Canada

MINISTRY OF TRANSPORTATION, ONTARIO
CORPORATION OF THE COUNTY OF ESSEX

Ontario

County Road 19 (Manning Road) & County Road 22 Improvements GWP 3031-06-00

DILLON CONSULTING

ENVIRONMENTAL STUDY / PRELIMINARY DESIGN REPORT

November 2008

Ministry of Transportation, Ontario
Corporation of the County of Essex

County Road 19 (Manning Road) & County Road 22 Improvements
GWP 3031-06-00

Environmental Study/Preliminary Design Report
November 2008

Project No. 06-6998

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New page 130 inserted November 18, 2008.

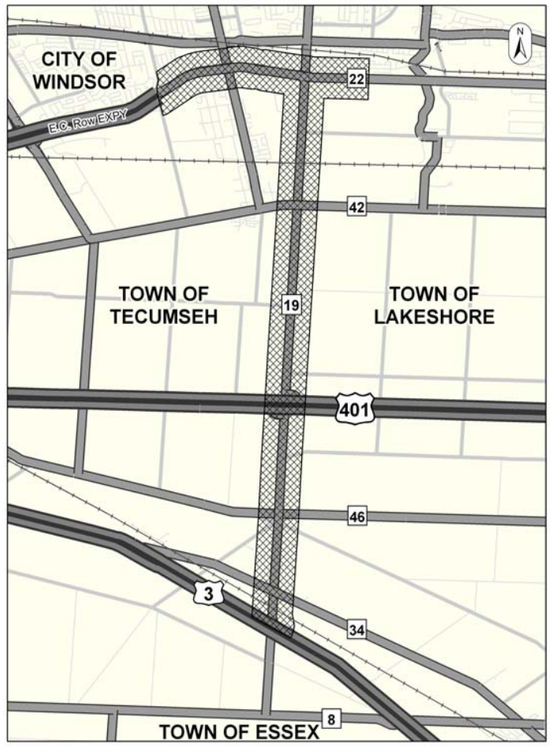
ONTARIO MINISTRY OF TRANSPORTATION (MTO) AND THE COUNTY OF ESSEX
CLASS ENVIRONMENTAL ASSESSMENT AND PRELIMINARY DESIGN
***Let's Get Windsor-Essex Moving* Strategy**

ESSEX COUNTY ROAD 19 (MANNING ROAD) AND ESSEX COUNTY ROAD 22 IMPROVEMENTS

NOTICE OF STUDY COMPLETION

The Study

Dillon Consulting Limited was retained by the Ontario Ministry of Transportation (MTO) and the County of Essex) to complete the Environmental Assessment and Preliminary Design of improvements to 13 kilometres of Essex County Road 19 (Manning Road), from Highway 3 to the VIA rail line, and 3 kilometres of Essex County Road 22, from the City of Windsor boundary to Lakeshore Boulevard. The preferred design of the improvements includes:



- widening Essex County Road 19 from two to four lanes
- widening Essex County Road 22 from four to six lanes
- double lane roundabout at Essex County Roads 19 and 34
- Highway 401 interchange improvements, including construction of a new underpass structure and reconstruction of interchange ramps
- widening of Pike Creek Bridge from two to four lanes
- grade separation of the CP Rail crossing and construction of access/service roads for existing uses
- single point urban interchange at Essex County Roads 19 and 22
- partial interchange (half diamond/button hook) at Essex County Road 22 and Lesperance Road.

The Process

The study is subject to Ontario's *Environmental Assessment Act* and was planned in accordance with the requirements of Schedule C of the Municipal Class Environmental Assessment (October 2000 as amended in 2007) and Group B of the Class Environmental Assessment for Provincial Transportation Facilities (2000). Opportunities for public input were provided throughout the course of the study. A screening will also be completed under the *Canadian Environmental Assessment Act (CEAA)*.

Environmental Study Report/Preliminary Design Report

The Environmental Study Report/Preliminary Design Report (ESR/PDR) prepared for this project describes the preferred Preliminary Design, anticipated environmental impacts, and the environmental measures and provisions that have been incorporated into the design to mitigate the project's impacts.

The ESR/PDR will be available for a 30-day public and agency review period from **November 18, 2008 to January 5, 2009** at the following locations or by visiting
http://www.countyofessex.on.ca/countyservices/engineering_road_studies.asp

County of Essex
360 Fairview Avenue West
Essex, Ontario
Tel: 519-776-6441

Essex County Library
Tecumseh Branch
13675 St. Gregory's Road
Tecumseh, Ontario
Tel: 519-735-3670

Town of Tecumseh
917 Lesperance Road
Tecumseh, Ontario
Tel. 519-735-2184

Town of Lakeshore
419 Notre Dame Street
Belle River, Ontario
Tel: 519-728-2700

Ministry of Transportation
949 McDougall Avenue, Suite 200
Windsor, ON
Tel: 519-973-7367

Ministry of Transportation
West Region, 1st Floor
659 Exeter Road
London, Ontario
Tel: 519-873-4100

Ministry of the Environment
Windsor Area Office
4510 Rhodes Drive, Unit 620
Windsor, Ontario
Tel: 519-948-1464

Ministry of the Environment
Southwest Regional Office
733 Exeter Road
London, Ontario
Tel: 519-873-5000

Comments

If you have concerns, comments or questions, please provide a written response to the Project team representatives listed below by **January 5, 2009**.

If you have serious concerns, that cannot be resolved through discussions with ,the County, MTO and their consultants, you may request the Minister of the Environment (in writing) to issue a "Part II Order" under the *Environmental Assessment Act* to change the status of the project from a Class EA to an individual EA. Requests must be received by the Minister at the address below by **January 5, 2009**. A copy of the request must be sent to the County of Essex, the Ontario Ministry of Transportation and the Consultant at the addresses listed below. If no Part II Order requests are received by **January 5, 2009**, this project will be considered to have met the requirements of the Class EA. Detailed design can be scheduled subject to available funding.

Minister of the Environment
135 St. Clair Avenue West, 10th Floor
Toronto, Ontario, M4V 1P5

Information will be collected and used 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.

Let's Get Windsor-Essex Moving Strategy

This project is part of the *Let's Get Windsor-Essex Moving* strategy, a joint commitment by the federal and provincial governments to invest $300 million at the Windsor Gateway on several infrastructure projects that will help reduce congestion and improve efficiency in Windsor-Essex. Funding is being provided under the Canada-Ontario Border Infrastructure Fund.

Keeping Track of the Project

The Ministry of Transportation and County of Essex websites are valuable sources of information on the project. Additional information can be found online at: www.countyofessex.on.ca and www.mto.gov.on.ca.

Disponible en français.

If you have any questions, or require further information, please contact:

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EXECUTIVE SUMMARY

1. Introduction

The Ministry of Transportation, Ontario (MTO), in association with the County of Essex and Transport Canada, retained Dillon Consulting Limited to complete an Environmental Assessment (EA) and Preliminary Design of improvements to Essex County Road 19 (CR 19) (Manning Road) and Essex County Road 22 (CR 22). This project is part of the *Let's Get Windsor-Essex Moving* strategy, a joint commitment by the Federal and Provincial governments to invest $300 million in the Windsor Gateway, a vital transportation artery between Canada and the U.S.

The Study Area includes 13 km of CR 19, from Highway 3 to the VIA Rail line, including the CR 19/Highway 401 interchange, and 3 km of CR 22, from the City of Windsor boundary to 350m east of Lakeshore Boulevard:

- forming the boundary between the Towns of Lakeshore and Tecumseh, CR 19 is a major north-south arterial that connects Highways 401 and 3 to CR 22, CR 34, CR 42 and CR 46. It serves commuting and commercial traffic to Windsor, Tecumseh, St. Clair Beach, Maidstone and other urban centres. It also provides direct access to abutting properties, including agricultural, residential, commercial and industrial uses
- CR 22 connects the E.C. Row Expressway and City of Windsor with the Towns of Lakeshore and Tecumseh. It also functions as a major arterial for commuting and commercial traffic to Belle River and other urban centres along Lake St. Clair.

The Study Team for the project consisted of representatives of MTO, County of Essex, Town of Lakeshore and Town of Tecumseh. Dillon Consulting Limited was the project engineering and planning consultant.

The Environmental Study/Preliminary Design Report (ESR/PDR) was prepared in accordance with the requirements of the Municipal Class EA (October 2000, as amended in 2007) and MTO's Class EA for Provincial Transportation Facilities (2000). MTO's Class EA applies to the Highway 401 interchange. The *Canadian Environmental Assessment Act* (*CEAA*) also applies to the study.

2. Proposed Improvements and Construction Phasing

The major features of the recommended improvements to CR 19 and CR 22 include:

- widening CR 19 from two to four lanes. The section from just south of County 42 to CR 22 will be changed from a rural to an urban roadway
- widening CR 22 from four to six lanes. This section of CR 22 will be changed from a limited access to a controlled access roadway
- double lane roundabout at CR 19 and CR 34
- Highway 401 interchange improvements, including construction of a new underpass structure and reconstruction of the interchange ramps
- widening of Pike Creek Bridge from two to four lanes
- grade separation of the CP Rail crossing and construction of access/service roads for adjoining uses
- single point urban interchange at CR 19 and CR 22
- partial interchange (half diamond/button hook) at CR 22 and Lesperance Road.

Property acquisitions and utility relocations are also required in advance of construction.

The preliminary cost estimate for the proposed improvements to CR 19 and CR 22 (2008 dollars) is in the range of $180 million to $200 million. The Study Team recommends that the improvements be constructed generally from north to south in the following five phases:

- ***Phase 1*** - CR 19 from just south of Little Baseline Road to Amy Croft Drive and CR 22 from west of CR 19 to east of Lakeshore Boulevard (2 years construction duration)
- ***Phase 2*** - CR 22 from the City of Windsor boundary to east of Lesperance Road (1 year)
- ***Phase 3*** - CR 19 from south of Little Baseline Road to south of CR 42, including the Pike Creek Bridge (1.5 years)
- ***Phase 4*** - CR 19 from south of CR 42 to south of North Rear Road, including the Highway 401 interchange (2 years)
- ***Phase 5*** - CR 19 from south of North Rear Road to Highway 3 (1 year).

Construction phasing will be confirmed during the Detailed Design stage. The timing and phasing of the Detailed Design and Class EA studies will be determined following environmental clearance of the ESR/PDR. Detailed Design may proceed for the whole project or be split into different project phases.

At this time, no provincial/federal commitment has been made to fund the proposed improvements. As a result, construction timing cannot be confirmed. The timing for construction will be considered in the context of other regional projects.

3. Transportation Needs Assessment

Section 3 of the ESR/PDR includes a Transportation Needs Assessment.

The Essex-Windsor Regional Transportation Master Plan (EWRTMP) (October 2005) identified capacity and operating deficiencies for both CR 19 and CR 22 in the Towns of Lakeshore and Tecumseh. The EWRTMP concluded that improvements to both roads are required to meet existing and future traffic demands. The need for improvements was confirmed by a Transportation Needs Assessment completed by Dillon as part of the Class EA and Preliminary Design study.

Both County Roads 19 and 22 are designated as Arterial Roads in the County of Essex and local municipal Official Plans and serve as key transportation system components in support of growth in the area's urban centres. Although both roads play a crucial role in serving existing travel demands and short- and long-range land use planning and development objectives, the existing corridors exhibit considerable operational stress due to the relatively high traffic peaks, mix of traffic and numerous access points and intersections. **Table 1** shows approximate traffic volumes for peak hour traffic in each direction on CR 19, including daily traffic (AADT), based on data collected in the Fall of 2006.

Table 1 - CR 19 and CR 22 Typical Corridor Section Volumes

Road Section	**AM Peak Hour**		**PM Peak Hour**		**AADT**
CR 19:	**SB**	**NB**	**SB**	**NB**	**Two-way**
North of CR 22	600-650	400-450	750-950	750-950	19,500
CR 22 to CR 42	450	450	650	550	12,500
CR 42 to Highway 401	500-550	400-450	450-600	450-550	12,000
Highway 401 to CR 46	350	500	500	400	11,000
CR 46 to CR 34	300	500	500	350	10,500
CR 34 to Highway 3	200	350	300	200	6,000
CR 22:	**WB**	**EB**	**WB**	**EB**	**Two-way**
West of Lesperance Road	1,600	800	1,250	1,750	35,500
Lesperance Road to CR 19	1,250	800	1,200	1,550	32,500
East of CR 19	1,000	750	800	1,200	21,500

As shown on **Table 1**, the section of CR 19 north of CR 22 experiences the highest demand. In this section, traffic is more local in nature and the higher volumes reflect the influence of residential commuter traffic and commercial/retail traffic in the PM peak hour. South of CR 22, traffic volumes are more moderate and decrease gradually to the south, reflecting the more regional, longer-distance nature of trips in this section of the corridor. Traffic volumes drop in the southernmost section of the corridor, as traffic branches off to Maidstone and Essex. South of CR 34, traffic volumes on CR 19 are low.

Traffic volumes on CR 22 through the Study Area are very high, particularly west of CR 19, and reflect the corridor's role as a major east-west regional arterial and commuter route and its connection to the E.C. Row Expressway to the west.

As part of the Transportation Needs Assessment, Dillon determined Level of Service (LOS) for existing and future conditions on CR 19, as shown on **Table 2**. Level of Service is a qualitative measure reflecting motorists' perception of operation of an intersection or roadway facility, and is categorized from LOS A to LOS F. LOS A reflects optimum conditions with minimal delays and LOS F reflects congested conditions and intersection / roadway failure.

Table 2 – CR 19 Two-Lane Highway Operations

Section	**Existing LOS**	**Future Low Growth**			**Future High Growth**		
		5-year	**10-year**	**20-year**	**5-year**	**10-year**	**20-year**
CR 22 to CR 42	D	D	E	F	D	E	F
CR 42 to Highway 401	D	D	E	E	E	E	F
Highway 401 to CR 46	D	D	D	D	D	D	E
CR 46 to CR 34	D	D	D	D	D	D	E
CR 34 to Highway 3	B	C	C	C	C	D	D

As shown on **Table 2**:

- north of Highway 401, CR 19 currently operates at LOS D, but is expected to reach LOS E by the 10-year horizon and fail (LOS F) in 20 years. Widening to four lanes is required between 2011 and 2016 to maintain an acceptable level of service

- south of Highway 401 to CR 34, CR 19 currently operates at LOS D and is anticipated to continue to operate at this level for the next 10 years. In the longer term, however, under the high growth scenario, level of service is expected to drop to LOS E, indicating that widening to four lanes will be required prior to 2026 to maintain an acceptable level of service.

Table 3 – CR 22 Suburban Arterial Operations

Direction	Existing LOS	Future Low Growth			Future High Growth		
		5-year	10-year	20-year	5-year	10-year	20-year
Westbound	D	D	F	F	E	F	F
Eastbound	D	D	F	F	E	F	F

As shown **on Table 3**, the portion of CR 22 in the Study Area is currently operating at LOS D in both directions. In the near term, CR 22 will continue to operate at this level (or, will decline to LOS E under the higher-growth scenario). However, level of service will decrease to LOS F by the 10-year horizon under both growth scenarios, indicating high levels of delay, inconsistent with driver expectations for a major regional arterial facility.

Dillon also reviewed collisions in the CR 19 corridor from 2000 to 2005, and in the CR 22 corridor from 1998 to 2003. In general, the majority of collisions occurred under ideal conditions: on straight and level road alignments providing good visibility (88%); under good lighting conditions (76%) and on dry pavement (64%). Approximately 65% of collisions either occurred at intersections and driveways, or were related to traffic conditions at intersections. The majority of these accidents were either rear-end collisions (39%) that tend to occur at intersections or approaching a queue of vehicles at an intersection, or turning movement and right-angle collisions (31% combined). This type of accident occurs at intersections or driveways where conflicting vehicle paths are the greatest and most severe. The highest level of collision activity was reported at the CR 19 / CR 22 intersection, and on CR 22 to the west, typical for a location with high levels of congestion and high travel speeds (vehicles bound to / from the E.C. Row Expressway).

4. Existing and Projected Environmental Conditions

Section 4 of the ESR/PDR describes existing and projected environmental conditions potentially affected by the proposed improvements to CR 19 and CR 22.

The Study Area is located in the municipalities of Lakeshore and Tecumseh, in Essex County, with CR 19 forming the boundary between the two municipalities. The Town of Lakeshore is located on the east side of CR 19 while the Town of Tecumseh is located on the west side. From Highway 3 to Little Baseline Road, the Study Area is predominantly agricultural and rural. Farming activities consist mostly of cash crop farming with some beef feedlots. The rural portion of the Study Area also includes extensive strip development, mostly including single family houses along both sides of CR 19. North of Little Baseline Road, the Study Area is highly urbanized with residential, commercial and light industrial development along CR 19 and CR 22.

A Stage 1 Archaeological Assessment completed for the EA and Preliminary Design study, identified many areas along the corridor with moderate to high potential for the discovery of archaeological artifacts during construction. A Built Heritage and Cultural Landscapes Assessment completed for the corridor identified 28 built heritage and cultural landscape features in the Study Area. Notable resources include St. Anne's Cemetery at the northwest corner of CR 22 and Lesperance Road, two mid-19th century farm complexes, and the roadscape at CR 19 and CR 42.

The Study Area is located in the Pike Creek subwatershed. Major receiving water systems include Pike Creek, East Townline Municipal Drain and West Townline Municipal Drain. Several open channel and enclosed municipal drain systems are located in the CR 19 corridor. Drainage areas generally consist of land located directly on the east and west sides of CR 19. In the southern portion of the Study Area, the existing roadway acts as drainage divide, directing overland flow from lands east of the right-of-via drainage culverts to lands to the west. In the northern portion, the topography results in relatively long, narrow drainage areas adjacent to the right-of-way, where ditches and open channels flow parallel to CR 19 towards Pike Creek.

Fish habitat in the Study Area ranges from low to high sensitivity, depending on factors such as fish presence and connectivity with downstream aquatic resources. Pike Creek and West Townline Drain have high fish habitat sensitivity. Pike Creek is also a navigable waterway.

The historical clearing and draining of the land for agriculture and non-farm development in Essex County has resulted in a degraded natural ecosystem. Fairplay Woods (also known as Fairplay Dragstrip Woodlot) is the only natural environmental area near the Study Area. It is located approximately 200 metres from CR 19, northwest of the CR 19/Highway 401 interchange. The woodlot is approximately 47 hectares and is the largest intact woods in the northern part of the Essex region. The original channel of Pike Creek runs through the southwest portion of the woodlot and holds water in Spring.

Since agriculture is the major land use in the area, other terrestrial features are limited to isolated cultural meadows and the vegetated portions of drainage features, including West Townline Drain, the rights-of-way of CP Rail, CASO (CN), and VIA Rail lines and the floodplain of Pike Creek.

5. Public and Agency Consultation

As outlined in Section 5 of the ESR/PDR, the Notice of Study Commencement was advertised in January 2007 and over 120 replies were received, including 21 from agencies. Three rounds of Public Information Centres (PIC) were held: PIC 1 was held in May 2007 to present alternative design concepts; PIC 2 was held in November 2007 to present the recommended Preliminary Design; and PIC 3 was held in July 2008 to present changes to the recommended design of the CR 22/Lesperance Road intersection and modifications to the drainage improvements proposed along CR 19, north of CR 42. Approximately 100 people attended PIC 1 and over 150 people attended both PICs 2 and 3.

The main questions/concerns from residents and business owners along the corridor pertained to the need for the proposed improvements, timing of construction, property acquisition, noise and air quality impacts, business impacts, safety concerns, traffic impacts and impacts on the natural environment. Public and agency consultation will continue through the subsequent Detailed Design stage.

Consultation with City of Windsor

Ongoing consultation occurred with the City of Windsor throughout the study. The Study Team met with the City several times to discuss the recommended design options and coordinate the proposed improvements to CR 19 and 22 with other projects in the area, including the Class EA for Banwell Road. The City expressed several concerns about the study, mostly related to the proposed improvements' impacts on the City's transportation system. Other City concerns included the validity of some of the data used in the study; the City felt that the interconnectedness of regional systems, including population, land use and employment data, was not considered in the evaluation of alternatives; and the EA was completed in a fragmented and piecemeal manner. The County of Essex provided a written response to the City addressing these concerns. The concerns raised by the City have been reviewed and addressed in this report, where appropriate.

6. Alternatives and Preferred Design

Section 6 of the ESR/PDR summarizes the alternatives considered by the Study Team during the Planning and Preliminary Design Stages of the project.

Previous studies, in particular the Essex-Windsor Regional Transportation Master Plan (EWRTMP) (October 2005), identified a need for additional north-south capacity on CR 19 to address existing and projected future capacity and operational deficiencies. The EWRTMP covered Phases 1 and 2 of the Municipal Class EA process and dealt with transportation system needs and alternative planning strategies. Transportation system need was determined using a detailed regional transportation model of the City of Windsor and Essex County to project long-term traffic volumes across the region to the year 2021.

The Master Plan assessed alternative solutions for diverting traffic from congested links to mitigate anticipated congestion and eliminate the need for road widenings. These "alternatives to" included increased transit ridership, widening of the Lauzon Parkway (instead of widening CR 19) and extending it to Highway 401. Although these solutions are still required to meet future needs, none eliminated the need to widen CR 19.

As part of the Class EA and Preliminary Design study, Dillon re-evaluated these and other "alternatives to", as summarized on the following **Table 4**.

Table 4 – "Alternatives To" Widening County Roads 19 and 22

"Do Nothing"	Does not address existing and future deficiencies

Reduce Transportation Demand:
• Transportation Demand Management (TDM) Measures:
  • Transit Service
  • Alternative Modes of Travel
  • Off Peak Trip Making
 	
• Land Use Planning & Urban Design Principles (development patterns that reduce distance between residential areas and trip attractions)
	Recommended for CR 22, but will not change need for additional capacity.
	
	Ridesharing/carpooling, walking, cycling could reduce vehicle trips. Sidewalks, bicycle lanes recommended for some sections of CR's 19 and 22, but will not mitigate anticipated congestion.
	
	Already occurring, but limited potential to address peak period capacity requirements.
	
	Encourage walking and biking, but do not significantly reduce future traffic demands generated by planned commercial development.

Localized Intersection Improvements	Isolated intersection improvements may be appropriate as a staged approach, but do not fully address capacity deficiencies.
Widen Other Corridors	Even if Lauzon Parkway is widened and extended to Highway 401, widening CR 19 to four lanes is still required. Widenings of other parallel roads also do not effectively address projected traffic demands.

As shown on the table, none of the "Alternatives to" address the existing and future capacity deficiencies on CR 19 and eliminate the need to improve CR's 19 and 22. Based on the evaluations completed for the Master Plan and this study, widening CR 19 to four lanes and CR 22 to six lanes was identified as the preferred transportation solution.

A number of preliminary design alternatives were developed for widening sections of County Roads 19 and 22 and major intersections, including the Highway 401 interchange and CR 22 and Lesperance Road intersections. Alternatives for the road widenings included widening symmetrically from the existing centre line of road; widen to the right or left of the centre line; or a combination of these based on site specific conditions. Alternatives for the CR 22 and Lesperance Road intersection included a grade separation and various types of interchanges. Factors used to comparatively evaluate the alternatives included traffic operations and safety, technical engineering considerations, impacts on the cultural, natural and socio-economic environments and costs.

The preferred alternative for the road widenings is to widen both roads using a combination of the alternatives to utilize the available right-of-way and minimize potential impacts. A centre left turn lane for access to rural residences will be included, where feasible, along CR 19. Preferred interchange/intersection alternatives include the construction of a double lane roundabout at the intersection of CR 19 and CR 34, a new underpass structure at Highway 401 and reconstruction of the interchange ramps, a single point urban interchange at CR 19 and CR 22 and a partial interchange (half diamond/half button hook) at CR 22 and Lesperance Road. Other improvements include:

- widening of Pike Creek Bridge from two to four lanes
- grade separation of the CP Rail crossing and construction of access/service roads for existing uses.

7. Impact Assessment and Mitigation

Section 7 of the ESR/PDR is a detailed description of the recommended Preliminary Design of Improvements to CR 19 and CR 22.

Section 8 includes an impact assessment of the recommended design. **Table 83**, Summary of Environmental Concerns and Commitments, outlines the work which must be completed during the Detailed Design stage to avoid and/or mitigate the project's impacts.

The proposed improvements to CR 19 and CR 22 will enhance the interconnectivity between the Study Area's two Provincial Highway facilities (Highways 401 and 3), the regional road network and existing and future international crossings. Widening CR 19 and CR 22 through the Study Area addresses anticipated future traffic capacity constraints by providing additional capacity at intersections and along mid-block sections. In addition, the widening will accommodate future growth and development in the immediate and broader Study Area. The improvements will also improve safety conditions, thereby reducing accidents.

The proposed improvements to CR 19 and CR 22 have traffic impacts and impacts on cultural resources, natural features, fisheries and aquatic eco-systems, land uses and the socio-economic environment. Significant impacts include the following:

- the improvements require the removal of two farmhouses on CR 19 and the Highway 401 underpass structure, all identified as cultural heritage resources. A Cultural Heritage Evaluation Report (CHER) will be completed at the beginning of Detailed Design to determine appropriate mitigation
- extensive drainage modifications are required for the proposed improvements, including culvert extensions, replacements and removals, alterations to Municipal Drains and a new regional

stormwater management facility located near CR 19 and CR 22. An urban storm sewer drainage system will be provided for CR 19, north of Pike Creek

- Harmful Alteration, Disruption or Destruction (HADDs) of fish habitat are expected at four locations, including the West Townline Drain, Griffith Drain, Croft Drain and Pike Creek
- approximately 100 acres of property is required for the improvements, including 18 residential, commercial and light industrial buildings
- access changes and road closures/realignments are required along both the CR 19 and CR 22 corridors. The proposed partial interchange at CR 22/Lesperance Road will improve traffic flow on Lesperance Road and eliminate existing congestion on CR 22. Changes in access to the businesses at CR 22 and Lesperance Road will be mitigated by the improved road connections to CR 19 included as part of this project.

8. Environmental Clearances and Approvals

Once the ESR/PDR is "cleared" under the Class EA, the project may proceed to the Detailed Design stage. As outlined in Section 9 of the report, the following design related approvals must be obtained during Detailed Design:

- archaeological clearance from the Ministry of Culture
- approval from the Towns of Lakeshore and Tecumseh for modifications to Municipal Drains. Approval from the Essex Region Conservation Authority (ERCA) may also be required
- DFO approval, under the *Fisheries Act*, for HADDs and Fish Habitat Compensation Plans
- Transport Canada approval under the *Navigable Waters Protection Act* for the Pike Creek Bridge widening
- Transport Canada sign-off of the *CEAA* Environmental Screening Report.

1. INTRODUCTION

1.1 Introduction

The Ontario Ministry of Transportation (MTO), in association with the County of Essex and Transport Canada, has undertaken an Environmental Assessment (EA) and Preliminary Design of improvements to Essex County Road 19 (Manning Road) (CR 19) and Essex County Road 22 (CR 22). The project is located in the Town of Lakeshore and Town of Tecumseh, in the County of Essex. CR 19 forms the boundary between Lakeshore (on the east) and Tecumseh (on the west). As shown on **Figure 1**, the Study Area includes:

- 13 km of CR 19, from Highway 3 to the VIA Rail line. This section also includes the CR 19/Highway 401 interchange
- 3 km of CR 22, from the City of Windsor boundary to 350m east of Lakeshore Boulevard.

CR 19 is a major north-south arterial that connects Highways 401 and 3 to CR 22, CR 34, CR 42 and CR 46. It serves commuting and commercial traffic to Windsor, Tecumseh, St. Clair Beach, Maidstone and other urban centres. It also provides direct access to abutting properties, including agricultural, residential, commercial and industrial uses.

CR 22 connects the E.C. Row Expressway and City of Windsor with the Towns of Lakeshore and Tecumseh. It also functions as a major arterial for commuting and commercial traffic to Belle River and other urban centres along Lake St. Clair.

This project is part of the *Let's Get Windsor-Essex Moving* strategy, a joint commitment by the Federal and Provincial governments to invest $300 million in the Windsor Gateway, a vital transportation artery between Canada and the U.S. The Governments of Canada and Ontario, in partnership with the County of Essex and City of Windsor, are working together to implement infrastructure projects that will help relieve traffic congestion and improve traffic flows to existing Windsor/U.S. border crossings in the near term. Several *Let's Get Windsor-Essex Moving* projects have already been completed or are underway. Funding is being provided under the Canada-Ontario Border Infrastructure Fund for the portion of the project north of Highway 401, including the 401 interchange. The County of Essex is funding the section south of Highway 401.

MTO's Windsor Border Initiatives Implementation Group (BIIG) was organized by MTO to implement all transportation initiatives at the Windsor Gateway. Windsor BIIG is comprised of three main streams: regional improvements through the *Let's Get Windsor Essex Moving Strategy*; the Detroit River International Crossing study, a binational environmental assessment study of a new crossing; and Governance, a collaborative investigation of governance approaches to provide effective public oversight and government control.

1.2 Study Team

The Study Team consisted of the following representatives of MTO, County of Essex, Town of Lakeshore, Town of Tecumseh and Dillon Consulting Limited:

Rakesh Shreewastav, P.Eng.	Project Manager, MTO, Windsor BIIG
Barbara Macdonell, MCIP	Environmental Planner, MTO, Windsor BIIG
Tom Bateman, P.Eng.	County Engineer, County of Essex
Jaime Garcia, P.Eng.	Project Manager, County of Essex
Daniel Piesic, P.Eng.	Director of Engineering and Infrastructure Service, Town of Lakeshore
Tony DiCiocco	Manager of Engineering Services, Town of Lakeshore
Chuck Chevalier	Manager of Public Works, Town of Lakeshore
George DeGroot	Director of Public Works & Environmental Services, Town of Tecumseh
Brian Hillman	Director, Planning & Building Services, Town of Tecumseh
John Zangari, P.Eng.	Project Manager, Dillon
John Gawley, P.Eng.	Project Engineer, Dillon
Janet Smolders, MCIP	Environmental Planner, Dillon.

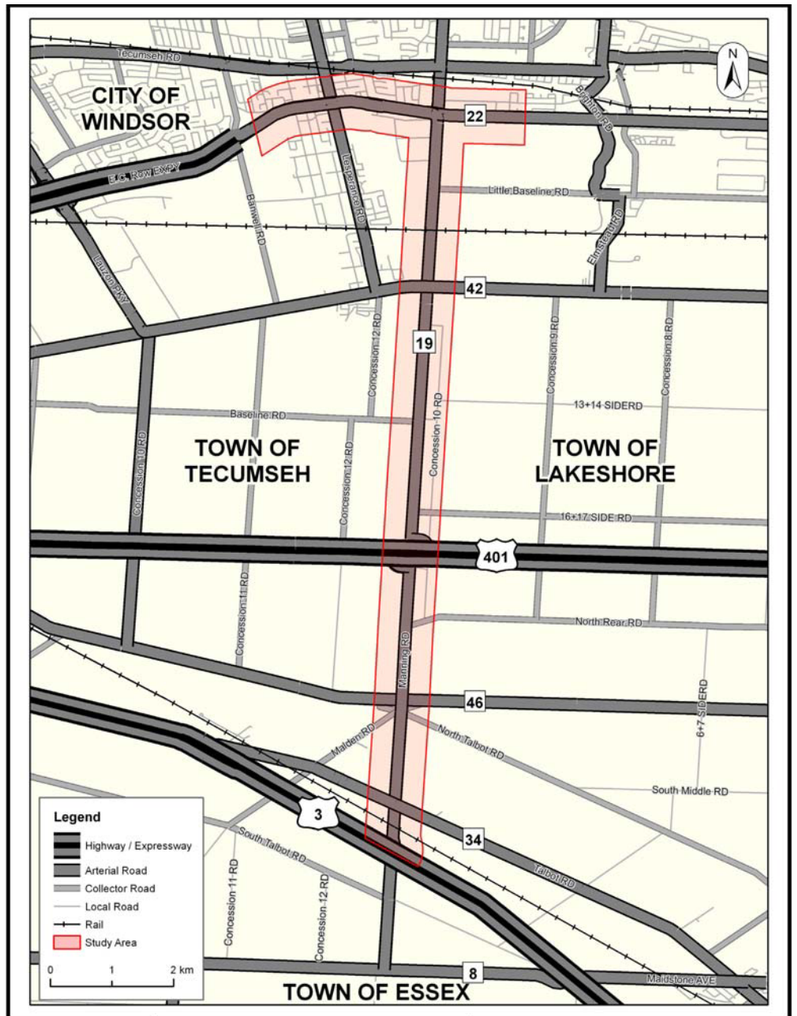
Additional MTO and Transport Canada Study Team members are shown in **Appendix H**.

1.3 Overview of ESR/PDR

This Environmental Study/Preliminary Design Report (ESR/PDR) was prepared in accordance with the requirements of the Municipal Class EA (June 2000, as amended in 2007) and MTO's Class EA for Provincial Transportation Facilities (2000).

The *Canadian Environmental Assessment Act* (*CEAA*) also applies to the project. The ESR documents the following:

- Section 2 provides an overview of the major features of the recommended Preliminary Design and the applicability of Municipal and Provincial Class EAs and *CEAA* to the project. This section also describes related studies and includes a list of reports prepared during the Preliminary Design stage
- Section 3 includes a Transportation Needs Assessment documenting the need to improve CR 19 and CR 22
- Section 4 describes existing and projected environmental conditions potentially affected by the proposed improvements to CR 19 and CR 22
- Section 5 summarizes public and agency consultation undertaken during Preliminary Design
- Section 6 identifies and evaluates alternatives developed during the Planning and Preliminary Design stages, including "Alternatives To", Planning Alternatives and Preliminary Design Alternatives. This section also summarizes the Value Engineering exercise completed for the project
- the recommended Preliminary Design is described in Section 7
- Section 8 includes an impact assessment of the recommended Preliminary Design, including environmental concerns and commitments which must be addressed in more detail during the Detailed Design stage of the project
- Section 9 summarizes environmental clearance and approvals required for the project to proceed to Detailed Design. Section 9 also provides an overview of the major components of Detailed Design.



2. BACKGROUND

2.1 Project Description

Recommended improvements include widening CR 19 and CR 22 and improvements to the CR 19/Highway 401 interchange. County Roads 19 and 22 and the Highway 401 interchange will also be upgraded to current design standards.

CR 19 will be widened from two to four lanes and changed from a rural to urban roadway, from just south of CR 42 to CR 22. The widening necessitates improvements to the Highway 401 interchange, intersections, drainage, municipal drains and entrances and requires property acquisitions and utility relocations. The increase in traffic on CR 19 requires upgrading the pavement structure, construction of a grade separation for the CP Rail crossing and interchanges to replace the existing intersections at CR 19/CR 22 and CR 22/ Lesperance Road.

With the exception of construction of the S-E ramp and resurfacing, improvements to the CR 19/Highway 401 interchange ramps were not included in MTO's recent Highway 401 Reconstruction and Widening Contract (Contract No. 2005-3001). Replacement of the underpass structure and reconstruction of the ramps is required to meet current design standards and accommodate the alignment shift, widening and geometric improvements on CR 19.

CR 22 will be widened from four to six lanes and changed from a limited access to controlled access roadway with an interchange at CR 19 and partial interchange at Lesperance Road. The widening and interchanges require property acquisitions and utility relocations.

In summary, major project features include:

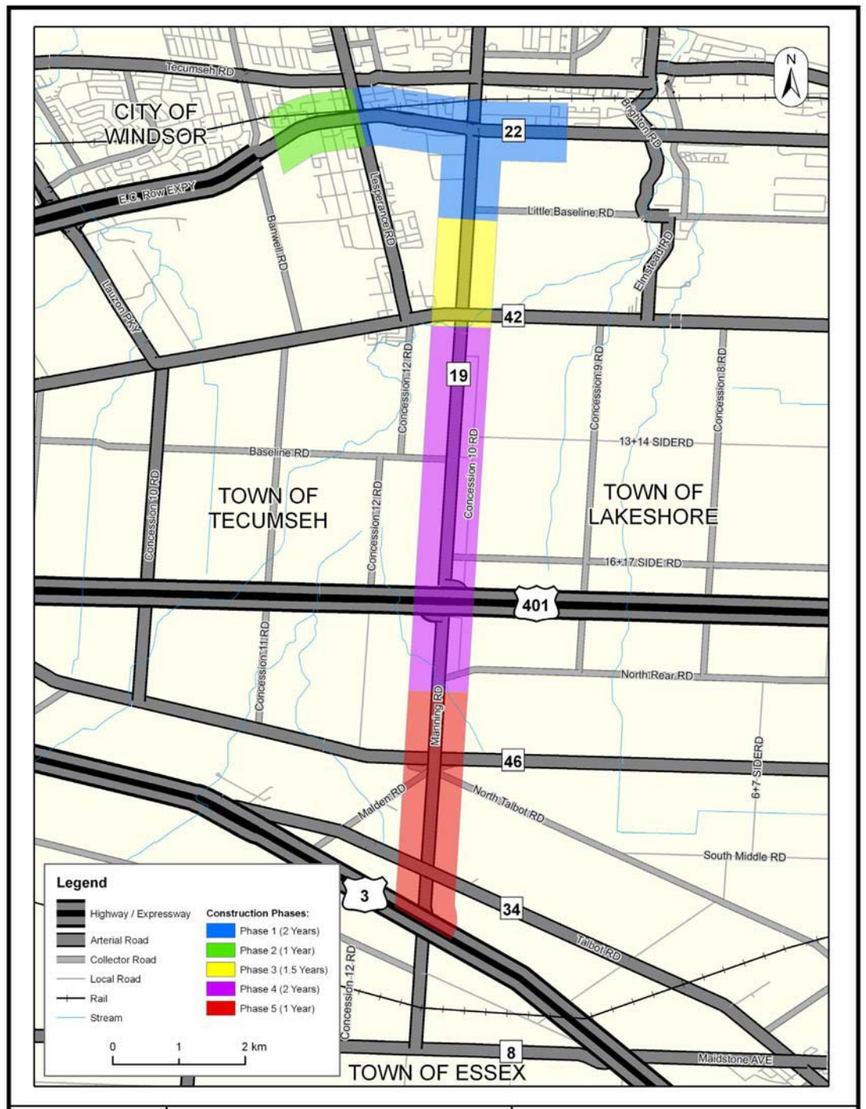
- widening of CR 19 from two lanes to four lanes and widening of CR 22 from four lanes to six lanes
- double lane roundabout at CR 19 and CR 34 intersection
- Highway 401 interchange improvements, including construction of a new underpass structure and reconstruction of interchange ramps
- widening of Pike Creek Bridge from two lanes to four lanes
- grade separation at the CP Rail crossing and construction of access/service roads for existing uses
- single point urban interchange at CR 19 and CR 22, with CR 22 partially depressed and CR 19 over CR 22
- partial interchange (half diamond/button hook) at CR 22 and Lesperance Road with CR 22 over Lesperance Road.

The proposed improvements are estimated to cost from $180 million to $200 million (2008 dollars). Dillon has recommended that the project be constructed in the following five phases, as shown on **Figure 2**:

- ***Phase 1*** - CR 19 from south of Little Baseline Road to Amy Croft Drive and CR 22 from west of CR 19 to east of Lakeshore Boulevard (2 years construction duration)
- ***Phase 2*** – CR 22 from the City of Windsor boundary to east of Lesperance Road (1 year)
- ***Phase 3*** – CR 19 from south of Little Baseline Road to south of CR 42, including the Pike Creek Bridge (1.5 years)
- ***Phase 4*** - CR 19 from south of CR 42 (including Pike Creek) to south of North Rear Road, including the Highway 401 interchange (2 years)
- ***Phase 5*** - CR 19 from south of North Rear Road to Highway 3 (1 year).

Construction phasing will be confirmed during the Detailed Design stage. The timing of Detailed Design will be determined following environmental clearance of the ESR/PDR.

At this time, no commitment has been made to fund the proposed improvements. As a result, construction timing cannot be confirmed. The timing of construction will be considered in the context of other regional projects.



DILLON CONSULTING	County Road 19 (Manning Road) and County Road 22 Improvements GWP 3031-06-00 Class EA and Preliminary Design Study	Construction Phases	
		November 2008	Figure 2

2.2 MTO and Municipal Class EA Applicability

The Class EA planning process in Ontario provides a streamlined process allowing individual projects or activities within a defined "class" to meet the requirements of the *Environmental Assessment (EA) Act*. Projects and activities within a class are generally ones that are recurring, carried out routinely and have predictable and mitigable environmental effects. The word "environment" is defined as any aspect of life that may be impacted by an undertaking and includes the natural, social, and economic environments. When a project meets the requirements of the applicable Class EA document, the requirements of the *EA Act* are fulfilled and the project may be implemented.

This study has been prepared according to the requirements of the Municipal Class EA (2000, as amended in 2007) and MTO's Class EA for Provincial Transportation Facilities (2000). Both documents provide a decision-making process that ensures that all relevant engineering and environmental features are considered in the planning and design of Municipal and Provincial transportation facilities, respectively. Public and agency consultation is an important component of both Class EAs.

Municipal Class EA

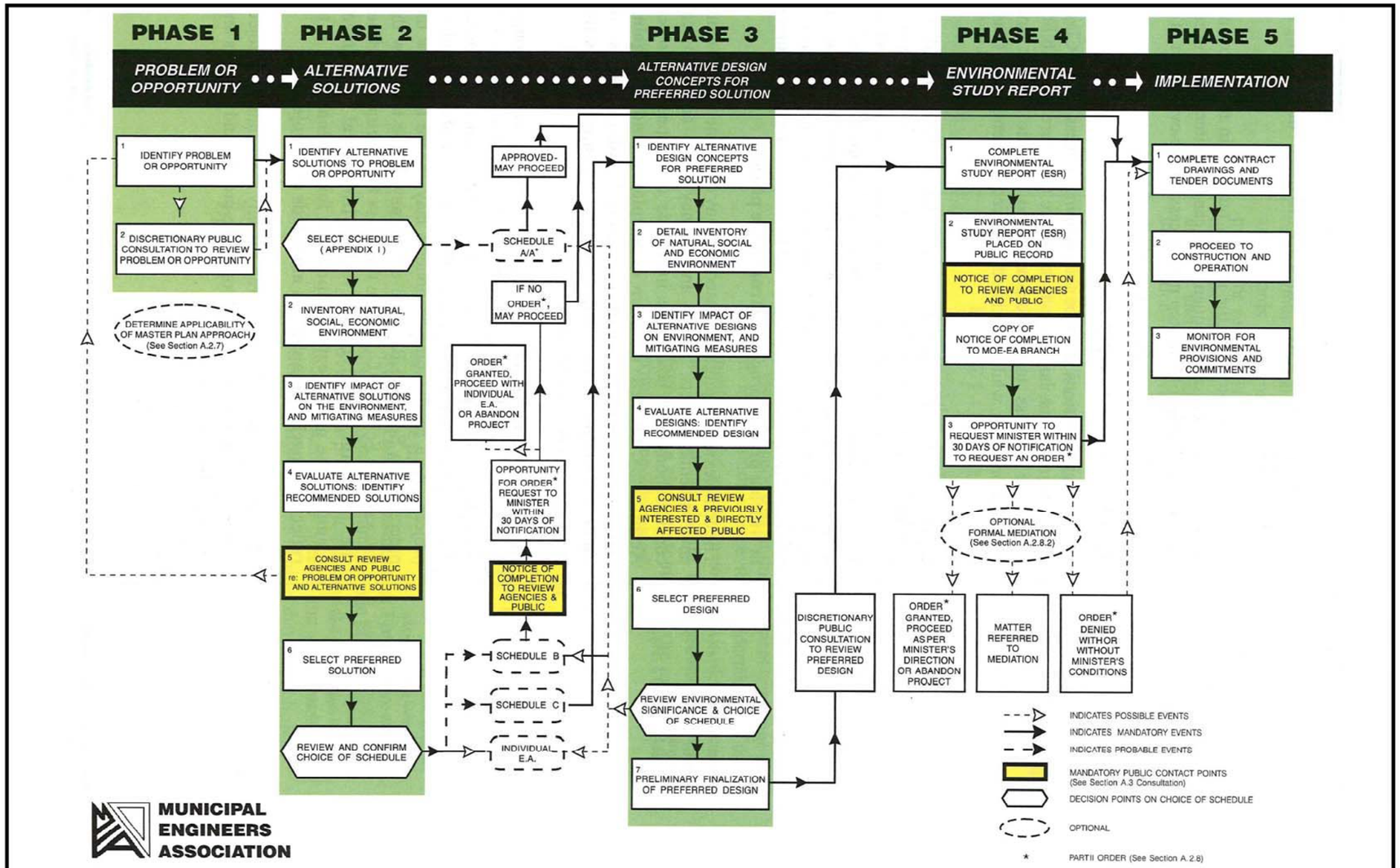
The proposed improvements to County Roads 19 and 22 are classified as the following type of "Schedule C" project in the Municipal Class EA:

> *Reconstruction or widening where the reconstructed road or other linear paved facilities will <u>not</u> be for the same purpose, use, capacity or at the same location as the facility being reconstructed (e.g. additional lanes, continuous centre turn lanes) (Page I-5).*

Schedule C projects are the most complex included in the "class" of municipal projects and have the potential for significant environmental impacts. This type of project is subject to the full Class EA process and requires the completion of an Environmental Study Report (ESR). **Figure 3** shows the five phases of the Municipal Class EA process.

MTO's Class EA

As explained in MTO's Class EA, "the goal of all projects and activities covered by this Class EA is to provide a safe and effective transportation system while avoiding or minimizing negative environmental effects." To achieve this, the Class EA is principle-based, rather than prescriptive in nature. The Class EA



DILLON CONSULTING	County Road 19 (Manning Road) and County Road 22 Improvements GWP 3031-06-00 Class EA and Preliminary Design Study	Municipal Class EA Planning and Design Process
		November 2008 / Figure 3

includes principles for transportation engineering, environmental protection, consultation and documentation.

These principles are based on MTO's Statement of Environmental Values (SEV) (1994). The SEV was developed pursuant to the *Environmental Bill of Rights* (*EBR*) and is included in the parent document as Appendix 4. It is based on the following mission statement:

> *"We will facilitate the mobility of people and goods, and promote the development of industries that provide transportation systems, services and products in ways that reflect the needs of Ontario's diverse population and support the broader economic, social and environmental objectives of the province."*

Based on this mission statement, the SEV includes the following environmental values and measures:

- the Ministry believes that the protection of air, water and land resources is necessary to sustain future generations and the long term survival of plants, animals and aquatic life
- the Ministry believes that the environment is an integral part of its activities, including policy and project development and the operation of transportation facilities
- the Ministry believes that a healthy environment depends on sound planning
- the Ministry believes that public participation is vital to sound environmental decision-making
- the Ministry believes that it should understand and recognize the environmental values of First Nations and other Aboriginal people
- the Ministry believes that research and development is important to the protection, enhancement and care of the environment
- the Ministry believes in the wise use and conservation of materials in all facets of its operations
- the Ministry believes that raising the awareness of its partners and the general public regarding environmental issues is an important component of environmental protection.

MTO's Class EA outlines the EA process for specific groups of Provincial transportation projects. Project groupings within the Class EA are established for the purposes of consultation, documentation and formal EA challenge (Part II Order) and include the following:

- Group A Projects are new facilities
- Group B Projects are major improvements to existing facilities
- Group C Projects are minor improvements to existing facilities
- Group D Activities involve facility operation, routine maintenance, administration and miscellaneous activities.

MTO's Class EA classifies the proposed improvements to the CR 19/Highway 401 interchange as the following type of Group "B" project:

> *Highway and freeway improvements over land… that provide a significant increase in traffic capacity or cause a significant widening of the "footprint" beyond the roadbed of an existing highway/freeway, such as interchange improvements with major footprint modifications (Page 2-3).*

Figure 4 shows MTO's Class EA process. Similar to Schedule C Municipal Class EA projects, a Group B project is considered to be a major improvement and requires the completion of a Transportation Environmental Study Report (TESR).

2.3 Class EA Process

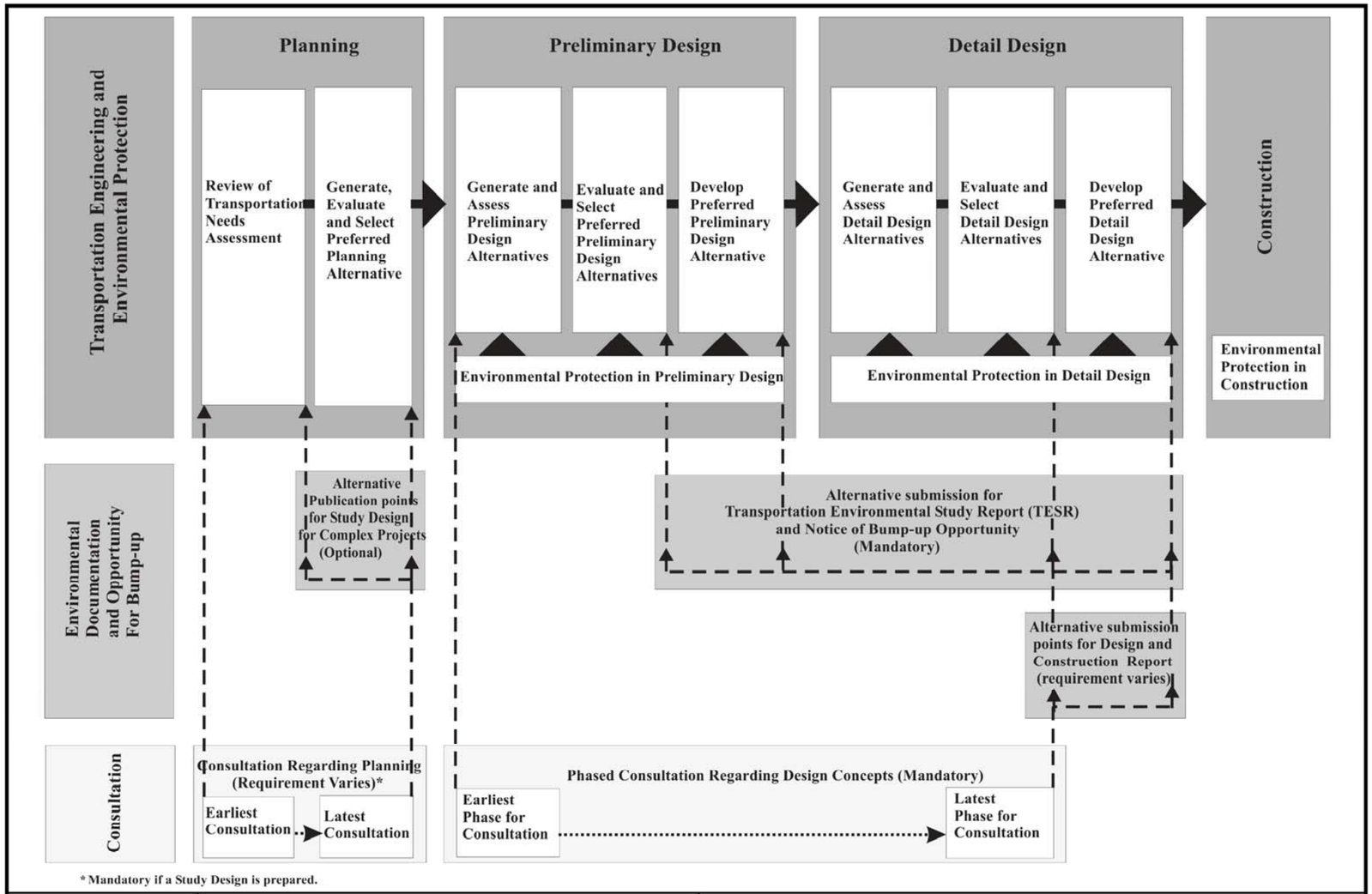
The County Roads 19 and 22 Improvements Study followed the first four phases of the Municipal Class EA process:

Phase 1, "Problem/Opportunity Identification

Phase 1 was covered by the Essex-Windsor Regional Transportation Master Plan (EWRTMP) completed in October 2005. The findings of the Master Plan with respect to County Road 19 and 22 were confirmed by Dillon as part of this Class EA and Preliminary Design study. During the Phase 1 review and update, Dillon completed a Transportation Needs Assessment and identified operational, geometric and capacity deficiencies in the County Roads 19 and 22 corridors.

Phase 2, "Alternative Solutions"

Phase 2 consisted of the identification and evaluation of solutions to address the deficiencies identified in Phase 1. This phase was also covered by the EWRTMP and updated by Dillon. Alternative solutions evaluated by Dillon as part of the Phase 2 update covered "Alternatives To", including "do nothing", "Reduce Transportation Demand" through Transportation Demand Management Measures and land use planning and urban design, "Localized Intersection Improvements", "Widen Other Corridors" and "Improve Provincial and Municipal Transportation Facilities". Following the selection of "Improve Provincial and


Transportation Engineering and Environmental Protection
Planning
Preliminary Design
Detail Design
Construction
Review of Transportation Needs Assessment
Generate, Evaluate and Select Preferred Planning Alternative
Generate and Assess Preliminary Design Alternatives
Evaluate and Select Preferred Preliminary Design Alternatives
Develop Preferred Preliminary Design Alternative
Generate and Assess Detail Design Alternatives
Evaluate and Select Detail Design Alternatives
Develop Preferred Detail Design Alternative
Environmental Protection in Preliminary Design
Environmental Protection in Detail Design
Environmental Protection in Construction
Environmental Documentation and Opportunity For Bump-up
Alternative Publication points for Study Design for Complex Projects (Optional)
Alternative submission for Transportation Environmental Study Report (TESR) and Notice of Bump-up Opportunity (Mandatory)
Alternative submission points for Design and Construction Report (requirement varies)
Consultation
Consultation Regarding Planning (Requirement Varies)*
Earliest Consultation
Latest Consultation
Phased Consultation Regarding Design Concepts (Mandatory)
Earliest Phase for Consultation
Latest Phase for Consultation
* Mandatory if a Study Design is prepared.
DILLON CONSULTING
County Road 19 (Manning Road) and County Road 22 Improvements
GWP 3031-06-00
Class EA and Preliminary Design Study
MTO Class EA Process for Group B Projects
November 2008
Figure 4

Municipal Transportation Facilities" as the preferred transportation undertaking, Dillon identified and evaluated various planning alternatives for improving County Roads 19 and 22.

Public Information Centre (PIC) 1 was held during Phase 2, on May 29, 2007, to present the recommended Planning Alternatives. Phase 2 ended with the selection of preferred Planning Alternatives for each section of CR 19 and CR 22, resulting in a Functional Design of the improvements.

Phase 3, "Design Options"

Phase 3 involved the refinement and further development of the Functional Design to a Preliminary Design level of detail. During Phase 3, Preliminary Design alternatives were identified and evaluated for each section of County Roads 19 and 22, including all intersections. Public and agency consultation continued throughout Phase 3 to aid in the development of the Preliminary Design. PIC 2 was held on November 19, 2007, to present the recommended design. PIC 3 was held on July 15, 2008, to present changes to the design of the CR 22/Lesperance Road intersection and modifications to the drainage improvements proposed along CR 19, north of CR 42. Phase 3 ended with the selection of a technically preferred Preliminary Design.

Phase 4, Environmental Study Report (ESR)/Preliminary Design Report (PDR)

Phase 4 consisted of the preparation of this combined ESR/PDR and the placing of the report on the public record for a 30-day review period. If no Part II Order requests are received by the end of the 30-day period, the project may proceed to Phase 5 of the Class EA process, "Design and Construction".

2.4 Federal EA Applicability

As mentioned, the portion of the project north of Highway 401 (including the interchange) is being funded by the Canada-Ontario Border Infrastructure Fund. Federal funding of the project and approvals required under Federal legislation "trigger" the requirements of the *Canadian Environmental Assessment Act* (*CEAA*). Transport Canada has been designated as the "Responsible Authority". The Canadian Environmental Assessment Agency is serving as the Federal and Environmental Assessment Coordinator.

To comply with the requirements of *CEAA*:

- Dillon prepared a "Detailed Project Description" for Transport Canada (September 10, 2007). The report provided an overview of potentially affected environmental features, including built heritage and cultural resources, natural features, land uses and the socio-economic environment
- Transport Canada prepared a "Scoping Document" (December 2007), based on the project description prepared by Dillon. The document outlined the scope of factors to be addressed in the *CEAA* Environmental Screening Report
- Dillon prepared a separate *CEAA* Environmental Screening Report.

2.5 Related Studies and On-going Construction Projects

This section of the ESR/PDR outlines related studies and ongoing construction projects in the greater study area. The design of the proposed improvements to CR 19 and 22 has been coordinated with the design of other projects. In addition, construction of the proposed improvements must be coordinated with other regional transportation improvements.

County of Essex, CR 19 Corridor Study, April 2002

Based on traffic volumes generated by future development in the CR 19 and CR 22 corridors, this study recommended that CR 19 be widened to a four-lane cross-section between St. Gregory's Road and the CP Rail tracks by 2006, south to the Highway 401 interchange by 2011 and ultimately to CR 34 by 2021. The study also recommended widening CR 22 to six basic lanes through the CR 19 intersection.

County of Essex, Essex-Windsor Regional Transportation Master Plan, October 2005

Prepared in 2005 by the IBI Group with Paradigm Transportation Solutions for the County of Essex and City of Windsor, the Master Plan provides direction to address future regional transportation needs to the year 2021. Major study findings were:

- 80% of all trips are by automobile
- Severe roadway congestion is forecasted for CR 19 and CR 22 by the year 2021, if there are no changes to current trip-making behaviour, development form or roadway network capacity.

The Master Plan identified a number of options to address the region's future transportation needs. Strategic roadway capacity enhancements (mainly road widenings), more intensified and mixed use urban

development and the extension of transit services to the Towns of Tecumseh and Lakeshore were selected as preferred options. The study found that widening CR 19 to four lanes between CR 22 and Highway 3 will be required by 2021 to accommodate increased traffic demand. Other widenings of adjacent north-south roadways would also be required, including Banwell Road and Lauzon Parkway (with a new Lauzon Parkway connection to Highway 401). The Master Plan also recommended widening a number of major east-west arterials intersecting with CR 19, namely CR 22 (to six lanes west of CR 19 and four lanes east of CR 19), CR 42 (to four lanes) and Highway 3 (to four lanes).

Town of Lakeshore, Transportation Master Plan, June 2008

Prepared by IBI Group in March 2008, this study identified short- and long-term transportation needs for the Town of Lakeshore based on proposed, planned, and approved growth to 2025. It also confirmed the need for additional north-south capacity on CR 19 between Highway 401 and CR 22 by 2025. The study concluded that widening to four lanes north of Highway 401 is required by 2015, and widening to four lanes south of Highway 401 is required by 2025. In the long term, capacity of a four-lane facility may be exceeded in the peak direction north of Highway 401, depending on factors such as the type and magnitude of industrial development in the broader study area and the use of CR 19 as a connection between Highway 401 and the U.S. border. Based on existing cross-sections, other capacity deficiencies were identified on east-west roadways intersecting with CR 19, including CR 22, Little Baseline Road, CR 42, and Highway 3.

Town of Tecumseh, Tecumseh Hamlet Traffic Study, August 2008

Dillon Consulting undertook a traffic study, on behalf of the Town of Tecumseh, to assess the transportation impacts of developing Tecumseh Hamlet with 5,630 residential units, 800,600 sq. ft. of commercial space, and 136,725 sq. ft. of industrial space. The analyses were undertaken in parallel with the CR 19 and CR 22 improvements study and took into account the road widenings recommended by this ESR/PDR.

Town of Tecumseh, Transportation Master Plan

The Town of Tecumseh is undertaking a Transportation Master Plan study to develop a long term multi-modal transportation plan to accommodate future population and employment growth. The study is intended to provide the Town with the strategies, policies and tools needed to manage traffic safely, effectively, and cost efficiently. Building on the findings of the EWRMTP, the Tecumseh Plan will offer a range of transportation choices. The study is being conducted in accordance with the requirements of the Municipal Class EA process for Master Plans and is anticipated to be completed in early 2009.

County of Essex, CR 22 Class EA, May 2006

The County of Essex completed a Class EA for improvements to CR 22, from CR 19 to CR 42, in May 2006. The original Study Area for the EA extended from Banwell Road in the west to CR 42. After the Class EA was initiated, MTO advised the County of the initiation of the County Roads 19 and 22 Class EA and Preliminary Design as part of the *Let's Get Windsor-Essex Moving* strategy. As a result, the Study Area for the CR 22 EA was reduced to include only the section from east of CR 19 to CR 42. The study identified existing operational deficiencies at the CR 19/CR 22 intersection and recommended that CR 22 be widened to four lanes east of CR 19. The Study Area did not include the CR 22 intersection with CR 19.

County of Essex, CR 19 Class EA, December 2005

A Class EA for the widening of CR 19 from two to four lanes from north of the VIA Rail line to CR 22, was completed by the County of Essex in December 2005. Construction of the widening was completed in November 2007. Widening CR 19 has improved traffic operations and provided better access for local commercial and industrial uses and commuter traffic.

Ministry of Transportation, Ontario (MTO), Highway 401 Reconstruction & Widening, Windsor to Tilbury, Transportation Environmental Study Report, March 2003 (GWP 60-00-00)

MTO is currently completing the Detailed Design of the fifth phase (GWP 65-00-00) of the five phase Highway 401 Reconstruction and Widening project from Windsor to Tilbury (GWP 60-00-00). GWP's 62-00-00 and 64-00-00 are particularly relevant to proposed improvements to County Roads 19 and 22:

- GWP 62-00-00 was the second phase of construction and consisted of the reconstruction and widening of Highway 401 from four to six lanes from Manning Road to Puce Road (10.2 km section). As outlined in the DCR for the project, improvements to the Highway 401/Manning Road interchange included reconstruction of the interchange and construction of one new ramp, new service road and commuter parking lot. Construction began in the Spring of 2005 and was completed in 2006, as MTO Contract 2005-3001

- GWP 64-00-00 is the fourth phase and consists of the reconstruction and widening, from four to six lanes, of a 7.7 km section of Highway 401 from east of Highway 3 to east of Essex Road 17. Construction began in the Fall of 2007 and is expected to be completed by Fall 2010, as part of MTO Contract 2007-3043. The proposed improvements to CR 19 and CR 22 will not be constructed until this phase of the Highway 401 improvements is completed.

Ministry of Transportation, Ontario, Highway 3 Improvements

MTO is currently completing construction of the first phase (Contract 2007-3048) of a three phase program of improvements along Highway 3. Improvements include the widening and reconstruction of Highway 3 between Outer Drive at the City of Windsor boundary and the east junction of the Leamington By-pass (Essex CR 34). The first phase includes improvements to the Highway 3/CR 19 intersection, including four-laning of Highway 3 with a grass median, new traffic signals, improved auxiliary turning lanes, upgraded E-N ramp channelization and new channelization ramps at the N-W and S-E quadrants. The project also includes resurfacing and minor widening on CR 19, north and south of Highway 3, to complete transitions to existing lanes on CR 19.

Border Transportation Partnership, Detroit River International Crossing (DRIC)

The purpose of the Detroit River International Crossing Study (DRIC) is to provide for the safe, efficient and effective movement of people and goods across the Canada/U.S. border in the Detroit River area in support of the economies of Ontario, Michigan, Canada and the U.S. Led by the Border Transportation Partnership, the project will involve the construction of a new end-to-end transportation system to link Highway 401 to the U.S. interstate system with inspection plazas and a new river crossing.

On May 1, 2008, the DRIC study team presented the Windsor-Essex Parkway, the technically preferred alternative for the access road extending Highway 401 to a new inspection plaza and river crossing in West Windsor. Another important milestone was reached on June 18, 2008, with the announcement of the technically preferred location for the Canada inspection plaza and river crossing. The next steps in the process involve documentation of the environmental assessment and submission to the appropriate Canadian and U.S. authorities for approval. A commitment has been made to have the new access road and border crossing in place by 2013.

City of Windsor, County of Essex, Banwell Road Class EAs

Class EAs are currently underway for Banwell Road from Tecumseh Road East to the CP Rail tracks south of Intersection Road (City of Windsor is proponent) and from CP Rail tracks to south of CR 42 (County of Essex is proponent). Preliminary recommended improvements include widening Banwell Road to four lanes and constructing an interchange at Banwell Road and the E.C. Row Expressway.

Other On-going and Future Road Construction Projects

Due to the importance of County Roads 19 and 22 in the regional transportation system, the phasing and timing of construction within both corridors will need to be carefully managed. Each phase of construction will be reviewed and coordinated with the County of Essex, Towns of Tecumseh and Lakeshore and the City of Windsor.

Other studies and/or proposed construction projects currently underway include the following:

- CR 22 from Lakeshore Road to Patillo Road in the Town of Lakeshore. A *CEAA* Screening Report covering all three phases was completed in August 2008. The proposed improvements involve reconstruction and widening of CR 22 from two to four lanes, replacement and widening of Pike Creek Bridge and the realignment/enclosure of portion of the Webwood and Ruggaber Drains. Construction of the project will be completed in three phases:
  - Phase 1 – Completed in 2007, from 200 m east of East Pike Creek Road to 200 m west of Patillo Road
  - Phase 2 – from West Pike Creek Road to 200 m east of East Pike Creek Road. This section includes the construction of Pike Creek Bridge and will be constructed in 2008/2009
  - Phase 2a – includes the construction of the CR 22/Patillo Road intersection. Phase 2 and 2a will be completed in 2008/2009
  - Phase 3 – from Lakeshore Boulevard to West Pike Creek Road will be constructed in 2010
- trunk sanitary sewer installation on Banwell Road and CR 22 east to Lesperance Road
- Class EA for Patillo Road, from CR 22 to CR 42. From CR 22 to the CP Rail tracks, the preferred alternative is a 5-lane urban cross-section. A 2-lane rural cross-section (interim) and 4-lane (ultimate) is planned from the CP Rail tracks to CR 42
- other minor local road improvements potentially impacting the CR 22 and CR 19 corridors.

2.6 Preliminary Design Stage Reports

The following reports were prepared during the Preliminary Design stage:

Engineering -

- Dillon Consulting Limited, Electrical Equipment Condition Audit, June 2007
- Golder Associates Limited, Highway 401 and Manning Road Underpass, Preliminary Foundations Report, October 2007
- Golder Associates Limited, Pike Creek Bridge, Preliminary Foundations Report, October 2007
- Golder Associates Limited, Essex CR 22 Additional Geotechnical Investigation Technical Memorandum, November 2007

- Dillon Consulting Limited, Culvert Inspection Report, November 2007
- TSH, Travel Demand Forecasting, 2026 Horizon Year Volume Forecasts, November 2007
- Dillon Consulting Limited, Drainage and Hydrology Report, December 2007
- Dillon Consulting Limited, Pike Creek Bridge, Structural Design Report, December 2007
- MTO, Preliminary Pavement Recommendations Memorandum, December 2007
- Dillon Consulting Limited, Roadside Safety Report, January 2008
- Golder Associates Limited, Geotechnical Investigation Report, January 2008
- Dillon Consulting Limited, Manning Road Underpass at Highway 401, Structural Design Report, February 2008
- Dillon Consulting Limited, CR 22 Lesperance Road Overpass, Structural Design Report, February 2008
- Dillon Consulting Limited, Essex CR19 (Manning Road) Underpass at CR 22, Structural Design Report, February 2008
- Dillon Consulting Limited, Essex CR 19 (Manning Road) CP Rail Overhead, Structural Design Report, February 2008
- Golder Associates Limited, Essex CR 19 and CP Rail, Essex CR 19 and Essex CR 22 and Essex CR 22 and Lesperance Road, Preliminary Foundations Report, February 2008
- Dillon Consulting Limited, Traffic Operations Report, February 2008
- Dillon Consulting Limited, Tecumseh Hamlet Traffic Study, Interim Final Report, March 2008.

Environmental -

- Dillon Consulting Limited, Fisheries and Aquatic Ecosystems Report, September 2007
- Dillon Consulting Limited, Migratory Bird Nesting Review, September 2007
- Fisher Archaeological Consulting, Stage 1 Archaeological Assessment, November 2007
- Dillon Consulting Limited, Terrestrial Ecosystems/Agricultural Report, November 2007
- Unterman McPhail Associates, Cultural Heritage Assessment Report, December 2007
- Dillon Consulting Limited, Limited Contamination Overview Study, August 2008
- Dillon Consulting Limited, *CEAA* Screening Report, November, 2008
- Dillon Consulting Limited, Environmental Synopsis, October 2008
- RWDI AIR Inc., Environmental Noise Assessment, September 2008.

3. TRANSPORTATION NEEDS ASSESSMENT

3.1 Introduction

Section 3 of this ESR/PDR summarizes the Transportation Needs Assessment completed for the proposed improvements to County Roads 19 and 22. As explained in MTO's Class EA, a Transportation Needs Assessment serves to:

- identify transportation problems and opportunities, including any operational, geometric and capacity deficiencies in the County Roads 19 and 22 Study Area
- assist in the evaluation and selection of reasonable "alternatives to"
- develop transportation facility study objectives. Constituting "the purpose of the undertaking" under the *EA Act*, the objectives became the basis and focus for the subsequent Preliminary Design stage
- initiate the study process for a Group A, B or C project.

The Transportation Needs Assessment also covers Phase 1, "Problem/Opportunity Identification" of the Municipal Class EA process.

3.2 Existing Transportation/Engineering Conditions

Forming the boundary between the Towns of Lakeshore and Tecumseh, CR 19 is a major north-south arterial that connects Highways 401 and 3 to CR 22, CR 34, CR 42 and CR 46. It serves commuting and commercial traffic to Windsor, Tecumseh, St. Clair Beach, Maidstone and other urban centres. It also provides direct access to abutting properties, including agricultural, residential, commercial and industrial uses.

CR 22 connects the E.C. Row Expressway and City of Windsor with the Towns of Lakeshore and Tecumseh. It also functions as a major arterial for commuting and commercial traffic to Belle River and other urban centres along Lake St. Clair.

Both County Roads 19 and 22 are designated as Arterial Roads in the County of Essex and local municipal Official Plans and serve as key transportation system components in support of growth in the area's urban centres. In this way, both roads play a crucial role in serving existing travel demands and short- and long-range land use planning and development objectives. The existing corridors exhibit considerable operational stress due to the relatively high traffic peaks, mix of traffic and numerous access points and intersections.

3.2.1 Right-of-Way and Cross-Section

Currently, CR 19 is a two lane rural road in a predominantly agricultural/residential area. Urban development is planned for the Highway 401 interchange, Maidstone Hamlet and the section of CR 19 from CR 42 to CR 22.

The posted speed on CR 19 is 80 km/h, between Highway 3 and Pike Creek, where the speed reduces to 70 km/h from Pike Creek to Jamsyl Drive. North or Jamsyl Drive, the posted speed is 50 km/h.

Table 1 summarizes existing lanes, shoulders and right-of-way widths on CR 19.

Table 1:
CR 19 - Lanes, Shoulder and Right-of-Way

Item	Width (metres)
Travelled Lanes	• Varies 3.35 to 3.5m from Hwy 3 to CR 42 • Varies 3.65 to 3.75m from CR 42 to CR 22
Shoulder	• Varies from 2.5 to 3m granular • Paved shoulders in Hwy 401 interchange
Right-of-Way	• Varies from about 24 to 34m from Hwy 3 to Hwy 401 • Varies from about 19 to 25m from Hwy 401 to CR 42 • Varies from 20 to 21m from CR 42 to CR 22

CR 19 has turning lanes at the following intersections:

- southbound right turn channelized lane currently under construction at Highway 3
- left turn lanes at Highway 3
- left turn lanes at CR 46
- ramp tapers at Highway 401
- left turn lane at Highway 401 Ramp N-W
- left turn lanes at CR 42
- left turn lanes at CR 22
- southbound right channelized lane at CR 22

- left turn lanes at Amy Croft Drive (dual northbound)
- southbound right turn lane at Amy Croft Drive.

Right-of-way daylighting is deficient or non-existent at a number of intersections along CR 19. Obstructions also occur at intersections resulting in reduced sight distances. Trees at the CASO (CN Rail) reduce the sight distance at this crossing.

Table 2 shows cross-section features on CR 19 by section:

Table 2:
CR 19 - Cross-Section Features

Location	Cross-section Features
Hwy 3 to CR 34	• 2 lane rural section with granular shoulders • Posted speed 80 km/h • Signalized Hwy 3 intersection (currently under construction) • Farm/Residential entrances • At grade CASO (CN Rail) crossing (sight distance restricted) • Overhead cables on east side (crosses to west side near Hwy 3) • West Townline Road Drain on west side
CR 34 to CR 46	• 2 lane rural section with granular shoulders • Posted speed 80 km/h • Signalized CR 34 intersection • Intersecting roads - Malden Road (Old Hwy 114), North Talbot Road (basically one intersection) • Farm/Residential entrances • Overhead hydro tower crossing • Overhead cables on east side • West Townline Road Drain on west side
CR 46 to South side of Hwy 401 interchange shoulders	• 2 lane rural section with granular shoulders • Posted speed 80 km/h • Signalized CR 46 intersection • Intersecting roads to east are Memorial Drive (access to OPP station, commuter parking lot) and North Rear Road • Farm/Residential entrances • Overhead cables on east side • West Townline Road Drain on west side
South Side of Hwy 401 interchange to CR 42	• 2 lane rural section with granular shoulders (paved shoulders in Hwy 401 interchange) • Posted speed 80 km/h, 60 km/h CR 42
	• Pike Creek crossing structure • Recently rehabilitated Hwy 401 interchange (resurfacing, new guiderail, additional channelized lane) • Intersecting road to west is Baseline Road • Intersecting roads to east are 10th Concession Road, 13 & 14 Sideroad, 16 & 17 Sideroad • Farm/Residential entrances, one industrial access near Hwy 401 • Overhead cables on west side (excluding section from 250m south of Baseline Road to 16 & 17 Sideroad)
CR 42 to CR 22	• 2 lane rural section with granular shoulders • Posted speed 80 km/h, 60 km/h at CR 42 • Signalized CR 42 intersection • Intersecting roads to west are Desro Drive, Jamsyl Drive and Sylvestre Drive • Intersecting road to east is Little Baseline Road • Farm/Residential entrances with some commercial/industrial entrances • At grade CP Rail crossing with overhead hydro tower crossing • Two overhead hydro tower crossings • Overhead cables on east side (on west side just south of CR 22) • East Townline Road Drain on west side
CR 22 to VIA Rail	• Recently completed widening from 2 lanes to 4 lanes with raised median, turning lanes at intersections

In locations where a Municipal Drain is located within the clear zone, barrier protection may be required. Alternatively, the drain could be relocated outside the clear zone. The majority of utility poles must be relocated to accommodate additional lanes on CR 19.

CR 22 currently is a limited access rural road in a residential and commercial/industrial area. It has four lanes, west of CR 19, and two lanes east of Lakeshore Boulevard. The posted speed on CR 22 is 80 km/h. **Table 3** shows existing lanes, shoulders and right-of-way widths on CR 22.

Table 3: CR 22 – Lanes, Shoulders and Right-of-Way	
Item	**Width (metres)**
Travelled Lanes	3.75m
Shoulder	3.0m with 0.5m partial paved
Right-of-Way	• Varies from about 48 to 66m • Right-of-way increases to about 72m, approx. 400m west of Lesperance Road

On CR 22, turning lanes are provided at the following intersections:

- left and right turn lanes at Lesperance Road
- right turn exit lane to Sylvestre Drive
- left turn lanes at CR 19
- eastbound right channelized lane at CR 19
- eastbound left turn lane at Lakeshore Boulevard
- westbound right turn lane at Lakeshore Boulevard.

Table 4 summarizes the cross-section features of CR 22 by section.

Table 4: CR 22 – Cross-Section Features	
Location	**Cross-Section Features**
City Boundary to CR 19	• Four lane rural section with partially paved shoulders • Variable median, 13m grass median at west end to 2m flush/raised median at east end • Posted speed 80 km/h • Signalized intersections at Lesperance Road and CR 19 • Eastbound exit to Sylvestre Drive • No accesses • Commercial/Industrial area • Utility and sewer crossings at Lesperance Road and CR 19 • Bell fibre optic cable and gas along south side

Table 4: CR 22 – Cross-Section Features	
Location	**Cross-Section Features**
CR 19 to Lakeshore Boulevard	• Transition from four to two lane rural section with partially paved shoulders • Posted speed 80 km/h • Signalized Lakeshore Boulevard intersection • No accesses • Commercial area (proposed development south side) • Bell fibre optic cable along south side and gas along north side

One culvert crossing with headwalls at Station 19+300 may require barrier protection. Alternatively, the culvert could be extended, so the headwalls are outside the clear zone.

3.2.2 Existing Road Network

The existing road network is illustrated on **Figure 5** and includes the following roads:

- CR 19 is a rural two lane, north-south oriented roadway with a posted speed of 80 km/h, a posted speed of 60 km/h at CR 42 and 50 km/h north of CR 22
- Highway 3 is currently a rural two lane, east-west oriented highway with a posted speed of 80 km/h. The CR 19 intersection is signalized. This highway is being reconstructed to a four lane divided highway, including improvements to the CR 19 intersection
- CR 34 is a rural two lane, east-west oriented roadway with a posted speed of 80 km/h east of CR 19 and 60 km/h west of CR 19. The intersection with CR 19 is signalized
- Malden Road (Old Hwy 114) and North Talbot Road are two lane local roads crossing CR 19 at a three-leg stop-controlled intersection
- CR 46 is a rural two lane, east-west oriented roadway with a posted speed of 80 km/h. The intersection with CR 19 is signalized. CR 46 will be widened to a four lane section in the near future
- Memorial Drive and North Rear Road are two lane local roads east of CR 19 with stop-controlled 'T' intersections at CR 19

South Section

North Section

DILLON CONSULTING	County Road 19 (Manning Road) and County Road 22 Improvements GWP 3031-06-00 Class EA and Preliminary Design Study	Existing Road Network
		November 2008 / Figure 5

- Highway 401 is a six lane divided, access controlled east-west oriented highway with a posted speed of 100 km/h. The CR 19 interchange is a Parclo A-2 on the north side and Parclo A-4 on the south
- 10th Concession, 13 & 14 Sideroad and 16 & 17 Sideroad are all two lane local roads east of CR 19 with stop-controlled 'T' intersections at CR 19. 10th Concession, 13 & 14 Sideroad are gravel surface
- Baseline Road is a two lane local road west of CR 19 with a stop-controlled 'T' intersection at CR 19
- CR 42 is a rural two lane, east-west oriented roadway with a posted speed of 60 km/h. The intersection with CR 19 is signalized
- Little Baseline Road is a two lane local road east of CR 19 with a stop-controlled 'T' intersection at CR 19
- Desro Drive, Jamsyl Drive and Sylvestre Drive are all two lane local roads west of CR 19 with stop-controlled 'T' intersections at CR 19
- Amy Croft Drive is a two lane local road east of CR 19 with a signalized intersection at CR 19. A commercial access road is currently under construction opposite Amy Croft Drive
- Lanoue Street is a two lane local road west of CR 19 with a signalized intersection at CR 19
- CR 22 is a rural east-west oriented roadway with a posted speed of 80 km/h, with four lanes west of CR 19 and 2 lanes east of CR 19. West of CR 19, the roadway is divided with various median treatments, including grass, flush and raised. CR 22 has limited access with signalized intersections at CR 19 and Lesperance Road and an exit lane to Sylvestre Drive
- Lesperance Road is an urban two lane road, north-south oriented roadway with a posted speed of 50 km/h. The intersection with CR 22 is signalized
- Lakeshore Boulevard is an urban two lane road, north of CR 22 with a posted speed of 50 km/h. The intersection with CR 22 is signalized.

3.2.3 Horizontal Alignment

The existing horizontal alignment of CR 19 is basically tangent with minor deflections and two back-to-back curves at Highway 3 to reduce the skew angle at the intersection. With the exception of the Highway 401 crossing and a section at Highway 3, the existing alignment of CR 19 has been approximated from survey data since previous design data is not available. Stationing has been set with Station 10+000 at the centre line of Highway 401, increasing from south to north.

The existing horizontal alignment deflections on CR 19 from Highway 3 to CR 22 have been approximated as shown on **Table 5**.

Table 5:
CR 19 - Horizontal Alignment Deflections

Approx. PI Location	Deflection Angle (d-m-s)
7+668	01-09-39
7+830	0-57-20
8+728	0-55-26
9+220	1-24-38
9+593	0-30-00
10+351	0-10-25
14+376	0-24-03
14+664	0-35-51
15+433	0-05-29
17+181	0-07-48

The existing horizontal curves on CR 19 just north of Highway 3 are currently being reconstructed as summarized in **Table 6**.

Table 6:
CR 19 - Existing Horizontal Curves

Approx. PI Location	Deflection Angle (d-m-s)	Direction	Radius (m)	Spiral (A)	Superelevation Rate
5+175.377	29-09-30.08	Rt.	145.525	-	5.8%
5+355.801	14-34-30.54	Lt.	273.689	-	5.3%

The only horizontal deflections that have curves are at 5+175 and 5+355. The maximum deflection angle that does not require a horizontal curve is 0°30', as specified in MTO Geometric Design Standards for Ontario Highways (GDSOH), Section C.3.4.2. Five deflections do not meet current design standards.

The curve at 5+175 is on the approach to a re-aligned skewed intersection and the curve exceeds the required 80m radius specified in Section E.4.1 of the MTO GDSOH, but does not have the specified spiral. The existing horizontal curve at 5+355 is deficient since the design speed is less than the posted speed of 80 km/h and spirals are recommended for all horizontal curves.

On CR 22, the existing horizontal alignment shown on **Table 7** is based on Horizontal and Vertical Control Sheets prepared for Highway 2 (CR 22 is former Highway 2).

Table 7:
CR 22 – Existing Horizontal Alignment

Approx. PI Location	Deflection Angle (d-m-s)	Direction	Radius (m)	Spiral (A)	Superelevation Rate
23+520.091	31-20-20	Rt.	582.125	230.715	6%
24+362.940	20-53-06	Rt.	700	250	5%
25+439.313 = 9+970.273	Chainage equation Town of Tecumseh and Town of Lakeshore boundary (centre line of CR 19)				
10+224.195	8-26-36	Lt.	1100	270	4.4%

The existing superelevation rates on CR 22 were determined from survey data and are approximate only. Based on this data and current design standards, the horizontal curves meet the following approximate design speeds (DS):

- R = 582.125, e = 6%, DS = 115 km/h
- R = 700, e = 5%, DS = 102 km/h
- R = 1100, e = 4.4%, DS = 110 km/h.

3.2.4 Vertical Alignment

The existing vertical control is not available for CR 19, except for the original design control at the Highway 401 interchange. As a result, the existing profile control was approximated from survey data.

The land slopes from south to north with the approximate existing elevation at Highway 3 of 192.75 and at CR 22 of 179.25, over a distance of approximately 12.1 km. Since the overall drop is only about 0.1% from Highway 3 to CR 22, the majority of the existing road grades are at or near flat. The major profile change is at the Highway 401 underpass, with minor profile changes at the railway crossings, Pike Creek crossing and some of the intersections.

Based on current survey information, the main changes in vertical profile on CR 19 can be summarized as shown on **Table 8** (K and Stopping Sight Dist. are approximated):

Table 8:
CR 19 – Vertical Profile

Location	Approx. PI Station	Grade Change	Vertical Curve	K	Stopping Sight Dist.
CASO (CN Rail)	5+545	2.79	sag	11	61
	5+591	2.41	crest	10	92
	5+620	2.18	crest	10	
	5+654	1.91	sag	18	88
Hwy 401	9+721	2.28	sag	40	170
	10+000	4.54	crest	39	148
	10+340	2.19	sag	42	176
	13+978	0.84	crest	67	not restricted
	14+039	1.51	sag	40	170
Pike Creek	14+083	1.04	crest	-	not restricted
	14+151	1.67	Sag	30	135
	14+252	2.12	crest	43	not restricted
CR 42	14+345	1.52	Sag	54	220
	14+544	1.13	Crest	149	Not restricted
CP Rail	15+223	1.0	Sag	14	73
	15+256	2.34	Crest	16	Not restricted
	15+302	1.36	Sag	28	125
CR 22	17+099	1.16	Sag	48	197
	17+188	2.32	Crest	18	135
	17+284	1.2	Sag	70	275

The profile has many minor changes in grades, but most are without measurable vertical curves that restrict stopping sight distance. Current standards, however, recommend all changes in grade must have a vertical curve with a length in metres at least as long as the design speed in km/h.

Minor, but abrupt, changes in grade occur at the CASO (CN Rail) crossing, Pike Creek, CR 42, the CP Rail crossing, and CR 22. The abrupt changes do not necessarily result in substandard stopping sight distances at all locations because of the short distances between sags and crests, but there may be comfort concerns. There are two locations where these abrupt changes in grades result in sight distances of less than 80 km/h (135m), including the CASO (CN Rail) and CP Rail crossings.

The vertical curve at the Highway 401 crossing was originally designed with a 600’ VC, which is equivalent to about K=30.5. The roadway on the approaches has been raised, resulting in a vertical curve with K of approximately 39, with a stopping sight distance meeting current standards for a design speed of about 84 km/h. The Detailed Design of the Highway 401 Reconstruction and Widening (GWP 62-00-00) determined

that the vertical clearance at the underpass was 4.747m, just shy of the required 4.8m. For a rural roadway, flat grades are acceptable provided the road is adequately crowned (adequate cross-fall), snow does not interfere with surface drainage, and ditches have positive drainage. At about 2.55%, the maximum grade is within acceptable standards.

For CR 22, the existing vertical control is also not available, so the control was determined from survey data. The vertical profile on CR 22 is fairly flat with the highest point at about 23+637 and the lowest point at about 25+245. The minimum grade is about 0.07% and maximum grade about 0.7%.

Based on current survey information, **Table 9** summarizes the vertical profile on CR 22 (K and Stopping Sight Distance are approximated).

Table 9:
CR 22 – Vertical Profile

Approx. PI Station	Grade Change	Vertical Curve	K	Stopping Sight Distance
23+637	1.0	Crest	300	450
24+050	0.45	Sag	350	Not restricted
25+245	0.51	Sag	-	Not restricted
10+053	0.59	Crest	245	500
10+300	0.25	Sag	-	Not restricted
10+838	0.13	Sag	-	Not restricted

Stopping sight distances on CR 22 are much greater than the minimum 245m for a design speed of 120 km/h.

3.2.5 Intersections

There are 21 intersections along CR 19 within the project limits. Significant features and potential constraints at each intersection are summarized on **Table 10**.

Table 10:
CR 19 – Intersection Features and Potential Constraints

Crossing Road & Approx. Sta.	Intersection Features	Potential Constraints
Hwy 3 5+078	• Currently being reconstructed	Match completed design
CR 34 5+918	• Major four-legged intersection • 62° skew • Signalized with one street light • Right turn lane for WB movement • Curb and gutter (C&G) on all corners • West Townline Road Drain on west side • North Talbot Road Drain along north side of CR 34 and South Talbot Road Drain along south side of CR 34, with guiderail in SW and SE quadrants to protect large culvert ends • Commercial development in NE quadrant Sight distance restricted	Close proximity of buildings in NE, SW and SE quadrants West Townline Road Drain and South Talbot Road Drain
North Talbot Road 7+417	• 'T' intersection to east • 66° skew • Stop controlled on crossing road • One street light at Malden Road intersection • Dawson Drain along south side of North Talbot Road	Proximity to Malden Road and CR 46 Dawson Drain crossing CR 19 just south of intersection
Malden Road (Old Hwy 114) 7+454	• Four-legged intersection – east leg is named Old Hwy 114 • 66° skew • Stop controlled on crossing road • One street light at intersection • West Townline Road Drain on west side with guide rail in NW and SW quadrants to protect large culvert ends	Proximity to CR 46 and North Talbot Road West Townline Road Drain

Table 10:
CR 19 – Intersection Features and Potential Constraints

Crossing Road & Approx. Sta.	Intersection Features	Potential Constraints
CR 46 7+628	• Major four-legged intersection • No skew • Signalized with illumination • Opposing left turn lanes for NB and SB movements • Right turn lanes for WB and EB movements • C&G on all corners • West Townline Road Drain on west side with guide rail in NW and SW quadrants to protect large culvert ends • Guide rail in NE and SE quadrants to protect poles • Commercial developments in 3 quadrants (NW, NE & SW)	Close proximity of gas pumps to CR 19 in NE quadrant. West Townline Road Drain
North Rear Road 8+813	• 'T' intersection to east • 66° skew • Stop controlled on crossing road • One street light at intersection	Drain crossing CR 19 just south of intersection
Memorial Drive 9+509	• 'T' intersection to east • No skew • Stop controlled on crossing road • One street light at intersection • Access to OPP Station and Commuter Parking Lot	Close proximity to Ramp S-E taper
Hwy 401 Ramps – South Side 9+771	• 'T' intersection to west for Ramp W-N/S • Deceleration lanes for Ramp N-E and Ramp S-E • Recently rehabilitated • No skew • Stop controlled for Ramp W-N/S • Illuminated	Entrances in close proximity to ramp terminal
Hwy 401 Ramps – North Side 10+227	• 'T' intersection to east for Ramp E-S and Ramp N-W • Acceleration lane for Ramp E-N • Deceleration lane for Ramp S-W • Recently rehabilitated • No skew • Stop controlled for Ramp E-S	Entrance in close proximity to ramp terminal

Table 10:
CR 19 – Intersection Features and Potential Constraints

Crossing Road & Approx. Sta.	Intersection Features	Potential Constraints
	• Left turn lane for Ramp N-W • Illuminated	
16 & 17 Sideroad 10+675	• 'T' intersection to east • No skew • Stop controlled on crossing road • One street light at intersection	Close proximity to Ramp E-N taper
Baseline Road 12+152	• 'T' intersection to west • No skew • Stop controlled on crossing road • One street light at intersection	Slight offset with 13 & 14 Sideroad
13 & 14 Sideroad 12+192	• 'T' intersection to east • No skew • Stop controlled on crossing road • Street light opposite Baseline Road intersection	Slight offset with Baseline Road
10th Concession Road 13+727	• 'T' intersection to east • No skew • Stop controlled on crossing road • No street light at intersection	
CR 42 14+349	• Major four-legged intersection • No skew • Signalized with illumination • Opposing left turn lanes in all directions • C&G on all corners • Commercial developments in 3 quadrants (NW, NE & SW)	Close proximity of gas pumps to CR 19 in NW quadrant
Little Baseline Road 15+939	• 'T' intersection to east • No skew • Stop controlled on crossing road • One street light at intersection	
Sylvestre Drive 16+409	• 'T' intersection to west • 85° skew • Stop controlled on crossing road • One street light at intersection East Townline Road Drain on west side	East Townline Road Drain

Table 10:
CR 19 – Intersection Features and Potential Constraints

Crossing Road & Approx. Sta.	Intersection Features	Potential Constraints
Jamsyl Drive 16+787	• 'T' intersection to west • 85° skew • Stop controlled on crossing road • One street light at intersection • East Townline Road Drain on west side	Proximity to CR 22. East Townline Road Drain
Desro Drive 17+023	• 'T' intersection to west • No skew • Stop controlled on crossing road • One street light set back from intersection • East Townline Road Drain on west side	Proximity to CR 22. East Townline Road Drain
CR 22 17+181	• Major four-legged intersection • 82° skew • Signalized with illumination • Opposing left turn lanes in all directions with median islands on west and east legs • Channelized right turn lanes for N-W and W-S movements • C&G on all corners • East Townline Road Drain on west side	East Townline Road Drain. Fully developed in NE quadrant and portion of NW quadrant abutting intersection
Amy Croft Drive 17+391	• 'T' intersection to east with commercial access to west • No skew • Signalized intersection • Illuminated • East Townline Road Drain enclosed under CR 19	Proximity to CR 22. Recently reconstructed
Lanoue Street 17+654	• 'T' intersection to west • No skew • Signalized intersection • Illuminated • East Townline Road Drain enclosed under CR 19	Recently reconstructed

A number of intersections do not meet the desired maximum skew angle of 70°. The existing three-leg intersection of Malden Road (Old Hwy 114)/North Talbot Road is not a desirable configuration and is close to the CR 19/CR 46 intersection. Barrier protection may be required where Municipal Drains are located within the clear zone. Alternatively, the drain should be relocated outside the clear zone. Traffic signal poles must be relocated to accommodate additional lanes on CR 19. Hydro poles should be break away poles if located in the clear zone.

