTION TAKEN / RESPONSE
Emergency Services		
Ontario Provincial Police Chatham-Kent Detachment Contact: S/Sgt. John Moffatt	• In a fax-back form dated February 24, 2006, the Ontario Provincial Police, Chatham-Kent Detachment, indicated that they wish to participate in the project; • It was advised that the narrow radii of the eastbound off-ramps at Interchange 63 (Queen's Line), Interchange 81 (Bloomfield Rd) and Interchange 90 (Communication Rd) have caused roll-over accidents, and that it should be further examined; • Additionally it was indicated that Hwy 401 westbound on/off-ramps at Interchange 63 (Queen's Line) intersects with Jeannette Creek Rd. This road should be realigned so as to not cross the ramps.	• Comments noted and mailing list updated; • Ontario Provincial Police, Chatham-Kent Detachment, was kept informed of study activities, including meetings at key milestones in the study (see **Exhibit 6-2**)
Ontario Provincial Police Chatham-Kent Detachment Contact: Sgt. John R. Slack	• In a letter sent to Stantec Consulting Ltd regarding improvements to Highway 40 and copied to the MTO Project Engineer for the Highway 401 improvements (dated February 9, 2007) the Ontario Provincial Police, Chatham-Kent Detachment, indicated that there may be an opportunity for coordination between proposed Highway 40 improvements and the Highway 401 improvements - namely as it relates to the Highway 40 structure at Highway 401 and the closure of Pinehurst Line at Highway 40 and the proposed alternate route. • Advised that intersections for both east and west bound off ramps for Highway 401 are problematic due to poor sight lines caused by the elevation of the roadway. Request that as an interim solution, the Highway 40 project should consider posting a 60 km/h speed limit in the area, or consider large "Hidden Intersection" signs prior to both intersections along with appropriate flashing yellow lights. • Indicated that there should be a designated turn lane for northbound vehicles turning left (west) onto Creek Road at Highway 40. • Consideration should be given to installing rumble strips at the edge of pavement on Highway 40 as they are effective at improving safety. • Consideration should be given to the installation of gates both entrances of Highway 401 from Highway 40 for emergency shut downs of Highway 401.	• Comments noted. • In a letter dated April 30, 2007, from MTO to the OPP Chatham-Kent Detachment, the following was noted with respect to comments pertaining to the Highway 401 Preliminary Design Study and Class EA: – MTO will continue to ensure that improvements under the Highway 40 Detail Design and Class EA Study are coordinated with the Highway 401 Preliminary Design and Class EA Study where applicable. The Highway 40 Study will include a review of the existing condition to determine if any interim improvements can be provided along Highway 40 at Highway 401. The improvements recommended under the Highway 40 Study, including rehabilitation of the Highway 40 structure over Highway 401, are anticipated to be under construction between 2008 and 2010. Improvements being considered under the Highway 401 Study, including replacement of the Highway 40 structure over Highway 401, are considered longer term improvements with the timing of construction uncertain as the study is in preliminary design. – MTO advised that ramp closure gates will be included as part of the proposed improvements for all six Highway 401 interchanges within Chatham-Kent. – MTO advised that the status of the Tilbury Service Centre is currently being reviewed separately from the Highway 401 Preliminary Design and Class EA Study. MTO will follow-up with the OPP regarding the future status of the service centre once it has been determined.
Ontario Provincial Police Chatham-Kent Detachment Contact: Sgt. John R. Slack	• In an email (dated September 11, 2006) and memorandum (dated November 18, 2005), provided to MRC on February 19, 2007, the Ontario Provincial Police, Chatham-Kent Detachment, indicated a number of concerns related to the Tilbury Service Centres located on Highway 401 in Chatham-Kent. Concerns noted by OPP staff include: – No barriers preventing a motor vehicle from coming into the service centres at highway speed or faster and striking any of the gasoline pumps. More concrete barriers should be installed; – Both service centres report numerous parking complaints, the majority being transports parking in "no parking" zones and blocking access to fuel pumping area, as well as blocking the "off ramp" and "on ramp". Install more "no parking" signs and co-ordinate with the Municipality of Chatham-Kent to obtain by-law enforcement tickets for areas not on the highway; – Both truck parking areas should be expanded, which can be done by eliminating the picnic areas (that are seldom to rarely used); • Concerns specific to the westbound service centre: – Concern about tractor trailer back-ups on deceleration lanes. Despite enforcement actions and media attention tractor trailers continue to park in areas where they should not – dangerous traffic situation for motorists and pedestrians at the service centres. OPP respond to many tractor trailer collisions where trucks attempt to squeeze through areas; – The building is in poor condition. Comments from motorists about the lack of variety of food, overall decay of building. Washroom facilities too small for the number of people using them; – The westbound service centre cannot sustain a short-term or prolonged emergency (as a place of refuge during poor weather/winter conditions/fog) due to its limited size; – Recommend purchasing another property east of the existing location, adjacent to the Queen's Line and Highway 401 interchange. The existing property is not suitable for expansion and the existing building needs to be replaced. – Building a service centre with a large tractor-trailer parking area, access to fuel and safe area for drivers to walk to the facility would be beneficial to tractor-trailer drivers. – Establish an area for passenger vehicles only – safer environment for motorists; – A larger facility with more variety of foods and services would benefit motorists and businesses; – Overall, westbound service centre is largely inadequate for the current traffic volume and needs to be replaced.	• Comments and concerns noted. • See above regarding letter dated April 30, 2007, from MTO to the OPP Chatham-Kent Detachment • OPP was kept informed of the study alternatives, including meetings during key milestones in the study.

AGENCY / PARTICIPANT	COMMENTS RECEIVED	ACTION TAKEN / RESPONSE
Chatham-Kent Police Service Contact: Sgt. Paul Pomajba	• In a fax-back form dated February 16, 2006, the Chatham-Kent Police Service indicated that they with to participate in the project; • It was advised that the Ontario Provincial Police are responsible for patrolling and emergency services for Highway 401; • The Chatham-Kent Police Service concerns relate to access to Highway 401, and the increased traffic flow/congestion when Highway 401 is closed (*Note: The reason for Highway 401 closures was not noted); • Emergency detour routes will need to be considered and/or improved, as well as evaluated for safety and increased traffic volumes.	• Comments noted and mailing list updated; • Chatham-Kent Police Service was kept informed of study activities, including meetings during key milestones in the study (see **Exhibit 6-2**).
Chatham-Kent Fire Department Contact: Tony Lippers Assistant Fire Chief	• In a fax-back form dated March 6, 2006, the Chatham-Kent Fire Department indicated that they wish to participate in the project; • The Chatham-Kent Fire Department identified concerns related to access and road closures.	• Comments noted and mailing list updated; • Chatham-Kent Fire Department was kept informed of study activities, including meetings during key milestones in the study (see **Exhibit 6-2**)
Utilities		
Union Gas Limited, Windsor Division Contact: Ms. Diane Mastronardi District Engineer	• In a fax-back form dated February 17, 2006, Union Gas Limited, Windsor Division, indicated that they wish to be involved in the project; • Advised that they have 12 sites within the study area where gas pipelines either cross or are adjacent to Highway 401; • It was noted that the gas pipelines range in diameter from 2" plastic to 20" steel; • Request that Project Team advise Union Gas if hard copy maps of plant locations are required at this time.	• Comments noted and mailing list updated; • Union Gas Limited, Windsor Division, was kept informed of study activities.
Cogeco Cable Canada Inc. Contact: Mr. Brendan Smyth	• In a fax-back form dated February 14, 2006, Cogeco Cable Canada Inc. indicated that they have one crossing of Highway 401 within the study area; • The facility crossing is located at Queen's Line.	• Comments noted and mailing list updated; • Cogeco Cable Canada Inc. will be kept informed of study activities.
CN Rail Contact: Mr. John MacTaggart, P.Eng Senior Engineering Services Officer	• In a fax-back form dated February 22, 2006, CN Rail indicated that they wish to be involved in the project; • CN Rail expressed interest in potential impacts to the grade separated crossing over the CSX Railway crossing, which is now owned by CN. • Letter dated September 19, 2006 received by email indicating that CNR will not be able to attend the scheduled PICs. • CNR has interest in the project due to existing grade separation at Mile 14.02 CSX Sarnia Subdivision. • CNR requests to be kept informed throughout the EA process and advised of the potential impacts to the CN railway. • Letter dated June 12, 2007 received by email indicating that CN will not attend the scheduled PIC for the Bloomfield Road Interchange and has no concerns or comments regarding the Bloomfield Road Interchange. • Per previous correspondence, CN has interest in the overall project due to the existing grade separation at Mile 14.02 CSX Sarnia Subdivision. • CN requests to be kept informed throughout the EA process and advised of the potential impacts to the CN railway.	• Comments noted and mailing list updated; • CN Rail was kept informed of study activities.
School Boards		
St. Clair Catholic District School Board Contact: Ms. Eileen Core Supervisor, Facility Services	• In a fax-back form dated February 13, 2006, the St. Clair Catholic District School Board indicated that they do not wish to participate in the project.	• Comment noted; • St. Clair Catholic District School Board was removed from the mailing list.
Other		
Chatham & District Chamber of Commerce Contact: Ms. Gail Antaya General Manager	• In a fax-back form dated March 3, 2006, the Chatham and District Chamber of Commerce indicated that they wish to participate in the project; • Noted that the study should further pursue 3-laning throughout Chatham-Kent; • Indicated that the need for additional interchanges should be investigated.	• Comment noted.
Kruger Energy Port Alma Limited Partnership (KEPA LP) C/o Stantec Consulting Ltd. Contact: David Wesenger Senior Project Manager	• Copy of letter from Stantec to MTO, dated February 20, 2006 and received by MRC by fax on March 23, 2006, regarding the Port Alma Wind Power Project, indicating that the windfarm project area includes areas immediately adjacent to Hwy 401 in the 80-00-00 project area – want to ensure that there are no conflicts; • Kruger Energy Port Alma Limited Partnership (KEPA LP) is proposing to construct a wind power project (101.2 MW of power using approx. 44 wind turbines) in Chatham-Kent in the former townships of Romney, Tilbury East, and Raleigh; • Electricity will be transmitted to the existing Hydro One network which is adjacent to/within the Hwy 401 right-of-way within the Hwy 401 Study Area.	• Comment noted; • Mailing list updated; • Stantec Consulting Ltd and KEPA LP was kept informed of study activities.



G.W.P. 80-00-00: Highway 401
from 0.9 km East of Essex Road 42 to Elgin County Boundary
Preliminary Design Study and Class EA

STUDY SCHEDULE/CONSULTATION

EXHIBIT
6-2

6.2 First Nations Consultation

First Nation communities, as well as related organizations and government agencies, were contacted by the Project Team at key milestones throughout the study process. There are no First Nation communities located within or immediately adjacent to the study area, however, two communities are located within the Municipality of Chatham-Kent and a third is located northwest of the Municipality at Walpole Island. Communities, related organizations, and government agencies that were contacted during the study are as follows:

- Caldwell First Nation
- Delaware First Nation (Moravian of the Thames)
- Walpole Island First Nation
- Association of Iroquois and Allied Indians
- Ministry of Aboriginal Affairs (formerly the Ontario Secretariat for Aboriginal Affairs)
  - Negotiations Branch
- Department of Indian and Northern Affairs Canada
  - Comprehensive Claims Branch
  - Environment and Natural Resources
  - Specific Claims Branch
  - Litigation Management and Resolution Branch

Caldwell First Nation, Delaware First Nation and Walpole Island First Nation were contacted by letter from MTO near the start of the study and prior to the second PIC. MTO is sending a third letter to each of these First Nation communities to inform of the completion of the study, provide a summary of the improvements and impacts and to offer a copy of the Stage 1 Archaeological Study or other reports if desired. MTO also indicated that they would be willing to meet and/or further discuss the study with the First Nation communities. MTO contacted a representative of the Caldwell First Nation by telephone on November 22, 2007, regarding the study.

During the study comments were received from Indian and Northern Affairs Canada (INAC) as well as the Association of Iroquois and Allied Indians. Their comments and the action taken / response provided by the Project Team are summarized previously in **Exhibit 6-1**.

In correspondence dated July 19, 2007 from the INAC Litigation Management and Resolution Branch, the Project Team was advised of two active court cases in the vicinity of the study area. Information obtained by the Project Team determined that the court cases should not affect the proposed undertaking by MTO. The cases are noted and briefly described below:

Court Case #1
Walpole Island First Nation et al. v. Canada (Attorney General)
Ontario Supreme Court of Justice
Docket # - 00-CV-189329

The Walpole Island First Nation has declared that they hold aboriginal title to the lake bed under large portions of Lake Erie and Georgian Bay.

Court Case #2
Chatham-Kent vs. Canada (Minister of Indian Affairs and Northern Development)
Federal Court of Canada
Docket # - T-4-00

The court case involves the Municipality of Chatham-Kent challenging the land settlement agreement between Canada and the Caldwell First Nation. The agreement includes that the Government of Canada provide funding to the Caldwell First Nation to purchase land south of Thames River to create a Reserve for the First Nation. The First Nation must purchase the lands based on a willing seller / willing buyer agreement.

MTO will continue to notify the First Nation communities of the study in subsequent design stages.

6.3 Consultation with Property Owners and the Public

Consultation with adjacent property owners and the public is also highlighted in **Exhibit 6-2** and described in this section.

The notice of study commencement was published at the beginning of the study in the following newspapers:

- Chatham Daily News – Wednesday, February 8, 2006 and Saturday, February 11, 2006
- Blenheim News Tribune – Wednesday, February 8, 2006 and Wednesday, February 15, 2006
- Tilbury Times – Wednesday, February 8, 2006 and Wednesday, February 15, 2006
- Thamesville Herald – Wednesday, February 8, 2006 and Wednesday, February 15, 2006
- Ridgetown Independent News – Wednesday, February 8, 2006 and Wednesday, February 15, 2006

The principles of consultation requiring notification at the beginning of the study and notification to those stakeholders most directly affected are achieved through this notification method. A copy of the Ontario Government Notice is included in **Appendix B**.

A study mailing list was created and updated throughout the study. This list includes:

- Property owners in vicinity to the Highway 401 corridor, from 0.9 km east of Essex County Road 42 to the Elgin County Boundary within the Municipality of Chatham-Kent. Property owner addresses were collected in January 2006 from the Municipal Property Assessment Corporation (MPAC), and property owner names were also collected in January 2006 where necessary (rural delivery addresses) from assessment information available at the Municipality of Chatham-Kent.

- The study mailing list from the Planning Study for the Bloomfield Business Park undertaken by the Municipality of Chatham-Kent, which occurred prior to this EA study. This was provided to the Project Team prior to the Public Information Centre of June 19, 2007 held specifically to address concerns at the Bloomfield Road Interchange. The mailing list included property owners, business representatives and interest groups who were contacted as part of the earlier Municipal study.
- Individuals or interest groups who contacted the Project Team throughout the study, including those who attended the Public Information Centres (PICs).

Two rounds of Public Information Centres (PICs) were held during the study to ensure that the consultation plan provided timely, user-friendly opportunities for input by the public. An additional single PIC was also held to address specific concerns at the Bloomfield Road interchange. PICs are informal meetings where area residents and other interested parties are provided the opportunity to review planning and design plans. PICs are part of the overall consultation program for this project and designed to involve stakeholders early and throughout the study to identify public concerns and assist in the selection of the preferred plan. The PIC also addresses the overall consultation principles identified in Chapter 5 of the Class Environmental Assessment for Provincial Transportation Facilities. The PICs that were held are discussed in greater detail in the following subsections.

