4 DESCRIPTION OF THE EXISTING ENVIRONMENT

This section of the report provides an overview of existing environmental conditions within the Preliminary Analysis Area (PAA), which is represented by the highlighted area in Exhibit 1.1 (see Chapter 1). Subsequent to the evaluation of the illustrative plaza, crossing and access road alternatives (refer to Chapter 6), the study team identified an Area of Continued Analysis (ACA), and a more detailed review of existing environmental conditions within this more focused area was undertaken. The reader is referred to Chapter 7 of this report for information regarding the existing environmental conditions within the Area of Continued Analysis.

Two Environmental Overview Papers were prepared to support the study team's assessment of existing conditions within the PAA. These papers, which are summarized below provide a rich source of existing conditions information for the PAA:

- *Environmental Overview Paper – Canadian Existing Conditions Volume 1 (Social, Economic, Archaeological, Cultural Heritage, Acoustics and Vibration, Air Quality, Waste and Waste Management and Technical Considerations), June 2005; and*
- *Environmental Overview Paper – Canadian Existing Conditions Volume 2 (Natural Sciences), June 2005.*

To enhance readability, the key findings from these documents are presented in the subsequent sections of this chapter. The reader is referred to each of the above documents, which are available electronically from the study website (http://www.partnershipborderstudy.com). Hard copies of the report are available from URS Canada upon request.

4.1 Air Quality

Southern Ontario is part of a regional airshed that stretches from the U.S. Midwest into Quebec and the northeastern U.S. states. Local air pollution sources are outweighed by pollutants entering the province from U.S. sources. Prevailing wind patterns make U.S. pollution sources the largest contributors to air pollution in Ontario. This is especially true for smog. On average more than 50 per cent of Ontario smog originates south of the border.

The air quality of southwest Ontario and southeast Michigan is of special concern because of the past air quality problems that have been experienced in these areas. The increased air quality episodes in this region are mainly attributed to high population density in the region, a large number of heavy industries and the existing transportation infrastructure (major border crossings between the U.S. and Canada). Special attention has been given to the air quality of these regions to reduce/prevent episodes of bad air quality by identifying the major contributing sources of pollutants and coordinating efforts to reduce/prevent pollutant emissions.

The Ontario Ministry of the Environment (MOE) measures air contaminants at various locations throughout Ontario, and reports on the state of Ontario's air quality on an annual basis. In the *Air Quality in Ontario 2000 Report*, MOE reported trends from 1991 to 2000 for ozone, inhalable particles, nitrogen dioxide, carbon monoxide and sulphur dioxide, for nine U.S. and Canadian cities in the Great Lakes Basin Area, including Windsor. The report showed that Windsor's mean concentrations for these contaminants were below respective *U.S. National Ambient Air Quality Standards (NAAQS)* and Ontario ambient air quality criteria for all contaminants, with the exception of ozone.

The mean concentration of ozone in Windsor during this period exceeded Ontario's standard of 80 parts per billion. The report states that air quality in the province as a whole has improved over the past 30 years despite significant increases in population, economic activity and vehicle travel.

For the Windsor–Essex area, the existing air quality is influenced by local and long-range (cross-border) contaminants generated in upwind urban and industrial areas. The predominant wind directions in Windsor are from the west to south-southwest. These winds transport contaminants from the heavily industrialized areas of Detroit and nearby communities. Air quality impacts are dominated by the substances that combine to produce smog or acid rain such as carbon monoxide (CO); nitrogen oxides (NO_x); volatile organic compounds (VOCs); sulphur dioxide (SO_2); and particulate matter (SPM)[1].

To assess the current air quality in the Preliminary Analysis Area, historical air quality monitoring data from provincial (MOE)[2] and federal (Environment Canada)[3] stations, in close proximity to the Preliminary Analysis Area were considered.

Air quality monitoring stations with published data that were located in the vicinity of the Preliminary Analysis Area and had the most complete set of data were selected for use in this study. The following stations were used:

- 467 University Avenue (Station #060204 C);
- College/South St. (Station #060211R);
- Wright/Water St. (Station #060212I); and
- Tecumseh, 9725 Riverside Drive East (Station #012009) (note: removed from the network in 2002).

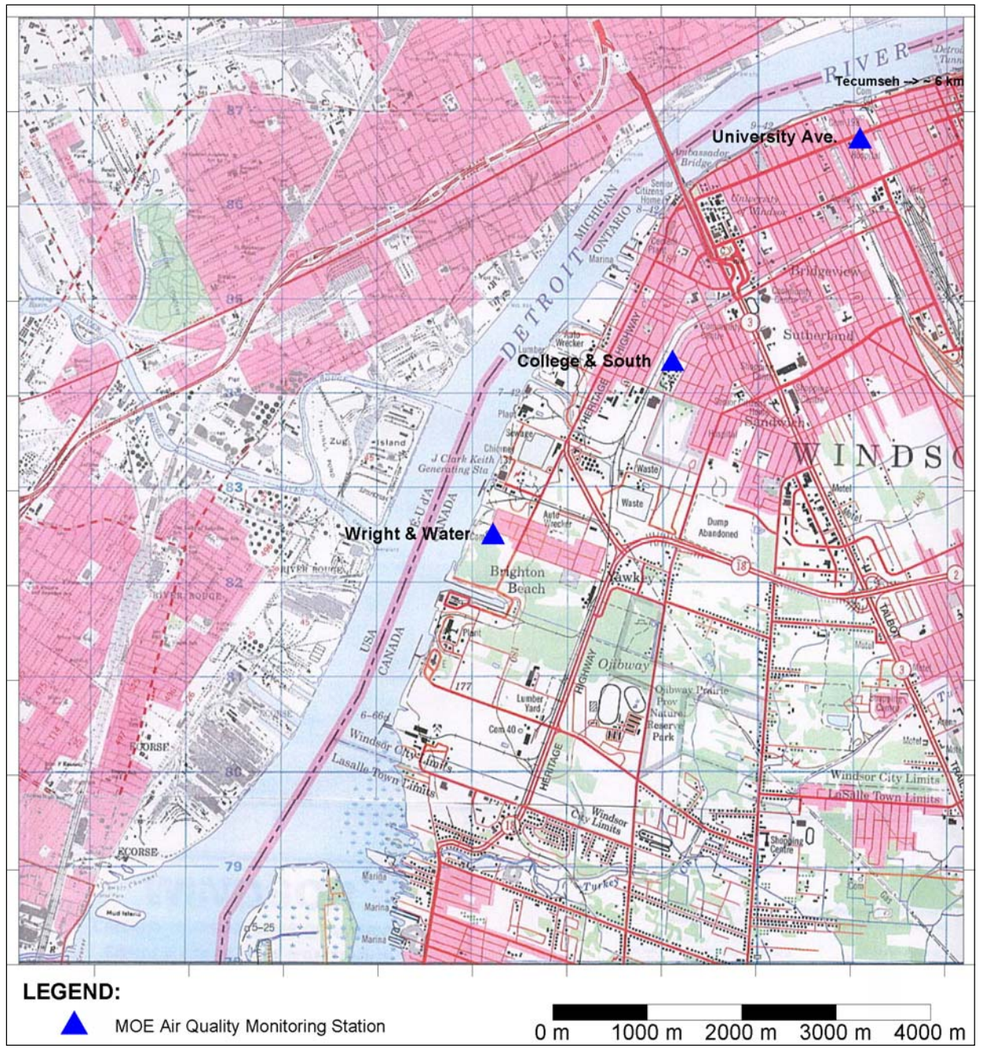
The location of these ambient air monitoring stations are illustrated in Exhibit 4.1. It should be noted that the stations shown in Exhibit 4.1 are representative of overall air quality conditions in the City of Windsor. They do not reflect particular local conditions, such as the present heavy traffic conditions on Huron-Church Road.