CR 22 includes four intersections within the project limits. Significant features and potential constraints at each intersection are shown on **Table 11**.

Table 11:
CR 22 - Intersection Features and Potential Constraints

Crossing Road & Approx. Sta.	Intersection Features	Potential Constraints
Lesperance Road 24+146	• Major four-legged intersection • no skew • Signalized with illumination • Opposing left turn lanes in all directions with median islands on west and east legs • EB & WB right turn lanes • Curb and gutter (C&G) on all corners • Lesperance Road major utility and municipal service corridor • Commercial developments on south side • Cemetery at NW quadrant	Proximity of cemetery and commercial developments. Utilities and municipal services
Exit to Sylvestre Drive 24+700	• Right lane exit only • Illuminated with two street lights	Exit only, no access to CR 22
CR 19 9+970	• See **Table 10**	
Lakeshore Boulevard 10+670	• 'T' intersection to north • no skew • Signalized with illumination • EB and SB left turn lanes • WB right turn lane • Commercial development NE quadrant	Proximity of commercial development

3.2.6 Rail Crossings

There are two at-grade rail crossings on CR 19 between Highway 3 and CR 22 and one at the north limit of the project. **Table 12** summarizes significant features and potential constraints at each crossing.

Table 12: Rail Crossings and Potential Constraints		
Rail Crossing & Approx. Sta.	**Crossing Features**	**Potential Constraints**
CASO (CN Rail) 5+606	• Two tracks • 56° skew • Signals and gates	• Sight lines restricted by trees • Stopping sight distance on CR 19 limited by profile • Poles not protected
CP Rail 15+254	• One track • 89° skew • Signals and gates	• High traffic area • Poles not protected
VIA Rail 17+782	• One track • 85° skew • Signals and gates	• High traffic area • Crossing recently reconstructed

3.2.7 Roadway Drainage

Dillon's Drainage and Hydrology Report documents existing drainage conditions. **Table 28** in Section 4 describes each municipal drain system that crosses or falls within the Study Area.

3.2.8 Drainage Structures

Table 13 lists potentially affected Municipal Drain drainage structures in the Study Area, as identified in Dillon's Culvert Inspection Report.

Table 13: Impacted Drainage Structures				
Name	**Span (m)**	**Height (m)**	**Length (m)**	**Type**
West Townline Drain (CN Rail)	2.74	1.54	11.62	RFB
South Talbot Road Drain (Enclosure)	1.50	1.50	43.05	CSP
North Talbot Road Drain (Enclosure)	1.20	1.20	163.98	CSP
West Townline Drain (CR 34)	4.90	1.83	42.36	NRFO
Griffith Drain (CR 19)	2.40	2.40	23.21	NRFO
McCann Drain (CR 19)	3.06	2.74	24.65	NRFO
West Townline Drain (CR 46)	5.48	2.34	27.15	NRFO
Croft Drain (CR 19)	3.84	2.06	30.45	CSPA
10th Concession Drain (Hwy 401 E-N/S Ramp)	3.05	1.32	26.30	NRFO
West Townline Drain (Hwy 401)	4.88	1.83	69.00	NRFO
HG Arnold Drain (CR 19)	1.50	1.50	24.05	CSP

Table 13: Impacted Drainage Structures				
Name	**Span (m)**	**Height (m)**	**Length (m)**	**Type**
East Townline Road Drain – South (CR 19)	1.20	1.20	24.87	CSP
East Townline Road Drain – North (CP Rail)	1.83	1.22	6.13	NRFB
East Townline Road Drain – North (Sylvestre Drive)	2.10	1.60	23.39	CSPA
East Townline Road Drain – North (Jamsyl Drive)	1.60	1.60	29.23	CSP
East Townline Road Drain – North (Desro Drive)	1.80	1.80	24.44	CSP
Manning Road Drain (CP Rail)	0.90	0.90	18.40	CSP
Manning Road Drain (CR 19)	1.20	1.20	27.55	CSP
East Townline Road Drain – North (CR 22)	3.04	2.44	88.86	RFB
East Townline Road Drain – Enclosure North of CR 22	2.44	1.83	N/A	RFB

Notes:

RFB – Rigid Frame Bridge; CSP – Corrugated Steel Pipe; NRFO – Non-Rigid Frame Open Footing Culvert; CSPA – Corrugated Steel Pipe Arch; NRFB – Non-Rigid Frame Open Footing Box Culvert

3.2.9 Entrances

Table 14 lists all of the existing entrances on CR 19 from Highway 3 to CR 22.

Table 14: CR 19 - Existing Entrances				
Approx. Sta.	**Side**	**Surface**	**Type**	**Address/ Commercial Name**
5+217	Rt.	Gravel	Field	3806 Manning Rd
5+414	Lt.	Gravel	Farm	6399 Manning Rd
5+421	Rt.	Gravel	Field	3782 Manning Rd
5+541	Rt.	Gravel	Field	3762 Manning Rd
5+653	Rt.	Grass	Field	3746 Manning Rd
5+717	Rt.	Asphalt	Resid.	3746 Manning Rd
5+789	Rt.	Asphalt	Resid.	3732 Manning Rd
5+845	Rt.	Gravel/Asphalt	Resid.	3724 Manning Rd
5+850	Lt.	Gravel	Resid.	6255 Manning Rd
5+956	Rt.	Asphalt	Comm.	3714 Manning Rd Lil's Cozy Corner
5+978	Rt.	Gravel	Farm	3624 Manning Rd
6+412	Rt.	Gravel	Field	3624 Manning Rd
6+890	Rt.	Gravel	Field	Manning Rd
6+892	Lt.	Gravel	Field	
7+137	Rt.	Gravel	Field	Manning Rd
7+566	Rt.	Asphalt	Comm.	3500 Manning Rd

Table 14:
CR 19 - Existing Entrances

Approx. Sta.	Side	Surface	Type	Address/ Commercial Name
7+678	Rt.	Asphalt	Comm.	ESSO
7+736	Rt.	Asphalt	Resid.	3486 Manning Rd
7+775	Rt.	Gravel	Resid.	3480 Manning Rd
7+838	Rt.	Gravel	Resid.	3472 Manning Rd
7+886	Rt.	Asphalt	Resid.	3470 Manning Rd
7+904	Rt.	Asphalt	Resid.	3466 Manning Rd
7+953	Rt.	Gravel	Resid.	3458 Manning Rd
7+981	Rt.	Gravel	Resid.	3454 Manning Rd
8+006	Rt.	Gravel	Resid.	3454 Manning Rd
8+037	Rt.	Asphalt	Resid.	3450 Manning Rd
8+054	Rt.	Asphalt	Resid.	3446 Manning Rd
8+083	Rt.	Gravel	Resid.	3442 Manning Rd
8+132	Rt.	Gravel	Resid.	3438 Manning Rd
8+198	Rt.	Gravel	Resid.	3428 Manning Rd
8+282	Lt.	Asphalt	Resid./Farm	12th Conc, Rd E/S
8+407	Rt.	Gravel	Field	Manning Rd
8+620	Lt.	Gravel	Comm.	5355 Manning Rd Lil's Country Gardens
8+622	Rt.	Gravel	Resid.	3370 Manning Rd
8+716	Rt.	Gravel	Resid.	3362 Manning Rd
8+890	Lt.	Asphalt	Resid.	5285 Manning Rd
8+932	Rt.	Gravel	Field	3254 Manning Rd
9+038	Rt.	Gravel	Resid.	3320 Manning Rd
9+068	Lt.	Gravel	Resid.	5213 Manning Rd
9+175	Lt.	Gravel	Resid.	5185 Manning Rd
9+281	Lt.	Gravel	Resid./Farm	5135 Manning Rd
9+350	Rt.	Gravel	Field	3254 Manning Rd
9+375	Lt.	Gravel	Resid.	5115 Manning Rd
9+387	Lt.	Gravel	Resid.	5115 Manning Rd
9+435	Lt.	Gravel	Resid.	5075 Manning Rd
9+562	Lt.	Gravel	Resid.	5033 Manning Rd
9+626	Lt.	Gravel	Resid.	5025 Manning Rd
9+696	Lt.	Gravel	Resid./Farm	5017 Manning Rd
10+295	Lt.	Gravel	Comm.	4891 Manning Rd CTS Coxon Services
10+473	Lt.	Grass	Field	4891 Manning Rd
10+723	Lt.	Grass	Field	4371 Manning Rd
11+373	Rt.	Gravel	Farm	2920 Manning Rd
11+597	Lt.	Gravel	Field	4371 Manning Rd
11+891	Rt.	Gravel	Comm.	Advertising Sign
11+937	Lt.	Gravel	Farm	4371 Manning Rd

Table 14:
CR 19 - Existing Entrances

Approx. Sta.	Side	Surface	Type	Address/ Commercial Name
12+076	Rt.	Gravel	Resid.	2894 Manning Rd
12+465	Lt.	Gravel	Resid.	4155 Manning Rd
12+484	Lt.	Asphalt	Resid.	4155 Manning Rd
12+711	Rt.	Gravel	Resid./Farm	2816 Manning Rd
12+744	Rt.	Gravel	Resid./Farm	2816 Manning Rd
12+775	Lt.	Gravel	Resid./Farm	3955 Manning Rd
12+823	Lt.	Asphalt	Resid./Farm	3955 Manning Rd
12+826	Rt.	Asphalt	Resid./Comm.	2790 Manning Rd
12+885	Rt.	Gravel	Resid./Comm.	2790 Manning Rd
12+917	Rt.	Asphalt	Resid./Comm.	2780 Manning Rd
12+953	Rt.	Asphalt	Resid./Comm.	2780 Manning Rd
13+113	Rt.	Asphalt	Resid.	2760 Manning Rd
13+153	Lt.	Gravel	Farm	3250 12th Conc. Rd
13+191	Rt.	Gravel	Field	2680 Manning Rd
13+541	Lt.	Gravel	Field	3300 12th Conc. Rd
13+593	Rt.	Gravel	Field	2680 Manning Rd
13+734	Lt.	Grass	Field	Manning Rd W/S
13+898	Rt.	Gravel	Field	2642 Manning Rd
14+026	Rt.	Asphalt	Resid./Farm	2642 Manning Rd
14+043	Lt.	Gravel	Resid./Comm.	3325 Manning Rd LocRite Landscaping
14+129	Rt.	Asphalt	Resid.	2626 Manning Rd
14+160	Rt.	Asphalt	Resid.	2622 Manning Rd
14+173	Lt.	Asphalt	Resid.	3165 Manning Rd
14+185	Rt.	Gravel	Comm.	2616 Manning Rd
14+202	Lt.	Gravel	Resid.	3125 Manning Rd
14+217	Rt.	Gravel	Resid.	2616 Manning Rd
14+271	Lt.	Asphalt	Comm.	3025 & 3075 Manning Rd Petro Canada, Tim Horton's
14+272	Rt.	Gravel	Comm.	2606 Manning Rd
14+298	Rt.	Gravel	Comm.	2606 Manning Rd
14+409	Lt.	Asphalt	Comm.	13366 County Rd 42 Pioneer
14+412	Rt.	Gravel	Comm.	2580 Manning Rd All Cars
14+432	Rt.	Asphalt	Comm.	2584 Manning Rd OLCO
14+463	Rt.	Asphalt	Comm.	2584 Manning Rd
14+464	Lt.	Gravel	Resid.	2575 Manning Rd
14+519	Lt.	Grass	Utility	Hydro One
14+755	Rt.	Gravel	Farm	2410 Manning Rd
14+806	Lt.	Gravel	Resid./Comm.	2465 Manning Rd
14+876	Lt.	Asphalt	Resid.	2445 Manning Rd

Table 14: CR 19 - Existing Entrances				
Approx. Sta.	**Side**	**Surface**	**Type**	**Address/ Commercial Name**
15+055	Lt.	Gravel	Field	2345 Manning Rd
15+130	Rt.	Gravel	Field	Manning Rd
15+203	Lt.	Gravel	Utility	Union Gas Substation
15+211	Rt.	Asphalt	Comm.	2260 Manning Rd
15+336	Rt.	Gravel	Comm.	2170 Manning Rd
15+379	Rt.	Asphalt	Resid.	2170 Manning Rd
15+407	Rt.	Asphalt	Resid./Comm.	2136 Manning Rd
15+446	Rt.	Gravel	Resid.	2124 Manning Rd
15+464	Lt.	Gravel	Field	2085 Manning Rd
15+473	Rt.	Asphalt	Resid.	2110 Manning Rd
15+506	Rt.	Gravel	Comm.	2110 Manning Rd
15+540	Rt.	Gravel	Resid.	2094 Manning Rd
15+605	Lt.	Gravel	Field	2085 Manning Rd
15+632	Rt.	Asphalt	Comm.	2084 Manning Rd Cedar Hurst Landscaping
15+687	Rt.	Gravel	Resid./Comm.	2062 Manning Rd
15+725	Rt.	Gravel	Resid./Comm.	2054 Manning Rd
15+793	Rt.	Grass	Field	357 W Pike Creek Rd
15+794	Lt.	Gravel	Farm	2085 Manning Rd
15+944	Lt.	Gravel	Field	2085 Manning Rd
15+989	Lt.	Gravel	Resid.	1975 Manning Rd
16+002	Rt.	Gravel	Field	1980 Manning Rd
16+046	Lt.	Gravel	Field	1965 Manning Rd
16+058	Rt.	Gravel	Resid.	1968 Manning Rd
16+105	Rt.	Asphalt	Resid.	1960 Manning Rd
16+117	Lt.	Asphalt	Resid./Farm	1865 Manning Rd
16+139	Rt.	Gravel	Resid.	1950 Manning Rd
16+225	Rt.	Gravel	Field	1924 Manning Rd
16+269	Rt.	Gravel	Field	1910 Manning Rd
16+291	Rt.	Gravel	Field	1894 Manning Rd
16+350	Rt.	Gravel	Resid.	1894 Manning Rd
16+429	Rt.	Gravel	Comm.	1894 Manning Rd Melvin Orr Trucking
16+500	Lt.	Asphalt	Comm.	1855 & 1865 Manning Rd
16+588	Lt.	Asphalt	Comm.	1847 Manning Rd
16+595	Rt.	Gravel	Field	1826 Manning Rd
16+637	Lt.	Gravel	Resid.	1845 Manning Rd
16+739	Rt.	Asphalt	Resid.	1820 Manning Rd
16+839	Rt.	Asphalt	Resid.	1792 Manning Rd
16+858	Rt.	Asphalt	Resid.	1792 Manning Rd
16+868	Rt.	Gravel	Resid.	1784 Manning Rd

Table 14: CR 19 - Existing Entrances				
Approx. Sta.	**Side**	**Surface**	**Type**	**Address/ Commercial Name**
16+912	Rt.	Gravel	Resid.	1776 Manning Rd
16+924	Rt.	Gravel	Comm.	1766 Manning Rd
16+935	Rt.	Gravel	Comm.	1766 Manning Rd
16+977	Rt.	Gravel	Resid.	1758 Manning Rd
17+007	Rt.	Gravel	Field	1750 Manning Rd
17+037	Rt.	Gravel	Comm.	1740 Manning Rd
17+122	Rt.	Gravel	Comm.	1740 Manning Rd

From Highway 3 to CR 22, CR 19 has almost 140 entrances, including 55 residential, 9 residential/farm, 7 farm, 9 residential/commercial, 25 commercial, 32 field and 2 utility. Most of the entrances do not meet current standards for width and radii. All entrances will require reconstruction to the property lines to accommodate the proposed widening.

North of CR 22, CR 19 has a number of existing entrances. These were reconstructed as part of the recent reconstruction of this section of CR 19. There are no entrances on CR 22 within the project limits.

3.2.10 Illumination and Traffic Signals

Traffic signals with illumination exist at the following intersections:

- CR 19/Highway 3
- CR 19/CR 34
- CR 19/CR 46
- CR 19/CR 42
- CR 19/CR 22
- CR 19/Amy Croft Drive
- CR 19/Lanoue Street
- CR 22/Lesperance Road
- CR 22/Lakeshore Boulevard.

One streetlight is provided at the following intersections:

- CR 19/Malden Road
- CR 19/North Rear Road
- CR 19/Memorial Drive
- CR 19/16 & 17 Sideroad
- CR 19/Baseline Road
- CR 19/Little Baseline Road
- CR 19/Sylvestre Drive
- CR 19/Jamsyl Drive
- CR 19/Desro Drive.

Two streetlights are currently provided at the Sylvestre Drive exit on CR 22. Illumination also exists at the Highway 401 interchange ramps.

3.2.11 Pavement

Existing Pavement Structure

The existing pavement structure on CR 19 generally consists of asphalt, granular base and granular subbase overlying silty clay. Localized layers of silt, sand and silty clay were also encountered during field investigations. In general, pavement on CR 19 is a flexible pavement structure averaging 165 millimetres of asphalt over approximately 300 millimetres granular base and 670 millimetres granular subbase. CR 19 was recently widened and repaved north of CR 22. Granular base or granular subbase was not encountered in several locations, especially on CR 19 north of Highway 401. Buried asphalt was also encountered at a couple of locations, south of Highway 401.

The existing pavement structure on CR 22 generally consists of asphalt, open graded drainage layer (OGDL) and granular base overlying clayey silt. In general, pavement on CR 22 is a flexible pavement structure averaging 420 millimetres of asphalt over approximately 100 millimetres OGDL with very minimal granular base. In 2007, CR 22 was milled and resurfaced with 40 millimetres HL 4, and the entire section of CR 22 was then tack coated and overlayed with HL 4 as a holding strategy. The partially paved shoulders were also completely removed and replaced.

Existing Land Uses

Land use in the Study Area is generally agricultural on CR 19 between Highway 3 and CR 42, except for clusters of residential and commercial properties in the vicinity of CR 34 and CR 46. Between CR 42 and the VIA Rail line, land uses are a mix of agricultural, residential and light commercial/industrial properties. Land uses along CR 22 consist of light commercial, industrial and residential uses.

Physiography and Soils Data

The Study Area lies within the Essex Clay Plain, a subregion of the physiographic region of southern Ontario known as the St. Clair Clay Plains (Chapman and Putnam, 1984). The clay plain is a till plain smoothed by shallow deposits of lacustrine clay which settled in the depressions of the till. The prevailing soil type is Brookston clay.

Based on the Ontario Department of Mines and Northern Affairs Preliminary Map P.749, "Quaternary Geology of the Windsor-Essex Area, Western Part", and Map P.750, "Quaternary Geology of the Windsor-Essex Area, Eastern Part", the project is located in predominantly clayey silt till.

Historical Data and Maintenance History

Very little historical data is available for CR 19. However, CR 19 was partially reconstructed at Highway 401 in 2005 as part of MTO Contract 2005-3001. Work included pavement widening, reconstruction of the ramp terminals and speed change lanes and a new riding surface, from approximately 500 metres south of Highway 401 to 500 metres north of the highway

Pavement on CR 22 east of CR 19 originally consisted of concrete pavement over 225 to 300 millimetres of granular materials. West of CR 19, CR 22 was reconstructed under MTO Contract 90-15 (when it was Highway 2) with 380 millimetres of asphalt (dense friction surface course) over 110 millimetres of OGDL and geotextile.

Based on information provided by Essex County, recent rehabilitation work on CR 22 in 2007 consisted of milling the through and turning lanes at the Lesperance Road and CR 19 intersections. Following this work, CR 22 was then tack coated and provided with a 40 millimetre thick overlay of HL 4. The partially paved shoulders were also removed and replaced.

Existing Pavement Condition

The existing pavement condition survey of CR 19 revealed that the existing lanes are exhibiting signs of transverse cracking, wheel path rutting, wheel path cracking and occasional reflection cracking throughout the project limits.

In general, the northbound and southbound lanes on CR 19, between Highway 401 and CR 42 are showing signs of slight to moderate transverse cracking and wheel path ruts throughout. There are also areas with extensive slight single and alligatored multiple inner wheel path with slight ravelling and a few pot holes. Between CR 42 and VIA Rail, moderate to severe rutting with intermittent to frequent moderate to severe outer wheel path cracks were observed.

On CR 19 south of Highway 401, the northbound and southbound lanes are exhibiting signs of slight to moderate transverse cracking with extensive slight inner and outer wheel path cracking. Slight to moderate rutting with severe rutting in the northbound lane was also observed at CR 46.

Several intersections are in poor condition and showing distress, including severe rutting and cracking (moderate transverse, longitudinal and map cracking). As noted, CR 19 was recently partially rehabilitated from approximately 500 metres south of Highway 401 to 500 metres north of the highway.

In 2007, the County of Essex reconstructed and widened CR 19 from north of CR 22 to the Via Rail Line.

3.2.12 Utilities and Municipal Services

The following municipal services have been identified in the CR 19 corridor, between Highway 3 and Amy Croft Drive:

- Gas – located throughout with a Union Gas Substation on the west side of CR 19, just south of CP Rail
- Bell – located underground throughout the Study Area, with many pedestals
- Hydro – hydro is located on poles throughout the corridor. A number are braced with a pole on an angle, with some extending toward the roadway. Hydro tower crossings include: four between CR 34 and North Talbot Road; two between CR 42 and CP Rail; and one on the south side of CP Rail. Additional details are provided in correspondence received from Hydro One (see **Appendix A**)
- Cable TV – none identified but should be confirmed with Cogeco
- Water – on the west side from 10th Concession to CR 22, on the east side from Baseline Road to 13 & 14 Sideroad, and on the east side from North Talbot Road to Highway 401, with fire hydrants located near existing property lines. A watermain is located on the north side of CR 22, from the west project limits to CR 19
- Sanitary Sewer – none
- Storm Sewer – see Section 3.2.7 on Roadway Drainage.

Within the CR 22 corridor, the following utilities and municipal services have been identified:

- Gas – located along the north side of ROW, except from Lesperance Road to the Sylvestre Drive exit, where it is located on south side. Crossings occur at Lesperance Road, CR 19 and about 450m west of Lesperance Road
- Bell – located along south side from Lesperance Road to east limit. Cable is fibre optics from CR 19 to east limit. Crossings occur at Lesperance Road, CR 19 and about 450m west of Lesperance Road
- Hydro – crossing at Lesperance Road
- Cable TV – none identified but should be confirmed with Cogeco
- Water – A watermain is located on the north side of CR 22 from the west limits to CR 19. Crossings occur at Lesperance Road, CR 19 and about 450m west of Lesperance Road
- Sanitary Sewer – crossing under CR 22 on Lesperance Road
- Storm Sewer – see Section 3.2.7 on Roadway Drainage.

Since plant locations are approximate, field locates are required prior to Detailed Design and construction. Utility relocations will comply with MTO's Utility Relocation Procedures, February 2005.

3.2.13 Guiderail

Steel beam guiderail has been installed at a number of locations along CR 19, as shown on **Table 15**.

Table 15: CR 19 – Guiderail				
Start Station	**End Station**	**Side**	**End Treatment**	**Condition**
5+593	5+605	Lt.	Upright End	Poor
5+617	5+641	Lt.	Upright End	Poor
5+854	5+893	Rt.	Upright End	Poor
5+893	5+923	Lt.	Upright End	Poor
7+421	7+439	Lt.	Eccentric Loader	Fair
7+447	7+478	Lt.	Eccentric Loader	Fair
7+601	7+616	Lt.	Upright End	Fair
7+603	7+620	Rt.	Upright End	Fair
7+635	7+650	Lt.	Upright End	Fair
7+636	7+650	Rt.	Upright End	Fair
On Ramp	9+967	Lt.	n/a	Good
9+808	9+967	Rt.	Extruder	Good
10+033	10+280	Lt.	Extruder	Good
10+033	On Ramp	Rt.	n/a	Good
10+314	10+461	Lt.	Extruder	Good
14+038	14+074	Rt.	Eccentric Loader	Good
14+049	14+074	Lt.	Eccentric Loader	Good
14+092	14+118	Rt.	Buried End	Good
14+092	14+127	Lt.	Eccentric Loader	Good

The upright end treatments are no longer acceptable and must be replaced. The entire guiderail will likely be replaced to accommodate the widening of CR 19.

3.3 Existing and Future Traffic Conditions

The Essex-Windsor Regional Transportation Master Plan (EWRTMP) identified capacity and operating deficiencies for both CR19 and CR 22 in the Towns of Lakeshore and Tecumseh. The Master Plan concluded that improvements to sections of both roads are currently required to meet existing traffic demands. Predicted traffic growth will create additional operational concerns along the corridor.

The EWRTMP included a detailed operations and safety assessment of the CR 19 and CR 22 corridors. The assessment covered the following:

- existing traffic operations along both corridors, identifying areas where capacity limitations are resulting in traffic congestion
- recent collision history along the corridor, identifying patterns or trends and possible solutions to reduce the number of collisions and improve safety
- future traffic demands along the corridors to determine future capacity deficiencies.

The purpose of the assessment was to identify and address operational and capacity deficiencies and safety concerns over a 20-year period. Existing condition operations were assessed for the AM and PM weekday peak traffic hours, using turning movement count data from the 1988 (Average Annual Daily Traffic (AADT)) counts, supplemented by 24 hour counts conducted in 2002 at 25 additional County Road locations. Collision history was assessed based on all Motor Vehicle Accident Reports over a 5 year period from 2000 to 2005. Future conditions operations were assessed based on the anticipated development scenario for a 20-year horizon, to 2021.

3.3.1 Existing and Projected Traffic Volumes

3.3.1.1 Existing Traffic Volumes

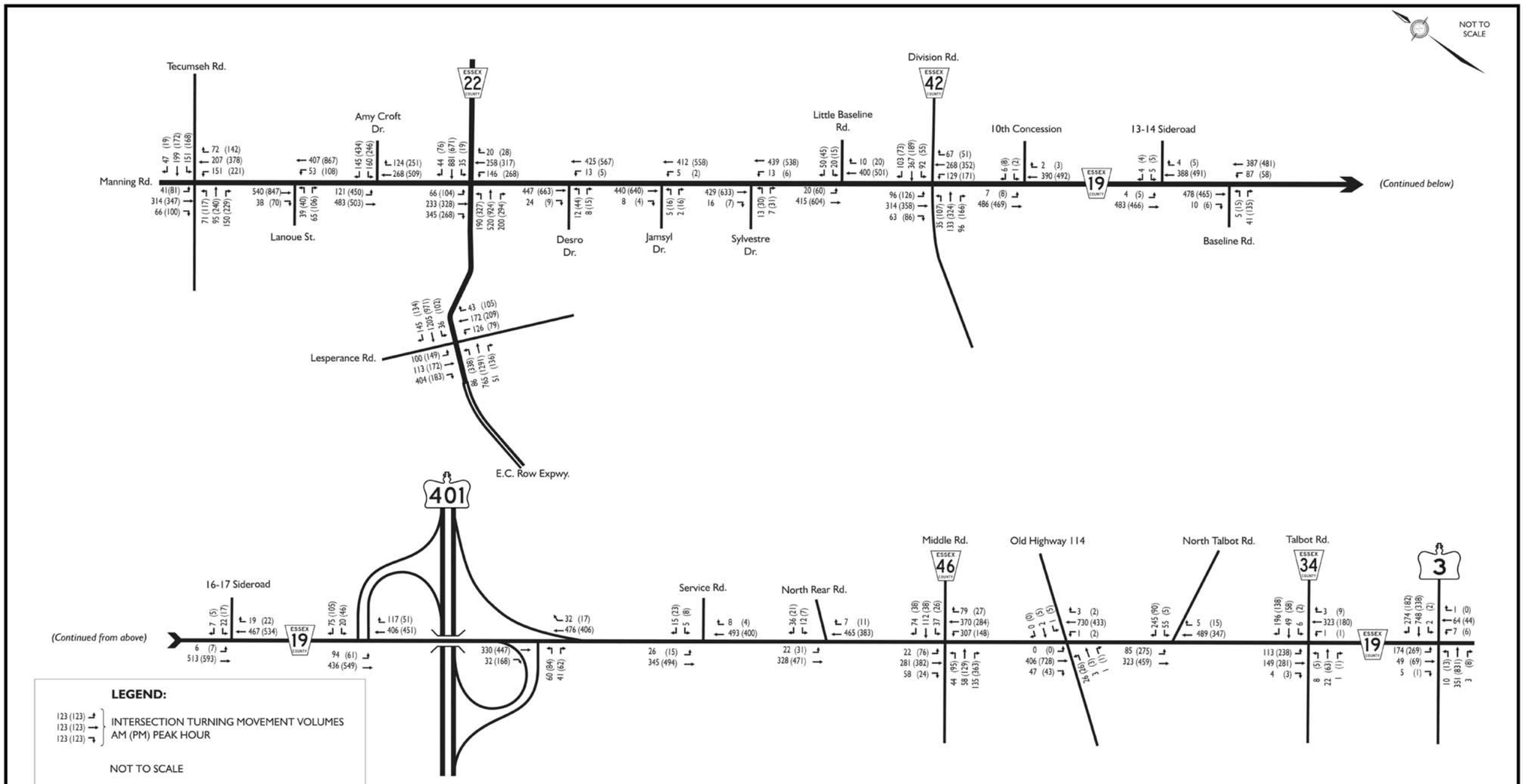
Dillon collected intersection and corridor traffic volumes throughout the Study Area in the Fall of 2006. Existing intersection traffic volumes are illustrated in **Figure 6**. **Table 16** summarizes approximate volumes, or range of volumes, for peak hour traffic in each direction and for daily traffic (AADT).

Table 16: Typical Corridor Section Volumes on CR 19 and CR 22					
Road Section	**AM Peak Hour**		**PM Peak Hour**		**AADT**
CR 19	**SB**	**NB**	**SB**	**NB**	**Two-way**
North of CR 22	600-650	400-450	750-950	750-950	19,500
CR 22 to CR 42	450	450	650	550	12,500
CR 42 to Highway 401	500-550	400-450	450-600	450-550	12,000
Highway 401 to CR 46	350	500	500	400	11,000
CR 46 to CR 34	300	500	500	350	10,500
CR 34 to Highway 3	200	350	300	200	6,000
CR 22	**WB**	**EB**	**WB**	**EB**	**Two-way**
West of Lesperance Road	1,600	800	1,250	1,750	35,500
Lesperance Road to CR 19	1,250	800	1,200	1,550	32,500
East of CR 19	1,000	750	800	1,200	21,500

The section of CR 19, north of CR 22, experiences the highest demand. Traffic is more local in nature, and the higher volumes reflect the influence of residential commuter traffic and commercial/retail traffic in the PM peak hour. South of CR 22, volumes are at a more moderate level and are generally consistent, decreasing gradually to the south. This reflects the more regional, longer-distance nature of trips in this section of the corridor.

The southernmost section of the corridor, between CR 34 and Highway 3, experiences a drop in traffic volume compared to the northern sections. In the southern section, traffic branches off to Maidstone, CR 34 and Essex. South of CR 34, most traffic is bound to/from Highway 3 and Leamington. As a result, traffic volumes on CR 19 south of Highway 3 are low.

South of CR 22, commercial traffic on CR 19 comprises approximately 10-15% of all traffic in the AM peak hour, and a slightly lower percentage (approximately 5-10%) in the PM peak hour. North of CR 22, where the road has a more local function, the percentage of commercial traffic is lower, with approximately 5% in the AM peak and 2% in the PM peak.



DILLON CONSULTING	County Road 19 (Manning Road) and County Road 22 Improvements GWP 3031-06-00 Class EA and Preliminary Design Study	Existing AM/PM Peak Hour Traffic Volumes
		November 2008 / Figure 6

The primary east-west roads intersecting with CR 19 are County Roads 22, 46, 42 and 34, and Highway 3. These roads exhibit a noticeable peak directional split favouring westbound traffic in the AM peak hour and eastbound traffic in the PM peak hour. This reflects a pattern of commuter trips between employment areas in Windsor and residential areas to the east in Essex County. CR 22 experiences the highest traffic demand since it turns into the E.C. Row Expressway at Banwell Road, and connects a number of residential and employment centres (Tecumseh; Patillo Road; Puce/Emeryville; Belle River). In addition, CR 42 experiences moderately high volumes as an alternate route to CR 22, and Highway 3 experiences moderately high volumes as the primary connection to Leamington and the southern and eastern part of Essex County.

The majority of stop-controlled side streets currently experience generally low traffic volumes (60 vehicles per hour, per direction or less). These roads generally serve the function of local rural access roads forming part of the original concession grid.

3.3.1.2 Traffic Operational Analysis (Level of Service)

Additional development in the broader study area will result in increased traffic volumes on CR 19 and intersecting streets. In some cases, particularly north of Highway 401, the increase in volume is anticipated to be significant. Major developments contributing to increased traffic volumes include:

- major expansion of the existing commercial node in the area of CR 19 and CR 22
- additional major commercial nodes along the CR 22 corridor, at Banwell Road, Patillo Road, and in the Wallace Woods area
- residential expansion in the Tecumseh Hamlet development area, west of Manning Road between County Roads 22 and 42
- residential and employment expansion in Lakeshore along the CR 22 corridor, including the Advance/Patillo, Wallace Woods, and River Ridge development areas.

Other development currently anticipated to have a somewhat lower impact on traffic volumes includes proposed employment and industrial uses in the vicinity of the CR 19/ Highway 401 interchange, and residential development in the Maidstone Hamlet west of CR 19, south of CR 46.

Future traffic volumes were projected using two different approaches:

- building on the EWRTMP transportation model, a screenline assessment was undertaken of interim and ultimate 20-year volumes, for parallel north-south roadways in the vicinity of CR 19. This assessment determined if sufficient north-south capacity will exist at various points along the broader CR 19 corridor, and if some roadways are more constrained than others. This "top-down" modelling approach involved dividing the Windsor / Essex area into transportation zones, estimating vehicle trips produced and attracted by each zone and the attraction between each origin–destination pairing. These trips were assigned to the regional road network on the basis of road capacity and travel delays
- future traffic volumes were also estimated by determining the magnitude of development in the CR 19 and CR 22 corridors; determining traffic volumes generated by each development (by referring to previous traffic studies where available); and adding these development-generated volumes to existing traffic, with an allowance for some additional growth (via an annual growth rate) to account for development further away from the Study Area. Separate sets of traffic projections were prepared representing low-growth and high-growth scenarios, through adjustments to the general annual growth rate.

While these two approaches result in some differences in projected volumes, in part due to inherent differences in the two procedures, they allow for a comparison to confirm the recommended basic lane requirements and anticipated timing.

3.3.1.3 Results of Regional Transportation Model

Table 17 outlines the volumes projected through the regional transportation model approach, focusing on six strategic screenlines along the corridor. Projected volumes are indicated for the short-term (2011), medium-term (2016), and long-term (2026) horizons.

Table 17: Modelled Volumes on CR 19						
Screenline	**Southbound**			**Northbound**		
	2011	**2016**	**2026**	**2011**	**2016**	**2026**
North of CR 22	1,115	1,320	1,615	1,170	1,310	1,555
South of CR 22	1,050	1,315	1,650	1,055	1,250	1,560
South of CR 42	760	1,030	1,370	1,070	1,285	1,615
North of Highway 401	895	1,160	1,500	935	1,145	1,475
South of Highway 401	680	800	1,025	700	845	1,050
North of Highway 3	455	540	695	395	505	670

3.3.1.4 Results of Development-Based Traffic Projections

Whereas the regional model estimated link volumes at a screenline level, the second approach allowed for development of more detailed intersection turning movement estimates to determine the adequacy of intersections along the corridor to accommodate future volumes. This approach involved determining existing intersection turning movement volumes, increasing existing volumes by an annual growth rate to account for general traffic increases related to external growth areas, and adding specific turning movement volumes generated by developments proposed along the corridor. Traffic forecasts for these background developments were developed from a number of sources, including development traffic forecasts from traffic studies prepared for individual developments. In other cases, traffic forecasts were unavailable or adjusted to reflect subsequent changes to development concepts.

For each horizon year, two sets of traffic projections were generated, representing low-growth and high-growth scenarios. The difference between these scenarios is a higher background growth rate applied to existing volumes (0.5% per year in the low-growth scenario, vs. 2.0% per year in the high-growth scenario). The total 5-year, 10-year, and 20-year horizon volumes are presented in **Figures 7** through **9**.

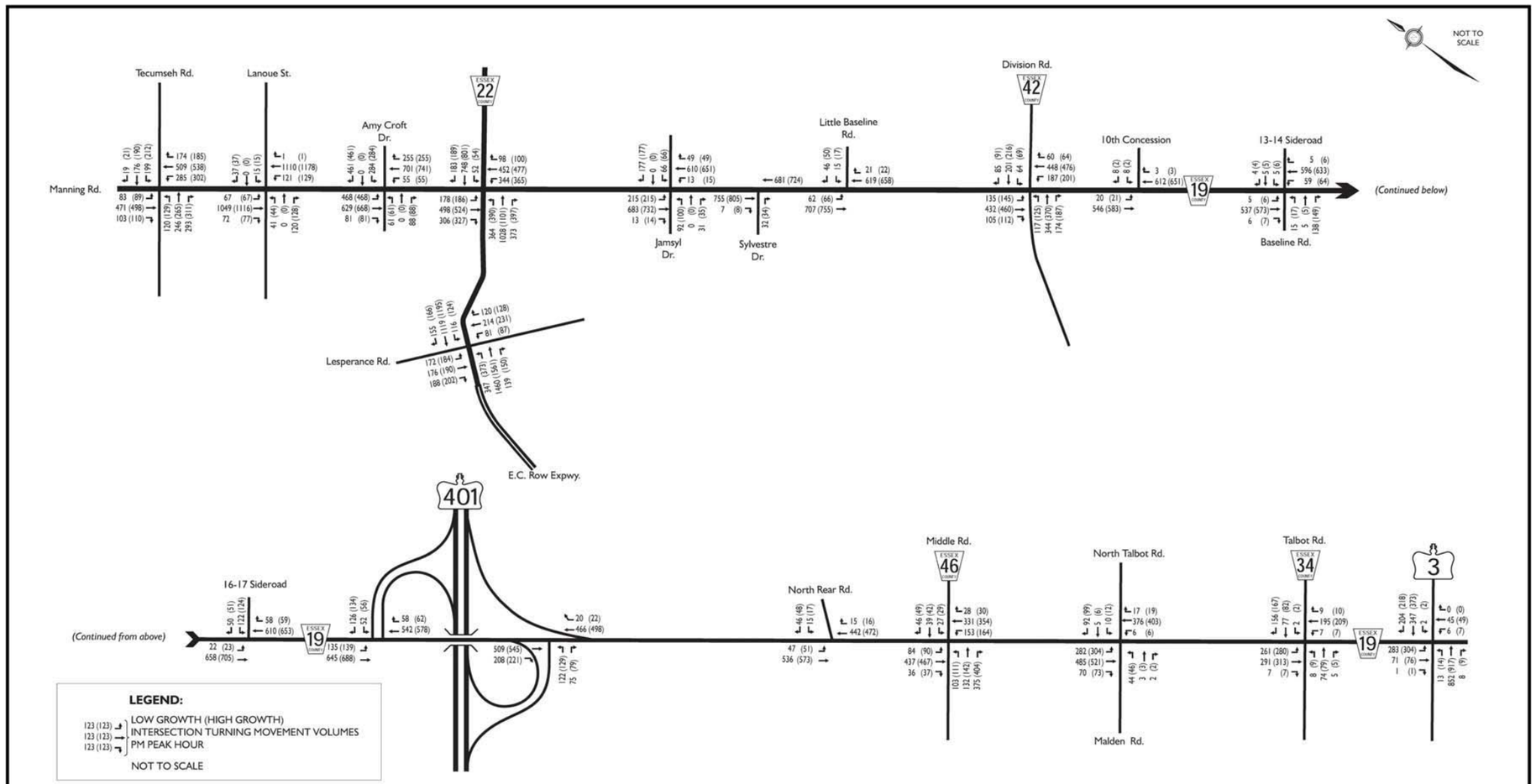
Traffic analyses were undertaken using three approaches:

- modeled link volumes were compared to the planning capacity for each link to determine if additional lane capacity will be required in general
- projected intersection volumes were analyzed to determine operations and level of service at an intersection level (delays and capacity)
- intersection projections were also extrapolated to estimate link volumes and assess operations of the existing two-lane highway, taking into account not only lane capacity, but geometric and operational considerations, such as passing opportunities and travel speed.

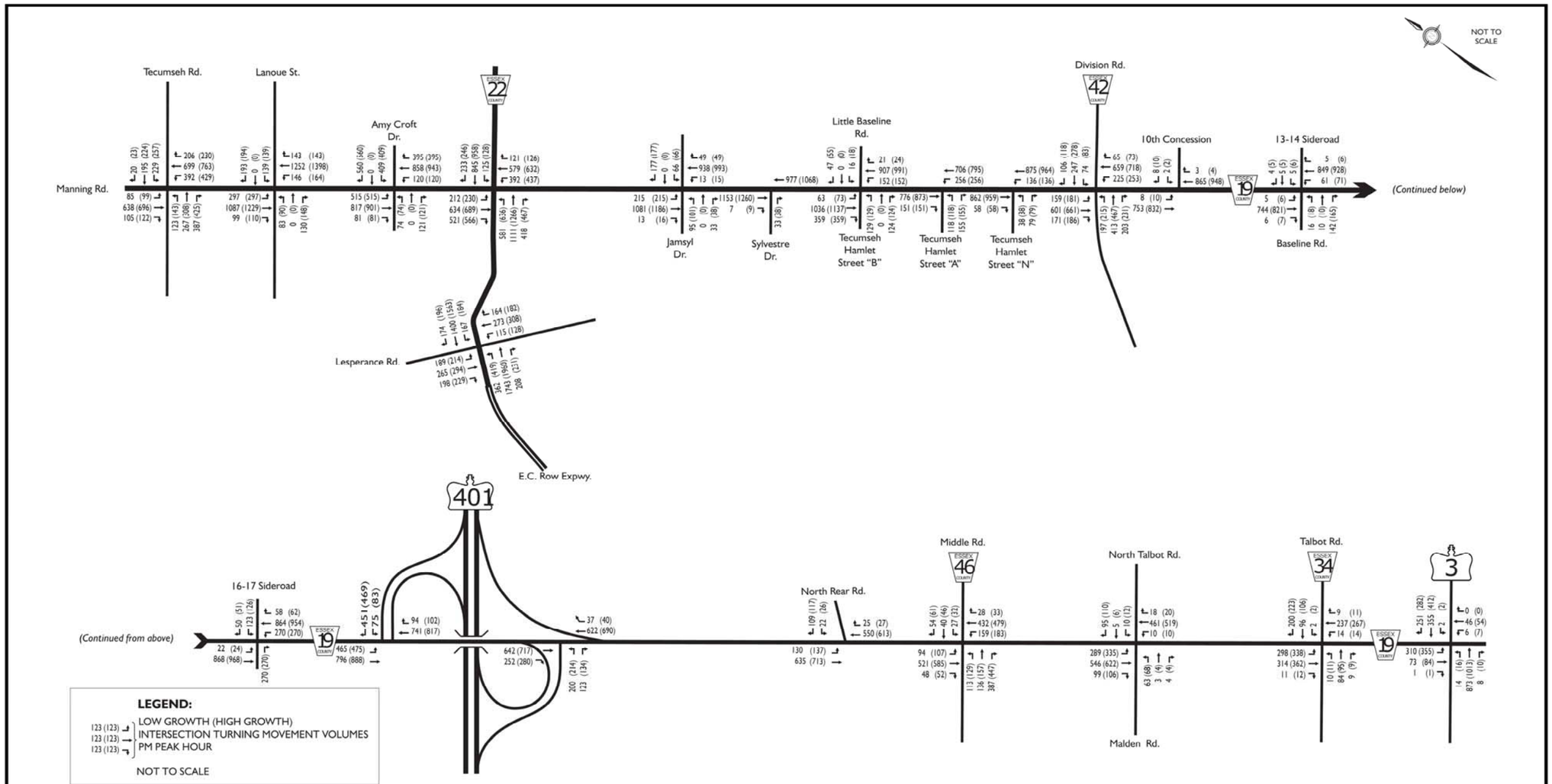
3.3.1.5 General Planning Capacity

In determining the adequacy of the existing cross-section at a planning level, the primary consideration is projected volumes compared to existing planning-level capacity. **Table 18** compares modelled volumes at each screenline for the short-term (2011), medium-term (2016), and long-term (2026) horizons to available capacity. The planning-level lane capacity incorporated in the model parameters is 1,000 vehicles per hour per lane in the rural sections of CR 19 (south of CR 42), and 900 vehicles per hour per lane in the more urban sections of CR 19 (north of CR 42). Highlighted values on the table indicate if and when increased capacity is likely to be required.

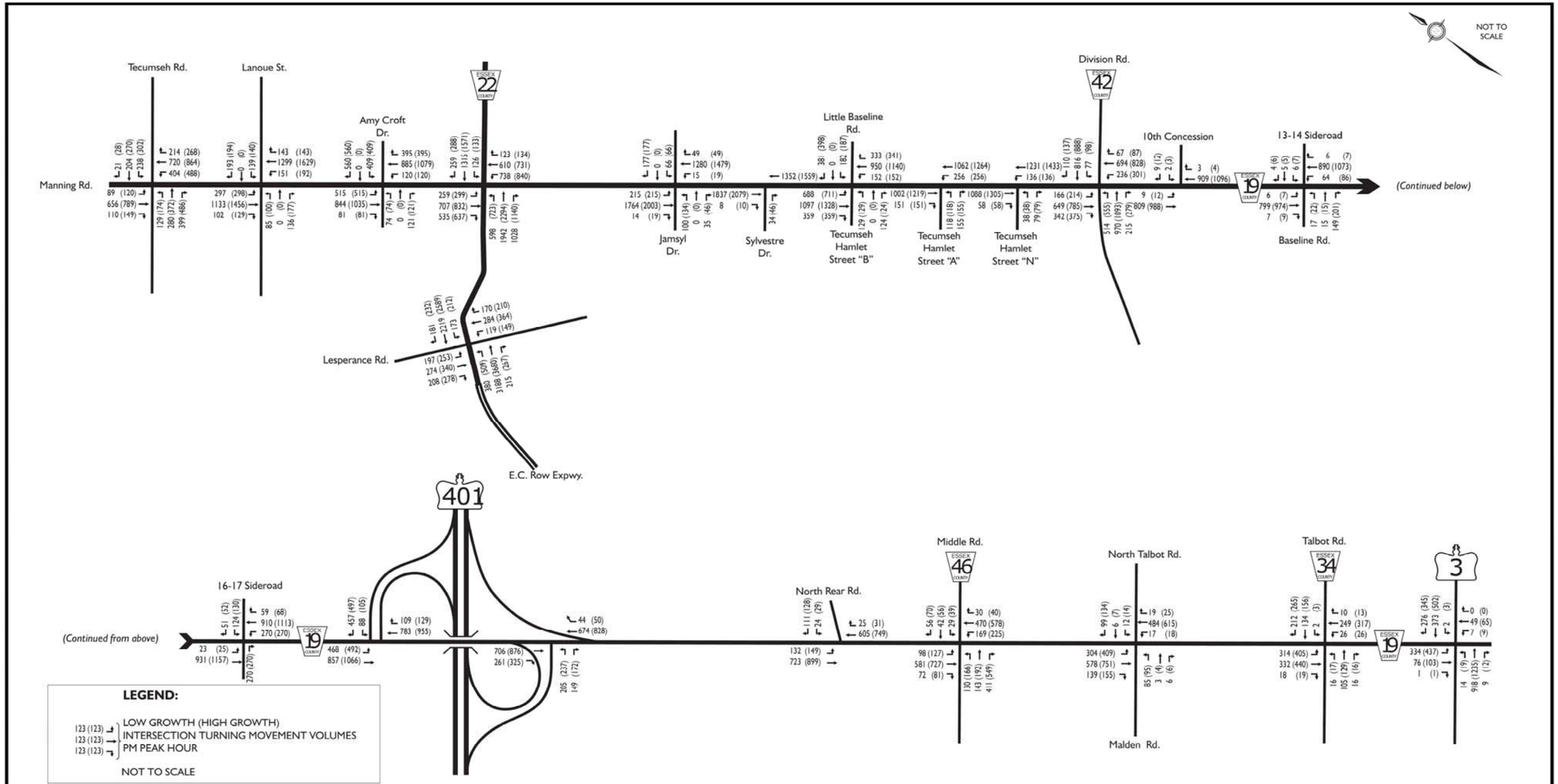
Table 18: Modelled Volumes and Projected Capacity Deficiencies on CR 19							
Screenline	**Year**	**Southbound**			**Northbound**		
		Volume	**Capacity**	**v/c**	**Volume**	**Capacity**	**v/c**
North of CR 22	2011	1,115	900	1.24	1,170	900	1.30
	2016	1,320	900	1.47	1,310	900	1.46
	2026	1,615	900	1.79	1,555	900	1.73
South of CR 22	2011	1,050	900	1.17	1,055	900	1.17
	2016	1,315	900	1.46	1,250	900	1.39
	2026	1,650	900	1.83	1,560	900	1.73
South of CR 42	2011	760	1,000	0.76	1,070	1,000	1.07
	2016	1,030	1,000	1.03	1,285	1,000	1.29
	2026	1,370	1,000	1.37	1,615	1,000	1.62
North of Highway 401	2011	895	1,000	0.90	935	1,000	0.94
	2016	1,160	1,000	1.16	1,145	1,000	1.15
	2026	1,500	1,000	1.50	1,475	1,000	1.48
South of Highway 401	2011	680	1,000	0.68	700	1,000	0.70
	2016	800	1,000	0.80	845	1,000	0.85
	2026	1,025	1,000	1.03	1,050	1,000	1.05
North of Highway 3	2011	455	1,000	0.46	395	1,000	0.40
	2016	540	1,000	0.54	505	1,000	0.51
	2026	695	1,000	0.70	670	1,000	0.67



DILLON CONSULTING	County Road 19 (Manning Road) and County Road 22 Improvements GWP 3031-06-00 Class EA and Preliminary Design Study	5-Year Horizon Peak Hour Traffic Volumes
		November 2008 / Figure 7



DILLON CONSULTING	County Road 19 (Manning Road) and County Road 22 Improvements GWP 3031-06-00 Class EA and Preliminary Design Study	10-Year Horizon Peak Hour Traffic Volumes
		November 2008 / Figure 8



DILLON CONSULTING	County Road 19 (Manning Road) and County Road 22 Improvements GWP 3031-06-00 Class EA and Preliminary Design Study	20-Year Horizon Peak Hour Traffic Volumes
		November 2008 / Figure 9

North of CR 22, modelled volumes indicate the need for two lanes on CR 19. Widening of this section has recently been completed.

From Highway 401 to CR 22, modelled volumes in both directions meet or exceed the planning capacity of the existing two-lane highway (one lane per direction) in either 2011 or 2016, and will require widening to four lanes from that point through the 20-year horizon. South of Highway 401, modelled volumes drop off, and the existing two-lane roadway is anticipated to operate below its planning capacity through the 10-year horizon, beyond which point widening to four lanes will be required.

These findings are generally consistent with those of the EWRTMP. The long-term (2021) traffic projections generated for the regional model indicated that CR 19 would need to be widened to four lanes from CR 22 to Highway 3. The updated model output suggests that two lanes may be sufficient for projected volumes immediately north of Highway 3, but confirms that four lanes will be required for the remainder of the corridor.

3.3.1.6 Intersection Operations

Intersection operations were assessed at all signalized intersections, and major unsignalized intersections in the Study Area. The analysis was based on the methodology outlined in the *Highway Capacity Manual* (HCM), 2000 edition, using the Synchro (version 6) software package, which is based on the HCM methodology.

Intersection operations were assessed using the existing lane configurations, except where roadway relocations are proposed for the purposes of development or to address existing geometric design concerns. Signal timings were optimized, including the addition of new left turn phases, where appropriate. This reflects a "do-nothing" approach, where no major roadway improvements are implemented and capacity increases are limited to optimizations of the existing traffic signal network.

For each intersection, the volume to capacity (v/c) ratio and Level of Service (LOS) were noted for the intersection as a whole (signalized intersections), or for side street approaches / left turn movements (unsignalized intersections). The v/c ratio measures the degree of saturation of an intersection or movement; a v/c ratio of 1.00 or greater indicates that volume has exceeded the available capacity. Level of Service is a qualitative measure related to average vehicle delay at the intersection or on a particular movement, and is categorized from LOS A to LOS F, where LOS A reflects optimum conditions with minimal delays and LOS F reflects congested conditions and intersection failure. The existing and anticipated future operations at signalized and unsignalized intersections are outlined in **Tables 19** and **20**.

Table 19:
Signalized Intersection Operations (Existing Configuration)

Intersection		Existing	Future Low Growth			Future High Growth		
			5-year	10-year	20-year	5-year	10-year	20-year
Tecumseh Rd. / Manning Rd.	v/c	0.53	0.64	0.77	0.85	0.64	0.89	1.14
	LOS	B	B	C	C	C	C	D
Lanoue St. / Manning Rd.	v/c	0.62	0.41	0.85	0.87	0.45	0.95	0.96
	LOS	A	A	B	B	A	C	C
Amy Croft Dr. / Manning Rd.	v/c	0.95	0.84	1.09	1.00	0.86	0.95	1.12
	LOS	C	C	D	D	C	D	E
CR 22 / Manning Rd.	v/c	1.02	1.12	1.45	2.00	1.23	1.61	>2.00
	LOS	E	E	F	F	F	F	F
CR. 22 / Lesperance Rd.	v/c	1.11	1.04	1.31	1.89	1.13	1.50	>2.00
	LOS	F	F	F	F	F	F	F
CR. 42 / Manning Rd.	v/c	0.83	0.84	1.08	>2.00	0.89	1.32	>2.00
	LOS	D	C	E	F	D	F	F
CR 46 / Manning Rd.	v/c	0.61	0.63	0.73	0.78	0.67	0.79	1.00
	LOS	B	B	B	C	B	C	E
CR 34 / Manning Rd.	v/c	0.55	0.57	0.65	0.71	0.61	0.74	0.94
	LOS	B	B	B	B	B	B	C
Hwy. 3 / Manning Rd.	v/c	0.86	0.88	0.92	0.98	0.94	1.03	1.31
	LOS	C	C	C	C	C	D	F

Table 20:
Unsignalized Intersection Operations (Existing Configuration)

Intersection with Manning Road	Approach		Existing	Future Low Growth			Future High Growth		
				5-year	10-year	20-year	5-year	10-year	20-year
Desro Dr.	Eastbound	v/c	0.69	1.14	>2.00	>2.00	1.51	>2.00	>2.00
		LOS	F	F	F	F	F	F	F
Jamsyl Rd.	Eastbound	v/c	0.24	1.53	>2.00	>2.00	>2.00	>2.00	>2.00
		LOS	D	F	F	F	F	F	F
	Westbound	v/c	—	>2.00	>2.00	>2.00	>2.00	>2.00	>2.00
		LOS	—	F	F	F	F	F	F

Table 20:
Unsignalized Intersection Operations (Existing Configuration)

Intersection with Manning Road	Approach		Existing	Future Low Growth			Future High Growth		
				5-year	10-year	20-year	5-year	10-year	20-year
Sylvestre Dr.	Eastbound	v/c	0.44	0.25	0.84	>2.00	0.31	1.34	>2.00
		LOS	D	D	F	F	D	F	F
Little Baseline Rd. / Street B	Eastbound	v/c	—	—	>2.00	>2.00	—	>2.00	>2.00
		LOS	—	—	F	F	—	F	F
	Westbound	v/c	0.34	0.24	>2.00	>2.00	0.30	>2.00	>2.00
		LOS	D	C	F	F	D	F	F
Street A	Eastbound	v/c	—	—	>2.00	>2.00	—	>2.00	>2.00
		LOS	—	—	F	F	—	F	F
Tecumseh Hamlet "Area N"	Eastbound	v/c	—	—	1.09	>2.00	—	1.51	>2.00
		LOS	-	-	F	F	-	F	F
10th Concession	Westbound	v/c	0.03	0.03	0.05	0.06	0.03	0.06	0.12
		LOS	B	C	C	C	C	C	E
Baseline Rd. / 13-14 Sideroad	Eastbound	v/c	0.34	0.45	0.86	1.13	0.54	1.23	>2.00
		LOS	C	C	F	F	D	F	F
	Westbound	v/c	0.03	0.13	0.32	0.52	0.17	0.63	>2.00
		LOS	C	E	F	F	F	F	F
16-17 Sideroad	Westbound	v/c	0.11	1.00	1.96	>2.00	1.16	>2.00	>2.00
		LOS	C	F	F	F	F	F	F
Hwy. 401 Westbound Off-Ramp	Westbound	v/c	0.40	0.75	>2.00	>2.00	0.66	>2.00	>2.00
		LOS	F	F	F	F	F	F	F
Hwy. 401 Eastbound Off-Ramp	Eastbound	v/c	0.38	0.56	1.52	1.89	0.68	1.99	>2.00
		LOS	C	D	F	F	E	F	F
North Rear Rd.	Westbound	v/c	0.07	0.16	0.44	0.54	0.18	0.59	0.98
		LOS	B	C	C	D	C	E	F
Malden Rd. / North Talbot Rd.	Eastbound	v/c	0.32	1.12	>2.00	>2.00	1.55	>2.00	>2.00
		LOS	F	F	F	F	F	F	F
	Westbound	v/c	0.10	0.40	0.54	>2.00	0.55	0.95	>2.00
		LOS	E	D	E	F	E	F	F

CR 19 at Tecumseh Road

This intersection is currently operating at a good LOS B, following the recent widening on the north and south approaches. Under the low-growth scenario, it is expected to operate at LOS B to the five-year horizon and LOS C to the 20-year horizon, with sufficient capacity to meet projected future volumes. Under the high-growth scenario, the intersection will operate above capacity and at LOS D by the 20-year horizon; however, the low-growth volumes are more likely at this location given the more built-out nature of the area to the north and the lower proportion of "through" traffic. As a result, it is anticipated that this intersection will have sufficient capacity to meet long-term traffic demands.

CR 19 at Lanoue Street

This intersection is currently operating at an excellent LOS A and well below capacity, even in its previous configuration with a two-lane CR 19. It is expected to continue operating at LOS A in the short term. In the medium term, operations are expected to decrease to LOS B, as a result of planned development that will use the new east leg. Under the high-growth scenario, medium- and long-term operations decrease slightly further to LOS C, and some capacity issues are anticipated in the short term. However, like the upstream intersection at Tecumseh Road, it is anticipated that low-growth volumes are more likely at this location and, as a result, the intersection will have sufficient capacity to meet long-term traffic demands.

CR 19 at Amy Croft Drive

At the time the "existing conditions" traffic counts were undertaken, CR 19 had a basic two-lane cross-section north of CR 22. Based on that cross-section, the Amy Croft Drive intersection operated near capacity, although at a reasonable LOS C. The recent widening of CR 19 to four lanes through this intersection has provided additional capacity and resulted in improved operations.

Under five-year operations, the intersection will continue to operate at LOS C and under capacity. Beyond the five-year horizon, operations at the intersection are sensitive to the magnitude of development in the Amy Croft Drive commercial node. Under the low-growth scenario, and by the 20-year horizon, the intersection will be operating at capacity and the northbound through movement will be critical. Under the high-growth scenario, operations will be somewhat worse. Due to the sensitivity of traffic volumes and intersection operations to commercial build-out, volumes should be monitored as development proceeds to determine if additional capacity is required on Amy Croft Drive.

CR 22 at CR 19

This intersection is currently operating at LOS E, with a number of turning movements operating near or above capacity. Under future conditions, this intersection is anticipated to experience significant additional traffic pressure from a number of sources:

- development proposals in the area of CR 22 and Manning Road are anticipated to result in an increase in commercial space of at least 1,300,000 sq. ft. The great majority of trips to this node from Windsor and other areas to the south, west and east will travel through this intersection, including heavy volumes on low-capacity left turn movements
- some traffic bound to and from the Tecumseh Hamlet area will also travel through the intersection
- major developments further east along CR 22 (Wallace Woods; Advance / Patillo; River Ridge) are projected to generate a significant volume of traffic bound to and from Windsor and areas west of CR 19. Even accounting for a 50% reduction in build-out (i.e., not all development in place by the long-term study horizon), background traffic projections for this development anticipate roughly 825 peak direction, peak hour vehicle trips added to CR 22 east of CR 19. In addition, a significant volume of this development traffic (roughly 930 peak direction, peak hour vehicle trips) will rely on Little Baseline Road. Since Little Baseline Road does not extend west of CR 19, this traffic will divert north to CR 22 and south to CR 42 to continue further west, adding significantly to turning movements at those intersections.

Under the existing configuration, the intersection is anticipated to operate well over capacity and at an unacceptable level of service, even in the short term. By long-term conditions, significant congestion will occur on virtually all turning movements.

CR 22 at Lesperance Road

This intersection is currently experiencing significant peak period congestion due to commuter traffic bound to and from the E.C. Row Expressway and Windsor. These conditions are compounded by high eastbound left turn demand, which is accommodated on a protected-only left turn phase. As a result, the intersection is currently operating at LOS F and above capacity. Several movements are operating near or above capacity in the PM peak hour, including the eastbound and westbound through movements, the eastbound left turn movement and the northbound approach. Signal timing adjustments could have a marginal benefit, but will not significantly address capacity deficiencies, which will compound in the future.

CR 19 at Desro Drive

Although this unsignalized intersection has sufficient capacity to meet the current demand, it is currently operating at a poor level of service due to delays experienced turning onto CR 19 in the PM peak period when employees are leaving work, As traffic increases on CR 19, the number of gaps in through traffic will decrease, resulting in increased delays for side street motorists and insufficient capacity.

CR 19 at Jamsyl Road

This unsignalized intersection is currently operating at a reasonable level of service and well below capacity. The combination of increased traffic volumes on CR 19 and a new commercial access planned opposite Jamsyl Road will cause this intersection to fail in its current configuration, potentially as early as the five-year horizon, although this will depend on the timing of build-out of development in the area.

CR 19 at Sylvestre Drive

This intersection is currently operating at a reasonable level of service below capacity. By the 10-year horizon, it is anticipated that it will be operating at LOS F and either slightly below capacity (in the low-growth scenario) or above capacity (in the high-growth scenario).

CR 19 at Little Baseline Road

Little Baseline Road is currently a low-volume local rural road, and the intersection with CR 19 operates at a good level of service. Future development will result in the intersection failing by the mid-term scenario. It is currently proposed that Street “B” from the Tecumseh Hamlet area provide access to CR 19 directly opposite Little Baseline Road. In the longer term, development in Wallace Woods and other areas to the east is expected to rely on Little Baseline Road as an alternate east-west route bypassing County Roads 22 and 42. This will change the nature of Little Baseline Road and add additional traffic pressure to its intersection with CR 19.

CR 19 at CR 42

This intersection is currently operating at LOS D overall, with the eastbound through movement approaching capacity. Adjustments to signal timings could result in the overall level of service improving to LOS C in the short term; however, as growth continues, additional capacity will be required by the ten-year horizon, when the intersection will exceed capacity and operate at LOS E to LOS F. Also, a number of individual movements will have reached capacity, including the northbound and southbound through movement, the northbound left turn movement and the eastbound through movement By the 2026 horizon,

the intersection is projected to operate at LOS F under both growth scenarios, with significant capacity deficiencies, including all through and left turn movements operating near or above capacity.

CR 19 at 10th Concession

The 10th Concession currently experiences a minimal volume of traffic and consequently operates at a very good level of service. Traffic volumes on 10th Concession are not anticipated to increase in the future and therefore reasonable operations are anticipated to continue through the long-term horizon.

CR 19 at Baseline Road / 13 & 14 Sideroad

Currently, the separate eastbound and westbound approaches operate at a good level of service (LOS C). By the ten-year horizon, level of service is expected to deteriorate to LOS F and the eastbound approach will have nearly reached or exceeded capacity.

CR 19 at 16 & 17 Sideroad

16 & 17 Sideroad currently experiences low volumes and therefore a very good level of service at Manning Road. Planned industrial development east of Manning Road will substantially increase traffic volumes along 16 & 17 Sideroad and will result in the intersection with Manning Road reaching capacity by the short-term horizon, with the exact timing driven by development.

CR 19 at Highway 401 Westbound Off-Ramp

This intersection currently operates at a poor level of service (LOS F), indicating high levels of delay, but operates well under capacity. Sufficient capacity will continue to be available through the short-term horizon, but additional capacity will be required by the ten-year horizon.

CR 19 at Highway 401 Eastbound Off-Ramp

This intersection currently operates at a good level of service (LOS C), well below capacity. Operations will continue to be reasonable in the short term (LOS D to E), but by the ten-year horizon, the intersection will diminish to LOS F and additional capacity will be required.

CR 19 at North Rear Road

This intersection currently operates at a very good level of service (LOS B) since volumes are comparatively low and most side street traffic is comprised of right turns. In the short term, operations are anticipated to diminish slightly (LOS C) corresponding to the closure of the Service Road and relocation of trips to North Rear Road. Traffic increases will result in the intersection reaching LOS D to LOS F conditions by the 20-year horizon; however, the intersection will operate at or under capacity since the majority of side street traffic will continue to be comprised of right turns.

CR 19 at CR 46

This intersection is currently operating at a good LOS B, with no critical movements. In the short term and medium term, it is anticipated to continue to operate at a good level of service with no capacity constraints. In the long term, the intersection is anticipated to operate at capacity and worsen to LOS E under the high-growth scenario, with the eastbound and southbound approaches near or above capacity.

CR 19 at Malden Road/North Talbot Road

These intersections are currently operating at LOS F for the eastbound approach, and a slightly better LOS E for the westbound approach. The different levels of service reflect the orientation of most side street traffic to the north (i.e., eastbound traffic includes more left turns, whereas westbound traffic includes more right turns). Eastbound and westbound traffic currently operates under capacity; however, in the short term the eastbound approach is anticipated to exceed capacity, particularly as build-out proceeds in the Maidstone Hamlet development.

CR 19 at CR 34

This intersection is currently operating at a good LOS B, with no critical movements. In the short and medium term, it is anticipated to continue to operate at a good level of service with no capacity constraints. In the long term, the intersection is anticipated to operate near capacity under the high-growth scenario, with the single-lane southbound approach at capacity.

CR 19 at Highway 3

This intersection is currently operating at a reasonable overall LOS C, although the eastbound approach on Highway 3 is currently near capacity as a result of heavy commuter demand. This capacity deficiency cannot be fully addressed with signal adjustments alone, and will result in the intersection level of service decreasing with additional traffic growth. The intersection is anticipated to reach capacity by the 10-year horizon under the high-growth scenario, and by the 20-year horizon is anticipated to operate at LOS F. However, these operations are based on the existing intersection configuration. MTO is widening Highway 3 to a four-lane divided cross-section, which will provide additional capacity to the eastbound critical movement and improve overall intersection operations.

3.3.1.7 Roadway Section Operations

CP 19 Level of Service

The methodology contained in MTO's Geometric Design Standards for Ontario Highways (GDSOH) Manual for two-lane roads was utilized to assess existing and anticipated future operations of the Manning Road corridor. For analysis purposes, the corridor was subdivided into five sections corresponding to major intersections. Since the MTO methodology applies to rural (free-flow) two-lane highways, the methodology was not applied to the section north of CR 22, which exhibits characteristics of an urban (restricted flow) roadway.

Table 21:
CR 19 - Two-Lane Highway Operations Level-of-Service (LOS)

Section	Existing LOS	Future Low Growth			Future High Growth		
		5-year	10-year	20-year	5-year	10-year	20-year
CR 22 to CR 42	D	D	E	F	D	E	F
CR 42 to Highway 401	D	D	E	E	E	E	F
Highway 401 to CR 46	D	D	D	D	D	D	E
CR 46 to CR 34	D	D	D	D	D	D	E
CR 34 to Highway 3	B	C	C	C	C	D	D

North of Highway 401, CR 19 currently operates at a high although acceptable LOS D, but is expected to reach LOS E by the 10-year horizon and fail (LOS F) by the 20-year horizon. Based on this, widening to a basic four-lane cross-section will be required sometime between 2011 and 2016 to maintain an acceptable level of service.

South of Highway 401 to CR 34, CR 19 currently operates at a high but acceptable LOS D, and is expected to continue operating at LOS D to the 10-year horizon. In 20 years, under the high growth scenario, level of service is expected to drop to LOS E, indicating that widening to a basic four-lane cross-section will be required sometime before 2026 to maintain an acceptable level of service.

South of CR 34, CR 19 currently operates at a good LOS B. It is anticipated that this level of service will drop to LOS C by the 5-year horizon, and then to LOS D by the 10-year horizon (under the high-growth scenario). This suggests that the existing two-lame section south of CR 34 can operate at a high, but acceptable level within the design period.

CR 22 Level of Service

The GDSOH methodologies were also used to assess existing and future operations of the CR 22 corridor in the Study Area. For a suburban arterial, level of service compares the average travel speed, including delays at signalized intersections and other locations, with typical free-flow (unimpeded) travel speeds.

CR 22 – Suburban Arterial Operations Level-of-Service (LOS)

Direction	Existing LOS	Future Low Growth			Future High Growth		
		5-year	10-year	20-year	5-year	10-year	20-year
Westbound	D	D	F	F	E	F	F
Eastbound	D	D	F	F	E	F	F

CR 22 currently operates at LOS D in both directions. In the near term, it will continue to operate at this level of service (or may decline to LOS E under the higher-growth scenario). However, the level of service will decrease to LOS F by the 10-year horizon under both growth scenarios, indicating high levels of delay, inconsistent with driver expectations for a major regional arterial facility.

3.3.1.8 Road/Rail Grade Separation Assessment

Three at-grade road/rail crossings currently exist in the Study Area. These are:

- VIA Rail crossing on CR 19 south of Tecumseh Road
- CP Rail crossing on CR 19 north of CR 42
- CN rail crossing on CR 19 north of Highway 3.

All three crossings are currently controlled by flashing lights, bells, and gates.

The appropriate level of traffic control at road/rail crossings is determined by calculating an exposure index, defined as the cross-product of the Annual Average Daily Traffic (AADT) on the crossing road and the number of daily train movements through the crossing:

- a cross-product of 1,000 or more requires bells and flashing lights
- a cross-product of 50,000 or more requires gates
- a cross-product of 200,000 or more suggests consideration of a grade separation.

Table 22 shows existing level crossing locations, existing traffic and train volumes and appropriate corresponding level of control. Train volumes were provided by CN and CP Rail.

Table 22:
Existing Railway Crossing Control

Location	Existing Control	Existing Roadway AADT	Existing Train Movements per Day	Cross-Product	Warranted Control	Control Appropriate?
Manning Road at VIA Rail (south of Tecumseh Rd.)	Gates	19,500	8	156,000	Gates	Yes
Manning Road at CP Rail, Windsor Subdivision (north of CR 42)	Gates	12,500	15	187,500	Gates	Yes
Manning Road at CNR, Caso Subdivision (north of Highway 3)	Gates	6,000	2	12,000	Bells/ Flashing Lights	Yes

Based on existing traffic volumes and levels of train activity, the existing traffic control is appropriate at all three rail crossings in the study corridor. However, the CP Rail crossing north of CR 42 is close to the threshold for grade separation. An increase of 1-2 trains per day, or an increase of roughly 850 vehicles per day (approximately 7%) at this location results in the crossing meeting or surpassing the 200,000 exposure index threshold.

Future daily traffic volumes were projected at the three existing level railway crossings based on the increase in peak hour traffic. As a best-case scenario, it was assumed that there will be no change in the number of daily train movements at each crossing. The resulting exposure indices at each crossing in the horizon years are outlined in **Table 23**.

Table 23:
Projected Future Railway Crossing Exposure Indices

Location	Horizon Year	Projected Roadway AADT		Existing Train Movements per Day	Exposure Index	
		Low Growth	*High Growth*		*Low Growth*	*High Growth*
Manning Road at VIA Rail (south of Tecumseh Rd.)	2011	29,500	30,000	8	236,000	240,000
	2016	35,500	37,500	8	284,000	300,000
	2026	41,000	48,000	8	328,000	384,000
Manning Road at CP Rail, Windsor Subdivision (north of CR 42)	2011	14,500	15,500	15	217,500	232,500
	2016	21,000	23,000	15	315,000	345,000
	2026	29,000	33,000	15	435,000	495,000
Manning Road at CNR, Caso Subdivision (north of Highway 3)	2011	6,500	6,500	2	13,000	13,000
	2016	7,000	8,000	2	14,000	16,000
	2026	8,000	10,000	2	16,000	20,000

The CP Rail crossing (north of CR 42) is expected to experience the highest exposure index, with the greatest number of daily train movements combined with high roadway AADTs. This crossing is already close to the level at which grade separation is typically considered. It is anticipated that the threshold will be slightly exceeded in the short term, more significantly exceeded in the medium term as development proceeds in the vicinity, and well exceeded in the long term as development outside the Study Area (e.g., Wallace Woods) adds traffic to CR 19.

The VIA Rail crossing (north of Lanoue Street) is also expected to exceed the typical grade separation minimum exposure index. However, the magnitude of the exposure index is lower than at the CP Rail crossing, since the number of trains per day is lower. In addition, the relative exposure at the VIA Rail crossing is reduced since it accommodates predominantly passenger trains, which are typically shorter in length than the freight trains using the CP Rail crossing to the south.

The CN rail crossing (south of CR 34) is anticipated to continue to experience a low exposure index, since train activity at this crossing is very low and roadway volumes are not anticipated to increase as significantly as areas further to the north.

3.3.2 Collision Analysis/Roadside Safety

Collision data for Manning Road between Tecumseh Road and Highway 3 were obtained from MTO and Essex County covering a six-year period from 2000 through 2005. These data include information on all reportable collisions at intersections and on road sections between intersections. For CR 22 west of CR 19, collision data from Essex County covers a six-year period from 1998 through 2003.

3.3.2.1 Collision Rates

Collision rates were calculated for the CR 19 corridor, based on the number of collisions recorded per million vehicle kilometres (MVKM). Collision rates for individual intersections were also calculated. A total of 608 collisions were reported within the Study Area from 2000 through 2005, for an average of approximately 100 collisions per year. Ninety-one collisions were report on the CR 22 corridor in the Study Area from 1998 through 2003 (not including collisions related to the Manning Road intersection), for an average of 15 collisions per year.

Sectional collision rates are summarized in **Table 24A** for CR 19, and in **Table 24B** for CR 22. All of the collision rates on the CR 19 and CR 22 segments are below the average Provincial Accident Rate (PAR) of 0.8 collisions per MVKM for King's Highways and 1.3 collisions per MVKM for Secondary Highways. Collision rates at intersections are summarized in **Table 25.**

Table 24A:
CR 19 - Mid-Block Collision Rates

From	To	Two-Way Collision Rate
Tecumseh Rd.	Lanoue St.	0.369
Lanoue St.	Amy Croft Dr.	0.179
Amy Croft Dr.	CR 22	0.000
CR 22	Desro Dr.	0.000
Desro Dr.	Jamsyl Rd.	0.000
Jamsyl Rd.	Sylvestre Dr.	0.277
Sylvestre Dr.	Little Baseline Rd.	0.157
Little Baseline Rd.	CR 42	0.182
CR 42	Concession Rd.	0.105
Concession Rd.	Baseline Rd.	0.170
Baseline Rd.	16/17 Sideroad	0.125
16/17 Sideroad	Hwy 401 North Ramp	0.000
Hwy 401 North Ramp	Hwy 401 South Ramp	0.580
Hwy 401 South Ramp	North Rear Rd.	0.135
North Rear Rd.	CR 46	0.101
CR 46	CR 34	0.271
CR 34	Hwy 3	0.000

Table 24B:
CR 22 - Mid-Block Collision Rates

From	To	Two-Way Collision Rate
Banwell Rd.	Lesperance Rd.	0.355
Lesperance Rd.	Manning Rd.	0.097

Table 25
CR 19 - Intersection Collision Rates and Frequency

Intersection	Collision Frequency	Collision Rate
Manning Road and Hwy 3	4.50	0.63
Manning Road and CR 34/Talbot Road	5.50	1.39
Manning Road and CR 46	6.17	0.93
Manning Road and Hwy 401 South Ramp	2.67	0.55
Manning Road and Hwy 401 North Ramp	4.67	0.90
Manning Road and CR 42	4.50	0.54
Manning Road and CR 22	12.50	0.85
Manning Road and Tecumseh Road	2.17	0.24
CR 22 and Lesperance Road	7.50	0.48
Average	**5.57**	**0.72**

3.3.2.2 Collision Trends

All CR 19 collision records, including both mid-block and intersection collisions, were categorized by collision type, severity, lighting condition, road surface conditions, weather/visibility, collision locations, driver actions, driver conditions and road alignment.

Collision Type

A review of collision data from 2000 through 2005 revealed that 39% of collisions in the CR 19 study area were rear-end collisions. Turning movement, single motor vehicle and right-angle collisions also represented significant percentages at 17%, 16% and 14%. The remaining 13% consisted of approach, sideswipe and other collisions.

On CR 22 west of CR 19, 60% of collisions were rear-end collisions. Turning movement and single motor vehicle collisions each represented 11% of all reported collisions. The remaining 18% were comprised of all other collision types.

Collision Severity

During the six-year period, there were four fatal collisions, 141 injury collisions, and 463 property damage only collisions on CR 19. The four fatal collisions resulted in 7 fatalities. Three of the fatal collisions were single motor vehicle collisions caused by impaired drivers (all under dry pavement conditions and two under dark conditions). The fourth fatal collision was an angle collision at the intersection of CR 19 and CR 22 that resulted from the southbound through driver disobeying the traffic control signal. This collision was under dark lighting and wet roadway conditions.

On CR 22 west of CR 19, there were 22 injury collisions (24%) and 69 property damage only collisions (76%), with no fatal collisions.

Lighting Conditions

Of all reported collisions on CR 19, 76% occurred during periods of daylight, while the remaining 24% occurred during periods of reduced lighting (including night, dawn and dusk times; and conditions with and without artificial light, i.e. street lighting).

On CR 22, 70% of collisions occurred during periods of daylight, while the remaining 30% occurred during periods of reduced lighting.

Road Surface Conditions

Of all reported collisions on CR 19, 64% occurred on dry pavement, while the remaining 36% of collisions occurred on less than ideal road surface conditions (e.g., wet, icy, or snow-covered pavement).

On CR 22, 78% of reported collisions occurred on dry pavement, with most of the remaining collisions on wet pavement.

Location

The majority of reported collisions on CR 19, (64%) occurred at intersections or driveways, including collisions related to, but not occurring directly at, an intersection, such as rear-end collisions approaching a queue of vehicles. The remaining 33% occurred on sections between intersections and were not related to intersection activity.

On CR 22 west of CR 19, collisions were evenly split between intersections and mid-block locations. However, it is noted that more than two-thirds of mid-block collisions were rear-end collisions that were most likely indirectly intersection-related (e.g., approaching queues of vehicles at an intersection). As a result, it is more likely that roughly 85% of collisions on CR 22 in the Study Area were intersection-related.

Road Alignment

Most of the Study Area consists of straight and level road segments, which accordingly represented the vast majority of reported collisions (88%). Collisions on hills and curves only accounted for 12% of collisions.

Summary of Collision Trends

In general, the majority of 2000 to 2005 collisions occurred under ideal conditions: on straight and level road alignments providing good visibility (88%); under good lighting conditions (76%); and on dry pavement (64%). Sixty-five per cent of collisions either occurred at intersections and driveways, or were related to traffic conditions at intersections. Most of these accidents were either rear-end collisions (39%) that tend to occur at intersections or approaching a queue of vehicles at an intersection, or turning movement and right-angle collisions (31% combined) that occur at intersections or driveways where conflicting vehicle paths are greatest and the most severe.

3.3.2.3 Collision Analysis at Intersections

Collisions occurring at major intersections along the corridor were reviewed in terms of both absolute collision frequency (average number of collisions per year), and collision rate (number of collisions per million vehicles entering the intersection).

The most critical intersection along Manning Road in the Study Area, both in terms of collision frequency and collision rate, is the intersection of Manning Road and CR 22. A total of 75 collisions occurred at this intersection from 2000 to 2005, for an average of 12.5 collisions per year (more than twice as often as the next highest intersection), or 2.15 collisions per million vehicles (double the average rate experienced at all intersections along the corridor). This intersection experiences the highest traffic volumes and greatest level of peak period congestion along the corridor. The high level of congestion and associated queues of vehicles (notably the eastbound left turn movement, which can extend beyond the available storage at peak times), combined with high approach speeds (particularly eastbound and westbound, leading to and from the E.C. Row Expressway roughly 2 km to the west), contribute to the observed higher than average collision frequency:

- 50% of collisions at this intersection are either rear-end collisions approaching queues of vehicles from the west, east and south, or sideswipe collisions approaching from the west or south potentially related to left turn queues overflowing into through traffic
- 20% of collisions are turning movement or right-angle collisions occurring at the intersection itself
- nearly 25% of collisions are related to eastbound (15%) and southbound (10%) right turn channelizations. Roughly 4 in 5 were single vehicles travelling too quickly for conditions around the curve and losing control, while the remainder appear to relate to merging issues.

Collision activity related to congestion and queues was also observed on CR 22 west of CR 19, where 91 collisions were reported over a six-year period (15 per year) between Banwell Road and CR 19. Most of the collisions were directly or indirectly related to a combination of intersection congestion and queues and high-speed traffic bound to and from the E.C. Row Expressway.

The intersection of CR 19 and CR 34 also presents opportunities for collision reductions. The absolute number of collisions at this intersection (33, or 5.5 per year) was only slightly higher than the corridor average; however, because this is a lower-volume intersection, the collision rate at this intersection relative to traffic volume is the highest of all intersections within the corridor. More than 40% of collisions were rear-end collisions, particularly on the westbound approach. Another 40% of collisions were right-angle collisions, mostly between northbound and westbound traffic, or turning movements between northbound traffic and the high-volume southbound left turn movement. This intersection does not experience significant volumes overall, but turning movements between the north and east are comparatively high. Further, geometric factors may contribute to some collisions, including a skewed angle of intersection (roughly 60 to 65 degrees), single-lane approaches (no left turn lanes), sight line limitations, closely-spaced accesses, and signal head visibility (i.e., some signal heads without backplates).

The Manning Road intersections with County Roads 42 and 46 both were observed to experience collision frequencies and rates at or slightly above average. At CR 42, 27 collisions were observed with no major discernable patterns. At CR 46, 37 collisions were observed, of which 30% were eastbound rear-end collisions, roughly 20% were turning movement collisions predominantly involving northbound left turns, and roughly 20% were right-angle collisions involving various movements. At both intersections, additional collisions were observed that did not occur at the intersections specifically but could have been related to congestion at the intersection and/or commercial driveways located near the intersection.

All other intersections in the corridor experienced collision rates below the corridor average. Notwithstanding, some additional trends have been noted:

- at Highway 3, more than half of the collisions were rear-end collisions on the westbound (11) and eastbound (5) approaches. This condition may be addressed as the MTO widens Highway 3 to provide additional east-west capacity and mitigate existing operational issues
- at Highway 401, 11 rear-end collisions involved southbound vehicles turning left onto the N-W loop ramp. This problem has likely been addressed by the recent construction of a new left turn lane to accommodate this movement
- at Highway 401, 7 right-angle collisions occurred involving northbound traffic and vehicles turning left from the westbound off-ramp. This condition will be addressed if and when traffic signals are warranted at this location.

3.3.3 Transportation Studies and Long Range Perspectives

As part of this assessment, a number of previous background studies were reviewed. Particularly relevant are Essex County's CR 19 Corridor Study (April 2002), the Essex-Windsor Regional Transportation Master Plan (October 2005) and the County's Environmental Study Reports on Improvements to County Rd. 22, East of Manning Road to County Rd. 42. Also relevant are Transportation Master Plans prepared for the Town of Lakeshore (June 2008) and Town of Tecumseh (currently underway). These reports are described in Section 2.5 of this ESR/PDR.

In addition, the following reports and studies were available to use as a base for projecting development-related traffic volumes:

- Manning Road/Amy Croft Commercial Area Transportation Study, Final Report, IBI Group, November 2006
- CR 19 & 22 Development Traffic Impact Study, Paradigm Transportation Solutions Limited, September 2006
- Wallace Woods Secondary Planning Area Transportation Study, Final Draft Report, IBI Group, March 2007
- Manning Road Secondary Plan Area, Draft Traffic Impact Study, Dillon Consulting, June 2006
- St. Michael's School Site Redevelopment Transportation Impact Study, Dillon Consulting, July 26, 2006

- Truck Pre-Processing Facility (Highway 401 at Manning Road) Traffic Impact Assessment, Dillon Consulting, June 2004
- Maidstone Hamlet Secondary Plan Transportation Study, F.R. Berry & Associates, November 11, 2003.

3.4 Summary of Transportation Needs and Opportunities

3.4.1 Basic Lane Requirements

Previous transportation planning studies have identified the need to widen CR 19 to a four-lane cross-section between CR 22 and Highway 3 by 2026. The analyses undertaken as part of this study confirm the need to provide four lanes from CR 22 southerly to at least as far as CR 34. This finding is based on a number of separate but related analyses:

- an update of the regional model used for the EWTMP projected that long-term horizon volumes will exceed the planning-level capacity of the existing two-lane roadway from CR 22 to CR 34
- intersection turning movement volumes projected on the basis of modest continuous growth of existing volumes, plus additional development-related traffic, found that all signalized intersections from CR 22 southerly will exceed capacity by the 20-year horizon without some level of geometric improvements beyond minor adjustments (e.g., adjusted signal timing or phasing). The projections also showed that many unsignalized intersections will exceed capacity and experience high levels of delay with long-term volumes, as increased north-south traffic on CR 19 reduces the number of gaps in which to turn into traffic
- analysis of two-lane highway segments based on MTO methodology found that all segments north of CR 34 are anticipated to operate at LOS E or LOS F under 20-year volumes.

3.4.2 Intersection Requirements

CR 19 at Tecumseh Road
No additional geometric requirements are proposed at this location to accommodate long-term traffic projections.

CR 19 at Lanoue Street
No additional geometric requirements are proposed at this location to accommodate long-term traffic projections, other than those required to serve development on the east side of CR 19 (i.e., movements to and from a future east leg).

CR 19 at Amy Croft Drive
Depending on the magnitude of commercial development ultimately built out at the Amy Croft Drive node and the distribution of commercial trips (i.e., if the same proportion will continue to approach the site from the north), additional southbound left turn capacity may eventually be required. A dual left turn lane can be accommodated opposite the northbound dual left turn lanes, but would require that eastbound Amy Croft Drive be widened to provide a second receiving lane. However, a second eastbound lane may be required regardless to mitigate potential internal circulation issues that may arise within the Amy Croft node as a result of higher east-west volumes.

CR 19 at CR 22 and CR 22 at Lesperance Road
In both the low-growth and high-growth scenarios, operational problems are anticipated at the CR 22 intersections with CR 19 and Lesperance Road. With both intersections widened to their practical geometric limitations (e.g., three through lanes, dual left turn lanes and exclusive right turn lanes in each direction on CR 22 at both intersections; dual left turn lanes in both directions on CR 19 and; Lesperance Road widened to four lanes plus auxiliary lanes), both will continue to operate over capacity and at LOS F.

Existing high traffic volumes are anticipated to increase significantly as a result of area development. Proposed commercial development at Amy Croft Drive will increase turning movements at CR 22 / Manning Road. In particular, development to the east in Lakeshore (Wallace Woods, of which only 50% build-out has been assumed; Advance/Patillo; River Ridge) will generate heavy east-west traffic volumes on CR 22. Development to the east will also add to turning movements at CR 19 and CR 22, since development traffic is anticipated to use Little Baseline Road as an alternate east-west route and no connection is available west of CR 19.