6.3.1 Public Information Centre #1

The first round of Public Information Centres (PICs) was held:

- Tuesday, October 3, 2006, at the Royal Canadian Legion, Banquet Room, located at 75 Main Street East in Ridgetown
- Wednesday, October 4, 2006, at the Tilbury Memorial Arena, Ryder Hall, located at 49 Bond Street in Tilbury
- Thursday, October 5, 2006, at the Wheels Inn, Wedgewood Room, located at 615 Richmond Street in Chatham

Three sessions were held at each PIC:

- A preview session for external agencies and municipalities was held from 1:00 p.m. to 2:00 p.m.
- Local property owners and the general public were invited to attend from 2:00 p.m. to 4:00 p.m., and from 6:00 p.m. to 8:00 p.m.

MTO representatives along with their consultant were available to answer questions and discuss any aspect of the study. The purpose of the PIC was to provide an opportunity for interested stakeholders, including municipal and external agency representatives, local residents, business owners and the public, to review and provide input on:

- The study need, process, and justification;
- The background of the study;
- The environmental constraints and sensitivities in the study area;
- The alternatives for the highway widening;
- The preliminary assessment of the widening alternatives;
- The preferred Highway 401 widening alternative;
- The preliminary interchange alternatives;
- The anticipated environmental effects; and
- The anticipated next steps in the study.

The "Notice of Public Information Centre #1 (Ontario Government Notice) was advertised in the following newspapers:

- Chatham Daily News – Tuesday, September 19, 2006 and Saturday September 30, 2006
- Blenheim News Tribune – Wednesday, September 20, 2006 and Wednesday, September 27, 2006
- Tilbury Times – Wednesday, September 20, 2006 and Wednesday, September 27, 2006
- Thamesville Herald – Wednesday, September 20, 2006 and Wednesday, September 27, 2006
- Ridgetown Independent News – Wednesday, September 20, 2006 and Wednesday, September 27, 2006

A copy of the Ontario Government Notice is found in **Appendix B** and the PIC #1 Summary Report is provided in **Appendix C**.

A PIC notification letter was distributed to all representatives on the External Agencies List (see **Section 6.1**) to invite them to the preview session arranged for the hour prior to the public session at the PIC. The notification letters were mailed on Friday, September 15, 2006.

A flyer, which was the same as the newspaper notice, was sent on Friday, September 15, 2006 by first class mail to each property owner, business, and/or member of the general public on the study mailing list. At the time of this distribution, approximately 950 individual addresses were included on the study mailing list as described in the previous section.

The PICs were well-attended, with 127 people (37 people at Ridgetown, 27 people at Tilbury, and 62 people at Chatham) signing the register between the three PICs; actual attendance was slightly higher. This total includes those who attended the preview session for external agencies from 1:00 p.m. to 2:00 p.m., and the public sessions from 2:00 p.m. to 4:00 p.m. and from 6:00 p.m. to 8:00 p.m.

There was a high level of support for the widening of Highway 401 through the Municipality of Chatham-Kent. An extensive amount of relevant and valuable information about the study area, preferences for widening and interchange alternatives, and other related concerns were received through discussions with those who attended the PICs. The following is an overview of the comments received during and after the PICs:

- Most people supported Alternative A for the highway widening which includes widening to the median and installing a tall wall barrier.
- Several people expressed the need for a median barrier wall to eliminate cross-over accidents.

- Closure of Spence Line will cause significant out-of-way travel for residents on Spence Line. Moreover, there were concerns with emergency access to the residents on Spence Line, access to the agricultural lands and impacts to local business. It was noted that local residents use Spence Line to Victoria Road to travel to Ridgetown, which is the community centre for the local residents. While some understood the safety issue with the proximity of the Spence Line intersection at Victoria Road to the north ramp terminal, many would like to have a connection from Spence Line to McLarty Line as an alternate route. Some people suggested that a new connection be built through the woodlot in the northeast quadrant of the interchange rather than through agricultural lands.
- Any changes to the highway drainage system should ensure that flooding does not occur on the adjacent agricultural lands.
- Many people recognize the traffic issues at the Highway 40 interchange and the need to close Pinehurst Road at Highway 40. Some suggested that an alternate route be provided to connect Pinehurst Road to Highway 40 further north of the existing intersection with Highway 40 rather than provide a connection to Boundary Line. Some felt that if a connection is provided to Boundary Line, then Boundary Line should be updated (i.e. paved). Others raised concerns with the closure of Pinehurst Road at Highway 40.
- Most people noted that there are safety issues with the existing sight distances at the ramp terminals at the Highway 40 interchange.
- Many local residents raised concerns with the closure of Jeanette's Creek Road and McKinlay Road and suggested that alternate routes be provided. At a minimum, the local road system for the alternate routes should be updated (i.e. paved) to accommodate the increased travel on these roads.
- One person suggested that the emergency exit ramps be used for towing broken down heavy trucks.
- Carpool parking lots should be provided at Queen's Line, Kent Bridge Road and Victoria Road. It was noted that informal carpool parking occurs at Kent Bridge Road north of Highway 401 and at Merlin Road north of Highway 401. Motorists parking at Merlin Road generally are traveling from Chatham to access the Queen's Line interchange to travel to Windsor.
- Many people raised concerns about high noise levels from Highway 401. After explaining the generalities of highway noise and the requirements of MTO/MOE Noise Protocol, some recognized that barriers would not mitigate noise at locations further away from the highway. Nonetheless, it was noted that a noise assessment will be carried out to determine the potential noise impacts from the highway widening.
- Residents along the residential development on the south side of Highway 401 in Tilbury raised concerns about highway noise. The Project Team explained that it is the developer's responsibility for providing noise mitigation at the development in order to meet MOE requirements under the Ontario Planning Act. It was suggested that they contact the Municipal Planning Department to determine if there were any commitments made for providing noise mitigation.
- Wildlife crossings should be considered given the introduction of the tall wall median barrier.
- Landscaping within the highway corridor should be considered including the planting of trees.
- Some residents along 8th Line raised concerns about a possible connection from the Bloomfield Business Park to 8th Line, and noted that the Municipality had an agreement with them that there would be no connection to 8th Line.
- The closure of Jeannette's Creek Road and McKinlay Road would be unacceptable to local traffic and commuters as it would cut-off access for commuters to factories, residents, community and local farmers etc. The local farmers must be able to cross or access this interchange; only alternate route would be to go east to Merlin Road (however may be issues with narrow bridge) or to go west through Tilbury (issues with local traffic/intersections/obstacles etc).
- Agree that sideroads should not intersect Highway 401 on/off ramps; however disagree that intersections should not be located within 800 m to the highway ramp terminals/intersections, as this would disrupt and inconvenience many adjacent properties, businesses, and residents. The 800 m access control guideline did not apply in the recent reconstruction of the overpass and interchange on the west side of Tilbury (Richardson Sideroad northbound and southbound at Essex County Road 42), therefore, there is no reason to enforce at Queen's Line.

6.3.2 Bloomfield Road Interchange - Public Information Centre

The PIC was held on Tuesday, June 19, 2007 at the Wheels Inn, Coach Room, located at 615 Richmond Street in Chatham.

Three sessions were held at the PIC:

- A preview session for external agencies and municipalities was held from 1:00 p.m. to 2:00 p.m.
- Local property owners and the general public were invited to attend from 2:00 p.m. to 4:00 p.m., and from 6:00 p.m. to 8:00 p.m.

This PIC was held to present new interchange alternatives for the Bloomfield Road interchange and access options to the Bloomfield Road Business Park only, developed as a result of the Value Engineering (VE) Study held in March 2007. The VE Study, which included and independent Consultant Team, staff from MTO and the Municipality of Chatham-Kent, identified a new interchange alternative for the Bloomfield Road interchange and access to the Bloomfield Business Park. The PIC provided area residents and business owners, and members of the public an opportunity to review the alternatives for the Bloomfield Road interchange and provide further input into the evaluation process prior to selecting a preferred plan for the interchange.

The "Notice of Public Information Centre"(Ontario Government Notice) was advertised in the following newspapers:

- Chatham Daily News – Tuesday, June 5, 2007 and Saturday June 16, 2007
- Blenheim News Tribune – Wednesday, June 6, 2007 and Wednesday, June 13, 2007
- Tilbury Times – Wednesday, June 6, 2007 and Wednesday, June 13, 2007
- Thamesville Herald – Wednesday, June 6, 2007 and Wednesday, June 13, 2007
- Ridgetown Independent News – Wednesday, June 6, 2007 and Wednesday, June 13, 2007

A copy of the Ontario Government Notice is found in **Appendix B** and the PIC Summary Report is provided in **Appendix C**.

A PIC notification letter was distributed to all representatives on the External Agencies List (see **Section 6.1**) to invite them to the preview session arranged for the hour prior to the public session. The notification letters were mailed on Friday, June 1, 2007. A letter was also sent to the local Member of Provincial Parliament (MPP) on Wednesday, May 30, 2007.

A flyer, which was the same as the newspaper notice, was sent on Friday, June 1, 2007 to each property owner, business, and/or member of the general public on the study mailing list. At the time of this distribution, approximately 1000 individual addresses were included on the list.

MTO representatives along with their consultant were available to answer questions and discuss any aspect of the study. The purpose of the PIC was to provide an opportunity for interested stakeholders, including municipal and external agency representatives, local residents, business owners and the public, to review and provide input on:

- The study scope and process;
- The environmental assessment process;
- Background to the study;
- Summary of the Value Engineering Study held in March 2006;
- Explanation of Highway Access Management;
- Typical interchange configurations;
- Bloomfield Road interchange alternatives with options to the Bloomfield Business Park;
- Evaluation measures for the Bloomfield Road interchange alternatives; and
- The next steps in the study.

The PIC was well-attended, with 57 people signing the register; actual attendance was slightly higher. This total includes those who attended the preview session for external agencies from 1:00 p.m. to 2:00 p.m., and the public sessions from 2:00 p.m. to 4:00 p.m. and from 6:00 p.m. to 8:00 p.m.

An extensive amount of relevant and valuable information about the study area, preferences for the Bloomfield Road interchange alternatives, and other related concerns were received through discussions with those who attended the PICs. The following is an overview of comments received:

- Residents along 8th Line are opposed to any connection from the Bloomfield Business Park onto 8th Line. It was noted by many that they had an agreement with the Municipality of Chatham-Kent that access to the Bloomfield Business Park would not connect to 8th Line. Some noted that they were originally going to oppose the Bloomfield Business Park to the Ontario Municipal Board (OMB) during the planning process for the business park, but receded since the Municipality agreed that access to the business park would not connect to 8th Line. Some noted that 8th Line is a residential street and it is not appropriate to have business park traffic on 8th Line. Residents were also concerned with the widening of 8th Line and potential impacts to Wesley Church on the south side of 8th Line.
- Built heritage and cultural landscape concerns were also raised by some residents in opposition to any of the new alternate business park access options. The felt several heritage buildings, including Wesley Church, on 8th Line would be impacted by widening of 8th Line and the anticipated increased traffic. They noted that Wesley Church was built in approximately 1901 and that there several heritage residences that are occupied by third and fourth generations. It was also noted that maple trees that lined 8th Line were lost in an earlier municipal project despite resident objections.
- Some business owners along Bloomfield Road opposed Alternatives 2D and 2E given that it would require out-of-way travel to Bloomfield Road, the Highway 401 interchange, and to the urban area of Chatham.
- Property owners of the family farm northeast of the Bloomfield Road interchange supported Alternatives 2D and 2E since it shifts the interchange away from their farm. They also supported Alternative 2B since it keeps the interchange ramps on the west side of Bloomfield Road. They noted that they would tolerate out-of-way travel if their access to Bloomfield Road is closed. They were also concerned with impacts to their existing water well located immediately northeast of the interchange. This well would be located in the middle of the N/S-W loop ramp with Interchange Alternative 2A (e.g. Parclo A option). They noted that this well is one of the better wells in the area and they depend on it for their cattle farm. They were satisfied that the relocated carpool parking lot would not be located on the north side of the interchange opposite of their farm. They were also concerned with vibration if the interchange ramps are relocated near their farm (e.g. Interchange Alternative 2A).
- The realignment of Bloomfield Road to the west as shown on Alternatives 2D and 2E may impact the pumping station within the Bloomfield Business Park.
- One person felt the loop ramps are a poor design that does not properly accommodate truck traffic.
- Some noted that the type of development occurring in the business park is not the type envisioned by the Municipality during the planning process. Some felt that the development should occur on the north side of the interchange closer to the urban area.

6.3.3 Municipality of Chatham-Kent – Town Hall Meeting

The Municipality of Chatham-Kent, through the Mayor's Office, held a Town Hall meeting on August 23, 2007 to receive additional comments on the Bloomfield Road interchange alternatives that were presented at the June 19, 2007 PIC. The meeting was held in the Council Chambers at the Chatham-Kent Municipal Building. Property owners and business owners in the vicinity of the Bloomfield Road interchange were invited to attend the meeting to provide additional comments on the interchange alternatives. MTO and MRC staff attended the Town Hall meeting to answer questions and receive comments on the interchange alternatives. The notes of this Town Hall meeting are included in **Appendix D**.

The Project Team reviewed the comments received at the June 19, 2007 PIC and August 23, 2007 Town Hall Meeting into the analysis / evaluation of the Bloomfield Road interchange alternatives.

6.3.4 Public Information Centre #2

The second round of PICs was held:

- Tuesday, November 27, 2007, at the Portuguese Canadian Social Club of Chatham-Kent, located at 346 Grand Avenue in Chatham
- Wednesday, November 28, 2007, at the Tilbury Memorial Arena, Ryder Hall, located at 49 Bond Street in Tilbury
- Thursday, November 29, 2007, at the University of Guelph Ridgetown Campus, Gymnasium, located at 120 Main Street in Ridgetown

Four sessions were held at each PIC:

- A session for impacted property owners was held from 12:00 noon to 1:00 p.m.
- A preview session for external agencies and municipalities was held from 1:00 p.m. to 2:00 p.m.
- Local property owners and the general public were invited to attend from 2:00 p.m. to 4:00 p.m., and from 6:00 p.m. to 8:00 p.m.

Additionally, a preview session for the businesses located at the Bloomfield Road interchange was held from 11:00 a.m. to 12:00 noon at the Chatham PIC on November 27, 2007.

This was the second of two rounds of PICs for the study. The second round of PICs provided an opportunity for interested stakeholders, including municipal and external agency representatives, impacted property owners, local residents, business owners and the public, to review and comment on:

- The preferred Highway 401 widening alternative;
- Interchange alternatives;
- Alternate routes for proposed road closures at the interchange;
- The analysis / evaluation of the interchange alternatives and alternate routes;
- The preferred interchange alternatives and preferred alternate routes;
- Emergency access ramps and carpool parking lots;
- The preferred plan;
- Potential environmental impacts and anticipated mitigation measures; and
- The next steps in the study.

The first round of PICs was held in October 2006 to present the widening alternatives, the preferred widening alternative, interchange alternatives and the proposed road closures. In addition, a PIC was held on June 19, 2007 and a Town Hall meeting was held on August 23, 2007 to present new interchange alternatives and access options developed for the Highway 401 / Bloomfield Road interchange and area.

The “Notice of Public Information Centre” (Ontario Government Notice) was advertised in the following newspapers:

- Chatham Daily News – Tuesday, November 13, 2007 and Saturday November 24, 2007
- Blenheim News Tribune – Wednesday, November 14, 2007 and Wednesday, November 21, 2007
- Tilbury Times – Wednesday, November 14, 2007 and Wednesday, November 21, 2007
- Thamesville Herald – Wednesday, November 14, 2007 and Wednesday, November 21, 2007
- Ridgetown Independent News – Wednesday, November 14, 2007 and Wednesday, November 21, 2007

A copy of the Ontario Government Notice is found in **Appendix B** and the PIC #2 Summary Report is provided in **Appendix C**.