The most recent available data (for 1999 to 2003) collected from these air monitoring stations are summarized in the *Environmental Overview Paper – Canadian Existing Conditions Volume 1*. For each pollutant, statistical analyses including the mean, maximum and 90th percentile as well as the measured concentrations for different averaging times (e.g. one-hour, 24-hour, etc.) are presented in tabular format in the report. Where applicable, numbers of exceedances (when the measured concentrations exceed the ambient air quality criteria (AAQC) for a certain averaging time) are also presented. With the exception of the annual monitoring data for VOCs and PAHs, which is collected by Environment Canada, all other data for conventional pollutants are from the MOE ambient monitoring stations in the vicinity of the Preliminary Analysis Area.

A brief summary of the findings for each pollutant is summarized in the following sections.

[1] Environment Canada 1999a.
[2] Environmental Monitoring and Report Branch, Ontario Ministry of the Environment, Air Quality in Ontario 1999-2003.
[3] Environment Canada 1999-2003.

EXHIBIT 4.1 – LOCATION OF LOCAL AMBIENT AIR QUALITY MONITORING STATIONS



NITROGEN OXIDES (NO_X) / NITROGEN DIOXIDE (NO_2)

Nitrogen oxides (NO_x) are present in the atmosphere as various species of NO, NO_2, N_2O, etc. NO_2 is monitored at three of the four monitoring locations, namely at College/South Street, Riverside Drive, and University Avenue, however, monitoring at the Riverside Drive Station was halted as of 2002. The one-hour and 24-hour maximum NO_2 concentrations measured at the three stations did not exceed the AAQC of 200 and 100 ppb, respectively.

SULPHUR DIOXIDE (SO_2)

Ambient monitoring data for SO_2 concentrations was collected at all four monitoring locations examined in this study. However, the monitoring at Riverside station was halted in 2002. The available data indicate that the annual mean and the one-hour and 24-hour maximums were not exceeded at any of the four stations, for the years 1999 to 2003.

CONTINUOUS PM_{10} MEASUREMENTS

Continuous ambient monitoring data for PM_{10} was collected at one of the four monitoring locations, namely, the College/South Street Station. However, this monitoring was halted as of 2002. The available data indicate that the Ontario interim criterion of 50 µg/m3 was exceeded sporadically for all the three years of available data, i.e., 1999 to 2001.

CONTINUOUS $PM_{2.5}$ MEASUREMENTS

Ambient monitoring data for $PM_{2.5}$ is available for all four stations. However, the monitoring started in 2002 at the College/South Street Station, in 2001 at the 467 University Avenue Station, and ended in 2001 for the Riverside Drive Station. Only two years of data was collected at the Wright/Water Street Station. Achievement of the Canada Wide Standard (CWS) is based on the 98th percentile over three years, which is equivalent to approximately 22 exceedances during this period. The available data indicate that the proposed CWS of 30 µg/m^3 was exceeded at all the four stations for all the years of available data.

OZONE (O_3)

Ambient monitoring data for O_3 concentrations is available for two of the ambient monitoring stations, namely, the College/South Street Station and the 467 University Avenue Station. The available data indicate that the one-hour maximum concentrations at both stations exceeded the AAQC of 80 ppb for the years 1999 to 2003.

CARBON MONOXIDE (CO)

Ambient monitoring data for CO concentration is published for one of the ambient monitoring stations, namely, the 467 University Avenue Station. The available data indicate that the one-hour and eight-hour maximum concentrations at both stations did not exceed the AAQC of 30 and 13 ppm from 1999 to 2003, respectively.

VOCS AND PAHS

Published ambient monitoring data for VOC and PAH concentrations is from Environment Canada's monitoring station for the City of Windsor. With the exception of benzo(a)pyrene and one year of data for naphthalene, the data set for the organic contaminants of interest is complete for the period of 1999 to 2003. When compared against the AAQC values, the maximum 24-hour values for the pollutants of concern are all below the associated criteria.

4.2 Socio-economic Environment

This section provides a summary of existing socio-economic conditions within the Preliminary Analysis Area. Existing noise and vibration conditions, and economic conditions, as well as population

characteristics are presented in this section. The *Environmental Overview Paper – Canadian Existing Conditions Volume 1* provides detailed documentation of conditions.

4.2.1 Noise and Vibration

The study team obtained information with regard to existing noise conditions in the Preliminary Analysis Area from numerous sources. These sources are described in more detail in the *Environmental Overview Paper – Canadian Existing Conditions Volume 1*.

The Preliminary Analysis Area (Exhibit 2.1, Chapter 2) encompasses a range of land use conditions which varies from highly urbanized areas within the City of Windsor and the neighbouring towns of LaSalle and Tecumseh to rural areas with intensive agricultural land uses.

Transportation noise, including road, rail, air and watercraft, is a major contributor to the existing noise environment. Industrial operations, including several large complexes and commercial activities are also significant sources of existing noise.

In rural areas, the existing noise environment is characterized by sounds of nature, domestic activities and farm machinery noises.

4.2.2 Population and Demographic Trends

Table 4.1 lists the population of the Canadian segments of the Preliminary Analysis Area for 1991 and 2001. Although not available at the time of preparing the *Environmental Overview Paper – Canadian Existing Conditions Volume 1*, population and demographic information from the 2006 Canadian Census was available at the time of preparing this EA Report, and has also been presented in Table 4.1 for comparison purposes.

Between 1991 and 2001 all three communities experienced growth, while higher growth rates were experienced in the surrounding Towns of LaSalle and Tecumseh.

Continued growth was experienced between 2001 and 2006 for the City of Windsor and Town of LaSalle, while a small decline in growth was experienced in the Town of Tecumseh. The highest growth rate was experienced in the Town of LaSalle over the five-year period.

TABLE 4.1 – POPULATION IN THE PRELIMINARY ANALYSIS AREA[4]

Population	Windsor	LaSalle	Tecumseh
Population in 2006	216,473	27,652	24,224
Population in 2001	208,402	25,285	25,105
Population in 1991	191,435	16,628	10,495
1991 to 2001 population change (%)	9%	23.7%	23.9%
2001 to 2006 population change (%)	3.9%	9.4%	-0.4%

As illustrated in Table 4.2, the population in the Preliminary Analysis Area is projected to grow moderately over the next twenty years overall. While the City of Windsor is anticipated to experience a decline in population, the populations of the Town of LaSalle and Town of Tecumseh are expected to grow significantly. The most significant growth is expected to occur in the Town of LaSalle, which is a rapidly urbanizing municipality.[5]

TABLE 4.2 – FORECASTED POPULATION CHANGES IN THE PRELIMINARY ANALYSIS AREA[6]

Population	Windsor	LaSalle	Tecumseh
Population in 2001	208,402	25,285	25,105
Population in 2020	200,972	32,400	35,259
2001 to 2020 population change (%)	-3.6%	28.1%	40.4%

With regard to demographic trends, the age characteristics of the population for the three communities are presented in Table 4.3. Other characteristics of the population are included in the *Environmental Overview Paper – Canadian Existing Conditions Volume 1*.