As a result, additional measures will need to be taken to mitigate congestion at the CR 22 intersections with CR 19 and Lesperance Road, with preference given to minimizing traffic generated by future development. Possible measures could include:

- confirm that the scale of future development (e.g., the magnitude of retail and residential projections) is supportable and achievable
- confirm the nature of future development (e.g., if retail facilities in Wallace Woods are intended to serve the immediate residential and employment areas, or intended to serve a broader, more regional function)
- implement transportation demand management (TDM) measures to reduce the number of trips taken, reduce average trip length, or shift trips to other modes. In particular, the expansion of transit into Lakeshore should be planned for, including both local service and regional (higher-speed, limited-stop) service along the CR 22 corridor to link Lakeshore and Tecumseh to Windsor.

In the event that future development unfolds and traffic is generated as envisioned, anticipated traffic volumes at the CR 22 intersections with CR 19 and Lesperance Road are expected to exceed levels that could be reasonably accommodated by an at-grade intersection. In addition, the intersections will need to be grade separated with construction of interchanges. Dillon developed and evaluated a number of interchange alternatives for the CR 19/CR 22 intersection, as summarized in Section 6.3.7 of the ESR/PDR. Section 6.3.8 of the ESR/PDR summarizes the alternatives evaluated by Dillon for CR 22 at Lesperance Road.

CR 19 at Desro Drive
This intersection will need to be closed due to the proximity of the intersection to the proposed interchange at CR 22. As a result, traffic currently using this intersection will divert south to Jamsyl Drive.

CR 19 at Jamsyl Drive
This intersection is anticipated to provide access to future development in the southeast quadrant of CR 22 and CR 19. It will also need to accommodate traffic that has been diverted as a result of the future closure of Desro Drive. To accommodate planned future volumes, the intersection will require left turn lanes on all approaches and will likely require a northbound right turn lane entering the future commercial development. The intersection will also need to be protected for the installation of traffic signals when warranted.

The Town of Tecumseh Hamlet Secondary Plan designates significant future commercial/industrial development along Jamsyl Drive. This will likely result in additional requirements at the intersection and/or a need to rationalize development between the southwest and southeast quadrants of CR 22 and CR 19. The additional lanes required at this intersection assume additional commercial/industrial space in the southeast quadrant only, and will need to be revisited if significant commercial development goes forward in both quadrants.

CR 19 at Sylvestre Drive
It is anticipated that southbound left turn lane requirements (storage; parallel lane; taper) at the Little Baseline Road intersection will result in insufficient distance to provide an adequate northbound left turn lane at Sylvestre Drive. As a result, it is proposed that this intersection be restricted to right turn movements only in the long term. Left turns currently occurring between Manning Road and Sylvestre Drive will instead be shifted north to the Jamsyl Drive intersection, which is anticipated to be signalized in the future.

CR 19 at Little Baseline Road
The intersection of Manning Road and Little Baseline Road will experience traffic pressures for two reasons. The Tecumseh Hamlet development will generate traffic on a new west leg (Street "B"), likely requiring signalization. In the longer term, development south of CR 22 in Lakeshore is anticipated to cause a major increase in traffic along Little Baseline Road as an alternate route bypassing County Roads 22 and 42, adding significantly to turning movements at the intersection as traffic on Little Baseline Road turns onto CR 19 to access County Roads 22 and 42. At a minimum, this intersection is anticipated to require left turn lanes on all approaches, and northbound and southbound right turn lanes. The ultimate lane requirements should be reviewed as development concepts and traffic projections for the lands to the east become better defined.

CR 19 at Tecumseh Hamlet Street "A"
Planning for the Tecumseh Hamlet concluded that this intersection ultimately requires traffic signals, and northbound and eastbound left turn lanes. Lane requirements will likely be re-examined as the Tecumseh Hamlet plan and traffic projects are further refined.

CR 19 at Tecumseh Hamlet "Area N"
Planning for the Tecumseh Hamlet has assumed that this intersection will operate under two-way stop control, with northbound and eastbound left turn lanes. Lane requirements, and the need for stop or signal control, will likely be re-examined as the Tecumseh Hamlet plan and traffic projections are further refined.

CR 19 at CR 42
This intersection is anticipated to require dual left turn lanes on the eastbound approach, single left turn lanes on all other approaches, and right turn lanes on all approaches. In addition, CR 42 will require two through lanes in each direction. The EWRTMP also identified the need to widen CR 42 to a four-lane cross-section.

CR 19 at Concession 10

This intersection is anticipated to operate at a reasonable level as an unsignalized intersection under long-term future volumes.

CR 19 at Baseline Road / 13-14 Sideroad

This intersection currently consists of a pair of three-leg intersections offset by approximately 40 metres. As part of the reconstruction of these intersections, it is recommended that one or both of the east and west approaches be realigned to consolidate them into a single intersection. The intersection should be protected for signalization when warranted in the future, and will require left turn lanes on all approaches.

CR 19 at 16-17 Sideroad

This intersection should be protected for signalization when warranted in the future (likely as a result of future development north of the Manning Road / Highway 401 interchange), and will require left turn lanes on all approaches.

CR 19 at Highway 401 Westbound Ramps

The ultimate configuration for this ramp terminal will depend on access requirements for the truck processing facility proposed in the northwest quadrant of the interchange. The proposed design currently provides for a standard Parclo A4 configuration, with the N-W movement removed from the current loop ramp and relocated onto a new direct ramp in the northwest quadrant of the interchange.

CR 19 at Highway 401 Eastbound Ramps

These ramps will require installation of traffic signals and widening to provide an exclusive eastbound left turn lane or a channelized right turn movement.

CR 19 at Memorial Drive

Based on MTO's Access Management Guidelines, it is anticipated that this intersection will be closed due to its proximity to the Highway 401 interchange. Traffic will be relocated south to North Rear Road.

CR 19 at North Rear Road

This intersection is anticipated to operate at an acceptable level under the existing stop control. However, Dillon recommends that it be protected for signalization if warranted in the future as a result of increased development.

CR 19 at CR 46

At a minimum, this intersection will require northbound and southbound left turn lanes. It is also recommended that the lane configuration on the east and west legs be reassigned to provide exclusive left turn lanes. The lane requirements will be the same under both the high and low-growth scenarios.

CR 19 at Malden Road / North Talbot Road

These roads currently intersect with CR 19 at a six-way intersection (or, more accurately, at three closely offset intersections). Dillon recommends that these intersections be realigned and consolidated for more efficient and standardized operations. The Maidstone Hamlet Secondary Plan envisioned the east and west legs to be consolidated into a standard four-leg intersection; this configuration will require signalization and left turn lanes on all approaches. Alternately, the intersection with CR 19 could be closed entirely, requiring that Malden Road be diverted to CR 46, west of CR 19, and that North Talbot Road be diverted to CR 46, east of CR 19. With this configuration, it is anticipated that the North Talbot Road/CR 46 intersection will require signalization; the Malden Road/CR 46 intersection will need to be monitored for potential future signalization; and the CR 19/CR 46 intersection will require an eastbound right turn lane in addition to the other noted lane requirements.

A third alternative is to maintain the Malden Road connection to CR 19 from the Maidstone Hamlet on the west side, but continue to divert North Talbot Road to a new intersection on CR 46, east of CR 19. This will reduce back-to-back left turn storage requirements on CR 19 and CR 46 to the adjacent intersections to the south and west.

The first alternative (consolidate to a single four-leg intersection on Manning Road) is preferred to best serve development in the Maidstone Hamlet area, including neighbourhood commercial space on the west side of Manning Road, south of CR 46. This configuration has been carried forward.

CR 19 at CR 34

This intersection is anticipated to require northbound and southbound left turn lanes under the high-growth and low-growth scenarios. Alternately, this intersection could also function adequately as a double-lane roundabout. As at CR 46, there are concerns about driver familiarity with multi-lane roundabouts. However, volumes at this location are lower, thereby mitigating these concerns by providing a larger margin of error in the initial stages of operation. As a result, the roundabout option has been selected for this intersection, and will result in more efficient operations compared to a standard traffic signal.

MTO's Roundabout Task Force is currently developing guidelines for roundabouts. It is expected that the guidelines will be available during the Detailed Design stage of the project.

CR 19 at Highway 3
As noted before, the EWRTMP identified the widening of Highway 3 to four lanes. This widening will address anticipated capacity requirements at this intersection.

3.4.3 Phasing of Construction

Based on road segment operations and intersection operations as projected by horizon year, the following outlines the timing of required widenings and other works. Since some of the traffic growth is a result of anticipated development, the required timing of improvements may be impacted (positively or negatively) by the timing of development. If development does not proceed as quickly as assumed, the need for some improvements may not occur as early as anticipated.

Short Term (Up to Five Years)
In the short term, the primary operational deficiencies are anticipated to be at the north end of the study corridor. Intersections on CR 22 are already experiencing congestion and poor levels of service, and the two-lane section south to CR 42 is anticipated to operate at a poor level of service by 2011. Also by 2011, the level rail crossing north of CR 42 is anticipated to have exceeded (albeit slightly) typical thresholds for grade separation. The timing of some individual design components within this section will depend on development timing (i.e., access roadways and associated turning lanes).

Further south along the corridor, some stop-controlled intersections (16-17 Sideroad, Malden Road / North Talbot Road) may require localized improvements (e.g., temporary traffic signals) to address capacity issues, depending on traffic growth on those streets. Additional capacity will also be required in the short term on Highway 3 at CR 19. This deficiency has been addressed by improvements to Highway 3, currently under construction by MTO.

In the long term, the CR 22 intersections with Lesperance Road and CR 19 will ultimately require grade separation. However, operations at these intersections could potentially be improved on an interim basis through short-term widenings, and the full grade separation deferred until a later horizon or until a certain threshold of anticipated future development is in place.

Medium Term (Five to Ten Years)
In the medium term, operational deficiencies will begin to be felt further south along the corridor roughly to the Highway 401 interchange. The two-lane highway segment will operate at a poor level of service, and most intersections from CR 42 to the Highway 401 interchange will experience some level of capacity deficiency or poor operations. The Highway 401 ramp terminals are expected to have passed signal justification thresholds by this time horizon.

Long Term (Ten to 20 Years)
Additional capacity on the section of Manning Road south of Highway 401 will not be required until sometime prior to the 20-year horizon. The two-lane highway segments are not anticipated to experience significant capacity or operational constraints prior to 2016, nor are the signalized intersections at County Roads 46 and 34.

3.5 Problem Statement

The CR 19 and CR 22 corridors within the Study Area have insufficient traffic capacity to accommodate existing and anticipated future traffic demands.

The CR 19 / CR 22 intersection and the CR 22 / Lesperance Road intersection are both operating with capacity constraints in the peak hours, leading to vehicle congestion and queues. Both intersections are currently failing in the PM peak hour. In addition, these congested conditions are contributing in part to a high number of collisions at CR 19 and CR 22, and on the CR 22 corridor, particularly rear-end and turning movement collisions. Based on the level of development planned near the CR 19 / CR 22 intersection, and the growth in traffic anticipated along CR 22 as a result of development east of the Study Area, these two intersections are anticipated to ultimately experience traffic demands above the reasonable capacity of an at-grade intersection.

Given the magnitude of anticipated future development in the CR 19 corridor and broader study area and the resulting significant growth in traffic, most intersections along CR 19 will exceed existing capacity, and congestion will occur along all mid-block two-lane sections of CR 19 north of CR 34. In addition, growth in traffic volumes on CR 19 results in a grade separation being warranted at the CP Rail railway crossing north of CR 42.

Since most traffic growth can be attributed to future development, the timing of capacity deficiencies will depend on how quickly anticipated development occurs. Generally, operational issues are expected to occur from CR 22 to CR 42 in the short term, south to Highway 401 in the medium term, and then south of Highway 401 in the longer term.

4. EXISTING AND PROJECTED ENVIRONMENTAL CONDITIONS

4.1 Cultural Heritage Resources

4.1.1 Archaeology

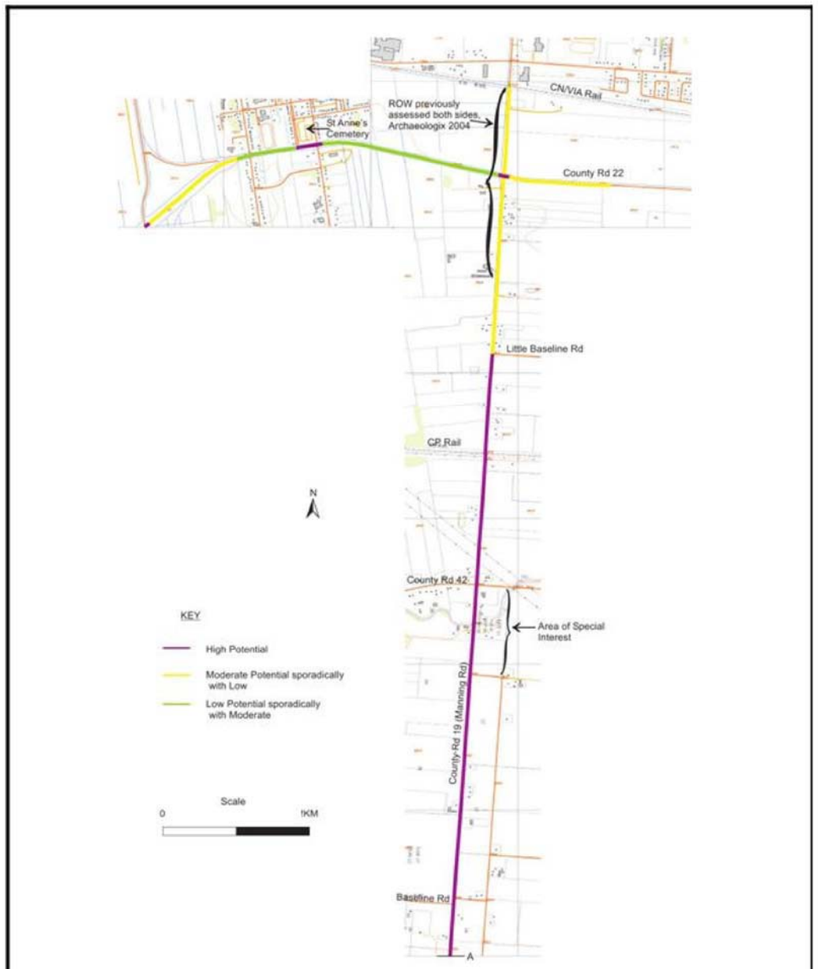
Fisher Archaeological Consulting (FAC) completed a Stage 1 Archaeological Assessment of the Study Area, as documented in a report dated November 2007. The assessment identified lands with potential for the discovery of cultural artefacts, based on primary and secondary sources and a "windshield survey". The assessment was completed in accordance with the Ministry of Culture's Archaeological Assessment Technical Guidelines (1993). It was submitted to the Ministry of Culture by FAC letter dated January 17, 2008 and approved by a Ministry letter dated February 28, 2008.

According to the Ontario Archaeological Sites Database, five registered archaeological sites are located within 2.5 km of the Study Area. Registered sites include late 19th to early 20th century, historic Euro-Canadian residential occupations, a pre-contact Aboriginal findspot, a historic site in the Little River watershed and a Late Woodland period village. The village has been fully excavated.

The geographic township of Maidstone and interior of Sandwich South and Sandwich East Townships were settled primarily by Europeans in the mid to late 19th century. As roads were constructed and conditions improved in the area, settlers began building houses along Middle Road and Talbot Road. By the early 1900's, there were four railways and several roads in the area. Development in the area slowed in the mid 1900's, but began again in the latter half of the century with the expansion of the Town of Tecumseh. There is one known cemetery (St. Anne's Roman Catholic) within the Study Area, located at CR 22 and Lesperance Road. The cemetery has been in use since 1859 and includes over 2,000 names.

Based on the Study Area's environmental setting, registered sites and regional history, the Stage 1 Archaeological Assessment concluded that a large portion of the Study Area has moderate to high potential for the discovery of archaeological resources. Due to the history of the area, limited water sources, lack of topography and heavier soils, the assessment concluded that the Study Area has greater potential for historic Euro-Canadian sites than Aboriginal sites. This potential is based on the area's early road system.

Figures 10 and 11 and Table 26 illustrate the archaeological potential of the Study Area.



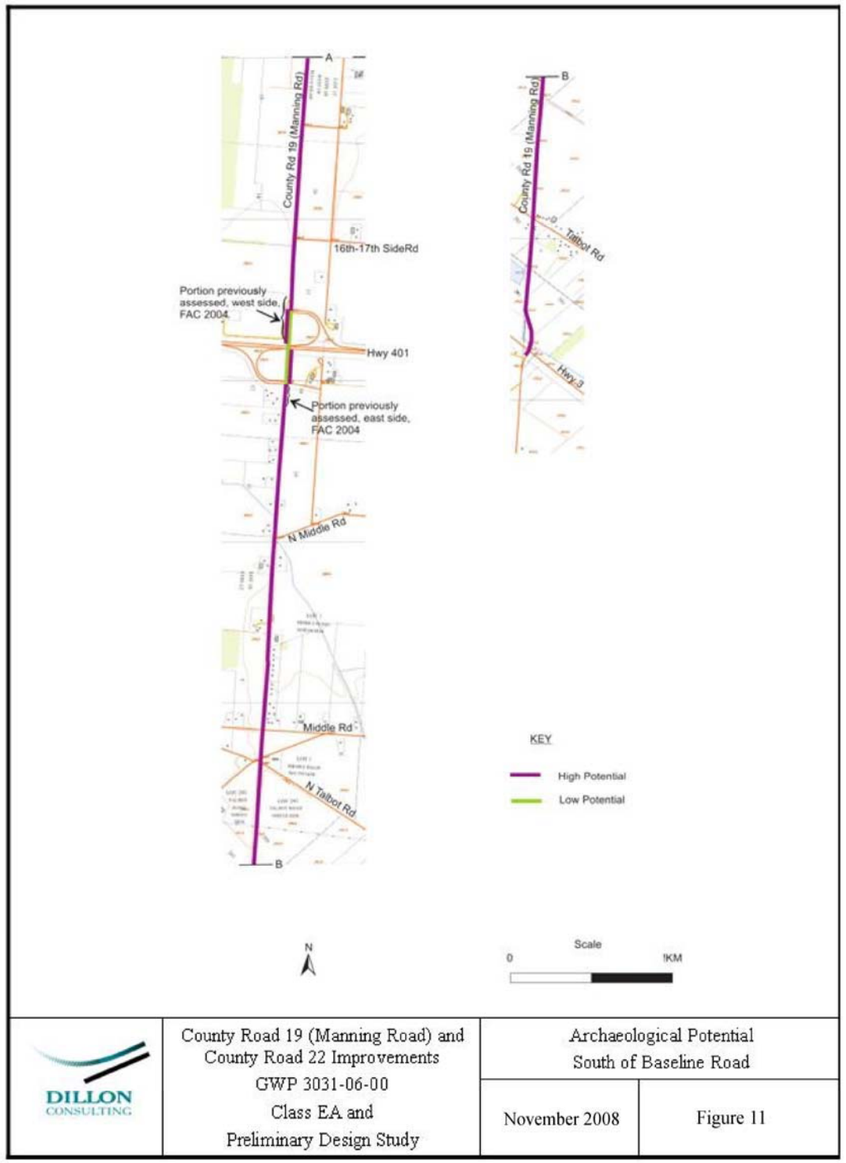


Table 26:
Archaeological Potential in Study Area

Study Area	Potential[1]	Comments[2]
CR 19 Corridor		
South side of Highway 3 to Talbot Road (CR 34)	High - A & EC	• primarily agriculture • DA - former pit or quarry, railway
Talbot Road to North Talbot Road	High - EC & A (south end)	• primarily agriculture • DA - hydro corridor, gas line; NE corner of 19/34
North Talbot Road to CR 46	High – EC	• west side primarily agriculture • east side residential, commercial
CR 46 to North Rear Road	High – EC High - A (north half)	• west side primarily agriculture • east side residential, agriculture • DA - gas station at NE corner of N Talbot/46, paved yard on west side and gas lines
North Rear Road to Highway 401	High EC High - A (south half)	• primarily agriculture with residences on west side • DA – gas line, interchange, local roads
Highway 401 to Baseline Road	High – EC	• Agriculture
Baseline Road to North end of Concession 10	High – EC Moderate – A	• primarily agriculture with some residences
North end of Concession 10 to CR 42	High - EC & A	• agriculture south of Pike Creek • residential, commercial north of creek • DA - Pike Creek bridge, driveways, parking areas, gas station at 42/19 intersection
CR 42 to CP Rail tracks	High - EC High - A (south end)	• Primarily agriculture with some residences • DA - hydro tower, light industry just south of track on west, gas line
CP Rail to Little Baseline Road	High – EC	• west side primarily agriculture • east side residential, commercial, agriculture
Little Baseline Road to CR 22	Moderate – EC	• mostly disturbed. Potential in undisturbed areas
CR 22 to VIA Rail lines	Moderate (EC) to Low	• two vacant lots remain • DA - commercial paved areas, probable underground servicing

[1] A - Aboriginal, EC - Historic Euro-Canadian
[2] DA - Significantly disturbed area

Table 26: Archaeological Potential in Study Area		
Study Area	**Potential[1]**	**Comments[2]**
Essex CR 22 Corridor		
East side of Banwell Road to Shawnee Road	High - EC Moderate – A	• within 50 m Banwell Road only (CR 22 is not a historic road) • grassy area between 22 and ditch • mix of agriculture, vacant lots, residential
Shawnee Road to Lesperance Road	Moderate to Low - A High - EC	• residential development • undisturbed area within 50 m of Lesperance Road • St. Anne's Cemetery
Lesperance Road to Essex CR 19	High - EC Moderate to Low - A	• commercial, residential, agriculture • undisturbed area within 50 m of Lesperance Road • DA - residential areas, parking lots
Essex CR 19 to Lakeshore Boulevard	High - EC Moderate - A	• within 50 m of CR 19, beyond road disturbance • north side - commercial, vacant/agricultural • south side agricultural

4.1.2 Built Heritage and Cultural Landscapes

Unterman McPhail Associates, Heritage Management Resource Consultants, prepared a cultural heritage resource assessment of built heritage and cultural heritage landscapes in the Study Area. The assessment is documented in a report dated December 2007. Dillon submitted the report by letter dated January 11, 2008, to the Ministry of Culture, for review and comments. In a letter dated April 8, 2008, the Ministry of Culture stated that the report is consistent with Ministry standard requirements.

Based on background research and a windshield survey of the corridor on May 16, 2007, Unterman McPhail identified 28 built heritage and cultural landscapes in the County Roads 19 and 22 corridor. **Table 27** and **Figure 12** illustrate the Study Area's resources. Photos of the Study Area's built heritage and cultural resources are included in **Appendix B**. Noted resources include:

- St. Anne's Cemetery
- early 20th century farm complex at 1951 Manning Road
- the roadscape at CR 19 and CR 42 (Division Road) marks the boundary between the French seigneury lots of the geographic township of East Sandwich and the English survey of South Sandwich. This is also reflected in the agricultural landscape of the area
- mid-19th century farm complexes at 5033 and 3320 Manning Road
- a concrete culvert dated 1910 carrying a drain under the Essex "cut-off", part of the Canada Southern Railway (later the Michigan Central Railway).

Table 27: Identified Cultural Heritage Resources				
Site #	**Resource Type**	**Category**	**Location**	**Description**
1.	CHL	Cemetery	Lesperance Road at CR 22 (northwest corner), Town of Tecumseh.	St. Anne's Cemetery established in 1859, still in use. Associated with Roman Catholic Eglise Ste. Anne at 12233 Tecumseh Road East and schools. Markers reflect Franco-Ontarian community of the parish
2.	CHL	Roadscape	Lesperance Road, Town of Tecumseh.	Road allowance relating to survey of East Sandwich Township. Two lane paved local road. Lesperance commemorates an early settling family of the area
3.	CHL	Railway	Corridor runs east to west crossing CR 19 north of CR 22, Town of Tecumseh and Town of Lakeshore.	The Great Western Railway, originating at the Niagara River and running through London, Chatham and northern part of Essex County, reached Windsor in 1854. Grand Truck Railway (1888) and CNR later operated the line. VIA Rail currently uses the single track for passenger service. A level crossing with gate and signals is located at CR 19. OHT plaque to GWR in Windsor
4.	CHL	Roadscape	Manning Road, CR 19, Town of Tecumseh and Town of Lakeshore.	Formerly known as East Townline Road, Manning Road developed in the mid-19th century as a north-south route between the Townships of Sandwich South and Sandwich East to west and Township of Maidstone to east. Two lane paved regional road, well-travelled and provides access to Highway 401
5.	CHL	Drain	West side of CR 19, north limit of CR 42 north to outlet at Lake St. Clair, Town of Tecumseh.	East Townline Drain is an open municipal drain with a number of access bridges, road crossings and culverts

Table 27:
Identified Cultural Heritage Resources

Site #	Resource Type	Category	Location	Description
6.	CHL	Drain	East side of CR 19, north limit of CR 42 to south limit of VIA Rail line, Town of Lakeshore.	Manning Road Drain consists of three separate systems crossing under CR 19 at CR 22, Amy Croft Drive and south of rail line to drain into East Townline Drain. Open municipal drain with access bridges, road crossings and culverts. Relocated onto private lands in 1968
7.	CHL	Farm complex	No. 1951 Manning Road, Lot 156, Town of Tecumseh.	Early 20th century farm with one and-a-half storey frame farmhouse, barn with gable roof, several contemporary outbuildings and fields. Residence has been altered with contemporary sidings. Site remains in agricultural use
8.	CHL	Railway	Corridor runs east to west crossing CR 19 between Little Baseline Road and CR 42, Town of Tecumseh and Town of Lakeshore	The Canadian Pacific Railway was constructed across Essex County to Windsor in the late 1880s. A level crossing with gate and signals is located at CR 19
9.	BHR	Residence	No. 2575 Manning Road, Lot 156, Town of Tecumseh.	One and-a-half storey frame residence with a gable roof and moulded concrete block foundation currently clad in insulbrick. The 1920s building addresses the northwest corner of CR 19 and CR 42 (Division Road). Site retains a large lot suggesting it was formerly a farm complex. A new gas station has been built at the corner
10.	CHL	Roadscape	CR 42 crosses CR 19 just north of Pike Creek, Town of Tecumseh and Town of Lakeshore.	West of CR 19, CR 42 (Division Road) marks the boundary between the geographic townships of East Sandwich to the north and South Sandwich to south. Marked visual difference in survey patterns. While the two lane roadway runs east-west to the east of CR 19, it angles to the southwest west of CR 19
11.	BHR	Bridge	CR 19 south of CR 42 at Pike Creek, Lot 20, Con. 12, Town of Tecumseh and Lot 11, Con. 9, Town of Lakeshore.	Pike Creek Bridge is an Essex County road bridge dating to 1955. Two-lane bridge has undergone extensive modifications with new railings, deck and steel beams. Only the abutments appear to be original
12.	CHL	Roadscape	East side of CR 19, south of Pike Creek,	10th Concession Road, two-lane gravel road relating to initial survey of Maidstone Township.

Table 27:
Identified Cultural Heritage Resources

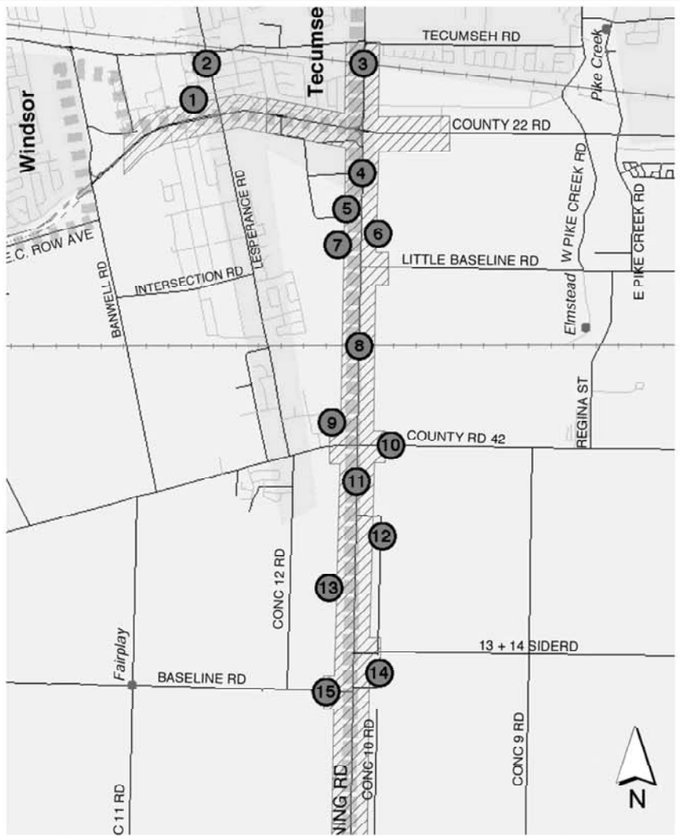
Site #	Resource Type	Category	Location	Description
			Lot 12, Con. 9/10, Town of Lakeshore.	Road does not appear to have been opened through to CR 42 but terminates south of Pike Creek to connect with CR 19. Road does not carry over Highway 401
13.	CHL	Agricultural Landscape	Either side of CR 19, Town of Tecumseh and Town of Lakeshore	The field patterns on either side of CR 19 reflect the differing surveys of South Sandwich Township to the west and Maidstone Township to the east. The lots oriented east-west to the west side of the road and north-south to the east. Sideroads and ditches accentuate the layout
14.	CHL	Roadscape	East side of CR 19, south of 10th Concession Road, Lot 14, Conc. 10, Town of Lakeshore	13th – 14th Sideroad, two-lane gravel road relating to initial survey of Maidstone Township. The road is offset to the north from Baseline Road to the west of CR 19
15.	CHL	Roadscape	West side of CR 19, Lots 16/17, Conc. 12, Town of Tecumseh	Baseline Road, narrow, two-lane paved road with steep ditches to either side relating to the initial survey of South Sandwich Township. The road is offset to the south from 13th – 14th Sideroad to the east of CR 19
16.	CHL	Roadscape	East side of CR 19, south of 13th-14th Sideroad, Lot 16/17, Con. 10, Town of Lakeshore.	16th-17th Sideroad, two-lane paved road relating to initial survey of Maidstone Township
17.	CHL	Roadscape	Lot 13, Con. 12, Town of Tecumseh and Lots 17, 18, Con. 10, Town of Lakeshore.	Highway 401. Construction and grading began on the Windsor to Tilbury section of Highway 401 in 1950. Four-lane divided highway with grass median opened from Highway 98 (Provincial Road) east to Highway 2 in Tilbury, a distance of 26.35 miles (42.41 km), on August 15, 1957. Highway has been widened to six lanes
18.	BHR	Bridge	CR 19 at Highway 401, Lot 13, Con. 12, Town of Tecumseh and Lots 17.18, Con. 10, Town of Lakeshore.	CR 19 Underpass and Interchange were envisioned as part of the original design of Highway 401, but the four-span reinforced concrete structure was not constructed until the mid-1960s. Site No. '6-230' and date '1966' are incised in the concrete fascia on the west side of bridge at north end

Table 27:
Identified Cultural Heritage Resources

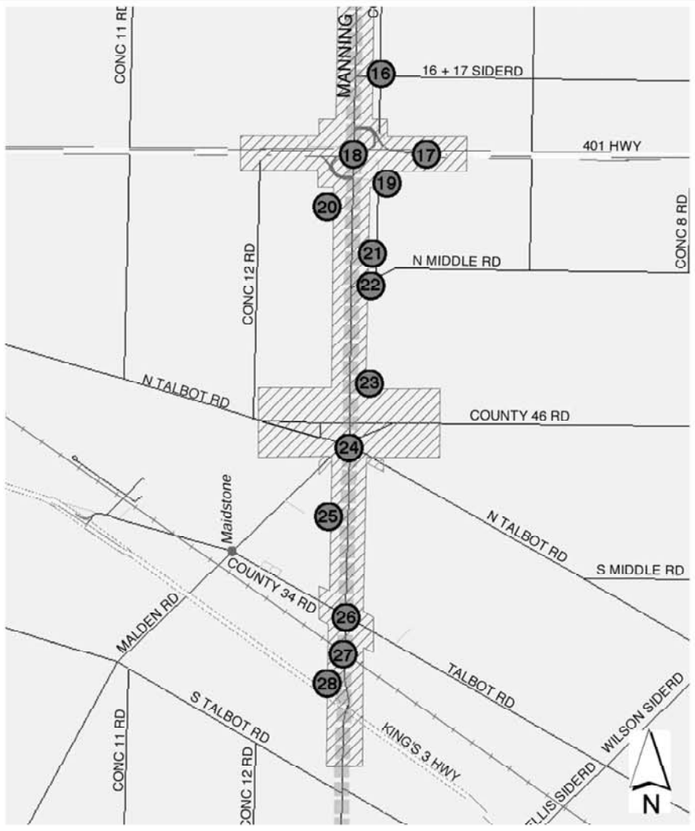
Site #	Resource Type	Category	Location	Description
19.	CHL	Public	No. 1219 10th Concession Road, Lot 18, Con. 10, Town of Lakeshore.	Ontario Provincial Police, Essex Detachment, B11965, one-storey, flat roof, brick structure with stone accents and provincial crest, on an angle to Highway 401, constructed 1956. Set in spacious grounds with stone wall. Memorial Woods commemorating 401 accident, Sept 1, 1999 is located beside site
20.	CHL	Farm complex	No. 5033 CR 19, Lot 12, Con. 12, Town of Tecumseh	One and-a-half storey frame farmhouse, barn with gable roof, concrete silo and fields. Farmstead W. Dixon noted at this location in 1881 *Illustrated Historical Atlas*
21.	BHR	Residence	No. 3320 CR 19, Lot 19, Con. 10, Town of Lakeshore	One and-a-half storey, frame, front gable residence, 'L' plan. Not noted in 1881 *Illustrated Historical Atlas*, but a building shown on Lot 19 on 1913 topographical map. Only the residence remains of former farm complex (no barns or outbuildings). Surrounding lands in agricultural use
22.	CHL	Roadscape	Lot 19, Con. 10 and Lot 1 North Middle Road (NMR), Town of Lakeshore	North Middle Road (North Rear Road) marks a change in survey pattern reflecting lots laid out along Middle Road. The rural road runs along the rear of the lots on the north side of Middle Road
23.	BHF	Residence	No. 3458 CR 19, Lot 1 NMR, Town of Lakeshore	One and-a-half storey frame residence, front gable with one storey wing to south. May be a former farmhouse. Gravel drive. Set among 1970s rural residential along CR 17
24.	CHL	Roadscape	Lot 1 SMR and Lot 293 NTR, Town of Lakeshore and Lots 293/294 NTR and Lot 9, Con. 12, Town of Tecumseh	Maidstone Crossing marked the location of three roads crossing: CR 19, Middle Road and North Talbot Road. Does not appear to have been a community, but a schoolhouse was located on Lot 1 SMR for much of the 20th century
25.	CHL	Drain	West side of CR 19 from south of Highway 401 to south of Highway 3.	Mooney Creek Drain is an open municipal drain with a number of access bridges, road crossings, railway crossings and culverts
26.	CHL	Roadscape	Lot 292 NTR and STR, Town of Tecumseh and Town of Lakeshore	Talbot Road is an early settlement road from Waterford to Amherstburg. It reached Essex County in 1818 and became an important stagecoach route, with lots fronting on both sides

Table 27:
Identified Cultural Heritage Resources

Site #	Resource Type	Category	Location	Description
				of road. Several buildings relating to Talbot Road are located in the vicinity of CR 19. The Windsor Essex and Lake Shore Electric Railway, 1907-1932, ran on the road from Maidstone to Essex. OHT plaque to Talbot Road outside St. Thomas
27.	CHL	Railway	Lot 291 STR	The Essex 'cut-off', part of the Canada Southern Railway, later Michigan Central Railway was constructed from Essex Centre to Windsor in 1883. A concrete culvert, dated 1910, carries the drain under the tracks. A level crossing with gate and signals is located at CR 19. Formerly a double track, only one track remains in use
28.	CHL	Roadscape	Lot 291 STR	At the time Highway 3 was realigned for the Essex Bypass, CR 19 was modified to meet the new controlled intersection at Highway 3 at right angles. A section of CR 19 was abandoned at that time. The concrete culvert has the initials 'L. F.' and date '1957' incised in the curb



North Section of Study Area



South Section of Study Area

DILLON CONSULTING	County Road 19 (Manning Road) and County Road 22 Improvements GWP 3031-06-00 Class EA and Preliminary Design Study	Cultural Heritage Landscape and Built Heritage Resources	
		November 2008	Figure 12

4.2 Natural Features

4.2.1 Physiography

The topography of southern Ontario was formed by glacial and post-glacial activity. Previously covered by Glacial Lake Whittlesey and Lake Warren, Essex County has little topographical relief. Shallow deposits of lacustrine clay cover the clay till overlying a limestone or shale base. This whole area, encompassing 2,270 square miles in Essex County and parts of Lambton and Kent County, is known as the St. Clair Clay Plains. This region has little relief, lying between 575 and 700 feet above sea level, with the exception of a moraine at Ridgetown.

The Essex Clay Plain is located in the St. Clair Clay Plains, between the basins of Lake Erie and Lake St. Clair. The topography of the plain is generally flat, with the exception of two eskers that provide some relief. The Talbot Road follows one of these gravel ridges, from Maidstone to southeast of Cottam.

4.2.2 Soils

Soils in the Study Area are primarily gleysolic soils of the Brookston series, including clays and clay loams. This type of soil developed under a swamp forest of elm, black and white ash, silver maple, and other moisture loving trees. Man-made ditches and tile underdrains have been constructed throughout Essex County to aid in drainage. A narrow strip of land on either side of the main branch of Pike Creek is composed of Bottom Land (alluvial soils and muck).

A small area of sandier soil, Brookston Clay Sand, is located around CR 22 and Banwell Road. These sandy spots occur periodically in the clay fields and provide patches of better drainage.

4.2.3 Groundwater

The Lakeshore portion of the Study Area is shown as "Low Aquifer Susceptibility" on Schedule "B.1" to the Town of Lakeshore Draft Official Plan. According to the Essex Region/Chatham-Kent Region Groundwater Study prepared by Dillon in 2004, almost all of Lakeshore is situated on the Essex Clay Plain, consisting of low permeability clay till soils. The till is weathered and fractured in the top 5 metres and is somewhat hydraulically active. Underneath the weathered zone, the unfractured clay till has very low permeability.

Based on the stratigraphy of water well records, the clay till extends to a depth of around 35 metres, where a basal sand and gravel is sometimes found overlying limestone of the Dundee formation. The basal/bedrock aquifer is well protected by the overlying thick deposit of low permeability clay till and, as a result, is not susceptible to impacts or anthropogenic sources of contamination.

The water table in the Town of Tecumseh ranges from 181 to 200 metres above sea level and is generally characterized by subsurface elevation that very closely conforms to its topographic surface. Areas close to the Highway 401 interchanges in the Windsor area have the highest topographic elevation and water table levels. Superficial geology is predominated by lacustrine clays with patches of glacial tills, both of which have very low permeability. The principle shallow groundwater flow direction is away from the topographic ridges and towards Lake St. Clair and the Detroit River. Water table aquifers are unlikely present as there is an absence of sand and gravel deposits throughout the town.

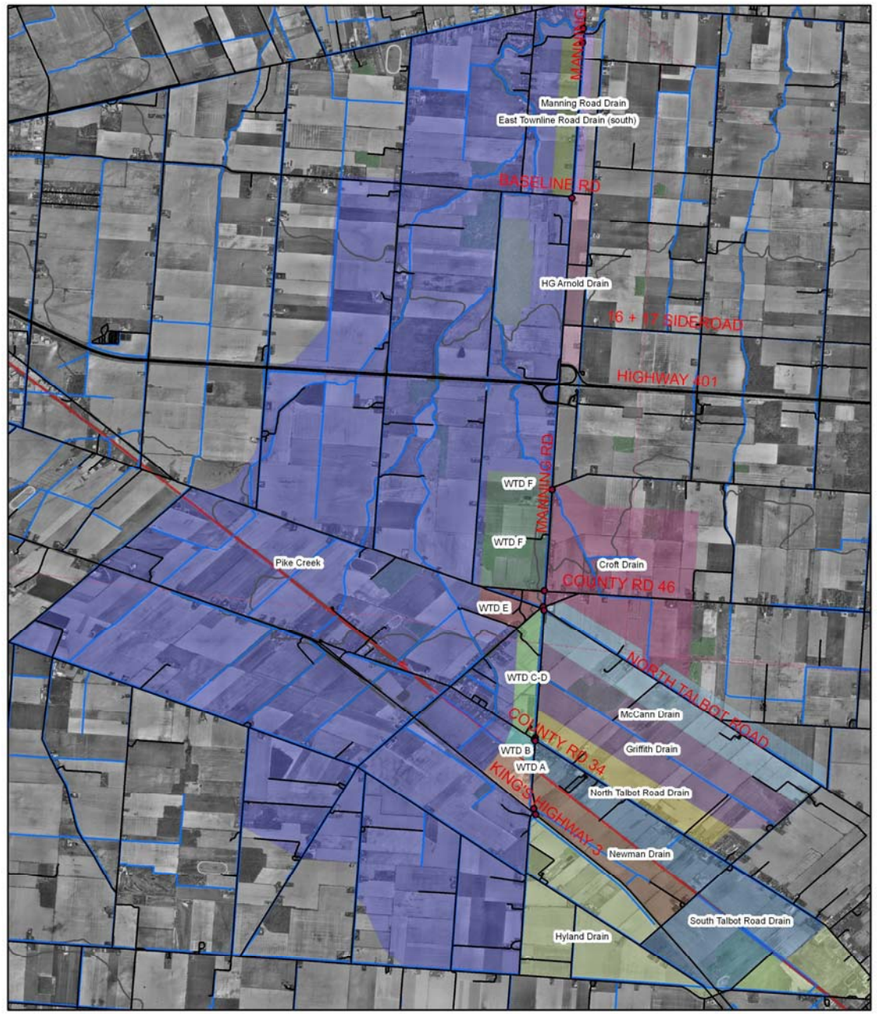
4.2.4 Drainage and Hydrology

Section 4.2.4 summarizes Dillon's Drainage and Hydrology Report and describes drainage systems potentially affected by the proposed roadway improvements. The following information is included for each drain:

- general description of the drainage area
- field notes and general observations from field inspections
- photo documentation.

Information sources used to complete the assessment included:

- field investigations completed in June and August 2007
- 1:20,000 OBM topographic mapping
- input from Essex Region Conservation Authority (ERCA)
- County of Essex GIS database
- Municipal Drain reports.


MANNING RD
Manning Road Drain
East Townline Road Drain (south)
BASELINE RD
HG Arnold Drain
16 + 17 SIDEROAD
HIGHWAY 401
MANNING RD
WTD F
WTD F
Pike Creek
Croft Drain
COUNTY RD 46
WTD E
WTD C-D
NORTH TALBOT ROAD
McCann Drain
COUNTY RD 34
WTD B
WTD A
Griffith Drain
KINGSVILLE-HIGHWAY 3
North Talbot Road Drain
Newman Drain
South Talbot Road Drain
Hyland Drain
Legend
Existing Major Culverts/Bridges
Railway
Road Segments
Contours
Drainage Feature
ESA
Utility Line
Woodlots
N
500 250 0 500 Meters
Project No. 06-6998
UTM NAD83 Zone 17 Coordinates
County Roads 19/22 Improvement
Drainage and Hydrology Impact Report
November 2008
DILLON CONSULTING
Figure 13
Existing Condition Drainage Mosaic
South of Pike Creek

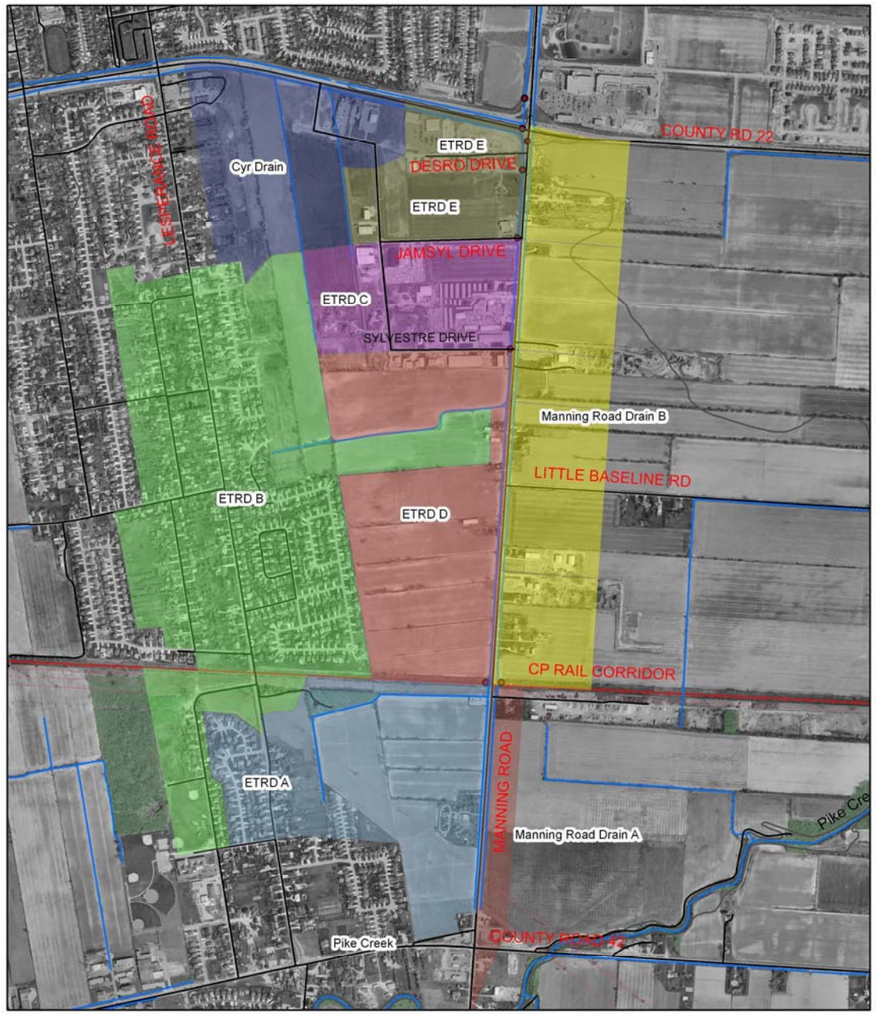

WESTERNAIR RD
Cyr Drain
ETRD E
DESRO DRIVE
COUNTY RD 22
ETRD E
JAMSYL DRIVE
ETRD C
SYLVESTRE DRIVE
Manning Road Drain B
LITTLE BASELINE RD
ETRD B
ETRD D
CP RAIL CORRIDOR
ETRD A
MANNING ROAD
Manning Road Drain A
Pike Creek
Legend
Existing Major Culverts/Bridges
Railway
Road Segments
Contours
Drainage Feature
ESA
Utility Line
Woodlots
N
150 75 0 150 Meters
Project No. 06-6998
UTM NAD83 Zone 17 Coordinates
County Roads 19/22 Improvement
Drainage and Hydrology Impact Report
November 2008
DILLON CONSULTING
Figure 14
Existing Condition Drainage Mosaic
North of Pike Creek

Table 28: Existing Drainage		
	General Description	**Site Photographs**
Hyland Drain Outlet	• surface water input from Siefker Drain, Ellis Drain, Newman Auxiliary Drain • passes under Hwy. 3 just south of Hwy 3/CR 19 intersection and discharges to Newman Drain • well vegetated channel • topographic relief less than 0.12%	
Newman Drain	• surface water input from Beattie Drain and Hyland Drain Outlet • passes under CR 19 through a 4.28 x 1.6 m non-rigid frame open footing box culvert • forms the headwaters for West Townline Drain • intermittent flows with moderate water body sensitivity, capable of supporting warm water baitfish • well vegetated channel upstream of culvert with some overhanging brush • topographic relief, averaging less than 0.18%	
South Talbot Road Drain	• short drain enclosure near CR 19/CR 34 intersection and discharges directly into a culvert carrying flows from West Townline Drain under CR 34 • intermittent flows, may provide seasonal fish habitat • topographic relief, averaging less than 0.12% • forms roadside ditch system on south side of CR 34, east of CR 19 • surface water input from Sherwood Ellis D&W • channel well vegetated upstream of culvert	
North Talbot Road Drain	• open-channel/roadside ditch portion of the drain flows under CR 19 and discharges into the culvert carrying flows from West Townline Drain under CR 34 • upstream (east) of enclosure North Talbot Road Drain receives surface water from Dawson Road Drain, • enclosed for approx. 164 m • topographic relief, averages less than 0.15%. • forms roadside ditch system on north side of CR 34 east of CR 19 • surface water input from Dawson Road Drain • flows under Manning Road into West Townline Drain (Mooney Creek) through an existing 1200 mm corrugated steel pipe culvert • channel well vegetated upstream of culvert	

Table 28: Existing Drainage		
	General Description	**Site Photographs**
Griffith Drain	• originates west of Wilson Side Road • provides outlet for extensive agricultural lands from Manning Road east to Wilson Sideroad • discharges into West Townline Drain under CR 19 • more naturalized municipal drain system in Study Area partly due to its location away from any road or highway infrastructure • banks lined with dense overhanging vegetation providing good cover • drain meanders through an incised valley east of CR 19 • drainage area includes a significant woodlot approx. 0.5 km east CR 19. Woodlot approx. 16 ha and 8% of total contributing drainage area • topographic relief, averaging less than 0.10% • flows under Manning Road into West Townline Drain (Mooney Creek) through an existing 2.4 x 2.4 m culvert • highly naturalized channel is densely vegetated upstream of culvert • steeper gradient channel immediately up and downstream of culvert shows signs of erosion and scour	
McCann Drain	• flows in a northwest direction along the North Talbot Road ROW and passes under CR 19 North Talbot Road/CR 19 intersection into West Townline Drain • receives surface water flows from Dawson Drain • well-vegetated channel side slopes immediately east of CR 19 • intermittent flows • provides habitat for warm water fish species • topographic relief, averaging less than 0.14%	
Croft Drain	• originates within agricultural land along CR 46, east of CR 19 • outlets to the West Townline Drain at North Rear Road • well vegetated and naturalized • moderate water body sensitivity and supports warm water fish habitat • topographic relief, averages less than 0.24% • surface water input from Doyle Drain	

Table 28: Existing Drainage		
	General Description	**Site Photographs**
West Townline Drain (Mooney Creek)	• largest watercourse in Study Area south of Hwy 401 • originates near Hwy 3, at the confluence of the Hyland Drain Outlet and the Newman Drain, flows north along western side of CR 19 • provides outlet to numerous roadside ditch systems. Tributaries include the North and South Talbot Road Drains, Griffith Drain, Croft Drain, and McCann Drain • North of Croft Drain culvert crossing CR 19, drain diverges from CR 19 and flows in a northwesterly direction towards Hwy 401 corridor. Portion often referred to as Mooney Creek due to highly naturalized channel configuration and curvilinear alignment • Mooney Creek is a tributary of Pike Creek and flows through Fairplay Woods ESA • high water body sensitivity, with permanent flows and capacity to support warm water baitfish and game fish • western bank contains a large number of mature trees • eastern bank contains herbaceous shrubs and grasses • bottom of the drain shows some signs of erosion from periods of high flows • steep side slopes combined with the drain's proximity to the roadway causes a potential hazard to motorists • drain has four significant culvert crossings along CR 19: CN Rail crossing, CR 34, Malden Road and CR 46	
10th Concession Road Drain	• originates in agricultural land south of Hwy 401 and east of CR46 • large portion of the watercourse length extends north along the east side of 10th Concession Rd to Pike Creek just south of CR46 • primary tributary of Pike Creek • provides seasonal warm water baitfish habitat • topographic relief, averages less than 0.20% • forms roadside ditch system on the east side 10th Concession Road, north and south of Highway 401 • surface water input from Sherwood Ellis D&W • Flows under Highway 401 and E-N/S Ramp • channel is well vegetated upstream of culvert	
H.G. Arnold Drain	• originates in agricultural land east of CR 19 and west of 10th Concession Road and flows in a westerly direction along the southern side of the Baseline Road ROW, eventually discharging directly into Pike Creek • drain does not fall directly within CR19 ROW, flow is conveyed via a system of roadside ditches on the east and west side of CR 19 eventually discharging into the upstream portion of the drain • channel well vegetated downstream of culvert • topographic relief, averages less than 0.20%	

Table 28: Existing Drainage

	General Description	Site Photographs
East Townline Road Drain (South)	• originates just north of Baseline Road and flows in a northerly direction along the west side of CR 19 ROW. Drain crosses ROW to the east side just south of Pike Creek • Class C drain, may contain potential for warm water baitfish, perched drain restricts movement of fish species, even during seasonally high water levels in Pike Creek • drain consists of a very basic roadside ditch arrangement in the Study Area and is generally a shallow swale with flat side slopes in the ROW • majority of the drainage area consists of lands immediately east and west of CR 19 • agricultural land west of ROW drain toward Pike Creek, lands east drain to 10th Concession Drain • topographic relief averages less than 0.24% • well vegetated upstream of culvert • Steep gradient ditch downstream of culvert crossing has been extensively protected from erosion and scour • significant drop at Pike Creek considered a barrier for fish passage	
East Townline Road Drain (North)	• CR 19 represents a drainage divide between the East Townline Road Drain system and the Manning Road Drain system • East Townline Road Drain (North of Pike Creek) originates within the agricultural land north of CR 42, flowing north along the western side of the CR 19 ROW in a shallow swale/roadside ditch • provides outlet for Antaya Drain, Baillergeon Drain, and Manning Road Drain and deepens quickly past the CP Rail corridor and adjacent to the developed potion of CR 19 • large portion of the CR 22 ROW east of CR 19 drains to East Townline Road Drain • drain flows through five significant culverts (CP Rail, Sylvester Drive, Jamsyl Drive, Desro Drive, CR 22) and into a drain enclosure located north of CR 22 • North of CR 22, forms an extensive underground drainage system that provides outlet for number of local storm sewer systems within the highly urbanized corridor • discharges into Lake St. Clair through a flap-gate control structure • low watercourse sensitivity	
Manning Road Drain	• originates just north of the urbanized area north of CR 42 • enters 1200 mm diameter corrugated steel pipe drain enclosure just south of CR 22 and flows underground along the frontages of several residential homes, eventually crossing CR 19 just north of Desro Drive and discharging into East Townline Road Drain • potential for warm water baitfish and the existence of other fish habitat however enclosures restrict the movement of fish species during high flow conditions • shallow swale with flat side slopes in Study Area • topographic relief within the drainage area averages less than 0.24% • channel generally well vegetated, some portions of channel have been lined with riprap • side slopes are very steep, channel is very low gradient	

Table 28: Existing Drainage

	General Description	Site Photographs
Pike Creek	• flows northeast and discharges directly into Lake St. Clair • many small tributaries including Mooney Creek, East Townline Road (South), and H.G. Arnold Drain • CR 19 passes over creek just south of CR 42 • provides habitat for top predator fish <u>Downstream</u> • run, riffle, and pool habitat • banks slightly unstable, some areas moderate to high instability, trees along banks and valley slopes provide shade • in-stream cover provided by boulders, cobble, organic debris, in-stream and overhanging woody debris, and overhanging vegetation • substrates varied, including gravel, sand, cobble, boulders • small rock weir within Pike Creek bridge structure limits, creating riffle habitat at the downstream (east) end of the bridge crossing, with a wetted depth of approximately 0.25 m and a wetted width of approximately 3.5 m <u>Upstream</u> • river morphology is 100% habitat • substrates primarily clay and silt with sporadic cobbles along river bottom • tree cover consistent with downstream area • in-stream cover for fish provided by some cobble, in-stream woody debris, and overhanging plants • roadside ditch enters Pike Creek upstream of bridge on north side, significant erosion of the valley wall and sediment deposition • watershed area provides outlet for several municipal drains and natural watercourses • average topographic relief approx. 0.96 m/km in watershed, topographic relief in drainage area less than 0.1%	

Drainage Area Hydrology

As shown on Figures 13 to 18, the Study Area is crossed by one significant watercourse (Pike Creek) and several major municipal drain systems. Several open channel municipal drain systems are located within the CR 19 corridor. In addition, a number of enclosed drain systems are located under the roadway or within the adjacent boulevard area flowing parallel to CR 19. Drainage areas generally all consist of land located directly on the east and west sides of the CR 19 corridor. Within the southerly portion of the Study Area, the existing alignment of the roadway acts as a drainage divide, directing overland flow from land east of the right-of-way to crossing locations, where flow is conveyed through the right-of-way via drain culverts. Within the northern portion of the Study Area, topography results in relatively long narrow drainage areas adjacent to the right-of-way. Ditches and open channels flow parallel to CR 19 towards Pike Creek or existing municipal drains systems flow in a south to north direction.

Three main receiving water systems are located in the Study Area, including:

- West Townline Municipal Drain system (also known as Mooney Creek)
- Pike Creek
- East Townline Road Municipal Drain.

Drainage boundaries for each drain and watercourse were determined using various Municipal Drain reports, Drainage Feature mapping from ERCA and OBM contour mapping for Essex County. In several cases, drainage areas were deduced from a combination of sources with consideration of topographic relief and known flow directions of drains outside the Study Area. Hydrologic parameters, such as drainage area length, slope, and corresponding time of concentration were estimated based on known watershed parameters and OBM topographic mapping. Final hydrologic computations were based on existing land use conditions. To determine calculated design flow rates for smaller drainage areas and larger drainage systems, a Visual Otthymo model was developed to represent drainage areas. Visual Otthymo is a single-event hydrologic simulation model capable of generating runoff hydrographs and associated peak flow rates for complex drainage systems.

Existing Culvert Hydraulic Assessment

Like most municipal drain systems, the drains in the Study Area serve as conveyance systems that store a significant volume of stormwater runoff. The available volumetric capacity of these drainage systems allow them to efficiently drain large portions of land although channel characteristics are limited by gradient and the existence of many undersized hydraulic structures. Most of the drains can be characterized as having large cross-sectional areas, very flat gradient channels, relatively straight channel form, and limited associated floodplain. Only significant drainage structures were considered while assessing the performance of the two main drainage systems within the Study Area, including the West Townline Drain and East Townline Road Drain. The Bentley software analysis program CulvertMaster and FlowMaster were used to complete the hydraulic assessment of existing drainage structures.

The Study Area's major drainage structures can be grouped according to the following general categories and areas:

- drains discharging into West Townline Drain – south of Highway 401
- drains discharging into Pike Creek – between Highway 401 and Pike Creek
- drains discharging into East Townline Road Drain enclosure north of CR 22 – north of Pike Creek.

West Townline Drain

This drain flows through the CR 19 corridor south of Highway 401 with water levels ultimately governed by water levels in West Townline Drain (Mooney Creek) and subsequently Pike Creek. Affected drains include:

- South Talbot Road Drain
- North Talbot Road Drain
- Griffith Drain
- McCann Drain
- Croft Drain.

Table 29 summarizes the hydraulic performance of the existing culvert structures along West Townline Drain.

Table 29:
West Townline Drain Culvert Performance

Location	Existing Culvert Size	25/100-Year Flow (cms)	Design Headwater Elevation/ Depth (m)	Design Tail-water Elevation/ Depth (m)	Design Exit Velocity (m/s)	Design Free-board (m)	100-yr High Water Level
CN Railway	2.74 x 1.54 m	6.12/8.14	190.98/1.47	190.79/1.29	1.73	0.94	191.23
CR 34	4.90 x 1.83 m	12.08/16.03	190.53/1.80	190.37/1.66	1.49	1.09	190.84
CR 46	5.48 x 2.34 m	21.06/28.06	188.70/2.26	188.46/2.03	1.89	1.31	189.06

Based on resultant headwater and tail-water elevations at the culverts along West Townline Drain, governing tail-water elevations were established at each of the five drains and associated drainage structures discharging into the system. **Table 30** summarizes the hydraulic performance of North and South Talbot Road Drain, Griffith Drain, McCann Drain, and Croft Drain.

Table 30:
Existing Culvert Performance

Location	Existing Culvert Size	25-Year Flow (cms)	Design Headwater Elevation/ Depth (m)	Governing WTD 25-Year Tail-water Elevation	Design Exit Velocity (m/s)	Design Freeboard (m)
South Talbot Road Drain	1500 mm CSP	4.03	191.54/2.52	190.45	2.90	0.08
North Talbot Road Drain	1200 mm CSP	1.59	191.48/1.89	190.45	1.36	0.03
Griffith Drain	2.44 x 2.44 m	4.52	189.71/1.81	189.64	1.04	1.80
McCann Drain	3.06 x 2.74 m	4.31	188.95/1.96	188.91	0.74	1.40
Croft Drain	3.84 x 2.01 m CSPA	6.77	187.28/1.97	187.11	0.94	1.26

Pike Creek

Generally, the hydraulic performance of the drains discharging directly into Pike Creek from just north of Highway 401 are not impacted by Pike Creek hydraulic characteristics and water levels because of the incised nature of the channel and perched nature of the drain outlets. Affected drains include:

- H.G. Arnold Drain
- East Townline Road Drain (south)
- 10th Concession Drain
- West Townline Drain (crossing Highway 401 west of CR 19 interchange).

The hydraulic analysis of these three structures did not consider the effects of governing tail-water conditions resulting from high water level in the receiving watercourse. Hydraulic analysis assumed free-flowing outlet conditions. **Table 31** summarizes the hydraulic performance of HG Arnold Drain, East Townline Road Drain (South), 10th Concession Drain, and West Townline Drain, where it crosses Highway 401.

Table 31:
Existing Culvert Performance

Location	Existing Culvert Size	25/50-Year Flow (cms)	Design Headwater Elevation/ Depth (m)	Design Tail-water Elevation/ Depth (m)	Design Exit Velocity (m/s)	Design Freeboard (m)
HG Arnold Drain	1500 mm CSP	1.23	183.60/0.92	N/A	2.02	0.78
East Townline Road Drain-South	1200 mm CSP	1.05	181.65/0.70	N/A	1.71	1.38
10th Concession Drain	3.05 x 1.32 m	5.18	186.42/1.09	N/A	3.07	0.58
West Townline Drain (Hwy 401)	4.88 x 1.83 m	25.59	185.07/2.41	N/A	4.42	2.20

East Townline Road Drain (North)

The hydraulic capacity of the East Townline Road Drain (north) and drains discharging into it are limited by the existing drain enclosure located just north of CR 22, west of Manning Road. Water levels in East Townline Road Drain (north) system can be controlled by a set of flap gates and pumps located near Lake St. Clair at the north end of Manning Road. Flap gates and pump stations stop the backwater effects of high water levels within Lake St. Clair from reducing the hydraulic capacity of the drain. Although Lake St. Clair water levels remain low and the use of the flap gates and pumping facility is uncommon, this infrastructure remains in place to protect low-lying residential areas north of CR 22 from the damaging effects of flooding. Affected drains include:

- Antaya Drain
- Baillergeon Drain
- Manning Road Drain.

Although they form part of the municipal drainage system within the Study Area, neither Antaya nor Baillergeon Drain have associated drainage structures in the CR 19 corridor. Calculated peak flow rates generated by the East Townline Road Drain drainage area upstream of the existing drain enclosure were used to assess the performance of the existing drain enclosure north of CR 22. Due to the limited capacity of the downstream system, flow-rates for a range of design storm events were applied to the existing enclosure assuming free-flow conditions at the outlet to illustrate the conveyance capacity of the 2.44 x 1.83 m concrete box drain enclosure. **Table 32** summarizes the hydraulic performance of the existing enclosure.

Table 32: East Townline Road Drain Hydraulic Performance						
Location: 2.44 x 1.83 m East Townline Road Drain Enclosure – North of CR 22, West of CR 19						
Design Storm Event	**Design Flow Rate (cms)**	**Design Headwater Elevation**	**Design Headwater Depth (m)**	**Hydraulic Profile**	**Flow Regime**	**Design Velocity (m/s)**
2-year	4.85	177.91	1.33	M2	Sub-critical	2.69
5-year	7.50	178.36	1.78	M2	Sub-critical	3.11
10-year	9.20	178.61	2.03	M2	Sub-critical	3.33
25-year	11.98	179.13	2.55	CompM2/Pressure	Sub-critical	3.64
50-year	13.95	179.63	3.05	CompM2/Pressure	Sub-critical	3.83
100-year	15.87	180.15	3.57	CompM2/Pressure	Sub-critical	4.00

As indicated in **Table 32**, surcharging (submerged inlet) of the existing enclosure results from flow rates exceeding the 5-year design storm event. The analysis completed on the drain does not consider any capacity-reducing impacts of tail-water conditions within the drain. Although the basic analysis shows the drain is performing to a 5-year level of service, several other factors affect the actual system capacity. Factors include:

- hydraulic capacity of the outlet structure and pumping station at Lake St. Clair
- storage capacity of the enclosure and associated storm sewer network
- conveyance capacity of the 'minor' stormwater drainage system within sub-catchment areas
- ability of sub-catchment areas to deliver 'major' stormwater drainage system flow to the receiving water system.

According to MTO Directive B-100 and given CR 19's classification as an urban arterial, it is expected that the storm drainage system operates at a level of service corresponding to the 10-year design storm. In addition to MTO design criteria, this portion of East Townline Road Drain falls under the provisions of the *Drainage Act* and is maintained as such. Typically, an enclosure of this length would provide conveyance of flows generated by the 25-year design storm event. MTO Directive B-100 also specifies that the storm drainage system must accommodate or provide an overland flow route for the Regional or 100-year design storm event. Elimination of the open-channel portion of East Townline Road Drain north of the Study Area has resulted in the elimination of a major overland flow route for flows exceeding the capacity of the existing enclosure. Although typical of the area, elimination of major overland flow routes can result in ponding of surface water runoff during significant storm events. In many cases, ponding of surface water runoff can be controlled so that runoff is stored until capacity in the storm drainage system becomes available, thus combining the major and minor drainage system.

Hydraulic analysis of the culverts upstream of the existing East Townline Road Drain enclosure is complicated by the inability to establish governing tail-water elevations for the portion of the drain immediately north of CR 22. To illustrate the hydraulic performance of the existing culvert along East Townline Road Drain, south of CR 22 and north of the CP Rail corridor, a governing tail-water elevation of 178.04 was selected corresponding to '80% flow-full' conditions within the drain enclosure. The series of culverts upstream of the drain enclosure have been analyzed from downstream to upstream. The uniformity, proximity, and flat longitudinal grade of East Townline Road Drain results in a situation where the resultant headwater elevation forms the governing tail-water elevation for each successive culvert location. Both CP Rail crossing culverts have been analyzed considering the affects of backwater within a 1.5 m bottom width, 2:1 side slope, trapezoidal channel immediately downstream of the culvert location.

Table 33 summarizes the hydraulic performance of drainage structures at the CP Rail corridor, Sylvestre Drive, Jamsyl Drive, Desro Drive, CR 22, and the Manning Road drain crossing the CP Rail corridor, as well as the existing drainage enclosure outletting into East Townline Road Drain, just south of CR 22.

Table 33: East Townline Road Drain and Manning Road Drain Culvert Performance						
Location	**Existing Culvert Size**	**50-Year Flow (cms)**	**Design Headwater Elevation/ Depth (m)**	**Design Tail-water Elevation/ Depth (m)**	**Design Exit Velocity (m/s)**	**Design Freeboard (m)**
East Townline Road Drain						
CP Rail	1.83 x 1.22 m	2.63	181.54/1.10	181.37/0.87	1.65	0.62
Sylvestre Dr	2.10 x 1.60 m CSPA	8.42	185.25/6.79	183.77/2.13	3.19	-4.39
Jamsyl Dr	1600 mm CSP	9.10	183.77/5.94	180.62/2.85	4.52	-3.59
Desro Dr	1800 mm CSP	9.37	180.62/3.28	178.54/1.20	4.04	-1.07
CR 22	3.04 x 2.44 m	11.98	178.54/1.93	178.04/1.63	2.42	0.87

Table 33: East Townline Road Drain and Manning Road Drain Culvert Performance						
Location	**Existing Culvert Size**	**50-Year Flow (cms)**	**Design Headwater Elevation/ Depth (m)**	**Design Tail-water Elevation/ Depth (m)**	**Design Exit Velocity (m/s)**	**Design Freeboard (m)**
Manning Road Drain						
CP Rail	900 mm CSP	0.27	180.29/0.49	179.86/0.27	1.45	1.87
Enclosure	1200 mm CSP	2.00	179.05/1.67	178.54/1.20	1.72	0.50

Pike Creek Bridge Hydraulics
In July 1981, ERCA, in association with MNR, completed a flood-line study for Pike Creek, Puce River, Belle River, Duck Creek and Ruscom Rivers in Essex County. The study included the preparation of hydrologic and hydraulic computations for locations throughout the Pike Creek subwatershed. The existing bridge crossing of CR 19 was used as a hydrologic gauging location and hydraulically assessed using Hec-2.

According to the study, the upstream drainage area (approximately 5150 Ha) produces a 100-year peak flow of 55.76 cms at the CR 19 bridge. The Hec-2 modeling prepared for the watercourse indicates that the resultant 100-year flood line elevations up and downstream of the existing bridge structure are 179.741 and 179.497, respectively. ERCA regulates to these 100-year flood-line elevations.

The bridge crossing Pike Creek on CR 19 has not been physically altered (except for minor rehabilitation works) since the Hec-2 model was developed in the early 1980's. The model was based on a structure having the following physical characteristics:

- clear span of 17.25 m
- maximum high over the stream bed of 4.85 m
- a total conveyance area of 46.6 m^2 under the 100-year flood-line elevation
- bridge width of 11.0 m
- estimated Manning's roughness coefficient value of 0.035.

The combination of hydraulic capacity and morphology (highly incised nature) of the Pike Creek channel allows conveyance of the 100-year flows without significant impact on lands upstream and downstream of CR 19.

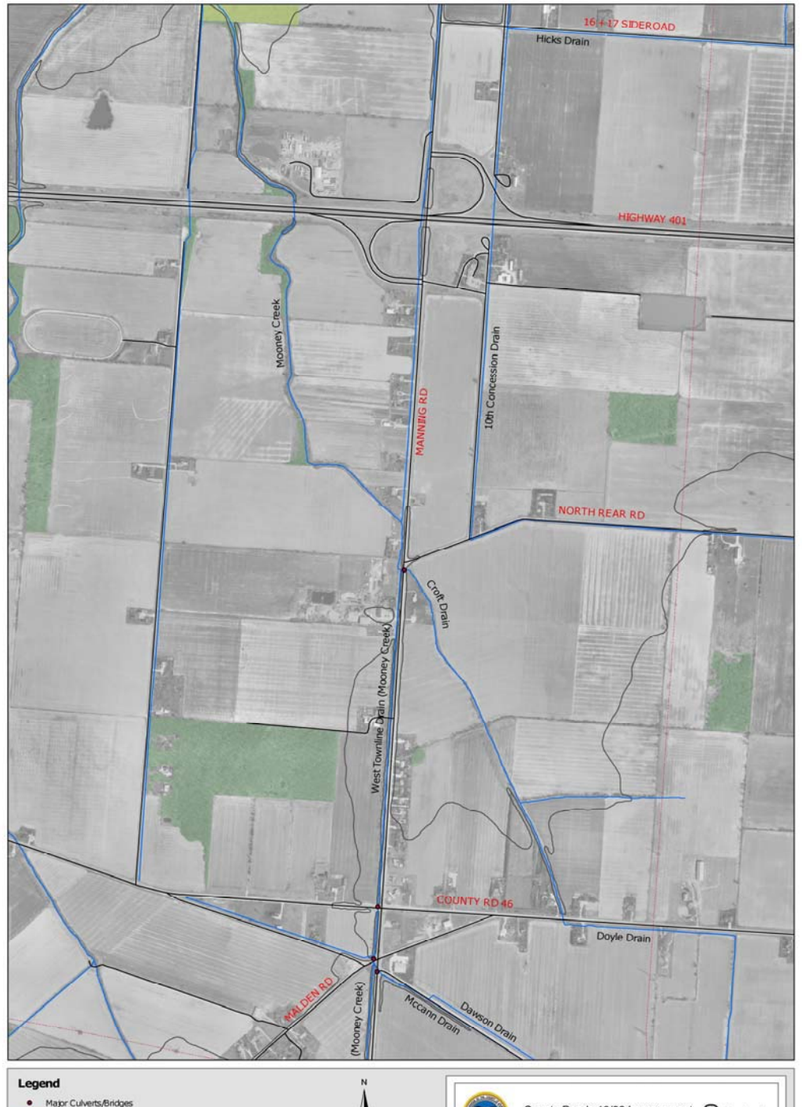
4.2.5 Fisheries and Aquatic Ecosystems

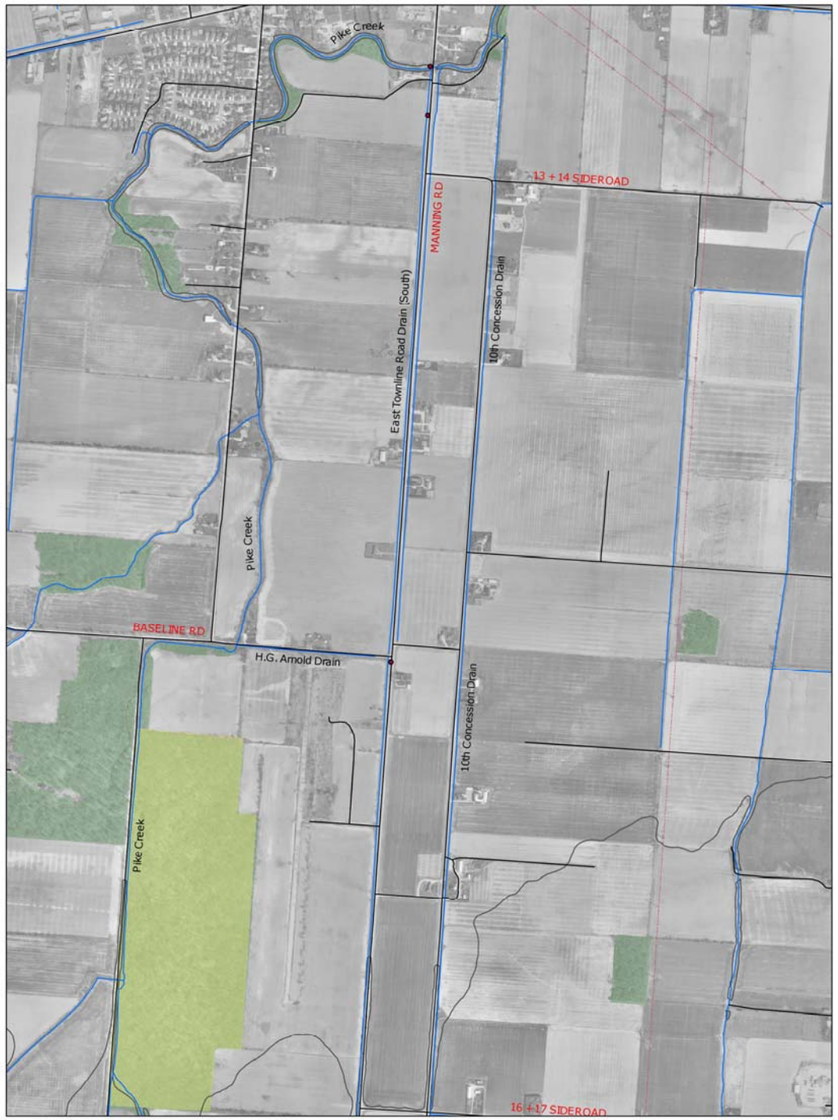
Dillon's Fisheries Biologists completed a review of existing fish and fish habitat conditions along CR 19 and CR 22. Major watercourses in the area include West Townline Drain and Pike Creek. In addition, there are several crossings by agricultural drains that lie within the Pike Creek subwatershed, including McCann Drain, Griffith Drain, Newman Drain, and Croft Drain. Fish habitat in the Study Area ranges from low to high sensitivity, depending on factors such as fish presence and connectivity with downstream aquatic resources.

A background review of existing fisheries information was completed by contacting ERCA for relevant fish habitat data and drain classifications. In addition, MNR was contacted for background fisheries information. Detailed assessments using methods outlined in the *MTO Environmental Guide for Fish and Fish Habitat* (MTO, 2006) were conducted at the following watercourse crossings, as shown on **Figures 15** to **18**:

- Newman Drain
- West Townline Drain
- South Talbot Road Drain
- Griffith Drain
- McCann Drain
- Croft Drain
- East Townline Road Drain (south of Pike Creek)
- Pike Creek
- East Townline Road Drain (north of Pike Creek).


COUNTY RD 46
Doyle Drain
MALDEN RD
McCann Drain
Dawson Drain
West Townline Drain (Mooney Creek)
NORTH TALBOT ROAD
Griffith Drain
COUNTY RD 34
North Talbot Road Drain
South Talbot Road Drain
KING'S HIGHWAY 3
West Townline Drain (Mooney Creek)
Newman Drain
Hyland Drain Outlet
Newman Auxiliary Drain
Legend
Major Culverts/Bridges
Woodlots
ESA
Road Segments
Drainage Feature
Utility Line
Railway
Contours
N
150 75 0 150 Meters
Project No. 06-6998
UTM NAD83 Zone 17 Coordinates
County Roads 19/22 Improvement
November 2008
Ontario
Figure 15
Study Area Drainage Features


16+17 SIDEROAD
Hicks Drain
HIGHWAY 401
Mooney Creek
MANNING RD
10th Concession Drain
NORTH REAR RD
Croft Drain
West Townline Drain (Mooney Creek)
COUNTY RD 46
Doyle Drain
MALDEN RD
(Mooney Creek)
McCann Drain
Dawson Drain
Legend
Major Culverts/Bridges
Woodlots
ESA
Road Segments
Drainage Feature
Utility Line
Railway
Contours
N
150 75 0 150 Meters
Project No. 06-6998
UTM NAD83 Zone 17 Coordinates
County Roads 19/22 Improvement
November 2008
Ontario
Figure 16
Study Area Drainage Features


Pike Creek
13 + 14 SIDEROAD
MANNING RD
East Townline Road Drain (South)
10th Concession Drain
pike Creek
BASELINE RD
H.G. Arnold Drain
10th Concession Drain
Pike Creek
16 + 17 SIDEROAD
Legend
Major Culverts/Bridges
Woodlots
ESA
Road Segments
Drainage Feature
Utility Line
Railway
Contours
N
150 75 0 150 Meters
Project No. 06-6998
UTM NAD83 Zone 17 Coordinates
County Roads 19/22 Improvement
October 2008
Ontario
Figure 17
Study Area Drainage Features


East Townline Road Drain
COUNTY RD 22
DESRO DRIVE
ESPERANCE ROAD
Tecumseh Outlet Drain(Ereboud)
Cyr Drain
JAMSYL DRIVE
SYLVESTRE DRIVE
Baillergeon Drain
East Townline Road Drain
Manning Road Drain
LITTLE BASELINE RD
Antaya Drain
East Townline Road Drain
Manning Road Drain
COUNTY RD 42
Pike Creek
Legend
Major Culverts/Bridges
Woodlots
ESA
Road Segments
Drainage Feature
Utility Line
Railway
Contours
N
150 75 0 150 Meters
Project No. 06-6998
UTM NAD83 Zone 17 Coordinates
County Roads 19/22 Improvement
October 2008
Ontario
Figure 18
Study Area Drainage Features

West Townline Drain does not cross CR 19, but flows along the west side of the road for a significant distance through the Study Area, south of Highway 401. General reconnaissance of other watercourses in the vicinity of CR 19 took place, including:

- H. G. Arnold Drain
- Antaya Drain
- Baillergeon Drain
- Manning Road Drain.

Field work was conducted on May 8 and 9, 2007. Fish sampling took place at several watercourses, including Newman Drain, West Townline Drain, Griffith Drain, McCann Drain, Croft Drain, and East Townline Road Drain (north of Pike Creek). Pike Creek was not sampled for fish due to the availability of historical fisheries data, and East Townline Road Drain (south of Pike Creek) was not fished as conditions were not suitable due to dense emergent vegetation and lack of sufficient water depth.

Background information and the results of field investigations were used to summarize the existing fishery and determine fish habitat sensitivity. Fish habitat sensitivity was assigned for each watercourse based on the following criteria:

Low Sensitivity

- identified as intermittent or ephemeral
- poor or no connectivity to permanent downstream fisheries resources

Moderate Sensitivity

- warmwater fish presence confirmed from field investigations or background data
- seasonal warmwater baitfish habitat observed
- seasonal connection with permanent downstream fisheries resources

High Sensitivity

- permanent watercourse
- provides habitat for both game and baitfish, based on field investigations or background data
- continual connectivity to downstream fisheries resources

Rare

- provides habitat for fish Species at Risk.

Most of the watercourses in the Study Area are within the Pike Creek watershed, which flows to Lake St. Clair. Other drainage, such as the East Townline Road Drain (north of Pike Creek), also flow to Lake St. Clair. ERCA's draft drain classifications for drains in the Study Area are used for Fisheries and Oceans Canada (DFO) Class Authorizations for drain maintenance activities. The classifications are draft and could be subject to change as additional fisheries information becomes available.

Table 34 summarizes existing fish community information for Pike Creek and West Townline Drain in the vicinity of CR 19, based on fisheries data provided by ERCA. The table also shows the Provincial Ranks (S Ranks) and status under the Committee on the Status of Endangered Wildlife in Canada (COSEWIC), where available.

Table 34:
Historical Fish Collections for Pike Creek and West Townline Drain near CR 19

Common Name	Scientific Name	Pike Creek[1]	West Townline Drain[2]	Provincial Rank	COSEWIC Status
northern pike	*Esox lucius*	✓	✓	S5	
creek chub	*Semotilus atromaculatus*	✓		S5	
largemouth bass	*Micropterus salmoides*	✓		S5	
Emerald shiner	*Notropis atherinoides*	✓			
golden shiner	*Notemigonus crysoleucas*	✓			
spotfin shiner	*Cyprinella spiloptera*	✓			
striped shiner	*Notropis chrysocephalus*	✓		S3	NAR
white sucker	*Catostomus commersoni*	✓		S5	
Gizzard shad	*Dorosoma cepedianum*	✓		S4	
goldfish	*Carassius auratus*	✓		SE	
Carp	*Cyprinus carpio*	✓		SE	
black bullhead	*Ameiurus melas*	✓		S3	
Fathead minnow	*Pimephales promelas*	✓	✓		
bluntnose minnow	*Pimephales notatus*	✓			
blackside darter	*Percina maculate*	✓		S4	
goby family	*Gobiidae*	✓			

Table 34:
Historical Fish Collections for Pike Creek and West Townline Drain near CR 19

Common Name	Scientific Name	Pike Creek[1]	West Townline Drain[2]	Provincial Rank	COSEWIC Status
Bluegill	*Lepomis macrochirus*	✓			
green sunfish	*Lepomis cyanellus*	✓	✓	S4	NAR
Pumpkinseed	*Lepomis gibbosus*	✓	✓	S5	

[1]Pike Creek – at CR 42 (ERCA Site 3; Sources: ERCA 1999, 2001 and MNR, 1978) and at Baseline Road (ERCA Site 4; Source: ERCA, 1999).
[2]West Townline Drain (ERCA Site 10) at North Talbot Road (Source: MNR (ROM) 1979).

SE – Exotic; not believed to be native.
S3? – Species thought to be rare in Ontario but insufficient available information to assign an accurate rank.
S4 – Common and apparently secure in Ontario; usually with more than 100 occurrences in the province.
S5 – Very common and demonstrably secure in Ontario.
NAR – Not at Risk. A species that has been evaluated and found to be not at risk.

Based on a review of Species at Risk mapping and information provided by DFO, channel darter (*Percina copelandi*), a Schedule 1 Species at Risk, is mapped as being present within Pike Creek and the East Townline Road drain portion that flows along CR 19 into Pike Creek from the south. However, at a meeting with ERCA and DFO on September 17, 2007, DFO confirmed that channel darter is not present in the East Townline Drain.

The following sections describe watercourse crossings in the Study Area, with references to photographs included in **Appendix C**. **Table 35** summarizes watercourse and fishery conditions. No fisheries resources were noted along CR 22 within the Study Area. Drainage entering CR 22 ditches from the south (e.g., the enclosed Tecumseh Outlet Drain, Cyr Drain), were not noted to have a fisheries function, and CR 22 ditches appeared to have a roadside conveyance function only.

Newman Drain

Newman Drain accepts flow from the east along the north side of Highway 3, in addition to receiving flow from the south side of the highway, via a concrete culvert located east of CR 19. The drain crosses CR 19, north of Highway 3, and conveys flow into the upstream end of the West Townline Drain, which flows northerly along the west side of CR 19. Photographs of Newman Drain are shown as **Plates 1-5** in **Appendix C.**

Newman Drain has typical drain characteristics, with a relatively uniform channel between steep banks. Field tile drainage was noted entering the drain upstream of CR 19. Heavy silt deposition was noted throughout the channel. Cover was provided for fish in the form of some instream and overhanging woody debris, and instream organic debris. Portions of the banks were slightly unstable, but well vegetated with trees and shrubs beyond the CR 19 right-of-way.

A secondary concrete culvert downstream of the CR 19 ROW (**Plate 2**) provides access from the Highway 3 ROW to the north side of the Newman Drain. The concrete culvert at CR 19 is covered with screens at its inlet (**Plate 3**) and outlet, resulting in a fish passage barrier at CR 19. Fathead minnow were captured in Newman Drain downstream of CR 19, but no fish were captured upstream (east) of CR 19.

West Townline Drain

West Townline Drain (**Plates 6-9,** in **Appendix C**) provides warmwater gamefish/baitfish habitat and is considered to have high fish habitat sensitivity. The drain flows northerly along the west side of CR 19 before veering westerly to cross Highway 401 and discharge to Pike Creek. The drain does not cross CR 19, but accepts flow from several drains crossing CR 19 from east to west, including South Talbot Road Drain, Griffith Drain, McCann Drain, and Croft Drain.

West Townline Drain has a range of bottom substrates, including gravel, sand, cobble, boulder, and clay. Some minor and major bank instability sections were noted along the banks of West Townline Drain, although the majority of the banks observed were well vegetated with trees, shrubs, and herbaceous vegetation, lending some overhanging cover to the drain.

Fish species observed in the drain include green sunfish, white sucker and carp. Fathead minnow were also observed at the upstream end of West Townline Drain where it accepts flow from Newman Drain. Historically, fish captures in West Townline Drain have included northern pike, fathead minnow, green sunfish, and pumpkinseed.

South Talbot Road Drain

South Talbot Road Drain (**Plates 10-11**) flows along the south side of Essex Road 34, crossing CR 19 to outlet to West Townline Drain. The drain is a Class F intermittent drain and has low fish habitat sensitivity based on observed conditions.

Dominant substrates include silt, detritus and sand, although some cobble and riprap is present at the inlet of the CSP conveying flow across CR 19. The drain flows as ditch drainage with moderately unstable banks and limited shore cover. Some instream cover is provided in the form of overhanging grasses and shrubs, in addition to instream organic debris. The outlet of the CSP to West Townline Drain is slightly perched (approximately 0.2 m) and is located in the West Townline Drain concrete culvert beneath Essex Road 34.

Fish sampling was not possible due to the lack of sufficient water depth, but fish presence did not appear likely. The drain is considered to have the potential for seasonal fish habitat based on the potential seasonal connectivity to West Townline Drain.

Griffith Drain

Griffith Drain (**Plates 12 and 13**) is designated as a Class F intermittent drain and provides potential seasonal fish habitat with moderate fish habitat sensitivity. This watercourse conveys flow westerly across CR 19 to the West Townline Drain.

Griffith Drain is comprised of primarily flat habitat with bottom substrates dominated by sand, gravel, and clay. The channel was well-defined and slightly meandering within a well-defined drain valley with steep slopes. Vegetation was relatively dense along portions of the banks and slopes, and provided potential cover for fish in portions where it hung over the channel. Banks were slightly unstable in areas, but localized bank undercutting provided good cover for fish. Watercress growth was noted upstream of the CR 19 ROW, which indicates the potential for groundwater input within this system. The concrete culvert beneath CR 19 did not have a good low flow channel; as a result, water depth within the culvert appeared limiting to fish passage between Griffith Drain and West Townline Drain. No fish were captured as a result of the electrofishing survey.

McCann Drain

McCann Drain (**Plates 15 to 17**) is an intermittent Type F drain that provides warmwater fish habitat with seasonal connectivity and has moderate fish habitat sensitivity. The drain flows westerly across CR 19 to West Townline Drain. North Talbot Road borders the north side of the drain, east of CR 19.

McCann Drain was noted to be dominated by flat habitat upstream of the right-of-way; however, the channel within the culvert consisted of one long shallow riffle over gravel substrate. Upstream of the ROW, the wetted depth and width were approximately 0.2 and 1.0 m, respectively, in a gravel/sand bottomed channel that meandered slightly within its valley walls (**Plate 15**). The banks of the drain were mostly stable, with some slight instability noted in some areas. Cover in the drain was provided in the form of undercut banks, cobble, and overhanging woody debris. Shore cover from vegetation was relatively limited, but consisted of trees and shrubs. Some grassy hummocks were noted at the concrete culvert inlet.

The green sunfish sampled in the drain were juvenile, indicating that it is used as rearing habitat.

Croft Drain

Croft Drain (**Plates 18 to 20**) has a Class F designation, provides warmwater fish habitat and has moderate fish habitat sensitivity. The drain flows in a northwesterly direction across CR 19 to West Townline Drain. It converges with West Townline Drain south of where the West Townline Drain veers west away from CR 19.

A large grass-covered bar is located at the Croft Drain culvert outlet to West Townline Drain, with flow directed toward the south side of the outlet. Upstream of the ROW, Croft Drain had a slight meander through a typical drainage valley with steep side slopes. Flat and riffle habitat were the dominant channel morphology. Drain banks were moderately unstable, but were covered by grasses and sporadic trees and shrubs; the northeast bank was more open. Cover for fish was provided in the form of undercut banks, instream woody debris, and some overhanging vegetation. Fish sampling resulted in the capture of juvenile green sunfish.