All representatives on the External Agencies List, which includes government ministries and agencies, the Municipality of Chatham-Kent, emergency services, school boards and utility companies, were notified by letter about the PICs, and were invited to the preview session arranged for the hour prior to the public session. The notification letters were sent on Monday, November 12, 2007. A letter was also sent to the local Member of Provincial Parliament (MPP) on Wednesday, November 5, 2007.

The Walpole Island First Nation, Delaware First Nation (Moravian of the Thames), and Caldwell First Nation, were also notified by letter about the PICs and preview sessions. The notification letters to First Nations were sent by fax on Thursday, November 22, 2007.

A flyer, which was the same as the newspaper notice, was sent on Monday, November 12, 2007 to each property owner, business, and/or member of the general public on the study mailing list. At the time of this distribution, approximately 1000 individual addresses were included on the list.

A notification letter was sent to each property owner that would be impacted as a result of the preferred plan on Monday, November 12, 2007. This included property owners impacted by interchange improvements, alternate routes due to road closures, the potential carpool parking lot locations and the proposed emergency access ramps. Impacted property owners were invited to attend the affected property owner session from noon to 1:00 p.m. at the PICs where there would be greater opportunity to discuss the preferred plan and the extent of property impacts on an individual basis with the Project Team.

Letters were also sent to property owners immediately adjacent to the potential carpool lot locations inviting them to attend the PICs. They were also invited to the affected property owner session from noon to 1:00 p.m. at the PICs.

Furthermore, letters were sent to Spence Line property owners advising that the road would no longer be closed at Victoria Road; however, MTO would still be seeking EA approval to close if changes in traffic volumes and/or land use result in a need to do so. These owners were invited to the public sessions from 2:00 p.m. to 4:00 p.m. and 6:00 p.m. to 8:00 p.m. at the PICs.

Letters were sent to 83 affected property owners.

A letter was sent on Monday November 12, 2007 to the business owners located on Bloomfield Road. The letter invited them to attend a preview session in Chatham where there would be greater opportunity to discuss the preferred plan and the extent of property and/or business impacts (if any) resulting from the preferred plan for the Highway 401 / /Bloomfield Road interchange as well as the proposed access to the Bloomfield Business Park on an individual basis with the Project Team.

The PICs were well-attended, with 181 people (90 people at Chatham, 46 people at Tilbury, and 45 people at Ridgetown) signing the register between the three PICs; actual attendance was slightly higher.

This total includes those who attended the property owner session from 12:00 noon to 1:00 p.m., the preview session for external agencies from 1:00 p.m. to 2:00 p.m., and the public sessions from 2:00 p.m. to 4:00 p.m. and from 6:00 p.m. to 8:00 p.m.

The following provides a summary of the most common verbal and written comments received, grouped by key issues. It should be noted that most comment sheets raised more than one issue.

Highway Widening:

- There is much support for the widening of Highway 401.
- No written comments were received.

Queen's Line Interchange (including closures of Jeannette's Creek Road and McKinlay Road):

- Range of opinions regarding the proposed closure of Jeannette's Creek Road and McKinlay Road, including suggestions to:
    - Leave the interchange as is because both the interchange and local roads work fine.
    - Fly Jeannette's Creek Road over Highway 401 to connect directly to McKinlay Road as it will minimize disruption to the agricultural community and farmland.
    - Extend Jeannette's Creek Road and McKinlay Road to Queen's Line directly across from the proposed ramp terminals in the preferred plan. This would reduce the amount of land required, minimize the extent of new road required, and maintain convenient access to both Highway 401 and Queen's Line for people using Jeannette's Creek Road and McKinlay Road.
    - Utilize the existing road network instead of constructing a new roadway for Jeannette's Creek Road as it would be the most practical and cost effective solution. It would not disrupt any farmland. Instead of spending money on new roads, would be better to upgrade the existing road network.
    - Eliminate the interchange/access to and from Highway 401 altogether. The interchange on the west side of Tilbury and at Bloomfield Road are more than necessary for the area. Would allow McKinlay Road and Jeannette's Creek Road to be used by those that live and work in the area.
- A lot of concern about potential closure of Jeannette's Creek Road and McKinlay Road due to inconvenience for residents as well as farm traffic, possible delays in emergency response, impacts to farmland, impacts to agricultural community and manufacturing companies.
- Several comments inquiring about the interchange at Highway 401 and Essex County Road 42 on the west side of Tilbury and the access provided to Richardson Sideroad. They noted that the same rationale for allowing Richardson Sideroad to access County Road 42 in close proximity to interchange ramp terminals should be applied to the Queen's Line interchange and the proposed alternate routes for Jeannette's Creek Road and Queen's Line.
- Several comments indicating that the MTO's access management best practices requiring 800 m between roads and ramp terminals is excessive for the interchange.
- Some suggested that McKinlay Road and Jeannette's Creek Road to Queen's Line connect to Queen's Line directly across from the Highway 401 ramp terminals.
- Several comments suggest using the existing road network instead of realigning Jeannette's Creek Road.
- Several comments on need to reconfigure intersection of Gleeson Line/Pollard Line/McKinlay Road.

Bloomfield Road Interchange

- There was much support for the preferred plan, especially which no access would be provided to 8th Line from the Bloomfield Business Park. No written comments were received.
- Owners of farm in northeast quadrant of the interchange raised concerns with the location of the proposed E-N/S exit ramp impacting their farm land and operation. They also noted that their water well will be impacted by the proposed ramps and they would require a new water well to ensure that their farming operation remains viable. They also raised concerns about the potential widening to Bloomfield Road and impacts to their property and inquired about who would maintain the closed section of 7th Line.
- Some local business owners inquired about the potential for an east leg of the proposed intersection at Bloomfield Road and the proposed access road to the Bloomfield Business Park.
- Owner of transit / trailer raised concern about changes to entrance/yard and resulting impact on storage and movement of trailers.

Highway 40 / Communication Road Interchange

- Drainage impacts (field tiles, catch basins etc.).
- Highway 40 structure crossing over McGregor Creek should be replaced as part of improvements.
- Improvements to intersection of Highway 40 and Boundary Line (turning lanes/traffic lights/illumination).
- Concern about heavy traffic/damage on Pinehurst Line.
- Access concerns to farmland due to realigned Pinehurst Line.
- One person suggested that the new Pinehurst Road north-south leg be aligned to maintain the existing tree windbreak on the existing property line in a way that the windbreak functions to enhance road safety.
- Some suggested that a traffic signal should be installed at the Highway 40 / Boundary Line intersection to address sight distance issues at the existing intersection.

Kent Bridge Road Interchange

- Affected property owners attended the PICs.
- No written comments received were received.

Victoria Road Interchange

- Property owners satisfied that Spence Line is no longer proposed for closure under existing conditions as part of the initial improvements.
- While some wished to see Spence Line remain open as an ultimate solution, most recognized there would be a need to close Spence Line if substantial development occurred in the vicinity of the interchange, there would be a need to close Spence Line.
- One person noted that they would like to see Kenesserie Road and O'Neil Road be paved if the existing road network will be utilized.
- Large hedgerows and wooded areas would obstruct the view of the two potential car pool lot locations at Victoria Road and McLarty Line from Highway 401. Also, these areas are commonly used by deer for yarding.

Orford Road Interchange

- No comments were received.

Merlin Road Emergency Access Ramps

- Most people recognized the need for the emergency access ramps.
- The affected property owners would like the radii of the ramps reduced to minimize property impacts.
- Drake Sideroad should be considered as an alternate location since this flyover is centrally located between the Queen's Line interchange and Bloomfield Road.
- Concern about proposed ramp access to Highway 401 EB located in front of residential house on Merlin Road.
- Impacts to farmland on north side of Highway 401 would make remainder of parcel inefficient to work.

Noise

- Concern about noise at the residential areas on the south side of Highway 401 in Tilbury. The Project Team advised those homeowners that lived in recently constructed developments that the developer was responsible to ensure indoor and outdoor noise levels meet Ministry of the Environment requirements. The Project Team advised that these homeowners to contact the Municipality of Chatham-Kent to discuss their concerns.
- Some homeowners at intermittent residential houses raised concerns about noise, including the homeowners at Charing Cross Road.
- Residents on Queen Street in Tilbury also raised concerns about highway noise. The Project Team advised that they will review this situation since residents are located outside the recent residential developments on the south side of Highway 401 in Tilbury.

Other Comments

- There were many attendees inquiring about the need for an interchange at Charing Cross Road.
- Existing TOD signs on Highway 401 for local businesses/attractions should remain visible during construction.
- Concern about wildlife crossing opportunities.
- A representative from the OPP suggested that the Project Team contact their Community Policing through Environmental Design (CPTED) group to discuss the design of the car pool parking lot. They suggested that this group could provide comments on design features to enhance security.

Following the second round of PICs, a petition organized by residents of the Highway 401 / Queen's Line interchange area was received by fax on January 4, 2008 and January 7, 2008. The petition was in opposition to the proposed closure of McKinlay Road and Jeannette's Creek Sideroad at the Highway 401 / Queen's Line interchange. The petition was made available throughout the community. Approximately 750 people signed the petition.

6.3.5 Integration of External Consultation

The intent of holding Public Information Centres (PICs) for this project was to ensure the public had an opportunity to identify their concerns and influence the outcome of the preferred plans while also addressing the consultation principles identified in the Class EA document. One of the consultation principles relates to showing how the input received in earlier stages affected the project.

Exhibit 6-3 highlights some of the key concerns and comments provided by the public and how they were addressed throughout the study.

Exhibit 6-3: Summary of Public Comments and Responses

SUMMARY OF KEY COMMENTS	MTO RESPONSE
• Concern about MTO access management best practices and the justification for an 800 m distance between interchange ramp terminals and adjacent intersections. • Concern about loss of direct access to Queen's Line and Highway 401 from Jeannette's Creek Road and McKinlay Road, and resulting impact to emergency response times, farm/commuter access, out-of-way travel etc.. • Alternate routes that have been proposed (use of existing roads or construction of new roads through fields)will cause much distress to the area. • Options should be considered in order to lessen the impact on local agricultural community and manufacturing companies.	Throughout the EA Study process, MTO proposed closing several local road intersections that are too close to the interchange in order to improve existing and future traffic operations and safety in the vicinity of the interchanges. In all cases, the proposed road closures were reviewed in conjunction with providing new road connections or using alternate routes along existing road networks to provide for the continuation and continuity of access to the interchange. MTO applied access management with discretion and flexibility in applying the 800 m desirable offset from the proposed interchange ramp terminals. Each interchange was assessed independently, taking into account impacts to the rural community. At the Queen's Line interchange, MTO proposed modifications based on existing safety and operational concerns associated with direct access to McKinlay Road and Jeannette's Creek Road directly from the existing interchange ramps. In response to the concerns raised by the public at and after the PICs held in November 2007, MTO reviewed additional access alternatives for McKinlay Road and Jeannette's Creek Road. Based on this review, MTO identified a revised version of the preferred alternative presented to the public in November 2007. The revised preferred alterative allows for McKinlay Road to intersect Queen's Line opposite the Highway 401 eastbound ramp terminal, and for Jeannette's Creek Road to intersect Queen's Line opposite the Highway 401 westbound ramp terminal. This alternative minimizes property requirements as well as reduces and/or eliminates the amount of out-of-way travel for road users. With respect to Spence Line, the preferred plan involves keeping the connection of Spence Line to Victoria Road as part of the initial improvements to the Victoria Road interchange. However, Spence Line at the Victoria Road interchange is protected for future closure, which is dependent on: • Future development in the area, • An increase in traffic volumes triggering the need for closure, or • Traffic operational concerns determined by MTO in order to protect the safety and efficiency of future operations at these interchanges. MTO will monitor the Victoria Road interchange to determine if the above conditions warrant a future closure of Spence Line. If ever warranted, MTO will involve affected property owners in the area.
• Concern about MTO access management best practices and the justification for an 800 m distance between interchange ramp terminals and adjacent intersections. • Concern about closure of Spence Line at Victoria Road and resulting impacts to emergency response, business access, farm access, local residents, out-of-way travel etc.	
• Owners of farm/cattle operation in northeast quadrant of the interchange raised concerns with the location of the proposed E-N/S exit ramp impacting their farm land and operation. They also noted that their water well will be impacted by the proposed ramps and they would require a new water well to ensure that their farming operation remains viable. They also raised concerns about the potential widening to Bloomfield Road and impacts to their property and inquired about who would maintain the closed section of 7th Line.	In consultation with the affected property owner, a hyrdrogeological survey will be carried out in the subsequent detail design phase to determine the viability of relocating their impacted well to a new site on their property or connecting the Municipal water system. The widening of Bloomfield Road may occur to the west to accommodate the construction staging of the new structure crossing over Highway 401. This shift to the west would minimize property impacts along Bloomfield Road at the property in the northeast quadrant of the interchange. MTO would not be responsible for the maintenance of the closed section of 7th Line as this roadway is currently maintained by the Municipality of Chatham-Kent. The Project Team consulted with the Municipality about the future maintenance of the closed section of 7th Line east. The Municipality advised that they wound not maintain a privately-owned roadway, however, they would require an easement to maintain a Municipal watermain along 7th Line West.
• Concern about the proposed location of the emergency access roads at Merlin Road and the amount of farmland impacted by the proposed design.	It was determined, in conjunction with input from emergency service providers, that Merlin Road would be an appropriate location for the proposed emergency service access ramps for the following reasons: • Merlin Road is located approximately 6 km east of the Queen's Line interchange and approximately 12 km west of the Bloomfield Road interchange, which will provide for an acceptable level of access between the existing interchanges. • Merlin Road is paved. In response to comments received, the Project Team revised the alignments of the ramps to minimize property impacts. The Highway 401 access to the ramp on the north side was moved closer to the Merlin Road structure. There is flexibility to move the access closer to the structure since there are no sightline issues from the Merlin Road structure for westbound emergency vehicles. In contrast, sightlines are restricted by the Merlin Road structure for eastbound emergency vehicles. The location of Highway 401 access to the ramp on the south side needs to be located a sufficient distance away from this structure to accommodate stopping sight distance on Highway 401. Nonetheless, the Project Team tightened the alignment to minimize the property impacts. The proposed emergency access ramps at Merlin Road are further discussed in **Section 3.1.5**.
• Carpool parking lot locations and the need for carpool parking lots at the Queen's Line, Communication Road, Kent Bridge Road, and Victoria Road interchanges.	MTO presented potential locations for the carpool parking lots at PIC #2, and noted that property acquisition shall take place only upon a "willing seller-willing buyer" basis.

SUMMARY OF KEY COMMENTS	MTO RESPONSE
	Subsequent to PIC #2, MTO determined that expropriation of property for carpool parking lots is possible under Section 26(3) of the Public Transportation and Highway Improvement Act ("PTHIA"). Given the foregoing, MTO will initiate a separate Class EA study to develop criteria for selection of carpool parking lot locations. It is anticipated that this study will include reviewing potential sites for a new carpool parking lot at the Queen's Line, Communication Road, Kent Bridge Road, and Victoria Road interchanges. This separate study will occur after the completion of the Preliminary Design Study and Class EA for the improvements to Highway 401 within Chatham-Kent.
• Provision of tree plantings should be included as part of the proposed improvements to Highway 401.	During the subsequent detail design phase, a detailed landscaping/naturalization plan will be developed for appropriate interchange and right-of-way areas in consultation with the Lower Thames Conservation Authority, the Chatham-Kent Network Stewardship and the public.
• Residents indicated that Chatham-Kent Council had always maintained that the Bloomfield Business Park would not have road access to the 8th Line.	A number of access alternatives were examined by the Project Team for the Bloomfield Business Park. Several of the alternatives included access to 8th Line to reduce turning movements on Bloomfield Road and to meet MTO access management best practices. Upon completion of the analysis and evaluation of the access alternatives, and in conjunction with the public consultation undertaken, the preferred Bloomfield Business Park access is off of Bloomfield Road and not the 8th Line.
• Concern regarding wildlife crossing opportunities. • Several alternatives described include: – Incorporate "quadrant" openings in the bottom corners of each concrete barrier – allows small mammals passage through barrier. – Construction of "Y" fence structures connecting to a wildlife conduit. – Culverts for animal passage only – i.e. not seasonal when may be non-accessible due to water.	The majority of the existing bridges provide potential wildlife movement opportunities. Existing culverts also accommodate potential wildlife movement, as many support intermittent flows. Where culvert replacements are proposed, low flow channels will be created, providing an overbank area for wildlife to use at least on a seasonal basis. The study team recognizes that it is preferable to encourage wildlife passage under this busy freeway as opposed to across the travelled surface. Additionally, openings within the tall wall median barrier would affect the integrity of the barrier to prevent errant vehicles from traveling into the opposite lanes. As such, this option is not being considered.