TABLE 4.3 – AGE CHARACTERISTICS OF THE POPULATION[7]

Age Characteristics of the Population (2001)	Windsor			LaSalle			Tecumseh		
	Total	Male	Female	Total	Male	Female	Total	Male	Female
Total - All persons	208,405	101,925	106,475	25,285	12,550	12,730	25,105	12,410	12,690
Age 0-4	13,155	6,810	6,345	1,765	945	820	1,420	725	695
Age 5-14	26,495	13,680	12,810	4,095	2,065	2,025	3,955	2,035	1,920
Age 15-19	12,960	6,555	6,400	1,885	935	945	2,035	1,020	1,015
Age 20-24	15,330	7,600	7,730	1,470	745	725	1,550	810	740
Age 25-44	65,915	33,355	32,560	8,245	3,985	4,255	7,255	3,460	3,790
Age 45-54	26,910	13,220	13,690	3,650	1,800	1,845	4,205	2,055	2,150
Age 55-64	18,305	8,800	9,500	2,190	1,130	1,060	2,385	1,240	1,145
Age 65-74	15,595	7,070	8,530	1,295	665	635	1,435	720	720
Age 75-84	10,645	4,015	6,630	585	245	340	685	280	400
Age 85 and over	3,100	815	2,285	110	30	80	175	60	115
Median age of the population	36.0	34.8	37.2	35.1	34.9	35.3	37.1	36.8	37.4
% of the population ages 15 and over	81.0	79.9	82.0	76.8	76.0	77.6	78.6	77.8	79.4

4.2.3 Economic Conditions

This section provides an overview of the existing economic conditions in the Preliminary Analysis Area. At the time of undertaking the analysis, the most recent available information corresponded to 2004. At the time of preparing this report, more recent information was available, and has also been presented throughout this section for comparison purposes.

The economic analysis for this study has been undertaken in two phases:

[4] Statistics Canada 2002 & Statistics Canada, 2007.

[5] URS Canada Inc. Canada - U.S. - Ontario - Michigan Border Transportation Partnership Planning/Need and Feasibility Study: Environmental Overview Report (Amended). January, 2005.
[6] Statistics Canada 2002.
[7] Ibid.

- Phase I consisted of an overview of the existing economic base, urban structure and growth outlook in the Preliminary Analysis Area; and,
- Phase II consisted of a detailed analysis of the economic and business impacts of each route, including an examination of the social and economic fabric of the neighbourhoods. Further information with regard to the Phase II economic analysis is included in Chapter 7.

The focus of the analysis was on local economic impacts. Regional economic impacts related to reducing the cost of congestion were analyzed; however, it was difficult to assign these impacts to any particular person or location. Improving transportation is primarily a benefit to society and the enhancement of the role of Windsor-Essex within southern Ontario.

The analysis considered three main factors:

- The future outlook. A key consideration in determining local economic impact is the effect that a major transportation investment could have on future growth. If the improved capacity results in more rapid growth than is currently anticipated there will be economic impacts related to new jobs and people, the provision of services, and property assessment and other land use planning considerations.
- Urban structure. Major highway corridors can be highly influential in directing the location of urban growth and economic activity. Plans are currently in place to accommodate growth in Windsor for about 20 years. If the planned urban structure is changed this would have economic impacts in terms of land use designations, inefficient use of existing investments and additional infrastructure investment to accommodate growth in new locations
- Real estate in the corridor. There will be economic impacts associated with demand for services related to the construction of the facility, the displacement of people and jobs, changes in property values, and long term changes in access patterns.

CURRENT ECONOMIC SITUATION IS HAVING A SIGNIFICANT IMPACT ON WINDSOR-DETROIT, BUT THE COMPLETE EFFECT IS NOT YET CLEAR

At this time, there is no clarity as to the short-term or long-term consequences of the global financial crisis and stock market turmoil of September and October 2008. While significant effects to the local economy of Windsor and elsewhere are expected, the length and depth of the economic slowdown is highly uncertain.

Additional uncertainty in Windsor is created by the possibility of major restructuring and, perhaps, mergers among the major North American manufacturers. As this is being written, some of the major outcomes are expected soon, but yet unknown.

The current situation will only be understood within a long-term context, recognizing the cyclical nature of economies, particularly a manufacturing-based economy such as Windsor. Future long-term prospects for Windsor, even in a time of great uncertainty, will remain based on its core economic attractions including international trade infrastructure such as is being planned for the long term through the Detroit River International Crossing process.

WINDSOR-DETROIT IS A KEY LINK IN A LARGER ECONOMIC SYSTEM

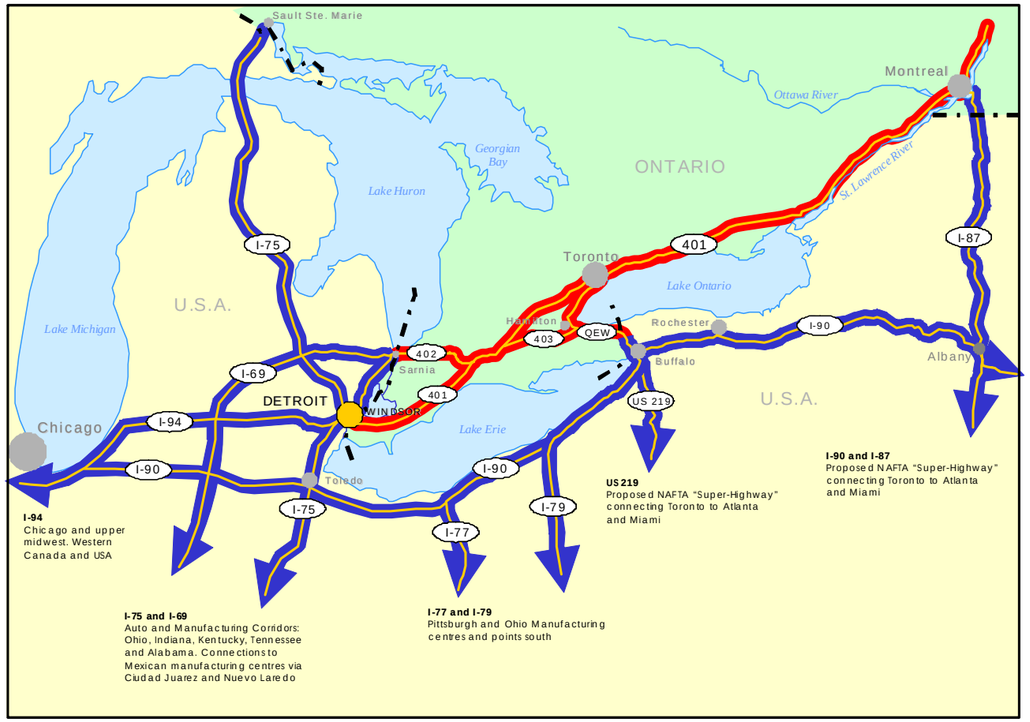
As illustrated below in Exhibit 4.2, the Windsor-Detroit area is one of three major links within a system of highways and trade corridors connecting major urban areas in southwest Ontario to major U.S. centres. A significant amount of trade takes place between Canada and the U.S., and the transportation system in southern Ontario plays a key role in facilitating this economic activity. Major connections to the U.S. served by the Windsor-Detroit crossing include:

- I-94, which provides access to Chicago and the upper midwest, Western Canada and other parts of the U.S.;
- I-75 and I-69, which are major auto and manufacturing corridors providing access to Ohio, Indiana, Kentucky, Tennessee, Alabama and to major Mexican manufacturing centres in Mexico; and
- I-77 and I-79, which provide access to manufacturing in Pittsburgh and Ohio and other southern locations.

In the Windsor-Detroit area, Windsor is by far the smaller of the two urban areas. The Windsor Census Metropolitan Area (CMA) is comprised of the City of Windsor and the Town's of Lakeshore, Amherstburg, Tecumseh, and LaSalle. Windsor represents the major urban area in the CMA with the built up areas of neighbouring Tecumseh and La Salle located along the border. The remainder of the CMA is largely rural with some scattered hamlets and shoreline development. In 2006, the Windsor Census Metropolitan Area (CMA) had a population of approximately 325,000[8]. This is much smaller than the approximately 4.5 million residents within the Detroit Metropolitan Statistical Area (MSA). Within the MSA, Wayne County contains the core urban area within which the City of Detroit is located. The difference in size between Windsor and Detroit is clearly evident in Exhibit 4.3. Because Windsor is relatively small, a major infrastructure investment could have a major economic impact. Windsor is strategically located at the end of one highway corridor in Ontario (Highway 401) and the beginning of a much larger system of highways and trade corridors to the United States. As a result, improving the connection between these two areas could have significant implications for future economic prospects and growth.