East Townline Road Drain (south of Pike Creek)

East Townline Road Drain (**Plates 21 to 24**), south of Pike Creek, conveys roadside drainage along CR 19 in a northerly direction, and outlets to Pike Creek. The drain is located primarily on the west side of CR 19, but crosses over to the east side through a CSP, approximately 150 m south of the Pike Creek valley. This drain is classified as Class C (warmwater baitfish) habitat. Conditions observed suggest that East Townline Road Drain is intermittent in nature.

Along CR 19, the drain has a uniform width and depth with no distinct low flow channel. Dense cattail was observed throughout the drain. This vegetation, combined with the absence of sufficient water depth, precluded fish community sampling. Near its outfall to Pike Creek, the East Townline Road Drain drops a few metres in elevation and flows subsurface through riprap. In addition, a concrete structure is located in the channel's path on the southern Pike Creek valley slope. There is no surface water connectivity with Pike Creek.

Channel darter was mapped in the drain and is a Schedule 1 Species at Risk that prefers larger slow-moving river systems, but sometimes smaller tributaries. Within rivers, this species will frequent deep pools or slow-moving riffle habitat with substrates ranging from sand to gravel and rock. Based on conditions observed within the East Townline Road Drain, combined with its lack of surface water connectivity with Pike Creek, this drain does not appear to be suitable for channel darter, and does not appear to be direct fish habitat. At a meeting on September 17, 2007, DFO confirmed that channel darter is not present in the East Townline Drain. The drain is considered to have a low fish habitat sensitivity.

Pike Creek

At CR 19, Pike Creek (**Plates 25 to 27**) flows within a defined wooded valley from west to east, eventually reaching Lake St. Clair to the north.

Downstream of the ROW, Pike Creek consists of run, riffle and pool habitat. The banks were approximately 70% slightly unstable and 30% moderately unstable. Instream cover for fish was provided by boulders, cobble, organic debris, instream, overhanging woody debris and overhanging herbaceous vegetation. The trees along the banks and valley slopes provided good shade to the river (approximately 70%). Within the bridge ROW, a small rock weir has been constructed, creating riffle habitat at the downstream end of the bridge crossing.

Upstream of the CR 19 ROW, the river morphology is 100% flat habitat. Tree cover along the banks and valley side slopes was similar to the cover provided downstream of the ROW. Instream cover for fish was provided by some cobble, instream woody debris and overhanging plants; however, cover for fish appeared limiting within this area. Immediately upstream of the bridge, on the north bank, a roadside ditch enters Pike Creek, resulting in significant erosion of the valley wall and sediment deposition within Pike Creek.

Based on the presence of habitat for a Schedule 1 Species at Risk, channel darter, Pike Creek is considered to have a high/rare fish habitat sensitivity. Fish species records within Pike Creek crossings at CR 42 and Baseline Road are provided in **Table 34**. The watercourse provides habitat for warmwater baitfish and gamefish, including northern pike.

East Townline Road Drain (North of Pike Creek)

East Townline Road Drain (**Plates 28 to 31**), north of Pike Creek, conveys ditch drainage northerly along the west side of CR 19 and crosses CR 22 before discharging into the storm sewer north of CR 22. This drain provides warmwater baitfish habitat, however, given the lack of surface water connectivity with downstream resources, this drain is considered to have low fish habitat sensitivity and is classified as an intermittent Class F drain.

At the station surveyed upstream of CR 22, East Townline Road Drain flows in a slightly meandering channel lined with common reed grass and other grasses. The drain included both riffle (10%) and flat (90%) habitat. The banks were considered moderately unstable, but the undercutting did provide some cover for fish. Cover was also provided by boulders, cobble, and overhanging vegetation. The drain had almost no shade cover. Ditch drainage entered the drain from the west along the south side of CR 22.

Fish community sampling resulted in the capture of brook stickleback upstream of the CR 22 crossing. This was unexpected given that the drain flows into the stormwater system north of CR 22 and is isolated from downstream resources.

H.G. Arnold Drain

H.G. Arnold Drain (**Plate 32**) is an intermittent Class F drain that conveys ditch drainage along the south side of Baseline Road. The drain had dense cattail throughout and is not considered fish habitat; therefore, the drain is considered to have low fish habitat sensitivity.

Antaya Drain

Antaya Drain (**Plate 33**) is also a Class F intermittent drain with low fish habitat sensitivity. The drain conveys drainage from the west to East Townline Drain along the south side of the CP Rail. A natural gas facility is located on the south side of the drain. The drain had dense emergent vegetation and exhibited stagnant flow conditions. It appears to provide potential seasonal fish habitat, given its seasonal connectivity to East Townline Road Drain at CR 19, which was determined to provide habitat for brook stickleback.

Baillergeon Drain

Baillergeon Drain (**Plate 34**) conveys field drainage to East Townline Road Drain, and is also considered to be an intermittent Class F drain. Dense cattail was noted along the drain. It appears to provide potential seasonal fish habitat within its downstream reach, where it is seasonally connected to CR 19 ditch drainage. Baillergeon Drain does not cross CR 19.

Manning Road Drain

Manning Road Drain (**Plate 35**) conveys roadside drainage along the east side of CR 19. It is an intermittent Class F drain, with low fish habitat sensitivity. The drain was filled with dense common reed grass, with no distinct low flow channel. Based on conditions observed, the drain does not appear to provide fish habitat, but has a flow conveyance function.

Potential Enhancement / Compensation Opportunities

Improvements to CR 19 and CR 22 will provide opportunities for fish habitat enhancement and/or fish habitat compensation. Potential enhancement or compensation opportunities are summarized in **Table 35** below, based on existing conditions observed in Spring 2007.

Table 35:
Potential Enhancement or Fish Habitat Compensation Opportunities

Watercourse	Potential Enhancement/Compensation Opportunities
Newman Drain	- Additional riparian plantings along south bank, on upstream side of CR culvert - Remove screens on CR 19 culvert to permit fish passage - Addition of instream habitat features upstream of CR 19
West Townline Drain	- If re-alignment of a portion of the drain is an alternative, incorporate natural channel design where possible - Incorporate additional riparian plantings and instream features to add habitat complexity
South Talbot Road Drain	- Bank stabilization/riparian plantings - Fix perched culvert at outfall to West Townline Drain
Griffith Drain	- Make low flow channel within CR 19 culvert
McCann Drain	- Make low flow channel within CR 19 culvert - Stabilization at CR 19 culvert outfall - Riparian plantings
Croft Drain	- Bank stabilization/riparian plantings - Add instream cover - Make low flow channel within CR 19 culvert to enhance fish passage
East Townline Road Drain (south of Pike Creek)	- Mitigate migration barrier to Pike Creek - Remove instream concrete structure south of Pike Creek
Pike Creek	- Enhance instream cover with instream structures - Fix rock weir within bridge crossing to improve fish passage - Stabilize significant ditch gulley erosion on north bank, upstream of bridge - Riparian planting along both banks
East Townline Road Drain (north of Pike Creek)	- No opportunities identified (conveys flow to stormwater system)
H.G. Arnold Drain	- No opportunities identified
Antaya Drain	- No opportunities identified
Baillergeon Drain	- No opportunities identified
Manning Road Drain	- No opportunities identified

4.2.6 Terrestrial Ecosystems

Dillon's field survey of terrestrial ecosystems was completed on May 17 and 18, 2007. Photographs of the Study Area are included in **Appendix C**.

The Study Area is within the Deciduous or Carolinian Forest Region. This region is one of Canada's more biologically diverse regions and contains many rare species. It covers most of southwestern Ontario, along the northern shores of Lakes Erie and Ontario, and contains species characteristic of the southern forest types widespread throughout the northeastern USA. Trees are predominantly broad-leaved. Sugar maple, American beech and white oak are common species. A number of species are also at the northern limits of their range, including sassafras, swamp white oak, hickories and black oak.

The historical clearing and draining of the land for agriculture and community development in Essex County has resulted in a degraded natural ecosystem. Impacts include loss of forest and wetland cover. Less than 6% of the land in the County contains natural heritage features, resulting in a patchy natural heritage system with limited habitat and poor linkages between natural areas. Very few natural areas remain along County Roads 19 and 22, and vegetation along both roadways is typical of urban areas.

Fairplay Woods (also known as Fairplay Dragstrip Woodlot) is the only natural environmental area near the Study Area. It is located approximately 200 metres from CR 19, northwest of the CR 19/Highway 401 interchange. According to the Natural Heritage Information Centre (NHIC), Fairplay Woods is

approximately 47 hectares and is the largest intact woods in the northern part of the Essex region. The original channel of Pike Creek runs through the southwest portion of the woodlot and holds water in Spring.

Fairplay Woods includes two biological communities, depending on soil type and slight differences in elevation. Higher areas with sandy soils support a forest of sugar maple, white oak, red oak, beech, black cherry, white ash and sassafras. Spring flowers include white trillium and dwarf ginseng, both unusual species for clay plains. Lower, wetter soils support a forest more typical of clay plains and are dominated by bur oak, swamp white oak, pin oak, American elm, shumard oak, red ash, silver maple, black ash, black maple and big shellbark hickory.

Since agriculture is the major land use in the area, other terrestrial features are limited to isolated cultural meadows (**Photo 5**) and the vegetated portions of drainage features, including West Townline Drain (**Photo 6**), the rights-of-way of the CP Rail, CASO (CN), and VIA Rail lines and the floodplain of Pike Creek. Where possible, terrestrial sites were evaluated using MNR's Ecological Land Classification (ELC) for Southern Ontario (Lee et al. 1998) protocol. However, with the exception of cultural meadows and odd cultural thicket, ELC could not be applied because the ELC guide stipulates that the minimum polygon size should be 0.5 hectare or greater, based on mapping at a scale of 1:10,000. Hedgerows are also not classified using this system since they are considered to be linear features and do not have many of the attributes found in a typical ELC polygon.

Table 36:
Agricultural and Terrestrial Activity Adjacent to Right-of-Way

Location (West Side)	Description (West Side)	Location (East Side)	Description (East Side)
Highway 3 to CASO (CN) railroad	Limited agricultural activity, cultural poplar woodland or old meadow	Highway 3 to CASO (CN) railroad	Crop field not plowed, cultural meadow adjacent to rail line
CASO (CN) railroad to CR 34	Cultural Manitoba maple *(Acer negundo)*, red ash *(Fraxinus pennsylvanica)*, white elm thicket adjacent to rail line, crop fields	CASO (CN) railroad to CR 34	Crop fields adjacent to rail line, but residential estate land use occurs towards CR 34
CR 34 to Malden Road/ North Talbot Road	Limited development. Land use is mostly agricultural, well developed hedgerow along West Townline	CR 34 to North Talbot Road	Some residential development adjacent to CR 34, large soybean field to North Talbot Road
	Drain		
Malden Road/North Talbot Road to CR 46	Well developed hedgerow with honey locust *(Gleditsor triacanthos)*, hawthorn, apple *(Malus pumila)*, white elm *(Ulmus Americana)* adjacent to ditch Small crop field to west	North Talbot Road to CR 46	No agricultural activity, light industrial activity
CR 46 to opposite of North Rear Road	Large soybean field associated with beef feedlot, Lil's Country Gardens	CR 46 to opposite of North Rear Road	Approximately 14 estate homes, plowed field adjacent to western feed lot
Opposite of North Rear Road to Highway 401	Approximately 11 estate homes front onto Manning, crop fields located to west	North Rear Road to Highway 401	Planted in soybean. Access road from OPP Station, Memorial Woods adjacent to Highway 401 eastbound on-ramp
Highway 401 to opposite 16/17 Sideroad	Plowed crop fields	Highway 401 to 16/17 Sideroad to 13/14 Sideroad	Mostly plowed fields or winter wheat, one residence south of 13/14 Sideroad, ornamental plantings of cedar, red ash and silver maple *(A. Saccharinum)* at driveway
Baseline Road to Pike Creek	Fields are mostly corn or soybean. Farm infrastructure at midpoint, abandoned homestead and one house with non-farm activity south of Pike Creek	13/14 Sideroad to Pike Creek	Mostly agricultural activity, with soybean as predominant crop. Some residential activity, but appear to be farm related severances, lawn care/irrigation/firewood businesses, small orchard south of Pike Creek
Pike Creek to CR 42	No agricultural activity	Pike Creek to CR 42	No agricultural activity
CR 42 to CP Rail	Agricultural activity is high, one large residential estate	CR 42 to CP Rail	Mostly agricultural activity (soybean or winter wheat), recently constructed light industrial buildings
CP Rail to Sylvestre Drive	Agricultural activity is high with crops and farm infrastructure, farm produce stand located near Sylvestre Drive	CP Rail to Little Baseline Road	Residential activity is high Some landscape companies have replaced field crops Fields of soybean and winter wheat still exist

Table 36: Agricultural and Terrestrial Activity Adjacent to Right-of-Way			
Location (West Side)	**Description (West Side)**	**Location (East Side)**	**Description (East Side)**
Sylvestre Drive to VIA Rail	No agricultural activity - fields taken out of production	Little Baseline Road to CR 20 CR 20 to VIA Rail	Estate residential activity, but area includes several large soybean fields No agricultural activity. Fields have been taken out of production

As shown on **Table 36**, some isolated cultural meadows greater than 0.5 ha were found in the Study Area adjacent to Highway 3, the CASO (CN) rail line (**Photos 7 and 8**), Highway 401/Manning Road interchange, the CP Rail line (**Photos 9 and 10**), and south of CR 22. These fields were once agricultural fields, but have been abandoned due to fragmentation or excessive moisture.

Typical species found in these fields include:

- redtop (*Agrostis gigantea*)
- smooth brome (*Bromus inermis*)
- orchard grass
- reed canary grass
- foxtail barley (*Hordeum jubatum*)
- twitch grass (*Agropyron repens*)
- daisy fleabane (*Erigeron annuus*)
- teasel (*Dipsacus fullonum*)
- Canada thistle
- dandelion (*Taraxacum officinale*)
- common milkweed (*Asclepias syriaca*)
- red clover (*Trifolium pratense*)
- yellow madder (*Galium verum*)
- yellow sweet clover (*Melilotus officinalis*)
- blueweed (*Echium vulgare*)
- chicory (*Cichorium intybus*)
- Canada anemone
- poison ivy (*Rhus radicans*)
- purple loosestrife (*Lythrum salicaria*)
- common reed grass (*Phragmites australis*)
- Canada goldenrod (*Solidago canadensis*)
- various asters and successional shrubs, such as prickly ash (*Xanthoxylum americanum)*
- grey dogwood (*Cornus foemina*)
- wild grape (*Vitis riparia*)
- Virginia creeper (*Parthenocissus spp*)
- staghorn sumach (*R. typhina)*
- red cedar *(Juniperus virginiana*).

Cultural shrub thickets found in the Study Area near Highway 3 and an abandoned homestead, north of Baseline Road, were dominated by up to four main species, including red ash, white elm, honey locust and Manitoba maple. In many cases, the red ash had died or was showing secondary growth due to the feeding habits of the Emerald ash borer. Native to eastern Asia, the borer is a highly destructive pest. The Canadian Food Inspection Agency is undertaking an aggressive campaign to prevent the further spread of the borer in Ontario.

A well developed hedgerow is located on the west side of West Townline Drain. While this feature is noticeable on the flat landscape, it cannot be placed into an ELC category because, in many areas, it consists of regrowth from stumps or a few rows of trees and shrubs that have dominant shrub cover. This feature is dominated by red ash, white elm, Manitoba maple, and honey locust, but other species such as apple, trembling aspen, cottonwood, white mulberry, and bur oak occurred. One nationally rare species, pin oak (*Quercus palustris*), was found within the northern portion of the hedgerow. Although this tree is listed as sensitive by MNR, it is considered common in Essex County (Oldham, 1993).

4.2.7 Wildlife

Agricultural areas in fallow, old fields overgrown with old field or shrub thicket vegetation, as well as farm drain culverts and Pike Creek were inspected for wildlife activity. Most culverts under CR 19 function as effective eco-passages for small mammals, including raccoon (*Procyon lotor*), and white tailed deer (*Odocoileus virginianus*). Tracks were seen in most fields, especially around the perimeter adjacent to hedgerows. Dillon biologists observed muskrat (*Ondatra zibethicus*) and mink (*Mustella viso*n), including their burrows, along the wetted portion of the West Townline Drain. Several eastern cottontail (*Sylvilagus floridanus*) were observed along the Drain, as well as "roadkill".

4.2.8 Migratory and Protected Birds

Dillon's Avian Biologist completed a field survey of all bridges and culvert structures with a span greater than 3 metres in the Study Area on April 20, 2007. Dillon's Terrestrial Biologist completed a survey of the rest of the right-of-way on May 17 and 18, 2007. The purpose of the surveys was to determine the presence/absence of breeding birds, including species protected by the Federal *Migratory Birds Convention*

Act (MBCA), 1994, and Provincial *Fish and Wildlife Conservation Act*, 1997. Since the survey of bridges and culvert structures took place at the beginning of the nesting season (starting around April 15 in this part of Ontario), a reconnaissance level assessment was completed. Information from the field surveys was supplemented by Breeding Bird Atlas data and rare species reports from NHIC to determine species that could potentially nest in the right-of-way.

Bridges and culvert structures with a span greater than 3 metres include the Highway 401/Manning Road underpass, Pike Creek Bridge, McCann Drain, Newman Drain, West Townline-Mooney Drain (north), West Townline-Mooney Drain (south) and West Townline Drain. Each structure was examined for the presence of active/inactive nests on or under the structure for species protected by Federal and Provincial legislation. Where possible, the number of nests that the species were using, or had used previously, was recorded.

Protected Species

The following is a list of species protected by the *MBCA* and MNR:

Federal – *Migratory Birds Convention Act, 1994*
Migratory Game Birds include:

- Anatidae, or waterfowl (ducks, geese, and swans)
- Gruidae, or cranes (greater and lesser sandhill and whooping cranes)
- Rallidae, or rails (coots, gallinules, and rails)
- Charadriidae, Haematopodidae, Recurvirostridae, and Scolopacidae, or shorebirds (including plovers and lapwings, oystercatchers, stilts and avocets, and sandpipers and allies)
- Columbidae (doves and wild pigeons)

Migratory Insectivorous Birds include:

- Aegithalidae (long-tailed tits and bushtits); Alaudidae (larks)
- Apodidae (swifts)
- Bombycillidae (waxwings)
- Caprimulgidae (goatsuckers)
- Certhiidae (creepers)
- Cinclidae (dippers)
- Cuculidae (cuckoos)
- Emberizidae (including the emberizid sparrows, wood-warblers, tanagers, cardinals and grosbeaks and allies, bobolinks, meadowlarks, and orioles, but not including blackbirds)
- Fringillidae (including the finches and grosbeaks)
- Hirundinidae (swallows)
- Laniidae (shrikes)
- Mimidae (catbirds, mockingbirds, thrashers, and allies)
- Motacillidae (wagtails and pipits); Muscicapidae (including the kinglets, gnatcatchers, robins, and thrushes)
- Paridae (titmice)
- Picidae (woodpeckers and allies)
- Sittidae (nuthatches); Trochilidae (hummingbirds); Troglodytidae (wrens); Tyrannidae (tyrant flycatchers)
- Vireonidae (vireos)

Other Migratory Non-game Birds include:

- Alcidae (auks, auklets, guillemots, murres, and puffins)
- Ardeidae (bitterns and herons)
- Hydrobatidae (storm petrels)
- Procellariidae (petrels and shearwaters)
- Sulidae (gannets)
- Podicipedidae (grebes)
- Laridae (gulls, jaegers, and terns); and Gaviidae (loons)

Provincial – Ministry of Natural Resources – *Fish and Wildlife Conservation Act, 1999*
Upland Game Birds:
Odontophoridae, Phasianidae (bobwhite, ptarmigan, grouse, turkey)

Raptors:
Accipitridae, Cathartidae, Falconidae, Strigidae, Tytonidae (hawks, falcons, vultures, owls)

Pike Creek Bridge – Site No. 19-05

Pike Creek Bridge is an open-bed concrete deck structure on steel girders crossing Pike Creek. A small valley feature with appropriate riparian vegetation could provide suitable nesting habitat during the breeding season. No nests were observed on or under this bridge. A pair of Song Sparrows with a territory on the south slope, approximately 10 metres west of the bridge, was observed. Song Sparrows are protected by the *MBCA*. Common Grackles (not protected) were also observed in the vicinity of the bridge. Limited riparian habitat exists in the immediate area to attract protected breeding birds.

Highway 401/CR 19 Underpass – Site No. 6-230

This underpass is a concrete post tensioned deck slab structure. No nests were observed on or under this bridge. No birds were observed in the vicinity of this bridge. Structure type, high traffic volume and the lack of natural cover on adjacent lands will likely limit protected nesting species on or immediately adjacent to this structure.

West Townline-Mooney Drain (North) – Site No. 46-077

The West Townline-Mooney Drain (North) is a rigid frame culvert located at the intersection of Manning Road and CR 46. No nests were observed on or under this culvert. No birds were observed in the vicinity. Limited habitat potential exists for breeding birds adjacent to this feature.

West Townline-Mooney Drain (South) – Site No. 46-585

The West Townline-Mooney Drain is a structure plate corrugated steel pipe arch located at the intersection of CR 19 and Malden Road. No nests were observed on or under this culvert. Red-winged blackbirds and house sparrows were observed in the vicinity of this culvert. However, these species are not protected under the *MBCA*. Limited habitat potential exists for breeding birds adjacent to this feature.

McCann Drain – Site No. 19-121

The McCann Drain is a rigid frame culvert located south of the intersection of CR 19 and North Talbot Road. No nests were observed on or under this culvert. No birds were observed in the vicinity. Limited habitat potential exists for breeding birds adjacent to this feature.

West Townline Drain – Site No. 34-026)

The West Townline Drain is a rigid frame culvert crossing CR 19 between North Talbot Road and CR 34 (Talbot Road). No nests were observed on or under this culvert. No birds were observed in the vicinity of this culvert. Limited habitat potential exists for breeding birds adjacent to this feature.

Newman Drain – Site No. 19-142

The Newman Drain is a rigid frame culvert located at CR 34 (Talbot Road). No nests were observed on or under this culvert. Red-winged blackbirds, common grackles and house sparrows were observed in the vicinity of this culvert. None of these species are protected under the *MBCA*. A downy woodpecker was also observed 20 metres north of the culvert, although no appropriate nesting habitat was noted immediately adjacent to the culvert. Limited habitat potential exists for breeding birds adjacent to this feature.

CR 19 ROW

The CR 19 corridor is within Ontario Breeding Bird Atlas – Region 1 – Square 17LG47 and Square 17LG48. Only the most common species, tolerant of human disturbance, can potentially be found in the Study Area. Even fewer are likely to nest within the ROW.

Various birds were found foraging, nesting, singing, or dead during terrestrial investigations completed in May 2007. Protected species included:

- barn swallow (*Hirundo rustica*)
- American goldfinch (*Carduelis tristis*)
- indigo bunting (*Passerina cynea*)
- northern oriole (*Icterus galbula*)
- northern robin (*Turdus migratorius*)
- killdeer (*Charadrius vociferous*)
- mourning dove (*Zenaida macroura*)
- northern cardinal (*Cardinalis cardinalis*)
- ring-necked pheasant (*Phasianus colchicus*).

Species observed in the right-of-way which are not protected by Federal or Provincial legislation include common grackle (*Quiscalus quiscula*), red-winged blackbird (*Agelaius phoeniceus*) and European starling (*Sturnus vulgaris*).

Summary

All species observed in the ROW, are noted on **Table 37**.

Table 37:
Birds Observed in the Study Area

Common Name	Scientific Name	Provincial Status[2]	Early Nesting Date	Late Nesting Date
Song Sparrow	*Melospiza melodia*	S5B, SZN	APRIL 20	SEPT. 1
European Starling[1]	*Sturnus vulgaris*	SE	MARCH 30	AUG. 15
Red-winged Blackbird[1]	*Agelaius phoeniceus*	S5B, SZN	APRIL 20	AUG. 1
House Sparrow[1]	*Passer domesticus*	SE	APRIL 1	SEPT. 15
Downy Woodpecker	*Picoides pubescens*	S5	MAY 1	AUG. 1
Common Grackle[1]	*Quiscalus quiscula*	S5B, SZN	APRIL 10	JULY 15
Barn Swallow	*Hirundo rustica*	S5B, SZN	MAY 15	SEPT. 1
American Goldfinch	*Carduelis tristis*	S5B, SZN	JUNE 1	SEPT. 15
Indigo Bunting	*Passerine cynea*	S5B, SZN	JUNE 1	SEPT. 15

Table 37:
Birds Observed in the Study Area

Common Name	Scientific Name	Provincial Status[2]	Early Nesting Date	Late Nesting Date
Baltimore Oriole	*Icterus galbula*	S5B, SZN	MAY 20	AUG. 15
American Robin	*Turdus migratorius*	S5B, SZN	APRIL 10	SEPT. 1
Killdeer	*Charadrius vociferous*	S5B, SZN	APRIL 1	JULY 15
Mourning Dove	*Zenaida macroura*	S5B, SZN	MARCH 1	OCT. 1
Northern cardinal	*Cardinalis cardinalis*	S5	APRIL 15	SEPT. 1
Ring-necked Pheasant	*Phasianus colchicus*	SE	APRIL 6	JULY 1

[1]Not protected by the *MBCA*.
[2] S5B or S5 – secure; S4B – apparently secure; SE – exotic; SZN – non-breeding migrant/vagrant

The diversity and abundance of breeding bird species observed within or adjacent to the Study Area was low, with no nesting sites observed under or on any of the bridges or major culverts. This is a result of high roadside noise levels due to traffic volumes which has been shown to significantly reduce the abundance and diversity of species that would otherwise be present in a given habitat (Jackson, 2000; Forman and Deblinger, 2000). Also, vegetative cover was limited to sparse tree and shrub cover along roadside drains, on residential properties and nearby hedgerows. As a result, observed species are those typically found in agricultural fringe environments and/or urban environments that are tolerant of human disturbance.

MNR's NHIC uses Provincial (or Subnational) ranks to set protection priorities for rare species and natural communities in Ontario. All bird species observed in the Study Area are considered very common in Ontario and none are listed under the Federal *Species at Risk Act* (*SARA)* or the Provincial *Endangered Species Act (ESA)*. A geographic query of the Study Area using the NHIC database did not identify any historical occurrences of rare bird species.

4.2.9 Species at Risk

The Federal *Species at Risk Act* (*SARA*) is intended to prevent wildlife from becoming extinct or lost from the wild with the ultimate objective of helping their numbers recover. SARA covers birds, plants, fish, mammals, insects, amphibians and reptiles. The Ontario *Endangered Species Act* came into force in 2008 and protects species at risk in Province of Ontario. The Ontario Act includes additional species that are not at risk in Canada but are at risk in Ontario, such as the bald eagle.

Two species at risk have been mapped in the Study Area:

- Channel Darter (*Percina copelandi*), a Schedule 1 threatened species, is mapped as being present in Pike Creek. Although mapped as present in the East Townline Drain, ERCA and DFO have confirmed that the channel darter is not present in the drain.
- MNR has records of Fox Snake (*Elaphe gloydi*), a Schedule 1, threatened species, in the Study Area.

Pin oak (Quercus palustris), a nationally rare tree species is located in the West Townline Drain hedgerow. Although this tree is listed as sensitive by MNR, it is considered common in Essex County (Oldham, 1993). The Pin Oak is not listed under the Federal *Species At Risk Act*.

A search for species covered under both Acts in the Study Area was completed using information from the Natural Heritage Information Centre database. Two species were identified: spring avens (*Geum vermum*), which is identified as vulnerable, and elusive clubtail (*stylurus notatus*), which is identified as imperiled. Neither species was observed during the field investigations.

No other Species at Risk or Provincial Endangered Species were identified in the Study Area.

As part of the recently completed *CEAA* Screening for widening County Road 22 from two to four lanes, from Lakeshore Boulevard to Patillo Road, Northern Map Turtle were observed near the CR 22 crossing of Pike Creek, approximately 2km east of CR 19. The species is categorized as a Species of Special Concern. Blanding's Turtle and Eastern Spiny Softshell Turtle were also identified in the *CEAA* Screening Report as potentially inhabitating the area around Pike Creek; however, neither species was observed during the field review.

4.3 Land Uses and Socio-Economic Environment

The County of Essex covers an area of approximately 1,750 square kilometres and had a 2006 census population of 393,402. It is comprised of seven local municipalities, including Amherstburg, Essex, Kingsville, Lakeshore, LaSalle, Leamington, and Tecumseh. According to the County's Official Plan, the County's population is projected to grow to approximately 200,000 by the year 2016.

The Study Area is located in the municipalities of Lakeshore and Tecumseh, with CR 19 forming the boundary between the two municipalities. The Town of Lakeshore is located on the east side of CR 19 and

was established in 1999 by the amalgamation of the former Town of Belle River and former Townships of Maidstone, Rochester, Tilbury North and Tilbury West. Also in 1999, the former Town of Tecumseh, Township of Sandwich South and Village of St. Clair Beach were amalgamated to form the Town of Tecumseh, located on the west side of CR 19. Lands within both municipalities are primarily rural, with small urban centres and urban development north of CR 42.

The City of Windsor borders the westerly project limits of the CR 22 portion of the Study Area. The City's population increased by 3.5% from 209,218 in 2001 to 216,473 in 2006. The Windsor Census Metropolitan Area (CMA) is the 16th largest CMA in Canada. Current population projections anticipate that the total projected population of Windsor will reach 244,811 by 2021. As a hub of Canada's automotive manufacturing industry and its associated suppliers, approximately 70% of the economy of Windsor and Essex County depends on the automotive sector. Both Windsor and Essex County are major contributors to the $18.477 million GDP generated by the automotive industry in Ontario.

4.3.1 Existing Land Use Pattern

Agriculture and Rural Areas

Essex County is one of the most intensively farmed areas in Southwestern Ontario and produces 14% of Canada's gross domestic product in agriculture. It has very productive soils and a long growing season of approximately 3500 Crop Heat Units. Most of the natural vegetation has been cleared, creating large, level fields to grow tomatoes and other vegetable crops, orchard crops (i.e., apples and peaches), grain and oilseeds, winter wheat and soybeans (Wilson, 2005). The County's greenhouse industry has an estimated local impact of $1 billion annually. Approximately $500 million worth of greenhouse products are shipped across North America using Highway 3 as the initial point of access and the Highway 3/CR 19 corridor as a critical link to the U.S.A. The total value of all vegetable crops produced in Essex County is $850 million, with the U.S.A. as the largest market.

Agriculture is the main land use in the Study Area, from Highway 3 to Little Baseline Road. Farming activities consist mostly of cash crop farming with some beef feedlots. **Table 36** describes agricultural activity in the Study Area.

According to Canada Land Inventory (CLI) Soil Capability for Agriculture mapping, the soils along CR 19 are rated as Class 2, meaning that they have moderate limitations for the production of common field crops. The soils are deep and have good water-holding capacity. While the soils in this area are limited by excessive water (due to the dominant clay soils), this trait is correctable through tile drainage. The Study Area is extensively tile drained.

Many of the agricultural drains in the Study Area are deep with some (i.e., West Townline Drain) reaching depths of more than 3.0 metres. Many farmers have also built reinforced concrete ramps to reach their fields at their own expense. The more expensive structures are located on the west side north and south of Highway 401.

Non-agricultural uses in the agricultural and rural portions of the Study Area, south of Little Baseline Road, include:

- extensive strip development, mostly including single family houses along both sides of CR 19
- residential and commercial development is concentrated at major intersections. Non-agricultural uses in the vicinity of the CR 19/Highway 401 interchange include single-family houses, the Essex OPP Detachment, located on a service road in the southeast quadrant of the interchange, and Coxon's Towing Service, located on a service road northwest of the interchange
- the hamlet of Maidstone is located west of CR 19, centred on the intersection of Malden Road and CR 34
- north of CR 42, the predominant type of business is landscaping related with turf care or stone and other landscape based building materials. A produce roadside stand is located on the west side of CR 19, south of Sylvestre Drive. This venue provides a variety of produce including tomatoes, asparagus, and cucumbers.

Urban Area

The Study Area is highly urbanized north of Little Baseline Road, with residential, commercial and light industrial development adjacent to CR 19 and CR 22:

<u>CR 19</u>

- several commercial and light industrial uses are located on CR 19 from Little Baseline Road to CR 22. Uses include a landscape supply company, building supplies and a construction equipment sales centre. Several single family houses are located along the ROW
- from CR 22 to the VIA Rail crossing, lands along both sides of CR 19 have been developed for a wide range of commercial uses. Uses include a veterinarian office, grocery store, fast food outlets,

restaurants, banks, personal care service and retail stores, a multi-screen theatre and physician and dental offices.

CR 22

- from CR 19 to Banwell Road, lands north of CR 22 are predominately low density residential. St. Anne's Cemetery is located in the northwest quadrant of the CR 22/Lesperance Road intersection
- lands on the south side of CR 22, from CR 19 to west of Lesperance Road are primarily commercial and light industrial. A commercial/light industrial development immediately west of CR 19 includes a bingo hall, furniture store, automotive repair shop, warehouse facilities and a storage lot for recreational vehicles/camper trailers. A Hyundai car dealership is located west of this area
- Tecumseh Town Centre, a commercial plaza, is located at the southeast corner of CR 22 and Lesperance Road. The plaza includes a mix of restaurants, personal care services, retail stores and office space
- Tecumseh Home Hardware is located in the southwest corner of the CR 22 and Lesperance Road intersection. It is a large, recently expanded establishment and includes a Canada Post outlet
- low density residential development continues west of the Home Hardware along CR 22 for approximately 500 metres. The remainder of the area west to Banwell Road is currently in agricultural production.

All commercial and industrial establishments in the Study Area depend almost exclusively on automobile use and include on-site parking areas.

4.3.2 Navigable Waters

Pike Creek has been designated as a navigable waterway by Transport Canada. As a result, the *Navigable Waters Protection Act (NWPA)* applies to the proposed widening of Pike Creek Bridge.

4.3.3 County and Municipal Official Plans

Section 6 of the *Planning Act* requires that MTO, before carrying out or authorizing any undertaking that directly affects a municipality, shall consult with and have regard for, the established planning policies of the municipality.

This section of the ESR/PDR summarizes the land use designations and policies of the County of Essex Official Plan and the Lakeshore, Tecumseh and Windsor Official Plans, as they apply to the Study Area.

County of Essex Official Plan

The County's Official Plan (approved in April 2002) was prepared to accommodate growth and development until the year 2016. The Official Plan provides a long-term vision for Essex County and guides the County in land use policy and physical planning on a broad basis. The plan establishes an upper tier policy framework for the preparation of more detailed local municipal Official Plans and Zoning By-laws.

Most of the lands along the CR 19 corridor are designated "Agricultural Areas" on Schedule "A", "Land Use Plan". As outlined in the Essex County Official Plan, agriculture is one of the predominant features distinguishing the landscape and economy of Essex County from other areas in Ontario. Over 80 percent of the land area in Essex County is agricultural. The relatively flat terrain, mild climate, long growing season and good soils make the county ideal for a variety of agricultural crops.

As shown on **Figure 19**, all of the lands along the east side of CR 19, from Highway 3 to north of Little Baseline Road, are in the "Agricultural Area". Along the west side of CR 19, the "Agricultural Area" extends from CR 46 north to Pike Creek. The goals of the Agricultural designation (Section 3.3) are to:

- protect prime agricultural areas for long-term agricultural use
- promote and protect agricultural uses and normal farm practices
- reduce the type and amount of non-farm development in the agricultural area by directing non-farm activities to Settlement Areas
- allow the expansion of existing Settlement Areas onto lands designated for agriculture only if development is serviced by full municipal services and conforms to the Official Plan and the Provincial Policy Statement.

Three areas along the CR 19 corridor are designated "Settlement Area" in the Essex County Official Plan, as shown on **Figure 19**:

- the Tecumseh urban area starts at Pike Creek on the west side of CR 19 and extends north to Lake St. Clair

- the northwest quadrant of the Highway 401 interchange. This area includes a truck towing service. According to the Official Plan, the "Settlement Area" designation on these lands "is a recognition of a stand alone travel plaza… approval for this site was based on specific locational criteria and is not considered to be an appropriate location for future settlement area growth"
- the Maidstone hamlet on the west side of CR 19 from south of CR 34 to CR 46.

To preserve lands designated "Agricultural Areas" and "Natural Environmental Areas", the County Official Plan directs future growth to "Settlement Areas". These areas include towns, villages, hamlets and other residential and industrial areas. Areas designated "Settlement Areas" must either have full municipal services or a servicing strategy outlining the provision of future servicing.

Fairplay Woods, a large woodlot along Pike Creek, west of CR 19 and north of Highway 401 is designated as a "Regionally Significant Woodland" in the Official Plan. The Official Plan states that local municipalities may either designate this area "Natural Environment Area" or agricultural in the local Official Plan. The woodlot will not be affected by the proposed improvements.

Pike Creek and its floodplain are shown as "Inland Floodplain – Development Control Area" on Schedule "C", "Areas Susceptible to Flooding". The County Plan requires that local municipalities direct development away from these areas.

CR 19 is part of the "County Arterial Road System" as shown on Schedule "D", "Road Systems". Intersecting roads, also part of the arterial road system, include County Roads 34, 46, 42 and 22. Highways 3 and 401 are part of the "Provincial Road System". According to the plan, the County will strive to minimize conflict between local and non-local traffic by protecting the Arterial Road System. As explained in Section 2.9.1 of the plan:

> "*The cumulative impact of individual private accesses to the arterial road system, outside of urban development areas, compromises the underlying function of the transportation network… The nature of road traffic along these roads will have an impact on adjacent land uses. The volumes, speeds and types of traffic can be a nuisance especially in residential areas. On the identified arterial road system, access shall be strictly controlled and where such roads abut residential areas, reverse frontage is encouraged. Agricultural, industrial, commercial, institutional and open space land uses are considered to be appropriate land uses adjacent to the identified arterial roads provided access is properly located and designed.*"

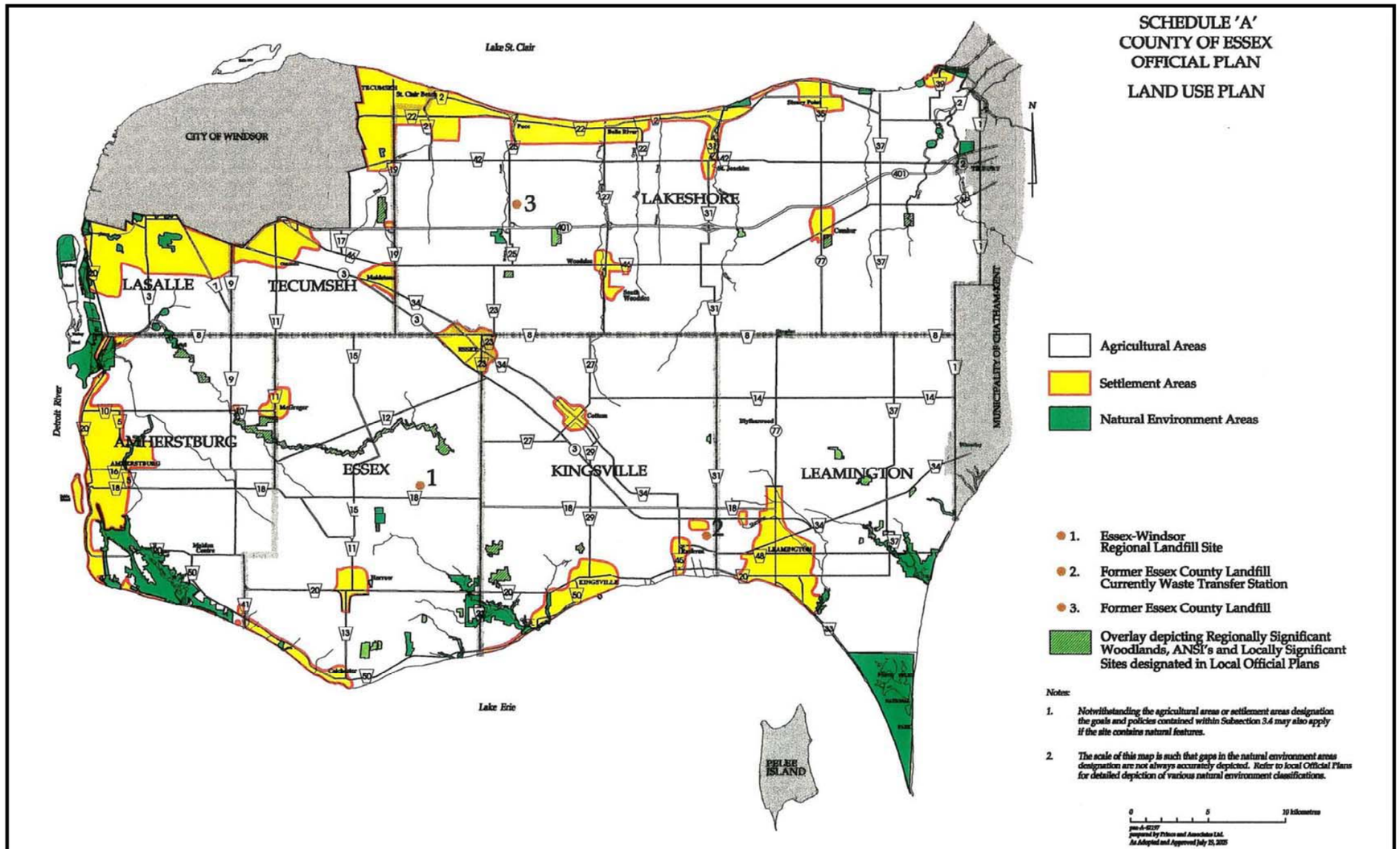
The County Official Plan also includes the following transportation related policies:

- "to connect urban areas… by providing space for the efficient, cost effective and safe movement of people, goods energy and information without disrupting community integrity and function" (Section 1.5)
- "it is the fundamental policy of this Plan to promote healthy and diverse communities where County residents live, work and enjoy recreational opportunities. In this regard, every attempt should be made to make efficient use of existing infrastructure and to enhancing that infrastructure" (Section 2.2)
- "take into consideration the need to improve regional traffic flow in the vicinity of the City of Windsor" (Section 2.9.1)
- "encourage safe, convenient and visually appealing pedestrian facilities, where appropriate, along the arterial and collector road system" (Section 2.9.1)
- "address the matter of cross boundary traffic with adjacent municipalities and establish a planned network of roads which considers and coordinates the road hierarchy across municipal boundaries" (Section 2.9.1)
- "pedestrian and bicycle crossings of major barriers, such as railways and expressways, should be comprehensively planned and integrated where possible with street crossings" (Section 2.9.3)
- "to create built forms and settlement patterns which strengthen and enhance community identities and are capable of promoting greater social interaction and healthier lifestyles" (Section 3.2.2)
- "to support long term economic prosperity by providing infrastructure and public service facilities to accommodate projected growth" (Section 3.2.2)
- "provide for an efficient, cost effective, reliable, multi-modal transportation system that is integrated with adjacent systems and those of other jurisdictions and is appropriate to address expected growth" (Section 3.2.3).

Finally, the Official Plan states that "the County will work in a comprehensive, timely and equitable manner to achieve on-going cooperation and resolution of inter-municipal issues, including, but not limited to, the following: transportation and physical service coordination" (Section 4.11).

Town of Lakeshore Official Plan

The Town of Lakeshore's new Official Plan was adopted by Council on May 26, 2008. The Township of Maidstone Official Plan remains in effect until the new Official Plan is approved under the *Planning Act*. The new Official Plan is subject to change since it has yet to be approved.



DILLON CONSULTING	County Road 19 (Manning Road) and County Road 22 Improvements GWP 3031-06-00 Class EA and Preliminary Design Study	County of Essex Official Plan, Land Use Plan
		November 2008 / Figure 19

As shown on **Figure 20**, most of the Study Area is designated "Agricultural Area" on Schedule "A", "Community Structure", in the Lakeshore Official Plan. According to the Plan, the "Agricultural Area" designation "is intended to preserve and strengthen the continued viability of the agricultural community" and "protect agriculture from the intrusion of incompatible uses, such as non-farm related residential dwellings."

The remainder of the Study Area has been placed in a number of Community Structure and Special Policy Areas. Special Policy Areas have been established to rationalize development in existing Settlement Areas, promote redevelopment or intensification or guide new development.

The Highway 401 corridor from the CR 19 interchange to east of the CR 25 interchange is designated "Highway 401 Employment Area". Permitted uses in this area include a wide range of employment and industrial uses, such as manufacturing, logistics operations, warehousing, distribution, offices and related industrial and business park uses. Ancillary service commercial uses serving Employment Area employees and the travelling pubic are also permitted. Lands in the southeast quadrant of the CR 19/Highway 401 interchange are currently designated "Employment Area". A Secondary Plan is required prior to any new development occurring in this area. In the interim, uses permitted in the "Agricultural Area" are allowed.

The "Manning Road Special Planning Area" extends from CR 42 to the Via Rail line. The Official Plan requires a "Comprehensive Review", prepared according to the requirements of the Provincial Policy Statement issued under the *Planning Act*, before the "Urban Area" can be expanded onto the "Manning Road Special Planning Area". In the interim, vacant portions of the Planning Area may be developed with uses permitted in the "Agricultural Area" designation.

The "Manning Road Special Planning Area" also includes:

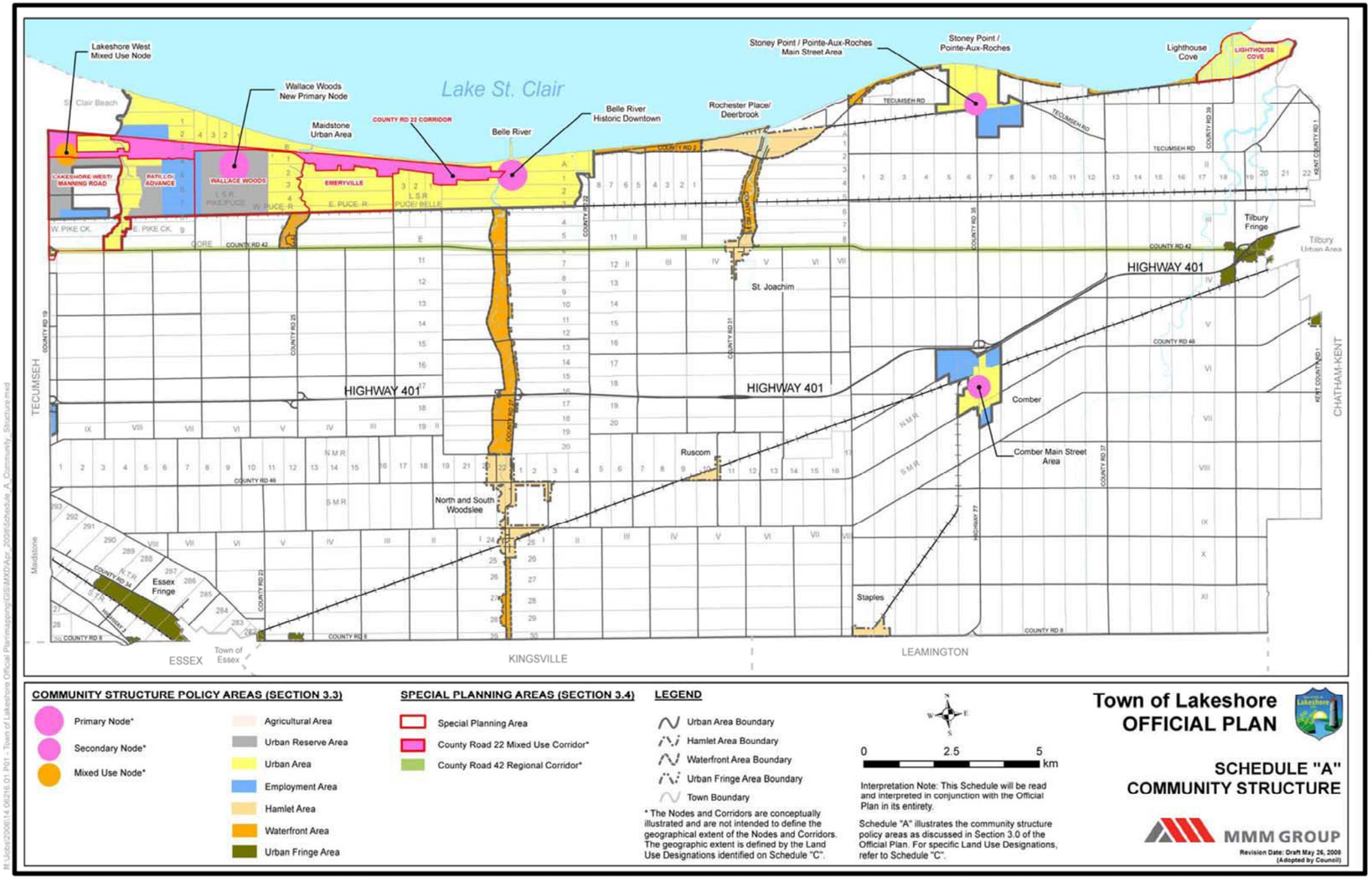
- the "Lakeshore West Business Area" at the intersection of CR 22 and Manning Road. The Plan envisions this node as a "major concentration of commercial and business uses serving the Town and region" that will "function as a gateway to the Town of Lakeshore and create a sense of community identity". Permitted used include a range of commercial and retail uses, including Large Format Retail, restaurants, entertainment uses and professional offices
- "Amy Croft Mixed Use Node, Special Planning Area" is centred on Amy Croft Drive and consists primarily of existing retail, commercial, entertainment and residential uses. A Secondary Plan is required to "facilitate further development of the Planning Area and address unique planning considerations related to transportation, servicing infrastructure, land use and the advancement of the Lakeshore West Business Area"
- CR 22 Mixed Use Corridor, Special Planning Area. The plan mentions that a Corridor Study and Urban Design Study will be prepared for the corridor
- CR 42 Regional Corridor. According to the Official Plan, CR 42 functions as a major inter-regional transportation corridor and accommodates high volumes of traffic throughout the region. "Land uses adjacent to the corridor should be carefully controlled" to ensure that the road maintains its function as a regional corridor.

According to the Official Plan, "the Town will work to conserve, restore and enhance natural heritage features and functions, wherever possible." As shown on **Figure 21**, areas designated "Natural Heritage" or "Hazard Lands" on Schedule "B.2" to the Lakeshore Official Plan include:

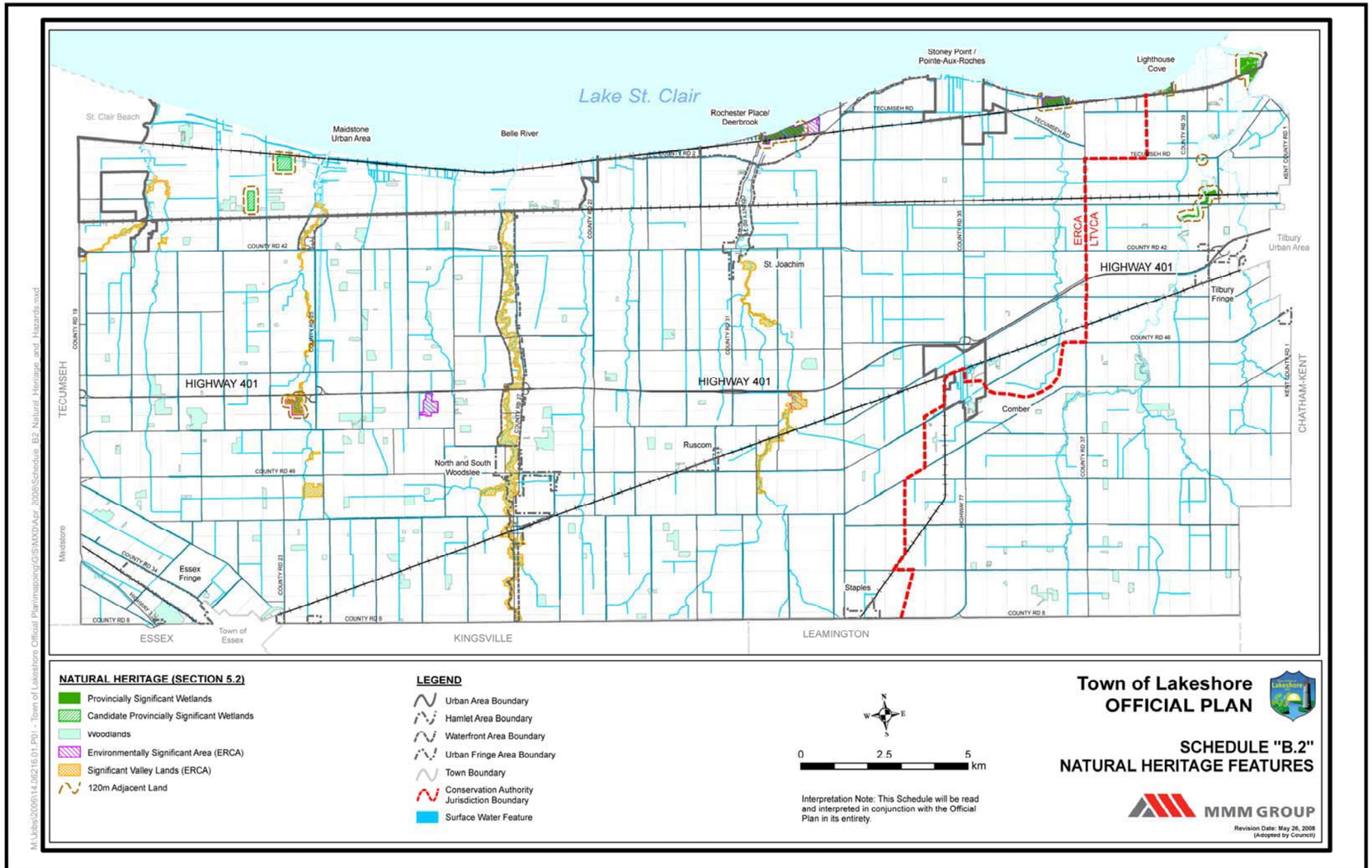
- the 10th Concession Drain "Hazard Lands". This is a large area extending to CR 46
- the Pike Creek valley, designated as "Significant Valley Lands" by ERCA and "Hazard Lands".

Schedules "D-1" and "D-2", "Road Classification" classifies the roads in the Study Area as follows:

- CR 19 is a "Rural Regional Road", north of Highway 401. South of the highway, it is designated as a "Rural Secondary Road". According to the Official Plan, a "Rural Regional Road" typically serves relatively high volumes of traffic at high speeds
- County Roads 42 and 46 are also designated as "Rural Regional Roads"
- Highway 401 is shown as "Provincial Highway"
- CR 22 and Little Baseline Road are designated as "Urban Arterial Road".



DILLON CONSULTING	County Road 19 (Manning Road) and County Road 22 Improvements GWP 3031-06-00 Class EA and Preliminary Design Study	Town of Lakeshore Draft Official Plan, Community Structure
		November 2008 / Figure 20



DILLON CONSULTING	County Road 19 (Manning Road) and County Road 22 Improvements GWP 3031-06-00 Class EA and Preliminary Design Study	Town of Lakeshore Draft Official Plan, Natural Heritage Features and Hazards
		November 2008 / Figure 21

Town of Tecumseh

The Town of Tecumseh portion of the Study Area is covered by the Sandwich South Official Plan (Consolidated July 2003) and the former Town of Tecumseh Official Plan (Consolidated January 2000). Both Plans remain in effect until repealed by the Town of Tecumseh and replaced with a new plan.

Approximately half of the Tecumseh portion of the Study Area is designated "Agricultural Area", as shown on **Figure 22**. Similar to the goal of the Agricultural designation in the County of Essex Official Plan, the goal of the Agricultural designation in the Sandwich South Official Plan is to preserve good agricultural land for agricultural purposes and encourage and support farm practices and agricultural uses sustainable over the long-term.

Three areas are designated "Urban Area" in the Sandwich South Official Plan, as shown on **Figures 22, 23, 24 and 25**. These areas include:

- the northwest quadrant of the Highway 401 interchange is designated "Highway Service Centre". "The Plan envisages that this 46 hectare site will be developed, managed and operated as a single, comprehensive and integrated highway service centre facility"
- the Maidstone Hamlet is located on CR 19 from south of CR 34 to CR 46. Official Plan Amendment 9 (approved by County of Essex on February 23, 2007) is a Secondary Plan for development in the hamlet, including a road pattern and various land uses. Major uses include ""Hamlet Residential", "Neighbourhood Commercial" and "Community Facility"
- the Tecumseh urban area starts just south of CR 42. Lands along this portion of CR 19 are designated for a variety of urban uses, including "Recreational" (Ontario Hydro corridor), "Low Density Residential", "General Commercial", "Hamlet Development", "Business Park" and "Community Facility" (Town of Tecumseh Municipal Office).

Fairplay Woods, northwest of CR 19 and Highway 401, is designated "Natural Environment". Permitted uses include passive recreational, wildlife management and conservation uses.

Lands along the north side of CR 22, west of Manning Road, are covered by the former Town of Tecumseh Official Plan. This portion of the Study Area, as shown on **Figure 23**, is part of the urbanized area of Tecumseh. Most of this area is designated "Residential", with smaller areas, such as St. Anne Cemetery, designated as "Community Facility". Lands along the west side of CR 19, between CR 22 and the VIA Rail line are currently being developed and are designated "General Commercial". This designation permits "commercial establishments primarily engaged in the buying and selling of goods and personal services serving the whole of the municipality's market area".

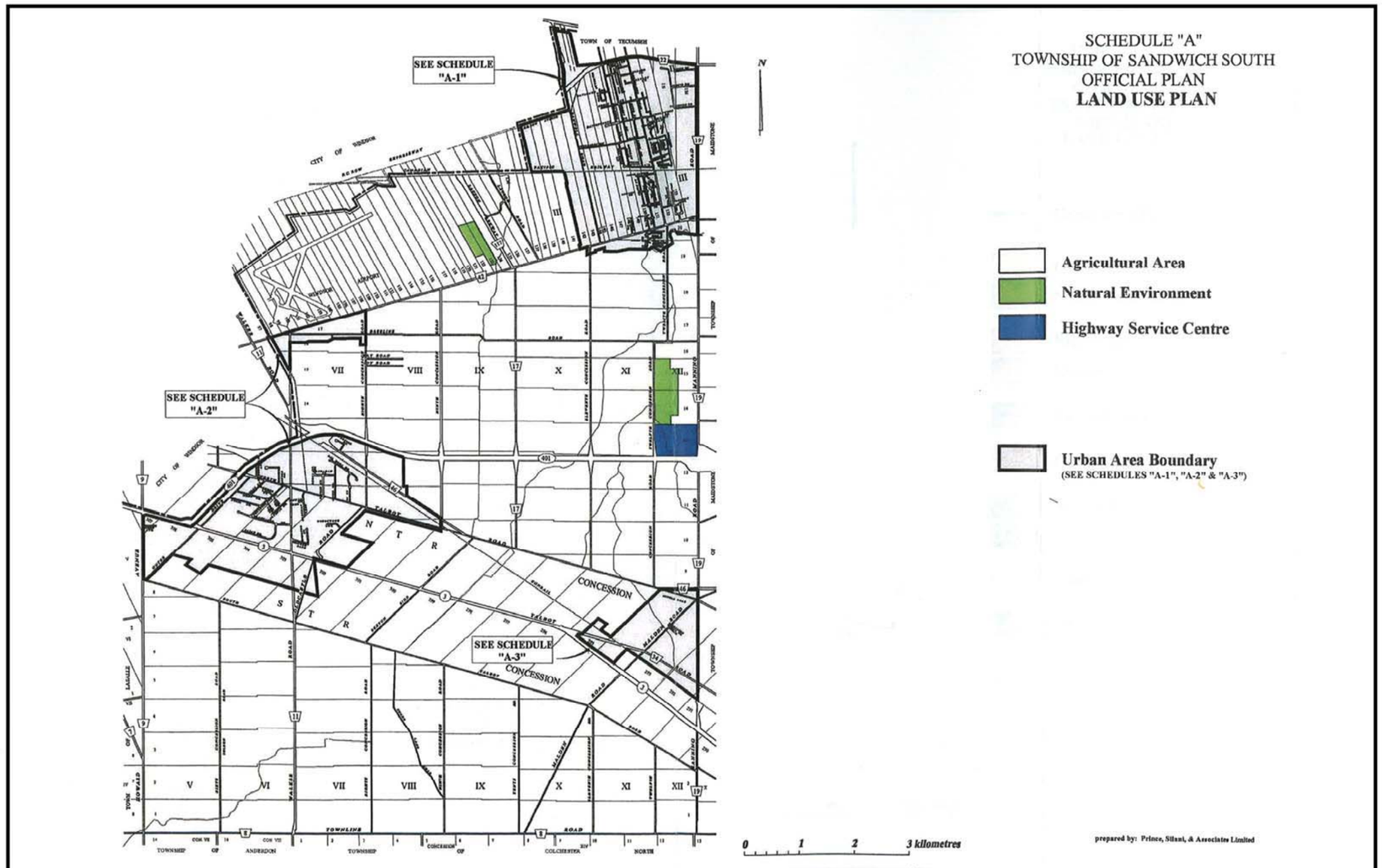
CR 19, CR 22, CR 42 and 46 are all designated as "Arterial Roads" in the Sandwich South Official Plan. The portion of CR 22 covered by the former Town of Tecumseh Official Plan is designated "Arterial Road". Lesperance Road is designated as a "Collector Road".

City of Windsor Official Plan

The City of Windsor borders the westerly project limits of the CR 22 portion of the Study Area. As shown on **Figure 26**, Schedule "D", "Land Use" to the City's Official Plan, these lands are designated "Residential". Uses permitted in the "Residential" designation include low, medium and "high profile" dwelling units (defined as a building up to 14 storeys). These lands are also included in a "1-3 years Baseplan Development Phasing" designation, as identified in Schedule "H" of the Plan.

Essex CR 22 continues through the City as the E.C. Row Expressway and is designated as a "Controlled Access Highway" on Schedule "F", "Roads and Bikeways". Section 7.2.6.12 of the Plan states that Council shall support the construction of right-of-way widening when the widening has been identified as a recommended system improvement in the Official Plan or the need for the widening has been demonstrated through a comprehensive analysis and public consultation process. The Plan also states that the widening should reduce the use of local roads by non-local traffic, minimize conflicts between local and non-local traffic, improve the level of service and road capacity and minimize any negative impacts on the social and natural environment of the adjacent area. Another relevant policy is included in Section 7.2.2.8 which states that "Council shall establish and manage a truck route system to minimize the intrusion of trucks into sensitive areas, while providing acceptable access to businesses and industries."

Schedule "G", "Civic Image", designates the E.C. Row Expressway as a "Civic Way". Section 8.7.2.16 of the Plan states that Council shall enhance public rights-of-way along major entry points into Windsor consistent with a highly attractive and distinctive image using unifying elements such as landscaping, fixtures and boulevard and median treatments. Since the expressway abuts the westerly project limits, CR 22 at the E.C. Row Expressway is classified as a "Gateway". According to the Plan, Council shall promote gateways at major entry points into Windsor by providing a sense of welcome and arrival.



DILLON CONSULTING	County Road 19 (Manning Road) and County Road 22 Improvements GWP 3031-06-00 Class EA and Preliminary Design Study	Former Township of Sandwich South Official Plan Schedule A	
		November 2008	Figure 22

4.3.4 Current Development Activity

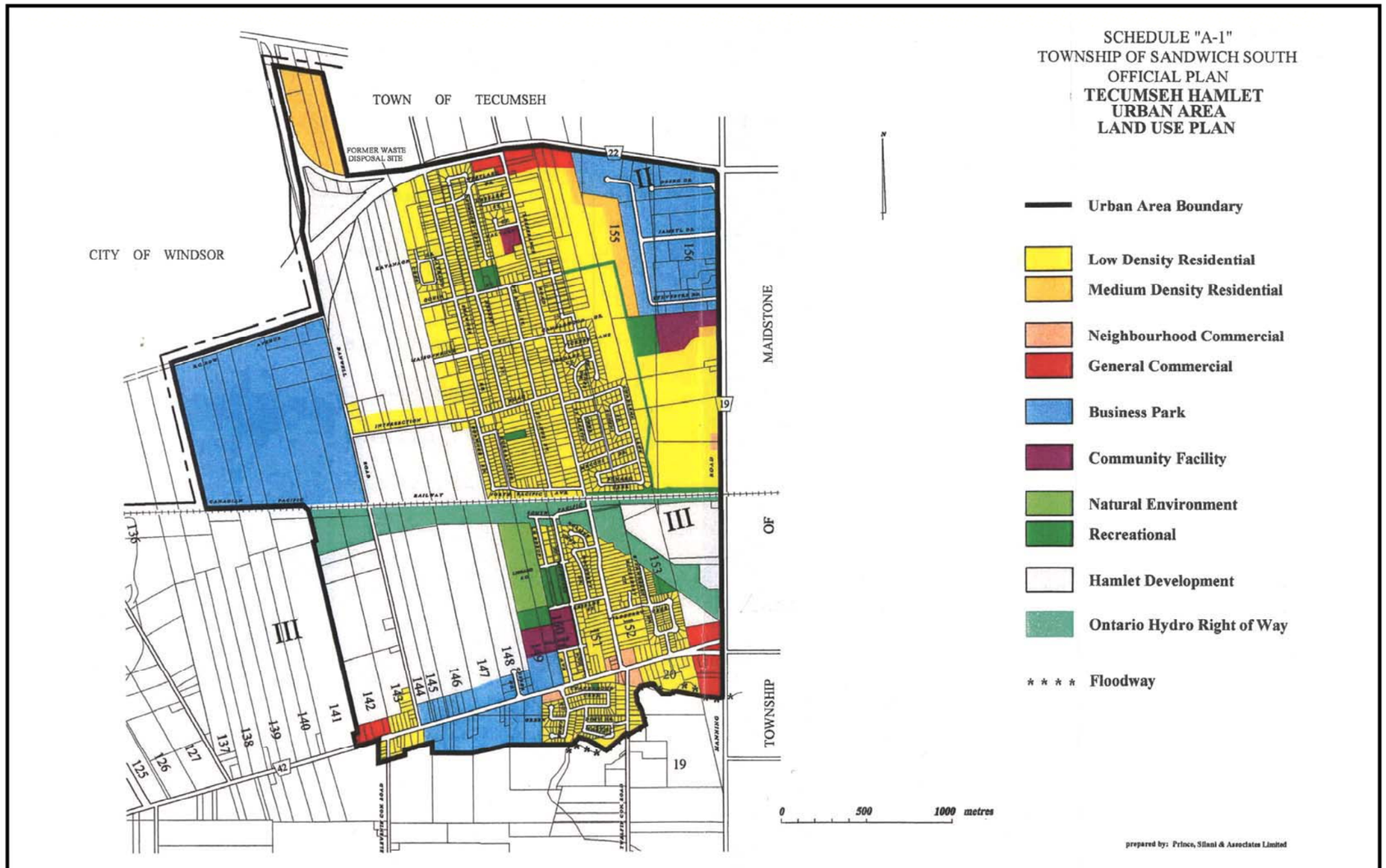
This section summarizes developments which are currently proposed in the Study Area.

CR 22 / E.C. Row / Banwell Road Commercial Node
Commercial development is proposed for lands at this intersection, including the "Fanelli Lands", a parcel of approximately 300 acres located on the west side of Banwell Road, south of E.C. Row Expressway, in the City of Windsor. Proposed development consists of approximately 1,000,000 square feet of "big box" commercial development.

The Town of Tecumseh is currently preparing a Secondary Plan for the Tecumseh Hamlet in the area bordered by CR 22 on the north, CR 19 on the east, CR 32 on the south and Banwell Road on the west. The Plan is expected to be completed in 2008. Since the CR 22/Banwell Road intersection is a key intersection, the Town has developed the following two development scenarios for this area:

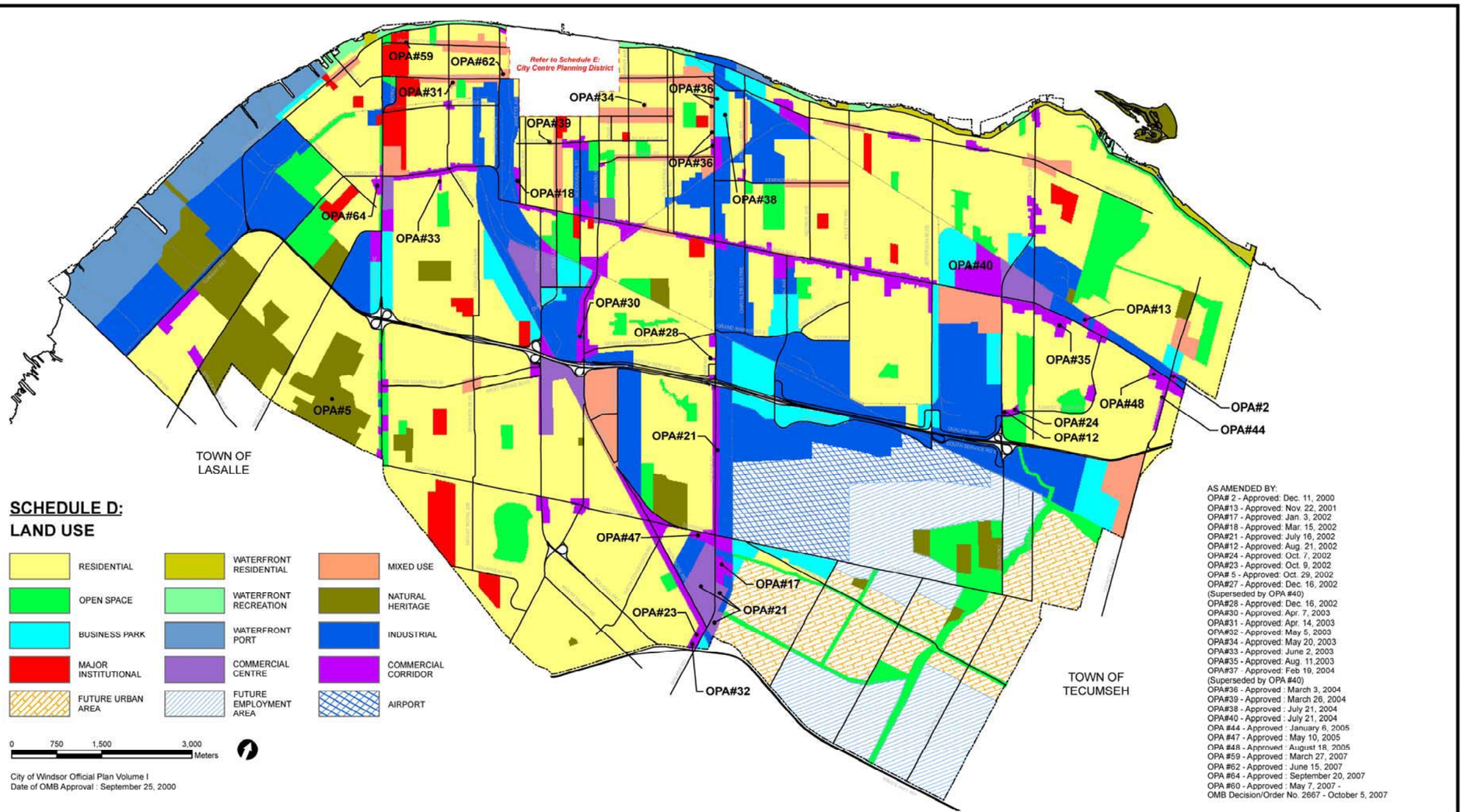
- Option 1 includes a mix of residential (1,630 dwelling units) and a "main street" commercial concept with some "big box" retail (406,000 square feet)
- Option 2 includes a mix of residential (1,458 dwelling units) and "main street" and "big box" commercial retail uses (768,445 square feet).

CR 22 at CR 19
Over the last five years, substantial development activity has occurred in the northern portion of the Study Area, particularly at the CR 22/CR 19 intersection. A number of commercial developments have been constructed servicing both surrounding residential uses and the commuting public. Commercial development consists of a mix of retail, restaurant and personal service uses with visibility from both CR 19 and CR 22.



DILLON CONSULTING	County Road 19 (Manning Road) and County Road 22 Improvements GWP 3031-06-00 Class EA and Preliminary Design Study	Former Township of Sandwich South Official Plan, Schedule A-1	
		November 2008	Figure 24

DILLON CONSULTING	County Road 19 (Manning Road) and County Road 22 Improvements GWP 3031-06-00 Class EA and Preliminary Design Study	Former Township of Sandwich South Official Plan, Maidstone Hamlet Urban Area Land Use Plan
		November 2008 / Figure 25



DILLON CONSULTING

County Road 19 (Manning Road) and
County Road 22 Improvements
GWP 3031-06-00
Class EA and Preliminary Design Study

City of Windsor Official Plan Land Use Plan

November 2008

Figure 26

Recent development activity in the Towns of Lakeshore and Tecumseh north of the CR 22/CR 19 intersection over the last two years has included:

- Tecumseh Golf Redevelopment Phase 1, Lakeshore, opened in Spring of 2007 with 17,000 square feet of retail, restaurant and personal service uses. Additional phases planned for this development include Phase 2 (projected for 2009) with 55,000 square feet of commercial space and Phase 3 (projected for 2011/12) with the potential for approximately 200,000 square feet of commercial space
- Spidrock, Tecumseh, opened in Fall 2007 with 75,000 square feet of retail, restaurant and personal service uses.

There has been significant interest and active property consolidation in the past year at the southeast quadrant of CR 22 and CR 19 in Lakeshore to assemble future commercial lands. Approximately 300 acres has been assembled for a "big box" commercial development known as "Lakeshore Square", with upwards of 750,000 square feet of "big box" commercial development. Development is expected to take place over the next three years. The owners are currently working with the Town of Lakeshore to provide full municipal services for the development.

CR 19 – South to Highway 401

Lands on the west side of CR 19 in Tecumseh, south of CR 22, are covered by the Official Plan and draft Tecumseh Hamlet Secondary Plan. Over the next 20 years, the area south of CR 22, north of the CP Rail, is expected to be developed with the following:

- commercial development at CR 19 and CR 22, including 652,270 square feet, in addition to the existing 134,100 square feet of commercial space
- industrial development at CR 19 and CR 22, including 136,725 square feet, in addition to the existing 294,200 square feet of existing industrial development
- residential development, north of the CP Rail, including 1,784 dwelling units.

The Official Plan and draft Tecumseh Hamlet Secondary Plan also identify lands north of CR 42 and west of CR 19 as available for the following future development opportunities over the 20 year planning horizon:

- commercial development at CR 19 and CR 42, including 90,415 square feet of commercial space
- residential development north of CR 42, including 364 dwelling units.

In Tecumseh, lands abutting CR 19 from south of CR 42 continuing south to Highway 401 are not anticipated to be developed in the near future.

The Coxon Towing Services property, located at the northwest quadrant of CR 19 and Highway 401 in Tecumseh, is approximately 120 acres in size. This site is expected to be developed for highway commercial uses in the future.

In Lakeshore, the former site of St. Michael's Secondary School, at the southeast quadrant of the CR 19 and CR 42 intersection, is proposed for future commercial uses. Proposed uses include a gas station and strip plaza, with approximately 25,000 square feet of commercial space.

CR 19 - Highway 3 to Highway 401

Development is proposed for the Maidstone Hamlet (Tecumseh) in accordance with the Maidstone Hamlet Secondary Plan. The Secondary Plan identifies a number of proposed land uses for the area, including residential and commercial uses. The Plan calls for a mix of approximately 900 dwelling units of various types. It also establishes two commercial nodes at the intersections of CR 19 and CR 46 and CR 19 and Talbot Road.

Lakeshore has recently rezoned a large area at the southeast quadrant of CR 19 and Highway 401 for the development of "NAFTC Studios", a proposed multimedia production facility. The studio will consist of a series of production studios constructed over several phases, with approximately 160,000 square feet of space. Ancillary uses are also proposed.

4.3.5 Provincial Policy Statement on Land Use Planning

The *Strong Communities Act* (an amendment to the *Planning Act*, November 30, 2004) requires that any decisions made by the Crown and municipalities "shall be consistent" with the Provincial Policy Statement (PPS) issued under the *Planning Act* (March 1, 2005). The PPS defines "Transportation Systems" as "a system consisting of corridors and rights-of-way for the movement of people and goods". Section 1.6.5 of the PPS states, "transportation systems should be provided which are safe, energy efficient, facilitate the movement of people and goods and are appropriate to address projected needs."

4.4 Human Health

4.4.1 Water Wells

Dillon's review of MOE's Water Well Record database indicated there are 51 water wells within 500 metres of CR 19.

Nine of the wells are located north of Highway 401, while the rest are south of the highway. According to the database, 10 are overburden wells and 41 are bedrock wells. The minimum depth of the overburden wells is 24.4 metres, with seven of the 10 overburden wells deeper than 30 metres. Only one bedrock well has a minimum depth of 26.8 metres, while all others are deeper than 30 metres.

4.4.2 Air Quality

Ministry of the Environment operates an extensive network of air quality monitoring sites across Ontario. The closest monitoring site to the Study Area is located in downtown Windsor, at 465 University Avenue West. Recorded pollutants include ozone, fine particulate matter, nitrogen dioxide, carbon monoxide, sulphur dioxide and total reduced sulphur compounds. The amount of pollutants in the air is measured by the Air Quality Index (AQI):

- Good - < 32
- Moderate - 32 to 49
- Poor - 50 to 99.

In 2006, the Windsor Downtown monitoring station recorded seven days where an AQI over 49 was observed for at least one hour. The poor AQI was largely due to high levels of ozone. In comparison with other monitoring stations in the Province, the number of occurrences where the AQI was over 49 ranged from 0 days in Thunder Bay to 15 days in Port Stanley.

A wide variability in the number of poor air quality days has been observed in recent years, primarily due to prevailing meteorological conditions. A significant number of poor air quality days occurred during the hot, humid conditions of 2005, whereas, during the relatively cooler and cloudy summers of 2004 and 2006, fewer poor air quality days were recorded.

As outlined in the 2006 Air Quality Report prepared by MOE, Windsor experienced a total of 29 one-hour ozone exceedances in 2006. This level is 80 per cent lower than those recorded in 2005. Elevated ozone levels in these areas are generally attributed to the long-range transport of pollutants into Ontario from the United States. This transboundary air pollution is then combined with a local build-up of pollutants that may be carried throughout the Province during a smog episode. Significantly less transboundary pollution occurred in 2006 because upwind weather conditions in the U.S. were often cloudy, unstable and wet, allowing smog formation and subsequent transport to occur less frequently. At approximately 80 ppb, Windsor exceeds the 2006 Canadian-wide Standard (CWS) for ozone of 65 ppb (an eight-hour running average time, based on the 4th highest annual ambient measurement averaged over three consecutive years) and has the second highest monitoring recording in Ontario.

From 2001 and 2005, Windsor experienced an average of 6.8 days where eight-hour average ozone concentrations were greater than 84 ppb, which is considered unhealthy for sensitive groups. Windsor had the highest number of days of ozone levels greater than 84 ppb in Ontario.

In addition to ozone, MOE also monitors fine particulate matter (PM 2.5). In 2006, Windsor Downtown only recorded two days where PM 2.5 24-hour concentrations exceeded 30 µg/m3 (which is considered high).

5. PUBLIC AND AGENCY CONSULTATION

This section summarizes the public and agency consultation undertaken as part of the Class EA and Preliminary Design process. Copies of the consultation materials referred to in this section are included in **Appendix A**. To comply with the *Freedom of Information and Protection of Privacy Act*, the appendix does not include correspondence from private individuals. A summary of all comments received from private individuals is included in **Appendix A**.

5.1 Project Contact List

The project Contact List consists of over 50 agency contacts, including Federal agencies, Provincial Ministries, Essex County, City of Windsor, Town of Lakeshore, Town of Tecumseh, local agencies, emergency services and utilities. The list also includes over 800 property owners along County Roads 19 and 22 and individuals who attended the Public Information Centres held for the project.

5.2 Notice of Study Commencement

Dillon mailed a copy of the Notice of Study Commencement to the Contact List on January 26, 2007. Special letters dated January 26 were sent to Transport Canada, Ministry of Culture (Southwest Archaeological Field Office and Heritage Policy and Program Development), Ontario Secretariat for Aboriginal Affairs and the Essex Region Conservation Authority (ERCA) dealing with these agencies particular area of jurisdiction. The notice and letters were accompanied by a comment form requesting comments by February 16, 2007.

The Notice of Study Commencement appeared in the following newspapers:

- January 31 and February 3, 2007 editions of the Windsor Star
- January 31 and February 7 editions of Tecumseh Shoreline Week, Belle River Lakeshore News, Essex Free Press and Windsor Le Rempart (French language newspaper)
- January 30 and February 6 editions of The Voice.

Dillon received over 120 replies to the Notice of Study Commencement, including 21 from agencies and over 100 from the public:

Agency Comments -

- Indian and Northern Affairs Canada confirmed there are no comprehensive land claims in Essex County
- Transport Canada, Marine Division, requested a site map showing the location of all watercourse crossings. Transport Canada subsequently determined that Pike Creek is the only navigable waterway in the Study Area
- Ministry of Culture, Southwest Archaeological Field Office, requested more information on the scope of the project to determine potential impacts on cultural heritage resources
- Ministry of Culture, Heritage Policy and Program Development, requested a copy of the Built Heritage and Cultural Landscapes report
- Ministry of Municipal Affairs and Housing stated that the preferred design should be consistent with the Provincial Policy Statement
- Town of Tecumseh replied that it has several concerns, including the potential for increased traffic along CR 19, including truck traffic destined for the U.S. border, increases in noise and dust along CR 22 and potential property impacts
- ERCA requested a digital copy of all fisheries assessments
- OPP, Essex Detachment, requested that a turning lane be added to the Essex Detachment building and commuter parking lot
- Union Gas described its facilities within the Study Area.

Residents' Comments -

- several residents stated that improving CR 19 will result in the road being used as a short-cut for U.S. border-bound trucks to the E.C. Row Expressway and CR 22. Some residents suggested that Lauzon Parkway be extended to Highway 401 and Highway 3 instead of widening and improving CR 19
- many residents of CR 19 and CR 22 expressed concerns about potential property impacts, including loss of access to CR 19, loss of property, decrease in property value, increases in traffic, particularly truck traffic, and resulting noise and air quality impacts
- driver and pedestrian safety is also a significant concern for residents due to the high volume and speed of traffic, lack of sidewalks and the many unsignalized intersections along CR 19. One resident noted that some cars don't stop for school busses

- other comments and suggestions included constructing a multi-use trail along CR 19, replacing all fences after construction and constructing a berm along CR 19 for noise mitigation.

Business Comments -

- Coxon's Towing Service requested modifications to its entrance at Manning Road and Highway 401.

By letters dated May 14, 2007, Dillon replied to all written comments requiring a response.

5.3 First Nations Engagement

Two meetings were held with First Nations representatives:

- MTO and Transport Canada met with representatives of the Walpole Island First Nation on December 11, 2007. At the meeting, MTO provided copies of the displays from Public Information Centre 2 and the Stage 1 Archaeological Assessment Report
- MTO met with a representative of the Caldwell First Nation on February 19, 2008, to review *Let's Get Windsor Essex Moving* projects, including improvements to County Roads 19 and 22.

Other consultation included the following correspondence:

- a letter dated January 26, 2007, to the Ontario Secretariat for Aboriginal Affairs, copied to the Ministry of the Attorney General and Indian and Northern Affairs Canada, asked for a list of First Nations which should be contacted for the study, if there are any outstanding land claims in the vicinity of the Study Area and if the Study Area falls within an area subject to litigation. A copy of the Notice of Study Commencement was enclosed
- MTO forwarded a copy of the Notice of Study Commencement to the Chiefs of the Caldwell and Walpole Island First Nations by letter dated May 16, 2007. The letter described the Class EA and Preliminary Design process and cultural resources and natural sciences studies to be completed as part of the project. The letters also invited the First Nations to Public Information Centre 1
- MTO forwarded a copy of the Notice of Public Information Centre 2 to the Chiefs of the Caldwell and Walpole Island First Nations by letter dated November 1, 2007.

Engagement with First Nations expanded throughout the project. In addition to Caldwell and Walpole Island First Nations, MTO identified seven other First Nations that may be interested in the Project, including Aamjiwnaang, Chippewas of Kettle and Stony Point, Munsee Delaware, Moravian of the Thames, Chippewas of the Thames, Oneida Nation of the Thames and the Huron Wendat in Quebec First Nations. By letter dated January 15, 2008, MTO forwarded a copy of the displays presented at Public Information Centre 2 to the Chief of each First Nation. The Notice of Public Information Centre 3 was also sent to all First Nations by MTO letter dated July 2, 2008.

All First Nations contacted by MTO will be provided an opportunity to review the ESR/PDR during the 30-day review period.

5.4 City of Windsor Consultation

Ongoing consultation occurred with the City of Windsor throughout the Study. The Study Team met with the City several times to discuss the recommended design options and coordinate the project with other studies in the area, including the Class EA for Banwell Road. The City expressed several concerns about the Study, mostly related to the proposed improvement's impacts on the City's transportation system. Other concerns included the validity of some of the data used in the study, a concern that the interconnectedness of regional systems, including population, land use and employment data was not considered in the evaluation of alternatives, and the EA was completed in a fragmented and piecemeal manner. The County of Essex provided a written response to the City addressing these concerns. The concerns raised by the City are addressed throughout the ESR/PDR.

Copies of all written correspondence to and from the City are included in **Appendix A**. The following outlines the City's main concerns about the proposed improvements and the Study Team's response:

- the City stated it is a "significant stakeholder" and requested ongoing consultation with the Study Team. The Study Team and City met several times throughout the study to discuss the impacts of the project on the City and coordination with other studies in the area
- according to the City, the recommended design will increase traffic in the east end of the City, along the E.C. Row Expressway, potentially impacting the City's infrastructure, and increasing noise and air quality impacts along the expressway. In response to these concerns:

- the Study Team considered proposed improvements at Banwell Road as part of the evaluation of alternatives for CR 22
- the need to widen CR 19 and CR 22 was identified in the Essex-Windsor Regional Transportation Master Plan (EWRTMP) to accommodate future increase in traffic volumes. Traffic volumes are projected to increase even if the project does not proceed. As a result, noise and air quality concerns along the E.C. Row Expressway are related to future increases in traffic volumes, not improvements to CR 19 and 22
- the Study Team agrees that the E.C. Row Expressway is currently deficient, strengthing the need for improvements proposed by the EWRTMP
- improvements to CR 19 and CR 22 will not impact the City beyond improvements already required for the 2026 Planning horizon
- delay in the City's Banwell EA is due to the City's internal review of the traffic and employment projections presented at Public Information Centre 2 and not because of potential impacts from the CR 22 traffic diversions
- a noise impact assessment was completed as part of the CR 19 and 22 Class EA and Preliminary Design
- Essex County supports the City of Windsor proceeding with the EA for Lauzon Parkway as early as possible

- the City is also concerned about timing of the proposed improvements. No funding commitments for construction of the improvements have been made at this time
- according to the City, the Class EA did not consider other projects in the area and is being completed in a piecemeal manner. The Study Team responded that the study has coordinated the proposed improvements with others proposed by MTO, the County and City. In addition, the EWRTMP was undertaken to ensure a comprehensive approach to regional transportation improvements.

5.5 Public Information Centres

5.5.1 Public Information Centre (PIC) 1

PIC 1 was held at the Royal Canadian Legion in Tecumseh on May 29, 2007 from 4:00 to 8:00 p.m., with an Agency Session from 3:00 to 4:00 p.m. at the same location. The purpose of PIC 1 was to obtain public and agency input on the alternatives developed by Dillon for the proposed improvements to County Roads 19 and 22.

Dillon mailed a copy of the notice for PIC 1 to the project Contact List on May 14, 2007. MTO advised area MPs and MPPs of the PIC by letters dated May 16, 2007. In addition, the notice appeared in following newspapers:

- May 16 and 23, 2007 editions of Tecumseh Shoreline Week, Belle River Lakeshore News, Essex Free Press and Windsor Le Rempart (French language newspaper)
- May 15 and 22 editions of The Voice – Essex
- May 15 and 19 editions of the Windsor Star.

PIC 1 was an informal walk-in session with displays summarizing the work completed to date. Dillon, MTO and County of Essex staff were present to explain the displays, answer questions and record comments. A copy of the displays and a comment form requesting comments by June 19, 2007, were handed out to all present. The displays summarized:

- project background and need for improvements
- Study Area
- "Let's Get Windsor-Essex Moving" Strategy
- Environmental Assessment process
- EWRTMP
- public and agency consultation
- collision history
- alternative evaluation process
- existing natural features and cultural resources
- existing land uses and proposed developments

- warrants for grade separations
- drawings at a scale of 1:2000 showing the design alternatives
- typical cross sections
- outline of the remaining steps in the Class EA process.

The displays were available in English and French.

PIC 1 Attendance and Informal Discussions

PIC 1 was attended by approximately 100 people. Agency representatives included staff from the Town of Tecumseh, Town of Lakeshore, ERCA and a consultant representing the Greater Essex County District School Board. Members of the public in attendance included residents of the Study Area and other area residents interested in on-going transportation issues in Essex County.

During the informal discussions, several residents stated that improvements to CR 19 are necessary due to the volume of traffic along the road. Some residents also agreed with the proposal to realign the West Townline Drain. Concerns included the following:

- many residents were concerned about potential property impacts, including property requirements, impacts on private entrances along CR 19 and noise and air quality impacts
- another significant concern included recent increases in truck traffic volumes along CR 19
- some residents were concerned about impacts on intersections along CR 19, including intersections with Concession Road 10, 16/17 Sideroad and Jamsyl Drive. A few residents stated that the Lauzon Parkway should be widened instead of CR 19.

Several business owners also attended PIC 1. Most were concerned about property impacts and maintaining access to CR 22.