SUMMARY OF KEY COMMENTS	MTO RESPONSE
• A number residents throughout the study raised concerns about traffic noise from the highway. • Residents living in recent housing developments on the south side of Highway 401 in Tilbury expressed concern about noise from the highway and that inadequate noise mitigation was provided as part of their residential developments.	A noise assessment was carried out to determine the potential noise impacts from the proposed improvements to Highway 401. Noise mitigation was reviewed at specific locations where noise levels exceeded MTO/MOE noise criteria (e.g. ≥65 dBA). However, the assessment concluded that noise mitigation is not technically and/or economically feasible. Thus, noise mitigation is not recommended. The developers for the residential developments on the south side of Highway 401 east and west of Queen Street were responsible for ensuring noise levels are consistent with Ministry of the Environment noise criteria. MTO has raised these concerns about noise with the Municipality of Chatham-Kent and they are aware of this issue. Any noise concerns for the residential developments should be forwarded to the Municipality of Chatham-Kent. The noise assessment is further discussed in **Section 7.10** and the *Noise Report* is provided in **Appendix I**.

7. POTENTIAL ENVIRONMENTAL EFFECTS, MITIGATION MEASURES AND COMMITMENTS TO FURTHER WORK

This section focuses on the direct and indirect environmental effects associated with the project. It also describes the mitigation measures that will be implemented to minimize the effects. Mitigation includes planning decisions, design features, construction requirements and construction constraints.

The key to ensuring effective environmental quality control and risk management during the project is the development and proactive implementation of an approach that:

- Identifies the environmental sensitivities;
- Presents the environmental protection measures in a way that can be translated into contractual requirements and for which compliance can be verified; and
- Includes a monitoring program that verifies that the environmental protection measures are being implemented and are effective.

It is important to ensure that the Contract Administrator and Contractor are made aware of, and are prepared to deal with, all environmental issues that may arise during construction. The mitigation measures outlined in this report will be refined in greater detail as the design is developed and assessed in a subsequent phase of the project. Specific environmental controls based on these detailed mitigation measures will then be included in the contract documents to address specific environmental and operational concerns during the preparation of the contract documents in subsequent design phases.

7.1 Erosion & Sediment Control

Without the implementation of appropriate mitigation measures, creation of erosion and generation of sediment during excavation and grading activities associated with the construction of the proposed improvements may impact the watercourses/municipal drains within the study area.

Erosion and sediment control practices will focus on two separate targets: minimizing site erosion and keeping any eroded materials on site. General measures such as erosion control blanket, silt fence barriers, rock flow checks and quickly treating exposed earth surfaces with stabilizing cover material (seed and mulch, sod, etc.) are governed by special provisions (i.e. Ontario Provincial Standard Specification (OPSS) 565), which will be specified and refined in relation to the site conditions and construction requirements during the detail design stage. An Erosion and Sedimentation Control will be developed during the subsequent detail design phase. All relevant erosion and sediment control measures will be identified on the contract drawings. Implementation of the sediment and erosion control measures will then be monitored and documented during construction.

Relevant mitigation measures will include the following:

- Vegetation removal will be limited to only what is required for grading and ditching operations, and will be clearly identified on the drawings;
- Erosion and sediment control practices will be implemented throughout construction to prevent migration of sediment to the watercourses/municipal drains within the study area and all other natural features;
- All appropriate temporary erosion and sediment control measures such as: silt fence barriers, erosion control blanket, and rock flow checks will be used to contain the construction area and prevent any migration of sediment. The silt fencing and other containment measures will be regularly inspected and maintained as necessary;
- New or re-constructed ditches will be properly stabilized using vegetation or rock protection depending on slope;
- Rip rap or other stabilizing systems will be installed at outlets and spillways;
- All disturbed surfaces will be stabilized with the most appropriate treatments available;
- Stabilized and re-vegetation of all disturbed surfaces will be established as soon as possible following excavation and construction to protect against erosion and sedimentation of local drainage; and
- An environmental inspector will be employed throughout construction to ensure the sediment and erosion control measures are functioning properly and all of the mitigation measures are being implemented.

7.2 Management of Excess Material and Property Contamination

There is potential to encounter contaminated material from undertaking improvement works to Highway 401, which will require removal of existing pavement, site excavation and grading, and application of new pavement.

Surplus materials will be generated during construction, such as old pavement, guardrail materials, and concrete. These materials will be sorted and either reused if feasible, recycled, or disposed of at an approved landfill facility in accordance with OPSS 180. In addition, implementation of the contingency plan measures provides a mechanism for dealing with soil contaminant issues if they arise during construction.

Standard mitigation will be used for dust control (i.e. water, calcium chloride) during construction.

7.3 Terrestrial Ecosystems and Wildlife Habitat

Vegetation

Direct impacts to the right-of-way vegetation where construction work is proposed are not anticipated to be significant due to the character, function and minor extent of the removal. The majority of the direct removal impacts are into the median areas. At least a component of the direct impacts at the interchanges can be considered temporary in that they are improvements to existing interchanges, so the removals are usually combined with removal and potential re-naturalization of abandoned sections of ramp/roadway. Other areas of vegetation will be temporarily disturbed for construction access.

Most of the vegetation species and communities affected are common, and will re-colonize quickly after construction. This includes vegetation in ditches/drains, or at culverts where work is proposed; this vegetation is limited to old field or localized pockets of tolerant wetland species. However, the latter vegetation typically supports some localized aquatic or fisheries habitat riparian functions, and as such these are addressed in the *Fisheries and Aquatic Ecosystems Technical Report*, which is provided in **Appendix F**.

However, in a few cases, plant species of conservation concern (prairie species) will be directly affected. This includes 2 of the 3 identified tallgrass sites and 9 additional species of conservation concern locations. As noted, these tallgrass sites are not considered native communities, however they are still notable due to the rarity of the species and the high number of prairie indicators present (most notable at tallgrass site #2). Anticipated effects include fragmentation and removal of portions of the 2 tallgrass sites within the new or realigned ramp footprint. The 9 additional species of conservation concern locations are of Whorled Milkweed, Sullivant's Milkweed, Tall Ironweed, and Gray-headed Coneflower. The locations of these species are provided in the Terrestrial Ecosystems Technical Report, which is provided in **Appendix E**. These 9 locations will be removed all or in part due to grading along Highway 401.

A number of individual roadside trees found throughout the project study area are expected to be removed due to grading requirements. The dominant tree species that is anticipated to be removed is White Poplar, Manitoba Maple, and White Elm. Other common tree species that will likely be impacted include (but are not limited to) Black Walnut, White Ash, Red Cedar, White Cedar, Honey-Locust, Silver Maple, Apple sp., Scotch Pine, Norway Maple, Sugar Maple, Austrian Pine, and various spruce species. A variety of tolerant and non-native (naturalized) shrub species will also be directly impacted (i.e. removed) during construction grading in various locations within the ROW along the project limits. Species likely impacted include (but are not limited to) Hawthorn species, Staghorn Sumac, Gray Dogwood, Red-osier Dogwood, Willow sp., and White Mulberry.

Removal of localized patches of this woody vegetation is not considered to result in a significant ecological impact based on the character, location and local functions associated with this vegetation generally. These species are common throughout the project study area and will likely continue to re-colonize the right-of-way and adjacent area after construction.

Wildlife and Wildlife Movement

As with any construction project, there is also potential for temporary disturbance of wildlife during construction. Direct and indirect impacts to wildlife habitats are primarily related to encroachment into the associated vegetation, as discussed and addressed in the preceding section. There is also some potential for direct wildlife mortality during construction; however this can be addressed through implementation of standard mitigation measures.

The more defined and vegetated watercourse systems are likely used for movement by some wildlife at a local level. There is potential for wildlife to use several bridges for movement under the highway especially during lower flow conditions. This includes but is not limited to the bridges at Baptiste Creek, McDougall Drain, Government Drain 1, Government Drain 2 and Government Drain 3.

The proposed widening works will lengthen culverts into the median, which may reduce the existing use of the culverts by some species of wildlife to some extent, however it is anticipated that tolerant species such as Racoon and Striped Skunk will continue to use the culverts. However, the nominal widening of the bridges is not anticipated to affect their use by wildlife moving under the highway.

The proposed widening includes the installation of a concrete median barrier that may have impacts on wildlife by impeding passage of the highway. These impacts will be mitigated by encouraging wildlife to use culverts and structures under the highway where feasible.

Based on the nature of the proposed works (i.e., primarily rehabilitation, addition of guide rail etc., with only 2 culvert extensions, and generally minor extension of 10 of the existing bridges into the median), potential for impacts to wildlife movement should be minor. Since the extensions are generally minor relative to the overall structure length, and they are bridges with good light penetration for the most part, the proposed bridge extensions should not significantly change the existing movement opportunities.

Nesting of migratory birds was evident on many of the bridges and in many of the culverts along the project limits, and nesting is likely in some of the woody vegetation in the ROW that may be disturbed for the construction activities in and along the ROW. During field investigations bird nests were observed in 23 culverts and at 7 bridges (see **Appendix E** for specific locations). Therefore application of standard mitigation measures to protect migratory birds (and other wildlife) and prevent removal of active nests is generally relevant. Any site specific issues should be identified and addressed in the subsequent detail design phase.

Wildlife species of conservation concern, which general background data indicated might 'potentially' use habitats in the general vicinity of the project, include several bird species that might potentially nest in the ROW. These species include Common Nighthawk, Chimney Swift, Golden-winged Warbler and White-eyed Vireo. Although the exact location of these breeding birds is not known, it is unlikely that these species uses habitat within proximity of the Highway 401 corridor. Also, a Badger (road kill) was previously recorded from the area historically (1982). It is highly unlikely that this species has a den site within the ROW, but assuming other individuals of this species may be present in the vicinity, it is possible that this species moves through the area.

Wildlife will also be disturbed temporarily during construction, however for the most part, they will simply move away during the construction period. Given the existing four-lane highway, species using the adjacent habitats are already tolerant of noise and disturbance.

Indirect Impacts

Potential indirect impacts to the terrestrial environment including vegetation features and wildlife habitat and wildlife that may occur during and following the construction period are outlined below:

- Release of construction generated sediment to adjacent vegetation areas.
- Vegetation clearing / damage beyond the working area. This may include additional vegetation removals associated with grading encroachment into vegetated slopes.
- Spills of contaminants, fuels and other materials that may reach natural features.
- Damage to vegetation and wildlife from maintenance mowing activities.
- Damage to root zone of adjacent trees from grading or parking of vehicles and heavy equipment.
- Damage to bordering natural vegetation from roadway maintenance activities such as salting and sanding, structure/culvert repairs, ditch cleanout. Specifically, salt runoff and salt spray into vegetated areas may cause loss of vegetation vigour and in extreme cases, vegetation dieback, and spread of salt tolerant flora (halophytes). However, these activities are already occurring and no additional changes are anticipated.

- Changes in drainage patterns (groundwater and/or surface runoff flow) that can impact dependant vegetation or wetland areas located either upgradient or downgradient of the right-of-way. Obstruction or alteration of existing surface or subsurface drainage patterns can result in upstream and downstream vegetation dieback or condition changes. An increase in downstream runoff can result in erosion impacts on receiving vegetation. Again, for the most part, potential for new drainage related changes are limited since this is an existing facility and only minor works are proposed.

In general, since this project consists of a highway widening to the median, interchange improvements, and associated works, impacts will be limited to edge areas which have already been disturbed by the existing highway construction, maintenance and road operations. Construction works will largely be within the already disturbed highway ROW. However, although there are few large or sensitive features adjacent to Highway 401, there are several populations of provincially rare species within the ROW. Site-specific mitigation measures are recommended to address potential impacts in these situations.

Construction-Related Vegetation and Wildlife Mitigation Measures

Standard Mitigation Measures

Employing the standard mitigation measures outlined below will minimize direct impacts to vegetation and within / along the ROW, protect adjacent vegetation from potential indirect impacts both during and following construction:

- Clearly delineate the highway right-of-way vegetation clearing zones and vegetation retention zones in both the Contract documents and in the field to minimize the risk of off right-of-way vegetation impacts.
- Install barrier fencing along root zone protection areas adjacent to forested areas as off-limits.
- Ensure the use of appropriate vegetation clearing techniques (e.g. trees to be felled away from the retained natural area).
- Design and install stringent standard sediment and erosion control measures and maintain throughout construction (see also detailed measures for near-water works in the corresponding *Fisheries and Aquatic Ecosystems Technical Report*, which is provided in **Appendix F**).
- Re-stabilize and re-vegetate exposed surfaces as soon as possible following construction and within 45 days, using native vegetation seed mixes and plantings in specified areas (see **Appendix E**).
- Ensure proper storage, containment and/or filtering of all construction-generated materials (whether from dewatering, stockpiling of soil or other materials, exposed soils or debris from clearing and grubbing, etc.). Excess material will be managed in accordance with the Ontario Provincial Standards Specifications 180 (OPSS 180).
- Ensure appropriate clearing and disposal of all construction-related debris following construction.
- Employ proper handling of potentially toxic construction materials and ensure proper spills management protocols are in place and implemented.
- Implement environmental inspection throughout construction to ensure that protection measures are implemented, maintained and repaired and remedial measures are instigated where warranted.
- Avoid siting temporary storage areas, maintenance areas and soil stockpile areas immediately adjacent to natural areas. Site these areas on level ground well removed from natural areas wherever possible, and contain them as appropriate. Specific natural areas are outlined below and should be delineated as 'Environmental Sensitive Areas' in Contract Drawings and Specifications.

Employing the standard mitigation measures outlined below will minimize direct impacts to habitat features and wildlife within / along the right-of-way, protect habitat features from potential indirect impacts both during and following construction, and prevent impacts to migratory bird nests and nesting activities during construction:

- In general, any wildlife incidentally encountered during construction will not be knowingly harmed.
- Protect any wildlife incidentally encountered during construction. The Contractor should notify the Contract Administrator and Environmental Inspector in the event wildlife requires removal from the construction area.
- Specific opportunities to improve wildlife movement under the highway should be reviewed further during detail design of the structures, and incorporated where feasible and appropriate based on the nature of the habitats, potential linkage function and the proposed works. Of the structures where lengthening is proposed, Baptiste Creek, McDougall Drain, Government Drain 1, Government Drain 2 and Government Drain 3 were identified as supporting the greatest potential for wildlife movement based on the presence of an overbank area under the structure.
- Opportunities to improve wildlife movement under the highway could include ensuring wildlife friendly substrates are/have been used in the overbank areas (e.g., avoid rip rap or infill and top with sand/gravel), installing strategic vegetation plantings to create ' vegetation funnels' to provide additional cover and guide animals into the structures at the ends of the structures, and considering opportunities to maintain natural light between the widened structures (e.g., maintain opening between structures in median if possible) during Detail Design to the extent feasible.
- Guide rail has been incorporated at most of the existing culvert crossings and those proposed for extension to avoid re-grading slopes that would otherwise involve culvert lengthening. Only 2 culverts require extension. At these locations, there is some vegetated cover on the north side of Highway 401, which may encourage wildlife movement to the culvert. However, there is no intact vegetation corridor to the south of Highway 401 or large habitat blocks to the south. In these cases, given the length of the existing culverts and minor extensions involved, specific efforts to enhance movement opportunities through the existing culverts by providing overbank area etc., are not considered warranted. The more 'tolerant' animals like raccoons that are already using them are going to continue to use them regardless.