[8] http://www.citywindsor.ca/002358.asp

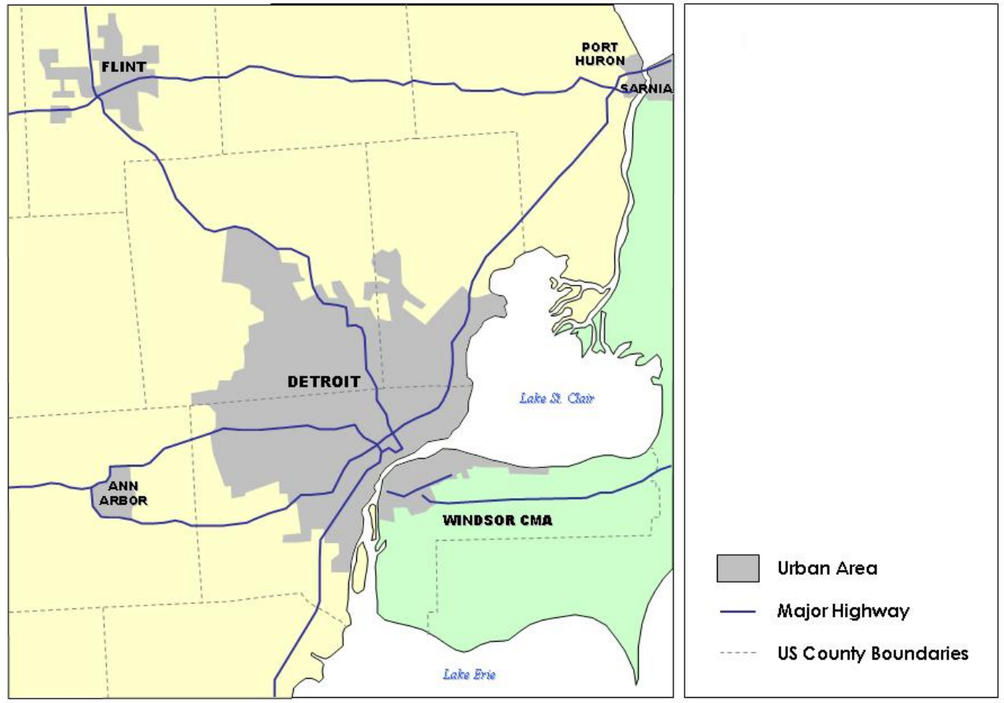
EXHIBIT 4.2– SOUTHWEST ONTARIO – U.S. HIGHWAY SYSTEM



Source: Hemson Consulting Ltd.

NTS

EXHIBIT 4.3 – WINDSOR-DETROIT CONTEXT



NTS

WINDSOR IS SMALLER THAN DETROIT, BUT GROWING

Overall, the population of the Detroit MSA has remained stable at about 4.5 million since 1970. Wayne County, however, which contains the core urban area, has experienced a steady decline in population, from 2.7 million in 1970 to just under 2 million in 2007. By comparison, the Windsor CMA has grown steadily over the past 35 years adding about 140,000 people, as shown in Exhibit 4.4.

A similar situation is observed with employment. Between 1987 and 2008, a net of more than 30,000 jobs have been added with steady gains occurring from 1994 through to a peak of 165,000 in 2006. The last two years have seen some employment decline as the downturn in manufacturing has affected the labour market (refer to Exhibit 4.5).

EXHIBIT 4.4 – POPULATION OF WINDSOR CMA SINCE 1971

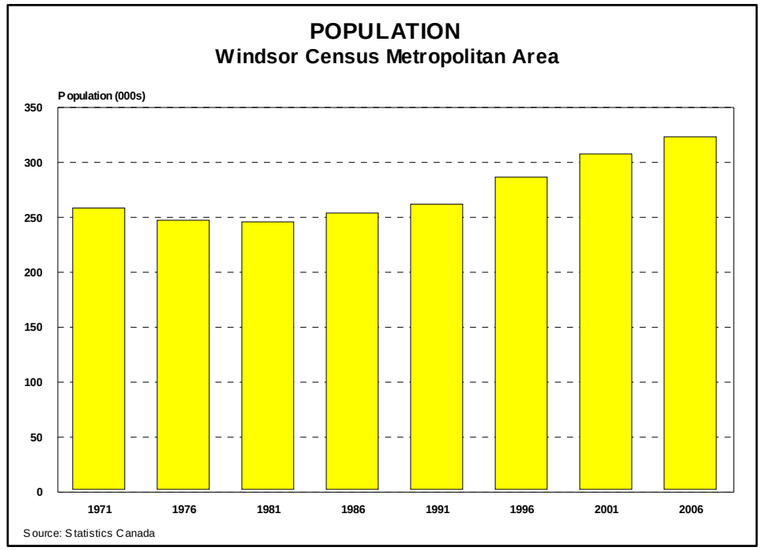
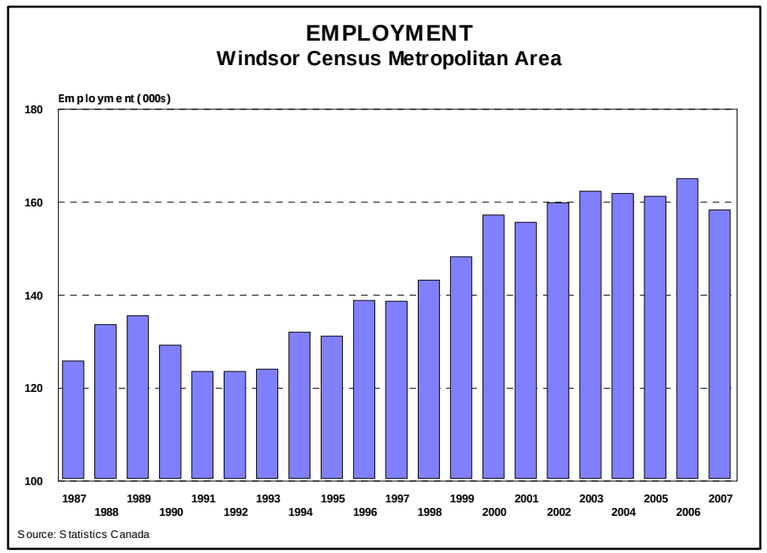


EXHIBIT 4.5 – EMPLOYMENT IN WINDSOR CMA SINCE 1987



BUILDING ACTIVITY HAS BEEN STRONG

Despite some clear cyclical variations, new residential construction has generally been strong over the long term (Exhibit 4.6). Rapid population growth in the 1970s was accompanied by significant housing construction and then halted abruptly by a deep downturn at the start of the 1980s. The remainder of the 1980s and 1990s was characterized by steady growth in new permits, with the peak of the current cycle evident in 2002 but with significant subsequent declines in response to the recent economic slowdown.

In the industrial commercial sector the recession of the early 1980s was followed by more moderate levels of new permit activity. It is only since the 1990s that new construction and investment returned to levels observed in the late 1970s. The peak in 1997 is the Windsor Casino investment, as shown in Exhibit 4.7. Recent permit values have yet to show a pattern of decline seen in the residential permits.