PIC 1 Written Submissions

Dillon mailed a copy of the PIC displays and comment form to the agencies on the Contact List by letter dated May 31, 2007. The comment form requested comments by June 19. Approximately 40 written submissions were received at and following the PIC, including seven from agencies and the remainder from residents and businesses:

Agency Comments-

- Nav Canada stated it has no objections to the project
- MNR stated that all woodlands adjacent to the Study Area are important and provide potential habitat for species at risk
- City of Windsor Public Works, Transportation Division, submitted a report dated July 25, 2007 to Council. The report noted that the EWRTMP recommends improvements to the Manning Road corridor to handle regional traffic. Since the "proposed free-flow traffic plan expedites traffic to the City's eastern limits", the improvements will adversely impact City residents, the development/expansion of Windsor Transit and "active" transportation projects, such as improvements to Banwell Road and local noise and air quality especially along the E.C. Row Expressway. Based on this, the report concludes that City administration "will continue to monitor, attend, comment and report to Council on relevant project activities"
- Town of Lakeshore submitted a letter with a number of comments, questions and concerns related to road, signage, traffic and drainage issues, potential conflicts with water works and sanitary sewers, noise, dust and other nuisances and planning issues
- a consultant for the Greater Essex County District School Board stated that he supports the Malden Road/North Talbot Road intersection improvements and the CP Rail grade separation
- Union Gas stated there are several pipelines and transmission lines within the CR 19 right-of-way.

Residents' Comments-

- several residents wrote that they have safety concerns about the speed of traffic along CR 19. Increased truck traffic was also mentioned as a concern
- one resident stated that access to Lesperance Road from CR 22 should be maintained. He also stated that the study should include recommendations about providing transit in the Study Area
- many residents are concerned about property impacts, including loss of heritage homes, continued access to existing roads, property requirements and drainage impacts
- two residents expressed concerns about noise and air quality
- two residents asked if sewers will be constructed as part of the project
- one resident stated that Lauzon Parkway should be extended to Highway 401, instead of widening Manning Road
- another resident requested that the urban section of Manning Road include bike lanes.

Business Comments -

- the Coco Group of Companies provided comments on all of the alternatives presented at the PIC
- a consultant acting on behalf of Petrovec Investments requested that access be maintained to the company's land on Manning Road at CR 22
- Home Hardware Stores stated it recently made a significant investment in the store at 1613 Lesperance Road and requested that impacts to the property be considered in the evaluation of alternatives
- Coxon Towing Services provided comments on access to its property at Highway 401 and Manning Road
- James Sylvestre Development and Jamsyl Group provided comments on the alternatives at Manning Road and CR 22 and CR 22 and Lesperance Road
- James Sylvestre Farms asked that the study consider large, slow moving farm vehicles on Manning Road.

Dillon replied in writing by letters dated September 4, 2007, to all written comments requiring a response.

Meeting with DFO/ERCA

Dillon and MTO met with representatives of DFO and ERCA on September 17, 2007, to discuss the draft Fish and Fish Habitat Conditions Report and the project's drainage impacts.

DFO and ERCA agreed with Dillon's fish habitat sensitivity classifications. Species at Risk mapping indicates the possible presence of the channel darter in the south branch of the East Townline Drain. DFO and ERCA agreed, however, that a barrier for fish passage near the confluence of the drain and Pike Creek eliminates the possibility that the channel darter is present.

Dillon provided an overview of the drainage impacts of the project. Major topics discussed at the meeting included:

- the concept of closing out the West Townline Drain and redirecting the flow to the Croft Drain was discussed. DFO and ERCA indicated that they would not support this alternative due to the potential loss of habitat and fisheries resources in the Croft Drain caused by the required hydraulic improvements. Both agencies suggested that there may be opportunities to realign West Townline Drain and still keep its function as a Municipal Drain
- the impacts of the proposed urban section of CR 19 north of Pike Creek on the East Townline Drain were also discussed. DFO and ERCA agreed that further enclosure of the drain is acceptable since it is a low sensitivity fishery and substantial sections are already closed north of CR 22. Fisheries compensation was provided for the enclosure north of CR 22. ERCA noted that the hydraulic performance of the existing enclosure north of CR 22 is inadequate based on the performance of the pumping station at Lake St. Clair.

5.5.2 Public Information Centre 2

PIC 2 was held at the Royal Canadian Legion in Tecumseh on November 19, 2007 from 4:00 to 8:00 p.m., with an Agency Session from 3:00 to 4:00 p.m. The purpose of PIC 2 was to obtain public and agency input on the recommended Preliminary Design of improvements to County Roads 19 and 22. Special meetings were also held with property and business owners on November 19.

Dillon mailed a copy of the notice for PIC 2 to the project Contact List on November 1, 2007. MTO advised area MPs and MPPs of the PIC by letters dated November 1, 2007. The notice also appeared in the following newspapers:

- November 7 and 14, 2007, editions of Tecumseh Shoreline Week, Belle River Lakeshore News, Essex Free Press and Windsor Le Rempart (French language newspaper)
- November 6 and 13 editions of The Voice – Essex
- November 7 and 10 editions of the Windsor Star
- November 15 edition of the Tecumseh Tribune.

Similar to PIC 1, PIC 2 was an informal walk-in session with displays summarizing the work completed to date. Dillon, MTO and County of Essex staff were present to explain the displays, answer questions and record comments. A copy of the displays and a comment form requesting comments by December 7, 2007 was handed out to all present. The displays summarized:

- Study Area and Project Background and Purpose
- "Let's Get Windsor-Essex Moving" Strategy
- Study Process and Consultation to Date
- Environmental Features

- Traffic Volumes and Collision History
- Value Engineering
- Recommended Drainage Improvements
- Evaluation of Alternatives and Summary of Recommended Alternatives
- Noise Assessment
- Evaluation of CR19/CR22 and CR 22/Lesperance Road Alternatives
- Potential Impacts and Mitigation of CR 22/Lesperance Road Grade Separation
- Noise Mitigation
- Construction Cost and Phasing
- Next Steps.

Also presented, were plans showing the recommended Preliminary Design. The displays were available in English and French.

Property Owners Meeting

On the day of PIC 2, an informal meeting was held on November 19, 2007, 10:00 a.m., with property owners significantly affected by the proposed improvements to County Roads 19 and 22. Held at the Royal Canadian Legion in Tecumseh, approximately 15 owners were invited to the meeting by Dillon letter dated November 5, 2007. Six property owners attended the meeting.

Dillon and MTO gave a brief presentation on the study and recommended Preliminary Design. Comments, questions and concerns included:

- staff of MTO's Property Division answered questions about the property acquisition process
- property owners at the CR 19/CR 34 intersection appeared to generally accept the proposed roundabout. Some property owners stated that the existing buildings would be difficult to move and MTO should buy entire properties
- property owners affected by the relocation of the West Townline Drain suggested that the drain be relocated along existing property lines to minimize the severance of properties, access restrictions and decreases in property value
- the timing of construction
- a local developer stated that the proposed location for "Street B" is not consistent with the Town of Tecumseh Secondary Plan and will have significant impacts on his property.

Following PIC 2, meetings were held on an on-going basis with individual affected property owners.

Business Owners Meeting

Also on the day of PIC 2, a special meeting was held at 1:00 p.m. with business owners significantly impacted by the proposed CR 22/Lesperance Road grade separation. Invitations were hand delivered by Dillon to all businesses on the south side of CR 22 at Lesperance Road.

Similar to the property owners meeting, MTO and Dillon gave a brief presentation on the study and recommended Preliminary Design. The meeting was attended by seven representatives of the Home Hardware Store on Lesperance Road who stated that the proposed grade separation of CR 19 and Lesperance Road, with no access to CR 22, would result in a substantial loss of business. Home Hardware would prefer that MTO provide a full interchange and purchase the entire property.

Agency Session

A separate notice was sent to agencies advising them of the November 19, 2007, 3:00 to 4:00 p.m. Agency Session. The session was attended by staff of the Towns of Lakeshore and Tecumseh and a consultant representing the Greater Essex County District School Board. The school board's consultant expressed support for the recommended improvements.

PIC 2 Attendance and Informal Discussions

PIC 2 was attended by approximately 150 people, including residents, property and business owners and area residents interested in transportation issues in Essex County. The timing of construction was the most frequently asked question. During the informal discussions, other comments, questions and concerns included the following:

- similar to PIC 1, most concerns related to property impacts. Several residents stated that MTO should purchase their entire property rather than just a portion. Some questioned the fairness of the property acquisition process. A few residents stated that if the project is delayed for several years, owners will avoid making major renovations/repairs, further eroding the value of affected houses. Several residents stated that noise barriers should be erected immediately along CR 22
- property specific concerns were also expressed. The owner of land leased to the Pioneer Gas station at CR 19/CR 42 stated that the gas station will be forced to close without access to Manning Road.

Another concern was a potential loss of property value for properties affected by the closure of Desro Drive

- many comments were made about the proposed Lesperance Road grade separation, including:
  - several residents are opposed to relocating the Home Hardware since they like having it in their neighbourhood
  - traffic calming measures should be implemented on Lesperance Road since traffic currently travels above the posted limits
  - the proposed grade separation will increase travel times
- other concerns included:
  - potential impacts on wildlife habitat along the West Townline Drain. A resident recently saw a Cooper's Hawk in this area
  - some residents requested that sanitary sewers be provided along Manning Road
  - the 10th Concession Road is not wide enough to accommodate farm vehicles
  - one resident requested that bike lanes be provided along Manning Road.

PIC 2 Written Submissions

By letter dated November 23, 2007, Dillon mailed a copy of the PIC 2 displays and a comment form to all of the agencies on the Contact List. The comment form requested comments by December 7.

Approximately 35 written submissions were received from agencies, residents and businesses, at and following the PIC:

Agency Comments –

- City of Windsor stated that the:
  - improvements will have an adverse impact on the City's transportation system
  - EA does not address impacts beyond the project limits
  - City of Windsor has not officially adopted the EWRTMP
  - traffic study has not accounted for future improvements to Lauzon Parkway
  - City also requested input on the timing of construction of the project
- Town of Tecumseh stated it is currently completing a separate stormwater management study for the Manning Road Secondary Plan Area and requested that the County and MTO review the potential benefits of a regional stormwater management detention facility at the southwest corner of CR 19/CR 22
- the Royal Astronomical Society requested that the project include full cut-off lighting to minimize light pollution of the night-time sky.

Residents' Comments -

- four residents stated they are opposed to the proposed grade separation at Lesperance Road and the six-laning of CR 22. One said that these improvements will significantly increase noise and asked that noise barriers be provided along CR 22
- three residents expressed opposition to the proposed CP Rail grade separation based on property impacts. One of the residents also stated that the speed limit on Manning Road should be reduced to 60 km/hour. Another resident said there are drainage problems in the vicinity of the CP Rail crossing
- one resident supports the Parclo-B diamond interchange at CR 22. Another resident stated that the need for an interchange at CR 22 has never been identified before
- three residents stated they are opposed to realigning the West Townline Drain based on impacts on nearby properties and the drain
- one resident said that closing Memorial Drive will adversely affect the value of her property. Another resident requested that a service road be constructed along the south side of Highway 401.
- a resident of CR 42 asked that sidewalks be constructed along CR 42 from Lesperance Road to Manning Road
- some residents asked MTO to purchase their entire property instead of just a portion
- similar to PIC 1, many residents stated they are concerned by potential increases in truck traffic, noise, vibration and air quality impacts. One resident stated that Lauzon Parkway should be extended to Highway 401, instead of improving Manning Road.

Business Comments -

- Cedarhurst Landscaping requested that proposed Street "B" be "lined up" with its property across Manning Road
- the Coco Group of Companies provided comments on the recommended alternatives
- pertaining to its property on the southeast corner of CR 19 and CR 22, Petrovec Investments requested that the Ruggaber Drain be relocated, the CR 22/Lakeshore Boulevard intersection be improved and access provided to CR 19
- Melvin Orr Trucking opposes the right-in, right out turning restrictions for 1894 Manning Road

- Home Hardware is opposed to the proposed grade separation of CR 22 and Lesperance Road. The company stated it employs 60 people and cannot survive without access to CR 22. It requested that the work be delayed until the connection between CR 22 and Westlake Drive is constructed. It also requested a copy of supporting traffic studies and the ESR/PDR
- Fairlane Developments, the owner of the plaza at the southeast corner of CR 22 and Lesperance Road, is also opposed to the grade separation. It stated that the grade separation will significantly impact property values
- Hicks Farms is opposed to closing Memorial Drive
- R. Lessard Trucking is opposed to the proposed CP Rail grade separation. Dennis Sylvestre Limited requested traffic signals for the service road at the CP Rail tracks.

By letters dated December 21, 2007 and January 9, 2008, Dillon replied to all written comments requiring a response.

5.5.3 Public Information Centre 3

A third PIC was held to present changes to the recommended design for the CR 22 and Lesperance Road intersection and drainage modifications on CR 19 from Baseline Road to CR 22. A grade separation of CR 22 and Lesperance Road was presented at PIC 2 as the recommended design alternative for this intersection. Based on public and agency concerns about the impacts of the proposed grade separation on existing and future commercial development at the intersection, two new alternatives were developed and presented at PIC 3.

PIC 3 was held at the Royal Canadian Legion in Tecumseh on July 15, 2008 from 4:00 to 8:00 p.m., with an Agency Session from 3:00 to 4:00 p.m. A meeting was held with business owners and operators at 2:00 p.m.

Dillon mailed a copy of the notice for PIC 3 to the project Contact List on June 30, 2008. MTO advised area MPs, MPPs and First Nations of the PIC. The notice also appeared in the following newspapers:

- July 1 and 8 editions of The Voice – Essex
- July 3 edition of the Tecumseh Tribune
- July 2 and 9 editions of the Essex Free Press and the Windsor Le Rempart (French language newspaper)
- July 4 and 11 editions of the Tecumseh Shoreline Week and Belle River Lakeshore News
- July November 6 and 13 editions of The Voice – Essex
- July 9 and 12 editions of the Windsor Star.

Similar to the previous PICs, PIC 3 was an informal walk-in session with displays summarizing the work completed to date. Dillon, MTO and County of Essex staff were present to explain the displays, answer questions and record comments.

A copy of the displays and a comment form requesting comments by August 8, 2008 was handed out to all present. The displays summarized:

- Study Area
- Class EA and Consultation Activities to Date
- Comparative Evaluation of Alternatives 1, 2, 3, 4 and 5 for the CR 22/Lesperance Road intersection. Alternative 5 (Half Diamond/Button Hook Interchange) was shown as the recommended alternative
- Plans showing Alternatives 1 to 5 and typical sections
- Drainage modifications on CR 19 from Baseline Road to CR 22
- Construction Phasing
- Next Steps in the Class EA and Preliminary Design study.

A copy of the displays was available in French.

Business Owners and Operators Meeting

On the day of PIC 3, a special meeting was held at 2:00 p.m. with business owners and operators significantly impacted by the CR 22/Lesperance Road intersection alternatives. Invitations were hand delivered by Dillon to all businesses on the south side of CR 22 at Lesperance Road on July 2, 2008.

MTO and Dillon gave a brief presentation on changes made to the recommended design since PIC 2. The meeting was attended by thirteen people, including representatives from the Home Hardware Store and the Tecumseh Town Centre Plaza on Lesperance Road. The owners of the plaza stated it is unacceptable if

there is no access to eastbound CR 22 from Lesperance Road. They stated they have already had difficulty signing long-term leases for tenants due to the uncertainty regarding the proposed work at the intersection.

Both the plaza owner and Home Hardware stated that, in their opinion, the recommended alternative will result in a substantial loss of business. Home Hardware would prefer that MTO provide a full interchange and purchase the entire property. Both parities also asked for a definite project timeline so they could discuss project timing with existing and future tenants.

Agency Session

A separate notice was sent to agencies advising them of the July 15, 3:00 to 4:00 p.m., Agency Session. The session was attended by a representative of MP Joe Cormatin's office, and the Mayor, two councillors and staff from the Town of Tecumseh. The Mayor and councillors stated they were all in favour of the recommended partial interchange alternative (Alternative 5) for CR 22 and Lesperance Road.

PIC 3 Attendance and Informal Discussions

PIC 3 was attended by approximately 150 people, including residents, property and business owners and residents interested in transportation issues in Essex County. Many of the residents expressed concerns about the anticipated traffic impacts of the recommended partial interchange at CR22/Lesperance Road. Some residents also expressed support for the proposed improvements.

Additional comments, questions, and concerns included:

Traffic

- potential increase in travel times
- increased traffic in surrounding residential areas, particularly south of CR 22
- potential increase in traffic speeds on Lesperance Road since traffic will not be required to stop at intersection
- increase in traffic on Westlake Drive
- potential for more traffic congestion on Banwell Road and CR 19 due to limited access at CR 22/Lesperance Road
- several residents stated a westbound exit ramp should be constructed at CR 22/Lesperance Road. If there is not enough room to do this, the existing properties at the intersection should be purchased

Property

- two property owners northeast of the CR 22/Lesperance Road intersection stated their entire property should be purchased, rather than just the area identified on the drawings
- landscape business owner north of the CP Rail crossing is concerned that the proposed grade separation will limit visibility to the property, resulting in significant business loss
- two property owners on Desro Drive requested additional information on the property impacts of the recommended design
- several property owners along CR19 asked if existing septic systems would be moved or replaced if they are within the area identified for property purchase

Noise and Air Quality

- several residents said they are concerned about increased noise for properties adjacent to CR 22 and stated noise barriers should be erected prior to construction
- property owners north of CR 22 and Lesperance Road are concerned that they will be able to see traffic on CR 22 from their backyards. They are also concerned about noise and air quality impacts
- one resident expressed concern about the potential noise impacts of a new traffic signal and traffic queuing at Lesperance Road and Westlake Drive

Other

- one resident stated that he is concerned that the uncertainty of the timing of the project will impact his ability to sell his property
- several residents had questions regarding construction timing
- others expressed concerns about the aesthetics of the new structure (height, appearance, loss of natural vegetation at intersection).

PIC 3 Written Submissions

Approximately 30 written submissions were received from agencies, residents and businesses, at and following the PIC:

Agency Comments –

- Transport Canada, Marine Division stated that a *Canadian Environmental Assessment Act* Screening is required if approval is required under the *Navigable Waters Protection Act* for the Pike Creek Bridge widening

- NavCanada stated that it has no objections to the project as planned
- City of Windsor, M. Palanacki, Director of Operations, requested the following information be provided:
  - Town of Tecumseh Hamlet Study
  - AutoCAD drawing of Alternative 5
  - Weaving analysis between CR 22 westbound on ramp at Lesperance Road and the westbound off ramp at Banwell Road
- Ministry of Natural Resources, stated there are records of Fox Snake (a threatened species) in the area

Residents' Comments -

- several residents indicated support for the recommended alternative
- a few residents believe the diamond interchange (Alternative 1) is preferred as the long-term solution for the CR 22/Lesperance intersection
- several residents are concerned about potential health impacts, particularly related to noise and air quality during the construction and operation phases
- many residents said that the project will negatively impact property values and several of the houses close to the CR 22/Lesperance intersection should be purchased
- several residents are concerned about the safety of the horizontal curve caused by the realignment of Baseline Road
- residents along CR 19 stated the recommended alternative will have significant property impacts and asked if existing features disturbed during construction, such as septic tanks, will be replaced/repaired
- some residents are also concerned about the impacts of construction traffic
- a petition was signed by 20 residents asking that a noise barrier be installed at the southwest quadrant of the CR 22/Lesperance Road intersection prior to construction
- one resident is concerned that debris will fly over the noise barrier on CR 22 into her backyard in the event of an accident and the interchange at CR 22 and Lesperance Road will impact the character of the neighbourhood
- another resident stated that the potential increase in truck traffic will negatively impact traffic safety
- one resident is currently experiencing difficulty getting out of their property during peak periods and believes signalizing the Westlake Drive/Lesperance Road intersection will not help.

Business Comments –

- Coxon's Sales and Rentals Ltd, and CTS Coxon stated that the preferred design does not permit access to its property from CR 19, thereby limiting future development
- Fairlane Developments Inc., owners of the Tecumseh Town Centre Plaza, had the following comments:
  - CR 22/Lesperance Road should be a full interchange. If not, the Tecumseh Town Centre and Home Hardware should be bought out
  - questioned the need for 6-laning CR 22 and grade separated interchanges
  - anticipates significant financial impacts to tenants
  - Lauzon Parkway should be improved instead of to CR 19
- James Sylvestre Developments Ltd. is concerned about the elimination of access along the Baillargeon Drain, access to its property along the Hydro corridor (north of CR 42) and the potential loss of the family's heritage home at 1951 Manning Road
- Home Hardware stated it does not agree with the recommended partial interchange (Alternative 5). The CR 22/Lesperance intersection was recently partially closed, reducing the number of customers in its store. Canada Post has also cancelled its operating contract with Home Hardware. In the company's opinion, impacts on the Home Hardware store are equivalent to expropriation
- Petrovec Investments Ltd. is concerned about loss of its developable lands at the CR 19 and 22 intersection. It requested that the Ruggaber Drain be relocated, existing traffic lights be modified and a deceleration lane be provided for eastbound traffic turning right at Lakeshore Boulevard. The company also stated that it must have access to CR 19
- Marquis Tile Inc. is concerned about the impact of the proposed CR 19 and 22 interchange on its property and tenants. Impacts include loss of curb appeal, landscaping and plaza signs.

5.6 Special Meetings with Residents, Business Owners and Developers

Throughout the study, the Study Team held special meetings with local residents, business owners and developers. The following summarizes these additional meetings (with the dates of the meetings shown in brackets):

- Coco Development Group (November 7, 2007) indicated it agrees with the recommended alternatives and requested additional information from the Town of Lakeshore regarding the Lakeshore Boulevard area and the status of the Secondary Plan for the area. Coco also requested access to CR 19 from 16/17 Sideroad.

- Ontario Provincial Police (November 7, 2007). The OPP are generally in favour of the project and requested improved roadway conditions at North Rear Road and 10th Concession. The improvements are included as part of the project. The OPP station will be closed for improvements in 2008
- Coxon (November 7, 2007) requested changes to its entrance to CR 19.
- Petrovec Investments Ltd. (November 7, 2007) discussed the impacts of the CR 19/CR 22 interchange on its property
- Fairlane Developments Inc. (July 10, 2008) regarding the proposed interchange at CR 22/Lesperance Road and impacts to the Tecumseh Town Centre Plaza
- meetings with two other property owners, including one south of the CR 19/Highway 401 interchange, on North Rear Road to discuss access to CR 19 and one northeast of CR 19 and the CP Rail tracks to discuss the impacts of the proposed grade separation.

5.7 Notice of Study Completion

A Notice of Study Completion will be issued advising of the availability of the ESR/PDR for the 30-day public and agency review period. If no Part II Order requests are received by MOE during the review period, the project may proceed to the Detailed Design and construction stage.

6. ALTERNATIVES AND EVALUATION

6.1 Introduction

Section 6 summarizes the alternatives considered by MTO and the County during the Planning and Preliminary Design stages of the project. The generation and evaluation of alternatives followed the requirements of:

- MTO's Class EA for generating and evaluating alternatives during the Planning and Preliminary Design stages
- Phases 2 of the Municipal Class EA process, consisting of the identification and evaluation of "Alternative Solutions" and the selection of preferred Planning Alternatives
- Phase 3, "Design Options", of the Municipal Class EA process involving the refinement and further development of the preferred Planning Alternatives from a Functional Design to a Preliminary Design level of detail.

6.2 "Alternatives To" and Planning Alternatives

Previous studies, in particular the Essex-Windsor Regional Transportation Master Plan (EWRTMP), October 2005, identified the need for additional north-south capacity on CR 19 to address existing and projected future capacity and operational deficiencies. The EWRTMP satisfies the requirements of Phases 1 and 2 of the Municipal Class EA process and MTO's Class EA for dealing with transportation system needs and alternative planning strategies.

The EWRTMP established transportation system need through a detailed regional transportation model of the City of Windsor and County of Essex that projected long-term traffic volumes across the region based on land use projections for the 2021 horizon. The model found that the existing two-lane cross-section of CR 19 is not adequate to accommodate additional traffic generated by future growth in the region.

The Master Plan assessed alternative solutions for diverting traffic from congested links to mitigate anticipated congestion and eliminate the need for road widenings. General solutions included a reduction in area-wide trip-making through increased transit ridership and/or the extension of the Windsor Transit service area, currently limited to the City of Windsor and part of Tecumseh. The EWRTMP evaluated the alternative of widening and extending Lauzon Parkway to Highway 401 instead of widening CR 19. Although these solutions are still required to meet future needs, none eliminated the need to widen CR 19 to four lanes.

6.2.1 "Do Nothing" Alternative

MTO and the County considered the alternative of "doing nothing" and making no improvements to County Roads 19 and 22 in the Study Area.

Most of the CR 19 corridor (i.e., north of CR 34), under the current configuration, is either currently experiencing poor levels of service and capacity constraints, or is anticipated to experience poor levels of service and capacity constraints before the end of the study horizon, as illustrated on **Tables 18** to **20**. The "do nothing" alternative does not address these deficiencies.

CR 22 currently exhibits poor operating conditions, with many intersections and road sections performing at or above capacity. Anticipated growth in traffic volumes as a result of planned development will significantly increase delays experienced by motorists and commercial traffic in the corridor, potentially leading to road safety issues and adverse economic impacts. As a result, "doing nothing" in the CR 22 corridor is also not acceptable.

6.2.2 Reduce Transportation Demand (Transportation Demand Management)

Dillon considered a number of Transportation Demand Management (TDM) measures to potentially reduce demand for travel in the CR 19 corridor. Measures included the following:

- ***Provide transit service.*** Currently, Windsor Transit does not service the Study Area east of Banwell Road. This leaves significant areas of existing and future development unserved by transit, including residential areas in northeast Tecumseh and northwest Lakeshore, the major Amy Croft Drive commercial node, and the planned Tecumseh Hamlet development area. CR 22 provides a direct east-west corridor for local and/or express transit service, with connections from existing and planned development in Lakeshore and employment areas in Windsor along the E.C. Row Expressway. Dillon recommends that transit service be provided along the CR 22 corridor and in existing and future urban areas, both to reduce automobile demand on the road network and provide additional transportation options. However, the availability of transit service is not expected to

change the need for additional capacity in the CR 19 corridor, even with a significant shift in current transportation preferences

- ***Encourage alternative modes of travel.*** A shift in travel demand from single-occupant vehicle to other modes (ridesharing; walking; cycling) could potentially reduce vehicle trips in the area. However, such a shift is not expected to be significant enough to mitigate anticipated congestion in the corridor. Notwithstanding, alternate modes were provided for in the design of the preferred alternative solution, including sidewalks and bicycle facilities, where appropriate

- ***Encourage off-peak trip-making.*** A review of existing traffic patterns revealed that some spreading of the peak hour is already occurring due to staggered shift change times. Although some additional trips could be transferred to off-peak times, the potential for significant impact on peak period capacity requirements is likely limited.

6.2.3 Reduce Transportation Demand (Land Use Planning and Urban Design)

A significant amount of projected future traffic demand is comprised of trips generated by future development in the CR 19 and CR 22 corridors. As a result, land use planning and urban design principles in future development provide an opportunity to reduce automobile demand in the Study Area.

Development considered in the traffic projections includes a significant amount of planned commercial development at the CR 22/CR 19 intersection, plus major commercial nodes at Banwell Road, Advance/Patillo, and Wallace Woods. Estimates provided by the local municipalities suggest that the magnitude of planned commercial development at Banwell Road and at CR 22/CR 19 may be even higher.

In addition to this commercial space, development areas to the east are being planned to accommodate approximately 10,000 residential units and a significant amount of office and additional industrial space. These proposed developments not only potentially impact east-west volumes on CR 22 and CR 42, but also significantly impact Little Baseline Road since they will rely on Little Baseline for additional east-west capacity. This effectively changes Little Baseline from a low-volume rural road to a minor arterial roadway. Since Little Baseline will not provide a through connection west of CR 19, this east-west traffic will need to use CR 19 to travel north and south to County Roads 22 and 42, adding significantly to midblock volumes and turning movement volumes.

Given the magnitude of development proposed for the area, and its impact on traffic patterns, Dillon recommends that, prior to Detailed Design, the County and local municipalities undertake a high-level review of planned development in the broader study area, both in Tecumseh and Lakeshore, to ensure that planned development (particularly commercial space) is realistically supportable and achievable. If all development proceeds as accounted for in the traffic projections, development may impact lane requirements at intersections. Conversely, if the full extent of proposed development proceeds (likely a highly aggressive and potentially optimistic assumption), additional impacts may potentially occur beyond those anticipated in this study.

In addition to the magnitude of development, the nature of development may impact traffic volumes. For example, large-scale regional shopping centres are more likely to attract customers from a much broader catchment area, leading to longer trips and a higher volume of development-generated traffic. Conversely, smaller-scale commercial developments may be more likely to serve a more local customer base, leading to a lower traffic pressure and a higher potential for alternate-mode trips. Finer-grained development patterns reducing the distances between trip attractions could result in shorter trips and make active transportation modes (walking and cycling) more attractive. Neighbourhood and street design can also impact the attractiveness of transit, walking and cycling for some trips.

A drastic and likely unrealistic reduction in planned development across the broader study area is required to remove the need for additional capacity along CR 19. Indeed, there are sections of CR 19 that require additional capacity on the basis of existing or anticipated short-term conditions (i.e., with only a portion of anticipated development in place). Notwithstanding, it is recommended that steps be taken by the County and local municipalities to ensure that an appropriate and realistic level of development is planned on an area-wide or regional basis to minimize impacts on the road network.

6.2.4 Implement Localized Intersection Improvements

Dillon conducted operational analyses of intersections assuming existing lane configurations, with no increases in capacity other than adjustments to optimize signal timings or phasings, or consolidate and/or close closely-spaced minor intersections. Some intersection deficiencies can be addressed in part through isolated widenings, such as providing new turn lanes or additional through lanes in the vicinity of intersections only. However, these improvements do not address anticipated operational deficiencies on sections of two-lane highway between intersections, and would introduce downstream capacity bottlenecks

where widened cross-sections narrow to the existing two-lane cross-section. As a result, while isolated intersection improvements may be appropriate as a staged approach to construction, in the long term this alternative does not fully address capacity deficiencies.

6.2.5 Widen Other Corridors

The EWRTMP modeled long-term traffic volumes considering numerous permutations of potential road network improvements. In one of the scenarios, Lauzon Parkway was widened and extended to a new interchange on Highway 401 to determine if the additional connection between Highway 401 and the E.C. Row Expressway could divert sufficient traffic volumes from CR 19 to mitigate anticipated capacity deficiencies. This scenario concluded that, even with Lauzon Parkway providing an additional north-south connection from Highway 401, widening CR 19 to four lanes is still required to provide sufficient capacity to accommodate projected demand.

Other parallel roadways in the vicinity of CR 19 could be improved or widened to provide additional north-south capacity in the broader corridor. However, CR 19 is the only road that provides a continuous north-south link through Essex County, and already provides key links to major east-west roadways (Highway 401 interchange, E.C. Row Expressway, Highway 3), residential, commercial and employment concentrations (east Tecumseh, west Lakeshore, Amy Croft commercial, Maidstone and Tecumseh Hamlet development areas) and agri-business throughout the area. As a result, widenings of other parallel roadways will not effectively address projected traffic demand that is already concentrated on CR 19.

6.2.6 New/Improved Provincial and Municipal Transportation Facilities

Widening CR 19 and CR 22 through the Study Area addresses anticipated future traffic capacity constraints by providing additional capacity at intersections and along mid-block sections. The widening will also accommodate future growth and development in the immediate and broader study area. No other alternatives fully address the anticipated deficiencies, although the alternatives of reducing transportation demand through TDM measures and land use planning and urban design should also be considered. Therefore, widening CR 19 and CR 22 has been carried forward as the preferred planning alternative, in conjunction with TDM measures.

6.3 Preliminary Design Alternatives

6.3.1 Introduction

Preliminary Design alternatives developed for CR 19 and CR 22 improvements are based on current MTO standards, as defined in the Geometric Design Standards for Ontario Highways (GDSOH) and Transportation Association of Canada Geometric Design Guides for Canadian Roads (TAC). The standards used for the design of CR 19 and 22 are based on a design speed of 20 km/h over the posted speed limit.

CR 19 is currently a 2 lane rural arterial undivided roadway with a posted speed of 80 km/h between Highway 3 and Pike Creek, where the posted speed reduces to 70 km/h from Pike Creek to Jamsyl Drive. North of Jamsyl Drive, the posted speed is 50 km/h. However, since the northern section is being developed, it will be changed to an urban arterial roadway. CR 19 will be improved and widened from 2 lanes to 4 lanes based on the following classifications:

- from Highway 3 to 225m south of CR 42, CR 19 will be a Rural Arterial Undivided (RAU 100) with a posted speed of 80 km/h
- from 225m south of CR 42 to CR 22, CR 19 will be an Urban Arterial Undivided (UAU 90) with a posted speed of 70 km/h.

CR 22, from the City of Windsor Boundary to CR 19, requires widening from 4 lanes to 6 lanes. It will be changed from an arterial road with at grade intersections to a controlled access freeway. The posted speed will be increased from 80 to 100 km/h. Improvements to CR 22 are based on standards for a Rural Freeway Divided (RFD) with a posted speed of 100 km/h and a design speed of 120 km/h.

Dillon developed a number of Preliminary Design alternatives for improving/widening CR 19 and 22 on a section-by-section basis, including the following:

- CR 19 from Highway 3 to CR 34
- CR 19 from CR 34 to North Rear Road
- CR 19/Highway 401 interchange
- CR 19 from 16/17 Sideroad to Pike Creek
- CR 19 from Pike Creek to Little Baseline Road

- CR 19/CR 22 intersection
- CR 22/Lesperance Road intersection.

Alternatives for the road widenings included widening symmetrically from the existing centre line of the road; widen to the right or left of the centre line, or a combination of these based on site specific conditions. Alternatives for the CR 19/CR 22 and CR 22/Lesperance Road intersections included a grade separation (for CR 22/Lesperance Road) and various types of interchanges. Factors used to comparatively evaluate the alternatives included traffic operations and safety, technical engineering considerations, impacts on the cultural, natural and socio-economic environments and costs.

6.3.2 CR 19 from Highway 3 to CR 34

As shown on the drawings included in **Appendix D**, Dillon developed two alternatives for this section of CR 19, including:

- Alternative 1, Centred on Existing Road, requiring a lengthy relocation of West Townline Drain
- Alternative 2, Road Shift 8 m East.

Table 38 is a comparative evaluation of Alternatives 1 and 2. Factors used to evaluate the alternatives included traffic operations and safety, technical engineering considerations, impacts on cultural resources, fisheries and aquatic habitat, terrestrial features, existing and future land uses and costs.

Table 38:
CR 19 from Highway 3 to CR 34
Comparative Evaluation of Alternatives 1 and 2

Evaluation Factors & Indicators	Potential Impacts		
	Alternative 1 **Centred on Existing Road (Drain relocation required)** ***(recommended)***	**Alternative 2** **Road Shift 8 m East**	**Recommended Alternative**
1. Traffic Operations & Safety			
Future Traffic Needs	Meets current and projected traffic volumes on CR 19	Same as Alt. 1	Equal
Road Safety Improvements	Requires guiderail along relocated drain	Requires guiderail along existing drain	Equal
2. Technical			
Efficient Use of Existing Infrastructure	Centering on existing road maximizes use of existing roadbed, but requires relocation of utilities on both sides of road	Not as efficient as Alt. 1, since road shift requires additional road construction. More efficient with utility relocations on east side only	Alt. 1
Constructability	More difficult to maintain traffic – requires temporary widening	Slightly easier to maintain traffic with alignment shift	Alt. 2
3. Cultural Resources			
Archaeological Resources	Requires strips of property on both sides, potentially affecting less land with high archaeological potential than Alt. 2	Requires more property on east side than Alt. 1, potentially affecting more land with high archaeological potential	Alt. 1
Built Heritage and Cultural Landscapes: - Talbot Road (CR 34) Historic (1818) Stagecoach Route Roadscape	Fewer impacts than Alt. 2 since reconstructed CR 19 is centred on existing alignment. One house needs to be removed	More impacts to intersection than Alt. 1 due to displacement of four buildings on east side of intersection	Alt. 1

Table 38:
CR 19 from Highway 3 to CR 34
Comparative Evaluation of Alternatives 1 and 2

Evaluation Factors & Indicators	Potential Impacts		
	Alternative 1 **Centred on Existing Road (Drain relocation required)** ***(recommended)***	**Alternative 2** **Road Shift 8 m East**	**Recommended Alternative**
4. Fisheries and Aquatic Habitat			
Newman Drain (intermittent)	Improvements to Hwy. 3 intersection require extension of existing culvert. Enhancement/compensation opportunities include riparian plantings, instream habitat features	Same as Alt. 1	Equal
West Townline Drain (Mooney Creek) (permanent warmwater baitfish habitat, high sensitivity)	Requires lengthy relocation of drain resulting in significant Harmful Alteration, Disruption or Destruction (HADD) of fish habitat. Potential compensation includes natural channel design, additional riparian plantings, instream habitat features	No HADD since drain is maintained in current location. Watercourse fisheries protection measures required	Alt. 2
South Talbot Road Drain North Talbot Road Drain	Improvements to CR 34 require modification of existing drainage systems (extension or enclosures). Enhancement/compensation opportunities include bank stabilization, riparian plantings, fix perched outfall	Same as Alt. 1	Equal
5. Terrestrial Features			
West Townline Drain Terrestrial Habitat	Relocated drain displaces habitat along corridor. Landscape Plan will provide some compensation	No impacts since drain is maintained in current location	Alt. 2
6. Existing and Future Land Uses			
"Prime Agricultural Land" (CLI Soil Classes 1 to 3)	Requires prime land for drain relocation and road widening, but less than Alt. 2 since prime land is mostly on east side	Requires more prime land on east side	Alt. 1
Existing Residential Uses	Fewer impacts than Alt. 2: - roadway widening will displace one house - drain relocation requires new entrance over drain to house on west side CR 19, north of Hwy. 3 - drain relocation "naturally" severs house at SW quadrant of CR 34 from adjoining farm (may already be severed)	Displaces two houses on east side of CR 19	Alt. 1
Existing Commercial Uses	Fewer impacts than Alt. 2: - roadway will be very close to "Cozy Corners" restaurant - relocated drain requires part of funeral home parking lot at CR 34	Displaces "Cozy Corners" and a garage. Fewer impacts on funeral home than Alt. 1	Alt. 1
Future Land Uses	Compatible with land use designations in Lakeshore and Tecumseh Official Plans, but drain relocation slightly reduces future development land that is: - designated "Neighbourhood Commercial" at SW quadrant of CR 34 in Tecumseh OP - designated for "Low Density Residential" between rail line and CR 34 in Tecumseh OP	Compatible, but easterly shift reduces amount of land available for "Neighbourhood Commercial" development at SE quadrant of CR 34	Alt. 2
Consistency with Provincial Policy Statement	Consistent, but adversely impacts fish habitat and requires some prime agricultural land	Consistent, but requires more prime agricultural land than Alt. 1	Alt. 1

Table 38:
CR 19 from Highway 3 to CR 34
Comparative Evaluation of Alternatives 1 and 2

Evaluation Factors & Indicators	Potential Impacts		
	Alternative 1 Centred on Existing Road (Drain relocation required) *(recommended)*	**Alternative 2 Road Shift 8 m East**	**Recommended Alternative**
7. Costs			
Capital Costs	Lower cost	Higher cost with complete new roadbed	Alt. 1

Alternative 1, Centred on Existing Road, was recommended as the preferred alternative since it:

- maximizes use of the existing roadbed
- requires less land with archaeological potential and less "prime agricultural land"
- removes one house, while Alternative 2 removes two
- requires part of a funeral home parking lot, while Alternative 2 displaces the "Cozy Corners" restaurant and a garage
- has a lower capital cost.

6.3.3 CR 19 from CR 34 to North Rear Road

Drain Relocation

Alternative 1, involving an extensive relocation of the West Townline Drain, was recommended as the preferred alternative from Highway 3 to CR 34. Dillon developed two options for the West Townline Drain relocation for the CR 34 to North Rear Road section, including Option B1, Minor Drain Relocation, and Option B2, Major Drain Relocation. These options are shown on the drawings included in **Appendix D**.

Dillon's comparative evaluation of Options B1 and B2 is shown on **Table 39**. Factors used to evaluate the options included traffic operations and safety, cultural resources, fisheries and aquatic habitat, terrestrial features, existing and future land uses and costs.

Table 39
CR 19 from CR 34 to North Rear Road
Comparative Evaluation of Options B1 and B2 (Drain Relocation)

Evaluation Factors & Indicators	Potential Impacts		
	Option B1 Minor Drain Relocation	**Option B2 Major Drain Relocation *(recommended)***	**Recommended Alternative**
1. Traffic Operations and Safety			
Future Traffic Needs	Meets current and projected traffic volumes on CR 19	Same as Option B1	Equal
Road Safety Improvements	Still requires guiderail along relocated drain	Eliminates all safety concerns	B2
2. Cultural Resources			
Archaeological Resources	Potentially affects less land with high archaeological potential. Requires less extensive Stage 2 assessments than B2	Requires more property potentially affecting more land with high archaeological potential. Could require more extensive Stage 2 assessments than B1	B1
Built Heritage and Cultural Landscapes: - West Townline Drain Roadscape (numerous culvert crossings)	Changes roadscape throughout this section with relocated drain adjacent to road and new entrance culverts	Minimizes impact to roadscape by relocating drain	B2
3. Fisheries and Aquatic Habitat			
West Townline Drain (Mooney Creek) (permanent warmwater baitfish habitat, high sensitivity)	Requires lengthy relocation of drain resulting in significant HADD of fish habitat. Can be compensated, but naturalization difficult in residential environment	Requires equally lengthy relocation of drain resulting in HADD of fish habitat. Compensation likely to be more successful in agricultural rather than residential environment	B2
4. Terrestrial Features			
West Townline Drain Terrestrial Habitat	Relocated drain displaces habitat along corridor.	Relocated drain displaces habitat along corridor but:	B2

Table 39
CR 19 from CR 34 to North Rear Road
Comparative Evaluation of Options B1 and B2 (Drain Relocation)

Evaluation Factors & Indicators	Potential Impacts		
	Option B1 Minor Drain Relocation	**Option B2 Major Drain Relocation (*recommended)***	**Recommended Alternative**
	Landscape Plan will provide some compensation	- landscape plantings likely to be more successful in agricultural environment - provides an opportunity to "tie into" woodlot north of CR 46 and naturalized portion of Mooney Creek in undeveloped area	
5. Existing and Future Land Uses			
"Prime Agricultural Land" (CLI Soil Classes 1 to 3)	Requires some farmland for drain relocation	Requires more farmland than B1	B1
Farm Operations (field access)	Limited impacts since drain is relocated along road	More impacts than B1 since drain potentially severs existing farm parcels limiting field access	B1
Existing Residential Uses	Requires new entrance to several houses	Entrances improved by relocating drain through agricultural area	B2
Existing Commercial Uses	Requires new entrance to nursery	Severs nursery property in two requiring a culvert crossing	B1
Future Land Uses	Compatible with land use designations in Lakeshore and Tecumseh Official Plans (poses same access constraints on Tecumseh "Residential" area as existing drain)	Drain relocation compatible with Tecumseh "Agricultural" area but requires farmland and constrains operations	B1
Consistency with Provincial Policy Statement	Consistent, but adversely impacts fish habitat and requires some farmland	Consistent, but requires significantly more farmland than B1	B1

Table 39
CR 19 from CR 34 to North Rear Road
Comparative Evaluation of Options B1 and B2 (Drain Relocation)

Evaluation Factors & Indicators	Potential Impacts		
	Option B1 Minor Drain Relocation	**Option B2 Major Drain Relocation (*recommended)***	**Recommended Alternative**
6. Costs			
Capital Costs	Higher cost for additional culverts	Lower cost	B2

Option B2, Major Drain Relocation, was recommended as the preferred option for the following reasons:

- B2 eliminates all safety concerns regarding the proximity of the drain to the road
- although B1 and B2 both result in a significant HADD of fish habitat in the West Townline Drain, compensation for B2 is likely to be more successful because it will be located in an agricultural rather than a residential environment
- B1 and B2 also displace a significant amount of terrestrial habitat along the drain. With Option B2, similar to the fisheries compensation, landscape plantings along the relocated drain are likely to be more successful in an agricultural environment. Also, the relocated drain provides an opportunity to tie the drain into the naturalized portion of Mooney Creek and surrounding woodlot.

Option B2, however, requires more farmland than B1 and severs existing farm holdings.

CR 19 Widening

As shown on the drawings included in **Appendix D**, Dillon developed three alternatives for the widening of CR 19 from CR 34 to North Rear Road. Option B2, the preferred option for relocating the West Townline Drain, was incorporated into all three of the following alternatives:

- Alternative 1, Centred on Existing Road
- Alternative 2, Road Shift 8 metres East
- Alternative 3, Road Shift East and West.

Table 40 is a comparative evaluation of Alternatives 1, 2 and 3 using the evaluation factors and indicators shown on the table. Alternative 3, Road Shift East and West with Option B2, was recommended as the preferred alternative since it:

- eliminates safety concerns associated with the West Townline Drain
- allows traffic to be more easily maintained during construction with the easterly shift
- moves the traveled portion of the road away from existing houses on the east side of the road, including two farmhouses with cultural heritage value
- has fewer impacts on the Croft Drain's fisheries and terrestrial habitat.

Alternative 3, however, requires the most farmland compared to the other alternatives.

Table 40:
CR 19 from CR 34 to North Rear Road
Comparative Evaluation of Alternatives 1, 2, and 3

Evaluation Factors & Indicators	Potential Impacts			
	Alternative 1 Centred on Existing Road	**Alternative 2 Road Shift 8m East**	**Alternative 3 Road Shift East and West *(recommended)***	**Recommended Alternative**
1. Traffic Operations and Safety				
Future Traffic Needs	Meets current and projected traffic volumes on CR 19	Same as Alt. 1	Same as Alt.'s 1 and 2	Equal
Road Safety Improvements	Eliminates safety concerns associated with drain for section from CR 46 to North Rear Road	Requires guiderail along drain	Eliminates safety concerns associated with drain, but introduces a slight curvilinear alignment at CR 46	Alt. 3
2. Technical				
Efficient Use of Existing Infrastructure	Centering on existing road maximizes use of existing roadbed, but requires utility relocations on both sides of road	Not as efficient as Alt. 1 since road shift requires additional road reconstruction	Similar to Alt. 2, but less utility relocations required on east side from CR 46 to North Rear Road	Alt. 1
Constructability	More difficult to maintain traffic – requires temporary widening	Slightly easier to maintain traffic with alignment shift	Same as Alt. 2	Alt. 2 & 3
3. Cultural Resources				
Archaeological Resources	Requires strips of property on both sides, potentially affecting less land with high archaeological potential	Requires more property on east side than Alt. 1, potentially affecting more land with high archaeological potential	Similar to Alt. 2 with more property required on east side south of CR 46 and on west side north of CR 46	Alt. 1
Built Heritage and Cultural Landscapes: - Maidstone Crossing (historic crossing of three roads, schoolhouse)	Changes roadscape by adding a cul-de-sac on North Talbot Road and Old Hwy 114	Same as Alt. 1	Same as Alt.'s 1 and 2	Equal
- former farmhouse, 3458 CR 19, on east	Requires portion of front yard	Significant impact – may be displaced by easterly shift	Moves traveled portion of roadway slightly away from	Alt. 3

Table 40:
CR 19 from CR 34 to North Rear Road
Comparative Evaluation of Alternatives 1, 2, and 3

Evaluation Factors & Indicators	Potential Impacts			
	Alternative 1 Centred on Existing Road	**Alternative 2 Road Shift 8m East**	**Alternative 3 Road Shift East and West *(recommended)***	**Recommended Alternative**
side CR 19, north of CR 46 - 1913 farmhouse, 3320 CR 19, north of North Rear Road	House must be removed	Same as Alt. 1	house East edge of pavement maintained, with minor impact to front yard	Alt. 3
4. Fisheries and Aquatic Habitat				
Croft Drain (intermittent, moderate sensitivity)	Requires some modifications at both upstream and downstream ends. Potential compensation includes bank stabilization/riparian plantings, instream cover, low flow passage to enhance fish passage	Requires more extensive modifications than Alt. 1 with more impacts to upstream end. Same potential compensation as Alt. 1	Less impacts than Alt. 1 with impacts on downstream end only	Alt. 3
5. Terrestrial Features				
Croft Drain Terrestrial Habitat	Modifications to drain displace some habitat. Landscape Plan will provide compensation	More habitat displaced than Alt. 1	Less habitat displaced than Alt. 1	Alt. 3
6. Existing and Future Land Uses				
"Prime Agricultural Land" (CLI Soil Classes 1 to 3)	Requires some farmland for widening, but less than Alt. 2 since road is centred on existing alignment	Requires less farmland than Alt. 1 since more residential and commercial property required	Requires the most farmland	Alt. 2
Existing Residential Uses	Requires a significant portion of front yards of houses along road. Impacts can be minimized by "urban section"	Could potentially displace approximately 15 houses on east side of road	Moves traveled portion of roadway further away from houses on east side of road	Alt. 3
Existing Commercial Uses	Some impacts on gas station at CR 46	Displaces gas station	No impact on gas station	Alt. 3
Future Land Uses	Compatible with Maidstone Secondary Plan for "Residential" development. Slightly reduces future development land	Compatible with Maidstone Secondary Plan for "Residential" development, with no impact on future development land	Same as Alt. 2	Alt.'s 2 & 3
7. Costs				
Capital Costs	Less costly than Alt.'s 2 & 3	Higher cost with completely new roadbed	Higher cost with completely new roadbed	Alt. 1

6.3.4 CR 19/Highway 401 Interchange

Only one alternative was developed for the CR 19/Highway 401 interchange. Plans included in **Appendix D** show Alternative 1, with CR 19 shifted to the west. Shifting the road to the west allows traffic to be maintained on the existing Highway 401 underpass during construction of improvements to CR 19. Also, shifting CR 19 to the east is not possible due to the location of Memorial Woods in the southeast quadrant of the interchange.

Table 41 is an impact assessment of Alternative 1. As shown on the table, Alternative 1:

- meets current and projected traffic volumes on Highway 401 and CR 19 and improves sightlines, geometry and operation of the interchange
- maximizes use of the existing interchange and accommodates the existing commuter parking lot and future expansion
- requires the removal of the farmhouse at 5033 Manning Road and impacts the front yards of several houses. The farmhouse is part of a farm complex developed before 1881
- requires the replacement of the CR 19 underpass structure at Highway 401. Since the bridge is more than 40 years old, it is eligible for listing in the Ontario Heritage Bridge Program
- requires additional archaeological assessments
- will not likely result in a HADD of fish habitat
- requires the removal of some roadside trees in the southwest quadrant
- requires a significant amount of "prime agricultural land".

Table 41:
Highway 401 Interchange
Impact Assessment of Alternative 1, CR 19 Shifted West

Evaluation Factors and Indicators	Alternative 1 - Potential Impacts
1. Traffic Operations & Safety	
Future Traffic Needs	Meets current and projected traffic volumes for 401 and CR 19
Road Safety Improvements	Improves sightlines, geometry and operation of interchange by upgrading interchange to current design standards
2. Technical	
Support of other Transportation Modes	Does not support other modes, but accommodates a commuter parking lot
Efficient Use of Existing Infrastructure	Maximizes use of existing interchange
Constructability	Traffic can be maintained on CR 19 and Hwy 401 during reconstruction of interchange at CR 19/401

Table 41:
Highway 401 Interchange
Impact Assessment of Alternative 1, CR 19 Shifted West

Evaluation Factors and Indicators	Alternative 1 - Potential Impacts
3. Cultural Resources	
Archaeology	Requires additional archaeological assessments for lands not covered by GWP-62-00-00
Built Heritage & Cultural Heritage Landscapes: - farm complex, 5033 CR 19 (before 1881) SW of 401 interchange	 Requires removal of house
- access to OPP, Essex Detachment and Memorial Woods monument (commemorating 1999 multiple vehicle accident)	Interchange improvements require removal of direct access to/from 401 eastbound. Access changed to North Rear Road and 10th Concession
- CR 19 Underpass Structure (dated 1966)	Underpass is more than 40 years old and qualifies for listing in Ontario Heritage Bridge Program. A Cultural Heritage Evaluation Report (CHER) will be completed during Detailed Design
- Highway 401 Roadscape (opened on August 15, 1957)	No impacts
- 16/17 Sideroad (part of original survey of Maidstone Township)	Sideroad realigned at CR 19 to provide additional separation from interchange ramps
4. Fisheries and Aquatic Habitat	
10th Concession Drain (warmwater baitfish habitat)	Reconstruction of E-N/S Ramp and 16/17 Sideroad realignment requires "like for like" culvert replacement, not likely resulting in a HADD. Compensation could include channel restoration and riparian plantings

Table 41: Highway 401 Interchange Impact Assessment of Alternative 1, CR 19 Shifted West	
Evaluation Factors and Indicators	**Alternative 1 - Potential Impacts**
5. Terrestrial Features	
Vegetation	Interchange improvements may require removal of some roadside trees in SW part of interchange
6. Existing and Future Land Uses	
"Prime Agricultural Land" (CLI Soil Classes 1 to 3)	Interchange improvements, shifting CR 19 to the west, access road to Coxon's (NW quadrant), and 16/17 Sideroad realignment require a significant amount of farmland
Farm Operations	Improvements change some field access points
Existing Residential Uses	Shifting CR 19 to west requires removal of one house and property from the front yards of a number of residences
"General Commercial" lands (Tecumseh Official Plan) at NW Interchange Quadrant	New interchange ramps and access road reduce amount of developable land
"Employment" lands (part of Hwy. 401 Employment Area in Lakeshore Official Plan) at SE Interchange Quadrant	Removal of Memorial Drive increases the amount of developable land, but likely requires changes to NAFTC Studios proposal
Consistency with Provincial Policy Statement	Consistent, but requires a substantial amount of "Prime Agricultural Land"

6.3.5 CR 19 from 16/17 Sideroad to Pike Creek

Only one alternative was developed for the section of CR 19 from 16/17 Sideroad to Pike Creek, as shown on the plan in **Appendix D**. Alternative 1 involves centering widened CR 19 on the existing alignment to maximize the use of existing road infrastructure and minimize the widening's impacts.

An impact assessment of Alternative 1 is shown on **Table 42**. Alternative 1:

- meets current and projected traffic volumes and improves sightlines and geometry
- requires Stage 2 archaeological assessments along its entire length
- requires some modifications to East Townline Drain but impacts can be mitigated
- requires the removal of some roadside trees on both sides of the road
- requires changes to many field access points but minimizes the amount of "prime agricultural land" required
- impacts the front yards of several houses.

Table 42: CR 19 from 16/17 Sideroad to Pike Creek Impact Assessment of Alternative 1, Centred on Existing Road	
Evaluation Factors and Indicators	**Alternative 1 - Potential Impacts**
1. Traffic Operations & Safety	
Future Traffic Needs	Meets current and projected traffic volumes on CR 19
Road Safety Improvements	Improves sightlines and geometry. Sideroad closures and signals at Baseline Road further improve safety
2. Technical	
Support of other Transportation Modes	None
Efficient Use of Existing Infrastructure	Centered alignment maximizes use of existing infrastructure
Constructability	Not difficult to construct, but requires temporary widening to maintain traffic
3. Cultural Resources	
Archaeological Resources (adjoining lands all have "high" archaeological potential)	Requires Stage 2 archaeological assessment of undisturbed lands along entire length

Table 42: CR 19 from 16/17 Sideroad to Pike Creek Impact Assessment of Alternative 1, Centred on Existing Road	
Evaluation Factors and Indicators	**Alternative 1 - Potential Impacts**
Built Heritage & Cultural Heritage Landscapes:	
- 13/14 Sideroad Roadscape (part of original survey of Maidstone Township)	Road closed for safety reasons
- Baseline Road (part of original survey of Sandwich Township)	Minor changes for intersection improvements and signalization
- Agricultural landscape (reflects original surveys of two townships)	No impacts
4. Fisheries and Aquatic Habitat	
East Townline Drain (South) (intermittent warmwater baitfish habitat, mapped as *SARA* channel darter habitat)	DFO has confirmed that drain does not provide channel darter habitat. Minor drain modifications can be mitigated by removing migration barrier to Pike Creek and instream concrete structure south of Pike Creek
5. Terrestrial Features	
Vegetation	Likely requires the removal of some roadside trees on both sides of road
6. Existing and Future Land Uses	
"Prime Agricultural Land" (CLI Soil Classes 1 to 3)	Centred alignment minimizes the amount of land required. All adjoining lands are designated for long term "Agricultural" use in Lakeshore and Tecumseh Official Plans
Farm Operations	Road widening likely to require changes to many field access points
Existing Residential Uses	Impacts the front yards of existing residences
Consistency with Provincial Policy Statement	Consistent – minimizes amount of farmland required

6.3.6 CR 19 from Pike Creek to Little Baseline Road

Plans included in **Appendix D** show the two Preliminary Design alternatives developed for the Pike Creek to Little Baseline Road section of CR 19. Alternatives include:

- Alternative 1, Centred on Existing Road
- Alternative 2, Road Shift East at CR 42 to "save" the gas station at the northwest corner of the CR 19/CR 42 intersection.

Table 43 is a comparative evaluation of the two alternatives based on the evaluation factors and indicators shown on the table. Alternative 1, Centred on Existing Road, was recommended as the preferred alternative. Although Alternative 2 saves the gas station at the intersection, it brings the road much closer to the fairly new houses on the east side of CR 19. As a result, it has no advantages compared to Alternative 1. Alternative 1 also has a few advantages over Alternative 2, including:

- it improves sightlines at the CR 19/CR 42 intersection
- centering the widening on the existing road minimizes impacts on Pike Creek.

Table 43: CR 19 from Pike Creek to Little Baseline Road Comparative Evaluation of Alternatives 1 and 2			
Evaluation Factors & Indicators	**Alternative 1 Centered on Existing Road *(recommended)***	**Alternative 2 Road Shift East at CR 42**	**Recommended Alternative**
1. Traffic Operations & Safety and Highway Engineering			
Future Traffic Needs	Meets current and projected traffic volumes on CR 19	Same as Alt. 1	Equal
Road Safety Improvements	Eliminates safety concerns with at-grade railway crossing	Same as Alt. 1	Equal
2. Cultural Resources			
Archaeological Resources (adjoining lands all have "high" archaeological potential)	Requires Stage 2 archeological assessment of undisturbed lands along entire length	Same as Alt. 1	Equal

Table 43:
CR 19 from Pike Creek to Little Baseline Road
Comparative Evaluation of Alternatives 1 and 2

Evaluation Factors & Indicators	Alternative 1 Centered on Existing Road *(recommended)*	Alternative 2 Road Shift East at CR 42	Recommended Alternative
Built Heritage & Cultural Landscapes:			
- Pike Creek Bridge (1955)	No impacts (if bridge widened, not replaced). Bridge has undergone extensive modifications and only abutments appear to be original	Same as Alt.	Equal
- CR 42 Roadscape (reflects differences in surveys of East and South Sandwich Townships)	Requires removal of existing gas station in NW quadrant, but improves sightlines at intersection	No impacts	Alt. 1
- 2575 CR 19, 19th c. farmhouse	Brings traveled portion of road closer to house	Less impact than Alt. 1 due to easterly shift	Alt. 2
- CP Rail (1880 level crossing, gate and signals)	Crossing replaced by grade separation	Same as Alt. 1	Equal
3. Fisheries and Aquatic Habitat			
Pike Creek (high/rare fish habitat sensitivity, warmwater baitfish, gamefish, northern pike, *SARA* channel darter habitat)	Centering minimizes impacts on creek. No HADD caused by bridge widening. Potential enhancement measures include: - instream cover structures - improve fish passage - stabilize erosion - riparian plantings	Same as Alt. 1, but slightly more impact on creek	Alt. 1

Table 43:
CR 19 from Pike Creek to Little Baseline Road
Comparative Evaluation of Alternatives 1 and 2

Evaluation Factors & Indicators	Alternative 1 Centered on Existing Road *(recommended)*	Alternative 2 Road Shift East at CR 42	Recommended Alternative
East Townline Drain (North) (warmwater baitfish habitat, low sensitivity)	Minor modifications. No enhancement opportunities identified since drain has low sensitivity	Same as Alt. 1	Equal
Manning Road Drain (intermittent, no fish habitat)	Requires drain relocation. No enhancement or compensation required	Same as Alt. 1	Equal
4. Terrestrial Habitat			
Vegetation	Likely requires the removal of some roadside trees for widening	Same as Alt. 1	Equal
5. Existing and Future Land Uses, Recreation			
Changes in Access to Residential and Commercial Uses	CP Rail grade separation requires a service road to residential and commercial uses in vicinity of crossing	Same as Alt. 1	Equal
Existing Residential and Commercial Uses	Brings traveled portion of road closer to all uses. Displaces gas station at NW corner of CR 42	Although the easterly shift saves gas station, it brings road closer to houses at CR 42 intersection	Alt. 1
Navigability of Pike Creek	Bridge widening will maintain current navigational opening. New bridge requires Transport Canada approval under *NWPA*	Same as Alt. 1	Equal
Future Land Uses	Proposed future roads provide access to planned "Residential" and "Hamlet Development" in Tecumseh	Same as Alt. 1	Equal
Consistency with Provincial Policy Statement	Consistent	Same as Alt. 1	Equal

Table 43: CR 19 from Pike Creek to Little Baseline Road Comparative Evaluation of Alternatives 1 and 2			
Evaluation Factors & Indicators	**Alternative 1 Centered on Existing Road *(recommended)***	**Alternative 2 Road Shift East at CR 42**	**Recommended Alternative**
6. Costs			
Capital Costs	Similar to Alt. 2	Similar to Alt. 1	Equal

6.3.7 CR 19/CR 22 Interchange

As previously explained, anticipated traffic volumes at the CR 19/CR 22 intersection exceed levels that could be reasonably accommodated at an at-grade intersection. As shown on the plans included in **Appendix D**, Dillon developed three alternatives for an interchange at CR 19/CR 22, including:

- Alternative 1, Parclo B – Diamond Interchange, with the W-N movement accommodated via a loop-off ramp in the southeast quadrant
- Alternative 2, Single Point Urban Interchange (SPUI) where all ramps converge at a single intersection on CR 19
- Alternative 3, Diamond Interchange, with two ramp interchanges on CR 19.

Both Alternatives 1 (Parclo B – Diamond) and 2 (SPUI) provide sufficient capacity to meet future demand at the ramp terminal intersections. Although Alternative 1 reduces the magnitude of weaving on CR 22 between the potential Lesperance Road and CR 19 interchanges (by separating eastbound exiting traffic into two off-ramps) and increases ramp spacing on CR 19, it reduces spacing to Jamsyl Drive. The SPUI configuration reduces the number of intersections on CR 19 and increases intersection spacing, but increases the number of left turns required from the ramps and increases the magnitude of weaving on CR 22.

Alternative 3 (Diamond Interchange) provides sufficient capacity at the ramp terminals considered in isolation, but the short spacing between ramp terminals on CR 19, combined with the high projected volumes, may result in operational problems in the long term under the higher-volume scenario. Problems include limited left turn and through lane queue storage potentially leading to interlocking left turn movements.

A comparative evaluation of the three alternatives is shown on **Table 44**. Dillon recommended that Alternative 2, the SPUI, be selected as the preferred alternative for the following reasons:

- the SPUI meets future traffic demands at the ramp terminals. It also results in better traffic operations by providing better spacing and storage between the ramp terminal and Amy Croft Drive, compared to the other alternatives
- Alternative 2 removes fewer trees
- Alternatives 2 and 3 remove three houses, while Alternative 1 removes six. Alternative 2 removes the same number of commercial/industrial uses (five) as the other alternatives
- Alternative 2 requires the least amount of property, including land designated for future commercial and industrial development.

Alternative 2, however, has higher capital and maintenance costs than Alternatives 1 and 3.

Table 44: CR 19/CR 22 Interchange Comparative Evaluation of Alternatives 1, 2 and 3				
Evaluation Factors & Indicators	**Alternative 1 Parclo B-Diamond Interchange**	**Alternative 2 Single Point Interchange (*Recommended*)**	**Alternative 3 Diamond Interchange**	**Recommended Alternative**
1. Traffic Operation & Safety				
Ability to Meet Future Traffic Needs	Meets future demands at ramp terminals. Eastbound off-ramps allow free-flow operations	Meets future demands at ramp terminals. More spacing and storage between ramp terminal and Amy Croft Dr. compared to other alternatives	Configuration breaks down at higher volumes due to short spacing between ramp terminals	Alt. 2
Road Safety Improvements	Driver familiarity with standard configuration, reduced weaving activity between Lesperance and CR 19 interchanges due to separate eastbound ramps. Inner loop exit	Driver unfamiliarity with uncommon configuration, increased weaving activity between Lesperance and CR 19 interchanges	Driver familiarity with standard configuration, increased weaving activity between Lesperance and CR 19 interchanges. Left turn still required for	Alt. 3

Table 44:
CR 19/CR 22 Interchange
Comparative Evaluation of Alternatives 1, 2 and 3

Evaluation Factors & Indicators	Alternative 1 Parclo B-Diamond Interchange	Alternative 2 Single Point Interchange (*Recommended*)	Alternative 3 Diamond Interchange	Recommended Alternative
	ramps are discouraged. Less weaving length between on ramp and Lakeshore Blvd.		eastbound to northbound traffic	
2. Technical				
Supports Other Transportation Modes	Sidewalks and on-road bike lanes could be provided. Difficult crossing on-ramps	Sidewalks and on-road bike lanes could be provided. Crossing at some ramp terminals are controlled	Sidewalks and on-road bike lanes could be provided. Crossing at all ramp terminals are controlled	Alt. 3
Efficient Use of Existing Infrastructure	Does not make use of existing infrastructure	Same as Alt. 1	Same as other Alt.'s	Equal
Constructability	Difficult, but can be staged to maintain traffic movements	Same as Alt. 1	Same as other Alt.'s	Equal
3. Cultural Resources				
Archaeological Resources ("moderate" potential with some "low" potential areas)	Requires the most property, potentially affecting more lands with moderate archaeological potential. Requires more extensive Stage 2 assessments	Requires the least amount of land potentially affecting less land with archaeological potential	Requires the second most amount of land, potentially affecting land with archaeological potential	Alt. 2
Built Heritage & Cultural Heritage Landscapes: - CR 19 Roadscape (formerly known as East Townline Road opened in mid-19th c.)	Interchange significantly changes roadscape	Same as Alt. 1	Same	Equal
- East Townline Drain Roadscape (numerous culvert crossings)	Changes roadscape throughout this section	Same as Alt. 1	Same	Equal
- Manning Road Drain Roadscape (relocated in 1968)	Drain relocation changes roadscape	Same as Alt. 1	Same	Equal
4. Natural Features				
Fisheries, Aquatic and Terrestrial Habitat	Likely requires removal of roadside trees in SE quadrant of CR 19/CR 22. Primarily an urban environment	Fewer trees removed than Alt. 1	Fewer trees removed than Alt. 1	Alt.'s 2 & 3
5. Existing and Future Land Uses				
Existing Residential Uses	6 houses displaced	3 houses displaced	3 houses displaced	Alt.'s 2 & 3
Existing Commercial/ Industrial Uses	5 commercial/ industrial uses displaced	5 commercial/industrial uses displaced	5 commercial/ industrial uses displaced. Impacts access to commercial uses south of Desro Dr.	Alt.'s 1 & 2

Table 44:
CR 19/CR 22 Interchange
Comparative Evaluation of Alternatives 1, 2 and 3

Evaluation Factors & Indicators	Alternative 1 Parclo B-Diamond Interchange	Alternative 2 Single Point Interchange (*Recommended)*	Alternative 3 Diamond Interchange	Recommended Alternative
Future Land Uses	Requires a significant amount of vacant land designated "Town Centre" in Lakeshore Official Plan at SE quadrant. Reduces available land for development	Requires significantly less "Town Centre" land than Alt. 1	Less impact on "Town Centre" land than Alt. 1, more impact than Alt. 2	Alt. 2
Consistency with Provincial Policy Statement	Consistent	Consistent	Consistent	Equal
6. Costs				
Capital and Maintenance Costs	Extra cost for loop ramp estimated at about $1.0M for structure and about $0.8M for roadwork. Some additional maintenance costs for additional loop ramp	Structure costs about $2.2M more and retaining wall costs about $0.5M more than other alternatives. Future maintenance also more costly	Lowest capital and maintenance costs.	Alt. 3

6.3.8 CR 22 at Lesperance Road

Three alternatives were initially developed for this intersection, including Alternative 1, Diamond Interchange, Alternative 2, Grade Separation and Alternative 3, Single Point Interchange. Alternative 2, Grade Separation, was presented as the recommended design alternative at PIC 2. Two new alternatives were subsequently developed and presented at PIC 3, based on public and agency concerns regarding the impacts of the grade separation on existing and future commercial development at the intersection. The new alternatives included Alternative 4, Half Diamond Interchange, and Alternative 5, Half Diamond Interchange with a flyoff. In addition, Alternative 2 was modified by adding a flyoff.

In all, Dillon developed the following five alternatives for this intersection, as shown on the plans in **Appendix D**:

- Alternative 1, Diamond Interchange
- Alternative 2, Grade Separation with a Flyoff (button hook) to Sylvestre Drive
- Alternative 3, Single Point Interchange
- Alternative 4, Half Diamond Interchange
- Alternative 5, Half Diamond Interchange with a Flyoff (button hook) to Sylvestre Drive.

All five alternatives involve taking CR 22 over Lesperance Road on a new overpass structure, while keeping Lesperance Road at existing grade elevation.

6.3.8.1 Alternatives

Alternative 1 – Diamond Interchange

This alternative provides a full interchange with Lesperance Road in a diamond configuration on both the north and south sides of CR 22. All ramps are single lane ramps terminating at intersections controlled by traffic signals on Lesperance Road. Diamond interchanges are very common in Ontario.

The close spacing between the ramp terminals requires careful traffic signal co-ordination and short cycle lengths to limit traffic queuing and blocking of intersections during the red phase of the cycle. A 60-second cycle length and 45 metres of left turn storage is required in both directions, based on MTO's design standards for left turn storage. This requires that left turn lanes be provided side by side (i.e., a four lane cross-section of Lesperance Road under CR 22).

With Alternative 1, the Westlake Drive intersection is not anticipated to warrant signalization. Based on operational analyses using Synchro analysis software, the distance between the south ramp terminal and Westlake Drive (approximately 65 to 70 metres from centre line to centre line) may not provide sufficient room to accommodate northbound peak hour queues (about 65 to 70 metres) without blocking Westlake Drive. Southbound left turn volumes at Westlake Drive are projected to be low with Alternative 1, so a minimum 15 metre left turn lane will be sufficient. If volumes on Westlake Drive increase significantly beyond current projections, additional storage length could be required. In addition, higher traffic volumes on Westlake Drive may require that the intersection fall under stop control.

Alternative 2 – Grade Separation with Flyoff to Sylvestre Drive

Alternative 2 provides a grade separation with limited access to Lesperance Road. Partial access is maintained for traffic traveling eastbound from the City of Windsor exiting at a new buttonhook type exit ramp to Sylvestre Drive. A new connecting road is needed to connect Westlake Drive and Sylvestre Drive to bring traffic to Lesperance Road. This will require the installation of traffic signals at Lesperance Road and Westlake Drive. With the construction of a new overpass structure and elimination of the intersection at CR 22, two lanes of traffic will be provided on Lesperance Road.

With proper overhead signage, the proximity of the two eastbound interchange exit ramps for Lesperance Road and CR 19 have been spaced to provide sufficient decision distance for drivers.

Partial interchanges, which do not provide access back to the main freeway, are not common in Ontario. Proper signage directing traffic to alternative roads is essential for exiting eastbound traffic that wishes to return to eastbound CR 22.

Alternative 3- Single Point Interchange

This alternative provides a full interchange with Lesperance Road in a single point interchange (SPUI) configuration. All ramps are single lane ramps converging at a single point intersection on Lesperance Road under CR 22. SPUI type interchange configurations are uncommon in Ontario, but are used at several interchanges in the State of Michigan. If a SPUI is selected as the preferred alternative, the recommended SPUI interchange at CR 19/22 will provide a nearby comparable example to increase driver familiarity.

The entrance and exit ramps for a SPUI interchange are similar to a diamond interchange with the ramps converging at one intersection controlled by one set of traffic signals using three distinct phases (one phase for left turns from CR 22; a second phase for left turns onto CR 22; and a third for through traffic on Lesperance Road). Similar to Alternative 1, it is anticipated that signals will not be warranted at Westlake Drive, based on current projections. Since the ramps will be controlled by a single signalized intersection and a signal would not be in place at Westlake Drive, traffic signal coordination will be necessary. Alternatively, if signalization is ultimately warranted at Westlake Drive, due to higher than projected volumes, the signals at Westlake Drive should be coordinated with the SPUI signals.

Alternative 4- Half Diamond Interchange

This alternative provides a partial interchange with Lesperance Road in a half diamond configuration on the west side of Lesperance to accommodate traffic movements going to and from the City of Windsor. The south ramp terminal (eastbound traffic exiting CR 22) will need to be signalized, but the north ramp terminal traffic entering westbound CR 22 could operate as an unsignalized intersection. Similar to Alternatives 1 and 3, it is anticipated that signals will not be warranted at Westlake Drive, based on current projections. Therefore, similar to Alternative 3, with only one traffic signal required in the corridor, signal coordination will not be required.

With this alternative, the spacing between the north and south ramp terminals has been compressed since left turn storage is not required in the southbound direction between the interchange ramps. Spacing between the ramps can accommodate northbound left turn queues and southbound through queues as calculated by Synchro analyses, but it will be too short to accommodate a 65-metre left turn storage lane (as required by MTO's left turn storage lane standards). Spacing south of the interchange can accommodate northbound through queues on Lesperance Road, without blocking the Westlake Drive intersection.

As mentioned, partial interchanges are not common in Ontario. These types of interchanges do not provide access back to the main freeway. Proper signage is essential for eastbound traffic that uses this exit and wishes to return to eastbound CR 22 via an alternative route.

Alternative 5 – Half Diamond/Button Hook Interchange

Like Alternative 4, this alternative provides a partial interchange with Lesperance Road to accommodate major traffic movements to and from the City of Windsor. Traffic wishing to go west on CR 22 would use the half diamond interchange ramp on the north side of CR 22, while eastbound traffic wishing to exit at Lesperance Road would exit at a new buttonhook type exit ramp to Sylvestre Drive. A new connecting road would need to be constructed to connect Westlake Drive and Sylvestre Drive to bring traffic to Lesperance Road. Traffic signals will be required for the Westlake Drive/Lesperance Road intersection.

This alternative provides similar connections to Alternative 4. It has the benefit of reducing the number of intersections along Lesperance Road and, as a result, has greater intersection spacing better able to accommodate left turn queues. It also increases the weaving distance eastbound on CR 22 between the Banwell Road on-ramp and the Lesperance Road off-ramp. However, it results in more indirect travel for

eastbound traffic exiting CR 22. Traffic signals will be required at Westlake Drive to accommodate off-ramp traffic.

Since this is also a partial interchange, proper signage is essential for eastbound traffic that uses this exit and wishes to return to eastbound CR 22 via an alternative route.

6.3.8.2 Comparative Evaluation of Alternatives

Table 45 is a comparative evaluation of the five alternatives based on six evaluation factors. Factors include traffic operations and safety, technical, cultural resources, natural features, existing and future land uses and costs. Since this area is located in an urbanized area, all five alternatives have no impacts on natural features.

While sufficient capacity is provided by all five alternatives, Alternatives 1 and 3 best meet future traffic needs. With these two alternatives, all existing movements continue to be accommodated at the Lesperance Road / CR 22 interchange, and no additional traffic diversion is required to alternate routes. The increased network connectivity and more direct routings with these two alternatives result in decreased travel time overall. However, Alternatives 1 and 3 introduce operational constraints and present more safety concerns. These include short weaving sections west and east of Lesperance Road on CR 22, closely-spaced intersections on Lesperance Road with potential for queues to block upstream intersections (particularly for Alternative 1), side street delays on Westlake Drive, limited sightlines to traffic signals as a result of the CR 22 overpass and some initial driver unfamiliarity with Alternative 3's single-point interchange.

From an operational and safety perspective, Alternative 5 is preferred since the ramp terminals and Westlake Drive intersection will operate at an excellent level of service. The additional diverted trips for Alternative 5 are less than Alternative 2. As a result, Alternative 5 has fewer impacts on level of service at other locations. In addition, the removal of the westbound exit ramp eliminates weaving for westbound traffic on CR 22 between Lesperance Road and CR 19.

Technical Considerations
For technical considerations, including support for other transportation modes, efficient use of existing infrastructure and constructability, Alternatives 2 and 5 are preferred:

- both alternatives accommodate pedestrians and cyclists. With Alternative 5, the potential for conflicts at ramp terminals can be eliminated by keeping a sidewalk on the east side of Lesperance Road
- both Alternatives 2 and 5 require minimal reconstruction of Lesperance Road
- Alternative 2 is easier to construct because traffic flow on CR 22 can be managed due to the shift to the south, Lesperance can be fully closed during construction and construction will take less time.

Cultural Resources
Alternatives 2 and 5 are preferred with respect to impacts on cultural resources. Alternative 2 entirely avoids St. Anne's Cemetery while a slight easterly shift is required for Alternative 5 to avoid the cemetery. Both alternatives have the least impact on the historic Lesperance roadscape.

Existing and Future Land Uses
With respect to impacts on existing residential uses and the surrounding residential neighbourhood, Alternative 5 is preferred overall:

- Alternatives 1 and 3 displace approximately 15 houses in the SW and NE quadrants of the intersection. Alternative 4 displaces eight houses in the SW quadrant and requires "slivers" of property from six houses (possibly reduced to two by retaining walls) in the NE quadrant. Alternatives 2 and 5 do not remove any houses, but Alternative 5 requires slivers of property from two houses in the NE quadrant
- with respect to traffic impacts on residential neighbourhoods, Alternatives 4 and 5 are preferred. Both alternatives reduce traffic on Lesperance Road with traffic diverted to non-residential or future planned streets
- the interchanges provided by some of the alternatives will encourage Lesperance Road to function more as an arterial road connection to CR 22. This is inconsistent with the road's intended function as a "Collector Road", as designated in the Tecumseh Official Plan. Alternatives 2 and 5 are more consistent with the road's designated collector function.

Alternative 2, and to a lesser extent Alternatives 4 and 5, will decrease traffic volumes on Lesperance Road north and south of CR 22 and improve conditions for residents along that section. The lack of a direct connection to the west with Alternative 2 will require local residents to use alternate routes to and from CR 22, which will increase traffic on other east-west residential streets south of CR 22 (e.g., Gouin Street;

Intersection Road). With Alternatives 4 and 5, only movements to and from the east are diverted to alternate routes (predominantly on Westlake Drive to Sylvestre Drive). With Alternatives 1 and 3, traffic on local neighbourhood streets will not increase since no alternate routes are required. With both alternatives, traffic on Lesperance Road will be maintained at existing levels, plus increases corresponding to future development in the Tecumseh Hamlet areas.

Alternatives 1, 3 and 4 also have significant impacts on existing commercial uses. Although these alternatives provide adequate access and traffic volumes to support existing uses, they remove most of the major commercial uses at the CR 22 and Lesperance Road intersection. Alternatives 1 and 3 displace Tecumseh Home Hardware and Tecumseh Town Centre, while Alternative 4 displaces the Home Hardware. Alternatives 2 and 5 do not remove any commercial uses, but Alternative 2 provides inadequate access and traffic volumes to support commercial uses at this location. Unlike Alternative 2, however, Alternative 5 provides access back to CR 22 for traffic travelling to and from Windsor. Since Alternative 5 provides better access and more traffic to support existing commercial uses than Alternative 2, it is the preferred alternative with respect to impacts on existing commercial uses.

Although Alternatives 1, 3 and 4 significantly improve the development potential of the lands around the intersection for future commercial development, they require almost all of the existing developable land, leaving little land available for development. Alternative 2 decreases commercial development potential since it may not provide adequate access and traffic volumes to support future uses. Alternative 5 also decreases the development potential of land around the intersection, but not as significantly as Alternative 2 since traffic travelling from Windsor will have access back to CR 22 for the return trip.

With the improved access provided by the interchanges and little land available for new commercial development, Alternatives 1, 3 and 4 may all lead to the eventual redevelopment of the surrounding residential neighbourhood. On the other hand, Alternative 2 could potentially lead to the decline of commercial uses at the intersection. Alternative 5 will likely maintain the existing neighbourhood structure with sustainable commercial uses at the intersection surrounded by a stable residential neighbourhood on a collector road. For this reason, Alternative 5 is preferred with respect to long-term land use impacts.

All five alternatives are approximately equal in terms of impacts on the existing and future light industrial uses on Sylvestre Drive. All five alternatives require some property from the rear yards of existing light industrial uses on Sylvestre Drive. In addition, adequate access for future development is provided by the future road connecting Westlake Drive and Sylvestre Drive, with all five alternatives, and the button hook provided by Alternatives 2 and 5. The button hook slightly reduces the amount of developable land in this area.

All five alternatives are consistent with the Provincial Policy Statement (PPS) issued under the *Planning Act*. Overall, all alternatives are "safe, energy efficient, facilitate the movement of people and goods, and (are) appropriate to address projected needs" and the other transportation policies included in the statement. However, Alternatives 2 and 5, make the most efficient use of existing infrastructure, including Lesperance Road, as encouraged by the PPS. The other alternatives require extensive reconstruction of Lesperance.

Costs

Alternative 5 has the lowest overall capital and maintenance costs for the Lesperance Road and the CR 22 corridors and necessary alternative road upgrades. Although Alternative 2 has the lowest cost for Lesperance Road and CR 22, any cost savings are offset by the cost of necessary alternative road upgrades.

6.3.8.3 Recommended Alternative

Alternative 5 was recommended as the preferred alternative since it:

- provides adequate access to and from Windsor and adequate traffic volumes to support exiting and future commercial uses
- displaces no existing residential and commercial uses
- maintains the basic structure of the surrounding neighbourhood over the long term
- has the lowest capital and maintenance costs overall.

Table 45:
CR 22 /Lesperance Road Intersection Alternatives
Comparative Evaluation of Alternatives 1, 2, 3, 4 and 5

Evaluation Factors & Indicators	Alternative 1 Diamond Interchange	Alternative 2 Grade Separation with Flyoff (Button Hook)	Alternative 3 Single Point Interchange	Alternative 4 Half Diamond Interchange	Alternative 5 Half Diamond/Button Hook Interchange	Recommended Alternative (by indicator)
1. Traffic Operations & Safety						
Capacity to Meet Future Traffic Needs	Provides sufficient capacity to meet future demand at ramp terminals	Requires diversion of trips to alternate routes with adequate capacity to improve connections to Banwell Road and CR 19	Same as Alt. 1	Sufficient capacity to accommodate future demand at ramp terminals for traffic to/from Windsor, but does not directly accommodate traffic to/from Lakeshore. Results in some trips diverted to other routes with adequate capacity. Requires improved connections to CR 19	Same as Alt. 4	Alt.'s 1 & 3
Connection to CR 22	All existing movements maintained	Reduces direct connections to CR 22 and increases travel time for some movements	Same as Alt. 1	Reduces some direct connections to CR 22 and increases travel time for some movements	Same as Alt. 4	Alt.'s 1 & 3

Table 45:
CR 22 /Lesperance Road Intersection Alternatives
Comparative Evaluation of Alternatives 1, 2, 3, 4 and 5

Evaluation Factors & Indicators	Alternative 1 Diamond Interchange	Alternative 2 Grade Separation with Flyoff (Button Hook)	Alternative 3 Single Point Interchange	Alternative 4 Half Diamond Interchange	Alternative 5 Half Diamond/Button Hook Interchange	Recommended Alternative (by indicator)
Future Traffic Operations	Ramp terminals operate at good level of service, but close ramp terminal spacing requires careful signal co-ordination to avoid operational problems. Westlake Drive intersection operates at poor level of service under stop control, but unlikely to warrant signals. Northbound queues at south ramp terminal may block Westlake Drive at peak times. Distance between Banwell/ Lesperance and Lesperance/ CR 19 too short for separate acceleration and deceleration lanes - requires a shared weaving lane increasing potential for weaving conflicts	Westlake Drive intersection operates at good level of service (requires and warrants signals). Additional diverted trips (due to restricted movements) may reduce level of service at some locations on alternate routes. Eliminates weaving on CR 22 and results in improved interchange spacing	Ramp terminals operate at good level of service. Westlake Drive intersection operates at poor level of service under stop control, but unlikely to warrant signals. Distance between Banwell/ Lesperance and Lesperance/ CR 19 too short for separate acceleration and deceleration lanes, resulting in same weaving problems as Alt. 1	Ramp terminals operate at excellent level of service. Westlake Drive intersection operates at good level of service (requires and warrants signals). Additional diverted trips (due to restricted movements) may reduce level of service at some locations on alternate routes. Removal of east oriented ramps eliminates weaving on CR 22 between Lesperance/ CR 19. Proximity of intersection to south ramp terminal impacts traffic operations at north ramp terminal and Westlake Drive. Same potential weaving conflicts as Alt.'s 1&3	Ramp terminals operate at excellent level of service. Westlake Drive intersection operates at good level of service (requires and warrants signals). Some diverted trips (due to restricted movements, but less than Alt. 2) may reduce level of service at some locations on alternate routes. Removal of westbound exit ramp eliminates weaving for westbound traffic on CR 22 between Lesperance and CR 19	Alt. 5
Road Safety	Drivers familiar with standard configuration. Northbound queues at south ramp terminal may block Westlake Drive at peak times. Auxiliary signal heads may be required at ramp terminals to mitigate limited sight distance caused by CR 22 overpass. Short weaving sections on CR 22 east and west of Lesperance increase potential for weaving conflicts	Partial access interchanges not common and may cause confusion for drivers traveling to and from Lakeshore. Proper signage required to direct traffic on alternate routes	Driver unfamiliarity with uncommon configuration (although recommended CR 22/CR 19 SPUI may provide a nearby example). Auxiliary signal heads required at ramp terminals to mitigate limited sight distance caused by CR 22 overpass. Short weaving sections on CR 22 east and west of Lesperance increase potential for weaving conflicts	Partial access interchanges not common and may cause confusion for drivers traveling to and from Lakeshore. Proper signage required to direct traffic on alternate routes. Auxiliary signal heads required at ramp terminals to mitigate limited sight distance cased by CR 22 overpass. Short weaving sections on CR 22 west of Lesperance Road increase potential for weaving conflicts	Partial access interchanges not common and may cause confusion for drivers traveling to and from Lakeshore. Proper signage required to direct traffic on alternate routes. Short weaving sections on CR 22 west of Lesperance increase potential for weaving conflicts (westbound only)	Alt. 2, but all are safe with proper signage

Table 45:
CR 22 /Lesperance Road Intersection Alternatives
Comparative Evaluation of Alternatives 1, 2, 3, 4 and 5

Evaluation Factors & Indicators	Alternative 1 Diamond Interchange	Alternative 2 Grade Separation with Flyoff (Button Hook)	Alternative 3 Single Point Interchange	Alternative 4 Half Diamond Interchange	Alternative 5 Half Diamond/Button Hook Interchange	Recommended Alternative (by indicator)
Compatibility with Planned Banwell Road Improvements	Can be constructed in advance of Banwell interchange. Full Lesperance interchange may allow closure of Banwell during construction. Weaving issues for EB traffic entering CR 22 from Banwell and EB traffic exiting CR 22 to Lesperance	Grade separation to be deferred until Banwell interchange is improved, with full intersection access maintained. New NB right turn lane required at Tecumseh Road	Same as Alt. 1	Can be constructed in advance of Banwell interchange. Partial access Lesperance interchange may allow closure of Banwell during construction. Same weaving issues as Alt.'s 1 & 3	Similar to Alt. 4, but less weaving since EB exit ramp for Lesperance is located further east	Alt. 5
2. Technical						
Support for other Transportation Modes	Accommodates pedestrians and cyclists, but potential for conflicts at ramp terminals	Accommodates pedestrian and cyclists with no conflicts	Same as Alt. 1	Accommodates pedestrians and cyclists. Can eliminate potential for conflicts at ramp terminals by keeping sidewalk on east side of Lesperance	Same as Alt. 4	Alt.'s 2, 4 & 5
Efficient Use of Existing Infrastructure	Requires reconstruction of significant length of Lesperance	Requires minimal reconstruction of Lesperance	Same as Alt. 1	Same as Alt. 1	Same as Alt. 2	Alt.'s 2 & 5
Utility Conflicts	Must be compatible with Tecumseh deep sewer currently under construction	Same as Alt. 1	Same as Alt. 1	Same as Alt. 1	Same as Alt. 1	Equal

Table 45:
CR 22 /Lesperance Road Intersection Alternatives
Comparative Evaluation of Alternatives 1, 2, 3, 4 and 5

Evaluation Factors & Indicators	Alternative 1 Diamond Interchange	Alternative 2 Grade Separation with Flyoff (Button Hook)	Alternative 3 Single Point Interchange	Alternative 4 Half Diamond Interchange	Alternative 5 Half Diamond/Button Hook Interchange	Recommended Alternative (by indicator)
Constructability	CR 22 traffic flow can be managed due to shift to south. Lesperance to be fully closed during construction. Longer construction duration to construct ramps and improvements to Lesperance	CR 22 traffic flow can be managed due to shift in CR 22 to south. Lesperance to be fully closed during construction. Traffic can use Banwell following completion of Banwell interchange. Shorter construction duration because length of Lesperance reconstruction is shorter and no ramp construction	Same as Alt. 1	Similar to Alt. 1 but slightly shorter construction duration because it's only a partial interchange	Same as Alt. 4	Alt. 2 due to shorter construction duration
3. Cultural Resources						
St. Anne's Cemetery (1859, reflects French heritage)	Significant easterly shift of Lesperance to avoid cemetery	Avoids cemetery	Same as Alt. 1	Slight easterly shift in Lesperance to avoid cemetery	Same as Alt. 4	Alt. 2
Built Heritage Cultural Landscapes: -L'Esperance Roadscape (commemorates early settlers named Esperance)	Changes roadscape throughout this section	Less impact to roadscape	Same as Alt. 1	Changes roadscape, but not as significantly as Alt.'s 1 and 3	Same as Alt. 2	Alt.'s 2 & 5
4. Natural Features						
Fisheries, Aquatic and Terrestrial Habitat	None (entirely urbanized with few natural features)	Same as Alt. 1	Same as Alt. 1	Same as Alt. 1	Same as Alt. 1	Equal

Table 45:
CR 22 /Lesperance Road Intersection Alternatives
Comparative Evaluation of Alternatives 1, 2, 3, 4 and 5

Evaluation Factors & Indicators	Alternative 1 Diamond Interchange	Alternative 2 Grade Separation with Flyoff (Button Hook)	Alternative 3 Single Point Interchange	Alternative 4 Half Diamond Interchange	Alternative 5 Half Diamond/Button Hook Interchange	Recommended Alternative (by indicator)
5. Existing and Future Land Uses						
Existing Residential Uses and Neighbourhoods	Interchange displaces 9 houses in SW quadrant. Interchange and easterly shift in Lesperance requires buy-out of 6 houses in NE quadrant, for a total loss of 15 houses	No residential properties required, but alternate routes to Banwell and CR 19 may require property acquisition	Same as Alt. 1	Interchange displaces 8 houses in SW quadrant. Interchange and easterly shift in Lesperance requires "slivers" of front yards of 6 houses (possibly reduced to 2 with retaining walls) in NE quadrant	Slight easterly shift in Lesperance requires "slivers" of front yards of 2 houses in NE quadrant	Alt.'s 2 & 5
Traffic Impacts on Residential Neighbourhood	No diversion of traffic to alternate routes required. Traffic on Lesperance and neighbourhood streets maintained at existing levels, plus traffic growth generated by future Tecumseh Hamlet development	Reduces traffic on Lesperance, thereby reducing traffic impacts. Increases traffic on alternate east-west routes to Banwell and CR 19 (e.g., Intersection Road, Gouin Street East)	Same as Alt. 1	Reduces traffic on Lesperance, thereby reducing traffic impacts. May increase traffic on alternate routes east of Lesperance (e.g., Gouin Street East, Westlake Drive East, Tecumseh Hamlet streets)	Same as Alt. 4	Alt.'s 4 & 5. Both alternatives reduce traffic on Lesperance with traffic diverted to non-residential or future planned streets
Existing Commercial Uses	Displaces Tecumseh Home Hardware and Tecumseh Town Centre, but maintains connection between CR 22 and Lesperance. Provides adequate access and traffic volumes to support existing commercial uses	Displaces no commercial buildings. Eliminates direct access to CR 22 from Lesperance, but alternative access provided by flyoff to Sylvestre Drive/Westlake Drive for eastbound CR 22 traffic. May not provide adequate access and traffic volumes to support existing commercial uses	Same as Alt. 1	Displaces Tecumseh Home Hardware, but maintains connection between CR 22 and Lesperance commercial area for traffic to and from Windsor. Likely provides adequate access and traffic volumes to support existing uses	Similar to Alternative 2, but traffic to and from Windsor will have access back to CR 22 for return trip. Provides better access and more traffic to support existing commercial uses than Alt. 2	Alt. 5. Alt's 1, 3 and 4 improve access but displace major commercial uses. Alt. 2 may not provide adequate access and traffic volumes to support commercial uses.