Migratory Bird Protection

In addition to protecting vegetation, which in turn protects the associated wildlife habitat functions, it is necessary to ensure the protection of breeding birds, as well as wildlife generally, that may nest or otherwise use areas where construction is proposed. Specifically, nesting migratory birds are protected under the *Migratory Birds Convention Act* (MBCA), 1994. No work is permitted to proceed that would result in the destruction of active nests (nests with eggs or young birds), or the wounding or killing of birds, of species protected under the Migratory Birds Convention Act, 1994 and/or Regulations under that Act.

Specifically, in order to protect nesting migratory birds, the Contractor will:

- Ensure that no active nests will be removed or disturbed in accordance with the *Migratory Birds Convention Act*.
- Ensure that timing constraints are applied to avoid vegetation clearing during the breeding bird season (nesting season to be confirmed during detail design).
- If vegetation clearing cannot be scheduled outside the breeding bird season timing noted above, then an avian biologist will be employed to conduct a nest survey in the area to be cleared. If active nests of migratory birds are located, then a mitigation plan will be developed and approved by Environment Canada prior to clearing. This may involve delays to allow for fledging.
- Ensure that the proposed culvert / structure works are scheduled outside of the migratory bird nesting period, where evidence of past nesting is present or where potential for nesting is identified and works are proposed.
- If culvert/structure works cannot be scheduled outside the identified nesting season, ensure that bird nesting preventative measures (such as wire screens or tarps) are implemented to prevent new nesting prior to the beginning of nesting season and are maintained until the end of the nesting season of the calendar year in which they were installed. At a minimum, the preventative measures will be installed at structures where evidence of past nesting was observed. These measures will be periodically checked, and maintained as required, so as not to entrap birds, and removed following construction when no longer needed.
- Remove "inactive" nests (previous season, adult birds are not seen flying in and out of) at all culverts prior to construction, or prior to undertaking the preventative measures outlined above.
- Inspect the structure every two to three days to remove any nests under construction and adjust or install additional preventative measures to prevent further nesting.

In the event that the measures are not successful in preventing nesting of migratory birds in proposed work areas, that work may not proceed and the Contractor shall advise the Contract Administrator and await further direction. The Contract Administrator will be notified if active nests are found or preventative actions are implemented.

Site-Specific Mitigation Measures

Due to the nature of the proposed works, the impacts on terrestrial features will be limited and in most cases the standard mitigation measures outlined above will address any effects. Sites where additional effects (e.g. vegetation removal) are anticipated site-specific mitigation measures are recommended to address potential concerns. These site-specific mitigation measures are outlined in **Appendix E** and are summarized below:

- All locations where works are proposed adjacent to species of conservation concern populations or vegetation units (including tallgrass sites) should be delineated as 'Environmental Sensitive Areas' in Contract Drawings and Specifications and in the field using temporary vegetation protection fencing or other appropriate measures to prevent inadvertent encroachment into the feature. This includes 10 species of conservation concern (Whorled Milkweed, Sullivant's Milkweed, Ironweed, Paspallum, Gray-headed Coneflower).
- Opportunities to minimize the extent of slope grading and clearing to that required for works adjacent to species of conservation concern should be investigated and incorporated to the extent feasible during detail design. These sites include Sullivant's Milkweed, Whorled Milkweed, Ironweed, and Gray-headed Coneflower. If these locations can be retained, the retained portion should also be identified as 'Environmental Sensitive Areas' as noted above.
- Where direct impacts to rare plant species cannot be avoided, site specific mitigation measures will be developed as appropriate, and in consultation with appropriate external agencies during the detail design phase. These measures may include such techniques as seed collection, plant salvage, and relocation (e.g. sod mats, plug transplants).
- Implement appropriate edge management measures (e.g. native soil and seedbank retention, restricting root grubbing in a narrow transition zone, edge management plantings) to be further refined at the detail design stage. This measure is to be considered at forest units V32, and V33 as shown in **Appendix E**.
- Install temporary barriers for tree protection at the edge of clearing limits to prevent damage beyond the working area. This measure to be considered at Kent Bridge Road interchange.
- Minimize clearing and grading to the extent possible to minimize intrusion into adjacent vegetation units at V4, V5, V6, V9, V10, V32, V33, V34, V35, V38, tallgrass site #3, tallgrass site #2, and adjacent to the wetland feature in the northeast quadrant of Highway 40 interchange (see **Appendix E** for specific locations). Install protective fencing to isolate the construction zone from the remaining features. The remaining portions of these sites should be identified as "Environmentally Sensitive Features" as noted above.
- Avoid changes to the local drainage, groundwater/hydrologic regimes that support wetlands and install appropriate temporary erosion and sediment control measures (see standard mitigation measures) along the wetland feature in the northeast quadrant of Highway 40 interchange and V46 (see Appendix E for specific locations).

- In addition, riparian vegetation associated with the watercourses that support fish habitat will be identified on the construction drawings as 'environmentally sensitive areas', to ensure the Contractor protects and does not inadvertently disturb these features beyond the localized culvert or embankment works. Shrub and tree plantings may also be required as components of fish habitat restoration / enhancement works for culvert works and for the design of localized channel realignments. These components are addressed through fish habitat recommendations and are outlined in the related *Fisheries and Aquatic Ecosystems Technical Report*, which is provided in **Appendix F**.

7.4 Fisheries and Aquatic Habitat

Environmental Effects

An assessment of the potential impacts of the proposed works on fish and fish habitat at each of the 66 watercourse crossings (15 bridges, 51 culverts) along the project limits that were confirmed as supporting direct fish use or having the potential to support direct fish use is provided in Table 2 of the *Fisheries and Aquatic Ecosystems Technical Report* (see **Appendix F**). For each feature, the existing fish and fish habitat conditions are described, the proposed direct highway works are specified and their potential impacts on fish and fish habitat identified. Site-specific mitigation measures are outlined below for relevant watercourses to address the main direct or footprint impacts.

General potential construction-related impacts to fish habitat and fish community at, up and downstream of the crossings as a result the bridge widening, bridge replacements, culvert extensions and culvert rehabilitation include:

- erosion and sediment influx from disturbed stream banks, riparian and adjacent drainage areas or stockpiled soil material, either during construction or following construction if surfaces draining to the watercourses are not properly stabilized;
- other water quality impacts related to equipment operation and maintenance in or near the stream;
- obstruction of downstream flow and/or erosion and downstream sediment transport as a result of improper temporary flow passage measures; and
- potential disturbance of fish or obstruction of their movement, particularly during sensitive life history periods.

These potential impacts listed above can be managed using appropriate standard mitigation and restoration measures, as outlined in the report. These measures will be applied at all watercourses that support direct fish use or have the potential to support direct fish use. As well, standard mitigation measures will be applied at all watercourse crossings that drain to watercourses that support fish use.

Permanent (direct) impacts to habitat as a result of the proposed works are anticipated at Bridges 6-50, 13-190, 13-55, 13-152 and Culverts 31, 32 and 40 as outlined in the impact sections of the *Fisheries and Aquatic Ecosystems Technical Report* (see **Appendix F**). The degree of encroachment into the watercourses at these bridge locations, both permanent and temporary, will require assessment during the subsequent detail design phase once the design details (e.g. final extent of abutment extensions and size of footings, need for temporary scaffolding instream) are finalized.

Specific and Construction-Related Fisheries and Aquatic Habitat Mitigation Measures

General construction related mitigation measures, that will be implemented to minimize potential impacts to watercourse features and their associated fish habitat and fish community, during and following construction activities are detailed in the *Fisheries and Aquatic Ecosystems Technical Report* (see **Appendix F**).

Specific and/or design-related measures are detailed in the report and below:

Bridge Widening / Replacements and New Culverts/Culvert Extensions

- The instream work area at the bridge locations will be confined using appropriate measures (e.g., coffer damming). The cofferdams will be used to confine watercourse flow to half the channel at a time and confine the work area to the other half.
- If temporary disturbance of the channel bed and banks is required for footing construction, the stream bed (over the footing edge) and will be re-instated to existing conditions (all bridges requiring widening or replacement)
- An appropriate containment system will be specified during the subsequent detail design phase to prevent construction debris associated with repaving of the bridge deck, patch work, removal of concrete and any related works associated with the bridge widening or replacements, from entering the watercourse.
- Any material that is inadvertently dropped into the watercourse will be retrieved carefully with minimal disturbance to the channel bed or banks.
- Temporary scaffolding (where required) is to be confined within the dewatered zones if possible. If temporary scaffolding beyond the dewatered zones (i.e., instream) is required for patching of the existing bridge soffits, the Contractor will be constrained as follows:
  - maximum 6 week period of use of scaffolding;
  - use during low flow period only (e.g. July 1 to Sept 15th);
  - maximum 2 day period to install and remove;
  - pre-planning and organizing all required materials in advance to minimize the number of trips in water and overall time to install and remove; and
  - erecting a silt curtain during any in-water work required to install and remove the temporary scaffolding.
- All areas disturbed for access during construction will be restored, stabilized and re-vegetated. Woody vegetation removed for construction will be replaced with similar or otherwise compatible native species.
- Deck drains will be removed on all of the existing bridges that will be widened with the exception of Taff Creek, therefore enhancing the existing situation where the deck drains discharge directly to the creeks.

- Where SAR species or high potential for their presence has been identified and instream works are required, a SAR permit will be required from DFO prior to construction. DFO should be consulted during Detail Design in relation to other relevant requirements of the SARA, construction timing and current SAR sampling Protocols. The preliminary assessments of the habitat potential within the vicinity of the highway outlined herein should also be refined and discussed with DFO in relation to the likelihood of the SAR occurring in the affected reaches. The implications of the new provincial Endangered Species Act will require similar consultation with MNR.
- The site specific mitigation measures will be refined during subsequent detail design phase once the details of the proposed works and their associated impacts have been refined and confirmed. All of the mitigation measures will then be incorporated into the Contract package.

McKoy Drain Proposed Re-alignment (Reach from Kent Bridge Road (C32A to Highway 401)

- Align and design the new channel section to maintain overall channel length.
- Design and construct new channel section using naturalized principles to re-instate and enhance habitat opportunities, with specific consideration of the habitat requirements of the existing biota, including the Mapleleaf mussel:
  - Replace and enhance riparian vegetation by planting clusters of native shrub species (e.g. willows, Staghorn Sumac, Red Maple, Trembling Aspen, Red-osier Dogwood, Winterberry, Common Blackberry, Red Elderberry), to enhance riparian functions (e.g. overhead cover, overhanging cover, source of detritus and woody debris)
  - Add new pools, which are limiting in the present channel morphology
  - Excavate the new channel into the existing native substrate materials, presumed to be similar clay/muck materials as the existing channel (avoid lining with rock).
- Smooth transitions will be designed and constructed between the new channel section to the up and downstream channel sections. These transitions will be inspected prior to opening up the new channel section to flow.
- The re-aligned section of channel will be constructed 'in the dry', and then re-opened to the up and downstream channel sections. Construction of the new channel section, and particularly the flow transition, is recommended during the summer during low flow periods.

7.5 Groundwater Resources

Uncontrolled runoff during construction or operation of the Highway 401 improvements could result in contamination of groundwater through infiltration of potential contaminants, and/or surface water as a result of potential contaminants or sediment. There is also the potential for secondary effects via impacts to groundwater and surface water quality in relation to the watercourses within the study area.

Comprehensive drainage, spills and sediment and erosion control plans will be in place during all stages of construction and operation of the site in order to avoid potential impacts to surface water and groundwater. These measures include the following components:

- MTO's 'best management practices' for erosion and sedimentation control will be implemented by the Contractor to prevent fuel lubricants and fluid spills resulting from construction activities, and manage any unanticipated occurrences. The plan will identify appropriate response measures, materials and instructions, including maintenance of materials on-site or otherwise available for immediate use, and appropriate notification procedures. The Contractor, Contractor Administrator and all personnel will be aware of the practices and educated in its implementation. These practices include:
  - Containment of the construction zone with appropriately installed silt fencing throughout construction;
  - Monitoring and regular maintenance of sediment and erosion control measures as required throughout the construction period;
  - Stabilization of all disturbed surfaces prior to removal of the construction-related measures;
  - No storage, maintenance or refuelling of equipment will be permitted near any sensitive areas including the watercourses and drainage channels within the study area; and
  - Appropriate dewatering measures will be implemented to manage any groundwater encountered during grading activities.

<u>Permit to Take Water</u>

The Ontario Water Resources Act (OWRA) states that the diversion of the surface water or the extraction of groundwater in excess of 50,000 litres per day (24 hrs) requires a Permit to Take Water (PTTW) from the Ministry of the Environment (MOE). The Highway 401 improvements may result in the need for stream diversion (around the watercourses) and/or dewatering during construction (e.g. ditching, trenching, bridge pier installation). Therefore, the PTTW process will need to be addressed during the subsequent detail design phase, in order to assess the potential impacts of construction on groundwater resources.

The OWRA also stipulates that all groundwater users whose supplies are interrupted during construction activities shall be provided an alternate source of potable water. The impact of any temporary disruption in groundwater supply by construction related dewatering can be reduced through: 1) the advance notification of potentially affected users and provision of alternate supply if needed; 2) rapid completion of construction activities; and 3) the application of effective erosion control outfalls.

<u>Residential Well Survey</u>

A residential well water survey for the study area will be carried out in the subsequent detail design phase to further determine if water wells within the study area will impacted during construction. Characteristics of the survey should include (but not be limited to):

- Completion of a door-to-door well survey for residents located within the study area; especially residents located in areas of high groundwater susceptibility or in the vicinity of the interchange improvements.

7.6 Drainage and Surface Water

Drainage mitigation measures include:

- Implementation of stormwater management practices (SWMPs) for drainage protection and to minimize environmental degradation such as management of water quality drainage to off-site;
- Erosion and sediment control measures will be implemented to protect the watercourses and drainage channels within the study area; and
- All open ditches within the limits of the project will be constructed to allow proper stormwater flow to the watercourse/municipal drains within the study area.

7.7 Adjacent Land Uses/Property

The Highway 401 widening occurs towards the median, as such, no adjacent property is required to accommodate this highway improvement.

Adjacent property is required to accommodate improvements to the six highway interchanges (including the alternate routes for the identified road closures), the installation of the emergency access ramps at Merlin Road, and the relocation of the carpool parking lot at the Bloomfield Road interchange. MTO will negotiate with individual property owners to provide fair market value for the required property. Property negotiation and acquisition is anticipated to occur in the subsequent design phase.

The anticipated property impacts to accommodate the highway improvements are summarized below.

Queen's Line Interchange – Property Required

Property requirements at the Queen's Line interchange are shown on the preferred plan (see **Exhibit 5-8**) and are summarized below:

- NE and SW interchange quadrants to accommodate new ramps; and
- SE quadrant to accommodate McKinlay Road realignment.

Bloomfield Road Interchange – Property Required

Property requirements at the Bloomfield Road interchange are shown on the preferred plan (see **Exhibit 5-11**) and are summarized below:

- NW, NE and SW interchange quadrants to accommodate new ramps;
- The relocation of the interchange ramps in the southwest quadrant requires displacement of two businesses along 7th Line West;
- West and east of Bloomfield Road, north of Highway 401, to accommodate Bloomfield Road improvements (property impacts east of Bloomfield Road may be minimized by shifting the Bloomfield Road alignment to accommodate construction staging of the new structure crossing over Bloomfield Road); and
- West of Bloomfield Road, south of Highway 401, to accommodate relocated carpool parking lot and the access road to the Bloomfield Business Park. The relocated carpool parking lot is discussed further in **Section 7.16**.