EXHIBIT 4.6 - RESIDENTIAL BUILDING PERMITS IN WINDSOR CMA SINCE 1970

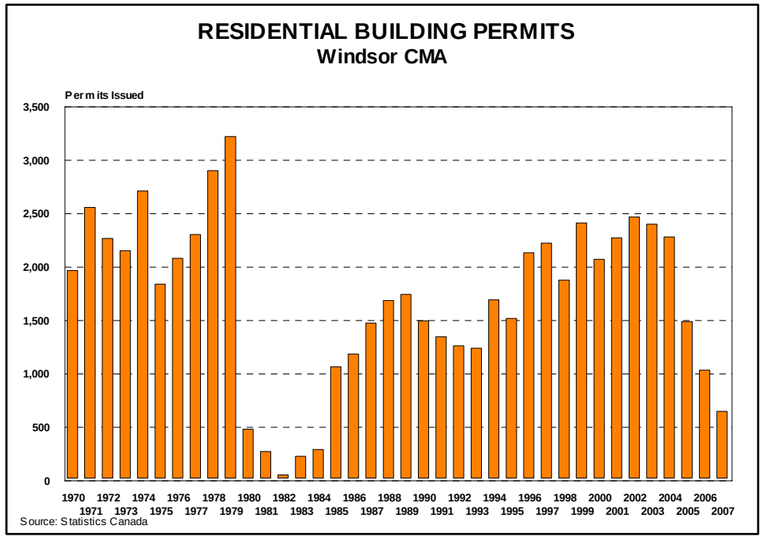
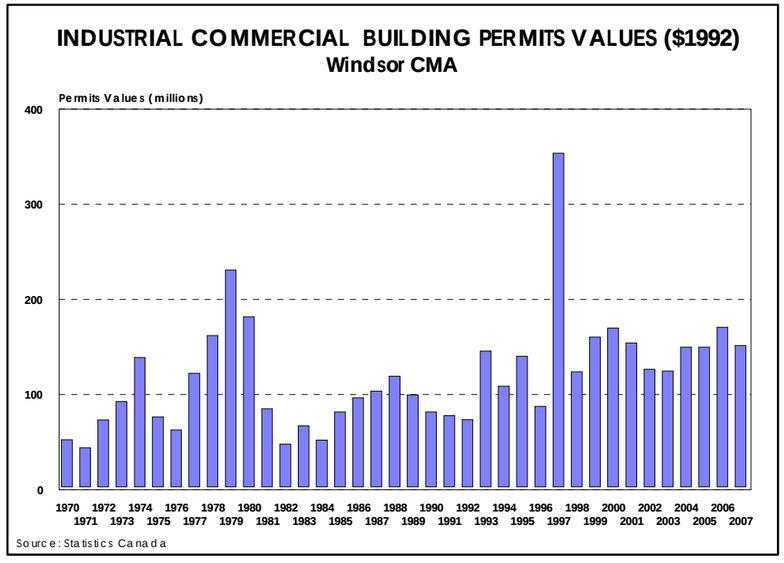


EXHIBIT 4.7– INDUSTRIAL COMMERCIAL BUILDING PERMITS VALUES IN WINDSOR CMA SINCE 1970



ECONOMIC BASE IS CONCENTRATED IN THE AUTOMOTIVE INDUSTRY

Considering the importance of the automotive sector in the Canadian economy the concentration of vehicle and parts manufacturing in Ontario and Windsor's key location in the broader transportation system, it seems logical that Windsor's economic base would also be focused in the automotive sector. The automotive sector is a major contributor to Windsor's manufacturing base. All three of the North American automakers produce car components in Windsor. Chrysler has the only major assembly facility in Windsor, which produces light trucks (mini vans and SUVs), which accounts for almost 13 per cent of the vehicles manufactured in Canada.

In addition to the Chrysler plants, Ford has an engine plant and a test track while General Motors has an engine plant in Windsor among a wide range of other automotive manufacturing activities. General Motors has, however, announced the closing of its engine plant, to occur in 2010.

While declining from earlier peaks, vehicle production in Canada remained relatively robust into 2007 However, when complete statistics are available for 2007 and more so for 2008, a significant decline in production will be evident. Refer to Table 4.4 below for trends in Canadian vehicle production from 2003 to 2006.

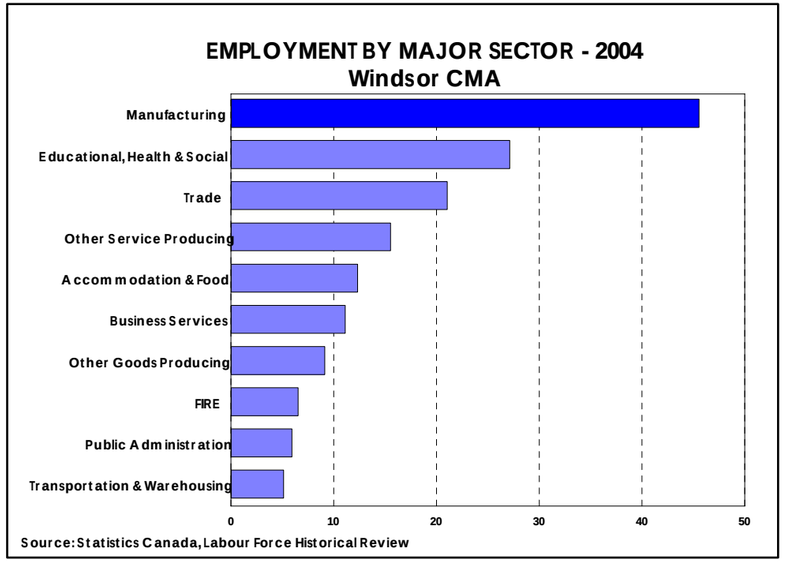
TABLE 4.4– CANADIAN VEHICLE PRODUCTION IN 2003 - 2006[9]

	2003	*Windsor*	2004	*Windsor*	2005	*Windsor*	2006	*Windsor*
Chrysler	447,526	*307,177*	555,278	*346,233*	678,382	*307,477*	605,733	*291,572*
Ford	461,429	-	372,241	-	221,809	-	196,374	-
GM	940,044	-	923,862	-	841,235	-	794,421	-
Honda	392,230	-	325,704	-	385,491	-	387,078	-
Toyota	227,543	-	287,859	-	305,966	-	317,433	-
Total	2,468,772	307,177	2,464,944	346,233	2,432,883	307,477	2,301,039	291,572

In addition to production, Windsor is home to the Chrysler Canadian headquarters and its Automotive Research and Development Centre. At peak production during the middle of this decade, the three major North American automakers together employed approximately 14,000 people in Windsor, almost 10 per cent of the workforce. In total, there are 80 companies involved in automotive parts and assembly in the City of Windsor. Complete recent statistics are not available, but many of these jobs will have been lost, at least temporarily through completed and announced plant closings and layoffs.

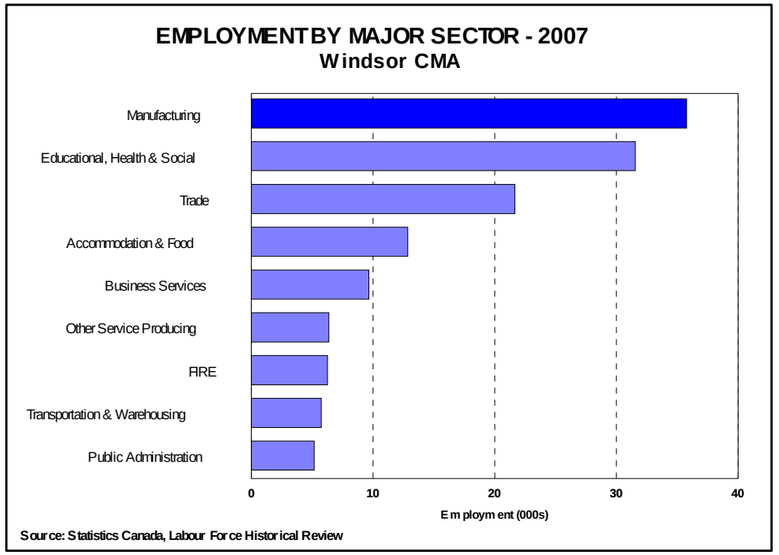
As a result of the focus on the automotive sector, Windsor has a long history as a manufacturing-based economy. In 2004, manufacturing accounted for 46,000 employees and 28 per cent of total employment (Exhibit 4.8). Subsequently, for comparison purposes, in 2007, manufacturing accounted for 36,000 employees and 23 per cent of total employment (Exhibit 4.9).