Table 45:
CR 22 /Lesperance Road Intersection Alternatives
Comparative Evaluation of Alternatives 1, 2, 3, 4 and 5

Evaluation Factors & Indicators	Alternative 1 Diamond Interchange	Alternative 2 Grade Separation with Flyoff (Button Hook)	Alternative 3 Single Point Interchange	Alternative 4 Half Diamond Interchange	Alternative 5 Half Diamond/Button Hook Interchange	Recommended Alternative (by indicator)
Future Land Uses – Lands designated "General Commercial"	Improves existing development potential of vacant commercial lands on south side of CR 22 by providing adequate access and traffic volumes to support future commercial uses. However, significantly reduces amount of developable commercial land. Remaining Home Hardware property at NW Lesperance and Westlake intersection can be developed with "General Commercial" uses	Alternative 2 decreases development potential since it may not provide adequate access and traffic volumes to support future commercial uses	Improves existing development potential, same as Alt. 1. Remaining Home Hardware property at NW Lesperance and Westlake intersection can be redeveloped with "General Commercial" uses. Rest of property along CR 22 difficult to redevelop with "General Commercial" uses. Remaining Tecumseh Town Centre property can be developed with "General Commercial" uses	Same as Alt. 1, but remaining Home Hardware property along CR 22 can be redeveloped similar to Alt. 3	Similar to Alt. 2, but traffic traveling from Windsor will have access back to CR 22 for return trip, likely providing adequate access and traffic volumes to support future commercial uses	Alt. 5. Alt.'s 1, 3 and 4 improve development potential but require a significant amount of developable land. Alt. 2 decreases development potential
Existing Light Industrial Uses	CR 22 widening requires property from rear yards of four uses on Sylvestre Drive. Eliminates direct access to Sylvestre Drive from CR 22, but alternative access provided by new road connection between Westlake Drive and Sylvestre Drive	Also requires property from rear yards of uses on Sylvestre Drive. Eliminates direct access to Sylvestre Drive from CR 22, but alternative access provided by buttonhook exit ramp	Same as Alt. 1	Same as Alt. 1	Same as Alt. 2	Approximately equal
Future Land Uses – Lands designated "Business Park"	Maintains existing development potential of vacant "Business Park" lands	Maintains existing development potential, but buttonhook exit ramp slightly reduces amount of developable land	Same as Alt. 1	Same as Alt. 1	Same as Alt. 2	Approximately equal

Table 45:
CR 22 /Lesperance Road Intersection Alternatives
Comparative Evaluation of Alternatives 1, 2, 3, 4 and 5

Evaluation Factors & Indicators	Alternative 1 Diamond Interchange	Alternative 2 Grade Separation with Flyoff (Button Hook)	Alternative 3 Single Point Interchange	Alternative 4 Half Diamond Interchange	Alternative 5 Half Diamond/Button Hook Interchange	Recommended Alternative (by indicator)
"Collector Road" Function of Lesperance Road (as designated in Tecumseh Official Plan)	Interchange at Lesperance not consistent with intended collector function of road. May change Lesperance into an arterial road	Reduces amount of traffic on Lesperance and protects its intended function as a collector road	Same as Alt. 1	Same as Alt. 1	Same as Alt. 1, but change in function of Lesperance not as significant	Alt.'s 2 & 5 (approximately equal)
Long Term Land Use Planning Impacts	Development pressures around interchange and lack of developable land may lead to redevelopment of surrounding residential neighbourhood for commercial uses. However, vacant lands designated for commercial uses are available east of intersection	Existing and future commercial uses may not be viable at this intersection. Fewest impacts on surrounding residential neighbourhood since Lesperance will retain its function as a collector road	Same as Alt. 1	Increases development pressures on surrounding residential neighbourhood for commercial development , but not as significantly as Alt.'s 1 and 3 since remaining Home Hardware property can be redeveloped with commercial uses	Maintains basic neighbourhood structure	Alt. 5. Alt's 1, 3 and 4 significantly increase development pressure on surrounding residential neighbourhood. Alt. 2 may lead to decline of commercial uses
Consistency with Provincial Policy Statement (efficient use of existing infrastructure)	Consistent, but requires reconstruction of a significant length of Lesperance	Makes most efficient use of existing infrastructure (Lesperance) but also requires improvements to alternative routes	Same as Alt. 1	Same as Alt. 1	Same as Alt. 2	Approximately equal
6. Costs						
Lesperance and CR 22 Corridors - Capital and Maintenance Costs	Extra costs for ramps and intersections (estimated $4.2M and $1.5M for structure) compared to Alt. 2. Future maintenance more expensive	Lowest capital and maintenance costs (includes button hook and future road connection between Sylvestre Drive and Lesperance)	Extra costs for ramps and intersection (estimated $5.8M and $3.0M for structure) compared to Alt. 2. Future maintenance more expensive	Extra costs for ramps and intersections (estimated $2.2M and $1.5M for structure) compared to Alt. 2. Future maintenance more expensive	Similar to Alt. 4	Alt. 2

Table 45:
CR 22 /Lesperance Road Intersection Alternatives
Comparative Evaluation of Alternatives 1, 2, 3, 4 and 5

Evaluation Factors & Indicators	Alternative 1 Diamond Interchange	Alternative 2 Grade Separation with Flyoff (Button Hook)	Alternative 3 Single Point Interchange	Alternative 4 Half Diamond Interchange	Alternative 5 Half Diamond/Button Hook Interchange	Recommended Alternative (by indicator)
Alternate Route Upgrades -Capital and Maintenance Costs	None	Estimated $6.0 M for alternative road upgrades	None	Requires alternative road upgrades to accommodate traffic east of Lesperance (for access to EB and from WB). Costs to be borne by future development	Similar to Alt. 4 but connection from button hook exit ramp to Lesperance already included in above. Costs to be borne by future development	Alt.'s 1, 3, 4 & 5 (approximately equal)

In summary, Alternative 5 provides a good compromise between:

- the fuller interchanges provided by Alternatives 1, 3 and 4 with their significant impacts on existing residential and commercial uses and potential future impacts on the surrounding neighbourhood
- the Grade Separation provided by Alternative 2, which has few property impacts, but provides inadequate access and traffic volumes for existing and future commercial uses.

6.4 Value Engineering/Value Analysis Study

MTO's business practice is to complete a VE exercise for major projects. During the week of July 9, 2007, MTO coordinated a VE exercise to evaluate the preliminary design alternatives presented at PIC 1 in May 2007. The goal of the exercise was to add value to the project and assist the design team in the selection of preferred alternatives. Specfiic objectives included identifying project risks and cost savings, while still achieving the best value for the money spent and identifying project risks.

Following the formal exercise, 19 VE proposals were carried forward for further evaluation by the Manning Road EA Study Team. The VE proposals carried forward were:

a) Build Roundabout at CR 34
b) Use 3.5m Lanes on CR 19 Between Hwy 401 and Hwy 3
c) Provide Center Left-turn Lane for Entrances on CR 19
d) Close Out West Townline Drain and Redirect Into Croft Drain
e) Provide 3m Wide Shoulders for Farm Vehicles
f) Bike Lanes Both Directions Within Rural Road Cross Section
g) Realign Baseline Road with 13/14 Sideroad
h) Realign Local Roads to CR 46 Instead of CR 19
i) Build CR 19 Bypass (east) at CR 46
j) Shorten Distance to Coxon Entrance and Relocate with 16/17 Sideroad
k) Evaluate Opportunities for Additional Park-N-Ride Spaces at Hwy 401
l) Retain Existing Hwy 401/CR 19 IC Ramp Geometry (With New N-W Ramp)
m) Bike Lanes Within Urban Road Cross Section
n) Off Road Multi-use Trail in Urban Section
o) Enhance Greening of Median and Boulevard of CR 19 North of Pike Creek (median)
p) North of Pike Creek, Reduce Design Speed to 80 km/h from 90 km/h
q) Partially Depress CR 22 at CR 19
r) Reduce CR 22 from 6 to 4 Lanes West of CR 19
s) Defer Lesperance Flyover until Banwell IC and Roads are Built.

Following the exercise, each proposal was then subjected to further technical evaluation, using information that may not have been available on the date the VE study commenced. Based on this, the following decisions were made regarding the 19 VE proposals:

a) Build Roundabout at CR 34

The Preliminary Design has carried forward a 2-lane roundabout at CR 34. Roundabouts are a fairly new concept in Ontario, especially in the southwest. MTO's Roundabout Task Force is currently developing guidelines for roundabouts. The guidelines will likely be available during the Detailed Design stage of this

project. "Roundabouts – An Information Guide" prepared by the U.S. Department of Transportation was used to design the roundabout included in the recommended Preliminary Design.

b) Use 3.5m Lanes on CR 19 Between Hwy 401 and Hwy 3

Not carried forward since it does not meet MTO guidelines and does not have County support.

c) Provide Centre Left-turn Lane for Entrance on CR 19

A 4.0m centre turn lane is included between North Rear Road and CR 46. A 1.0m flush median is provided elsewhere on the rural section.

d) Close Out West Townline Drain and Redirect Into Croft Drain

This proposal was not supported by ERCA and DFO and not carried forward.

e) Provide 3m Wide Shoulders for Farm Vehicles

This proposal was carried forward as part of the recommended Preliminary Design.

f) Bike Lanes Both Directions Within Rural Road Cross Section

A 3m wide shoulder addresses this issue and, if necessary, could accommodate a 1.5m bike lane in the future.

g) Realign Baseline Road with 13/14 Sideroad

This has been implemented as part of the recommended Preliminary Design.

h) Realign Local Roads to CR 46 Instead of CR 19

Not supported by technical analysis.

i) Build CR 19 Bypass (east) at CR 46

Not supported by technical analysis.

j) Shorten Distance to Coxon Entrance and Relocate with 16/17 Sideroad

Entrance to Coxon and 16/17 Sideroad relocated north satisfy draft MTO Access Guidelines.

k) Evaluate Opportunities for Additional Park-N-Ride Spaces at Hwy 401

Area is as defined in MTO's TESR for Hwy 401.

l) Retain Existing Hwy 401/CR 19 IC Ramp Geometry

Preliminary Design is based on ramp reconstruction necessary to accommodate proposed structure and revised CR 19 alignment.

m) Bike Lanes within Urban Road Cross Section

The Preliminary Design incorporates this proposal.

n) Off-Road Multi-use Trail in Urban Section

The Preliminary Design includes a multi-use trail on the west side of CR 9 in the urban section.

o) Enhance Greening of Median and Boulevard of CR 19 North of Pike Creek (Median)

The Preliminary Design incorporates greening where possible in the urban section.

p) North of Pike Creek, Reduce Design Speed to 80 km/h from 90 km/h

The Preliminary Design is based on this proposal.

q) Partially Depress CR 22 at CR 19

The Preliminary Design incorporates this proposal.

r) Reduce CR 22 from 6 to 4 Lanes West of CR 19

The Preliminary Design incorporates a transition from 6 to 4 lanes through CR 19 to the east.

s) Defer Lesperance Flyover Until Banwell IC and Roads Are Built

Not applicable as ESR/PDR now recommends partial interchange and flyover at this location.

Page inserted November 18, 2008.

7. RECOMMENDED PRELIMINARY DESIGN

7.1 Introduction

The Preliminary Design of recommended improvements to CR 19 and CR 22 is based on current MTO standards, as defined in the Geometric Design Standards for Ontario Highways (GDSOH) and Transportation Association of Canada Geometric Design Guides for Canadian Roads (TAC). Section 7 of the ESR summarizes the proposed improvements. Plan, profile and typical section details are shown on the drawings in **Appendix E**. **Appendix F** includes Design criteria for the project.

7.2 Major Project Features

CR 19 will be widened from 2 to 4 lanes and changed from a rural to urban roadway, from just south of CR 42 to CR 22. The widening necessitates improvements to the Highway 401 interchange, intersections, drainage, municipal drains and entrances and requires property acquisitions and utility relocations. The increase in traffic on CR 19 requires upgrading the pavement structure, construction of a grade separation for the CP Rail crossing and an interchange to replace the intersection at CR 19 and 22.

Improvements to the Highway 401 ramps were not included as part of MTO's recent Highway 401 Reconstruction and Widening contract, with the exception of construction of the S-E Ramp and resurfacing. Replacement of the underpass structure and reconstruction of the ramps is required to meet current design standards and accommodate the alignment shift, widening and geometric improvements on CR 19.

CR 22 will be widened from 4 to 6 lanes and changed from a limited access to controlled access roadway with an interchange at CR 19 and a partial interchange (half diamond/button hook) at Lesperance Road. The widening and interchanges require property acquisitions and utility relocations.

In summary, major project features include:

- widening of CR 19 from 2 to 4 lanes and widening of CR 22 from 4 to 6 lanes
- double lane roundabout at CR 19 and CR 34 intersection
- Highway 401 interchange improvements, including construction of a new underpass structure and reconstruction of interchange ramps
- widening of Pike Creek Bridge from 2 to 4 lanes
- grade separation at the CP Rail crossing and construction of access/service roads for existing uses
- single point urban interchange at CR 19 and CR 22, with CR 22 partially depressed and CR 19 over CR 22
- partial interchange at CR 22 and Lesperance Road with CR 22 over Lesperance Road. The interchange will only serve traffic to/from the west. Access to Lesperance Road will be provided for eastbound traffic via a button-hook ramp to Westlake Drive/Sylvestre Drive. There will be no access to Lesperance Road for westbound traffic.

7.3 Road Classification

CR 19 requires widening from 2 lanes to 4 lanes. Existing CR 19 is a rural arterial undivided roadway. Since the northern section is in an urban area, CR 19 has been split into urban and rural classifications with different design and posted speeds, as follows:

- Rural Arterial Undivided (RAU) 100, from Highway 3 to 225m south of CR 42, with a design speed of 100 km/h and posted speed of 80 km/h
- Urban Arterial Undivided (UAU) 90, from 225m south of CR 42 to CR 22, with a design speed of 90 km/h and posted speed of 70 km/h.

Currently, the posted speed on CR 19, north of Jamsyl Drive, is 50 km/h. With the proposed reconstruction of CR 19, the posted speed change will occur just south of Jamsyl Drive and this section will have a design speed of 70 km/h. Highway 3 is currently being reconstructed with some improvements on CR 19 just north of Highway 3. These improvements have been incorporated into the Preliminary Design.

The Preliminary Design of CR 22, east of CR 19, currently underway as a separate study, recommends widening CR 22 from 2 to 4 lanes. Dillon's study includes the section of CR 22 from the City of Windsor boundary (about 900 metres west of Lesperance Road) to CR 19. This section requires widening from 4 lanes to 6 lanes, changing CR 22 from an arterial road with at grade intersections to a controlled access freeway. The section from CR 19 to Lakeshore Road will function as transition section from a 6 lane divided freeway to a 4 lane undivided arterial. Therefore, the section from 900 metres west of Lesperance Road to CR 19 has been classified as Rural Freeway Divided (RFD) 120, with a design speed of 120 km/h

and posted speed of 100 km/h. The posted speed will change from 100 to 80 km/h west of CR 19, just east of the entrance and exit ramps.

Interchange improvements are proposed at Highway 401 and CR 19 (Manning Road), excluding the S-E Ramp, which was recently constructed to current standards. The interchange is currently Parclo A-3, but with the relocation of N-W Ramp, will be modified to Parclo A-4. Highway 401 is a rural divided freeway with a design speed of 120 km/h. At Highway 401, CR 19 is being upgraded to a rural undivided arterial with design speed of 100 km/h.

7.4 Design Features

7.4.1 Right-of-Way and Cross-Section

The proposed main cross-section component standards are summarized in the following **Table 46:**

Table 46:
Right-of-Way and Cross-Section

Component	MTO GDSOH	MTO Standard	Proposed Standard
Urban Arterial Undivided (UAU) 90			
Lane Width	Table D2-4	3.5 to 3.75m[1]	3.75m[5]
Boulevard Width	D.8.4	3.0m	3.0m[6]
Sidewalk Width	D.8.4	1.5m	1.5m
Right-of-way	n/a	n/a	37m[7]
Rural Arterial Undivided (RAU) 100			
Lane Width	Table D2-3	3.75m	3.75m
Shoulder Width	Table D5-1	2.5m[2]	3.0m[8]
Median Width	D.6.3.1	1.0m[3]	1.0m[8]
Right-of-way	D.10.2	26 to 40m	40m[7]
Rural Freeway Divided (RFD) 120			
Rural Lane Width	Table D2-3	3.5m & 3.75m[4]	3.75m[10]
Shoulder Width	D.5.3	3.0m	3.0m
Median Width	D.6.2.1	7.5m	6.8m[11]
Right-of-way	n/a	n/a	55m[7]

[1] For 80 km/h and upper value desirable, lower value is acceptable
[2] If truck percentage exceeds 10%, increase by 0.5m
[3] Flush median is appropriate for rural arterials with higher volumes
[4] Median lane can be 3.5m
[5] Use upper limit due to high traffic volumes and to match rural lane width
[6] Boulevard reduced on bridge approaches (sidewalk and path has additional offset from travelled lane with the proposed bike lanes)
[7] Minimum ROW
[8] Proposed 3.0m since truck percentage exceeds 10% in AM peak hour
[9] Median not required between Hwy 3 and CR 34 due to lower volumes
[10] Median lane 3.75m to accommodate transition from 6 to 4 lanes
[11] The 6.8m median allows for 2 x 3m inside shoulders and tall wall barrier

Proposed typical cross-sections are shown on **Figure 27**, with more detailed sections provided in **Appendix E**.

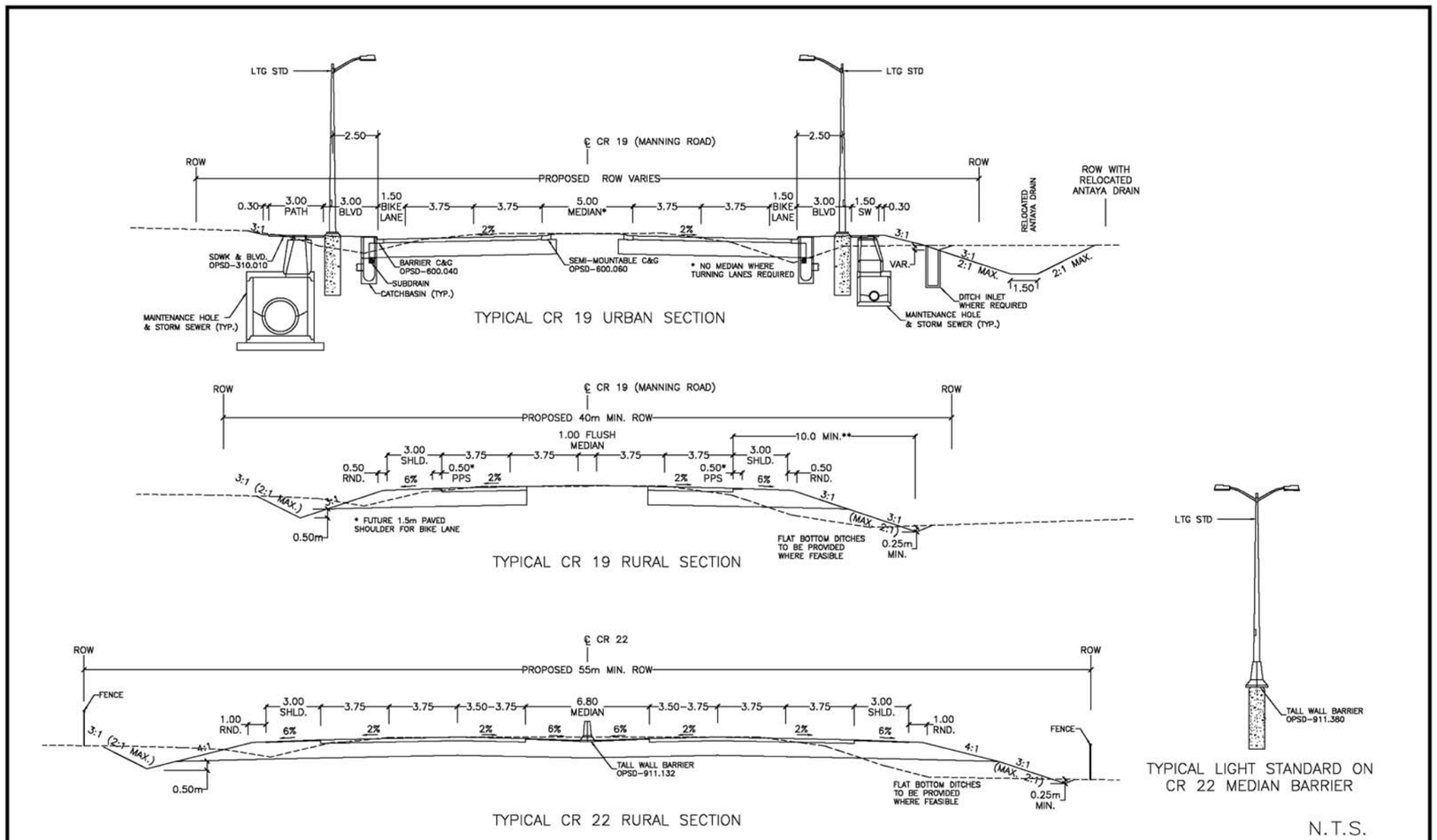
Other recommended design features include:

- a 4 metre continuous left turn lane (GDSOH Table D2-5) from CR 46 to North Rear Road due to the numerous residential and some commercial entrances in this section
- partially paved shoulders (0.5m width) in the rural section due to high traffic volumes and truck traffic. In the future, the shoulders may be paved 1.5m wide, if bike lanes are needed. Paved shoulder is acceptable as a bike lane if the shoulder is 1.5 to 2.0m wide (TAC Table 3.4.6.2)
- in the urban section, 1.5m bike lanes on both sides and a multi-use pathway on the west side are proposed. The width of the proposed pathway is 3.0m, based on the TAC standard of 3.0 to 4.0m (Table 3.4.6.1)
- CR 19 just north of Highway 3 is currently been reconstructed as part of the Highway 3 reconstruction, with 3.5m lanes and 2.0m shoulders. A section of the reconstruction can be salvaged since speeds are reduced with the reduced horizontal radius.

At the west limit of the Study Area, the widening of CR 22 and horizontal curve correction will not be completed until E.C. Row Expressway is widened to 6 lanes. The section of CR 22 between CR 19 and Lakeshore Boulevard will be the transition between roadway sections. East of Lakeshore Boulevard, a separate study recommends widening to a 4 x 3.7m lane section with a 1.0 m flush median.

The existing pavement structure will be maintained, where possible. In sections of alignment shift and grade raises, the entire roadway will be reconstructed. In sections with a minor horizontal shift in the centre line, the existing pavement must be padded to shift the crown line. Pavement structure recommendations for widening, full reconstruction and resurfacing are provided in the 'Pavement' section.

Figure 27: Typical Cross Sections



DILLON CONSULTING	County Road 19 (Manning Road) and County Road 22 Improvements GWP 3031-06-00 Class EA and Preliminary Design Study	Typical Cross Sections	
		November 2008	Figure 27

Locations of turning lanes and details on ROW daylighting are provided in the 'Intersection Design' section.

7.4.2 Horizontal Alignment

The proposed horizontal alignment for CR 19 maintains most of the existing centre line, with no curves in the urban section. Proposed curve standards for the rural section on CR 19 and for CR 22 are shown on the following **Table 47.**

Table 47:
Proposed Curve Standards

Component	MTO GDSOH	MTO Standard	Proposed Standard
RAU 100			
Min. Radius/A (e=6%)	Table C3-5	R=420m A=207	R=420m A=207m[1]
Min. Radius (normal crown)	Table C3-5	R=4500m	R=4500m
RFD 120			
Min. Radius/A (e=6%)	Table C3-5	R=650m A=277	R=650m A=277m[1]

[1] Min. 45m radius with spiral on approach to intersection (MTO GDSOH Figures E4-3 and E4-4)

The maximum deflection angle not requiring a horizontal curve is 0° 30', as specified in MTO GDSOH C.3.4.2. Any minor deflection greater than 0° 30' is provided with a larger curve that does not require superelevation. Some of the larger radius curves do not meet the standard for minimum length of curve as specified in GDSOH C.3.4.2 to keep the curves out of intersections.

The curve just north of Highway 3 has not been modified. Although this curve does not have the specified spiral, the existing radius exceeds the required 80m radius specified in Section E.4.1 of the MTO GDSOH (the standard for curves on the approach to a re-aligned skewed intersection). The second horizontal curve north of Highway 3 has been revised to meet current design standards for 100 km/h design speed. From CR 46 to CR 34, the alignment is shifted about 8m to the east, so the existing drain will be outside the clear zone and avoid impacting the drain. From CR 46 to Highway 401, the alignment is shifted to the west to reduce property impacts, with a shift of 7.5m at Highway 401 to accommodate construction of the new underpass structure.

The proposed alignment for CR 22 is shifted to the south at CR 19 to accommodate the new interchange and match the shift in alignment proposed for CR 22, east of Lakeshore Boulevard. The stationing was also modified with Station 20+000 at CR 19.

The existing horizontal curve on CR 22 west of Lesperance Road is less than desirable. This curve can be modified in the future when this section of CR 22 is widened to 6 lanes to match the future 6 lanes on E.C. Row Expressway to the west.

7.4.3 Vertical Alignment

The following table shows the main vertical alignment standards:

Table 48:
Vertical Alignment Standards

Component	MTO GDSOH	MTO Standard	Proposed Standard
UAU 90			
Stopping Sight Dist.	Table C2-1	160m	160m
Max. Grades	Table C4-2	6-8%[1]	4.5%
Min. Grades	Table C4-4	0.5%[2]	0.3%
Min. K – Crest	Table C4-6	50	50
Min. K – Sag (Headlight)	Table C4-7	40	n/a
Min. K – Sag (Comfort)	Table C4-7	20	30
RAU 100			
Stopping Sight Dist.	Table C2-1	185m	185m
Max. Grades	Table C4-1	6-8%[3]	3%
Min. Grades	Table C4-4	0.5%[4]	0.1%[4]
Min. K – crest	Table C4-6	70	70
Min. K – Sag (Headlight)	Table C4-7	45	45
RFD 120			
Stopping Sight Dist.	Table C2-1	245m	245m
Max. Grades	Table C4-3	3%[3]	2%
Min. Grades	Table C4-4	0.5%[4]	0.2%[4]
Min. K – crest	Table C4-6	120	120
Min. K – Sag (Headlight)	Table C4-7	60	80

[1] For 80 km/h and based on Traffic Volume >6000 AADT
[2] Absolute minimum is 0.3%
[3] Based on Traffic Volume >4000 AADT

[4] 0% grade acceptable provided roadway is adequately crowned (adequate cross-fall), snow does not interfere with surface drainage, and ditches have positive drainage.

The vertical alignment through the rural section of CR 19 will basically be maintained with minor adjustments for pavement rehabilitation, minor grade changes and/or padding for crown shift. There are many minor changes in grades without measurable vertical curves. Vertical curves have been added at all changes in grade to meet current standards. The profile has been adjusted at the two locations where stopping sight distance is less than standard, at the Highway 401 underpass and CASO (CN Rail) crossing. The vertical clearance at the Highway 401 underpass was also increased slightly to meet current standards.

The section of CR 19 from just south of CR 42 to CR 22 is being changed from a rural to an urban cross-section. This change requires adjustments to the vertical alignment to provide at least minimum grades for an urban roadway. Major changes to the profile are proposed at the CP Rail crossing to provide a grade separation and at CR 22 to provide an interchange. The profile at the Pike Creek Bridge will be modified slightly, so the existing structure can remain with widening on both sides.

The profile on CR 22 has been changed to allow for grade separations at Lesperance Road and CR 19. CR 22 is raised at Lesperance Road to go over and is slightly lowered at CR 19 to go under.

The minimum vertical clearance for roadway grade separation structures is 4.8m for a slab bridge and 5.0m for other types of bridges (MTO GDSOH C.4.4.3.1). For a railway structure, the minimum clearance is 7.01m to top of rail, as specified in MTO GDSOH C.4.4.3.3.

7.4.4 Intersection Design

The widening of CR 19 necessitates the redesign of all intersections, excluding the Highway 3 (currently under construction) and Amy Croft Drive intersections (recently reconstructed). The following improvements or road closures are recommended for all other intersections:

- the skew angle at CR 34 is less than the desired maximum skew angle of 70°. The skew angle does not have to be changed with the proposed roundabout. As mentioned, MTO is currently developing design guidelines for roundabouts which will likely be available for the Detailed Design stage
- North Talbot Road intersection will be relocated to the south. The intersection of CR19/Malden Road will be closed, with a connection road to CR 19 lining up with the realigned North Talbot Road. The east leg (Old Hwy 114) will have a cul-de-sac constructed at the end
- the CR 46 intersection is designed to accommodate the future four lane section on CR 46 west of CR 19
- the intersection of North Rear Road is shifted slightly to the north to reduce the skew angle
- the Memorial Drive and 16 & 17 Sideroad intersections are close to the ramps at Highway 401. Memorial Drive will be closed and 16 & 17 Sideroad relocated about 750m north of the Highway 401 ramp in accordance with MTO's Draft Highway Access Management best practices recommendation of 800 m
- the Highway 401 interchange ramps are redesigned to accommodate the widening on CR 19, the shift in the horizontal alignment and profile revision. The ramps are designed for 100 km/h design speed on CR 19. Reconstruction of the ramps necessitates replacing the existing ramp gates and an additional gate for N-W Ramp
- Baseline Road and 13 & 14 Sideroad will be realigned to line up with each other. Two options have been developed for this intersection
- Desro Drive intersection will be closed due to proximity to CR 22 and the new interchange proposed at CR 22
- the intersection at CR 19/CR 22 will be replaced with a Single Point Urban Interchange (SPUI)
- the CR 22/Lesperance Road intersection will be replaced with a partial interchange. The partial interchange will only serve traffic to/from the west, via a button-hook ramp to Westlake Drive/Sylvestre Drive. Traffic signals will be installed at the Westlake Drive / Lesperance Road intersection to accommodate traffic exiting CR 22. The on-ramp terminal to CR 22 westbound will be unsignalized.

The Town of Tecumseh is planning future roads to intersect CR 19, including three additional roads to the west at approximately Sta. 14+900, 15+630 and opposite Little Baseline Road. The location of Street B opposite Little Baseline Road is recommended in order to accommodate the dual southbound left turn lanes acquired for Little Baseline Road. There is insufficient distance between Little Baseline Road and the Town's original proposed Street B location to accommodate the northbound left turn lanes at Street B without impacting the southbound dual left turn lanes at Little Baseline Road. Consolodating these two intersections into one intersection also improves traffic operations in the CR 19 corridor. A future road is planned to the east Town of Lakeshore, in line with Jamsyl Drive in the Town of Lakeshore. Sylvestre

Drive will be restricted to right in/right out movements only to eliminate the required overlapping turning lanes.

Two alternative intersection options have been developed for the CR 19 intersection with Baseline Road/13 & 14 Sideroad as shown on the drawings in **Appendix E**. Baseline Road and 13 & 14 Sideroad are currently offset and the proposed improvements will improve intersection operations. Option 1 involves realigning Baseline Road to line up with 13 & 14 Sideroad, while Option 2 involves realigning 13 & 14 Sideroad to line up with Baseline Road. Implementing Option 1 or Option 2 to be reviewed and confirmed during Detailed Design.

Service Roads are provided on the east side of CR 19 at the proposed CP Rail grade separation to maintain local access. These Service Roads will be the responsibility of the County of Essex and access CR 19 at the same location as the future roads.

Closure of Memorial Drive will require improvements to North Rear Road and 10th Concession Road (between North Rear Road and the OPP Station/commuter parking lot). Moving 16 & 17 Sideroad further north will also require improved connection to 10th Concession Road. Improvement requirements shall be reviewed and confirmed during Detailed Design in consultation with the Town of Lakeshore.

Sight lines will be improved with proposed daylighting at all intersections. Any obstructions within these daylighting triangles must be removed.

Shoulder treatments at all rural intersections with signals or future signals are as per OPSD-304.010 Plan 'C'. At intersections without signals, the shoulder treatments will be as per OPSD-304.010 Plan 'B'.

Corner radii at County Road intersections accommodate the turning movements of a WB-17.5 tractor-semitrailer combination. Accommodating a WB-20.5 tractor – semitrailer combination should be reviewed during Detailed Design at all County Road intersections and implemented where feasible. The following intersections must be designed for WB-20.5: Highway 3, CR 34, CR 46, Highway 401 SRT, Highway 401 NRT, Coxon's Towing entrance and CR 42. Radii at Local Road intersections accommodate the turning movements of a WB-15 tractor-semitrailer combination.

The roundabout configuration at CR 34 should be reviewed and designed in accordance with the guidelines currently being developed by MTO's Roundtable Task Force. The guidelines will likely be available during Detailed Design. The roundabout should accommodate a WB-20.5 tractor-semi-trailor combination. Right-in/Right-out access should also be considered for the entrances near the intersection.

Left turning lanes are provided in accordance with MTO GDSOH Table E9-1. The parallel lane is provided for turning lanes on CR 19, except where left turn lanes overlap. Left turn storage lengths at CR 19 intersections are provided as shown on the following table, based on queues calculated using 95th percentile volumes during the design hour at the 20-year horizon:

Table 49:
Left Turn Storage Length

Intersection	Left Turn Storage length (m)			
	SB	NB	EB	WB
Hwy 3	(a)	(b)	(b)	(b)
Malden Road Connection/ North Talbot Rd. (Realigned)	65	15	Future	15
CR 46	37.5	60	30	15 (min)
North Rear Road	30	n/a	n/a	15 (min)
Hwy 401 South Ramp Terminal	n/a	n/a	60	n/a
16 & 17 Sideroad (relocated)	30	15 (min)	-	40
Baseline Road/13 & 14 Sideroad (Option 1 & 2)	15 (min)	37.5	15 (min)	15 (min)
CR 42	60	80	90 (x2)	20
Tecumseh Hamlet Area N	n/a	15 (min)	Future	n/a
Street 'A'	n/a	15 (min)	n/a	n/a
Little Baseline Road/Street 'B'	125 (x2)	n/a	n/a	30 (x2)
Sylvestre Road	n/a	n/a	n/a	-
Jamsyl Road	130	30	65	future
CR 22 (SPUI)	40 (x2)	85 (x2)	80 (x2)	n/a
Amy Croft Drive	(b)	25 (x2)	(b)	(b)

Notes:
a) Inside southbound lanes becomes southbound left.
b) Completed as part of separate projects.

The minimum left turn storage length of 15m is provided at future road locations. Ultimate storage requirements at these locations will be verified during Detailed Design after confirming updating development plans or traffic forecasts (e.g., Coxon site; Tecumseh Hamlet; Wallace Woods).

Right turn lanes are also provided on CR 19 in accordance with MTO GDSOH Table E7-1 for the following movements:

- NB and SB at CR 42
- NB at Little Baseline
- SB at Sylvestre Drive
- SB at Jamsyl Drive
- Future NB at Jamsyl Drive
- NB at CR 22
- SB channelized at CR 22.

Traffic signals will be replaced at all existing signalized intersections and added to the CR 19/Jamsyl Drive intersection. The signals at CR 19/CR 34 will be removed with the construction of the roundabout. Signals and provisions for signals are proposed at the following intersections on CR 19:

- Malden Road/North Talbot Road
- Ramp W-N/S terminal (future signals)
- Ramp E-N terminal (future signals)
- Realigned Baseline Road/13 & 14 Sideroad
- Little Baseline Road
- Jamsyl Drive.

On CR 22, the intersection at Lesperance Road is removed with the construction of the grade separation and partial interchange. The interchange will require one new unsignalized intersection on Lesperance Road (at the N/S-W ramp terminal) and ultimately traffic signals at the Westlake Drive intersection. The intersection with CR 19 is removed with the construction of the SPUI interchange.

Left turn storage length at the one remaining CR 22 intersection, and the Lesperance Road partial interchange, is provided as follows:

Intersection	Left Turn Storage length (m)			
	SB	NB	EB	WB
CR 22 / Lakeshore Boulevard	60	Continuation of Inside Lane	45	85
Lesperance Road / CR 22 N/S-W Ramp	n/a	65	n/a	n/a
Lesperance Road / Westlake Drive	15	15	15	75

A WB right turn lane is provided at CR 22/Lakeshore Boulevard intersection. The signals at this intersection will also be replaced to accommodate the widening and shift in alignment.

7.4.5 Rail Crossings

Improvements are proposed for the CASO (CN Rail) crossing on CR 19 to accommodate the widening of CR 19 and improve stopping sight distance on CR 19 and sight lines. The design will be completed during Detailed Design and follow current CN Rail design standards. Other changes at rail crossings are:

- a grade separation is recommended at the CP Rail crossing of CR 19 due to traffic volumes
- the VIA Rail crossing at the north limit of the project was recently reconstructed and does not require further modifications.

7.4.6 Highway Drainage and Culverts

Drainage and culvert modifications required to accommodate the proposed improvements are identified in Dillon's Drainage and Hydrology Report. Modifications are described in Section 8.5.2 of this ESR/PDR.

7.4.7 Entrances

All entrances on CR 19 are affected by the road widening and therefore will be reconstructed to the new ROW. Rural entrances will be designed to OPSD-301.010 and OPSD-301.020, and urban entrances to OPSD-350.010 and OPSD-351.010. Commercial entrances must be reconstructed to MTO standards, as specified in 'Commercial Site Access Policy and Standard Design. Consolidation of entrances should be considered during Detailed Design, especially if a property has more than one entrance.

Other entrance changes include:

- an entrance is added on the right side of CR 19 at about 7+410, since the current entrance to North Talbot Road will be eliminated with the relocation of North Talbot Road
- two new accesses are provided for Hydro One, one at about 7+025 Rt and the second at about 14+520 Rt. The entrance width must be at least 6 metres wide for access to utility facilities
- the existing commercial entrance at 10+300 for CTS Coxon Services Ltd. is relocated opposite to relocated 16 & 17 Sideroad. The existing entrance just north of relocated 16 & 17 Sideroad will be removed since the main access is to 10th Concession
- 14 existing entrances near the proposed CP Rail grade separation will have a new access off the Service Roads or a separate access road to CR 19. Access to Hydro One and CP Rail corridors are provided from the proposed Service Road in the southeast quadrant. Relocation of access for the Union Gas Substation requires the relocation of an access gate
- with the construction of the raised median at Sylvestre Drive, one entrance will be restricted to right in/right out
- entrances between Jamsyl Drive and CR 22 will be affected by the construction of the SPUI interchange. The four existing entrances just north of Jamsyl Drive can be maintained, but are restricted to right in/right out. The remaining six entrances will be removed.

Additional entrance details will be prepared during Detailed Design.

7.4.8 Commuter Parking

With the closure of Memorial Drive, access to the existing commuter parking lot will be changed to North Rear Road and 10th Concession. The parking lot will also be expanded, as recommended in MTO's March 2003 TESR for the Highway 401 Improvements from Windsor to Tilbury and Dillon's January 2005 Design and Construction Report for GWP 62-00-00.

7.4.9 Illumination and Traffic Signals

Illumination Warrants

Warrants for illumination have been calculated based on MTO Directive PLNG-B-05. The following illumination improvements are recommended on CR 19 and CR 22:

- for the rural section of CR 19, partial illumination will be provided at all intersections, including the roundabout and exit ramps
- continuous illumination is not warranted for the urban section on CR 19, from just south of CR 42 to CR 22, but is recommended because this is an urban cross-section and CR 19 is currently illuminated north of CR 22. Illumination should match the existing lighting recently installed north of CR 22
- full illumination should be considered for those sections of CR 19 where the centre lane is designated for continuous two-way turns. This should be reviewed during Detailed Design
- the Highway 401/CR 19 interchange warrants partial illumination, including exit ramps and ramp terminals
- CR 22 warrants continuous illumination, including the interchange at CR 19
- CR 22 eastbound exit ramp to Westlake Drive/Sylvestre Drive and the extension of Westlake Drive warrants continuous illumination
- additional illumination during Detailed Design for the commuter parking lot expansion should be reviewed.

Recommended illumination requirements are shown on the plan and profile drawings included in **Appendix E**. Full cut-off luminaires must be provided. Details of the luminaires and poles will be determined during Detailed Design.

Illumination Design Criteria

The illumination criteria for the proposed improvements will follow the requirements specified in the ANSI/IES (RP-8, 2000) standards and practice document.

Partial illumination at intersections and interchange decision points will be designed in accordance with Section 8 of MTO's *Electrical Engineering Manual, Principles of Design and Operation Guideline*. Since partial lighting, by virtue of its purpose, provides a beacon effect, illumination will not provide specific average lighting levels or uniformities.

Illumination poles will be placed as detailed in the figures shown in Section 8 of the MTO's *Electrical Engineering Manual, Principles of Design and Operation Guideline*.

Full illumination of CR 22 will be designed to meet the minimum requirements for an Expressway/Commercial road classification, as defined in RP-8, Table 2: Illumination Method – Recommended Values. Illumination requirements are as follows:

- Average Maintained Illuminance Level – 14.0 Lux
- Uniformity Ratio: E_{avg} to E_{min} – 3 to 1.

Full illumination of CR 19 will be designed to meet the minimum requirements for a Major Commercial road classification, also defined in Table 2 of RP-8. Illumination requirements are as follows:

- Average Maintained Illuminance Level – 17.0 Lux
- Uniformity Ratio: E_{avg} to E_{min} – 3 to 1.

Lighting Equipment

Lighting poles servicing partial and intersection illumination points along the rural section of CR 19 shall be base mounted steel or aluminum poles. Pole and luminaire types will be selected during Detailed Design, based on current County of Essex standards.

Lighting poles and luminaires for the Highway 401/CR 19 interchange will conform to current MTO standards. The existing electrical equipment at the interchange will not be reused for the proposed reconstruction. Lighting poles used at the Highway 401 exit ramp decision points will be 15.1 metre base mounted octagonal steel poles, while poles used at the Highway 401/CR 19 ramp terminals and CR 19 decision points will be 12.1 metre base mounted octagonal steel poles. Luminaires will be designed in accordance with MTO's approved luminaire photometric list and mounted on 2.4 metre long aluminum tapered elliptical arm and bracket.

Within the full illumination section of CR 19 between Pike Creek and Amy Croft Drive, the County will match the lighting streetscape recently placed on CR 19 north of CR 22. To provide the recommended illumination, lighting poles will be 12.0 metre base mounted aluminum poles placed at a 2.5 metre offset behind the curb (on both sides of the roadway). Luminaires shall be single Durastar 30 250 W HPS Type 2 Medium Distribution Full Cutoff.

Full illumination on CR 22 will be placed along the median, from just east of the City of Windsor boundary (where the tall wall barrier begins) to the CR 22/CR 19 underpass structure, by using 12.0 metre median mounted double fixture base mounted aluminum poles, spaced 45 metres apart. From the CR 22/CR 19 underpass structure to east of Lakeshore Boulevard, 12.0 metre base mounted aluminum poles will be placed just beyond the outside paved shoulder on both sides of the highway, as well as adjacent to the outside shoulders on all interchange ramps.

Underpass illumination is also warranted on Lesperance Road under the CR 22 overpass and on CR 22 under the CR 22/CR 19 underpass structure.

Traffic Signal Requirements

All existing signalized intersections will be upgraded for the proposed widening and turning lanes on CR 19, including illumination. These include:

- signals at CR 19/CR 34 are eliminated with the construction of a roundabout
- signals at CR 19/CR 46 and CR 19/CR 42 will be replaced with new signals to accommodate the widened intersection
- signals at CR 19/Amy Croft Drive may require adjustment to suit revised grading on the south side of the intersection
- new signals at CR 19/CR 22 will be designed for the SPUI interchange
- signals at CR 22/Lesperance Road are no longer required with the construction of the grade separation but signals are required at Lesperance Road/Westlake Drive to accommodate increased traffic flow at this intersection
- signals at CR 22/Lakeshore Boulevard will also be replaced to accommodate the widening and alignment shift.

The new traffic signals located at the SPUI interchange will need to be installed on a support structure spanning the intersection. In accordance with Book 12 of the Ontario Traffic Manual, traffic signals will be optically programmable heads focused to each designated traffic lane movement. The underpass structure will also need to be designed to accommodate the traffic signal structure, since it will be placed directly on top of the structure.

Temporary traffic signals will also be required at the following intersections during construction:

- CR 19/CR 34
- CR 19/CR 46
- CR 19/CR 42
- CR 19/Jamsyl Drive/Temporary Access Road
- CR 19/CR 22
- CR 22/Lakeshore Boulevard/Temporary Access Road
- CR 19/Amy Croft Drive (potential modification to existing system may be done to avoid need for temporary signals).

Traffic signals and provisions for signals are proposed at the following intersections that currently are stop controlled:

- CR 19/Malden Road/North Talbot Road
- CR 19/Ramp W-N/S terminal (future)
- CR 19/Ramp E-N terminal (future)
- CR 19/Baseline Road/13 & 14 Sideroad
- CR 19/Little Baseline Road/Street "B"
- Lesperance Road/Westlake Drive.

Anticipated traffic signal requirements for these locations was based on capacity requirements for the projected future design hour volumes, and confirmed using the warrant methodology for future conditions, as outlined in Book 12 of the Ontario Traffic Manual. Provisions for traffic signals at these locations will be included as part of road widening work, with signals installed at such time as future volumes warrant.
The County currently has hard wire interconnect on CR 19 between CR 22 and Lanoue Street. Interconnect for all intersections between CR 42 and Lanoue Street should be reviewed during Detailed Design. As a minimum, provision for future interconnect should be included. Due to the uncertainty of the timing for traffic signals, it is recommended that all underground work be completed during construction of CR 19 with adjacent developments financing and installing the signals when warranted.

Power Supply Facilities
Power supply will be required for each intersection with partial illumination and traffic signals. The existing power supply at the CR 19/Highway 401 may need to be upgraded and relocated once the Hydro One utility pole relocations have been confirmed during Detailed Design.

For the full illumination sections on CR 19 and CR 22, adequately spaced power supplies are required for each road section to minimize large conductor sizes and voltage drops. Power supply cabinets can be MTO design 120/240 Volt, 1 Phase, 3 Wire, Type 1 cabinet in accordance with OPSD 2440.010. However, if 600/347 volt supply is specified, circuits could be run for greater distances with reduced wire sizes, potentially reducing costs. This should be reviewed during Detailed Design.

In addition, the lighting circuits will be designed to achieve the following:

- Maximum 3% voltage drop
- Standard No. 6 AWG copper conductors or less
- Standardize on 20 amp single pole breakers
- Staggered multiple circuits for lighting runs.

7.4.10 Traffic Counting Stations

The existing traffic inventory counting stations currently in place on the Highway 401 interchange ramps will need to be replaced during reconstruction of the ramps. MTO will confirm the location of the replacement counting stations as part of Detailed Design. Also during Detailed Design, the County of Essex will confirm requirements for inventory and classification type traffic counting stations on CR 19, CR 22 and the new interchange ramps at CR 19 and CR 22.

7.4.11 Pavement

Based on MTO's preliminary pavement recommendations, the following are suggested pavement rehabilitation/reconstruction strategies for CR 19 and CR 22:

- CR 19 from Highway 3 to CR 22 – pulverize the existing asphalt into Granular A material to a total depth of 300mm, widen the pavement with a vertically faced excavation starting at existing edge of

pavement, place granular base material to match existing and pave with 40mm Superpave 12.5, 50mm Superpave 19.0 Upper Binder and 50mm Superpave 19.0 Lower Binder. Depth of existing granular base will be confirmed during Detailed Design

- CR 22 from west limit to Lakeshore Blvd – this section requires full reconstruction because CR 22 is being shifted to the south and the profile is changing significantly. The roadway will be fully reconstructed using 40mm Superpave 12.5 FC2, 70mm Superpave 19.0 Upper Binder, 70mm Superpave 19.0 Middle Binder, 70mm Superpave 19.0 Lower Binder and 750mm Granular A Base.

Partially paved shoulders within the rural sections of CR 19 will be paved integrally with both the surface and upper binder course paving. Fully paved shoulders will be provided on the median and outside shoulders on CR 22. Paved shoulders on CR 22 will be paved with two lifts of asphalt, including a surface course using Superpave 12.5 to provide a colour differential between the travelled lanes and paved shoulders.

Pavement rehabilitation/reconstruction will be confirmed during Detailed Design in a Pavement Design Report. The report will consider life cycle cost comparisons for flexible pavement and rigid pavement.

7.4.12 Utilities and Municipal Services

Improvements to CR 19 and CR 22 have significant conflicts with utilities and municipal services:

- the majority of Bell cables and pedestals must be relocated to accommodate the widening of CR 19. Some fibre optics cables will also be affected by the reconstruction
- most of the hydro poles must be relocated to accommodate additional lanes on CR 19 outside the clear zone, if possible. Some of the utility pole braces extend toward the road and should be eliminated
- existing hydro towers should not be affected by the proposed reconstruction, but the overhead lines just south of CP Rail need to be raised. Any required approvals from CP Rail will be obtained during Detailed Design
- some watermains need to be relocated or lowered and the majority of fire hydrants must be relocated to the new property line where the ROW is widened.

The following table summarizes potential utility conflicts.

Table 50:
Potential Utility Conflicts

Utility or Munc. Service	Location	Potential Conflict with:	Approx. Conflict Length (m)
Union Gas	WS CR 19 from Hwy 3 to CR 34	Relocated drain	590
Union Gas	SS CR 34	Intersection reconstruction and enclosure of drain	65
Union Gas	Crossing CR 19 about 1.1km north of CR 34	Ditching on east side	50
Union Gas	SS Malden Road, crossing CR 19, along ES CR 19, continuing on NS North Talbot Road	Road widening and relocated drain and with relocation of North Talbot Road	90
Union Gas	NS Malden Road, continuing on WS CR 19 to CR 46	Road widening and relocated drain	200
Union Gas	NS CR 46	Intersection reconstruction and relocation of drain on WS of CR 19	60
Union Gas	ES CR 19 from CR 46, crossing to WS about 190m north of North Rear Road and ending just south of Hwy 401	Reduced cover with road widening and ditching and relocation of Croft Drain	1880
Union Gas	NS North Rear Road	Intersection reconstruction and relocation of Croft Drain	85
Union Gas	SS Memorial Drive from WS of CR 19	Road widening on CR 19 and closure of Memorial Drive	25
Union Gas	WS 10th Concession	Relocation of 16 & 17 Sideroad	45
Union Gas	SS 10th Concession continuing on ES CR 19, crossing CR 19 just north of Pike Creek and continuing on WS CR 19 to CR 42	Road widening on CR 19 and widening of Pike Creek bridge	615
Union Gas	NS CR 42 with crossing just west of CR 19	Widening of CR 42 and reconstruction of intersection	270
Union Gas	WS CR 19 from CR 42 to about 300m south of CP Rail	Road widening on CR 19	590
Union Gas	Crossing CR 19 just south of CP Rail	Embankment and retaining walls for CP Rail grade separation	100

Table 50:
Potential Utility Conflicts

Utility or Munc. Service	Location	Potential Conflict with:	Approx. Conflict Length (m)
Union Gas	WS CR 19 from just south of CP Rail to beyond VIA Rail	Embankment for CP Rail grade separation, under CR 19 for short section about 185m north of Little Baseline Road, new culvert between Little Baseline Road and Sylvestre Drive, and embankments and retaining walls for new interchange at CR 19 and CR 22	725
Union Gas	SS Little Baseline	Road widening on CR 19 and reconstruction of intersection	65
Union Gas	NS Sylvestre Drive	Road widening	10
Union Gas	SS Desro Drive	Embankments and retaining walls for new interchange at CR 19 and CR 22	30
Union Gas	SS Amy Croft Drive	Should not be in conflict with intersection reconstruction	To be confirmed
Union Gas	NS Lanoue Street		N/A
Union Gas	Crossing CR 22 about 475m west of Lesperance Road with a stub extending west on NS CR 22	Ditching	10
Union Gas	NS CR 22 from about 145m west of Lesperance Road to WS Lesperance Road	Retaining wall along north side of Ramp N/S-W	135
Union Gas	ES Lesperance Road, crossing to WS at about 90m south of CR 22, and crossing back to ES about 45m north of CR 22	Lowering of Lesperance Road	125
Union Gas	SS CR 22 from WS Lesperance Road to Exit for Sylvestre Drive, continuing along WS Exit Ramp	Embankments for CR 22 over Lesperance Road Grade Separation, reconstruction of CR 22 and relocation of Exit Ramp	680
Union Gas	NS CR 22 from WS of CR 19 to just east of Lakeshore Blvd	Retaining walls on CR 19	55
BP Oil	3 pipelines crossing CR 19 about 280m north of North Rear Road	Should not be in conflict with road widening on CR 19, but need to confirm depth	To be confirmed

Table 50:
Potential Utility Conflicts

Utility or Munc. Service	Location	Potential Conflict with:	Approx. Conflict Length (m)
Bell	WS CR 19 from Hwy 3 to first entrance	Road widening and relocated drain	115
Bell	Crossing CR 19 and CN Railway on angle	Road widening and relocated drain	60
Bell	ES CR 19 from 140m south of CR 34 to NS CR 34	Road widening and intersection reconstruction	145
Bell	SS Malden Road continuing on NS North Talbot Road	Road widening and drain relocation on CR 19	60
Bell	ES CR 19 from NS of North Talbot Road to SS of CR 46	Road widening	185
Bell	NS Old Hwy 114	Road widening on CR 19	40
Bell	2 cables on NS CR 46, continuing on ES CR 19 to about 90m north of CR 46	Intersection reconstruction	20
Bell	ES CR 19 from just north of CR 46 to North Rear Road	Relocation of Croft Drain	65
Bell	ES CR 19 from North Rear Road continuing on SS of Memorial Drive	Relocation of Croft Drain, road widening on CR 19 and closure of Memorial Drive	665
Bell	NS North Rear Road	Intersection reconstruction and relocation of Croft Drain	50
Bell	Crossing CR 19 about 0.5km north of North Rear Road and continuing on WS CR 19 to just south of Hwy 401	Road widening on CR 19	365
Bell	Fibre optics cable on NS Hwy 401 but at CR 19 along WS CR 19 and along NS E-N/S Ramp	Construction of N-W Ramp, widening on CR 19 and reconstruction of E-N/S Ramp	950
Bell	Along NS and WS access road in north west quadrant of CR 19 and Hwy 401	Construction of N-W Ramp and relocation of access road	500
Bell	WS CR 19 from access road just north of Hwy 401, crossing just south of 16&17 Sideroad and continuing on ES to just south of Pike Creek	Road widening on CR 19, relocation of 16 & 17 Sideroad and reconstruction of 13 & 14 Sideroad	3785
Bell	SS 13&14 Sideroad	Reconstruction of intersection	120
Bell	2 cables on SS 10th Concession	CR 19 widening and culvert replacement	20
Bell	Aerial ES CR 19 crossing Pike Creek	Widening of CR 19 and bridge	40
Bell	ES CR 19 from NS Pike Creek to NS CR 42	Road widening of CR 19	270
Bell	Southwest quadrant of CR 19 and CR 42	Reconstruction of intersection	60

Table 50:
Potential Utility Conflicts

Utility or Munc. Service	Location	Potential Conflict with:	Approx. Conflict Length (m)
Bell	NS CR 42 with stub on WS CR 19	Reconstruction of intersection	360
Bell	ES CR 19 from CR 42 to Sylvestre Drive	Embankment for CP Rail grade separation and sections under widening of CR 19	1050
Bell	SS CP Rail crossing CR 19, along ES of CR 19 and along SS of CP Rail	CR 19 embankments and retaining walls	45
Bell	SS Sylvestre Drive	Off ROW	N/A
Bell	For a section on WS CR 19 just north of Sylvestre Drive crossing CR 19 about 95m north of Sylvestre Drive	Road widening of CR 19	170
Bell	ES CR 19 from about 95m north of Sylvestre Drive crossing CR 19 about 220m north of Jamsyl Drive and continuing on WS to north side of Desro Drive	Road widening of CR 19 and embankments and retaining walls for new interchange at CR 19 and CR 22	300
Bell	SS Jamsyl Drive, continuing on WS CR 19 and crossing CR 19 about 60m south of Jamsyl Drive	Road widening of CR 19	80
Bell	NS Desro Drive, crossing CR 19 and continuing on ES CR 19 to SS CR 22	Embankments and retaining walls for new interchange at CR 19 and CR 22	135
Bell	ES CR 19 from SS CR 22 to north of Amy Croft Drive	Embankments and retaining walls for new interchange at CR 19 and CR 22 and reconstruction of CR 22	215
Bell	ES Lesperance Road	Lowering of Lesperance Road	120
Bell	2 cables on SS CR 22 from Lesperance Road to WS CR 19 and continuing on WS CR 19 to Desro Drive	Embankments for CR 22 over Lesperance Road Grade Separation, reconstruction of CR 22 and embankments and retaining walls for new interchange at CR 19	2 x 1320
Bell	Fibre optics cable on SS CR 22 from ES CR 19 to beyond Lakeshore Blvd	Reconstruction of CR 22	1070
Bell	Crossing CR 22 about 470m west of Lesperance Road	Ditching	10
Bell	Crossing CR 22 about 450m west of Lesperance Road	Ditching	10

Table 50:
Potential Utility Conflicts

Utility or Munc. Service	Location	Potential Conflict with:	Approx. Conflict Length (m)
Hydro One	WS from Hwy 3, crossing to ES about 300m north of Hwy 3, continuing on ES to CR 46	Road widening of CR 19	2350
Hydro One	NS and SS CR 34	Reconstruction of intersection	300
Hydro One	Aerial crossing CR 19 about 1.1km north of CR 34	Should not be in conflict but clearance to be checked	To be confirmed
Hydro One	SS Malden Road	Road widening of CR 19	60
Hydro One	NS North Talbot Road	Road widening of CR 19	225
Hydro One	NS Old Hwy 114	Road widening of CR 19	60
Hydro One	NS CR 46	Should not be in conflict	To be confirmed
Hydro One	ES CR 19 from CR 46 to North Rear Road	Reconstruction of North Rear Road intersection	50
Hydro One	NS North Rear Road	Road widening of CR 19	65
Hydro One	ES CR 19 from North Rear Road to just south of Hwy 401	Road widening of CR 19	485
Hydro One	Along SS and ES access road in north west quadrant of CR 19 and Hwy 401	Construction of N-W Ramp and relocation of access road	585
Hydro One	WS 10th Concession from south of Hwy 401 to north of Hwy 401	Reconstruction of E-N/S Ramp	200
Hydro One	WS CR 19 from existing access road just north of Hwy 401, continuing on NS 16&17 Sideroad	Road widening of CR 19 and relocation of 16 & 17 Sideroad	620
Hydro One	WS CR 19 from 250m south of Baseline Road to NS CR 42	Road widening of CR 19	2460
Hydro One	SS Baseline Road	Road widening of CR 19	50
Hydro One	WS 10th Concession	Relocation of 16 & 17 Sideroad	100
Hydro One	SS CR 42	Reconstruction of CR 42 and intersection	385
Hydro One	ES CR 19 from CR 42 to Jamsyl Drive	Embankment for CP Rail grade separation	800
Hydro One	Aerial crossing CR 19 about 0.25km north of CR 42	Should not be in conflict but clearance to be checked	To be confirmed
Hydro One	Crossing CR 19 just south of Aerial crossing	Embankment for CP Rail grade separation	150

Table 50:
Potential Utility Conflicts

Utility or Munc. Service	Location	Potential Conflict with:	Approx. Conflict Length (m)
Hydro One	Aerial crossing CR 19 just south of CP Rail	Embankment for CP Rail grade separation	580 (raise lines over 3 spans)
Hydro One	NS Little Baseline Road	Reconstruction of Little Baseline Road and intersection	190
Hydro One	SS Sylvestre Drive	Road widening of CR 19	45
Hydro One	SS Jamsyl Drive	Road widening of CR 19	50
Hydro One	WS CR 19 from Jamsyl Drive to CR 22	Embankments for new interchange at CR 19 and CR 22	380
Hydro One	ES CR 19 from CR 22 to north of Amy Croft Drive	Embankments for new interchange at CR 19 and CR 22	215
Hydro One	ES Lesperance Road crossing CR 22	Raising CR 22 for grade separation	130
Tecumseh	SS CR 34 crossing to NS west of CR 19	Should not be in conflict but	To be
Tecumseh Watermain	SS CR 34 crossing to NS west of CR 19	Should not be in conflict but depth to be checked	To be confirmed
Tecumseh Watermain	SS Malden Road crossing to ES of CR 19	Should not be in conflict but depth to be checked	To be confirmed
Tecumseh Watermain	SS CR 46	Relocation of drain on WS of CR 19	20
Tecumseh Watermain	WS CR 19 from 10th Conc. to CR 42	Widening of Pike Creek Bridge	50
Tecumseh Watermain	WS CR 19 from CR 42 to CR 22	Embankment for CP Rail grade separation	725
Tecumseh Watermain	NS CR 42	Widening of CR 42	170
Tecumseh Watermain	2 WMs on WS CR 19 NS CR 22 to beyond VIA Rail	Embankments and retaining walls for new interchange at CR 19	400
Tecumseh Watermain	NS CR 22 from Windsor Boundary to WS CR 19	Under Ramp N/S-W and retaining walls	350
Tecumseh Watermain	Proposed crossing of CR 22 about 760m west of Lesperance Road	Should not be in conflict but depth to be checked	To be confirmed
Tecumseh Watermain	Crossing CR 22 about 450m west of Lesperance Road	Should not be in conflict but depth to be checked	To be confirmed
Tecumseh Watermain	ES Lesperance Road	Lowering of Lesperance at CR 22	

Table 50:
Potential Utility Conflicts

Utility or Munc. Service	Location	Potential Conflict with:	Approx. Conflict Length (m)
Tecumseh Watermain	Crossing CR 22 about 400m east of Lesperance Road	Should not be in conflict but depth to be checked	To be confirmed
Lakeshore Watermain	NS CR 34	Should not be in conflict but depth to be checked	To be confirmed
Lakeshore Watermain	NS North Talbot Road, continuing on ES of CR 19 to CR 46	Widening on CR 19	100
Lakeshore Watermain	SS CR 46	Should not be in conflict but depth to be checked	To be confirmed
Lakeshore Watermain	ES CR 19 from CR 46 to just south of Hwy 401, continuing east under Commuter Parking Lot	Reduced cover with road widening and ditching on CR 19 and relocation of Croft Drain (proposed WM relocation from Memorial Drive to Commuter Parking Lot)	200
Lakeshore Watermain	NS North Rear Road	Intersection reconstruction and relocation of Croft Drain	35
Lakeshore Watermain	ES CR 19 from about 140m south of 13&14 Sideroad to about 925m north of 13&14 Sideroad	Should not be in conflict but depth to be checked	To be confirmed
Lakeshore Watermain	SS 13&14 Sideroad	Widening on CR 19 and new culvert	20
Lakeshore Watermain	WS 10th Concession	Relocation of 16&17 Sideroad	50
Lakeshore Watermain	NS 10th Concession	Widening on CR 19 and new culvert	20
Lakeshore Watermain	NS CR 42	Widening of CR 42	170
Lakeshore Watermain	NS Little Baseline Road crossing CR 19	Widening on CR 19 and new culvert	20
Lakeshore Watermain	NS Amy Croft Drive	Should not be in conflict but depth to be checked	To be confirmed
Tecumseh Sanitary	Proposed sanitary sewer on SS CR 22 from about 750m west of Lesperance Road to Lesperance Road	Should not be in conflict but depth to be checked	To be confirmed
Tecumseh Sanitary	Under Lesperance Road	Should not be in conflict but depth to be checked	To be confirmed

Notes to Table 50:
NS – north side; SS – south side; WS – west side; ES – east side
The existing location of utilities and the potential conflicts must be confirmed during Detailed Design.

7.4.13 Guiderail

As recommended by the Roadside Safety Report prepared for this project, all existing guiderail will be replaced with the widening of CR 19. Guiderail may no longer be required in sections where the drain is relocated. At CR 34, part of the drain will be enclosed eliminating the need for guiderail at this intersection. Elimination of additional roadside hazards should be considered, such as the relocation of poles outside the clear zone or use of breakaway poles.

Additional guiderail may be required along the existing drain, based on warrants in the Roadside Safety Manual (RSM). The RSM will also be used during Detailed Design to ensure all hazards are protected and the proper type, length and end treatment for guiderails is applied.

7.4.14 Restoration

Topsoil and sod should be considered along frontage of private residences and commercial establishments. All other disturbed areas will be topsoiled and seeded. Alternative surface treatments may be required in ditches and drains and areas of potential erosion.

7.5 Design Criteria

Based on these design features, the design criteria for the reconstruction of CR 19, CR 22 and Highway 401 Ramps are provided in **Appendix F**. Design Criteria were prepared for:

- the rural section on CR 19 from Highway 3 to 225m south of CR 42, and the urban section on CR 19 from 225m south of CR 42 to CR 22
- CR 22 from City of Windsor Boundary (about 900m west of Lesperance Road) to CR 19
- Highway 401 interchange.

7.6 Signing and Pavement Marking

Sign and pavement marking layouts will be prepared during Detailed Design in accordance with the Ontario Traffic Manual. Layouts will include all temporary and permanent signs and pavement markings.

The existing overhead signs at Highway 401 exit ramps may require replacement with the widening of the deceleration lanes. Additional details on the existing overhead structures must be obtained to determine if replacement is necessary. The existing ramp gates on CR 19 exit ramps to Highway 401 must be replaced.

Overhead signs should be designed on CR 22 for the exit ramps to CR 19 and Lesperance Road, since CR 22 will be a multi-lane divided roadway.

7.7 Structures

The proposed improvements to CR 19 requires replacement of the existing underpass structure at the Highway 401 interchange and the widening of the existing bridge at Pike Creek. A new grade separation is proposed to carry CR 19 traffic over the CP Rail tracks between CR 42 and CR 22.

The construction of a new interchange at the intersection of CR 19 and CR 22 requires a new grade separation to carry CR 19 traffic over CR 22. A new partial interchange at the intersection of CR 22 and Lesperance Road also requires a new grade separation to carry CR 22 traffic over Lesperance Road.

Structural Design Reports and Preliminary General Arrangement drawings have been prepared for all five structures.

The structural design will be completed in accordance with the Canadian Highway Bridge Design Code, CAN/CSA-S6-06 (CHBDC), the MTO Structural Manual and the MTO Report SO-96-01, Integral Abutment Bridges.

7.7.1 Highway 401 Interchange

The existing CR 19 underpass at Highway 401 needs to be widened and replaced to accommodate the proposed four laning on CR 19 and the proposed horizontal and vertical alignment improvements. The

existing underpass structure also has substandard vertical clearance for Highway 401 traffic and has inadequate span for the future ten lanes (including two speed change lanes) on Highway 401.

The proposed profile will be higher than the existing road profile to accommodate the required Highway 401 vertical clearance and provide improved stopping sight distance to the exit ramp bullnoses and ramp terminals on both approaches to the bridge.

Four structural alternatives were reviewed and evaluated. The recommended alternative replaces the existing structure with a new two-span 70.0m (35m : 35m) concrete slab-on-CPCI girders with integral abutments. This alternative allows construction of the new bridge while CR 19 remains open to traffic at all times. The bridge superstructure depth also minimizes the grade raise on CR 19 and the structure has the flexibility to provide eight-laning, plus speed change lanes, on Highway 401 and provides the best economy and ease of construction.

The centreline of the new structure will be shifted to the west and constructed in halves to allow traffic to be maintained on CR 19 during construction. The new underpass bridge cross-section includes parallel exit speed change lanes across the entire bridge allowing the new underpass to be constructed as close as possible to the existing structure, thereby minimizing the horizontal alignment shift on CR 19.

7.7.2 Pike Creek Bridge

The proposed improvements to CR 19 at Pike Creek require widening the structure to accommodate the additional through lanes and centre turning lane. The existing superstructure and substructure are in good condition and the bridge was last rehabilitated in 2005 when the full deck and girders were replaced. The existing structure was kept and the structure widened using the same structural type as existing (slab-on steel girder) with new deck joint assemblies.

To accommodate the widening to two lanes in each direction and one centre turning lane, the Pike Creek Bridge needs to be widened by 8.12 m to the east and west, providing a new overall bridge width of 27.14 m

Dillon also investigated the feasibility of eliminating the deck expansion joints in the existing structure to provide retrofit semi-integral abutments. Since no information is available on the original foundations, it is expected that the original structure is supported on narrow spread footings, based on Dillon's experience from similar structures in the Highway 401 corridor between Tilbury and Windsor. The significant increase in the dead load on the original foundations makes retrofitting the semi-integral abutments of the existing Pike Creek structure not feasible. Therefore, this alternative is not recommended. However, it could be re-examined during Detailed Design when further investigation is conducted on the existing footings.

7.7.3 CR 19 CP Rail Overhead

The recommended new structure will carry CR 19 traffic over the CP Rail tracks and consist of a single 25.0m span constructed using concrete slab-on-CPCI girders with integral abutments. This bridge type is recommended because of the cost advantage over the other alternatives (slab-on-steel girders and prestressed box girders). The unit cost of steel girders has increased steadily in the last few years; unless the future price of steel drops significantly, concrete girders are preferred. A cast-in-place concrete rigid frame was considered, but this option was eliminated since the temporary falsework will infringe into CP Rail's construction clearances, thus requiring the further raising of the road profile.

The proposed structure cross section is symmetrical about the centerline and will consist of two through lanes in each direction, a flush centre median, on-road bicycle lanes with curb and gutter, boulevards and sidewalks on both sides of the structure.

7.7.4 CR 19 and CR 22 Interchange

The existing CR 19 and CR 22 intersection will be replaced with a full access interchange, specifically a Single Point Urban Interchange (SPUI). A SPUI is a fairly uncommon interchange for Ontario but it has been used in the past on Highway 406 and Fourth Avenue in St. Catharines. In a SPUI (pronounced "Spooey"), a single traffic signal at the centre of the interchange controls all left turns. Drivers make opposing left-turns at the same time under the protection of this signal.

CR 19 will cross over CR 22 with a fully signalized single point intersection located directly on top of the CR 19/CR 22 underpass structure. The following roads and ramps will converge at a single point:

- CR 19 northbound lanes (two lanes)
- CR 19 southbound lanes (two lanes)
- CR 19 northbound left turn lanes (two lanes) to S-W ramp
- CR 19 northbound left turn lanes (two lanes) to S-W ramp

- CR 19 southbound left turn lanes (two lanes) to N-E ramp
- W-N ramp (2 lanes) to CR 19 northbound lanes
- E-S ramp (1 lane) to CR 19 southbound lanes.

CR 22 will be realigned to the south to accommodate the new interchange ramps on the north side. The road profile of CR 19 will be raised higher than its existing elevation to provide the required minimum clearance over Essex County Road 22

The proposed road cross-section on CR 19 consists of two through lanes, dual left- turn lanes and on-road bicycle lanes with curb and gutter. A pedestrian sidewalk will be located adjacent to the northbound lanes.

The proposed road cross-section on the westbound lanes of CR 22 consists of three through lanes with paved shoulders on both the median and outside shoulders. The proposed cross-section on the eastbound lanes of CR 22 also consists of three through lanes with paved shoulders on the median and outside shoulders, but the outside through lane is being dropped at CR 19 with the transition beginning at the west side of the structure. However, for the purposes of maintaining a consistent and parallel structure span above the eastbound lanes, the outside lane is being considered full-width within the limits of the structure.

The proposed south span is 20.2 m between centres of south abutment and pier. The proposed north span is 16.4 m between centres of north abutment and pier. The horizontal clear zone for the south span to protect the reinforced soil supported (RSS) wall and pier is approximately 17.8 m. The horizontal clear zone for north span between concrete barriers which protect the RSS wall and pier is approximately 14.0 m.

Three structural alternatives were reviewed and evaluated. Slab-on-CPCI girders with skewed integral abutments has been selected as the preferred alternative because the depth of bridge superstructure minimizes the required road profile raise, retains flexibility to widen the structure for future horizontal alignment adjustment, provides durability and is the most economical structure.

Conventional concrete retaining walls, drilled caisson supported cantilever walls and RSS walls were considered to contain the approach fills. RSS walls were selected as the most economical.

7.7.5 CR 22 and Lesperance Road Partial Interchange

CR 22 currently intersects Lesperance Road at approximately right angles and both roads are on tangent horizontal alignments. The proposed work for CR 22 includes widening to six lanes and the elimination of the at-grade intersection with Lesperance Road.

Twin overpass structures are proposed to carry three lanes of traffic in each direction over Lesperance Road. Access to the CR 22 westbound lanes will be provided from Lesperance Road northbound and southbound lanes via a ramp at the northwest corner of the bridge.

The CR 22 profile will be raised higher than its existing elevation to provide the required minimum clearance over Lesperance Road. The Lesperance Road profile will also be lowered at the location of the overpass to reduce the height of embankments required on the CR 22 approaches and improve the approach grades on Lesperance Road itself underneath the proposed overpass.

The proposed structure cross-section is symmetrical about the centerline and will consist of six through lanes with paved shoulders on both the median and outside shoulders. The proposed cross-section on Lesperance Road will consist of a single northbound turning lane, two through lanes, curb and gutter and sidewalks on both sides. The new structure will have a single 22.0m span.

Four structural alternatives were reviewed and evaluated. Concrete slab-on-CPCI girders with skewed integral abutments are recommended because the depth of bridge superstructure minimizes the amount that the road profile has to be raised, retains flexibility to widen the structure for future horizontal alignment adjustment, provides durability and is the most economical structure. The concrete slab-on-CPCI girder bridge is recommended because of the cost advantage over the other alternatives. Although the option of using concrete box girders provides a grade raise reduction on the CR 22 approaches, it results in increased structure costs. This option should be re-evaluated, however, during Detailed Design.

RSS walls can be used for the retaining walls at the structure and along the approach embankments.

7.8 Foundation Investigation and Design

A preliminary foundation investigation was undertaken at the five structure locations. Preliminary recommendations are documented in the following Preliminary Foundation Investigation and Design Reports:

- Highway 401 Underpass
- Pike Creek Bridge
- CR 19/CP Rail Overhead, CR 19/CR 22 Underpass and CR 22/Lesperance Road Overpass.

High embankment fills (up to 9m in height above original ground) will be required on the approaches to the new structures for CR 19/CP Rail Overhead, CR 19/CR 22 underpass, CR 22/Lesperance Road overpass and for the embankment widening on the approaches to the CR 19/Highway 401 underpass.

Based on the preliminary foundation investigations, high fill approaches and long wingwalls will likely succumb to significant settlement due to consolidation of the underlying soils. Therefore, pre-loading of the new earth embankment structures is warranted to minimize post-construction settlement. Three types of fill are available: 1) conventional earth fill, 2) lightweight fill alternatives, and 3) expanded polystyrene (EPS) geofoam. The type of fill selected for the pre-loading will influence the settlement behaviour of the approaches and wingwalls. Depending on the type of the fill selected for pre-loading, between one to three years are required to reach the anticipated settlement.

Traffic staging and construction duration are critical components to consider when evaluating pre-loading alternatives. Historically, long duration pre-loading methods have been used in locations where new embankments are located “off line” with no impact on existing traffic patterns. Potential locations for earth pre-loading include:

- CR 19/Highway 401 Underpass – west embankment widening north and south of Highway 401
- CR 19/CP Rail Overhead – after construction of the 2-lane detour road
- CR 19/CR 22 – W-N/S ramp and N/S-E ramp embankments.

Earth pre-loading should be investigated further during Detailed Design since it will impact the construction timetable and project cost.

7.9 Construction Staging and Traffic Control

Staging of construction and traffic control will be critical to ensure that traffic operations are maintained and delays to the travelling public are minimized. Typical sections of the suggested staging are provided in **Appendix E**. The following summarizes the preliminary staging concept:

- the majority of the widening/reconstruction of CR 19 can be performed in two basic stages – the first is widening on one side with short lane closures and the second is widening to the other side with two lanes of traffic
- reconstruction of CR 22 can be completed in two basic stages while maintaining 4 lanes of traffic. The first stage will be to complete new EB lanes and the second to complete the new WB lanes
- temporary widening will be required for most of the CR 19 staging and some for CR 22 at Lesperance Road
- temporary concrete barrier is recommended to separate traffic and work zone if separation cannot be achieved
- access to sideroads and entrances must be maintained during construction
- long-term lane closures will require approval of alternative traffic control, such as temporary signals
- detours and temporary signals are required to construct the CR 19 and CR 22 interchange. The south leg of the intersection will be closed to construct the bridge, embankments and ramps on the south side, with detour on Future Road and extension of Lakeshore Boulevard. The north leg of the intersection will also be closed to construct retaining walls and embankments, with detours on Amy Croft and Lakeshore Boulevard
- CR 19 detour required to construct CP Rail grade separation and approaches. A 2 lane detour can be provided on the west side of CR 19 beyond the fill slope and gas substation. A temporary railway crossing will be required, including signals
- maintain 2 lanes of traffic on the Pike Creek structure by shifting lanes and using temporary barriers
- Highway 401 underpass can be constructed in 2 stages with 2 lanes of traffic on CR 19 since the centre line of CR 19 is shifted. Roadway protection and some ramp closures are required to raise the profile
- some of the Highway 401 ramps to remain open during reconstruction with temporary barrier protection
- Lesperance Road will be closed during construction of grade separation, with 4 lanes of traffic on CR 22. In the first stage, traffic can be maintained on CR 22, by shifting slightly to the north and

with roadway protection to construct the EB lanes and structure. In the second stage, traffic will be on the new EB lanes to complete the WB lanes and structure.

Alternative routes during construction are East Puce Road and Walkers Road. During construction of the CR 19/CR 22 interchange, alternative routes south of CR 22 are CR 42, Banwell Road, Lauzon Parkway and East Puce Road. North of CR 22, alternative routes are Tecumseh Road, Lesperance Road and West Pike Creek Road. Alternative routes will be identified during Detailed Design.

Staging, traffic control and alternative routes will be reviewed and finalized during Detailed Design.

The staging and detour design criteria for CR 19 and CR 22 are shown in **Tables 51 and 52** below.

Table 51:
CR 19 Staging & Detour Design Criteria

	Present Conditions	Design Standards	Proposed Standards
Highway Classification	RAU 80	RAU 80	RAU 80
Min Stopping Sight Dist	135m (a)	135m	135m (a)
Equivalent Min 'K' Factor	16 (Crest) (a) 14 (Sag) (a)	35 (Crest) 30 (Sag)	16 (Crest) (c) 14 (Sag) (c)
Grades Maximum	2.3%	5%	3% (c)
Minimum Radius	250m	250m	250m (d)
Pavement Width	2@3.35 - 3.65m	3.5m	2@3.5m
Shoulder Width	2.5-3.0m	2.0m (e)	2.0m (e)
Shoulder Rounding	0.5m	0.5m	0.5m
Median Width	N/A	N/A	N/A
R.O.W. Width	19-34m	26-40m	26m (f)
Posted Speed	80 km/h (b)	60-80 km/h	60 km/h

Notes:
a) Existing short successive tight vertical curves provide acceptable sight distance except at CASO (CN Rail) crossing K=10± result in a stopping sight distance of about 92m.
b) Posted speed from 300m south to 300m north of CR 42 is 60 km/h and north of CR 22 is 50 km/h.
c) Match existing or proposed profile.
d) Match existing horizontal curves, but increase for detours.
e) Shoulder reduced to minimum of 0.5m adjacent to barriers.
f) Minimum ROW.

Table 52:
CR 22 Staging & Detour Design Criteria

	Present Conditions	Design Standards	Proposed Standards
Highway Classification	RAD 100	RAD 100	RAD 100
Min Stopping Sight Dist	400m	185m	185m
Equivalent Min 'K' Factor	300 (Crest) 300 (Sag)	70 (Crest) 45 (Sag)	70 (Crest) (b) 45 (Sag) (b)
Grades Maximum	0.7%	4%	3% (b)
Minimum Radius	582m	420m	420m
Pavement Width	3.75m	3.5m	4@3.5m
Shoulder Width	3.0m	2.5m	2.5m (c)
Shoulder Rounding	0.5m	0.5m	0.5m
Median Width	2-13m (a)	1.0m	1.0m
R.O.W. Width	48-66m	26-40m	N/A (d)
Posted Speed	80 km/h	80-100 km/h	80 km/h

Notes:
a) Varies from 13m grass median at west end to 2m flush/raised median at east end.
b) Match existing or proposed profile.
c) Shoulder reduced to minimum of 1.0m adjacent to barriers.
d) Detours within ROW.

7.10 Property Requirements

Property acquisition is required throughout, since the existing right-of-way (ROW) is not sufficient for the proposed four laning of CR 19. Based on the proposed cross-sections, the minimum ROW within the urban section is 37m and 40m within the rural section. Additional ROW width is required at certain locations for turning lanes and to maintain existing open drains. Daylighting is required at intersections and railway grade crossing to improve sight lines. Additional property is required at the Highway 401 interchange to reconstruct the ramps, at the CP Rail crossing to construct the grade separation and at CR 19 and CR 22 to construct the new interchange.

CR 22 is shifted to the south at CR 19 to construct the interchange. East of CR 19, CR 22 will be widened and shifted to the south as recommended by a separate study. As a result, additional ROW is required from Lesperance Road to east of Lakeshore Boulevard.

Property requirements are shown on the Preliminary Design drawings in **Appendix E**. **Table 53** summarizes overall property requirements:

Table 53:
Overall Property Requirements

	Location	Property Requirements	Property Required (acres)				
			A	C	D	I	R
1	Hwy 3 to CR 34	Widen ROW both sides about 10m	2.5		0.7		0.4
2	CR 34 to CR 46	Widen ROW on east side about 20m, with relocation of Malden Road/North Talbot Road intersection	8.4	0.7	0.3		0.3
3	North Talbot Road Realignment	New 30m ROW	3.3				
4	CR 46 to about 600m north	Widen ROW to west about 26m (includes roadside drain)	3.7				
5	From about 600m north of CR 46 to Hwy 401	Widen ROW to west about 13m	2.3	2.3			0.4
6	Hwy 401 interchange reconfiguration	Widening in SW, NW and NE quadrants	1.5	1.8	0.1		
7	16 & 17 Sideroad relocation	Relocated 16 &17 Sideroad and connection to existing east of 10th Concession Road	3.1				
8	CR 19 from Hwy 401 to Pike Creek	Widen ROW to west about 13m and to east about 7m and with relocated Coxon entrance	22.1	1.1			0.2
9	CR 19 from Pike Creek to CR 22	Widen ROW to west about 10m minimum and to east about 15m minimum with additional widening for drains, CR Rail overpass and adjacent Service Roads	5.2	8.9	6.5	1.5	2.5
10	CR 19 from CR 22 to Amy Croft Drive	Widen ROW to east about 5m		0.2			
11	CR 22 from Lesperance Road to east of Lakeshore	Widen ROW to south about 13m, with additional widening for interchanges at CR 19 and Lesperance Road, SWM pond, minor widening on Lesperance Road and ROW for extension of Westlake Drive		6.0	0.1	14.1	0.0
TOTALS (100.2 acres)			**52.1**	**20.9**	**7.7**	**15.7**	**3.8**

Notes:
A – Agricultural ; C – Commercial; D – Development Land including existing ROW; I – Industrial; R – Residential

Temporary easements are required at two locations:

- at Pike Creek for minor channel realignment – about 0.1 acre
- at CP Rail for detour – about 8.2 acres.

The existing rights-of-way must be maintained as easements for the following improvements:

- relocation of North Talbot Road
- closure of Memorial Drive
- relocation of 16&17 Sideroad
- realignment of Baseline Road.

If existing utilities and/or municipal services are relocated off the existing ROW, some property could be surplus. There are also municipal drains within the existing rights-of-way of North Talbot Road and Baseline Road.

Two areas between existing and proposed right-of-ways are surplus property, including lands along the south side of Baseline Road and at the exit ramp to Westlake Drive/Lesperance Road.

Buildings on CR 19 affected by the proposed improvements are shown on the following table:

Table 54:
CR 19 Affected Buildings

Approx. Station	Side	Address/ Commercial Name	Type of Building	Conflict/Action
5+867	Rt	3724 Manning Rd	Residential	Within proposed ROW
5+933	Rt	943 Talbot Rd	Residential	Within proposed ROW
5+945	Rt	3714 Manning Rd Lil's Cozy Corner	Restaurant	To be removed
8+602	Lt	5355 Manning Rd Lil's Country Gardens	Commercial	Within proposed ROW
8+804	Rt		Shed	To be removed or relocated
9+577	Lt	5033 Manning Rd	Residential	Within proposed ROW
14+390	Lt	13366 County Rd 42 Pioneer Gas	Gas Station	To be removed
16+138	Lt	1950 Manning Rd	Residential	To be removed
16+879	Rt	1784 Manning Rd	Residential	To be removed
16+942	Rt	1766 Manning Rd	Commercial	To be removed
16+968	Rt	1758 Manning Rd	Residential	To be removed
17+025	Rt	1750 Manning Rd	Commercial	To be removed

Buildings backing onto CR 22 affected by the proposed improvements are shown on the following table:

Table 55:
CR 22 Affected Buildings

Approx. Station	Side	Address/ Commercial Name	Type of Building	Conflict/Action
19+603	Rt	13300 Desro Dr Lux Home Furniture Centre	Industrial	To be removed
19+674	Rt	13320 Desro Dr Classic Bingo III	Industrial	To be removed
19+737	Rt	13500 Desro Dr Relax Pools & Spas	Industrial	To be removed
19+862	Rt	13400 Desro Dr Motor City Auto Auctions	Industrial	To be removed
19+896	Rt	13400 Desro Dr Richard Lavin Auctions	Industrial	To be removed

7.11 Construction Phasing and Preliminary Cost Estimate

The proposed improvements, as shown on the Preliminary Design drawings, are estimated to cost from $180 to $200 million (2008 dollars). The cost estimate is based on preliminary quantities and unit costs for similar projects. Pavement structure costs are not based on the pavement recommendations, but assume concrete pavement for both CR 19 and CR 22. **Table 56** summarizes costs.

As shown on **Figure 2**, the following five construction phases are proposed:

- ***Phase 1*** - CR 19 from just south of Little Baseline Road to Amy Croft Drive and CR 22 from west of CR 19 to east of Lakeshore Boulevard (2 years construction duration)
- ***Phase 2*** **-** CR 22 from the City of Windsor boundary to east of Lesperance Road (1 year)
- ***Phase 3*** - CR 19 from south of Little Baseline Road to south of CR 42, including the Pike Creek Bridge (1.5 years)
- ***Phase 4*** - CR 19 from south of CR 42 to south of North Rear Road, including the Highway 401 interchange (2 years)
- ***Phase 5*** - CR 19 from south of North Rear Road to Highway 3 (1 year).

At this time no commitment has been made to fund the proposed improvements. As a result, construction timing cannot be confirmed. The timing for construction will be considered in the context of other regional projects.