Highway 40 / Communication Road Interchange – Property Required

Property requirements at the Highway 40 / Communication Road interchange are shown on the preferred plan (see **Exhibit 5-15**) and are summarized below:

- NW and SW interchange quadrants to accommodate new ramps; and
- Right of way to accommodate new connection between Pinehurst Road and Boundary Line, east of the Hydro One facility.

Kent Bridge Road Interchange – Property Required

Property requirements at the Kent Bridge Road interchange are shown on the preferred plan (see **Exhibit 5-19)** and are summarized below:

- NW, NE, SW and SE interchange quadrants to accommodate new ramps; and
- Protection of right of way to accommodate a new connection between Beechwood Line and Kent Bridge Road, across from the Burk Line intersection (should it be warranted).

Victoria Road Interchange – Property Required

Property is required at the Victoria Road interchange, as shown on the preferred plan (see **Exhibit 5-24**), and is summarized below:

- SW interchange quadrant to accommodate improved ramp.

Orford Road Interchange – Property Required

Property requirements at the Orford Road interchange are shown on the preferred plan, **Exhibit 5-25**, and are summarized below:

- NW, NE, SW and SE interchange quadrants to accommodate new and/or improved ramps.

Merlin Road Emergency Access Ramps – Property Required

Property requirements at Merlin Road for the proposed emergency access ramps are summarized below:

- North of Highway 401, east of Merlin Road; and
- South of Highway 401, east of Merlin Road.

The proposed emergency access ramps at Merlin Road are further discussed in **Section 7-15**.

7.8 Economic

The Highway 401 improvements are anticipated to benefit the economy of Chatham-Kent for efficient and safe movement of people and goods. Efficient movement of raw materials and finished goods is important for all industries, especially for the automotive sector (which provides for 56% of the employment in the private sector in Chatham-Kent). Food processing industries and agriculture also require efficient transportation owing to time sensitive and perishable nature of their produce. These improvements are anticipated to strengthen the industrial land base in the Municipality.

The tourism industry in the area will also benefit by providing improved access for tourists from and to their destination.

The improvements will help in furthering the planning objectives of Chatham-Kent to establish a prestige business park at the Highway 401 / Bloomfield Road interchange as a landmark use at the western gateway/entranceway into Chatham.

7.9 Agriculture

No direct impacts were identified with the widening of Highway 401 towards the median, as the highway widening does not require adjacent property. Any indirect impacts would be temporary (construction vehicles on side roads). Contractors will be required to allow farm equipment movement.

The preferred interchange improvements, emergency access ramps and new road connections are expected to result in some direct and indirect impacts to agriculture, which are detailed in the *Agriculture Report*, which is included in **Appendix K**. Mitigation measures include:

- Minimize impacts to Class I to Class II agricultural lands where possible;
- Avoid tile drains were possible; maintain or modify tile drainage systems where impacted;
- Maintain access to farm properties during and after construction.

7.10 Highway and Construction Noise

A noise assessment was undertaken to assess the potential noise impacts from the Highway 401 improvements following the MTO / MOE Noise Protocol and the new MTO Noise Guide. The *Noise Report* is included in **Appendix I** and the findings of the noise assessment are highlighted below.

Methodology

In order to determine noise impact, a comparison is made between the predicted future noise levels with the proposed undertaking in place (10 years after construction) and the predicted future noise levels associated with the "do nothing" alternative at the same date. The significance of a noise impact is calculated by comparing these two sound levels, qualified by using the objective of 55 dBA in addition to the change in noise level above the ambient sound level.

Per the MTO Noise Guide, where increases in noise levels are predicted, the mitigation efforts to be applied for the predicted change in noise level above the ambient and the projected noise level with the proposed improvements are as follows:

Change in Noise Level Above Ambient / Projected Noise Levels with Proposed Improvements	Mitigation Effort Required
< 5 dBA change & < 65 dBA	- None
≥ 5 dBA change OR ≥ 65 dBA	- Investigate noise control measures on right-of-way (ROW) - Introduce noise control measures within ROW and mitigate to ambient if technically, economically and administratively feasible - Noise control measures, where introduced, should achieve a minimum of 5 dBA attenuation, over first row receivers

Noise levels are predicted in decibels in the A-weighted dBA scale, which best approximates the human perception of sound over a specified time period. An increase of 2 – 3 decibels in noise levels is considered to be just perceivable to the average person. It should be noted that a 3 dBA increase in noise equates to a doubling of traffic volumes.

Noise Assessment

The findings of the noise assessment are as follows:

- The predicted increase in noise levels are < 5 dBA at all receiver locations.
- However, Noise Receiver 1 (R1), R1a, R4 to R6, R9, R11, R33, R37, R40, R47, R50, and R72 (see **Appendix I** for receiver locations) are predicted to experience an absolute noise level of ≥ 65 dBA (asphalt and/or concrete pavement). The provision of noise mitigation measures was therefore reviewed.
- A noise wall being 5 m in height along the MTO right-of-way would not achieve a 5 dBA reduction at all of the receiver locations and, therefore, walls along the MTO right-of-way are not considered to be technically feasible.
- A noise wall being 5 m high along the Highway 401 shoulder would achieve a 5 dBA reduction at residential houses immediately adjacent to Highway 401 on Regal Drive in the residential subdivision east side of Queen Street. However, as mentioned in **Section 4.3.5**, noise mitigation for the residential houses on Regal Drive is the responsibility of developer of this subdivision and the Municipality of Chatham-Kent. Given this, a noise wall is not recommended.

- A noise wall being 5 m along the Highway 401 shoulder would not achieve a 5 dBA reduction at the houses on Massey Drive in Tilbury due to the distance between these houses and Highway 401. As such, a noise wall along the shoulder is not technically feasible. Moreover, as mentioned in **Section 4.3.5**, noise mitigation at this residential subdivision is the responsibility of the developer of this subdivision and the Municipality of Chatham-Kent.
- The houses on the west side of Queen Street are not included in the two residential subdivisions east and west of Queen Street. These houses are older than the two residential subdivisions. A noise wall along the Highway 401 shoulder would achieve a 5 dBA reduction at the closest house to Highway 401 (R1a), but would not achieve a 5 dBA reduction at the houses located further away. Given the significant cost of constructing a wall along the Highway 401 shoulder, including placing the wall on the Highway 401 overpass at Queen Street, it was concluded that a 5 m wall would be cost-prohibitive for this one house. As such, a noise wall is not recommended along the Highway 401 shoulder.
- Noise walls being 5 m in height would not be considered economically feasible at the R9, R11, R22a, R33, R37, R40, R47, R50 and R72 due to isolated nature of these residential houses. The cost of the walls would be cost prohibitive for the limited number of houses.
- Should there be excess material available and available right-of-way along Highway 401, consideration should be given to providing a berm made from available excess material within the existing right-of-way at those NSAs that are predicted to have an absolute noise level of ≥ 65 dBA.

Construction Noise

During construction of the improvements, the contractor will be required to abide by the Contract Operational Constraints and municipal noise control by-laws. The Contractor will be required to keep idling of construction equipment to a minimum and to maintain equipment in good working order to reduce noise from construction activities.

Construction may occur outside of normal working hours and on weekends for certain activities along Highway 401. Such work will be carried out in compliance with local noise by-laws and any Noise By-Law exemptions that may be granted.

If complaints regarding construction noise arise from construction, they will be investigated according to the provisions of the existing MTO / MOE Noise Protocol and the new MTO Noise Guide. The Protocol requires that any initial complaint from the public requires verification by MTO that the general noise control measures agreed to be in effect. If not, MTO will warn the contractor of any problems and will take steps to enforce the contract

7.11 Air Quality Assessment

An air quality assessment was carried out to determine the potential air quality impacts from the proposed improvements to Highway 401. The air quality assessment determines the potential increase in particle matter in three size fractions (suspended particulate matter (SPM), PM_{10} (particle of sizes smaller than 10 microns), $PM_{2.5}$ (particle of sizes smaller than 2.5 microns)), carbon monoxide (CO), and nitrogen dioxide (NO_2) by comparing conditions with and without the highway widening. The detailed analysis and findings of the assessment are provided in the *Air Quality Assessment Report*, which is included in **Appendix J**.

For all contaminants and all scenarios, the predicted air quality levels shows that concentrations drop off very quickly with distance and after a few hundred metres concentrations are a small fraction of the concentrations that are occurring immediately beside the highway.

Under existing conditions, the cumulative levels of $PM_{2.5}$, NO_2 and CO are predicted to be below the 24 hour AAQC for all modelled locations. There are a limited number of modelled concentrations are above the AAQC for SPM and PM_{10}.

The results for the Year 2031 No Build and the Widening scenarios are essentially identical. In comparison to the existing conditions, two future scenarios show significant reductions in NO2 concentration levels despite the significant increase in traffic flow. The future levels of CO are almost the same as existing conditions. The emissions of particulate matter are dominated by the mechanically generated road dust portion and modelling shows significant increases in all size fractions levels due to increases in traffic. However, since the modelled concentrations drop off so quickly with distance, the area where the incremental concentrations are modelled to be above the AAQC is still vey localized and close to the highway.

For the proposed highway improvements, the air quality assessment determined that there is essentially no difference in modelled Year 2031 air quality whether the Highway 401 is widened or not.

7.12 Archaeological Resources

A Stage I archaeological assessment was carried out to assess the proposed improvements to Highway 401, and has been submitted to the Ministry of Culture (MCL) for review. The assessment concluded:

- The assessment determined that the existing corridor has been previously disturbed by the highway construction within the right-of-way and the highway widening will occur towards the median. Therefore, the highway widening would not require a Stage II archaeological assessment.
- The majority of the corridor crosses farm fields, woodlots and scrub bush and fallow areas, any new property required for construction outside of the existing right-of-way would require a Stage II assessment.
- The interchanges are all identified as having high potential for the recovery of archaeological remains since they are all located at historic roads and all appear to have undisturbed sections and therefore any property located outside the right-of-way would require a Stage II assessment.
- The proposed emergency access ramps at Merlin Road would occur outside of the highway right-of-way. This property will therefore require a Stage II assessment.
- The relocation of the existing carpool parking lot at the Bloomfield Road interchange is expected to occur outside of the highway right-of-way. The property required for this carpool parking lot will likely require a Stage II assessment.

Given the above, Stage II archaeological assessment will be carried out during the subsequent detail design phase to assess the improvements that occur outside of the MTO right-of-way.

There is always potential to uncover archaeological material during any construction project. If the Contractor's operations expose any items that may indicate an archaeological find, work in the area will be suspended immediately and MCL will be contacted.

7.13 Heritage Resources

All the bridge structures in the study corridor are greater than 40 years old and therefore eligible for inclusion in the Ontario Heritage Bridge List. None are currently listed. As well, none of the structures built before 1966 are included as Candidate Class A, B or C structures in the *Heritage Bridges Identification and Assessment Guide (1945-1965)* (Heritage Resource Centre, 2005). The need for a Cultural Heritage Evaluation Report (CHER) for any of the impacted structures using the applicable MTO criteria and scoring methods with the view of listing eligible structures in the Ontario Heritage Bridge List will be determined in the subsequent detail design phase. Mitigation recommendations are summarized in **Appendix M**.

7.14 Construction Staging

The exact construction staging/sequencing will be determined during the subsequent detail design phase. This will include a review of maintaining Highway 401 as two lanes in each direction at all times, or reducing Highway 401 to one lane per direction in construction phases.

Full access between Highway 401 and all of the interchanges is expected to be maintained during construction. Short term, off-peak closures may be required during some operations. This will be confirmed during detail design.

Advance signing of construction zones will be provided.

7.15 Emergency Vehicle Response

Emergency responses times may be impacted with construction of a median barrier wall and the associated removal of the median turnarounds. The distance between the existing interchanges at Queen's Line and Bloomfield Road is approximately 18 km. The distances between the other interchanges within the study area range from approximately 7 km to 12 km.

Openings in the median barrier wall cannot be provided, as they are a hazard for vehicles travelling on Highway 401. Mitigation measures for emergency vehicle access were discussed with emergency service providers and include:

- Re-organization of emergency response service areas, in consultation with the emergency service providers, to maximize coverage and minimize response times; and
- Provision of an emergency entrance/exit at Merlin Road between Queen's Line and Bloomfield Road.

The proposed emergency entrance/exit ramps at Merlin Road are shown in **Exhibit 7-1**. Only emergency service vehicles will be allowed to access these ramps to either access the highway or change direction when travelling on the highway. Maintenance/snow clearing will be provided as part of the MTO winter maintenance activities. The accesses will be fenced and gated at both right-of-way limits and the crossing road to prevent unauthorized access.

The emergency access ramps were shown at the second PIC. In response to comments received at and after the information centre, the alignments of the emergency access ramps were tightened to minimize property and agricultural impacts.

Consultation with emergency service providers about their service needs along this section of Highway 401 will continue during the subsequent detail design phase.

7.16 Carpool Parking Lots

The existing carpool parking in the southwest quadrant of the Highway 401 / Bloomfield Road interchange requires relocation to accommodate the interchange improvements. The preferred site is located northwest of the proposed intersection at Bloomfield Road and the new access road to the Bloomfield Business Park. The preferred site is shown in **Exhibit 7-2**. This locations and limits of the carpool parking require confirmation and discussion with the affected property owner. Access to the carpool parking lot will occur off of the new access road.

MTO has reviewed potential locations for carpool parking lots at the Highway 401 interchanges at Queen's Line, Highway 40 / Communication Road, Kent Bridge Road and Victoria Road. MTO will initiate a separate Class EA study to develop criteria for the selection of the carpool parking lots at these interchanges. This separate Class EA study will occur after the completion of this study. Affected property owners will be notified of this future study.

7.17 Illumination

Partial illumination is warranted for decision areas and critical points for all the ramps at the Highway 401 interchanges at Queen's Line, Bloomfield Road, Highway 40/Communication Road, Kent Bridge Road, Victoria Road, and Orford Road, in accordance with Directive PLNG-B-05.

Partial illumination exists for the ramp exits at all interchanges and will require relocation to accommodate the proposed highway and interchange improvements.

In addition, partial illumination also exists for the W-N/S and E-N/S ramp terminals at the Queen's Line interchange, Highway 40 / Communication Road interchange, Victoria Road interchange and Orford Road interchange. The existing illumination at both ramp terminals at Orford Road and Victoria Road are not impacted by the proposed improvements. The existing illumination at both ramp terminals at Highway 40 / Communication Road and Queen's Line requires relocation. New partial illumination will be installed at the E-N/S and W-N/S ramp terminal at the Kent Bridge Road interchange and Bloomfield Road interchange.

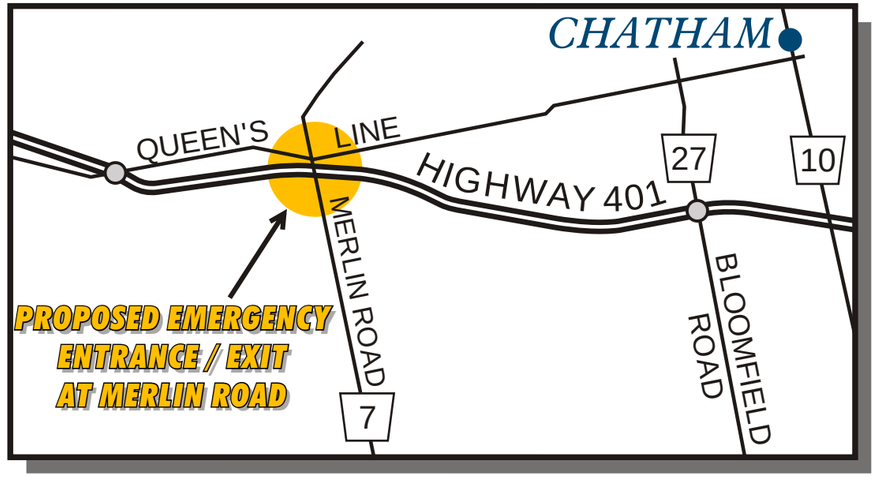
7.18 Utilities

Existing utilities within the Highway 401 corridor are summarized in **Section 4.12**. Disruptions to utility services as a result of the preferred highway widening and interchange improvement alternatives are not anticipated. Impacts to/relocation of the existing utilities are anticipated to be minor, and would occur through consultation with the affected utility providers in the subsequent detail design phase. Preliminary utility impacts are summarized below.