EXHIBIT 4.8 – EMPLOYMENT BY MAJOR SECTOR IN 2004 IN WINDSOR CMA



[9] Industry Canada; Ward's AutoInfoBank

EXHIBIT 4.9 – EMPLOYMENT BY MAJOR SECTOR IN 2007 IN WINDSOR CMA



The focus of Windsor's economic base on manufacturing is clear when compared to Ontario. Manufacturing is the third largest component of employment in Ontario, where there is a greater diversity in other service-providing sectors, as shown in Exhibit 4.10 and for comparison purposes, Exhibit 4.11.

EXHIBIT 4.10 – EMPLOYMENT BY MAJOR SECTOR IN 2004 IN ONTARIO

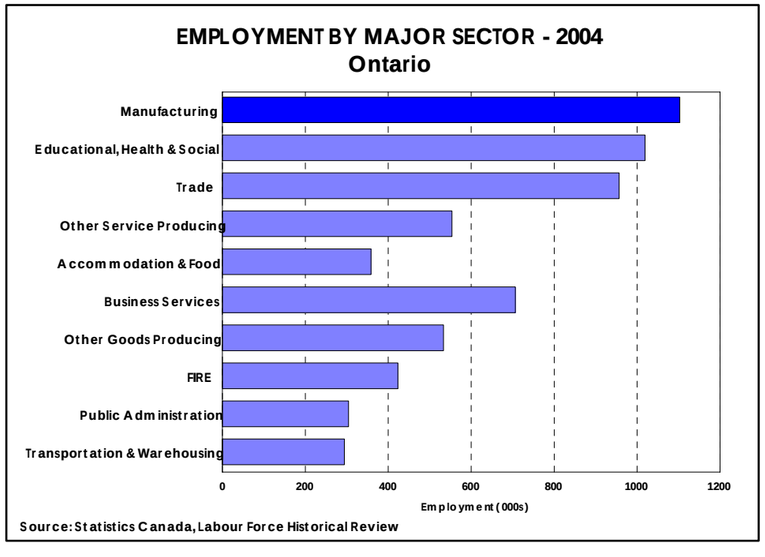
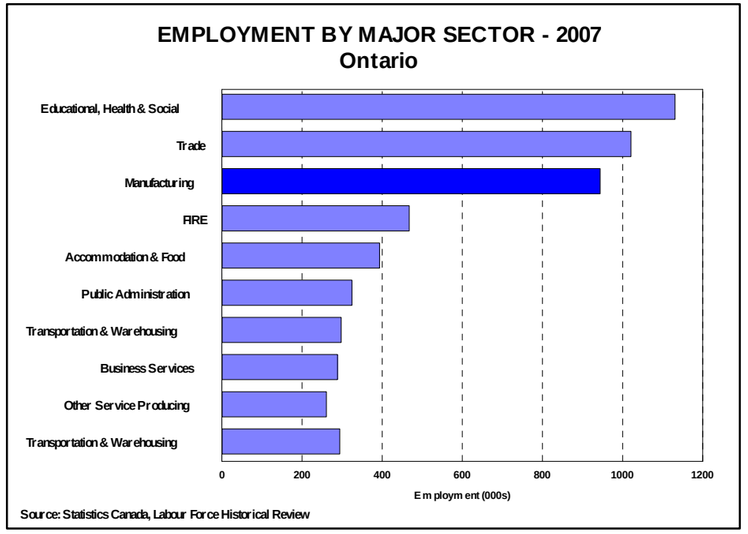


EXHIBIT 4.11 – EMPLOYMENT BY MAJOR SECTOR IN 2007 IN ONTARIO



4.3 Land Use

The Preliminary Analysis Area is comprised of an upper-tier and lower-tier municipal structure. The upper-tier municipalities are the City of Windsor, and the Corporation of the County of Essex.

The City of Windsor is responsible for providing long-range land use planning and policy development, environmental management, recreation, transit and other services (police, fire) for the City. The Official Plan for the City of Windsor provides the policy framework to guide and manage growth within the City.

The Corporation of the County of Essex is comprised of seven newly restructured municipalities –Town of LaSalle, Town of Tecumseh, Town of Lakeshore, Town of Amherstburg, Town of Essex, Town of Kingsville, and Municipality of Leamington. As an upper-tier municipality, Essex County is responsible for providing services that are common to all municipalities in Essex County, thereby avoiding the need for duplicate services and administration. These services include: transportation services, libraries, homes for the aged, planning services, emergency management coordination, community services, land ambulance and general government administration. As well, the county is a funding partner for regional services including: social services, child care, social housing, public health, economic development, tourism and property assessment[10].

With regard to long-range land use planning and other services, each lower-tier municipality within Essex County has an Official Plan to help guide and manage growth. Planning staff from the lower-tier municipalities collaborate with the upper-tier planning staff at the County of Essex to ensure future growth is well managed and in compliance with provincial legislation.

[10] www.countyofessex.on.ca

The following sections provide a brief overview of the Official Plans for the City of Windsor and the three lower-tier municipalities within Essex County that are included within the Preliminary Analysis Area for this study. Of note is that each municipality has planning designations related to floodplains and flooding control. These designations are not related to natural heritage or environmental features, but rather to natural hazards. Accordingly, no references were made to this aspect of planning policy in the following sections. Further to this, the designated environmental areas within the Preliminary Analysis Area are discussed in Section 4.6.6.

4.3.1 City of Windsor

LEGAL STATUS OF PLAN

The *City of Windsor Official Plan (2004)*[11] was adopted on October 25, 1999 by By-law 350-1999. The Plan was approved by the Ontario Ministry of Municipal Affairs and Housing (MMAH), in part, on March 28, 2000. The remainder of the plan was approved by an Ontario Municipal Board (OMB) decision on November 1, 2002.

ENVIRONMENTAL DESIGNATION

Section 5, Volume 1 of the Official Plan identifies designations as being part of the '*Greenway System'* on Schedule B of the city's Official Plan.

Section 6, Volume 1 identifies permitted uses for each of the land use designations in the City.

Public and Private Open Space (Section 6.7)	Identifies the main locations for recreation and leisure activities. Permitted uses include recreation and leisure areas and facilities. Public open spaces include community and regional parks, and neighbourhood parks. Ancillary uses may include residential, commercial or institutional provided that the use is clearly secondary to and complementary with the main open space use.
Natural Heritage (Section 6.8)	Permitted uses include nature reserves and wildlife management. Ancillary uses may include recreation and leisure activities and facilities, provided the use is secondary and complementary to the main permitted use. If development is proposed, an Environmental Evaluation Report (EER) is required to demonstrate that features and functions will not be adversely impacted. EERs are also required for any development on lands adjacent to those designated Natural Heritage.
Waterfront (Section 6.10)	Identifies the main locations for recreation and leisure activities and facilities along the waterfront. Permitted uses include recreation and leisure activities, facilities and marina for pleasure craft. A recreational needs study is required at the time of application to confirm that the change in land use is appropriate.

The following table summarizes subcategories to the land use designations, and is identified as *'Development Constraint Areas'* on Schedule C of the city's Official Plan. These areas afford various levels of protection to the City's natural environmental features.

[11] www.citywindsor.ca

Natural Heritage	Policies identify areas under provincial protection (i.e., Provincially-Significant Wetlands and ANSIs)
Environmental Policy Areas	Identifies areas of significance that may permit development, subject to criteria, including: biological diversity; significant natural community; vulnerable, threatened or endangered species; low levels of disturbance; significant earth science features; and, visual, aesthetic or recreational importance to the city.
Candidate Natural Heritage Sites	Contains potentially significant and/or sensitive environmental features or functions, which are subject to an Environmental Evaluation Report to determine if development is appropriate.
Aggregate Resource Sites & Mineral Mining Sites	Considers temporary land uses, with ultimate land uses identified on Schedule D of the plan.
Floodplain Area	Identifies floodplains determined by the Essex Region Conservation Authority (ERCA).
Shoreline and Floodprone Areas	Identifies areas subject to flooding that were determined by the ERCA. Development in these areas is subject to additional study and setbacks to prove that the development will not be impacted by flooding.
Potentially Contaminated Sites	Requires that Environmental Site Assessments be undertaken to confirm the existence and nature of any contaminants, as well as recommending methods to remediate the site.