Table 56:
Preliminary Cost Estimate

Road	Phase 1 CR 19 & CR 22	Phase 2 CR 22	Phase 3 CR 19	Phase 4 CR 19	Phase 5 CR 19	TOTAL****
From	Baseline & Lesperance	City Bound.	Pike Creek	North Rear Rd	Hwy 3	
To	CR 22 & Lakeshore	Lesperance	Little Baseline	Pike Creek	North Rear Rd.	
Grading & Drainage*	$27,500,000	$11,000,000	$12,600,000	$18,800,000	$10,800,000	*$80,700,000*
Structures	$16,600,000	$10,100,000	$11,300,000	$5,700,000	$4,800,000	*$48,500,000*
Electrical	$2,900,000	$800,000	$1,200,000	$800,000	$600,000	*$6,300,000*
Utilities & Services**	$2,600,000	$1,100,000	$4,000,000	$4,100,000	$3,200,000	*$15,000,000*
Subtotal	***$49,600,000***	***$23,000,000***	***$29,100,000***	***$29,400,000***	***$19,400,000***	***$150,500,000***
Cont. & Eng.	$12,400,000	$5,700,000	$7,300,000	$7,400,000	$4,900,000	*$37,700,000*
TOTAL***	**$62,000,000**	**$28,700,000**	**$36,400,000**	**$36,800,000**	**$24,300,000**	***$188,200,000***
Property******						*12,300,000*
						$200,500,000

Notes:
* Includes costs for traffic staging and detours
** Includes costs for watermain relocations
*** Does not include GST
**** Property Cost ranges from $10M to $15M
**** Property Cost includes costs for Temporary Easements, but not for Jamsyl and Lakeshore extensions

8. IMPACT ASSESSMENT AND MITIGATION

8.1 Introduction

Section 8 of the ESR/PDR includes an impact assessment of the recommended Preliminary Design of improvements to County Roads 19 and 22. The recommended design is illustrated on the drawings included in **Appendix E**. Measures and provisions to avoid or mitigate adverse impacts are also identified in this section. The impact assessment is summarized in **Table 83**, "Summary of Environmental Concerns and Commitments".

8.2 Engineering Considerations

8.2.1 Fill/Borrow

Substantial fill material is required to raise the profile of CR 19 at Highway 401, at the CP Rail crossing and CR 22, the profile of CR 22 at Lesperance Road and the project's retaining walls. Suitable fill material may be provided by the excavation of the existing roadbed and proposed stormwater management pond, but substantial fill is still required. Quantities will be determined during the Detailed Design stage.

Sites for borrow material could potentially impact cultural resources, natural features and agricultural lands. To avoid these impacts, the Contractor must obtain required permits during construction. Aggregate resources are administered in accordance with MTO Standard Provisions requiring that the Contractor apply to MTO for a "Category 9 Aggregate Permit". For permits of this type, MTO acts as the reviewing agent for MNR.

8.2.2 Utilities and Municipal Services

Utilities in the Study Area include Union Gas, BP Oil, Bell and Hydro One. These companies were contacted during Preliminary Design. Existing plant is shown on the drawings in **Appendix E**, based on mark-ups received from the utilities.

Municipal services located in the Study Area include:

- Tecumseh Watermain and Sanitary Sewers
- Lakeshore Watermain.

The municipalities were involved in the Preliminary Design stage and are aware that watermain/sewer lowering or relocations are required to accommodate the recommended improvements.

Section 7 of the ESR/PDR identifies potential utility conflicts. Utilities and municipalities will be contacted early in Detailed Design to confirm plant locations and conflicts and discuss relocation strategies. The depth of some of the utilities and watermains must be determined in the field to confirm conflicts.

8.3 Highway Safety, Traffic Impacts, Construction and Emergency Services Access

8.3.1 Highway Safety

The Preliminary Design of the proposed improvements was completed in accordance with MTO's Geometric Design Standards for Ontario Highways (GDSOH), Roadside Safety Manual (RSM) and TAC. Dillon also completed a Roadside Safety Report for the project.

An important benefit of the proposed improvements is the improvement of safety conditions, thereby reducing accidents. Improvements to existing geometric conditions, such as alignment, profile, intersection geometrics and turning lanes will also improve roadway safety. Conflict points will be reduced with the construction of interchanges at CR 19/CR 22 and CR 22/Lesperance Road and a roundabout at CR 34. In addition, the proposed roundabout at CR 34 will improve safety by reducing vehicle speeds through the intersection. When properly designed, roundabouts can reduce the frequency and severity of intersection collisions such as high-speed angle and turning movement collisions. Collisions that occur are usually lower-speed and lower-severity collisions. Cross median collisions will virtually be eliminated on CR 22 with the construction of a concrete median barrier. Dillon recommends that hydro poles and fire hydrants be moved to a location adjacent to the proposed new right-of-way limit outside the clear zone. Individual and cluster tree clearing will also need to be reviewed once grading limits have been established.

Guiderail will be brought up to current standards. A comprehensive roadside safety analysis and design will be completed during Detailed Design, as specific geometric and roadside safety elements are developed in greater detail.

8.3.2 Traffic Benefits and Impacts and Access Management

An improved CR 19 corridor will enhance the interconnectivity among Provincial highways (Highways 401 and 3), the regional road network and existing and future international crossings. The improvements address anticipated future traffic capacity constraints by providing additional capacity at intersections and along mid-block sections. Future growth and development in the immediate and broader Study area will also be accommodated.

MTO's Highway Access Management process manages entrances onto Provincial highways and roads in the vicinity of Provincial highways. It helps provide a sustainable road network for the movement of people and goods and, at the same time, preserve the safety and efficiency of our highways.

In keeping with currently accepted access management practices, intersections and private access within close proximity to the Highway 401/CR 19 interchange ramp terminals are proposed to be closed or relocated. These road closures and realignments will protect existing and future traffic operation and improve safety in the vicinity of the interchange. To provide for the continuation and continuity of access to the interchange, the closures or realignments will be undertaken in conjunction with the construction of new road connections or the redirection of traffic to alternate routes along existing roads. Memorial Drive and 16&17 Sideroads are both affected by MTO's policies:

- Memorial Drive will be closed and access provided to existing and future uses by the 10th Concession Road
- 16 & 17 Sideroad will be relocated to about 750 m north of the Highway 401 ramp. The guidelines' best practices recommend 800 m.

Implementation of the Memorial Drive closure, 16 & 17 Sideroad relocation and the Coxon/Parent access improvements can be triggered by the following actions:

- construction phasing as shown on **Figure 2**
- future development in the area
- an increase in traffic volumes triggering the need for closure
- traffic operational concerns identified by MTO to protect the safety and efficiency of future traffic operations at the Highway 401/CR 19 interchange.

Other road closures and realignments include:

- North Talbot Road intersection will be relocated to the south. The intersection of CR19/Malden Road will be closed, with a connection road to CR 19 lining up with the realigned North Talbot Road. The east leg (Old Hwy. 114) will have a cul-de-sac constructed at the end
- the intersection of North Rear Road is shifted slightly to the north to reduce the skew angle
- a section of Baseline Road will be realigned to line up with 13 & 14 Sideroad
- Desro Drive intersection will be closed due to proximity to CR 22 and the new interchange proposed at CR 22.

8.3.3 Coordination With Other Road Construction Projects

Construction of the proposed improvements must be coordinated with other regional transportation improvements. To minimize traffic impacts, MTO and the County of Essex have committed to review the timing of the recommended improvements in relation to the following projects:

- a new access road to the border
- the final phase of MTO's Highway 401 Reconstruction and Widening project in Essex County
- improvements to Banwell Road and the E.C. Row Expressway by the City of Windsor and Essex County.

8.3.4 Traffic Impacts During Construction

Traffic control, in accordance with Ontario Traffic Manual Book 7, Temporary Conditions, will be required on affected roads during construction.

During construction, the following road closures are required:

- ramps at CR 19/Highway 401
- CR 19 from Jamsyl Drive to Amy Croft Drive (detour route to be provided)
- Lesperance Road at intersection with CR 22.

Short term lane closures may also be required at various locations.

Access disruptions resulting from these closures will be mitigated by:

- enhanced signing to direct traffic on Highway 401 to Puce Road and Provincial Road. During construction of the CR 19/CR 22 interchange, alternative routes south of CR 22 include CR 42, Banwell Road, Lauzon Parkway and East Puce Road. North of CR 22, traffic can use Tecumseh Road, Lesperance Road and West Pike Creek Road
- incentive/disincentive clauses included in the construction Contract to limit road closures and duration of work
- newspaper notices on the timing and duration of closures.

If single laning of traffic in each direction is approved for CR 19, traffic speed will be reduced, potentially causing some delays. Measures to minimize delays/disruptions during construction include advance signing (such as portable variable message signs and TC-64 signs), newspaper notifications of traffic restrictions and incentive/disincentive clauses in the Contract to minimize the duration of work. These measures, including the identification of detour routes, will be finalized during Detailed Design.

8.3.4 Construction and Emergency Service Access

A preliminary staging concept is presented in Section 7.9. Staging and access will be further developed during Detailed Design.

During Detailed Design, emergency services will be consulted about all road closures or short term lane closures, so that alternative emergency routes can be determined. In addition, a communications program must be implemented by the Contract Administration consultant to assist all emergency service providers. The recommended Traffic Management Plan will be reviewed with emergency services during Detailed Design to ensure emergency access provisions are included in the Contract.

Construction access will be provided from CR 19 and other County Roads. With the closure of CR 19 at CR 22 during construction of the interchange, construction access can be maintained using the extensions of Lakeshore Boulevard and Jamsyl Drive. Any access off CR 22 must be provided with acceptable deceleration/acceleration areas, barriers and adequate signing. Construction vehicles will not be permitted access from local roads except to complete reconstruction of local roads. No access will be permitted from Highway 401.

8.4 Impacts on Cultural Heritage Resources

8.4.1 Archaeology

According to the Stage 1 Archaeological Assessment (approved by the Ministry of Culture by letter dated February 28, 2008), a large portion of the CR 19 corridor has moderate to high potential for the discovery of archaeological sites. During Detailed Design, a Stage 2 Archaeological Assessment is required for all lands affected by the roadway improvements with archaeological potential. This also applies to lands affected by the realignment of the West Townline Drain. This work will be initiated early in Detailed Design.

During construction, special attention must be paid to the presence of St. Anne's cemetery at the northwest corner of CR 22/Lesperance Road. Although Lesperance Road has been shifted to the east to avoid the cemetery, any work completed outside of the current footprint of the roadway should either be monitored during construction by an archaeologist or stripped of topsoil prior to the start of construction.

8.4.2 Built Heritage and Cultural Landscapes

Unterman McPhail Associates' Cultural Heritage Assessment Report includes a preliminary assessment of the potential adverse impacts of the recommended Preliminary Design on the Study Area's cultural heritage resources. In a letter dated April 8, 2008, the Ministry of Culture stated that the report is consistent with the Ministry's standard requirements.

According to the report, potential direct impacts and mitigation include the following:

- the farmhouse at 1950 CR 19, on the west side of CR 19, north of Little Baseline Road, requires removal since it is located within the proposed right-of-way. A Cultural Heritage Evaluation Report (CHER), following the requirements of MTO's Environmental Guide for Built Heritage and Cultural Landscapes, will be completed at the beginning of Detailed Design. The report will determine appropriate mitigation for the farmhouse

- a new underpass structure will be constructed over Highway 401 at CR 19 requiring the removal of the existing structure. The structure is more than 40 years old and eligible for listing in the Ontario

Heritage Bridge Program. A stand-along CHER will be completed using MTO's criteria and scoring methods during Detailed Design. Mitigation measures will be based on the results of the evaluation

- another farmhouse at 5033 CR 19, on the west side of the road, south of Highway 401, requires removal since it is located in the right-of-way. A CHER, including appropriate mitigation, will be completed during Detailed Design

- based on the historical significance of the Maidstone Crossing, the rights-of-way of Middle Road (old Highway 114) and the North Talbot Road should be retained up to the edge of the new right-of-way of CR 19. Unterman McPhail recommend that the County consider erecting a plaque on the site of the former schoolhouse at this location commemorating Maidstone Crossing

- the double lane roundabout at CR 34 (Talbot Road) and CR 19 will remove Cozy Corners restaurant at 3714 CR 34 and two residences at the intersection, thereby altering the character of the existing intersection. During Detailed Design, a qualified built heritage consultant will determine if a stand-alone CHER is required for the three buildings. If required, a CHER will be completed at the beginning of the design stage. Mitigation will be determined based on the evaluation.

Indirect impacts cover the potential for disruption to cultural heritage resources by the introduction of physical, visual, audible or atmospheric elements that are not in keeping with the resource's character or setting. The project's indirect impacts include:

- the new structure at CR 22 over Lesperance Road will alter views to St. Anne's cemetery and Lesperance Road for northbound traffic on Lesperance Road
- the character of CR 19 will be altered by the widening to four lanes and construction of grade separations at CR 22 and the CP Rail tracks
- Pike Creek Bridge, already significantly altered, will be widened on both sides
- the 16/17 Sideroad will be relocated and the 13/14 Sideroad will be realigned
- the West Townline Drain will be relocated for part of its length resulting in the removal of the culverts providing property access.

8.5 Impacts on Terrestrial Features

8.5.1 Groundwater Protection

The Study Area's basal/bedrock aquifer is well protected by the overlying thick deposit of low permeability clay till. As a result, the aquifer is not susceptible to impacts or anthropogenic sources of contamination.

During construction, groundwater will be further protected by fuel and spills management measures, dewatering and sediment control. During operation of the improvements, groundwater will be protected by facility management and continued improvements in salt management.

8.5.2 Drainage and Hydrology Impact Assessment

8.5.2.1 Hydrologic Assessment

Co-ordinated with the development of new roadway geometrics and roadside safety components, a drainage scheme was developed for the recommended Preliminary Design of improvements to County Roads 19 and 22. Changes to the alignment of roads, alterations to the roadway cross-section, and improvements to major intersections throughout the Study Area resulted in the need to re-establish drainage boundaries for a number of drains and watercourses.

Rural Hydrology

To quantify the impacts of the increase in level of imperviousness, the CR 19 right-of-way was assessed to illustrate the net change in runoff coefficient in the drainage areas of the Study Area's rural portion. Although there is a significant increase in imperviousness on a per-meter basis, the overall impact on weighted runoff coefficients within CR 19's drainage areas are very small. **Table 57** illustrates the changes in overall runoff coefficients based on the length of the CR 19 right-of-way within several key catchment areas of the West Townline Drain drainage area.

Table 57: Pre- and Post-Improvement Runoff Coefficients CR 19 ROW within Several Key Catchment Areas of the West Townline Drain				
Municipal Drain (Drainage Structure Location)	**Contributing Drainage Area (Ha)**	**Approximate Length of Right-of-way within Drainage Area (m)**	**Pre-Improvement Weighted Runoff Coefficient**	**Post-Improvement Weighted Runoff Coefficient**
West Townline Drain (CN Rail)	407	525	0.350	0.352
West Townline Drain (CR 34)	780	800	0.350	0.351
West Townline Drain (CR 46)	1218	2500	0.350	0.353

Based on the physical size of the drainage areas in the rural area, the change in levels of imperviousness due to the addition of lanes, flush median, and shoulders is negligible when assessing the overall weighted runoff coefficient. Adaptation of a rural road cross-section has allowed for the maintenance of the existing roadside ditch systems and drainage patterns. In rural areas south of Pike Creek, adjustments to the level of imperviousness within each drainage area had little or no effect on the overall rate of runoff generated by associated drainage areas due to the size of upstream drainage areas.

Urban Hydrology, Future Urban Area A – Pike Creek to CP Rail

In this area, the existing roadway consists of a driving lane in each direction and gravel shoulders on both sides of the road. **Table 58** illustrates the changes in overall runoff coefficient based on the length of the CR 19 right-of-way in future Urban Area A.

Table 58: Pre- and Post-Improvement Runoff Coefficients CR 19 ROW in Future Urban Area A				
Municipal Drain (Drainage Structure Location)	**Contributing Drainage Area (Ha)**	**Approximate Length of Right-of-way within Drainage Area (m)**	**Pre-Improvement Weighted Runoff Coefficient**	**Post-Improvement Weighted Runoff Coefficient**
Combined Antaya, East Townline Road Drain, and Manning Road Drain	66	1200	0.40	0.423

Based on the physical size of the drainage area associated with CR 19 and future Urban Area A, the change in levels of imperviousness due to the addition of lanes, flush median, bike lanes, sidewalks, and multi-use trails is minimal, when assessing the overall weighted runoff coefficient. A number of mitigation strategies were developed, as described in Section 8.5.2.5 of this report.

Future Urban Area B – CP Rail to CR 22

In this part of the Study Area, the existing roadway consists of a driving lane in each direction and gravel shoulders on both sides of the road. Although this is a significant increase in imperviousness on a per-metre basis, the overall impact on weighted runoff coefficients within the drainage areas are very small. **Table 59** shows the changes in overall runoff coefficient based on the length of CR 19/22 right-of-way in future Urban Area B.

Table 59: Pre- and Post-Improvement Runoff Coefficients CR 19/22 ROW within Future Urban Area B				
Municipal Drain (Drainage Structure Location)	**Contributing Drainage Area (Ha)**	**Approximate Length of Right-of-way within Drainage Area (m)**	**Pre-Improvement Weighted Runoff Coefficient**	**Post-Improvement Weighted Runoff Coefficient**
East Townline Road Drain Enclosure North of CR 22	320	CR 19 – 2000 CR 22 – 2500	0.45	0.47

Again, based on the physical size of the drainage area and future Urban Area B, the change in levels of imperviousness due to the addition of lanes, flush median, bike lanes, sidewalks, and multi-use trails is minimal, when assessing the overall weighted runoff coefficient. Although the volumetric rate of runoff is not expected to change a great deal, the capacity of the receiving water system (East Townline Road Drain enclosure) is already considerably undersized. A number of mitigation strategies have been developed to accommodate the changes in land-use and resultant runoff coefficient for the area north of the CP Rail corridor. These mitigation strategies are described in detail in Section 8.5.2.5.

To quantify design flow rates for each drainage area affected by the changes in drainage area boundaries, a proposed condition Visual Otthymo model was developed to represent drainage areas. **Table 60** summarizes the estimated future design flows generated by Visual Otthymo model for the 2-yr through 100-yr storm

events at each significant culvert crossing location in the CR 19 corridor, including those modified to accommodate future development east and west of the corridor.

Table 60:
Future Design Flows

Municipal Drain (Drainage Structure Location)	Design Storm Return Period					
	2-yr	5-yr	10-yr	25-yr	50-yr	100-yr
West Townline Drain (CN Rail)	2.43	3.77	4.65	6.12	7.09	8.14
South Talbot Road Drain (Enclosure)	1.61	2.49	3.07	4.03	4.66	5.34
North Talbot Road Drain (Enclosure)	0.64	0.99	1.21	1.59	1.84	2.11
West Townline Drain (CR 34)	4.80	7.46	9.17	12.08	13.97	16.03
Griffith Drain (CR 19)	1.78	2.78	3.43	4.52	5.24	6.02
McCann Drain (CR 19)	1.69	2.65	3.27	4.31	4.99	5.74
West Townline Drain (CR 46)	8.23	12.95	15.98	21.06	24.40	28.06
Croft Drain (CR 19)	2.64	4.15	5.12	6.77	7.85	9.03
10th Concession Drain (Hwy 401 E-N/S Ramp)	1.75	2.74	3.39	4.47	5.18	5.96
West Townline Drain (Hwy 401)	8.77	13.64	16.81	22.11	25.59	29.41
HG Arnold Drain (CR 19)	0.48	0.76	0.93	1.23	1.43	1.64
East Townline Road Drain – South (CR 19)	0.41	0.64	0.80	1.05	1.22	1.40
Combined Antaya and East Townline Road Drain (north)	1.22	1.93	2.40	3.04	3.49	3.89
Combined East Townline Road Drain (north) Baillergeon Drain and Manning Road Drain	4.57	4.96	6.60	8.76	10.72	12.47

8.5.2.2 Proposed Culvert Extensions, Replacements and Removals

This section summarizes the impacts and improvements required to each significant drainage structure. Drainage structures within the project limits have been placed into the following three groups in terms of the type of work required at each crossing location:

- Group 1 (**Table 61)** includes culverts that require extensions to accommodate shifts in the alignment of CR 19 or improvements to the geometry of critical intersections
- Group 2 (**Table 62**) includes culverts that require replacement due to structural deficiencies, inadequate hydraulic capacity, significant changes to the alignment of CR 19, significant improvements to the geometry of critical intersections, or changes in the overall drainage scheme for the affected area
- Group 3 (**Table 63**) includes culverts that will be removed as part of the proposed improvements to CR 19. The elimination of these culverts is a result of alterations in the overall drainage system and the need to address stormwater management from a regional perspective.

Table 61:
Proposed Culvert Extensions
Group 1 - Culvert Extensions

Name	Existing Culvert Size (WxH-L)	Preliminary Design Recommendation	Proposed Extension Length (m)	Hydraulic Impact of Culvert Extension
West Townline Drain (CR 34)	4.90x1.83-42.36 NRFO	- extend existing culvert to accommodate intersection improvements	- 110m south @ 0.12% - 65m north @ 0.12%	- increase (0.3m) in maximum allowable headwater depth - small increase (0.01m) in design headwater depth - meets freeboard requirement (1.4m) - small increase (0.08m) in 100-yr design high water elevation (190.92)
Griffith Drain (CR 19)	2.40x2.40-23.21 NRFO	- extend existing culvert to accommodate alignment shift	- 24 m east @ 0.38%	- small increase (0.01m) in design headwater depth - meets freeboard requirement (1.8m) - 100-yr high water level 189.79
West Townline Drain (Hwy 401)	4.88x1.83-69.00 NRFO	- extend existing culvert to accommodate speed-change-lane	- 9m south @ 0.49%	- small increase (0.04 m) in design headwater depth - meets freeboard requirement (2.1 m) - 100-yr high water level 185.47

Table 62:
Proposed Culvert Replacements
Group 2 - Culvert Replacements and New Culverts

Name	Existing Culvert Size (WxH-L)	Preliminary Design Recommendation	Proposed Culvert Size (WxH-L)	Notes
West Townline Drain (CN Rail)	2.74x1.54-11.62 RFB	- relocate/replace culvert to accommodate widened road - increase hydraulic capacity to meet freeboard requirement	3.66x1.83-23.00 @ 0.07%	- 1.02m freeboard at new crossing location - small decrease (0.11m) in 100-yr design high water elevation (191.12)
South Talbot Road Drain (Enclosure)	1.50-43.05 CSP	- replace existing culvert due to poor condition - increase hydraulic capacity to meet freeboard requirement	1.50 dia-45.00 @ 0.40% concrete or smooth-wall	- freeboard increased to 0.7m
			2.13x1.52-45.00 @ 0.04%	- freeboard increased to 1.0m
North Talbot Road Drain (Enclosure)	1.20-163.98 CSP	- replace existing culvert due to poor condition - increase hydraulic capacity to meet freeboard requirement	1.20 dia-165 @ 0.47% concrete or smooth-wall	- freeboard increased to 0.7m
			2.13x1.52-165.00 @ 0.47%	- freeboard increased to 1.0m
McCann Drain (CR 19)	3.06x2.74-24.65 NRFO	- replace existing culvert due to poor condition - correct -0.04% gradient - lengthen culvert to accommodate widened road	3.05x2.74-44.00 @ 0.10%	- freeboard maintained at 1.4m
West Townline Drain (CR 46)	5.48x2.34-27.15 NRFO	- relocate/replace existing culvert to accommodate intersection improvements - lengthen culvert to accommodate widened road	5.48x2.34-44.00 @ 0.04%	- 1.3m freeboard at new crossing location - small increase (0.08m) in 100-yr design high water elevation (189.06)

Table 62:
Proposed Culvert Replacements
Group 2 - Culvert Replacements and New Culverts

Name	Existing Culvert Size (WxH-L)	Preliminary Design Recommendation	Proposed Culvert Size (WxH-L)	Notes
Croft Drain (CR 19)	3.84x2.06-30.45 CSPA	- relocate/replace existing culvert due to channel realignment - new culvert required to convey flow from the south side of North Rear Road to the north - lengthen culvert to accommodate widened road - consider open footing culvert for fisheries or countersinking a rigid frame box culvert 300 mm for fisheries	3.05x2.13-45.00 @ 1.00% (CR 19)	- 1.19m freeboard at new crossing location approximately 150m north of original location
			3.05x2.13-32.00 @ 1.00% (North Rear Road)	- 1.24m freeboard at new crossing location - 100-yr high water level 187.37
10th Concession Drain (Hwy 401 E-N/S Ramp)	3.05x1.32-26.30 NRFO	- replace existing culvert to accommodate ramp improvements - increase hydraulic capacity to increase freeboard	3.66x1.22-35.00 @ 0.60%	- freeboard increased to 0.70m
HG Arnold Drain (CR 19)	1.50-24.05 CSP	- replace existing culvert due to poor condition - increase size to meet freeboard requirements - lengthen culvert to accommodate widened road	1.50 dia-45.00 @ 0.50% concrete or smooth-wall	- freeboard increased to 0.76m
			2.13x0.91-45.00 @ 0.50%	- freeboard increased to 1.0m
East Townline Road Drain – South (CR 19)	1.20-24.87 CSP	- replace existing culvert due to poor condition - lengthen culvert to	1.20 dia-45.00 @ 0.50% concrete or smooth-wall	- freeboard decreased (0.12m) to 1.26m

Table 62:
Proposed Culvert Replacements
Group 2 - Culvert Replacements and New Culverts

Name	Existing Culvert Size (WxH-L)	Preliminary Design Recommendation	Proposed Culvert Size (WxH-L)	Notes
		accommodate widened road		
Combined Antaya and East Townline Road Drain (north) Sta 14+900 CR 19	N/A	- major overland flow route for future development, accommodate 100-year design flow – 3.86 cms - 2.0m wide channel (3:1 side slopes) downstream of culvert location @ 0.10%	2.74x1.52-60.00 @ 0.10%	- u/s invert elevation 180.60 - d/s invert elevation 180.50 - computed headwater elevation 181.57 - freeboard 1.03m - exit velocity 2.40 m/s - 5-year water elevation 181.24

Table 63:
Proposed Culvert Removals
Group 3 - Culvert Removals

Name	Existing Culvert Size (WxH-L)	Preliminary Design Recommendation
West Townline Drain (Malden Rd.)	5.18x3.34-25.06 CSPA	- relocation of Malden Road connection to CR 46 eliminates the need for drainage crossing Malden Road
East Townline Rd. Drain – North (CP Rail)	1.83x1.22-6.13 NRFB	- redirection of flow south to new municipal drain outlet eliminates need for drainage crossing the CP Rail corridor
East Townline Rd. Drain – North (Sylvestre Dr.)	2.10x1.60-23.39 CSPA	- relocation of East Townline Road Drain to east side of CR 19 eliminates need for drainage crossing Sylvestre Drive
East Townline Rd. Drain – North (Jamsyl Dr.)	1.60-29.23 CSP	- relocation of East Townline Road Drain to east side of CR 19 eliminates need for drainage crossing Jamsyl Drive
East Townline Rd. Drain – North (Desro Dr.)	1.80-24.44 CSP	- relocation of East Townline Road Drain to east side of CR 19 eliminates need for drainage crossing Desro Drive
Manning Rd. Drain (CP Rail)	0.90-18.40 CSP	- redirection of flow south to new municipal drain outlet eliminates need for drainage crossing the CP Rail corridor
Manning Rd. Drain (CR 19)	1.20-27.55 CSP	- relocation of East Townline Road Drain to east side of CR 19 eliminates need for drainage enclosure crossing CR 19
East Townline Rd. Drain – North (CR 22)	3.04x2.44-88.86 RFB	- redirection of flow to new regional stormwater management facility, this crossing is eliminated, replaced by the proposed drainage crossing at 19+630 (CR 22)

8.5.2.3 Municipal Drain Assessment

This section summarizes the impacts that the improvements to the existing road infrastructure will have on individual Municipal Drain systems in the Study Area. In general, proposed changes to the roadway infrastructure results in a need to:

- extend or replace existing Municipal Drain culverts that convey flow from one side of the right-of-way to the other due to shifts in road alignments, intersection improvements, grade raises, or because of poor condition
- extend or replace existing Municipal Drain enclosures that fall within the improved road right-of-way to accommodate widened road platforms, intersection improvements, or because of poor condition
- realign roadside ditches and significant Municipal Drain channels due to shifts in road alignments, roadside safety improvements, intersection improvements or grade raises within an adjusted right-of-way to accommodate the affected drainage feature
- realign significant Municipal Drain channels outside the road right-of-way where improvements cannot be accommodated within an adjusted right-of-way under provisions of the *Drainage Act*
- divert existing Municipal Drains to alternative outlet locations where significant limitations exist with respect to outlet and grade
- enclose existing Municipal Drains and provide storage of surface water runoff where significant limitations exist with respect to outlet capacity, grade and an open-channel arrangement cannot be accommodated within an adjusted right-of-way.

Table 64 summarizes the impacts and necessary alterations to each Municipal Drain to accommodate infrastructure improvements to CR 19. Required alterations will be determined during Detailed Design when specific details relating to alignment, grade, and typical sections are developed. Many of the identified improvement works to existing municipal drainage systems will be completed under the *Drainage Act*.

Table 64:
Municipal Drain Impact Summary

Municipal Drain	Proposed Improvements	Required Alterations	Design Action Items
West Townline Drain, South project limit to CN Railway	- highway widening (centered alignment)	- relocate 275m of drain channel (5+325 to 5+600), accommodate within proposed ROW - replace existing culvert at CNR (Site # 19-142)	- incorporate 1.0m wide channel with 2:1 side slopes into property envelope - determine final culvert offset, size, length, slope
West Townline Drain, CN Railway to CR 34	- highway widening (centered alignment)	- relocate 175m of drain channel (5+625 to 5+800), accommodate within proposed ROW - extend existing culvert at CR 34 approximately 175m (110m south, 65m north, Site # 34-026)	- incorporate 1.0m wide channel with 2:1 side slopes into property envelope - determine final culvert extension length, maintaining size, slope
West Townline Drain, CR 34 to CR 46	- highway widening (shifted alignment-east) alignment transitions north of CR 34 and south of CR 46	- relocate 130m of drain channel (6+020 to 6+150), accommodate within proposed ROW - relocate 250m of drain channel (7+350 to 7+600), accommodate within proposed ROW - replace existing culvert at CR 46 (Site # 46-077)	- incorporate 1.5m wide channel with 2:1 side slopes into property envelope, matching existing channel at 6+150 and 7+350 - determine final culvert offset, size, length, slope
West Townline Drain, CR 46 to Croft Drain	- highway widening (shifted alignment-west)	- relocate 550m of drain channel (7+650 to 8+200), accommodate within proposed ROW - relocate approximately 1000m of drain channel, on private property to west of CR 19 corridor	- incorporate 2.5m wide channel with 2:1 side slope into property envelope from 7+650 to 8+200 - drain relocation from 8+200 to connection with Croft Drain to be completed under provisions of *Drainage Act*, compensation to be determined
South Talbot Road Drain (Enclosure)	- intersection improvements at CR 34 and CR 19	- replace existing 43m, 1500mm CSP drain enclosure due to poor condition	- determine final culvert offset, size, length, slope
North Talbot Road Drain (Enclosure)	- intersection improvements at CR 34 and CR 19	- replace existing 164m, 1200mm CSP drain enclosure due to poor condition	- determine final culvert offset, size, length, slope
Griffith Drain	- highway widening (shifted alignment-east)	- extend existing culvert at CR 19 approximately 24m (rt)	- determine final culvert extension length, maintaining size, slope
McCann Drain	- highway widening (shifted alignment-west)	- replace existing culvert at CR 19 due to poor condition (Site # 19-121)	- determine final culvert location, skew angle, size, length, slope
Croft Drain	- highway widening (shifted alignment-west) - intersection improvements at North Rear Road and CR 19	- relocate approximately 175 m of drain channel, within proposed ROW - replace and relocate existing culvert at CR 19 - new culvert required crossing North Rear Road	- incorporate 2.0m wide channel with 2:1 side slope into property envelope - determine final culvert locations, skew angles, sizes, lengths, slopes
10th Concession Drain	- realignment of CR 19/Highway 401 E-N/S ramp	- replace existing culvert at E-N/S ramp	- determine final culvert location, skew angle, size, length, slope
H.G. Arnold Drain	- highway widening (centered alignment)	- replace existing 1500 mm CSP culvert at CR 19	- determine final culvert location, size, length, slope

Table 64:
Municipal Drain Impact Summary

Municipal Drain	Proposed Improvements	Required Alterations	Design Action Items
East Townline Road Drain (South)	- highway widening (centered alignment)	- relocate 1900m of drain channel, accommodate within proposed ROW - replace existing 1200mm CSP culvert at CR 19	- incorporate V-ditch with 3:1 side slope into property envelope from 12+175 to 14+075 - determine final culvert location, size, length, slope
East Townline Road Drain (North) to CP Railway	- highway widening (centered alignment) urban cross section	- replace existing 700m ditch with a semi-urban swale and a series of ditch inlet catch basins discharging to east side of CR 19 - relocate approximately 80m of drain channel (Antaya Drain), on private property to the west of the CR 19 corridor - divert flow to Manning Road Drain through new culvert crossing CR 19 at Service Roads - eliminate existing culvert at CN Rail corridor	- drain relocation from 15+175 to 15+225 to be completed under provisions of *Drainage Act*, compensation to be determined - determine final culvert location, size, length and slope

Table 64:
Municipal Drain Impact Summary

Municipal Drain	Proposed Improvements	Required Alterations	Design Action Items
Manning Road Drain to CP Railway	- highway widening (centered alignment) urban cross section	- relocate 775 m of drain channel, accommodate within proposed ROW - receive flow from East Townline Road Drain (north) and Antaya Drain and divert flow south, along east side of CR 19 to Hydro corridor - relocate approx.375 m of drain channel, on private property just north of existing Hydro corridor, discharging to Pike Creek - eliminate existing culvert at CN Rail corridor	- incorporate V-ditch with 3:1 side slope into property envelope from 14+900 to 15+225 - incorporate 1.5 m wide channel with 2:1 side slope into property envelope from 14+600 to 14+900 - determine final culvert locations, size, length, slope - drain relocation along north side of Hydro corridor to be completed under provisions of *Drainage Act*, compensation to be determined.
Manning Road Drain to CR 22	- highway widening (centered alignment) urban cross section	- combine with East Townline Road Drain	- verify drainage areas, proposed land use and establish stormwater quality and quantity controls

Table 64:
Municipal Drain Impact Summary

Municipal Drain	Proposed Improvements	Required Alterations	Design Action Items
East Townline Road Drain (North) to CR 22	- highway widening (centered alignment) urban cross section	- enclose approximately 1100 m of drain enclosure (varying diameter storm sewer) - combine flow from East Townline Drain and Manning Road Drain discharging to regional SWM pond, accommodate within ROW - provide capacity in drain enclosure to receive flow from future development minor drainage system - eliminate existing culverts at Sylvestre Drive, Jamsyl Drive, Desro Drive, CR 22	- incorporate storm sewer system into property envelope from 15+275 to 16+375 - incorporate drain enclosure into property envelope from 16+375 to 17+100 - determine final pond inlet/outlet configuration, storage, general configuration
Cyr Drain	- highway widening (CR 22)	- relocate 600 m of drain channel discharging to regional SWM pond, accommodate within proposed ROW	- incorporate V-ditch with 4:1 side slope into property envelope from 19+000 to 19+600

Table 65 summarizes works to be completed under the *Drainage Act*. In general, these improvements will be completed on lands outside the County Roads 19 and 22 rights-of-way and will be classified as fundamental changes to the function of the drain, requiring alteration and updating of the existing Municipal Drain By-laws.

Table 65:
Proposed Work Under the Drainage Act

Municipal Drain	Location	Required Improvement Works	Drainage Act Requirements	Detailed Design Action Item
West Townline Drain	CR 19 north of CR 46 8+200 to 9+200 (west of CR 19)	- relocate approximately 1200m of drain channel outside CR 19 ROW at rear of three properties fronting CR 19	- prepare a new Municipal Drain Report combining - determine Bylaw assessment to County of Essex and Private Land Owners - determine compensation for loss of agricultural land	- establish final alignment, profile and cross section - determine Fisheries compensation for loss of existing habitat
Antaya Drain	CR 19 north of Future Road 15+170 to 15+210 (west of CR 19)	- relocate approximately 80m of drain channel outside CR 19 ROW, around existing Union Gas Sub-station	- prepare a new Municipal Drain Report - determine By-law assessment to County of Essex and Private Land Owners - determine compensation for loss of agricultural land	- establish final alignment, profile and cross section
New Outlet Drain	CR 19 north of CR 42 14+625 (east of CR 19)	- construct a new drain outlet outside CR 19 ROW, along north limit of existing Hydro One easement	- prepare a new Municipal Drain Report combining drainage areas from Antaya Drain and East Townline Drain/ Manning Drain, south of the CP Rail - determine Bylaw assessment to County of Essex and Private Land Owners - determine compensation for loss of agricultural land	- establish final alignment, profile and cross section

Table 65: Proposed Work Under the Drainage Act				
Municipal Drain	**Location**	**Required Improvement Works**	**Drainage Act Requirements**	**Detailed Design Action Item**
East Townline Road Drain and Regional SWM Pond	CR 19 north of the CP Rail corridor	- construct a new drain enclosure from the CP Rail corridor north to the proposed regional stormwater management facility, discharging to the existing East Townline Road Drain enclosure north of CR 22	- prepare a new Municipal Drain Report combining drainage areas from Manning Road Drain and East Townline Road Drain north of the CP Rail corridor - determine Bylaw assessment to County of Essex, Town of Lakeshore and Town of Tecumseh - determine construction cost allocations and long term maintenance program for Regional stormwater management facility	- establish final alignment, profile, pipe sizes (enclosures), pond configuration, outlet configuration and Regional stormwater management maintenance program

8.5.2.4 Pike Creek Hydraulic Impact Assessment

The Pike Creek Bridge is a single span slab-on-steel girder bridge constructed in the 1960s. The structure carries one lane of traffic in each direction over Pike Creek. The total bridge deck length is 18.28 m, with a girder span of 17.75 m. The overall width of the bridge is 10.90 m.

Both the existing superstructure and substructure are in good condition. The bridge was rehabilitated in 2005, when the full deck and girders were replaced. To accommodate the proposed widening of CR 19 at the bridge, a number of structural alternatives were investigated. Based on the condition of the bridge, cost, and ability to accommodate a widening, it is proposed that the existing bridge be widened to two lanes in each direction with one centre turning lane. The bridge will require structural widening totaling 8.12 m to the east and west, providing a new overall bridge width of 27.14 m. The span and height of the bridge will not be altered.

Proposed upgrades to the existing structure include:

- clear span of 17.25 m (maintained from existing)
- maximum high over the stream bed of 4.85 m
- a total conveyance area of 46.6 m^2 under the 100-year flood-line elevation
- bridge width of 27.14 m (16.14 m increase from existing)
- estimated Manning's roughness coefficient of 0.035.

To assess the hydraulic impacts of the proposed bridge widening on water levels upstream of the existing Pike Creek bridge, a simplified capacity analysis was completed. Initially, ERCA was contacted to attain the Hec-2 model for this reach of Pike Creek, but unfortunately it was not available in digital format. Existing floodplain mapping was used to confirm regulatory 100-year water levels up and downstream of the bridge, as well as hydraulic losses through the existing structure. The 1981 flood-line study 100-year flow rate of 55.76 cms was used to assess the hydraulic performance of the proposed structure. The hydraulic assessment program CulvertMaster was utilized to evaluate changes bridge geometry will have on water levels upstream of the structure. Head losses through the existing structure were used to calibrate both an existing condition representation of the bridge structure and proposed (widened) condition.

Conveyance capacity analysis indicates that a 0.02 m increase in headwater elevation will result based on a bridge widening of over 16 m. The increase in headwater depth is a product of friction at the wetted perimeter interface over the proposed increased in length. A Manning's roughness coefficient of 0.035 was used to simulate both existing and proposed channel properties along the wetted perimeter of the bridge. **Table 66** summarizes hydraulic characteristics based on the configuration of the existing bridge and preliminary general arrangement for the widened bridge.

Table 66: Hydraulic Bridge Analysis Summary		
Hydraulic Characteristic	**Existing Structure**	**Proposed Structure**
Span	17.25 m	17.25 m
Height	4.85 m	4.85 m
Width	11.0 m	27.14 m
Channel Slope	0.10%	0.10%
Headwater Elevation	179.740	179.760
Tail-water Elevation	179.500	179.500

Table 66: Hydraulic Bridge Analysis Summary		
Hydraulic Characteristic	**Existing Structure**	**Proposed Structure**
Flow Regime	Sub-critical	Sub-critical
Velocity Downstream	1.72 m/s	1.72 m/s

8.5.2.5 Recommended Drainage and Stormwater Management Strategy

The recommended preliminary stormwater management strategy for the County Road 19/22 corridor is split into two sections: the area south of Pike Creek and the remaining portion of the Study Area north of Pike Creek. The bridge structure crossing Pike Creek marks the transition point from a recommended urban roadway to the use of a more traditional rural cross-section. Both roadway treatments provide unique challenges in terms of stormwater and drainage management.

Rural Stormwater Management

A review of alternative stormwater management quality and quantity controls identified a number of measures suitable for use in the rural portion. This section summarizes recommended stormwater management alternatives for the proposed improvements and includes items such as design constraints, criteria and mitigation measures.

Design constraints within the rural portion of the CR 19 Study Area include the following:

- location of open channel municipal drain systems in the CR 19 corridor
- accommodation of surface water runoff generated from areas outside the corridor
- limited topographic relief providing roadside ditches with adequate longitudinal grades
- the need to compensate for flat longitudinal grades with increased ditch cross-sectional area
- limited property and/or location of existing above/underground infrastructure
- minimum diameter, flow velocities and minimum cover for frost protection for new underground storm sewer infrastructure
- implementation of Best Management Practices for stormwater quality control/management.

The recommended strategy for stormwater quality management is to provide an integrated treatment train approach to water management premised on providing control within the physical constraints of the stormwater conveyance system. The linear nature of the Study Area allows the use of vegetative management practices, such as grassed swales to treat surface run-off. Due to the topography of the Study Area, extensive roadside ditching is required to convey surface run-off from paved surfaces of the roadway to receiving watercourses. Provisions for day-lighting granular materials require grading adjustments through most of the Study Area. Fill slopes for the widened highway cross-section also impact the existing ditch configuration in a number of areas. As a result, opportunities exist throughout the Study Area to retrofit existing grassed ditches to provide a higher level of quality enhancement of surface run-off leaving the highway right-of-way.

Where feasible, it is recommended that the following mitigative measures be considered for implementation during Detailed Design:

1) Consider low gradient ditches to provide peak flow attenuation and promote vegetative uptake and infiltration in areas requiring re-grading of roadside ditches. If construction staging allows, it is recommended that storm sewers outlet into roadside ditches and not towards sensitive Municipal Drains. This will mitigate adverse impacts of point-source contamination and provide optimal ditch flow length (i.e., treatment) for stormwater exiting local storm sewer systems. A well-vegetated drainage swale at least 60 m long will provide adequately reduced pollutant levels for run-off from a typical highway section, (MTO 1992)
2) Consideration should also be given to eliminating the direct connection between the storm sewer network and Municipal Drain culverts, where feasible
3) Where possible, the limits of the outside ditch grading should be minimized to preserve established vegetation in roadside ditches. Existing ditch vegetation and undulations will be effective in causing some short–term ponding and peak flow attenuation, reducing flow velocity, increasing infiltration and settling of suspended solids, and increasing filtration of roadside contaminants, before reaching the receiving watercourses
4) Maintenance of existing vegetated buffer strips at the confluence of roadside ditches and sensitive receiving waters will provide an added level of protection (with respect to TSS and various contaminant removal) to watercourses. As stormwater run-off travels over buffer areas, vegetation slows the run-off and traps particulate pollutants. This type of Best Management Practice requires minimal maintenance and provides an aesthetically pleasing area. Permanent rock flow checks will further reduce ditch flow velocity, causing short-term ponding and promoting infiltration and sedimentation. Temporary straw bale flow checks and silt fence barrier will promote control of

sedimentation during construction activities and before new vegetative cover is established in areas disturbed by grading operations.

Urban Stormwater Management

A review of alternative stormwater management quality and quantity controls identified a number of measures suitable for use in the urban portion. This section summarizes recommended stormwater management alternatives for the proposed improvements and includes items such as design constraints, criteria and mitigation measures.

Design constraints in the urban portion of the Study Area include the following:

- limited property and/or location of existing above/underground infrastructure
- businesses/residents located adjacent to the CR 19/22 right-of-way
- minimum diameter, flow velocities and cover for frost protection of new underground storm sewer infrastructure
- implementation of stormwater management quality/quantity control.

As previously indicated, hydrologic analysis was completed on each drainage area associated with CR 19 in the urban portion. The hydrologic model developed for affected drainage areas, from Pike Creek north to CR 22, reflects both changes in drainage area boundaries, as well as modifications in the levels of imperviousness due to proposed land use changes east and west of the CR 19 corridor.

Proposed land use changes along County Roads 19 and 22 impose a number of challenges to the existing drainage system with respect to both quality and quantity of stormwater runoff. Measures have been taken to reduce the quantity of surface water runoff entering the East Townline Road Drain system by diverting flow from south of CP Rail to Pike Creek. However, proposed changes in land use and levels of imperviousness within the CR 19 corridor resulted in a net increase in rate of surface water runoff from the affected drainage areas. The future urbanization of the affected drainage area also potentially reduces the quality of surface water resources within the East Townline Road Drain system.

Future Urban Area A – Pike Creek to CP Rail

For the area south of the CP Rail corridor to Pike Creek, external area drainage from west of the corridor, including lands serviced by Antaya Drain, have been redirected within an open drainage system to divert flow from the East Townline Road Drain catchment area to the south, along the CR 19 right-of-way. Both major and minor drainage systems have been combined into a single open-channel system comprised of a 1.5 m wide trapezoidal channel. The purpose of the trapezoidal channel is to convey flow within the right-of-way south to the Hydro corridor. From there, surface flow will be directed to Pike Creek via a new Municipal Drain outlet. The diversion of surface water flow south to Pike Creek has a number of significant benefits including:

- reduces the size of the contributing drainage area of East Townline Road Drain (65 Ha reduction)
- eliminates the need to establish a new culvert crossing of CP Rail outside the fill slopes for the new grade-separation
- provides an appropriate outlet for the minor storm sewer system along CR 19, from north of CR 42 to the proposed grade separation
- addresses flooding concerns on property adjacent to CR 19 between CR 42 and CP Rail corridor mentioned by local land owners
- provides an appropriate outlet for future storm sewer infrastructure in the Town of Tecumseh Secondary Plan area, west of CR 19
- provides a major overland flow route for flows generated by the Tecumseh Secondary Plan area
- the culvert crossing CR 19 at Future Road and the channel downstream of the new crossing can be sized to accommodate both major and minor flows generated by future development (increased level of imperviousness) to the west
- land available east of CR 19 to accommodate a future stormwater management facility servicing the CR19 corridor and future residential development to the west (55 Ha).

To satisfy stormwater management requirements for Urban Area A the following stormwater management water quality/quantity control design criteria is recommended for implementation within this portion of County Road 19 corridor.

To address stormwater management objectives for the proposed CR 19 improvements (not including the Secondary Plan to the west), Dillon recommends that the strategy for stormwater quantity and quality management provide control within the physical constraints of the stormwater conveyance system. The construction of a new drain outlet outside the CR 19 right-of-way provides an opportunity to retrofit a typical municipal drain channel with enhancements to improve water quality and address water quantity concerns before discharging to Pike Creek. Enhancements of the municipal drain outlet may include

reduced gradient, widened bottom width, and the use of rock check dams to promote peak flow attenuation and settling of suspended solids. Enhancements could also include riparian plantings and the use of vegetative buffers along the length of the proposed channel. This option represents the minimum requirement for providing stormwater management of runoff generated by the proposed improvements.

Where feasible, it is recommended that the following mitigative measures be considered for further development during Detailed Design. The recommended 'treatment train' approach will ensure that water quality is protected and there will be no increase in flood damage potential:

1) Consideration should be given to eliminating the direct connection between the storm sewer network and drain culverts, where feasible. This will help reduce re-suspension of fine particles and contaminant loading within the downstream watercourse
2) Where feasible, the limits of outside grading should be minimized to preserve established vegetation. The existing ditch vegetation and undulations will be effective in causing some short–term ponding and peak flow attenuation, reducing flow velocity, increasing infiltration and settling of suspended solids, and increasing filtration of roadside contaminants, before reaching receiving watercourses
3) Maintenance of existing vegetated buffer strips at the confluence of the roadside ditches and sensitive receiving waters will provide an added level of protection (with respect to TSS and various contaminant removal) to the watercourses. As stormwater run-off travels over the buffer areas, vegetation slows the run-off and traps particulate pollutants. This type of Best Management Practice requires minimal maintenance and provides an aesthetically pleasing area. Permanent rock flow checks will further reduce ditch flow velocity, causing short-term ponding and promoting infiltration and sedimentation. Temporary straw bale flow checks and silt fence barrier will promote control of sedimentation during construction and before new vegetative cover is established in areas disturbed by grading operations.

Future Considerations

Based on information provided by the Town of Tecumseh Secondary Plan, agricultural lands north of the existing Hydro One easement, south of the CP Rail corridor, and west of CR 19 are slated for future residential development. To assess the impacts of future changes in land use the existing condition hydrologic model developed for the affected drainage area was manipulated (by increasing the CN value for the drainage areas) to more accurately describe future conditions and subsequent rate of surface water runoff generation. Based on preliminary analysis, the expected rates of runoff generated by the 55 Ha drainage areas west of CR 19 and the improved CR 19 corridor increased from 0.64 to 1.93 cms for the 5-year storm event and from 1.40 to 3.89 cms for the 100-year storm event. This dramatic, yet expected, increase in volumetric runoff further supports the recommendation to divert flow generated by this drainage area out of the East Townline Road Drain system towards Pike Creek.

The urbanization of the entire 55 Ha upstream drainage area results in the need to address stormwater quantity/quality management using more traditional retention/detention methods. Depending on the timing of the CR 19 improvements and development of the urban area to the west, Dillon recommends that a stormwater management master plan be developed for this area during Detailed Design. Preliminary sighting of a stormwater management facility large enough to service the future residential area and an improved CR 19 corridor has determined that the most suitable location for a future retention/detention pond is at the downstream end of the municipal drain outlet adjacent to Pike Creek, just outside ERCA regulated lands.

Based on preliminary calculations, a stormwater management detention pond with a storage volume of approximately 2.44 Ha.m or 24,400 m^3 is required to reduce 100-year post-development (55 Ha residential development) flow rates to 5-year pre-development levels. Of the 2.44 Ha.m quantity control volume, a detention pond servicing a residential development totaling approximately 55 Ha with a weighted runoff coefficient of 0.55 discharging into Pike Creek (MOE 'Enhanced' level of protection) is required to provide approximately 1.05 Ha.m of quality control storage volume. The 1.05 Ha.m or 10,500 m^3 extended detention quality control volume should have a maximum active depth of 1.5 m and a minimum drawdown time of 24 hours to achieve an average annual total suspended solids removal rate of 80%. Of the 1.05 Ha.m of extended detention quality control volume, approximately 0.83 Ha.m or 8250 m^3 represents permanent pool volume.

Urban Area B – CP Rail to CR 22

Based on information provided by the Town of Tecumseh Secondary Plan, the existing condition hydrologic model developed for the affected drainage area was manipulated. First, by removing the Urban Area A drainage area and second, by implementing stormwater management controls specified by the Tecumseh Secondary Plan Stormwater Management Study and adjusting the CN values for the drainage areas in the Town of Lakeshore. This will more accurately describe future conditions and subsequent rate of surface water runoff generation. **Table 67** compares flow-rates for the two through 100-year design storm event for the drainage areas north of the CP Rail corridor.

The first row of data shows flow-rates that are expected to be delivered to the East Townline Road Drain based on existing land-use conditions. The second row of data shows expected rates of runoff if the diversion of drainage areas south of the CP Rail corridor is completed (remaining 320 Ha drainage area). The third row of data summarizes flow rates resulting from combining flows generated within the Manning Road Drain drainage area, the controlled flow from the Tecumseh Secondary Plan area and the improved County Road 19/22 corridor.

Table 67:
Design Flow Comparison

Design Concept	Design Storm Return Period					
	2-yr	5-yr	10-yr	25-yr	50-yr	100-yr
Existing Condition Design Flow at East Townline Road Drain Enclosure North of CR 22 – 390 Ha Total Drainage Area (combined East Townline Road Drain (north), Antaya Drain, Baillergeon Drain, and Manning Road Drain)	4.85	7.50	9.20	11.98	13.95	15.87
Existing Condition Design Flow at East Townline Road Drain Enclosure North of CR 22 – 320 Ha Total Drainage Area (combined East Townline Road Drain (north), Antaya Drain, Baillergeon Drain, and Manning Road Drain)	3.94	6.05	7.43	9.67	11.15	12.82
Future Design Inflow to Regional Stormwater Management Facility (from proposed drain enclosure)	4.57	4.96	6.60	8.76	10.72	12.47

As shown on **Table 67**, the removal of the upstream drainage area (65 Ha) significantly reduces flow rates delivered to the existing East Townline Road Drain enclosure. Previous hydraulic computations indicated that the existing enclosure began to surcharge (submerged inlet) at a design storm return period of 5-years or 7.50 cm. By removing the 65 Ha of drainage area south of the CP Rail corridor, the level of service for the drain will be significantly improved.

Table 67 also illustrates that with the 65 Ha reduction in contributing drainage area, the urbanization of the remaining portion of the East Townline Road Drain catchment area, coupled with stormwater management controls proposed for the Tecumseh Secondary Plan area, resulting in a further reduction design flow rate to the existing East Townline Road Drain enclosure. In general, a drainage enclosure of this type would be designed to handle flow generated by the 25-year design storm event and have accommodations, via overland flow route, to convey the 100-year (major) storm event overland to the ultimate receiving water system. Due to significant modifications and urbanization in the area of East Townline Road Drain, the major overland flow route that may have once existed has been lost. This loss is further exaggerated by the proposed modifications to the County Road 19/County Road 22 intersection. The proposed grade separation completely eliminates any possibility of establishing an overland flow route for flows in excess of the capacity of the existing enclosure.

Due to capacity limitations in the receiving water system, lack of a major overland flow route, and the potential future urbanization of the upstream drainage area, it is recommended that a traditional retention/detention facility be incorporated into proposed improvements at the intersection of County Road 19 and County Road 22. A stormwater management facility located in the southwest quadrant of the intersection can store surface water runoff that exceeds the capacity of the existing drainage enclosure for flows generated by the improved County Road 19/22 corridor and future residential development identified by the Town of Tecumseh Secondary Plan.

In order to achieve conveyance of estimated design flows to the Regional stormwater management facility, the preliminary design of a storm sewer system has been completed and integrated into the corridor design for County Road 19.

Preliminary design of the storm sewer (drainage enclosure) system included the following design considerations:

- The primary system located along the westerly side of the Manning Road right-of-way providing outlet for the Town of Tecumseh Secondary Plan stormwater management facility as well as the existing Baillergeon Drain.
- Secondary storm sewer systems extend to the east side of the right-of-way providing outlet for agricultural/low-density rural residential drainage areas within the Town of Lakeshore.
- The primary system design profile allows for servicing of existing land uses and is at a depth such that the existing ditches along the CP Rail corridor can be drained via the proposed storm sewer system.
- The primary system provides outlet for local storm sewer systems draining the paved surfaces on Manning Road.

- The primary system (drainage enclosure) ranges in size from 1050mm diameter to approximately 3000 mm diameter smooth-wall pipe or an equivalent box section measuring 2.44m wide and 1.83m high.
- The downstream invert elevation maintaining minimum profile grade is approximately 175.150 and represents the elevation corresponding to the maximum active storage depth in the Regional stormwater management facility for the five-year storm event.

Based on the revised hydrologic model and calculated peak flows from the proposed storm sewer (drainage enclosure), several iterations of maximum pond outflow versus storage volume were compared in order to determine the most feasible configuration for the Regional stormwater management facility pumping station outlet. Several outflow configurations were tested and required storage volumes determined. **Table 68** summarizes pump station outflow rates and associated storage volumes.

Table 68:
Regional SWM Facility Outflow from Pumping Station

	Design Storage Volume (Ha.m)					
	2-yr	**5-yr**	**10-yr**	**25-yr**	**50-yr**	**100-yr**
0.5 cms Pumping Station	1.68	2.34	3.52	5.18	6.48	7.63
1.0 cms Pumping Station	1.20	1.78	2.92	4.55	5.83	6.97
2.0 cms Pumping Station	1.01	1.49	2.45	3.82	4.89	5.85

The selection of the proposed Regional stormwater management pond configuration was based on the following factors:

- The previously identified property parcel for Regional stormwater management pond is approximately 2.5 Ha in size.
- A 1.0 cm pumping station pond outlet utilizes available storage and remains as a relatively feasible outlet configuration in terms of overall cost.
- A 1.0 cm pumping station pond outlet corresponds with a maximum 100yr water level of 176.770, this maximum water level results in minimal surcharging of the proposed primary storm sewer (drainage enclosure) during the 100yr storm event or back to back lesser design storm events.
- Limiting pumping station outlet capacity and utilizing available storage results in a net benefit to the downstream section of East Townline Road Drain, the 1.0 cm pumping rate is approximately half of the capacity of the pumping station at Lake St. Clair (additional analysis is being completed to assess the feasibility of significantly upgrading this facility in conjunction with enclosure of a section of the Drain).

Based on preliminary calculations a stormwater management detention pond with a storage volume of approximately 6.87 Ha.m or 68,700 m^3 is required to reduce 100-year flow-rates via storage and release it at 1.0 cms to the existing East Townline Road Drain enclosure. Of the 6.87 Ha.m quantity control volume a detention pond servicing a drainage area totaling 320 Ha in size having a weighted runoff coefficient of 0.55 discharging into East Townline Road Drain (MOE 'Basic' level of protection) is required to provide approximately 2.40 Ha.m of quality control storage volume. The 2.40 Ha.m or 24,000 m^3 extended detention quality control volume should have a maximum active depth of 1.5 m and a minimum drawdown time of 24 hours to achieve an average annual total suspended solids removal rate of 60%. Of the 2.40 Ha.m of extended detention quality control volume, approximately 1.12 Ha.m or 11,200 m^3 represents permanent pool volume.

Table 69 (Table 4.6 MOE SWMP Design Manual) summarizes the remaining general design criteria for the recommended stormwater management ponds servicing CR 19 and the Town of Tecumseh secondary plan areas to the west of the corridor.

Table 69:
Preliminary Stormwater Management Pond Design Criteria

Design Component	Design Objective	Minimum Criteria	Preferred Criteria
Drainage Area	Volumetric Turnover	>5 Ha	>10 Ha
Treatment Volume	MOE SWMP Design Guideline Level of Protection	'Basic' or 60% Average Annual TSS removal	2.40 Ha.m of quality control storage
Active Storage Detention	Suspended Solids Settling	24hrs (12hrs if in conflict with minimum orifice size)	Permanent Pool volume increased by expected maximum ice volume Active storage increased from 40m3/Ha to 25% of total volume
Forebay	Pre-treatment	Minimum Depth – 1.0m Sized to ensure non-erosive velocities leaving forebay Maximum Area – 33% of total permanent pool	Minimum Depth – 1.5m Maximum volume – 20% of total permanent pool

Table 69:
Preliminary Stormwater Management Pond Design Criteria

Design Component	Design Objective	Minimum Criteria	Preferred Criteria
Length-to-width Ratio	Maximize flow path and minimize short-circuiting potential	Overall – minimum 3:1 Forebay – minimum 2:1	From 4:1 to 5:1
Permanent Pool Depth	Minimize re-suspension and avoid anoxic conditions	Maximum Depth – 3.0m Mean Depth 1.0-2.0m	Maximum Depth 2.5m Mean Depth 1.0-2.0m
Active Storage Depth	Storage/Flow Control	Water Quality and Erosion Control – maximum 1.5m Total – 2.0m	Water Quality and Erosion Control – maximum 1.0m Total – 2.0m
Side Slopes	Safety Maximize the functionality of the pond	5:1 for 3.0m on either side of permanent pool Maximum 3:1 elsewhere	7:1 near normal water level plus use of 0.3m steps 4:1 elsewhere
Inlet	Avoid clogging and freezing	Minimum – 450mm Preferred pipe slope - >1% If submerged, obvert 150mm below expected maximum ice depth	N/A
Outlet	Avoid clogging and freezing	Minimum – 450mm Reversed slope pipe should have a minimum diameter of 150mm Preferred pipe slope - >1% If orifice control used, 75mm minimum	Minimum 100mm orifice
Maintenance Access	Access for backhoes or dredging equipment	Provided to approval of Municipality	Provision for maintenance drawdown pipe
Sediment Drying Area	Sediment Removal	While preferable, should only be incorporated into the design when it imposes no additional land requirement	To be provided above maximum water quality level
Buffer	Safety	Minimum 7.5m above maximum water quality/erosion control water level Minimum 3.0m above high water level for quantity control	N/A

Wet ponds are the most common end-of-pipe stormwater management facilities in Ontario. They are less land-intense than wetland systems and are normally reliable in operation especially during varying seasonal conditions. In general, reliability can be attributed to several factors including:

- performance does not depend on soil characteristics
- the permanent pool minimizes re-suspension
- the permanent pool minimizes blockages of the outlet
- biological removal of pollutants occurs
- the permanent pool provides extended detention settling of suspended solids.

Wet ponds can be designed to efficiently provide for water quality, erosion and quantity control, reducing the need for multiple end-of-pipe facilities. They can also be designed with extensive landscaping and associated recreational amenities.

The following mitigative measures should also be considered for implementation during Detailed Design where feasible.

1. Consideration should be given to incorporate grass swales into boulevard areas within the urban cross-section. Implementation of grass swales can result in some minor snow storage and groundwater recharge where appropriate soil conditions exist.
2. Where feasible, the limits of the outside grading should be minimized to preserve the established vegetation. The existing vegetation and undulations will be effective in causing some short–term ponding and peak flow attenuation, reducing flow velocity, increasing infiltration and settling of suspended solids, and increasing filtration of roadside contaminants, before reaching receiving watercourses.

3. Increasing canopy cover with additional tree plantings is a simple, effective means to intercept rainfall before it comes into contact with the ground and becomes runoff. In addition, through the process of transpiration, trees can extract moisture from the subsurface and discharge it into the atmosphere. Increased planting of large canopy trees in the vicinity of streets may contribute to reduced rates of runoff in addition to habitat enhancement and aesthetics.
4. Consideration should be given to incorporating deep sumps in the catch basins located within the curbed portion of the right-of-way. Deep sumps, in combination with catch basins fitted with gauss traps can effectively protect downstream receiving water systems from heavy sedimentation and floatable petroleum products by trapping them in roadside catch basin structures. Regular cleaning of catch basin sumps can effectively reduce sediment loading in receiving watercourses.

Summary of Stormwater Management Strategy for County Road 19/22 Corridor

The stormwater management plan is the means by which water resource concerns are addressed during modification of a watershed. Generally, it provides the location and type of stormwater management facilities, details the implementation of certain best management practices, and will demonstrate that when integrated the management strategy will meet the criteria establish ensuring that:

- groundwater and base-flow characteristics are preserved
- water quality will be protected
- the affected watercourses will not undergo undesirable and potentially damaging geomorphic change
- there will not be any increase in flood damage potential.

The recommended strategy for stormwater management is to provide an integrated treatment train approach to water management that is premised on providing control at the source and in the conveyance system followed by end-of-pipe controls. This combination of controls is generally the only means of meeting water quantity, erosion control, and water quality design targets. To meet water quality and water quantity objectives, the following multi-component approach has been taken to fulfill the design requirements identified for the County Road 19 and County Road 22 corridors.

Source and Conveyance Controls:

- reduced grading to allow greater ponding of stormwater and natural infiltration
- grassed swales
- vegetated filter and corridor buffer strips.

End-of-Pipe Controls:

- transportation corridor stormwater management wet pond
- optional regional stormwater management wet ponds.

The successful implementation of many conveyance control measures requires innovative linear transportation facility design. All of these measures help detain stormwater and reduce peak runoff rates. In some cases there may be increased opportunity for evapo-transpiration; however, the primary benefit of extended detention times are to provide an opportunity for settling of suspended solids, infiltration of runoff into the upper soil mass, and some minor vegetative uptakes. Peak flow attenuation and increased settling of suspended solids potentially improves the quality of runoff entering sensitive receiving watercourses such as West Townline Drain and Pike Creek.

End-of-pipe stormwater management facilities receive stormwater from conveyance systems such as ditches, drains, and storm sewer systems and treat runoff through a process of retention and settling of suspended solids. Stormwater management ponds, particularly wet ponds, can effectively control the impacts of urbanization which remain after lot level and conveyance controls have been applied. The stormwater management facilities recommended for use within the County Road 19 and County Road 22 corridors have the potential to address regional stormwater quality and quantity issues. Implementation of a regional stormwater management facility for the Urban growth areas north of Pike Creek can address historic capacity issues within the East Townline Road Drain system as well as provide remediation of degraded water quality.

8.5.3 Soils and Erosion/Sediment Control

Grading and other construction activities will potentially cause erosion and sedimentation. The primary objective of the mitigation measures developed for the project is to prevent erosion. The secondary objective is to capture sediment, if erosion occurs.

Erosion and sediment control measures will be developed during Detailed Design in accordance with the requirements of OPSS 577 “Construction Specifications for Temporary Erosion and Sediment Control Measure”, February 1996, MTO’s “Environmental Reference for Erosion and Sediment Control During Construction of Highway Projects” and MEA’s “Environmental Construction Guidelines”, January 1987. Both permanent and temporary measures will be implemented prior to the commencement of construction to

ensure that sediment is contained within the site. Permanent erosion control measures will ensure that potential long-term and localized erosion problems are dealt with prior to occurrence in sensitive areas such as outlet locations to West Townline Drain, Pike Creek, and East Townline Road Drain. The only area of soil erosion noted for the project are the east banks of Pike Creek which appear to be generally slightly unstable, with some areas of moderate to high instability.

Erosion and sediment control measures include erosion control blanket, rip rap, straw bale and rock flow checks, etc. General erosion and sedimentation control measures provisions include the following:

- minimize disturbance of existing well vegetated outside ditching and grassed slopes, where grading is required
- promote some short-term stormwater ponding within right-of-way ditches, where sub-grade drainage is not adversely affected
- design local storm sewer systems with adequate outlet erosion protection measures
- maximize the length of overland flow through ditches between outlets and points where stormwater leaves the right-of-way
- where ditch regarding is required, consider using flat bottom ditches instead of 'v' ditches to reduce velocities and erosion potential, promote peak flow attenuation and provide short-term stormwater storage
- the Contract can also include special provisions to restrict the length of time between the commencement of any work disturbing earth surfaces and the application of final cover.

8.5.4 Fisheries and Aquatic Ecosystems

Potential fisheries and aquatic ecosystem impacts caused by the proposed improvements to County Roads 19 and 22 are shown on **Table 83** at the end of Section 8.

In the case of the Newman Drain, there will be no changes to the culvert. However, impacts may occur from adjacent works, including bank instability and exposed soils, causing erosion potential and sediment suspension. These impacts can be mitigated by erosion and sediment control measures and provisions to minimize vegetation clearing and protect remaining vegetation.

Harmful Alteration, Disruption or Destruction (HADD) of FishHabitat

As shown on **Table 83**, HADD's of fish habitat are expected to occur at four locations:

- extensive modifications are required at the West Townline Drain, including relocation of significant lengths of the drain, replacement of the existing culvert at the CNR and culvert extensions/replacements at County Roads 34 and 46
- a 24 metre culvert extension is required at the Griffith Drain
- modifications to the Croft Drain, including relocation of a portion of the channel, replacement and extension of the existing culvert and a new culvert crossing at North Rear Road
- bridge widening and a minor channel realignment at Pike Creek. Pike Creek provides habitat for the Channel Darter, a Species at Risk.

Fish Habitat Compensation Plans, to be prepared and approved by DFO under the *Fisheries Act* during Detailed Design, will mitigate these impacts. Other design features and mitigating measures to be developed at each location during Detailed Design include:

- fish salvage/phasing plans at the West Townline Drain. Barrier free fish passage must be provided at all locations
- erosion and sediment control measures, including silt fence and rock rip rap
- minimization of vegetation clearing, protection of remaining vegetation and riparian plantings and re-seeding
- rehabilitation of banks by stabilizing with vegetation or rock
- Watercourse/Fisheries Protection measures to maintain temporary flow during construction and isolate working areas from water.

Culvert Relocations and Replacements

Other culvert relocations and replacements required for the proposed improvements are not expected to result in HADD's of fish habitat. Relocations and replacements are required at the following locations:

- replace 43 metres of South Talbot Drain due to the poor condition of the existing CSP drain
- replace McCann Drain culvert
- replace 10th Concession Drain culvert

- relocate 1900 of East Towline Road Drain channel (south of Pike Creek) and replace existing CSP culvert
- extensive modifications are required to the East Townline Road Drain (north of Pike Creek). Modifications include replacement of 700 metres of ditch, relocation of 1,180 metres of channel and the elimination of several existing culverts
- relocation of 2,150 metres of the Manning Road Drain
- replace and relocate portions of the H.G. Arnold Drain, Antaya Drain and Baillergeon Drain
- relocate 600 metres of the Cyr Drain.

Measures to mitigate these impacts will be developed during Detailed Design. Examples include:

- erosion and sediment control measures
- minimize vegetation clearing and protect remaining vegetation
- riparian plantings and re-seeding
- rehabilitate banks by stabilizing with vegetation and rock
- Watercourse/Fisheries Protection measures to maintain temporary flow during construction and isolate working areas.

Life Cycles

Construction could potentially cause temporary disruption of sensitive biological periods, such as spawning and nursery. This will be avoided by Watercourse/Fisheries Protection measures permitting instream work from July 1 to March 15 only. Isolation of working areas could allow work to proceed during this period, provided fish passage and flow conveyance are maintained. These measures will be developed during Detailed Design.

8.5.5 Vegetation

The relocation of the West Townline Drain will remove the well developed hedgerow along the drain, the only significant (but cultural) feature affected by the proposed improvements. As explained in Section 4, one nationally rare species, Pin Oak (Qurcus palustris) was found in the hedgerow. The widening of CR 19 also requires the removal of many ornamental trees along the right-of-way.

Throughout the Study Area, red ash has died from or was showing secondary growth due to infestation by the Emerald Ash Borer. Provisions must be developed during Detailed Design restricting the movement of all ash products, including nursery stock, logs and debris, during construction. The provisions must conform to the requirements of the Canadian Food Inspection Agency.

Dillon developed a Landscape Concept Plan during Preliminary Design. A low-maintenance, diverse and "minimalist" type landscape is recommended with the following major features:

- trees in groups or hedgerows in snow deposition problem areas to provide wind and snow control
- large caliper or specimen trees may be used in some areas to compensate for the removal of existing trees
- landscaping should provide traffic calming in areas where the road will be widened or changed dramatically, as is the case with the roundabout at CR 34. Tree and shrub plantings on the approaches to the roundabout and busier interchanges can provide an enhanced level of safety. Plantings may encourage a reduction in speed and help control pedestrian flow.

The proposed planting palette includes White Pine, White Spruce, Cedar, Silver Maple, Pin Oak, Serviceberry and Dogwood. Austrian Pine and Honey-Locust have been shown to be tolerant of drought, salt and wind. As a result, these species are suitable for the generally harsh conditions of the more open rural areas, including erosion from wind and stormwater, snow accumulation in winter and sun-shading in the summer. A mostly linear, "green edge" of mixed deciduous and coniferous trees and shrubs will provide the greatest chance of success. Also important, are MTO Guidelines requiring that all landscape designs provide for a safe and effective use of the road system.

The Concept Plan also includes a mix of native species such as Walnut, Basswood and Oak along with locally-found Kentucky Coffeetree, Locust and Red Cedar. MTO and ERCA identify these species as a desirable part of planting mixes in this area. Pin Oak will be included as a replacement planting to compensate for the loss of this species from the West Townline Drain hedgerow.

A detailed Landscape Plan will be developed during Detailed Design in consultation with ERCA. Opportunities for developing a partnership with ERCA for a planting program along the corridor will also be investigated.

8.5.6 Wildlife

Most culverts under CR 19 currently act as effective eco-passages for small mammals, such as raccoon. Larger culverts and Pike Creek Bridge provide passage for white tailed deer.

The relocation of the West Townline Drain and removal of the surrounding hedgerow will remove wildlife habitat for a number of species, including muskrat (*ondatra zibethicus*), mink (*Mustella vison*) and eastern cottontail (*Sylvilagus floridanus*). The realigned portion of the drain will be revegetated with shrub and tree cover to provide habitat. Opportunities also exist to replace the dominant red ash communities with tree species that are immune to the Emerald Ash Borer.

8.5.7 Migratory and Protected Birds

This section of the ESR/PDR includes recommendations for preventing any harm or destruction of breeding bird habitat, nests or young.

The core breeding window for landbirds in Southern Ontario is April 15 to August 15. However, this can vary slightly depending on seasonal conditions and species present in the area. To provide a more site specific assessment of potential breeding dates for birds observed within or adjacent to County Roads 19 and 22, Section 4 of the ESR/PDR provides early and late nesting dates for each species observed in the Study Area (Bird Studies Canada http://www.ofnc.ca/birding/bbanestdates.html). The earliest nesting date for observed species protected by the *Migratory Bird Convention Act (MBCA)* is April 20, with the latest nesting date documented as September 1. As a result, the potential breeding window is April 20 to September 1. Removal of vegetation outside this window will reduce the likelihood of any direct impact on breeding bird species, nests and young.

No nests were observed on or under structures wider than 3 metres in the right-of-way. Generally, reconstruction activities on bridges and culverts in the Study Area are not anticipated to result in direct impacts to breeding bird activity or opportunities. In a few isolated cases, breeding bird activity may occur in vegetation adjacent to the structures. Direct impacts can be avoided if standard mitigation measures are applied to protect species during vegetation removal in areas adjacent to structures, drains or agricultural fields.

Along the right-of-way, the opportunity for breeding birds is severely limited. Dillon recommends that additional survey work be conducted during the breeding season as part of the Detailed Design stage to confirm the presence/absence of species in isolated vegetation patches in the right-of-way. Provided appropriate mitigation measures are taken, direct impacts to breeding birds can be avoided.

The following proposed mitigation measures are based on consultation with Canadian Wildlife Service and MNR staff and adhere to the Federal *MBCA* and Provincial legislation protecting wild birds:

- during Detailed Design, additional survey work should be completed in the right-of-way during the breeding season to confirm the presence/absence of nesting species and locations and refine the bird breeding season
- the construction Contract for this project will include provisions advising that the Contractor shall not destroy any active nests (with eggs or young birds) or wound or kill protected birds. Other Contract provisions may include:
    - vegetation removal will only be allowed during an appropriate clearing window, outside the bird breeding season (September 1 to April 20)
    - if any vegetation clearing occurs during the bird breeding season, a detailed nest search by a qualified biologist will be required. Any nest located during these surveys will require a buffer, where no vegetation can be removed until the young have fledged
    - the Contractor will also be required to supply and maintain preventative measures to prevent protected bird species from nesting on any structure or culvert affected by construction. The measures must be installed no later than April 20 and maintained until September 1. If the measures are not successful in preventing nesting, construction may not proceed until the young birds have left the nest.

In summary, the proposed improvements to CR 19 and CR 22 are not expected to result in adverse impacts to breeding bird species, their nests or young, provided appropriate mitigation is undertaken.

8.5.8 Species at Risk

Species at Risk in the Study Area include Channel Darter, Pin Oak and Fox Snake:

- the relocation of the West Townline Drain requires the removal of the hedgerow, including some Pin Oak. Pin Oak is identified as an S3 Provincial Rank (vulnerable) by the Natural Heritage Information Centre. Although considered a nationally rare species, Pin Oak is common in Essex County. To compensate for the loss of this species, the Landscape Concept Plan includes Pin Oak.
- Fox Snake (Schedule 1, threatened species) has been noted in the Study Area by MNR. Fox Snake is known to be found in thickly wooded areas, wetlands and drains in Essex County. It has also been found near human habitation. The presence of Fox Snake in the Study Area will be further investigated during Detailed Design through the completion of a reptile survey. If Fox Snake are found in the area, examples of mitigation measures that may be required include:
    - daily search of construction equipment and stock-piled materials for the presence of snakes
    - fencing to be erected around the construction footprint to prevent snakes from entering the construction area. Fencing can consist of silt screen material, approximately 300 mm in height
    - if Fox Snakes are encountered on site, the Contractor will contact the Contract Administrators who will notify the appropriate agencies including ERCA and MNR (Alymer District) regarding appropriate procedures
    - if snakes are encountered, the Contractor may apply for an MNR Scientific Collection Permit to relocate the snakes outside of the construction footprint. The need for a Scientific Collection Permit will be identified during Detailed Design
- Pike Creek provides habitat for the channel darter, a Schedule 1 Species at Risk. Bridge widening activities at Pike Creek are not expected to impact this species provided appropriate mitigation measures are implemented. Examples of measures that will be developed in more detail during Detailed Design include:
    - the Fish Habitat Compensation Plan likely required for the bridge widening will be based on the assumption that the channel darter is present and must be protected
    - erosion and sedimentation control measures
    - minimize vegetation removal and protect remaining vegetation. The construction Contract will also provide for riparian plantings or re-seeding and the rehabilitation of banks with vegetation or rock
    - Contract provisions requiring Watercourse and Fisheries Protection will also be developed during Detailed Design. These provisions will include timing restrictions, maintenance of temporary flow passage, isolation of working areas and the rehabilitation of all bed and substrates disturbed during construction.

Northern Map/Blandings Turtle, a Species at Risk, has been found outside the Study Area on Pike Creek at CR 22. Based on this, Dillon recommends that a reptile survey of Pike Creek be completed during Detailed Design.

8.5.9 "Spills" Handling

All MTO construction Contracts include General Conditions specifying incident management, under several pieces of legislation, for protecting the environment and natural features. Relevant legislation includes the *Environmental Protection Act*, *Fisheries Act*, *Gasoline Handling Act*, *Ontario Pesticides Act*, *Ontario Water Resources Act* and *Transportation of Dangerous Goods Act*.

8.6 Land Uses and Socio-Economic Impacts

8.6.1 Navigation

The *Navigable Waters Protection Act* (*NWPA*) applies to the widening of the Pike Creek Bridge. An application for approval under the *NWPA* will be submitted to Transport Canada during the Detailed Design stage.

8.6.2 Existing Land Uses

The proposed improvements to County Roads 19 and 22 have extensive property impacts. As explained in Section 7 of this report approximately 100 acres of property are required, including 18 residential, commercial and light industrial buildings.

Agriculture

Agriculture, consisting mostly of cash crop farming, is the main land use in the Study Area from Highway 3 to Little Baseline Road. Most of this area is designated for long-term agricultural use in the county and

local municipal official plans. As explained in Section 4, Class 2 soils (classified as "prime agricultural land" in the Provincial Policy Statement) predominate in the Study Area.

Approximately 52 acres of "prime agricultural land" are required for the project. Land is required for the CR 19 right-of-way widening, realignment of North Talbot Road, major Municipal Drain relocations and the Service Roads required for the CP Rail grade separation. Most of the property acquisitions consist of strips of land along the existing CR 19 right-of-way. As a result, property acquisition, in most cases, is not expected to have significant impacts on the viability of the existing farm holdings, due to the relatively small size of the property "takes" and size of the remaining farms. In addition, since most of the property acquisitions are located at the edge of existing fields, planting, harvesting and other farming operations will not be adversely affected.

The relocation of the West Townline Drain, however, has significant impacts on the farm located on the west side of CR 19, north of CR 46. The drain relocation severs the farmhouse at the southwest quadrant of the intersection from the farm fields along CR 19. The need to provide culvert crossings of the drain for field access will be determined during Detailed Design. Also, minor adjustments to the drain alignment may be possible during Detailed Design to follow existing lot lines to avoid severing existing farm holdings.

The road widening will require that many field access points be changed and reconstructed to the new right-of-way. Contract documents developed during Detailed Design will require that all agricultural infrastructure affected by the project, such as field tiles, drainage ditches and fences be replaced and restored during construction.

Residential

The improvements require the removal of eight houses located on CR 19, at the addresses shown in Section 7.5. Two of these houses (1950 and 5033 Manning Road) are potential heritage buildings. Houses to be removed are required for the following project components:

- the roundabout at CR 34 requires two houses (3724 Manning Road and 943 Talbot Road)
- widening on the west side of CR 19 near Memorial Drive requires one house (5033 Manning Road)
- widening on both sides of CR 19, south of Little Baseline Road, requires three houses (1975, 1950 and 1865 Manning Road)
- the interchange at CR 22 requires two houses at 1758 and 1784 Manning Road.

In some cases, insufficient land is available on the existing lots to rebuild a house and a total "buy-out" of the properties appears to be necessary. In cases involving large lots, these lots could be rebuilt with residential uses, subject to the local municipalities' Zoning By-laws and County of Essex access restrictions limiting the number of entrances to County Roads.

A total of 3.8 acres of land from single-family residential lots are required for the proposed improvements to CR 19. Of this amount, a significant portion (2.6 acres) is required for the Service Roads needed to provide access to existing houses in the vicinity of the CP Rail grade separation. In all cases, property acquisitions will bring the traveled portion of the road closer to the affected houses, potentially increasing noise and air quality impacts. Road widenings range from 5 metres to 26 metres. Noise and air quality impacts are discussed in Sections 8.7.1 and 8.7.5 of the ESR. Construction noise will be mitigated by the impacts outlined in Section 8.7.2

Access changes for residential uses include:

- the proposed CP Rail grade separation requires the construction of a service road for access to 14 houses in the vicinity of the track.
- Two houses between Jamsyl Drive and CR 22 will be restricted to right in/right out movements due to the proximity of the SPUI interchange at CR 22
- The partial interchange at CR 22/Lesperance Road reduces the direct connection to CR 22 for the surrounding residential neighbourhood, thereby increasing travel time for some movements.

The improvements also require that many residential entrances be reconstructed to the new right-of-way. Significant changes will be made to the entrances affected by the West Townline Drain relocation. Access is currently provided by culvert crossings of the drain.

Commercial/Light Industrial

More than 36 acres of land currently used for commercial and light industrial uses are required for the improvements. Significant areas are required for:

- approximately 10.4 acres of commercial and industrial land is required along CR 19, from Pike Creek to CR 22, for road widening, the CP Rail overpass and required Service Roads. Affected businesses include small commercial uses located along CR 19 and recently developed light

industrial uses on the west side of CR 19, north of Sylvestre Drive. Aside from entrance modifications, required property will not adversely affect existing uses

- over 20 acres of commercial and industrial land is required for improvements to CR 22, including road widening and the interchange at CR 19. Entire properties are required for the SWM facility in Tecumseh.

Existing uses affected by the proposed partial interchange at CR 22 and Lesperance Road include a recently expanded Home Hardware store and the Tecumseh Town Centre, a commercial plaza with a mix of restaurants, retail stores and offices. The partial interchange at CR 22 and Lesperance Road will improve traffic flow on Lesperance Road and eliminate the congestion that is occurring in front of these uses' existing entrances on CR 22. The interchange accommodates traffic to/from Windsor, but does not directly accommodate traffic to/from Lakeshore, potentially resulting in loss of business for the commercial uses at the intersection.

Changes in access for the businesses located at CR 22 and Lesperance Road will be mitigated by the improved road connections to CR 19 included as part of this project. Intended to provide access to these businesses for Lakeshore traffic, the improvements include:

- an extension of Westlake Drive to the CR 22 off-ramp to join Westlake Drive to Sylvestre Drive
- improvements to Sylvestre Drive and Jamsyl Drive to CR 19 to accommodate additional traffic to/from Lakeshore.

These improvements are expected to provide sufficient traffic to support existing and future commercial development at the CR 22/Lesperance Road intersection.

Proposed improvements to County Roads 19 and 22 require the removal of the following ten commercial and light industrial buildings:

- the roundabout at CR 34 requires the removal of Lil's Cozy Corners, a restaurant at 3714 Manning Road. Insufficient land remains on this lot to develop another commercial use at this location
- widening on the west side of CR 19, north of CR 46, requires the removal of the building used for Lil's Country Gardens. The remaining lot appears large enough to be redeveloped with the same type of use
- widening and intersection improvements at CR 42 require the removal of the Pioneer Gas Station at 13366 CR 42. The remaining lot is not large enough to be redeveloped with a commercial use
- the interchange at CR 22 requires the removal of 1766 Manning Road and 1750 Manning Road, both residential houses converted to commercial uses. The remaining lots appear to be large enough to accommodate commercial uses
- the CR 22 interchange and proposed stormwater management pond require the removal of five commercial/light industrial buildings at 13300, 13320 and 13400 Desro Drive. These buildings are 25 to 30 years old and are occupied by Lux Home Furniture, Classic Bingo III and two auctioneers. If consolidated, the existing lots could be redeveloped with commercial/light industrial uses.

Entrance modifications will also be required for all commercial and light industrial uses affected by the improvements. New entrances will be reconstructed to MTO standards for commercial uses.

8.6.3 Current Development Applications

Proposed improvements to County Roads 19 and 22 are likely to require land from the many development applications located along both roads. Approximately 7.7 acres of land designated for future development is required for the improvements. However, the increased accessibility provided by the road improvements may increase the development potential of the proposals. In addition, all proposed and future development can be designed to accommodate the road improvements.

8.7 Human Health Impacts

8.7.1 Road Traffic Noise

RWDI Air Inc. completed an operational noise assessment of the project.

Ontario has two guidelines and documents related to assessing road traffic noise impacts, including:

- Ontario MTO, *Environmental Guide For Noise* (MTO 2006)
- Ontario MTO, *Environmental Reference for Highway Design* (MTO 2006).

These guidelines apply to major roadway construction and reconstruction of new Provincial Highways, and freeways. The *Environmental Guide for Noise* updates, improves and supersedes both the MOE/MTO "Joint Protocol" (MTO & MOE, 1986) and the MTO Quality and Standards Directive QST-A1 (MTO 1992a).

Under the *Environmental Guide for Noise* the importance of changes from a noise impact perspective is based on the objective level and the change from existing conditions. Cumulative sound levels are assessed. Assessments are based on a 10-year future horizon year (i.e., on traffic volumes 10 years after the completion of the project). Accordingly, a future design year of 2026 applies to this project.

Noise mitigation is warranted when increases in sound level over the no-build ambient are 5 dB and greater, or the upper threshold of 65 dBA is exceeded for the future "build" scenario. Mitigation measures can include noise barriers, noise reducing asphalts, and changes in vertical profiles and horizontal alignments. Noise mitigation, where applied, must be administratively, economically, and technically feasible, and provide at least 5 dB of reduction averaged over the first row of noise-sensitive receivers. Mitigation measure locations are restricted to within the roadway right-of-way. Off right-of-way noise mitigation, such as window upgrades and air conditioning, is not considered. Noise mitigation requirements are summarized in the following table.

Table 70:
Summary of Mitigation Efforts under Ontario Road Traffic Noise Guidelines

Change in Noise Level Above Future "No-Build" Ambient (dBA)	Mitigation Effort Required
< 5 dB change and < 65 dBA	• None
> 5 dB change OR ≥ 65 dBA	• Investigate noise control measures within right-of-way • Noise control measures where used must provide a minimum of 5 dBA of attenuation, averaged over the first row of receivers • Mitigated to as close to ambient as possible, where technically, economically and administratively feasible

Note:
Values are L_{eq} (16h) levels for municipal and Provincial Highways, and L_{eq} (24h) for Freeways

Under MTO and MOE policies, L_{eq} (24h) sound levels are used to assess impacts from freeways (400-series major highways) and daytime L_{eq} (16h) sound levels are used to assess impacts from all other Provincial Highways and Municipal roadways. As this project is a provincial highway, L_{eq} (16h) values have been used in the assessment.

Location of Noise Sensitive Areas
Under the *Environmental Guide for Noise*, Noise Sensitive Areas (NSAs) include the following land uses, provided they have an associated Outdoor Living Area (OLA):

- private homes (single family units and townhouses)
- multiple unit buildings such as apartments
- hospitals and nursing homes for the aged
- schools, educational facilities and daycare centres
- campgrounds that provide overnight accommodation
- hotels and motels with outdoor communal OLAs (e.g., swimming pools) for visitors.

The following land uses are generally not considered by the either MTO or MOE to qualify as NSAs:

- apartment balconies
- cemeteries
- parks and picnic areas not part of a defined OLA
- all commercial
- all industrial uses.

Lands that have been zoned for future noise sensitive uses with an approved Plan of Subdivision in place, but where NSAs do not currently exist, must also be considered under MTO / MOE policies. A review of the official plans within the project Area of Investigation was conducted. The land use review indicated no designated-for-future use NSAs.

The general locations of NSAs within the Area of Investigation are shown on **Figures 28 to 32**. Approximately 31 NSAs representative of potential noise impacts on noise sensitive land uses are within the Area of Investigation, meeting MTO requirements. Thirty existing single family homes and town homes make up the NSAs.

The 31 NSAs are described in the following table.