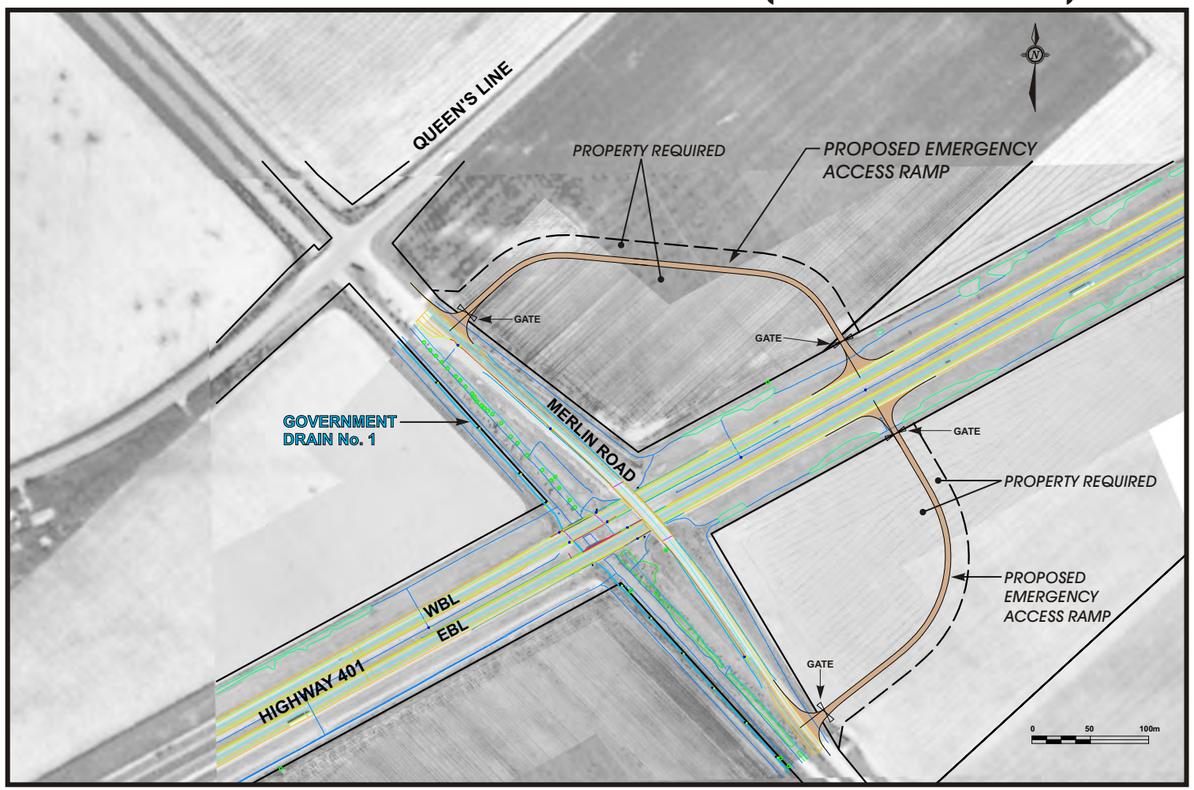
<u>Preferred Highway 401 Widening Alternatives</u>

The preferred Highway 401 widening alternative, to widen inward on existing median with a six-lane cross-section and provide a median barrier, is expected to result in minor impacts to all existing utilities that presently cross beneath Highway 401 within the study area. Utility providers that would be affected are:

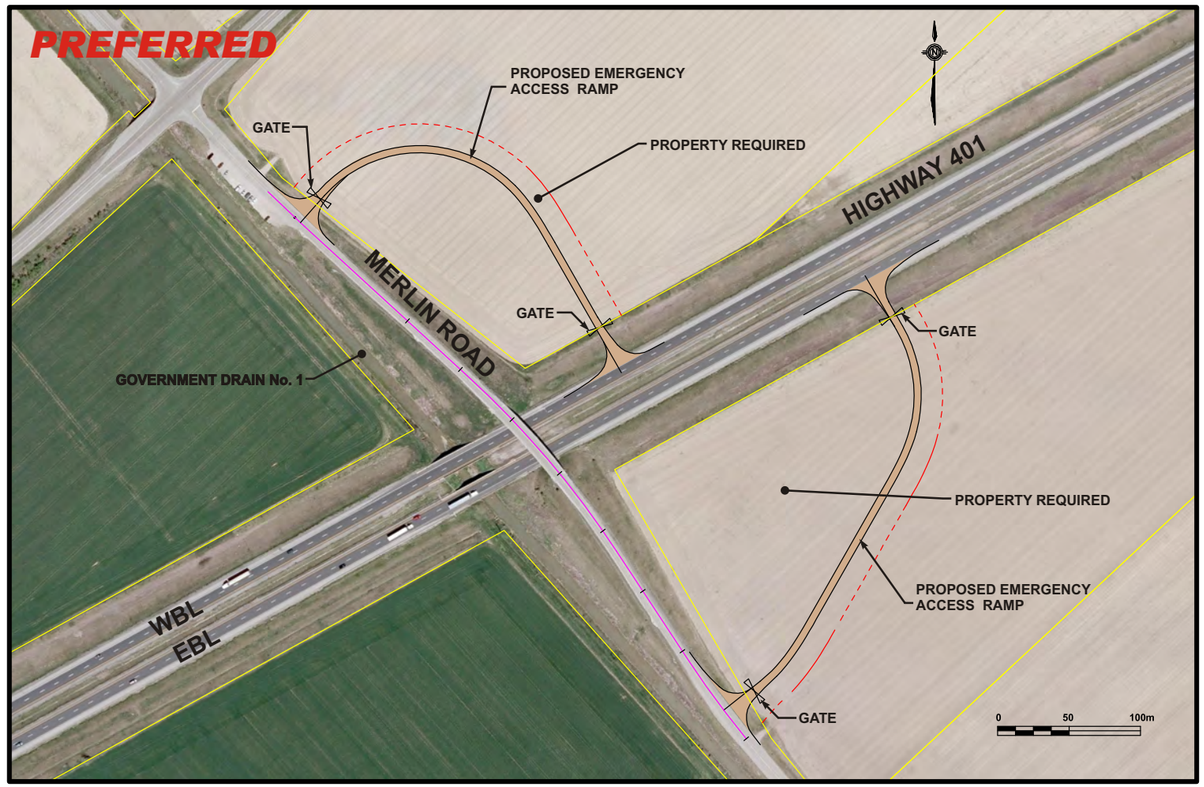
- Union Gas Limited



EMERGENCY ACCESS RAMP - MERLIN ROAD (as shown at PIC#2)



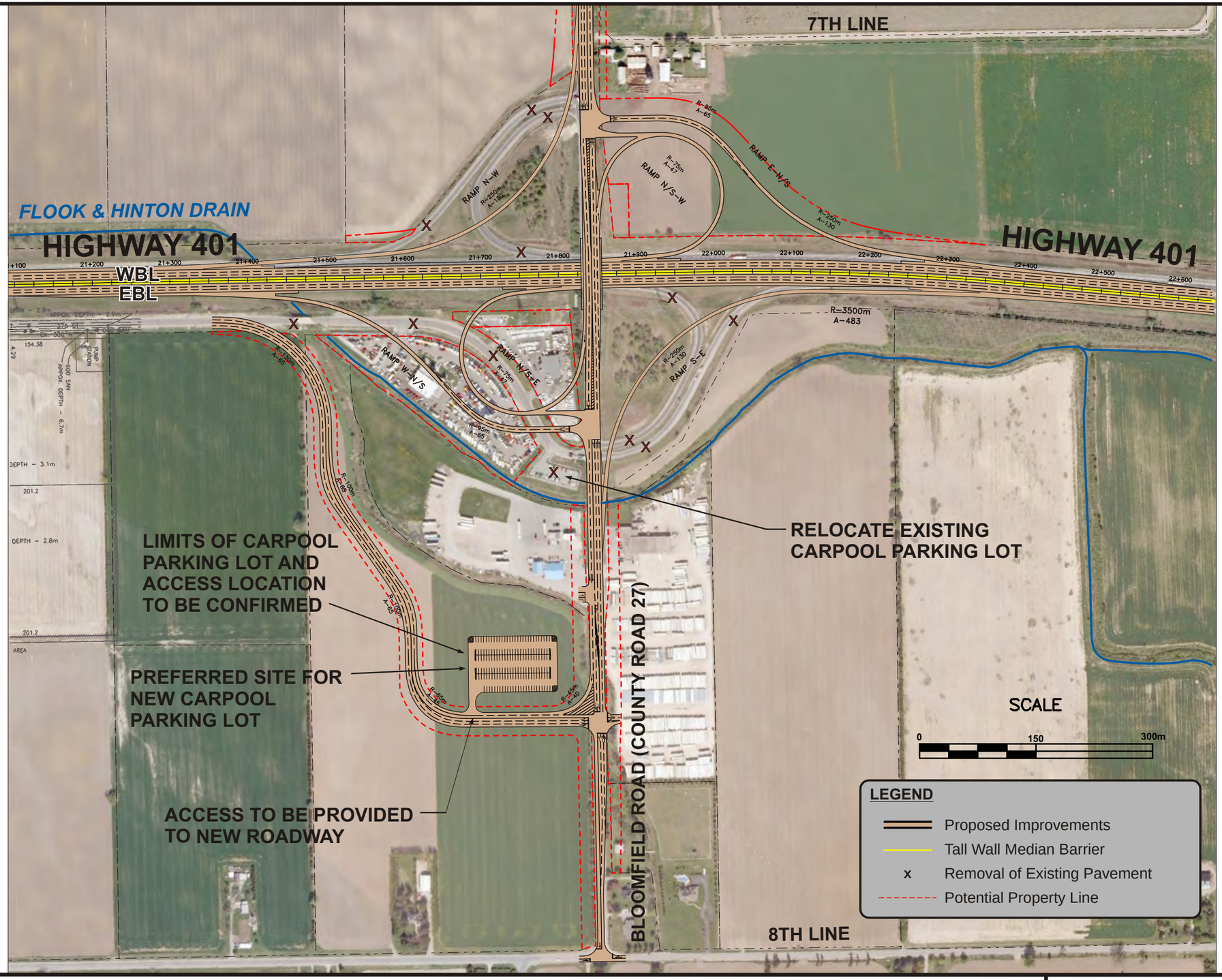
EMERGENCY ACCESS RAMP - MERLIN ROAD - PREFERRED PLAN



G.W.P. 80-00-00: Highway 401
from 0.9 km East of Essex Road 42 to Elgin County Boundary
Preliminary Design Study and Class EA

MERLIN ROAD -
EMERGENCY ACCESS RAMPS

EXHIBIT
7-1



G.W.P. 80-00-00: Highway 401
from 0.9 km East of Essex Road 42 to Elgin County Boundary
Preliminary Design Study and Class EA

BLOOMFIELD ROAD INTERCHANGE
CARPOOL PARKING LOT -
PREFERRED SITE

EXHIBIT
7-2

- Chatham-Kent Hydro
- Chatham-Kent PUC
- Bell Canada

The crossing locations of the above noted utility providers are summarized in **Section 4.12**.

Hydro One maintains a number of overhead power line crossings. Impacts to these facilities are not anticipated. It should be noted that the preferred widening alternative also avoids impacts to the Hydro One high voltage transmission line towers that are located within/adjacent to the Highway 401 south side right-of-way between Dillon Sideroad and the CSX rail crossing.

Queen's Line Interchange

The preferred Queen's Line interchange alternative, as well as the Jeannette's Creek Road and McKinlay Road realignments, are expected to result in minor impacts to Bell and Hydro One facilities at the interchange. These are:

- Bell Canada fibre optic along the north side of Highway 401 right-of-way and north west/north east interchange quadrants;
- Bell Canada lines on both the west and east side of Queen's Line at Highway 401;
- Hydro One line crossing from the north west to south east interchange quadrants (Jeannette's Creek Road to McKinlay Road); and
- Hydro One line on east side of Queen's Line at Highway 401.

Bloomfield Road Interchange

The preferred Bloomfield Road interchange alternative is expected to result in minor impacts and/or realignments of a number of utilities in the vicinity of the interchange. These are:

- Bell Canada fibre optic along Highway 401 north side right-of-way and north west/north east interchange quadrants;
- Bell Canada lines on the west side of Bloomfield Road both north and south of Highway 401, the south west interchange quadrant, as well as the east side of Bloomfield Road north of Highway 401;
- Chatham-Kent Hydro overhead crossing on the east side of Bloomfield Road over Highway 401 as well as the south west interchange quadrant;
- Chatham-Kent PUC 400 mm PVC sewer force main along the south side of 7th Line East, west side of Bloomfield Road, and along the Highway 401 south side right of way to the Bloomfield Business Park;
- Chatham-Kent PUC 400 mm PVC water main along the west side of Bloomfield Road, as well as the existing 7th Line West to the Bloomfield Business Park;
- Hydro One line along the west side of Bloomfield Road, both north and south of Highway 401;
- Hydro One line along the Highway 401 south side right of way; and
- Union Gas 8" gas main along the west side of Bloomfield Road beneath the highway and the along the south side of the Highway 401 right of way to the Bloomfield Business Park.

The preferred interchange alternative avoids impacts to the Hydro One high voltage transmission line towers that are located within/adjacent to the Highway 401 south side right-of-way at the Bloomfield Road interchange.

Highway 40 / Communication Road Interchange

The preferred Highway 40 / Communication Road interchange alternative, as well as the preferred Pinehurst Road connection to Boundary Road, are expected to result in minor impacts and/or realignments of several utilities. These are:

- Bell Canada fibre optic along Highway 401 north side right-of-way and north west/north east interchange quadrants;
- Bell Canada lines on the west side of Highway 40 / Communication Road both north and south of Highway 401;
- Hydro One line along the east side of Highway 40 / Communication Road, both north and south of Highway 401 and within the north east and south east interchange quadrants; and
- Change in access to the Hydro One facility located east of Highway 40 and south of Boundary Line.

Kent Bridge Road Interchange

The preferred Kent Bridge Road interchange alternative is expected to result in minor impacts to several utilities. These are:

- Bell Canada fibre optic along Highway 401 north side right-of-way;
- Bell Canada line on the east side of Kent Bridge Road south of Highway 401; and
- Hydro One line along the west side of Kent Bridge Road, both north and south of Highway 401.

Victoria Road Interchange

The preferred Victoria Road interchange alternative is expected to result in minor impacts to several utilities. These are:

- Bell Canada fibre optic along Highway 401 north side right-of-way and the north west and north east interchange quadrants;
- Bell Canada line on the west side of Victoria Road both north and south of Highway 401; and
- Hydro One line along the east side of Victoria Road, both north and south of Highway 401.

Orford Road Interchange

The preferred Orford Road interchange alternative is expected to result in minor impacts to several utilities. These are:

- Bell Canada fibre optic along Highway 401 north side right-of-way and the north west and north east interchange quadrants; and

- Bell Canada line on the west side of Orford Road both north and south of Highway 401.