SECONDARY PLANNING AREAS

The *Official Plan – Volume 2* contains several Secondary Plans, some of which have natural feature components.

East Riverside Planning Area

- A Greenway System is proposed for this area, which will be composed of a linear assembly of open spaces, natural features, stormwater management areas and community services. It will provide a network of recreational trails, linking planning areas to one another and to natural/recreational areas off-site.

South Cameron Planning Area

- A community park/woodland in the centre of the district is intended for conservation. It contains mature and successional deciduous woods.

Spring Garden Planning Area

- Features in this area are recognized as significant, including Spring Garden Natural Area Complex (Schedule SG-1) and shall be conserved. Development must adhere to the Spring Garden Complex Management Plan.
- All lands within the Spring Garden Natural Area Complex shall be acquired in stages, by means of exchanges, parkland conveyance provisions (*Planning Act*), purchase by city based on independent appraisal, or purchase by appropriate government agencies.
- A noise study shall be undertaken for any development proximate to the E.C. Row Expressway, Huron Church Road and Malden Road.

Forest Glade North Planning Area

- The ERCA identified a '*Candidate Natural Heritage Site'*, which is designated as an *'Environmental Policy Area B*' in the Official Plan. This feature contains mature woods and open fields that are in a shrub-dominated stage of succession.

LEVEL OF PROTECTION

Lands included as part of the Greenway System may be protected via: conveyance/dedication as part of the planning system; land purchase; partnership arrangements with the ERCA or other group; conservation as a condition of planning approval; leases with private property owners to protect all or parts of the identified area; land exchange; donations, gifts and bequeaths from individuals or corporations; conservation easements; stewardship agreements; and other measures.

Environmental land use designations within the City of Windsor are governed by Provincial statute and policy. Only those features/functions identified as Provincially-Significant are afforded protection under the Provincial Policy Statement. However, the *Planning Act*, in combination with the Official Plan and municipal practices, does provide protection through the use of development constraints, or overlays.

4.3.2 Essex County

Of the seven lower-tier municipalities within Essex County described previously, three are within the Preliminary Analysis Area – Town of Amherstburg, Town of LaSalle[12] and Town of Tecumseh[13]. The other four lower-tier municipalities are not within the Preliminary Analysis Area. An overview of the Official Plans for each of these municipalities is included in the following sections.

TOWN OF AMHERSTBURG

Legal Status of Plan

The *Corporation of the Town of Amherstburg Official Plan was* adopted on March 22, 1999. The Plan was approved by the Ministry of Municipal Affairs and Housing (MMAH) on July 6, 1999.

Environmental Designations

Section 2 identifies land use policies for various uses, including: woodlots, developments along inland watercourses, re-use of potentially contaminated sites, and special policy area – species at risk.

Section 3 provides the land use designations, including permitted uses and other restrictions in the Town. These include:

Natural Environment (Section 3.8)	Identifies and protects environmentally significant areas including: valleylands, habitat of endangered and threatened species, fish habitat, significant woodlands, wildlife habitat and ANSIs. Permitted uses include: wildlife management, including hunting and fishing, natural environmental management, passive outdoor recreation, conservation, and associated facilities. Site alteration is only permitted once council and the Conservation Authority are convinced that no adverse impacts will occur. An Environmental Impact Statement may be required to demonstrate this. All Natural Environment lands will be zoned in a Natural Environmental Zone in the implementing Zoning By-law.
Wetland (Section 3.9)	Identifies and designated Provincially Significant wetlands and prohibits development within them. Permitted uses include: conservation, fish and wildlife management areas, passive open space uses, existing agricultural uses, and any buildings or structures associated with a permitted use. Dyked portion of lands are not designated wetland, but rather Natural Environment instead. Development of adjacent lands, as defined by the Provincial Policy Statements, may be permitted if no negative impact on the wetland can be demonstrated. All land-based Provincially Significant wetland areas are zoned Wetland Area by the Town's Zoning By-law.

Level of Protection

All lands designated Natural Environment are protected by the Town's Zoning By-law and the *Planning Act*. In addition, the *Provincial Policy Statements* (PPS) and *Planning Act* provide protection for provincially significant natural heritage features and functions.

TOWN OF LASALLE

Legal Status of Plan

The Town *of LaSalle Official Plan – LaSalle 2016 – Healthy, Vibrant and Caring* was adopted on October 14, 1997. The Plan was approved by the Ministry of Municipal Affairs and Housing (MMAH) on May 18, 1998. The document used for this report is the November 4, 2003 Office Consolidation, which incorporates Official Plan Amendment No. 1, provincially approved on November 4, 2003.

Environmental Designations

Section 2 identifies general development policies for various uses, including: woodlots; developments along inland watercourses; re-use of potentially contaminated sites; and special policy area – species at risk.

Section 3 provides the land use designations for natural heritage sites, including permitted uses and other restrictions in the Town. These include:

Wetland (Section 3.11)	Includes all land-based and submergent wetlands situated on or along the Detroit River, Turkey Creek or the Canard River which have been identified by the MNR as Provincially-Significant. Detroit River Marsh Wetland Complex is the largest in the Town. First evaluated in 1985, it has had several re-evaluations to refine the boundaries of the wetland. Development is prohibited within any 'wetland' designation, except for buildings and structures used in conjunction with a permitted conservation, fish and wildlife management or public passive open space purpose. Permitted uses include: conservation, fish and wildlife management areas, passive open space uses, and existing agricultural uses.

[12] www.town.lasalle.on.ca
[13] www.town.tecumseh.on.ca

Natural Environment (Section 3.8)	Features designated include: woodlots, wetlands and prairie communities. Each of these play an important ecological role in keeping people physically, mentally and spiritually healthy. Permitted uses include: passive recreation, wildlife management, conservation uses and buildings and structures associated with these uses. Utility corridors and inland watercourses should be used as linkages between natural heritage sites, and should be enhanced and maintained as wildlife habitat areas, recreational trails, bikeways and walkways. Preservation and management of these areas shall be via public purchase, private stewardship, conservation easements and management agreements.

Secondary Planning Areas

The Official Plan contains Secondary Plans, some of which have natural feature components.

Bouffard and Howard Planning Districts Secondary Plan

- A Greenway System is proposed for this area, which is in the approved urban growth boundary of the Town of LaSalle. This will involve the creation of linkages, connecting wildlife habitats, human settlements, urban to rural areas, etc.
- Land Use designations include: Recreational, Natural Environment, Natural Corridors/Greenway Linkage, Neighbourhood Centre, Neighbourhood Park and Stormwater Management Pond.
- Permitted uses include: public use and utility facilities, stormwater management facilities, fish, wildlife and conservation management uses, archaeological activities, legally existing uses, buildings and structures and their replacement, and non-intensive recreation uses such as nature trails and parks.

Level of Protection

The Town of LaSalle, through its Official Plan has set a goal of creating a Greenway System, which will comprise trails, parks and woodlots for the benefit and enjoyment of wildlife and residents alike. As a municipal planning policy, this provides a reasonable level of protection for natural features within the proposed Greenway System.

Environmental land use designations within the Town of LaSalle are governed by provincial statute and policy. Only those features/functions identified as Provincially Significant are afforded protection under the *Provincial Policy Statement* (PPS), including the Detroit River Marsh Wetland Complex. However, the *Planning Act*, in combination with the Official Plan and municipal practices, does not provide protection for any regionally or locally significant natural features.