Table 71:
Representative NSAs Considered in Analysis

Receptor Location	Description	Distance to Closest Edge of Pavement from OLA [1] (m)	Approx. No. of NSAs Represented[2]
NR1	House on Shawnee Road	25	9
NR2	Chornoby Crescent	23	60
NR3	Lesperance Road	33	9
NR4	Demarse Court	32	97
NR5	Community Crescent	26	52
NR6	Lanoue Street	24	158
NR7	Heathergien Drive	41	20
NR8	East of Manning Road (South of EC Row)	13	3
NR9	East of Manning Road (North of Desro Drive)	28	12
NR10	West of Manning Road (South of Jamsyl Drive)	37	5
NR11	West of Manning Road (North of County Road 42)	35	2
NR12	West of Manning Road (South of County Road 42)	44	2
NR13	East of Manning Road (South of County Road 42)	69	4
NR14	West of Manning Road (South of County Road 42)	23	1
NR15	West of Manning Road (North of Baseline Road)	75	1
NR16	East of Manning Road (South of Baseline Road)	41	7
NR17	Concession 10 (North of Hwy 401)	156	3
NR18	Concession 10 (South of Hwy 401)	114	2
NR19	West of Manning Road (South of Hwy 401)	33	2
NR20	West of Manning Road (South of Hwy 401)	13	13
NR21	East of Manning Road (North of N Rear Road)	33	3
NR22	East of Manning Road (North of County Road 46)	45	13
NR23	North of County Road 46 (West of Manning Road)	48	6
NR24	North of County Road 46 (East of Manning Road)	103	1
NR25	Malden Road (West of Manning Road)	215	27
NR26	North of County Road 34 (West of Manning Road)	28	1
NR27	North of County Road 34 (East of Manning Road)	41	4
NR28	West of Manning Road (South of County Road 34)	13	1
NR29	East of Manning Road (South of County Road 34)	29	4
NR30	West of Manning Road (North of Hwy 3)	55	1
NR31	East of Manning Road (CP Rail Line)	68	5

Notes:
[1] Distance is with respect to the closest lane of the proposed road changes to the receptor location.
[2] NSAs represented are houses in the area of the modelled receptor.

The point of reception for impact assessment is first assessed at the most exposed façade of the residence. If required, the Outdoor Living Area (OLA) of the noise sensitive land uses is then used for the point of impact assessment. The OLA may be situated on any side of the receptor, but is generally taken to be the back yard. For assessment purposes, it is at a point 3 m from the façade of the receptor, and 1.2 m (approximate head-height) above the ground surface. Where the actual position of the OLA is unknown, the side closest to the proposed roadway has been assumed. The locations of the points of reception used in the analysis are shown on **Figures 28 to 32**.

Road Traffic Data

Traffic volumes for the year 2026 for both the future "build and "no-build" were provided by Dillon. Annual Average Daily Traffic (AADT) values were supplied for all roadway sections. Future "build" AADTs were provided for Manning Road and all intersecting roads. Future "no-build" AADTs were provided for Manning Road. Future "no-build" AADTs were not provided for the intersecting roads and therefore existing (Year 2006) data was used as a conservatism.

The breakdown of total commercial vehicles into heavy trucks and medium trucks was assumed to be proportional to the default truck percentages specified by the *Environmental Guide for Noise*, including 20% (13% heavy / 5% medium) for freeways, and 13% (8% heavy/ 5% medium) for Provincial Highways and Municipal arterial roadways. The directional split of traffic, percentage of commercial vehicles, and day/night split was confirmed by Dillon.

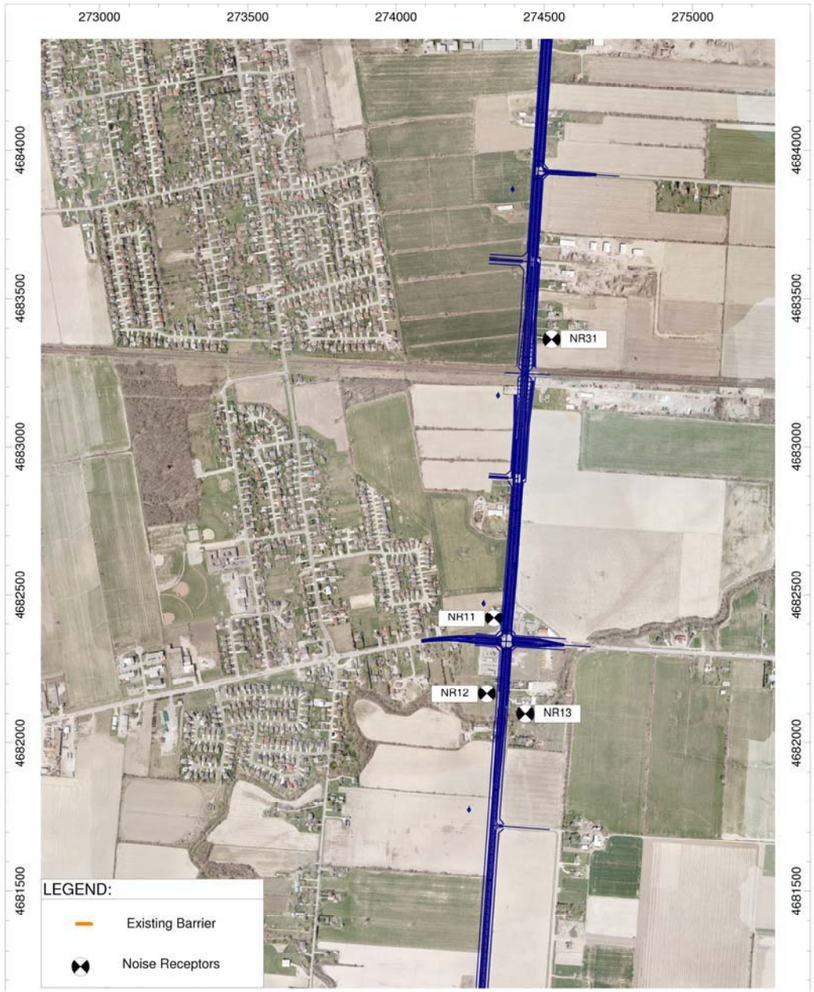
Location of Representative NSA's Used in Analysis, and Location of Existing Noise Barriers

Manning Road Reconstruction and Widening -
Town of Tecumseh and Lakeshore, Ontario

Project #W07-5067A

Drawn by: AKH	Figure: 28
Scale:	1:15000
Date:	November 2008

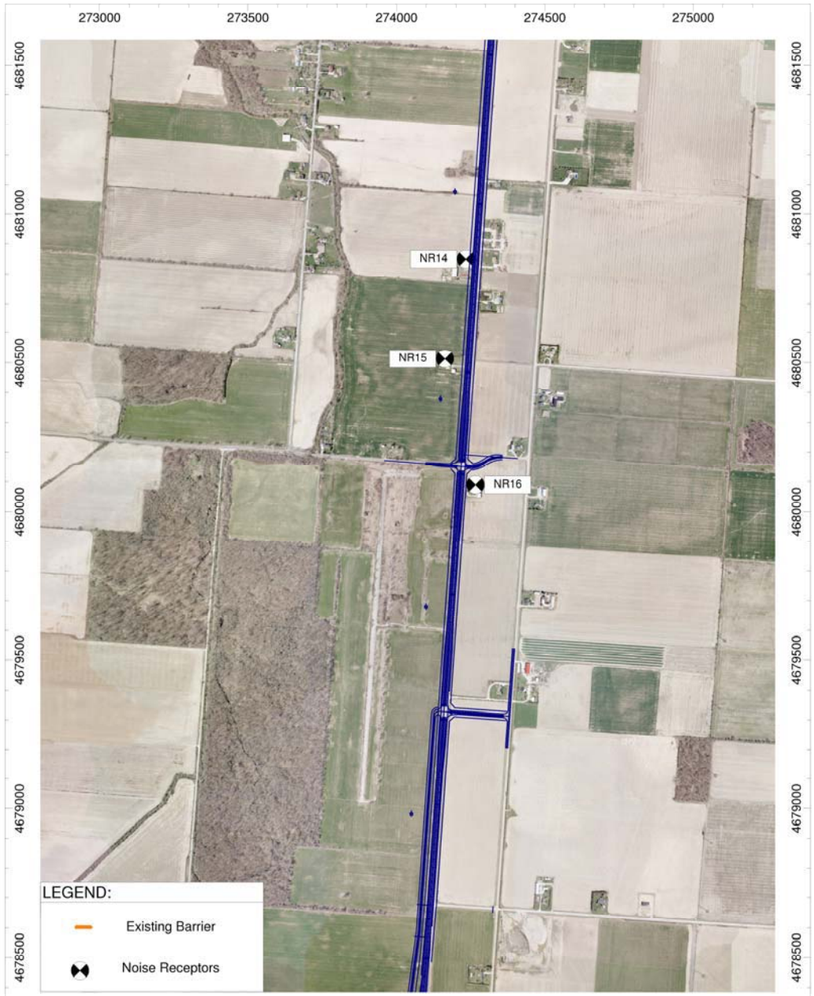
RWDI®



Location of Representative NSA's Used in Analysis, and Location of Existing Noise Barriers
Manning Road Reconstruction and Widening -
Town of Tecumseh and Lakeshore, Ontario — Project #W07-5067A

Drawn by: AKH	Figure: 29
Scale:	1:15000
Date:	November 2008

RWDI®



Location of Representative NSA's Used in Analysis, and Location of Existing Noise Barriers
Manning Road Reconstruction and Widening -
Town of Tecumseh and Lakeshore, Ontario — Project #W07-5067A

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Scale:	1:15000
Date:	November 2008

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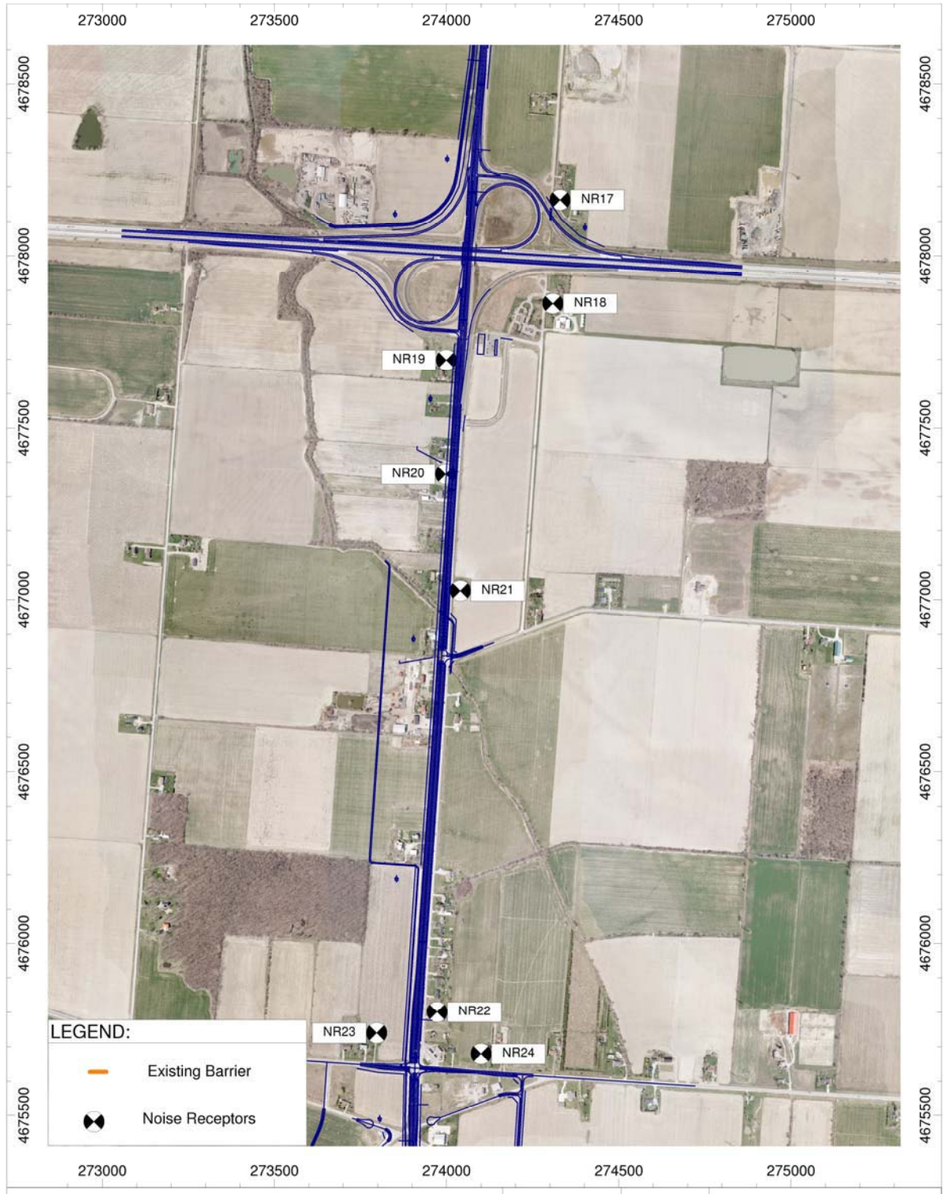

Location of Representative NSA's Used in Analysis, and Location of Existing Noise Barriers
Manning Road Reconstruction and Widening -
Town of Tecumseh and Lakeshore, Ontario
Project #W07-5067A

Drawn by: AKH | Figure: 31
Scale: 1:15000
Date: October, 2008

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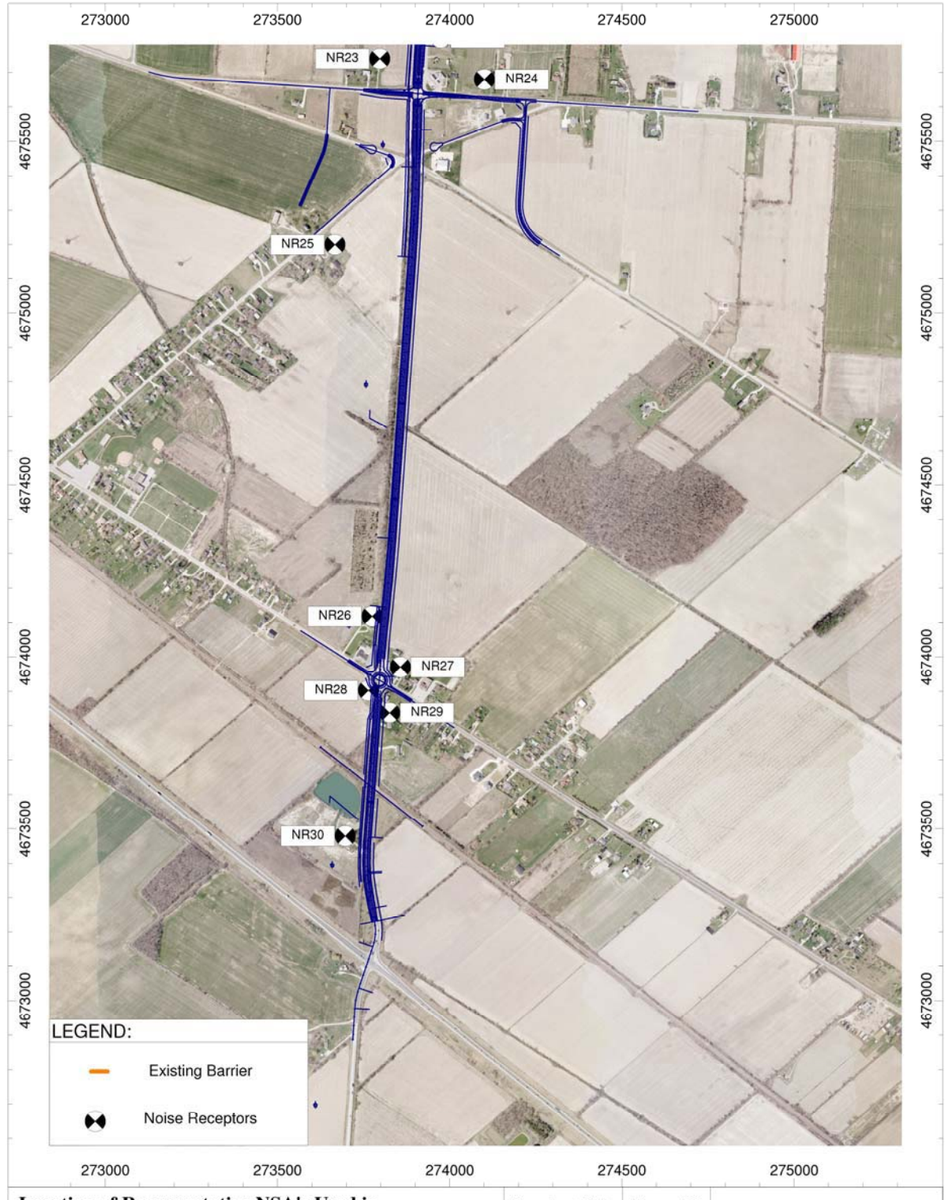

Location of Representative NSA's Used in Analysis, and Location of Existing Noise Barriers
Manning Road Reconstruction and Widening -
Town of Tecumseh and Lakeshore, Ontario
Project #W07-5067A

Drawn by: AKH | Figure: 32
Scale: 1:15000
Date: October, 2008

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The traffic data used in the assessment are summarized in the following tables.

Table 72:
Future Year 2026 "No-Build" Traffic Data

Road	YEAR 2026 AADT	Day/Night Split [1]	Overall % Commercial Vehicles	Medium/ Heavy Truck Split [2]	Posted Speed Limit (km/h)
Manning Road					
- North of County Road 22	39,000	92 / 8	2.5	1.0 / 1.5	50
- From County Road 22 to Country Road 42	25,000	92 / 8	10	3.8 / 6.2	80
- From County Road 42 to Highway 401	24,000	92 / 8	10	3.8 / 6.2	80
- From Highway 401 to County Road 46	21,000	92 / 8	10	3.8 / 6.2	80
-From County Road 46 to County Road 34	17,000	90 / 10	10	3.8 / 6.2	80
-From County Road 34 to Highway 3	9,500	90 / 10	10	3.8 / 6.2	80
County Road 22					
- West of Manning Road	32,500	88 / 12	7	2.7 / 4.3	80
- East of Manning Road	21,500	88 / 12	5	1.9 / 3.1	80
County Road 42					
- West of Manning Road	12,500	90 / 10	8	3.0 / 5.0	80
- East of Manning Road	9,500	90 / 10	10	3.8 / 6.2	80
Highway 401					
- West of Manning Road	23,000	68 / 32	42	10.5/ 31.5	100
- East of Manning Road	25,000	68 / 32	42	10.5/ 31.5	100
County Road 46					
- West of Manning Road	9,500	90 / 10	8	3.0 / 5.0	80
- East of Manning Road	4,000	90 / 10	8	3.0 / 5.0	80
County Road 34					
- West of Manning Road	1,500	90 / 10	5	1.9 / 3.1	60
- East of Manning Road	6,000	90 / 10	5	1.9 / 3.1	60
County Road 3					
- West of Manning Road	14,000	90 / 10	8	3.0 / 5.0	80
- East of Manning Road	19,000	90 / 10	8	3.0 / 5.0	80

Notes:
[1] XX / YY is the percentage of vehicle traffic in the 16 daytime and 8 hour night-time respectively.
[2] HH / MM is the percentage of heavy trucks and medium trucks used in the analysis, respectively.

Table 73:
Future Year 2026 "Build" Traffic Data

Road	YEAR 2026 AADT	Day/Night Split [1]	Overall % Commercial Vehicles	Medium/ Heavy Truck Split [2]	Posted Speed Limit (km/h)
Manning Road					
- North of County Road 22	41,000	92 / 8	2.5	1.0 / 1.5	50
- From County Road 22 to Country Road 42	29,000	92 / 8	10	3.8 / 6.2	70
- From County Road 42 to Highway 401	30,000	92 / 8	10	3.8 / 6.2	80
- From Highway 401 to County Road 46	22,500	92 / 8	10	3.8 / 6.2	80
-From County Road 46 to County Road 34	18,000	90 / 10	10	3.8 / 6.2	80
-From County Road 34 to Highway 3	10,000	90 / 10	10	3.8 / 6.2	80
County Road 22					
- West of Manning Road	74,000	88 / 12	7	2.7 / 4.3	100
- East of Manning Road	49,500	88 / 12	5	1.9 / 3.1	100
County Road 42					
- West of Manning Road	36,500	90 / 10	8	3.0 / 5.0	80
- East of Manning Road	20,000	90 / 10	10	3.8 / 6.2	80
Highway 401					
- West of Manning Road	36,000	68 / 32	42	10.5 / 31.5	100
- East of Manning Road	39,000	68 / 32	42	10.5 / 31.5	100
County Road 46					
- West of Manning Road	15,500	90 / 10	8	3.0 / 5.0	80
- East of Manning Road	6,000	90 / 10	8	3.0 / 5.0	80
County Road 34					
- West of Manning Road	4,500	90 / 10	5	1.9 / 3.1	60
- East of Manning Road	11,500	90 / 10	5	1.9 / 3.1	60
County Road 3					
- West of Manning Road	21,000	90 / 10	8	3.0 / 5.0	80
- East of Manning Road	30,000	90 / 10	8	3.0 / 5.0	80

Notes:
[1] XX / YY is the percentage of vehicle traffic in the 16 daytime and 8 hour night-time respectively.
[2] HH / MM is the percentage of heavy trucks and medium trucks used in the analysis, respectively.

Noise Model

Road traffic noise levels were modelled using a spreadsheet-based version of the "Ontario Road Noise Analysis Method for Environmental Transportation (ORNAMENT)" algorithms (MOE 1989). The algorithms in this spreadsheet form the basis of the STAMSON v5.03 computer program produced by MOE (MOE 1996). Results from the ORNAMENT calculations and STAMSON are equivalent. Sound levels were predicted for both the future "no-build" and future "build" cases. The ORNAMENT model was

selected since road-receiver geometries and intervening terrain within the Area of Investigation are relatively "simple".

The following factors were taken into account in the analysis:

- horizontal and vertical road-receiver geometry
- road gradients
- intervening terrain types (ground absorption)
- traffic volumes and percentage of trucks
- vehicle speeds
- screening provided by terrain, houses and existing sound barriers.

Distances, roadway heights and receptor locations were obtained from plan drawings and aerial photographs supplied by Dillon.

Existing Noise Barriers

Noise barriers are located in the project Study Area, as shown on **Figures 28 to 32**. The acoustical effects of the existing noise barriers have been considered in the analysis.

Potential Impacts

Under the *Environmental Guide for Noise*, the assessment of impact is conducted by comparing future "build" sound levels (with the project in place) versus future "no-build" sound levels (same year as the future build, but without the project undertaking).

Table 74 compares future "build" versus future "no-build" sound levels.

Table 74:
Future Noise Levels With and Without the Undertaking - Unmitigated

Receptor Location	No. of NSAs Represented	Future "Build" L_{eq} (16h) (dBA)		Future "No-Build" L_{eq} (16h) (dBA)		Change (Build – No-Build) (dB)	
		Closest Façade	OLA	Closest Façade	OLA	Closest Façade	OLA
NR1	9	76	76	70	70	6	6
NR2	60	68	68	62	62	6	6
NR3	9	76	75	69	69	7	7
NR4	97	67	67	62	62	5	5
NR5	52	66	66	61	61	5	5
NR6	158	67	67	63	63	4	4
NR7	20	66	66	64	64	3	3
NR8	3	73	72	74	73	-1	-1
NR9	12	72	67	74	69	-2	-1
NR10	5	71	66	70	66	0	0
NR11	2	68	68	66	64	2	4
NR12	2	72	67	68	64	4	4
NR13	4	68	66	68	65	1	1
NR14	1	75	69	72	68	2	2
NR15	1	68	65	67	64	1	1
NR16	7	72	67	71	67	0	0
NR17	3	72	72	70	70	2	2
NR18	2	70	70	67	67	2	2
NR19	2	72	70	70	68	2	2
NR20	13	75	71	72	69	3	2
NR21	3	71	67	73	68	-2	-1
NR22	13	70	65	71	66	-2	-1
NR23	6	67	65	66	65	0	0
NR24	1	65	64	64	63	1	1
NR25	27	62	62	61	61	0	0
NR26	1	69	69	69	68	1	1
NR27	4	64	64	64	64	0	0
NR28	1	72	68	70	66	2	1
NR29	4	69	65	70	66	-1	0
NR30	1	66	62	65	61	1	1
NR31	5	68	63	69	65	-1	-2

Notes: "Unmitigated" includes the effects of existing noise barriers located within the right-of-way.

In keeping with MTO requirements, impacts are also ranked in terms of increasing future build sound level at the OLA (in **Table 75**), and increasing change in sound level at the OLA (in **Table 76**).

Table 75:
Ranking of Future Absolute Noise Levels at the OLA - Unmitigated

Future "Build" Sound Level	Receptors in Category	Total No. of Affected NSAs
45 to < 50 dBA	--	--
50 to < 55 dBA	--	--
55 to < 60 dBA	--	--
60 to < 65 dBA	NR24, NR25, NR27, NR30, and NR31	55
65 < 70 dBA	NR2, NR4, NR5, NR6, NR7, NR9, NR10, NR11, NR12, NR13, NR14, NR15, NR16, NR21, NR22, NR23, NR26, NR28, and NR29	432
70 dBA or greater	NR1, NR3, NR8, NR17, NR18, NR19, and NR20	41

Notes:
– All sound levels are in dBA
– "Unmitigated" includes the effects of existing noise barriers located within the right-of-way.

Table 76:
Ranking of Change in Sound Levels at the OLA - Unmitigated

Future "Build" Sound Level		Receptors in Category	Total No. of Affected NSAs
Increase in Sound Level	> 15 dBA	--	--
	> 10 to 15 dBA	--	--
	> 5 to 10 dBA	NR1, NR2, and NR3	80
	0 to 5 dBA	NR4, NR5, NR6, NR7, NR11, NR12, NR13, NR14, NR15, NR17, NR18, NR19, NR20, NR24, NR26, NR28, and NR30	367
Decrease in Sound Level	-5 to < 0 dBA	NR8, NR9, NR10, NR16, NR21, NR22, NR23, and NR25, NR27, NR29, and NR31	81
	-10 to < -5 dBA	--	--
	-15 to < -10 dBA	--	--
	> -15 dBA	--	--

Notes:
– All sound levels are in dBA
– "Unmitigated" includes the effects of existing noise barriers located within the right-of-way.

The results show that at representative NSA's NR1, NR2, and NR3 changes in sound exposures resulting from the proposed project are greater than 5 dB. The results also show that at representative NSA's NR1 to NR23, NR26, NR28, and NR29 changes in sound level exposures resulting from the proposed project will result in a future "build" sound level greater than 65 dBA. As a result, under the *Environmental Guide for Noise*, investigation of noise mitigation is required in these areas.

RWDI also assessed the impacts of the proposed CR 19/CP Rail grade separation. The future build case has a lower predicted sound level compared to the no-build case. This is due to the new bridge/overpass acting as a barrier to traffic on the opposite side, which obstructs the line-of-sight for these receptors.

Table 77:
Noise Impacts of Proposed CR 19/CP Rail Grade Separation

Receptor Location	No. of NSAs Represented	Future Build L_{eq} (16h) (dBA)		Future No-Build L_{eq} (16h) (dBA)		Change (Build – No-Build) (dB)	
		Closest Facade	OLA	Closest Facade	OLA	Closest Facade	OLA
North of Manning/ CP Rail Tracks (NR 31)	**5**	**68**	**63**	**69**	**65**	**-1**	**-2**

Noise Mitigation Measures

Based on the projected increase in sound levels resulting from the project, an investigation of noise mitigation measures is required.

- noise mitigation should be investigated within the right-of-way. Off- right-of-way noise mitigation measures such as window upgrades and air conditioning are not considered
- mitigation measures should achieve at least 5 dB of attenuation over the first row of affected receivers or 3 dB of attenuation over the first row of affected receivers for upgrading existing measures
- mitigation should be implemented where administratively, technically, and economically feasible.

Noise mitigation measures that in general can feasibly be implemented within the right-of-way include:

- changes to vertical and horizontal alignments
- changes to pavement surface types

- acoustical barriers (noise walls and berms).

By moving the roadway closer or further away, horizontal changes in alignment can result in increases or decreases in noise levels at noise sensitive receptors. However, resulting changes are limited since the distance to the roadway must be doubled for a 3 to 5 dB decrease in noise level. For this particular project, the alignment is constrained by the location and width of the right-of-way, and the location of noise sensitive receptors. Changes to the horizontal alignment within the right-of-way will result in negligible changes in sound levels at NSAs and therefore this mitigation method has not been investigated further.

Vertical changes in alignment can affect noise at NSAs by affecting the line-of-sight between roadway sources and the receiver. For example, placing the roadway at the bottom of a shallow in-cut can create a natural barrier effect at the edge of the excavation. However, this may create drainage issues or other issues with highway construction and maintenance. Paradoxically, elevated roadways located on embankments or structures may also have reduced noise levels, as the structure/berm can act as a noise barrier for ground level receptors, blocking the line-of-sight for roadway lanes on the "far side" of the road from the receptor in question. For this project, changes in the vertical alignment are constrained by the existing roadway base course and structures and any changes in vertical profile that can be accommodated will result in negligible acoustical changes off-site. Therefore, this mitigation method has not been investigated further.

For vehicles travelling at highway speeds, most of the noise produced is due to interactions between the tires and pavement surface. The type of pavement surface can therefore substantially affect off-site noise levels. The following table illustrates the relative sound levels produced by different pavement types and the relative cost per tonne for asphalt pavements (concrete pavement costs are subject to more variables in the design of the system).

Table 78:
Noise Emission Level From Various Pavement Types (Relative to "Normal")

Pavement Type	Relative Sound Emission Level (dB)	Approximate Costs [1]
Grooved Concrete	+ 1 to + 4	Variable
Normal Dense-graded Friction Course (DFC)	0	$45 / tonne
Open-graded Friction Course (OFC)	- 2.5	$65 / tonne to $100 / tonne

Table 78:
Noise Emission Level From Various Pavement Types (Relative to "Normal")

Pavement Type	Relative Sound Emission Level (dB)	Approximate Costs [1]
Stone Mastic Asphalt (SMA)	- 2.5	$100 / tonne

Notes: [1] Relative costs based on 2004 noise reducing asphalt studies conducted by the Regional Municipality of Waterloo, and the University of Waterloo – Centre for Pavement and Transportation Technology.

Noise reducing asphalts may cost twice as much as conventional DFC mixes, and by themselves produce noise reductions of only 2.5 dB – half of the 5 dB minimum required for noise mitigation to be considered effective under the *Environmental Guide for Noise*. Other mitigation measures must therefore be employed in conjunction with noise-reducing pavements to meet the 5 dB requirements (e.g., barriers or alignment changes). Alignment changes have already been ruled out as an effective mitigation measure. Noise barriers by themselves will produce the required 5 dB reduction in noise level. Pavement type as a noise mitigation measure has not been investigated further.

Noise barriers reduce noise levels at protected receptors through blocking the path of sound waves emanating from the source towards the receiver and by absorbing or reflecting the incident sound energy away. Therefore, a noise barrier must at least break the line-of-sight between the source (the roadway) and the receptor (the ground-level OLA of the NSA under investigation). Such a barrier will provide at least 5 dB of attenuation.

Noise barriers can be formed of earthen berms, engineered noise walls, or some combination of the two. Where earthen berms are used, side slopes of 3:1 should be used for drainage, erosion control and right-of-way maintenance. Noise walls should be free of gaps and cracks, and have a minimum surface density (mass per unit of face area) of 20 kg/m^2 (4 lb. per sq. ft.). It is preferable that barriers are absorptive at least on the roadway side, and this is mandatory in situations where parallel walls (e.g., walls on both sides of a roadway) are proposed. Noise wall costs typically around $500 per m^2 of face area ($2000 per running metre length for a 4.0 m high barrier).

Under current MTO policies, modifications to existing barriers are only required to produce 3 dB drop to be considered economically feasible (Blaney 2008). Also, barriers located in the right-of-way are only

assessed in this report and any barriers that could potentially be located off the right-of-way should be determined later in the process.

Noise mitigation must be cost effective and economically feasible. Current MTO practice is to use a maximum cost of $50,000 to $100,000 per protected receptor as the determination of economic feasibility. An average value of $75,000 per protected receptor has been used in this assessment.

Noise wall colour and surface appearance and other aesthetic features must be considered in Detailed Design. Landscaping, including planting of trees, shrubs and ground cover, must be considered for noise berms and berm/wall combinations.

Recommended Noise Mitigation Measures

A number of noise walls are proposed as mitigation measures. Noise wall locations are shown on **Figure 33**. Noise barrier characteristics and effectiveness are evaluated in **Table 79** below:

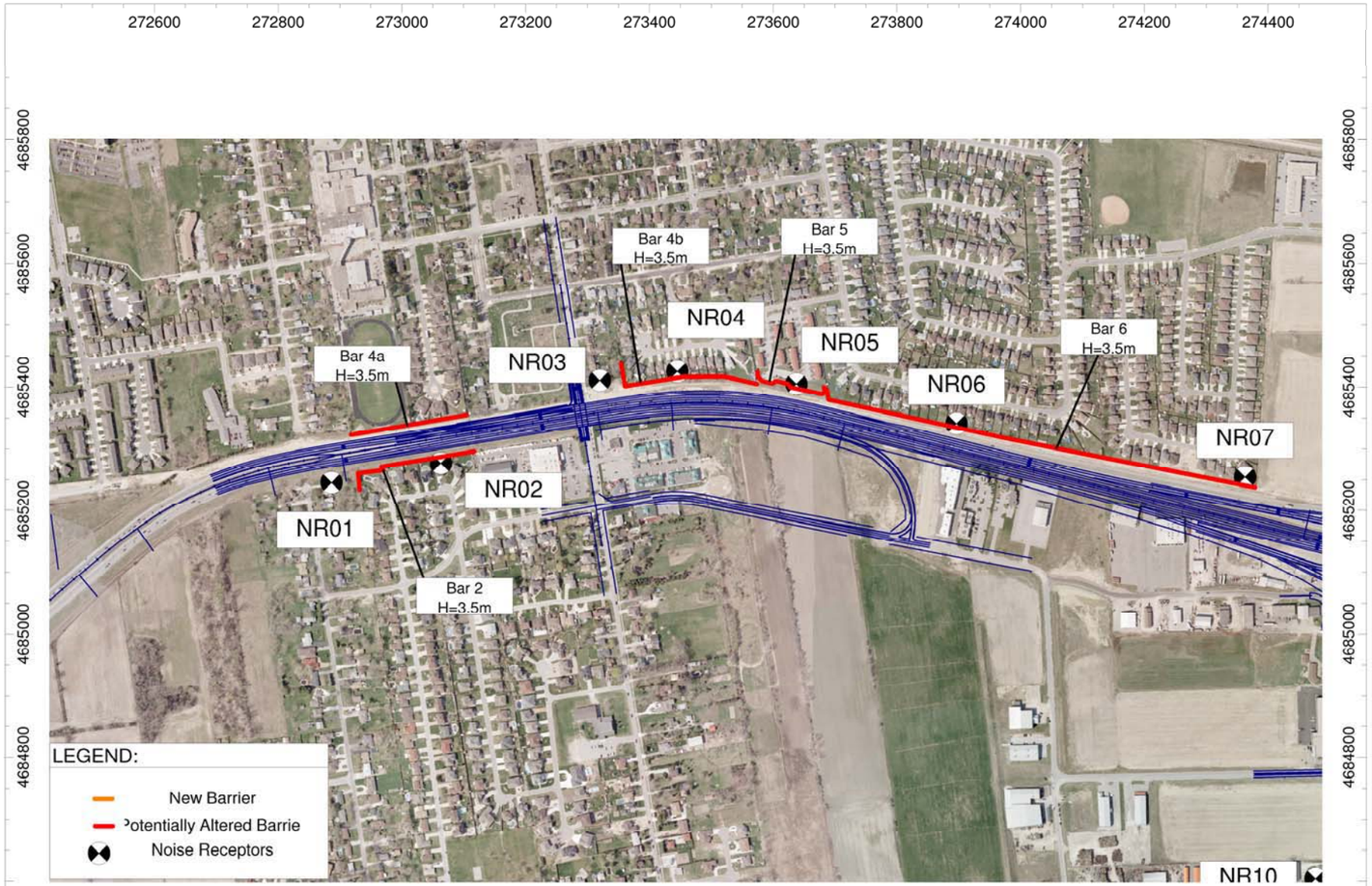
Table 79:
Noise Barriers and Barrier Cost Effectiveness

Barrier Name	Affected Modelled NSAs	No of Affected Residences [1]	Average Reduction (dB)	Barrier Height (m)	Barrier Length (m)	Approximate Barrier Cost Per Receptor [2]	Economically Feasible? [3]
Bar1	NR1	2	-	3.0	215	$161,000	No
Bar2	NR2	6	3	3.5	226	$66,000	Yes
Bar3	NR3	2	7	3.0	113	$85,000	No
Bar4	NR4	16	3	3.5	253	$28,000	Yes
Bar5	NR5	4	4	3.5	134	$59,000	Yes
Bar6	NR6/NR7	39	4	3.5	720	$32,000	Yes
Bar7	NR14	1	-	3.0	85	$128,000	No
Bar8	NR15	1	-	3.0	262	$393,000	No
Bar9	NR26	1	-	3.5	158	$277,000	No

Notes: [1] The number of affected residences in the first and (where applicable) second row of houses which will be protected by the noise barrier
[2] Based on a barrier cost of $600 per m^2 of face area, divided by the number of affected residences
[3] "Yes" if barrier costs is less than $75,000 per receptor; else, "No"

Noise barriers at representative NSA's NR08 to NR10 NR13, NR16 to NR23, NR28, and NR29 are not technically feasible. This is due to the orientation of houses with respect to the road and driveways with respect to the OLAs.

Based on the rough cost estimates in **Table 79**, there are no new barriers that are economically feasible. It may also be economically feasible for potentially altered (reconstructed) barriers to be installed for respective NSA's NR2, NR4, NR5, NR6, and NR7, depending on the final costs.



Location of Proposed New or Potentially Altered Noise Barriers
Manning Road Reconstruction and Widening -
Town of Tecumseh and Lakeshore, Ontario

Project #W07-5067A

Drawn by: AKH	Figure: 33
Scale:	1:9000
Date:	November 2008

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Mitigated Noise Levels

Noise levels with existing and proposed/replacement noise barriers in place are shown on **Table 80**.

Table 80:
Future Noise Levels With and Without the Undertaking - Mitigated

Receptor Location	No. of NSAs Represented	Future "Build" L_{eq} (16h)	Future "No-Build" L_{eq} (16h)	Change ("Build" – "No-Build")	Mitigation Measures Considered?
NR1	9	76	70	6	No
NR2	16	65	62	2	Yes
NR3	9	68	75	7	No
NR4	43	64	62	2	Yes
NR5	42	62	61	1	Yes
NR6	50	64	63	1	Yes
NR7	8	64	64	0	Yes
NR8	3	72	73	-1	No
NR9	12	67	69	-1	No
NR10	5	66	66	0	No
NR11	2	68	64	4	No
NR12	2	67	64	4	No
NR13	4	66	65	1	No
NR14	1	69	68	2	No
NR15	1	65	64	1	No
NR16	7	67	67	0	No
NR17	3	72	70	2	No
NR18	2	70	67	2	No
NR19	2	70	68	2	No
NR20	13	71	69	2	No
NR21	3	67	68	-1	No
NR22	13	65	66	-1	No
NR23	6	65	65	0	No
NR24	1	64	63	1	No
NR25	27	62	61	0	No
NR26	1	69	68	1	No
NR27	4	64	64	0	No
NR28	1	68	66	1	No
NR29	4	65	66	0	No
NR30	1	62	61	1	No
NR31	5	63	65	-2	No

Notes:
- All sound levels are in dBA.
- "Mitigated" includes the effects of existing noise barriers located within the right-of-way, and the additional/replacement barriers outlined above and shown in Figures 4a and 4b.
- Cells shaded grey include reused/additional mitigation.

8.7.2 Construction Noise

RWDI Air Inc. completed a construction noise assessment for the project.

Construction noise impacts are temporary in nature, and largely unavoidable. With adequate controls, impacts can be minimized. However, for some periods of time and types of work, construction noise will be noticeable. This section of the report evaluates construction noise impacts and identifies measures to minimize impacts.

Local Noise Control Bylaws

Bylaws restricting noise from construction activity within the Study Area are summarized in **Table 81.** A copy of the by-laws is included in **Appendix H**.

Table 81:
Applicable Local Noise Control By-laws

Jurisdiction	By-law No.	By-law Provision
Town of Tecumseh	2002-07	**Section 3** No person within the boundary of the municipality shall emit or cause or permit the emission of sound resulting form an act listed herein, and which sound is clearly audible at a Point of Reception: **(c)** The operation of any combustion engine or pneumatic device without an effective exhaust or intake muffling device in good working order and in constant operation. **(g)** The operation of any item of Construction Equipment in a Residential Area, Agricultural Area or Commercial Area without effective muffling devices in good working order and in consistent operation. **Section 4** No person within the municipality shall emit or cause the emission of sound resulting from any act in Table 4-1, hereinafter set out, if clearly audible at a point of reception located in an area of the municipality within a prohibited time

Table 81:
Applicable Local Noise Control By-laws

Jurisdiction	By-law No.	By-law Provision
		shown for such an area. **Table 4-1** Item 15. The operation of any equipment in connection with construction between the hours of 8:00pm to 7:00am.
Town of Lakeshore	69-99	**Section 2** No person shall emit or cause or permit the emission of sound resulting from an act listed herein, and which sound is clearly audible at a point of reception: **(7)** The operation of any item of construction equipment in a Residential Area, Agricultural Area or Commercial Area without effective muffling devices in good working order and in constant operation. **Section 3** No person shall emit or permit the emission of sound resulting from any act in Table 3-1 if clearly audible at a point of reception located in an area of the municipality indicated within a prohibited time shown for such an area. **Table 3-1** Item 15. The operation of any equipment in connection with construction between the hours of 8:00pm to 7:00am.

If required during Detailed Design, MTO, on behalf of the Contractor, may seek any required exemptions from the affected municipality, in advance for work to be performed outside of the time periods allowed by the by-laws. If an exemption cannot be obtained, construction will proceed in accordance with the By-law requirements.

MOE Model Municipal Noise Control Bylaw

MOE stipulates limits on noise emissions from individual items of equipment, rather than for overall construction noise. In the presence of persistent noise complaints, sound emission standards for various types of construction equipment used on the project should be checked to ensure they meet specified limits contained in MOE Publication NPC-115 – "Construction Equipment" (MOE 1977b). Limits are shown on the following table:

Table 82:
NPC-115 Maximum Noise Emission Levels for Typical Construction Equipment

Type of Unit	Maximum Sound Level[1] (dBA)	Distance (m)	Power Rating (kW)
Excavation Equipment[2]	83	15	Less than 75 kW
	85	15	75 kW or Greater
Pneumatic Equipment[3]	85	7	-
Portable Compressors	76	7	-

Notes: [1] Maximum permissible sound levels presented here are for equipment manufactured after Jan. 1, 1981.
[2] Excavation equipment includes bulldozers, backhoes, front end loaders, graders, excavators, steam rollers and other equipment capable of being used for similar applications.
[3] Pneumatic equipment includes pavement breakers.

Anticipated Construction Activities and Noise Levels

Proposed improvements to County Roads 19 and 22 involve the following construction activities:

- removing existing surface pavements
- construction and rehabilitation of the base course
- addition of new lane(s)
- construction of new bridges and overpass structures (including pile driving)
- paving (and repaving) of the roadway surface.

Construction activities will vary temporally and spatially as the project progresses. Noise levels from construction at a given receptor location will also vary over time as different activities take place and change location within the right-of-way. RWDI completed an analysis of potential worst-case construction noise levels based on generic data on equipment types and activities.

Construction Code of Practice Requirements

To minimize the potential for construction noise impacts, it is recommended that a Construction Code of Practice be developed during Detailed Design. The code should be incorporated into the Contract documents and include the following provisions:

- construction should be limited to the time periods allowed by the Tecumseh and Lakeshore by-laws. If construction activities are required outside these hours, the Contractor must seek exemptions in advance of construction from the municipalities
- the Contract should explicitly require the Contractor to comply with all applicable requirements of the Contract and local noise by-laws. Enforcement of noise control by-laws is the responsibility of the municipalities for all work done by Contractors
- all equipment should be properly maintained to limit noise emissions. All construction equipment should be operated with effective muffling devices in good working order
- the Contract documents should contain a provision that any initial noise complaint will trigger verification that the general noise control measures agreed to are in effect
- in the presence of persistent noise complaints, all construction equipment should be verified to comply with MOE NPC-115 guidelines
- in the presence of persistent complaints and subject to the results of a field investigation, alternative noise control measures may be required, where reasonably available. In selecting appropriate noise control and mitigation measures, consideration should be given to the technical, administrative and economic feasibility of alternative measures.

8.7.3 Potentially Contaminated Properties

As part of the Class EA and Preliminary Design, Dillon completed a "Limited Contamination Overview Study" (February 7, 2008) of property affected by construction of the proposed improvements. The purpose of the study was to determine the potential for contamination on each property and if a Phase I and II Environmental Site Assessment is required during Detailed Design. A total of 155 properties were evaluated. Site visits were completed on November 6, 7 and 8, 2007.

All properties were placed into one of the following categories:

- low potential for contamination on the required property and low potential for contamination migration from adjacent properties
- moderate potential for contamination on the required property and moderate potential for migration from adjacent properties
- high potential indicates a high potential for property contamination and high potential for contaminant migration.

The report concluded that:

- 30 properties have low potential for contamination and a Phase I Environmental Site Assessment is not recommended. These properties generally include cultivated land and commercial properties where buildings, stored equipment or above ground storage tanks are more than 50 metres from the required property line
- 95 properties have moderate potential for contamination. During Detailed Design, MTO will decide if a Phases 1 and II Environmental Site Assessment is required for these properties. These properties generally consist of residential and commercial properties where buildings, stored equipment or above ground storage tanks are less than 50 metres from the required property boundary
- 30 properties have high potential for contamination. A Phase I and II Environmental Site Assessment is recommended for these properties. Properties with high potential include those with a service station or rail line located inside or close to the required property line, above ground storage tanks inside or close to the required property line and properties with buildings requiring removal.

The report recommended that the Detailed Design stage also include:

- a sediment sampling program for properties with a portion of a Municipal Drain
- further investigations to determine the presence of polychlorinated biphenyls for properties with hydro poles with mounted transformers.

During the Detailed Design stage, MTO will determine those properties requiring further Environmental Site Assessments. Any required assessments will be initiated early in Detailed Design. This stage should also address the need to manage and dispose road salt contaminated soils during construction.

8.7.4 Water Wells

All 51 wells located along existing CR 19 are protected by a thick layer of overlying clayey soils. Since a large portion of the Study Area is serviced by municipal water, it is not known how many of these wells are still in use. Given their depth, no special precautions are required to protect wells. Any water wells encountered during construction will be decommissioned using a licensed water well contractor, as required by Ontario Regulation 903.

8.7.5 Air Quality

The proposed improvements will increase the capacity of the roadway network and accommodate an increased number of vehicles, potentially adversely affecting air quality. However, emission levels are highest when vehicles are stopping and starting. Widening CR 19 and CR 22, including the construction of interchanges and grade separations will reduce existing queuing, resulting in reduced emissions of greenhouse gases. Air quality is also expected to improve due to the adoption of stricter truck and car emission standards and anticipated significant reductions in transboundary pollution. The 2004 to 2007 car and truck emission standards will result in 70 to 90% reductions in oxides of nitrogen and particulate matter emissions, the principle contributors to smog. This measure is complemented by fuel quality standards that have already reduced the sulphur content of gasoline and diesel fuel by more than 95%.

When comparing the "do nothing" option and proposed improvements to County Roads 19 and 22, it is expected there will be little to no difference in air quality conditions due to the improvements. In addition, total vehicular emissions are expected to decrease over time for some contaminants due to regulations controlling emission levels and associated technological modifications.

Dust and air quality impacts on adjoining residential uses during construction will be minimized by the application of standard measures. Applicable measures will be developed during Detailed Design.

8.7.6 Light Pollution

In all cases, illumination will be directed towards the road rights-of-way by the use of shields ("flat glass" lighting). This will reduce light trespass into adjoining residential uses and minimize light pollution of the night sky.

8.7.7 Hazardous Materials

Laboratory samples of the conduit pipes in the concrete curbs extracted from the CR 19 (Manning Road)/ Highway 401 Underpass, Site 6-230, indicates it contains asbestos materials in the range of 5 to 25% chrysotile and 0.5 to 5% corocidolite.

Asbestos identification and appropriate safe handling practices, including removal and disposal, must comply with Ontario Regulation 278/05 Designated Substance – Asbestos on Construction Projects and in Buildings and Repair Operations, under the *Occupational Health and Safety Act* and Regulation 347B, General Waste Management.

8.8 Municipal and Provincial Land Use and Infrastructure Policies

8.8.1 Official Plans

The project requires the acquisition of approximately 8 acres of vacant lands designated for future development in local municipal Official Plans. Affected lands include:

Town of Tecumseh (former Town of Tecumseh and Sandwich Township Official Plan)

- a small amount of land (less than 1 acre) designated "Hamlet Development" and "General Commercial" in the Maidstone Hamlet Urban Area is required for the roundabout at the CR 19/CR 34 intersection. The road widening, configuration of the intersection and small amount of land required for the improvements do not adversely affect future development of these lands
- a negligible amount of land (less than 0.1 acre) is required from lands designated "Highway Service Centre" at the Highway 401 interchange
- approximately 5 acres of land is required from lands designated "Hamlet", "Low Density Residential" and "Business Park" on the west side of CR 19 from north of CR 42 to south of Sylvestre Drive for the road widening, CP Rail overpass and access/service roads for existing uses. These changes do not constrain future development of these lands. Any Plans of Subdivision can be designed to accommodate these changes.

Town of Lakeshore Official Plan

- a small amount of land designated "Rural Residential" is required for the roundabout at the intersection of CR 19 and CR 34. Sufficient land is still available to develop these lands with residential uses
- a negligible amount of land (less than 0.1 acre) is required from lands designated "Highway 401 Employment Area" at the Highway 401 interchange
- less than 1 acre is required from lands designated "Service Commercial" north of the CR 42 intersection. Sufficient land is still available to develop these lands with future intended uses.

In all cases, the increased accessibility to the Study Area provided by the road improvements may increase the development potential of lands designated for future development.

Proposed improvements to County Roads 19 and 22 conform to the County of Essex Official Plan designation of these roads as part of the "County Arterial Road System" and the local municipal Official Plan road designations. The Lakeshore Official Plan designates CR 19 as a "Rural Regional Road" south of Highway 401 and a "Rural Secondary Road", south of Highway 401. Lesperance Road is designated as a "Collector Road" in the former Town of Tecumseh Official Plan. The proposed partial interchange at CR 22/Lesperance Road may lead Lesperance Road to function more as an arterial road than a collector road.

Overall, the proposed improvements conform to the County of Essex, local municipal and City of Windsor Official Plans. The improvements:

- increase accessibility to the Study Area thereby helping to increase the development potential of lands designated for future development. In addition, the improvements do not pose any constraints for the future development of designated lands
- minimize impacts on cultural resources, natural features and agricultural lands
- conform to the road classifications included in the county and local official plans.

8.8.2 Consistency with Provincial Policy Statement

The *Strong Communities Act* requires that any decisions made by the Crown, "shall be consistent" with the Provincial Policy Statement, issued under the *Planning Act* in March 2005. The consistency of the proposed improvements to County Roads 19 and 22 to the relevant "Transportation Systems" and "Transportation and Infrastructure Corridors" policies included in Sections 1.6.5 and 1.6.6 of the statement is summarized as follows:

- the improvements are "safe, energy efficient, facilitate the movement of people and goods, and are appropriate to address projected needs". The improvements identified in this ESR/PDR are based on 20 year traffic projections
- the project makes efficient use of existing and planned infrastructure
- as required by Section 1.6.5.3, the project maintains "connectivity within and among transportation systems and modes". It also "improves connections which cross jurisdictional boundaries by improving connections between Highway 3, Highway 401, E.C. Row Expressway and the U.S. border
- MTO's Class EA and the Municipal Class EA planning and design process has integrated "transportation and land use considerations" at all stages of the project
- as required by Section 1.6.6.1, MTO and the County of Essex are planning for and will protect the corridor and right-of-way on County Roads 19 and 22 to meet current and projected transportation needs.

Section 1.6.6.4 requires that MTO and the County, when planning for significant transportation facilities, consider the significant resources protected by Section 2 of the Policy Statement, "Wise Use and Management of Resources". Resources potentially affected by the proposed improvements include natural heritage, water and cultural heritage and archaeology. The following is a summary of how MTO and Essex County considered these resources in the planning and design process:

- significant woodlands shall be protected (Section 2.1.4). None of the vegetation requiring removal for the project is considered to be significant
- "site alteration is not permitted in fish habitat except in accordance with provincial and federal requirements" (Section 2.1.5). Several Federal *Fisheries Act* approvals are required for the project
- Section 2.2.1 of the Policy Statement requires that the quality and quantity of ground and surface water be protected, improved or restored. All impacts have been avoided or minimized by the measures outlined in this ESR/PDR. The project is expected to have no adverse impacts on drinking water

- Section 2.6 requires that significant built heritage and cultural heritage landscapes be conserved. Subsequent cultural heritage assessments will ensure that none of these resources are adversely affected by the project
- Section 2.6 also requires that all significant archaeological resources be conserved by removal and documentation or by preservation on site. During Detailed Design, further, more detailed, archaeological assessments will be completed for the project to comply with this requirement.

Table 83:
Summary of Environmental Concerns and Commitments

I.D. #	I. D. # Sub –issues	Issues/Concern Potential Effects	Concerned Agencies	Mitigation/Protection/ Monitoring
1. Engineering Considerations	1.1 Borrow Sites	Potential impacts of earth borrow on environmental features	MTO/MNR, Essex, Lakeshore, Tecumseh, ERCA	Avoided by Contractor obtaining required permits during construction
	1.2 Utilities/Municipal Services Relocations	Utilities/municipal services relocation required in advance of construction	Union Gas, BP Oil, Bell and Hydro One, Lakeshore, Tecumseh	Plant locations and conflicts will be determined during Detailed Design
2. Highway Safety, Construction Traffic and Emergency Services Access	2.1 Highway Safety	Project improves safety conditions, thereby reducing accidents	MTO, Essex, Lakeshore, Tecumseh	A comprehensive roadside safety analysis and design will be completed during Detailed Design
	2.2 Traffic Impacts	Westlake Drive intersection requires traffic control signals to operate at a good level of service. Since all movements are not accommodated at the CR 22 and Lesperance interchange, some diverted trips may reduce level of service at some locations on alternate routes	MTO, Essex, Lakeshore, Tecumseh	Traffic control signals will be installed at the Westlake Drive and Lesperance Road intersection Any improvements to alternate routes (to address diverted traffic) must comply with the Municipal Class Environmental Assessment process
	2.3 Traffic Impacts During Construction: 2.3.1 Road Closures During Construction	Access disruptions/delays caused by: - possible single laning of CR 19 - closures at Highway 401 ramps, CR 19 from Jamsyl Drive to Amy Croft Drive (detour provided), Lesperance Road at CR 22 intersection	Essex, Lakeshore, Tecumseh, Emergency Services Providers	Minimized by staging and access plans to be developed during Detailed Design. Measures to minimize access disruptions/delays include: - enhanced signing - incentive/disincentive clauses - newspaper notices
	2.3.2 Emergency Services	Potential delays to emergency service vehicles	Essex, Lakeshore, Tecumseh, Emergency Service Providers	Emergency service vehicles delays minimized by measures developed during Detailed Design in consultation with emergency service providers: - communications program - traffic management plan - emergency response plans
	2.3.3 Construction Traffic	Potential traffic disruptions caused by construction vehicles	Essex, Lakeshore, Tecumseh, Emergency Service Providers	Construction access will be provided from CR 19 and other County Roads, with no access permitted from Highway 401 or local roads. Disruption minimized by following Ontario Traffic Manual, Book 7, Temporary Conditions
3. Cultural Resources	3.1 Archaeological Resources	Potential destruction of archaeological resources during construction	Ministry of Culture (MCL)	Avoided by completing more detailed archaeological assessments during Detailed Design, as recommended by Stage 1 Archaeological Assessment (approved by MCL letter dated Feb. 28, 2008). Clearance required from MCL prior to construction
	3.2 St. Anne's Cemetery	Potential disturbance during construction	MCL	Lesperance Road shifted slightly east to avoid cemetery. Advance topsoil stripping or monitoring by an archaeologist is recommended for any work outside current roadway footprint

Table 83:
Summary of Environmental Concerns and Commitments

I.D. #	I. D. # Sub –issues	Issues/Concern Potential Effects	Concerned Agencies	Mitigation/Protection/ Monitoring
	3.3 Built Heritage and Cultural Landscapes: 3.3.1 Direct Impacts	Requires removal of: - farmhouse at 1950 CR 19, north of Little Baseline Road - underpass structure at Highway 401/CR 19 (over 40 years old) - farmhouse at 5033 CR 19, south of Highway 401 - ROW of roads at Maidstone Crossing, a historically significant road crossing - three buildings at CR 19/CR 34 intersection, changing the character of the intersection	MCL, Essex, Lakeshore, Tecumseh	Cultural Heritage Evaluation Reports (CHERs) completed at beginning of Detailed Design for: - two farmhouses on CR 19 (M.N. 1950 and 5033) - Highway 401 underpass. County will consider erecting a plaque on site of former schoolhouse at Maidstone Crossing
	3.3.2 Indirect Impacts	Character/setting of heritage resources disrupted by: - partial interchange at CR 22 and Lesperance alters views to St. Anne's cemetery and Lesperance Road - widening CR 19 road changes character of roadscape - widening Pike Creek Bridge (already significantly altered by recent widening) - relocation of 16/17 Sideroad and realignment of 13/14 Sideroad (original township roads)	MCL, Lakeshore, Tecumseh	Not required. Changes are required to accommodate proposed improvements
4. Terrestrial Features	4.1 Groundwater	Groundwater protected by overlying thick deposit of low permeability clay till	MOE, MNR, ERCA, Essex , Lakeshore, Tecumseh	Additional protection during construction provided by: - fuel and spills management - dewatering/sediment control - facility management by Essex County and continued improvements in salt management
	4.2 Drainage and Hydrology: 4.2.1 Required Culvert Replacements, Extensions and Removals	Potential alteration of culvert geometry caused by: - shifts in horizontal, vertical alignment - widening of roadway - roadside safety improvements - intersection improvements - grade raises - inadequate hydraulic performance - poor condition	DFO, MNR, ERCA, Essex, Lakeshore, Tecumseh	MTO B-100 flood design criteria will be used during Detailed Design to assess hydraulic performance of extended culverts and determine appropriate size of replacement culverts
	4.2.2 Municipal Drain Systems	Potential alteration of Municipal Drain systems caused by: - shifts in horizontal, vertical alignment - widening of roadway - roadside safety improvements - intersection improvements - grade raises	DFO, MNR, ERCA, Lakeshore, Tecumseh	Detailed Design will meet the requirements of Sections 77(2) and (3) of *Drainage Act* for West Townline Drain, Antaya Drain. Also requires a new Municipal Drain By-law for lands north of Pike Creek and south of CP Rail

Table 83:
Summary of Environmental Concerns and Commitments

I.D. #	I. D. # Sub –issues	Issues/Concern Potential Effects	Concerned Agencies	Mitigation/Protection/ Monitoring
	4.2.3 Pike Creek Bridge Hydraulic Performance	Required structural widening resulting in: - increase in bridge width of 16.14 m (total 27.14 m) - height, width, channel slope and conveyance area maintained - increase in 100 year water elevation of 0.02 m upstream of modified structure	Transport Canada (TC), ERCA, Lakeshore, Tecumseh	Preliminary hydraulic analysis will be confirmed during Detailed Design. Proposed modifications require ERCA approval during Detailed Design
	4.2.4 Rural Section Stormwater Management	Potential impacts include: - minor changes to natural hydrologic cycle - minor peak flow increase - disturbance of existing well-established channels, ditches, roadway embankments - degradation of natural receiving water system water quality	ERCA, Essex, Lakeshore, Tecumseh	Integrated treatment train approach to stormwater management will mitigate impacts. Other mitigation measures are: - low gradient flat bottom ditches providing peak flow attenuation, promoting infiltration, vegetative uptake - elimination of direct connection between storm sewer networks and sensitive receiving watercourse - minimization of grading requirements to preserve establish vegetation - selection of site-appropriate Best Management Practices (BMPs)
	4.2.5 Urban Section Stormwater Management	Potential impacts include: - significant changes to natural hydrologic cycle - peak flow and volumetric increase in stormwater runoff causing or exaggerating downstream flooding conditions - disturbance of existing well-established channels, ditches, roadway embankments - degradation of natural receiving water system water quality	ERCA, Essex, Lakeshore, Tecumseh	Pike Creek to CP Rail - Impacts can be mitigated by integrated treatment train approach to stormwater management. Other mitigation measures are: - low gradient flat bottom ditches providing peak flow attenuation, promoting infiltration and vegetative uptake - elimination of direct connection between storm sewer networks and sensitive receiving watercourse - minimization of grading requirements to preserve/establish vegetation - site-appropriate Best Management Practices (BMPs). Future urbanized lands west of CR 19 - Potential location for 'Regional' SWM facility o to be verified during Detailed Design based on Tecumseh servicing requirements. CR 19 from CP Rail to CR 22 - End-of-Pipe stormwater quality and quantity control. Impacts mitigated by: - SWM facility in south-west quadrant of CR19/CR22 interchange - facility to provide quality and quantity reduction of rate runoff entering East Townline Road Drain. Future urbanized lands east and west of CR 19 - Potential location for 'Regional' SWM facility to be verified during Detailed Design based on Tecumseh and Lakeshore servicing requirements
	4.3 Soils: 4.3.1 Eroded Banks at Pike Creek	Increased erosion of east bank of Pike Creek	DFO, MNR, ERCA, Essex, Lakeshore, Tecumseh	Fish Habitat Compensation Plan for Pike Creek will include special erosion and sedimentation control plan
	4.3.2 All other Areas	Potential erosion and sedimentation impacts caused by grading activities during construction	DFO, MNR, ERCA, Essex, Lakeshore, Tecumseh	Minimized by comprehensive erosion and sedimentation control plan developed during Detailed Design, consisting of permanent and temporary measures implemented prior to construction. Sensitive areas include Pike Creek and West and East Townline Drains

Table 83:
Summary of Environmental Concerns and Commitments

I.D. #	I. D. # Sub –issues	Issues/Concern Potential Effects	Concerned Agencies	Mitigation/Protection/ Monitoring
	4.4 Vegetation	Requires removal of: - well developed hedgerow around West Townline Drain, including Pin Oak (nationally rare species) - many ornamental trees along ROW	MNR, ERCA	Landscape Concept Plan will be further developed during Detailed Design. Concept Plan includes low maintenance diverse landscape with Pin Oak included as a replacement planting Opportunities for planting partnerships with ERCA will be determined during Detailed Design
	4.5 Emerald Ash Borer	Potential spread of highly destructive insect	Canadian Food Inspection Agency, MNR, ERCA	Minimized by provisions developed during Detailed Design, consistent with Canadian Food Inspection Agency requirements
	4.6 Wildlife: 4.6.1 Loss of habitat	West Townline Drain hedgerow removes habitat for muskrat, mink and eastern cottontail	MNR, ERCA	Landscape Concept Plan provides for revegetation of realigned portion of drain with shrub and tree cover. Detailed Landscape Plan will be prepared during Detailed Design
	4.6.2 Eco-passages	Existing culverts and Pike Creek Bridge function as eco-passages for small mammals and white tailed deer	MNR, ERCA	During Detailed Design, culvert and bridge modifications will be designed to maintain eco-passages
	4.7 Migratory and Protected Birds	Potential harmful alteration, destruction or disruption of breeding bird habitat, nests or young caused by vegetation clearing, culvert/bridge modifications. All culverts and Pike Creek Bridge potentially provide bird habitat	Environment Canada, Canadian Wildlife Service, MNR, ERCA	Avoided by: - additional survey work during Detailed Design to confirm presence/absence of nesting species/locations and refine nesting season - development of Contract provisions during Detailed Design to protect migratory and other protected birds
	4.8 Species at Risk	Potential adverse impacts on: - channel darter (Schedule 1 SAR) and Northern Map/Blandings Turtle (Special Concern) in Pike Creek - Pin Oak (nationally rare species, S3 Rank) in West Townline Drain hedgerow - Fox snake (Schedule 1 SAR)	Environment Canada, DFO, MNR, ERCA	Impacts minimized by completing the following during Detailed Design: - Fish Habitat Compensation Plan for Pike Creek to avoid impacts on channel darter - Landscape Plan providing for Pin Oak plantings at relocated West Townline Drain - reptile surveys to determine the presence of Fox Snake and Northern Map/Blandings Turtle - determine the need for a permit under the Endangered Species Act.
	4.9 “Spills” Handling	Potential adverse impacts of “spills” on environment and natural features	MOE, Lakeshore, Tecumseh	Minimized by General Conditions to all MTO construction Contracts

Table 83:
Summary of Environmental Concerns and Commitments

I.D. #	I. D. # Sub –issues	Issues/Concern Potential Effects	Concerned Agencies	Mitigation/Protection/ Monitoring
5. Fisheries and Aquatic Ecosystems	5.1 Watercourses and Fisheries 5.1.1 Newman Drain	No change to culvert. Potential impacts from adjacent works are bank instability and exposed soils, causing erosion potential and sediment suspension	DFO, MNR, ERCA, Essex, Lakeshore, Tecumseh	Impacts mitigated by: - erosion and sedimentation control measures, including silt fence, rock rip rap - minimize vegetation clearing and protect remaining vegetation - Special Provisions for "Watercourse/Fisheries Protection" to be developed during Detailed Design
	5.1.2 West Townline Drain	Works expected to result in a **HADD** of fish habitat and include: - relocate 275m of drain channel (5+325 to 5+600) - replace existing culvert at CN Railway - relocate 175m of drain channel (5+625 to 5+800) - extend existing culvert at CR 34 approx. 175m (110m south, 65m north) - relocate 130m of drain channel (6+020 to 6+150) - relocate 250m of drain channel (7+350 to 7+600) - replace existing culvert at CR 46 - relocate 550m of drain channel (7+650 to 8+200) - relocate approx. 1000m of drain channel, on private property west of CR 19 corridor. Potential impacts: - bank instability and exposed soils, causing erosion potential and sediment suspension - removal of instream organic structure - alteration of riparian vegetation - obstruction/disruption of flow - disruption to fish passage - change in channel morphology	DFO, MNR, ERCA, Essex, Lakeshore, Tecumseh	Impacts mitigated by: - Fish Habitat Compensation Plan to be developed for drain re-alignments and/or culvert extensions, with associated fish salvage/phasing plan, to be approved by DFO under *Fisheries Act* - erosion and sedimentation control measures, including silt fence, rock rip rap - minimize vegetation clearing and protect remaining vegetation - riparian plantings or re-seeding as necessary - rehabilitate banks by stabilizing with vegetation or rock - design culverts to avoid barriers to fish passage - maintain temporary flow passage - isolate working area from water to keep debris out - Special Provisions for "Watercourse/Fisheries Protection" to be developed during Detailed Design
	5.1.3 South Talbot Road Drain	Replace existing 43m, 1500mm CSP drain enclosure due to poor condition. Potential impacts: - bank instability and exposed soils, causing erosion potential and sediment suspension - removal of instream organic structure - alteration of riparian vegetation - obstruction/disruption of flow - change in channel morphology	DFO, MNR, ERCA, Essex, Lakeshore, Tecumseh	Impacts mitigated by: - erosion and sedimentation control measures, including silt fence, rock rip rap - minimize vegetation clearing and protect remaining vegetation - riparian plantings or re-seeding as necessary - rehabilitate banks by stabilizing with vegetation or rock - maintain temporary flow passage - isolate working area from water to keep debris out - Special Provisions for "Watercourse/Fisheries Protection" to be developed during Detailed Design

Table 83:
Summary of Environmental Concerns and Commitments

I.D. #	I. D. # Sub –issues	Issues/Concern Potential Effects	Concerned Agencies	Mitigation/Protection/ Monitoring
	5.1.4 Griffith Drain	Extend existing culvert at CR 19 by approximately 24m (rt) expected to cause a **HADD** of fish habitat. Potential impacts: - bank instability and exposed soils, causing erosion potential and sediment suspension - removal of instream organic structure - alteration of riparian vegetation - obstruction/disruption of flow - change in channel morphology	DFO, MNR, ERCA, Essex, Lakeshore, Tecumseh	Impacts mitigated by: - Fish Habitat Compensation Plan to be developed for culvert extension, to be approved by DFO under *Fisheries Act* - erosion and sedimentation control measures, including silt fence, rock rip rap - minimize vegetation clearing and protect remaining vegetation - riparian plantings or re-seeding as necessary - rehabilitate banks by stabilizing with vegetation or rock - design culverts to avoid barriers to fish passage - maintain temporary flow passage - rehabilitate bed and substrate disturbed during construction - isolate working area from water to keep debris out - Special Provisions for “Watercourse/Fisheries Protection” to be developed during Detailed Design
	5.1.5 McCann Drain	Replace existing culvert at CR 19 due to poor condition. Potential impacts: - bank instability and exposed soils, causing erosion potential and sediment suspension - removal of instream organic structure - alteration of riparian vegetation - obstruction/disruption of flow - change in channel morphology	DFO, MNR, ERCA, Essex, Lakeshore, Tecumseh	Impacts mitigated by: - erosion and sedimentation control measures, including silt fence, rock rip rap - minimize vegetation clearing and protect remaining vegetation - riparian plantings or re-seeding as necessary - rehabilitate banks by stabilizing with vegetation or rock - maintain temporary flow passage - isolate working area from water to keep debris out - Special Provisions for “Watercourse/Fisheries Protection” to be developed during Detailed Design
	5.1.6 Croft Drain	Work at drain expected to result in a **HADD** of fish habitat and includes: - relocate approx. 175 m of drain channel, within ROW. - replace and relocate existing culvert at CR 19. - new culvert required crossing North Rear Road. Potential impacts: - bank instability and exposed soils, causing erosion potential and sediment suspension - removal of instream organic structure - alteration of riparian vegetation - obstruction/disruption of flow - disruption to fish passage - change in channel morphology	DFO, MNR, ERCA, Essex, Lakeshore, Tecumseh	Impacts mitigated by: - Fish Habitat Compensation Plan to be developed for drain re-alignment and/or culvert works, to be approved by DFO under *Fisheries Act* - erosion and sedimentation control measures, including silt fence, rock rip rap - minimize vegetation clearing and protect remaining vegetation - riparian plantings or re-seeding as necessary - rehabilitate banks by stabilizing with vegetation or rock - design culverts to avoid barriers to fish passage - maintain temporary flow passage - isolate working area from water to keep debris out - Special Provisions for “Watercourse/Fisheries Protection” to be developed during Detailed Design

Table 83:
Summary of Environmental Concerns and Commitments

I.D. #	I. D. # Sub –issues	Issues/Concern Potential Effects	Concerned Agencies	Mitigation/Protection/ Monitoring
	5.1.7 10th Concession Drain	Replace existing culvert at E-N/S ramp. Potential impacts: - bank instability and exposed soils, causing erosion potential and sediment suspension - removal of instream organic structure - alteration of riparian vegetation - obstruction/disruption of flow - change in channel morphology	DFO, MNR, ERCA, Essex, Lakeshore	Impacts mitigated by: - erosion and sedimentation control measures, including silt fence, rock rip rap - minimize vegetation clearing and protect remaining vegetation - riparian plantings or re-seeding as necessary - rehabilitate banks by stabilizing with vegetation or rock - maintain temporary flow passage - isolate working area from water to keep debris out - Special Provisions for "Watercourse/Fisheries Protection" to be developed during Detailed Design
	5.1.8 East Townline Road Drain (south of Pike Creek)	Relocate 1900m of drain channel within proposed ROW. Replace existing 1200mm CSP culvert at CR 19. Potential impacts: - bank instability and exposed soils, causing erosion potential and sediment suspension - removal of instream organic structure - alteration of riparian vegetation - obstruction/disruption of flow	DFO, MNR, ERCA, Essex, Tecumseh	Impacts mitigated by: - erosion and sedimentation control measures, including silt fence, rock rip rap - minimize vegetation clearing and protect remaining vegetation - riparian plantings or re-seeding as necessary - rehabilitate banks by stabilizing with vegetation or rock - maintain temporary flow passage - isolate working area from water to keep debris out - Special Provisions for "Watercourse/Fisheries Protection" to be developed during Detailed Design
	5.1.9 Pike Creek	Bridge widening with potential minor channel re-alignment expected to result in a **HADD** of fish habitat. Potential impacts: - bank instability and exposed soils, causing erosion potential and sediment suspension - removal of instream organic structure - alteration of riparian vegetation - obstruction/disruption of flow - change in channel morphology	DFO, MNR, ERCA, Essex, Lakeshore, Tecumseh	Impacts mitigated by: - Fish Habitat Compensation Plan for channel modification, to be approved by DFO under *Fisheries Act*. Plan will protect channel darter (Species at Risk) - erosion and sedimentation control measures, including silt fence, rock rip rap - minimize vegetation clearing and protect remaining vegetation - riparian plantings or re-seeding as necessary - rehabilitate banks by stabilizing with vegetation or rock - design culverts to avoid barriers to fish passage - maintain temporary flow passage - isolate working area from water to keep debris out - Special Provisions for "Watercourse/Fisheries Protection" to be developed during Detailed Design

Table 83:
Summary of Environmental Concerns and Commitments

I.D. #	I. D. # Sub –issues	Issues/Concern Potential Effects	Concerned Agencies	Mitigation/Protection/ Monitoring
	5.1.10 East Townline Road Drain (north of Pike Creek)	Works south of CN Rail include: - replace existing 700m ditch with a semi-urban swale and a series of ditch inlet catch basins discharging to east of CR 19 - relocate approximately 80m of drain channel (Antaya Drain), on private property to the west of the CR 19 corridor - divert flow to Manning Road Drain through new culvert crossing CR 19 at Service Roads - eliminate existing culvert at CN Rail. North of CN Rail works include: - relocate 1100 m of drain channel within proposed ROW - combine flow from East Townline Drain and Manning Road Drain in 800 m drain channel discharging to regional SWM pond, accommodate within ROW - eliminate existing culvert at Sylvestre Drive, Jamsyl Drive, Desro Drive, and CR 22 Potential impacts: - bank instability and exposed soils, causing erosion potential and sediment suspension - removal of instream organic structure - alteration of riparian vegetation - obstruction/disruption of flow	DFO, MNR, ERCA, Essex, Lakeshore, Tecumseh	Impacts mitigated by: - erosion and sedimentation control measures, including silt fence, rock rip rap - minimize vegetation clearing and protect remaining vegetation - riparian plantings or re-seeding as necessary - rehabilitate banks by stabilizing with vegetation or rock - maintain temporary flow passage - isolate working area from water to keep debris out - Special Provisions for “Watercourse/Fisheries Protection” to be developed during Detailed Design
	5.1.11 Manning Road Drain	Relocate 775 m of drain channel within proposed ROW Receive flow from East Townline Road Drain (north) and Antaya Drain and divert flow south, along the east side of CR 19 to the Hydro corridor Relocate approximately 375 m of drain channel, on private property just north of the existing Hydro corridor, discharging to Pike Creek Eliminate existing culvert at CN Rail corridor Relocate 1100 m of drain channel within proposed ROW Eliminate existing 1200 mm drain enclosure Potential impacts: - bank instability and exposed soils, causing erosion potential and sediment suspension - removal of instream organic structure - alteration of riparian vegetation - obstruction/disruption of flow	DFO, MNR, ERCA, Essex, Lakeshore, Tecumseh	Impacts mitigated by: - erosion and sedimentation control measures, including silt fence, rock rip rap - minimize vegetation clearing and protect remaining vegetation - riparian plantings or re-seeding as necessary - rehabilitate banks by stabilizing with vegetation or rock - maintain temporary flow passage - isolate working area from water to keep debris out - Special Provisions for “Watercourse/Fisheries Protection” to be developed during Detailed Design

Table 83:
Summary of Environmental Concerns and Commitments

I.D. #	I. D. # Sub –issues	Issues/Concern Potential Effects	Concerned Agencies	Mitigation/Protection/ Monitoring
	5.1.12 H.G. Arnold Drain, Antaya Drain, Baillergeon Drain	Replace existing 1500 mm CSP culvert at CR 19 at H.G. Arnold Drain. Relocate approximately 80m of Antaya Drain channel outside the CR 19 ROW, around existing Union Gas Sub-station Potential impacts: - bank instability and exposed soils, causing erosion potential and sediment suspension - removal of instream organic structure - alteration of riparian vegetation - obstruction/disruption of flow	DFO, MNR, ERCA, Essex, Lakeshore, Tecumseh	Impacts mitigated by: - erosion and sedimentation control measures, including silt fence, rock rip rap - minimize vegetation clearing and protect remaining vegetation - riparian plantings or re-seeding as necessary - rehabilitate banks by stabilizing with vegetation or rock - maintain temporary flow passage - isolate working area from water to keep debris out - Special Provisions for “Watercourse/Fisheries Protection” to be developed during Detailed Design
	5.1.13 Cyr Drain	Relocate 600 m of drain channel discharging to regional SWM pond within proposed ROW. Potential impacts: - bank instability and exposed soils, causing erosion potential and sediment suspension - removal of instream organic structure - alteration of riparian vegetation - obstruction/disruption of flow	DFO, MNR, ERCA, Essex, Tecumseh	Impacts mitigated by: - erosion and sedimentation control measures, including silt fence, rock rip rap - minimize vegetation clearing and protect remaining vegetation - riparian plantings or re-seeding as necessary - rehabilitate banks by stabilizing with vegetation or rock - maintain temporary flow passage - isolate working area from water to keep debris out - Special Provisions for “Watercourse/Fisheries Protection” to be developed during Detailed Design
	5.1.14 Fish *Species at Risk*	Pike Creek provides habitat for channel darter, a Species at Risk. Bridge widening not anticipated to impact channel darter, provided appropriate mitigation measures are implemented	DFO, MNR, ERCA	Impacts mitigated by: - Fish Habitat Compensation Plan for channel modification will protect channel darter - erosion and sedimentation control measures, including silt fence, rock rip rap - minimize vegetation clearing and protect remaining vegetation - riparian plantings or re-seeding as necessary - rehabilitate banks by stabilizing with vegetation or rock - maintain temporary flow passage - rehabilitate bed and substrate disturbed during construction - isolate working area from water to keep debris out - Special Provisions for “Watercourse/Fisheries Protection” to be developed during Detailed Design
	5.1.15 Fish Life Cycles	Potential temporary disruption of sensitive biological periods (spawning, nursery) during construction.	DFO, MNR, ERCA	Avoided by Contract’s “watercourse/Fisheries Protection” SP’s permitting instream work from **July 1 to March 15** only. Isolation of working areas could allow work to proceed during this period, however, provided fish passage and flow conveyance are maintained.
6. Land Uses and Socio-Economic Environment	6.1 Navigability of Pike Creek	Potential interference with navigation of Pike Creek avoided by Transport Canada approval of bridge widening under *Navigable Waters Protection Act* (*NWPA*)	Transport Canada	*NWPA* approval will be obtained during Detailed Design

Table 83:
Summary of Environmental Concerns and Commitments

I.D. #	I. D. # Sub –issues	Issues/Concern Potential Effects	Concerned Agencies	Mitigation/Protection/ Monitoring
	6.2Agriculture: 6.2.1 Loss of "Prime Agricultural Land"	Requires approximately 52 acres of "prime agricultural land". No adverse impacts on farm viability or operations for almost all farms since property acquisition mostly consists strips of property along existing ROW	Ministry of Agriculture (OMAFRA)	Detailed Design stage will evaluate impacts on each affected farm
	6.2.2 Impact on Farm Properties	West Townline Drain relocation separates existing farmhouse on CR 46 from fields along CR 19	OMAFRA, Essex, Lakeshore, Tecumseh	During Detailed Design: - need for culvert crossings for farm access will be determined - minor adjustments to drain alignment may be possible to avoid significant impacts on farm holdings
	6.2.3 Field Access Points	Many access points require relocation/reconstruction	OMAFRA, Essex, Lakeshore, Tecumseh	All existing access points will be reconstructed to the new ROW
	6.2.4 Other Farm Infrastructure	Potential damage to field tiles, drainage ditches and fences	OMAFRA, Essex, Lakeshore, Tecumseh	Any infrastructure affected by construction will be restored/replaced
	6.3 Residential Uses: 6.3.1 Houses Removed	Requires removal of 8 houses on CR 19	Essex, Lakeshore, Tecumseh	Fair market value will be paid for required property
	6.3.2 Residential Land Required	Requires 3.8 acres of land from existing single-family residential lots	Essex, Lakeshore, Tecumseh	Fair market value will be paid for required property
	6.3.3 Noise and Air Quality Impacts during Operation	Road widenings bring traveled portion of road from 5 to 26 metres closer to existing houses, potentially increasing operational noise and air quality impacts: - operational noise increases are greater than 5 dBA and/or exceed the 65dBA upper threshold at some noise sensitive areas - little to no difference in air quality expected with proposed improvements	MOE, Essex, Lakeshore, Tecumseh	Proposed noise barriers will mitigate noise increases. Location, height, extent and aesthetics of noise barriers to be confirmed during Detailed Design.
	6.3.4 Noise and Air Quality Impacts during Construction	Construction noise will be noticeable for some periods/type of work. Dust impacts during construction	MOE, Essex, Lakeshore, Tecumseh	The following will be developed during Detailed Design: - Construction Code of Practice to minimize noise impacts - Dust control measures
	6.3.5 Residential Access Changes	Changes include: - Service Road will provide new access to 14 entrances near proposed CP Rail grade separation - 2 entrances between Jamsyl Drive and CR 22 restricted to right in/right out due to SPUI interchange at CR 22 - partial interchange at CR 22/Lesperance Road reduces some direct connections to CR 22 and increases travel time for some movements	Essex, Lakeshore, Tecumseh	Access changes will be addressed further during Detailed Design
	6.3.6 Residential Entrances	Reconstruction of many entrances required	Essex, Lakeshore, Tecumseh	All entrances will be reconstructed to new ROW to OPSD design standards

Table 83:
Summary of Environmental Concerns and Commitments

I.D. #	I. D. # Sub –issues	Issues/Concern Potential Effects	Concerned Agencies	Mitigation/Protection/ Monitoring
	6.4 Commercial/Light Industrial: 6.4.1 Uses Displaced	Requires removal of ten commercial/light industrial buildings.	Essex, Lakeshore, Tecumseh	Fair market value will be paid for required property. Most properties can be redeveloped with commercial/light industrial uses
	6.4.2 Land Required	Requires more than 36 acres of commercial/light industrial land	Essex, Lakeshore, Tecumseh	Fair market value will be paid for required property
	6.4.3 Commercial Access Changes	Changes in access at the following locations not expected to result in any loss of business: - entrance to funeral home at northeast quadrant of CR 19/CR 34 relocated from CR 19 to CR 34 - entrance for CTS Coxon relocated opposite to 16&17 Sideroad to conform to MTO's Highway Access Management policies - raised median at Sylvestre Drive restricts Sylvestre Drive at CR 19 to right in/right out - 2 entrances to commercial uses on CR 19 between Jamsyl Drive and CR 22 restricted to right in/right out due to SPUI interchange at CR 22. Partial interchange at CR 22/Lesperance Road: - improves traffic flow on Lesperance Road and eliminates congestion problem at commercial entrances on CR 22 - accommodates traffic to/from Windsor but does not directly accommodate traffic to/from Lakeshore, potentially resulting in loss of business for commercial uses at this intersection	Essex, Lakeshore, Tecumseh	Access changes will be addressed further during Detailed Design. Changes in access to the businesses at CR 22 and Lesperance Road will be mitigated by the improved road connections at CR 19 that are included as part of this project. Improvements include: - an extension of Westlake Drive to the CR 22 off-ramp to join Westlake Drive to Sylvestre Drive - improvements to Sylvestre Drive and Jamsyl Drive to CR 19 to accommodate additional traffic to/from Lakeshore. These improvements are expected to provide sufficient traffic to support existing and future commercial development at the CR 22/Lesperance Road intersection
	6.4.4 Commercial Entrances	Entrance modifications required for all uses affected by CR 19 and 22 improvements	Essex, Lakeshore, Tecumseh	New entrances will be reconstructed to MTO standards for commercial uses
	6.5 Current Development Applications	Land may be required from current development proposals in CR 19 and CR 22 corridors	Essex, Lakeshore, Tecumseh	Increased accessibility CR 19 and CR 22 corridors provided by road improvements may increase development potential. Developments can be designed to accommodate improvements
	6.6 Future Development	Improvements require 7.7 acres of land designated for future development	Essex, Lakeshore, Tecumseh	Increased accessibility to CR 19 and CR 22 corridors provided by road improvements may increase development potential. Future development can be designed to be compatible with improvements
7. Human Health Impacts	7.1 Noise 7.1.1 Road Traffic Noise	Operational noise increases are greater than 5 dBA and/or exceed the 65dBA upper threshold at some noise sensitive areas	MOE, Essex, Lakeshore, Tecumseh	Proposed noise barriers will mitigate noise increases. Location, height, extent and aesthetics to be confirmed during Detailed Design
	7.1. 2 Construction Noise	Construction noise will be noticeable for some periods/types of work	MOE, Essex, Lakeshore, Tecumseh	Impacts minimized by Construction Code of Practice to be developed during Detailed Design

Table 83:
Summary of Environmental Concerns and Commitments

I.D. #	I. D. # Sub –issues	Issues/Concern Potential Effects	Concerned Agencies	Mitigation/Protection/ Monitoring
	7.2 Potentially Contaminated Properties	Potential sources of contamination identified on 125 properties by "Limited Contaminated Overview Study"	MOE, Essex, Lakeshore, Tecumseh	Phases I and II Environmental Site Assessments will be prepared for these properties during Detailed Design, as determined by MTO
	7.3 Water Wells	No adverse impacts anticipated. All drilled wells protected by deep overlying thick deposit of low permeability soils	MOE, Essex, Lakeshore, Tecumseh	No special precautions required. All water wells encountered during construction will be decommissioned by a licensed water well contractor
	7.4 Air Quality: 7.4.1 Operation	Little to no difference in air quality expected with proposed improvements. Total vehicular emissions expected to decrease due to regulations controlling emissions and technological advancements	MOE, Essex, Lakeshore, Tecumseh	Not required
	7.4.2 Construction	Dust and air quality impacts during construction	MOE	Applicable measures will be developed during Detailed Design
	7.5 Light Trespass and Pollution	Potential light trespass into adjoining residential uses/areas and increase in night sky light pollution caused by roadway illumination	Royal Astronomical Society	Reduced by use of cut-off shields
	7.6 Hazardous Materials	Asbestos containing duct work found in Highway 401 underpass structure	MOE, Ministry of Labour	Construction Contract will include provisions for the identification and safe handling of hazardous materials
8. Municipal and Provincial Land Use and Infrastructure Policies	8.1 Official Plan Conformity	MTO and Essex County consulted with and had "regard for" all relevant Essex County, City of Windsor, Town of Tecumseh and Town of Lakeshore Official Plan policies	Essex, Lakeshore, Tecumseh	MTO and County will continue to have regard for County, City and local municipal Official Plan policies
	8.2 Consistency with Provincial Policy Statement	Improvements are consistent with Policy Statement	Ministry of Municipal Affairs and Housing	MTO and County will ensure that the Detailed Design stage continues to be consistent with Policy Statement

9. ENVIRONMENTAL CLEARANCE AND APPROVALS

9.1 Design Related Clearances and Approvals

Following the clearing of the ESR/PDR, the project may proceed to the Detailed Design stage. The following design related approvals and permits must be obtained during Detailed Design:

- archaeological clearance from the Ministry of Culture
- approval from Towns of Tecumseh/Lakeshore for modifications to Municipal Drains, under the *Drainage Act*. ERCA approvals may also be required
- Certificates of Approval from MOE for stormwater management facilities
- DFO approval, under the Federal *Fisheries Act*, for HADD's and Fish Habitat Compensation Plans at the West Townline Drain, Griffith Drain, Croft Drain and Pike Creek
- Permit under the *Endangered Species Act*, if required, for impacts to Fox Snake
- Transport Canada approval, under the *NWPA*, for the Pike Creek Bridge widening
- Transport Canada sign-off of the *CEAA* Environmental Screening Report
- exemptions from Town of Tecumseh and Town of Lakeshore noise control by-laws, if required.

9.2 Public and Agency Review of ESR/PDR

The ESR/PDR will be made available for a 30-day public and agency review period. During the 30-day period, any individual or agency with significant concerns about the project may write to the Minister of the Environment requesting that the Minister issue a Part II Order to elevate the status of the project from a Class EA to an individual EA. All requests are reviewed by the Ministry's EA and Approvals Branch. EAAB staff consult with the requester(s), the municipality/Provincial Ministry and any other agency or group potentially affected by the Minister's decision. Criteria used to evaluate a request include the purpose of the EA, any differences between the proposed undertaking and other undertakings in the same class, the

significance of these differences, the nature of concerns raised by the requester(s) and the benefits of carrying out an individual EA. Staff also evaluate the applicability and effectiveness of other legislation and decision-making processes to address the concerns of the requester(s).

The Minister of the Environment has four options for a decision on a Part II Order request:

- deny the request
- deny the request with conditions
- refer the matter to mediation
- grant the request and require the proponent to undergo an individual EA.

If no Part II Order requests are received by MOE during the 30 days, the project may proceed to Detailed Design. Property acquisition may also commence following the clearance of the ESR/PDR.

9.3 Detailed Design Stage

The environmental protection and mitigating measures and provisions shown on **Table 83** will be developed in more detail during the Detailed Design stage of the project. This stage will include the preparation of:

- detailed engineering drawings and specifications
- more detailed Archaeological Assessments
- Cultural Heritage Evaluation Reports for several buildings and structures affected by the proposed improvements
- detailed Stormwater Management (SWM) Plan. The SWM Plan will review the need to enclose the open drains along CR 19, north of CR 42
- detailed Landscape Plan
- Phase I and II ESAs of potentially contaminated properties
- property acquisition
- environmental provisions for the construction Contract, including the protection and mitigation measures included in this ESR/PDR. As shown on **Table 83**, these measures are required for:
    - Roadside Safety Review
    - Emergency Access Plan
    - protection of archeological resources
    - erosion and sedimentation control
    - watercourse/fisheries protection measures
    - migratory and other wild bird protection
    - Code of Practice for noise mitigation during construction
    - safe identification, removal and handling and disposal of hazardous materials.

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