Merlin Road Emergency Access Ramps

The preferred Merlin Road emergency access ramp alignment is expected to result in minor impacts to Bell and Chatham-Kent PUC facilities at Merlin Road. These are:

- Bell Canada fibre optic along the Highway 401 north side right-of-way; and
- Chatham-Kent PUC (Blenheim System) 150 mm PVC watermain along the east side of Merlin Road, both north and south of Highway 401.

7.19 Landscape and Snowdrift Mitigation Plan

Comments were received from the Lower Thames Valley Conservation Authority, the Chatham-Kent Stewardship Network and members of public requesting a tree planting/landscaping component to the proposed improvements to Highway 401. A landscaping plan will be developed in the subsequent detail design phase in consultation with the Lower Thames Valley Authority, the Chatham-Kent Stewardship Network and the public. Landscaping measures will be identified on the contract drawings.

Certain sections of Highway 401 within the study limits have been identified as prone to snow drifting and accumulation, leading to occasional concerns with winter driving conditions and winter maintenance difficulties. The Project Team met with MTO maintenance staff to identify areas susceptible to snow drifting. These areas are shown in **Exhibits 4-1a and 4-1b**. An analysis of snow drifting and storage requirements is included in **Appendix O**.

The recommended plantings to provide additional snow hedges/fencing and/or ditching to provide additional snow storage will be further reviewed during subsequent detail design phase for incorporation into the recommended improvements.

7.20 Summary of Identified Concerns and Proposed Mitigation

Exhibit 7-3 summarizes the identified concerns and the proposed mitigation measures, based on the identified environmental sensitivities and the proposed Preliminary Design Plan. The proposed improvements to Highway 401 may be subject to minor refinements during the development of the detail design plan. Any potential refinements, however, are not anticipated to increase impacts to the identified concerns.

Exhibit 7-3: Summary of Identified Concerns and Proposed Mitigation

Legend

MTO: Ministry of Transportation	MOE: Ministry of the Environment
MNR: Ministry of Natural Resources	MCL: Ministry of Culture
DFO: Department of Fisheries and Oceans, Canada	Mun: Municipality of Chatham-Kent
LTVCA: Lower Thames Conservation Authority	OMAFRA: Ministry of Agriculture, Food and Rural Affairs
ES: Emergency Service Providers	UTL: Utility Providers

ENVIRONMENTAL ISSUE/CONCERN	CONCERNED AGENCIES	PROPOSED MITIGATION
Erosion and Sediment Control (Section 7.1 of TESR)		
• Excavation and grading may result in erosion of exposed soils that can be carried to the watercourses/municipal drains during storm events.	MOE MTO MNR	• Vegetation removal will be limited to only what is required. • Erosion and sediment control practices will be implemented throughout construction to prevent migration of sediment into adjacent areas. • All appropriate temporary erosion and sediment control measures such as silt fence barriers, erosion control blanket, and rock flow checks will be used to contain the construction area and prevent any migration of sediment. • All disturbed slope areas will be stabilized and vegetated with top soil, seed and mulch. • Stabilization and re-vegetation will be established as soon as possible following excavation and construction. • An environmental inspector will be employed throughout construction to ensure sediment and erosion control measures are functioning properly and all mitigation measures are being implemented.
Management of Excess Material and Property Contamination (Sections 7.2 of TESR)		
• Excess materials may be encountered during construction and require proper management/disposal. • Property contamination may be encountered during construction and require proper management/disposal.	MTO MOE	• Excess materials generated during construction will be managed by the Contractor in accordance with OPSS 180. • Opportunities to minimize excess material generation through salvage and reuse (such as earth material for slope flattening) will be identified during subsequent design phases. • Any placement of materials beyond the highway right-of-way should involve review by the project ecologist and consultation with MNR. MNR permits will also be required. • Ensure proper containment, filtering and proper release away from sensitive features of sediment from all construction-generated dewatering discharge. • Employ proper handling of potentially toxic construction materials and ensure proper spills management. The Contractor will have a Spills Prevention and Management Plan, and all required materials on site.

ENVIRONMENTAL ISSUE/CONCERN	CONCERNED AGENCIES	PROPOSED MITIGATION
Vegetation (Section 7.3 of TESR)		
• Removal of vegetation to accommodate the highway improvements. • Fragmentation and removal of species of conservation concern (prairie species) • Removal of individual roadside trees	MTO MNR MOE	• Ensure a clear delineation of vegetation clearing zones and vegetation retention zones in both the contract documents and in the field to minimize the risk of unnecessary vegetation impacts and avoid incidental impacts as a result of construction activities. • Ensure the use of appropriate vegetation clearing techniques. • Design and install standard sediment and erosion control measures. • Ensure the use of appropriate vegetation clearing techniques. • Exposed surfaces will be stabilized and re-vegetated as soon as possible using a combination of native plantings and the application of an appropriate native seed mix. • Abandoned portions of the roadway will be removed and the underlying road bed materials at least re-graded and scarified to enable re-colonization of natural vegetative cover. If desirable, or in particular locations, this are could be restored to natural vegetative cover using a combination of native plantings and the application of an appropriate native seed mix. • Delineate "Environmental Sensitive Areas" in Contract Drawings and Specifications and in the field use temporary vegetation protection fencing or other appropriate fencing or other appropriate measures to prevent encroachment into sensitive areas. • Implement environmental inspection throughout construction to ensure that protection measures are implemented, maintained and repaired and remedial measures are instigated where warranted. • Carry out additional consultation with MNR during the subsequent detail design phase to discuss the above the activities.
Wildlife Habitat (Section 7.3 of TESR)		
• Loss of wildlife during construction • Localized impacts due to removal of common vegetation/habitat. • Localized potential for nesting by some species in adjacent vegetation that may be disturbed by the construction activities. • Wildlife crossings.	MTO MNR MOE	• Any wildlife incidentally encountered during construction will be protected. If required, the environmental inspector will capture and release any small wildlife (e.g. amphibians, small mammals, reptiles) stranded within the construction zone. • Design of new culverts and structures and rehabilitation/extension of existing culverts and structures during detail design will give consideration to accommodating and enhancing wildlife movement functionality in consultation with MNR. • Avoid the creation of pools that can collect salt water adjacent to the highway because these areas can attract wildlife close to the road.
		• Ensure that no active nests will be removed or disturbed in accordance with the *Migratory Birds Act*. • Ensure that timing constraints are applied to avoid vegetation clearing during the breeding bird season. Regional timing window to be confirmed with Environment Canada/Canadian Wildlife Service prior to construction.
Fisheries & Aquatic Habitat (Section 7.4 of TESR)		
• Impact on fish habitat due to culvert extensions, new culverts and potential realignment of the McKoy Drain.	MTO MNR DFO	• Prepare HADD determination based on MTO/DFO/MNR Fisheries Protocol during the subsequent detail design phase. • Implement appropriate instream construction timing windows during less sensitive time period. • Implement general mitigation measures to minimize potential impacts during and following construction activities.
Groundwater Resources (Section 7.5 of TESR)		
• Uncontrolled runoff during construction or operation of the site could result in contamination of groundwater through infiltration of potential contaminants, and/or surface water as a result of potential contaminants or sediment. There is also the potential for secondary effects via impacts to groundwater and surface water quality in relation to watercourses/municipal drains.	MTO MOE Property Owner	• MTO 'best management practices' for erosion and sedimentation control will be in place during all stages of construction and operation of the site in order to avoid potential impacts to surface water and groundwater. • Design and operational components that emphasize prevention of any off-site impacts by first avoiding or minimizing potential for spills, and then ensuring proper containment measures are in place so that deleterious materials can not migrate off-site. Stringent management of site drainage will protect groundwater and surface water resources. • If diversion of surface water or the extraction of groundwater in excess of 50,000 litres per day, a Permit to Take Water (PTTW) will be obtained from MOE. • A residential well water survey for the study area will be carried out in the subsequent detail design phase to further determine if water wells within the study area will be impacted during construction. • A hydrogeological survey will be carried out for the affected property owner in the northeast quadrant of the Bloomfield Road interchange to determine the viability of relocating their impacted water well or connecting to the municipal water system.
Drainage (Section 7.6 of TESR)		
• Runoff from Highway 401 and crossing roads could impact water quality if not properly handled.	MTO MOE MNR	• Storm water management practices (SWMPs) will be implemented for drainage protection and to minimize environmental degradation. • Erosion and sediment control measures will be implemented to protect the Mississagi River and drainage channels.

ENVIRONMENTAL ISSUE/CONCERN	CONCERNED AGENCIES	PROPOSED MITIGATION
Adjacent Land Uses/Property (Section 7.7 of TESR)		
• Adjacent property is required to accommodate improvements to the interchanges (including alternate routes for the identified road closures), the installation of the emergency access ramps at Merlin Road, and the relocation of the carpool parking lot at the Bloomfield Road interchange. • Two businesses in the southwest quadrant of the Bloomfield Road interchange will be displaced to accommodate the interchange improvements.	MTO Property Owners	• MTO will negotiate with individual property owners to provide fair market value for the required property. Property negotiation and acquisition is anticipated to occur in the subsequent detail design phase.
Economic (Section 7.8 of TESR)		
• The Highway 401 improvements are anticipated to benefit the economy of Chatham-Kent for efficient and safe movement of people and goods. • The tourism industry in the area will also benefit by providing improved access for tourists. • Improvements will help in furthering the planning objectives of Chatham-Kent to establish the Bloomfield Business Park at the Bloomfield Road interchange.	MTO Mun	• None anticipated.
Agriculture (Section 7.9 of TESR)		
• No direct impacts were identified with the widening of Highway 401 towards the median. • The preferred interchange improvements are expected to result in some direct and indirect impacts to agriculture.	MTO OMFRA Property Owners	• Impacts to Class I to Class II agricultural lands will be minimized where possible. • Tile drains will be avoided where possible or the tile drainage systems will be maintained or modified if impacted.
Highway & Construction Noise (Section 7.10 of TESR)		
• Noise assessment identified the consideration of noise mitigation is warranted at specific NSAs within the study area. However, the assessment concluded that noise mitigation is not technically and/or economically feasible. Thus, noise mitigation is not recommended. • Noise concerns relating the newer residential subdivision on the south side of Highway 401 in Tilbury should be directed to the Municipality of Chatham-Kent. • Construction noise issues.	MTO	• Should there be excess material available and available right-of-way along Highway 401, consideration should be given to providing a berm made from available excess material within the existing right-of-way at those NSAs that are predicted to have an absolute noise level of ≥65 dBA. • The Contractor will be required to abide by the Contract Operational Constraints and municipal noise control by-laws. • The Contractor will be required to keep idling of construction equipment to a minimum and to maintain equipment in good working order to reduce noise from construction activities. • If construction work occurs outside of normal working hours and on weekends, such work will be carried out in compliance with local noise by-laws or Noise By-Law exemptions will be obtained. • Complaints from construction will be investigated according to the provisions of the existing MTO / MOE Noise Protocol.
Archaeology (Section 7.12 of TESR)		
• A Stage I Archaeological Assessment identified that the majority of the corridor crosses farm fields, woodlots and scrub bush and fallow areas, and thus any new property required for construction outside of the existing right-of-way will require a Stage II Archaeological Assessment.	MTO MCL	• A Stage II Archaeological Assessment will be carried out during the subsequent detail design phase to assess the improvements that occur outside of the MTO right-of-way. • If the Contractor's operations expose any items that may indicate an archaeological find, work in the area will be suspended immediately and MCL will be contacted.
Heritage Resources (Sections 7.13 of TESR)		
• All of the bridge structures in the study corridor are greater than 40 years old and therefore eligible for inclusion in the Ontario Bridge Heritage List. None are currently listed. • None of the structures built before 1966 are included as Candidate Class A, B or C structures in the *Heritage Bridges Identification and Assessment Guide (1945-1965)* (Heritage Resource Centre, 2005). • The existing structures that are directly or indirectly impacts are summarized in **Appendix M**.	MTO MCL	• The need for a Cultural Heritage Evaluation Report (CHER) will be determined during the subsequent detail design phase. Mitigation recommendations are summarized in **Appendix M**.
Construction Staging (Section 7.14 of TESR)		
• Motorists may experience delays and disruption during construction.	MTO ES Mun	• The exact construction staging/sequencing will be confirmed during the subsequent detail design phase in consultation with emergency service providers and the Municipality of Chatham-Kent. • Advance signing of construction will be provided.
Emergency Vehicle Response (Section 7.15 of TESR)		
• Construction of median barrier and the associated removal of the median turnarounds may impact emergency response times.	MTO Mun ES	• Emergency access ramps will be provided at the Merlin Road flyover to allow turnarounds for emergency vehicles between the Queen's Line interchange and the Bloomfield Road interchange. • Consultation with emergency service providers will continue during the subsequent detail design phase to identify re-organization of emergency response service areas.
Carpool Parking Lots (Section 7.16 of TESR)		
• The existing carpool parking lot in the southwest quadrant of the Bloomfield Road interchange will be impacted by the proposed improvements to the	MTO Mun.	• The preferred site for relocating the carpool parking lot at the Bloomfield Road interchange is located northwest of the proposed intersection at Bloomfield Road and the new access road to the Bloomfield

ENVIRONMENTAL ISSUE/CONCERN	CONCERNED AGENCIES	PROPOSED MITIGATION
interchange. • MTO has identified a need for carpool parking lots at other interchanges within the study area.		Business Park. This location and limits of the carpool parking lot requires confirmation and discussion with the affected property owner. • MTO will initiate a separate Class EA study to develop criteria for the selection of carpool parking lots at the interchanges at Queen's Line, Highway 40 / Communication Road, Kent Bridge Road and Victoria Road.
Illumination (Section 7.17 of TESR)		
• Partial illumination is warranted for the decision areas and critical points for all the ramps at all of the interchanges.	MTO	• All existing illumination will be impacted by the proposed highway and interchange improvements and will require relocation. • New partial illumination will be installed at the ramp terminals at the interchanges at Bloomfield Road, Kent Bridge Road and Victoria Road.
Utilities (Section 7.18 of TESR)		
• Disruptions to utilities are not anticipated. • Impacts to/relocation of the existing utilities are anticipated to be minor. • Access to the Hydro One substation is affected by the proposed alternate route for Pinehurst Road connecting to Boundary Line.	MTO	• Relocation of affected utilities will occur through consultation with the affected utility providers in the subsequent detail design phase.
Landscaping and Snow Drifting (Section 7.19 of TESR)		
• Certain sections of Highway 401 within the study limits have been identified as prone to snow drifting and accumulation, leading to occasional concerns with winter driving conditions and winter maintenance difficulties.	MTO	• A landscaping plan will be developed in the subsequent detail design phase in consultation with the Lower Thames Conservation Authority, Chatham-Kent Stewardship Network and the public. Landscaping measures will be identified on the contract drawings. • The recommended plantings to provide additional snow hedges/fencing to provide additional snow storage will be further assessed during the subsequent detail design phase in consultation with the above.

8. MONITORING

8.1 Monitoring During Construction

The MTO has an internal process to identify and address updates to the Ontario Provincial Standard Specifications, and MTO Special Provisions and Non-Standard Special Provisions. This includes ongoing review of unanticipated events that occur during other construction contracts and incorporation of required updates into future contract provisions. This helps to assess the effectiveness of the contract provisions to ensure that they are providing the expected control and / or protection.

On-site construction administration / inspection staff (retained by MTO) will ensure that the environmental protection measures outlined in this report are carried out. In the event that problems develop, the MTO Environmental Planner and appropriate external agency representatives will be contacted to provide additional input.

If the impacts of construction are different than anticipated, or if the method of construction is such that there are greater than anticipated impacts, the Contractor's methods of operation will be changed or modified to reduce those impacts.