TOWN OF TECUMSEH

Legal Status of Plan

In 1999, the former Town of Tecumseh, Village of St. Clair Beach and Township of Sandwich South were amalgamated. The existing Official Plans of the former municipalities remain in place until a new Official Plan is adopted by the Town of Tecumseh. Details of the existing Official Plan documents are provided in Table 4.5. Since June 13, 1946, the Town of Tecumseh has also been a subsidiary planning unit with the Windsor and Suburban Planning Area.

TABLE 4. 5 - SUMMARY OF TOWN OF TECUMSEH OFFICIAL PLANS

Title	Adopted	Approved
Town of Tecumseh – *Tecumseh Official Plan* (Consolidated January 2000)	November 27, 1973	By OMB in parts: August 4, 1976 July 21, 1977 August 25, 1978
Town of Tecumseh – *St. Clair Beach Official Plan* (Consolidated April 2004)	December 1989	Date of approval not stated. All OPAs adopted and approved by Province as of January 23, 2004
Town of Tecumseh – *Sandwich South Official Plan* (Consolidated July 2003)	June 23, 1997	March 13, 1998

Environmental Designations

The Town of Tecumseh – Tecumseh Official Plan has no environmental or natural heritage designations. Nor does it provide any related policy.

The Town of Tecumseh – St. Clair Beach Official Plan provides general level protection for natural hazards, but no direct or related policies dealing with natural heritage or the environment.

The Town of Tecumseh – Sandwich South Official Plan provides general development policies that use site plan control to incorporate buffering between conflicting land uses, setbacks for development along inland watercourses, and protection of woodlots.

Town of Tecumseh – Sandwich South Official Plan designations includes:

Natural Environment (Section 3.11)	Preserves, protects and enhanced the remaining natural areas for ecological and/or passive open space purposes. Permitted uses include: passive recreation, wildlife management, and conservation uses. Utility corridors and inland watercourses should be used as linkages between natural heritage sites, and should be enhanced and maintained as wildlife habitat areas, recreational trails, bikeways and walkways. Encourage and support private initiatives to maintain/improve the natural character of lands they own.
Natural Environment Land Division Policies (Section 4.8)	Consents permitted for conveyance of land to public or private agencies, conservation groups, etc., that are engaged in protection and conservation of the natural environment.

Level of Protection

While there is no land use designation within the Town of Tecumseh to provide local protection, all development applications are governed by provincial statute and policy. The Official Plan does not identify any features or functions having provincial significance. Current and pending development applications will be subject to municipal review against all current policies and practices.

4.4 Contaminated Properties and Waste Management

This section provides a summary of the study team's assessment of the Preliminary Analysis Area from the perspective of potential property contamination and waste management issues. Several types of potential issues are discussed including contaminated sites, underground storage tank sites, landfills, hazardous waste generators, disposal wells and undiscovered sites.

The information presented in this section of the report represents a summary of more detailed information contained in the *Environmental Overview Paper – Canadian Existing Conditions Volume 1*.

CONTAMINATED SITES

The Government of Canada introduced the *Federal Contaminated Sites and Solid Waste Landfills Inventory Policy* on July 1, 2000. This policy states that departments and agencies that hold property must establish and maintain a database of their contaminated sites and solid waste landfills, and that this information must be submitted to the Treasury Board Secretariat for inclusion in a central inventory.

The inventory includes all known federal contaminated sites for which departments and agencies are accountable. It also includes non-federal contaminated sites for which the Government of Canada has accepted some or all financial responsibility. Suspected sites are not added to the inventory until assessments have confirmed contamination. The inventory does not include properties owned by Crown corporations.

Based on a review of this inventory, one site was identified in the Preliminary Analysis Area, located onshore near the Town of Amherstburg. An additional eight sites were identified in close proximity to the Preliminary Analysis Area, located along the Detroit River on Bois Island and Fighting Island. These eight sites were located along channels and bays in between the mainland and the islands, mostly around navigational towers, dykes and burnpits. At these locations, it was found that the contamination ranged from heavy metals to petroleum hydrocarbons and polyaromatic hydrocarbons. Although these sites are offshore and do not fall within the limits of the Preliminary Analysis Area, their existence may impact construction activity associated with a river crossing.

The Ministry of the Environment has also produced a *Waste Disposal Site Inventory* that lists all the industrial sites that produced or used coal tar and related tars in Ontario prior to 1988. For each site, information is provided on the location, operating period, evidence of buried wastes, site conditions, site assessments conducted, resource characteristics (i.e., surface water, groundwater, wells), etc.

A review of the listings identified three sites located in the Preliminary Analysis Area that produced coal tar. Sites contaminated with coal tar tend to involve expansive contamination that can require extensive clean up of soil and groundwater prior to re-use. Alternative risk management methods for controlling the movement and seepage of coal tar can be conducted to mitigate contamination migration and allow the potential re-use of these properties.

UNDERGROUND STORAGE TANK SITES

In Canada, underground storage tanks containing petroleum products are primarily regulated under the *Technical Standards and Safety Act (TSSA)* and the Ontario *Environmental Protection Act* (OEPA). The Technical Standards and Safety Authority and the Ontario Ministry of the Environment (MOE) coordinate clean up efforts depending on the extent of contamination, whether there are off-property contaminant migration issues, and whether continued use of the property as a fuelling station is desired. The TSSA maintains a database of all registered tanks containing petroleum products that includes a listing of any work orders associated with the property. Based on the ERIS database search conducted, there are 16 registered storage tanks containing petroleum products within the Preliminary Analysis Area.

While underground and leaking underground storage tanks should be avoided if possible, they would not preclude routes, bridges, or other transportation projects. The contamination problems that they pose tend to be localized and relatively easy to address.

LANDFILLS

A *Waste Disposal Site Inventory* prepared by the Ministry of the Environment contains a list of all known active and closed waste disposal sites in the Province of Ontario as of October 31, 1990. For each site, information is provided on the type of wastes, site locations and operating period. The inventory includes both sites that were previously approved and operated under an Approval for which there is adequate information regarding the types of wastes that were deposited, and unapproved sites for which information regarding waste burial is limited.

The sites are classified according to the type of waste it received if known, (industrial, commercial, municipal) and the adjacent land use (urban or rural). Forty-one sites were identified in the Preliminary Analysis Area, and are depicted in Exhibit 4.12. Two liquid disposal dumps are located in Anderson Township near Amherstburg while the regional active landfill is located in the southeast corner of the Preliminary Analysis Area. The potential for re-use of these sites is dependent on the setting and previous landfilling activities and could involve extensive remediation and/or waste removal.

The OEPA restricts the re-use of any former landfill site for any other use for a minimum of 25 years from the day of closure; therefore, these types of sites should be avoided as they would require extensive legal negotiation for re-use.

HAZARDOUS WASTE GENERATORS

Ontario sites that generate subject wastes must register the types of waste classes that are produced under Regulation 347. Generators range from small printing shops to large automotive parts manufacturers. A database of waste generators is maintained and can be accessed. However, as most of these wastes are shipped off-site for disposal, a listing of a waste generator does not necessarily provide any additional information as to the relative risk of acquiring such a site for the purpose of transportation planning. Based on the ERIS database search, there are 122 waste generators within the Preliminary Analysis Area and two registered waste receiving sites. These are depicted in Exhibit 4.12.

While these facilities may use, generate, store, or dispose of hazardous materials or wastes, they do not preclude a route, bridge or other transportation project. Their utilization should be approached with caution, but issues associated with their use are generally readily resolved.

OIL, GAS, MINERAL AND DISPOSAL WELLS

The type of well determines the approvals that are needed for operation. Wells used for disposal of hazardous wastes through deep well injection are regulated under the *Ontario Environmental Protection Act* by the Ministry of the Environment. There are very few licences for deep well injection of hazardous wastes.

The Ministry of Natural Resources regulates oil and gas wells. Based on the EcoLog ERIS database search, nearly 180 wells were identified in the Preliminary Analysis Area.

While their use should be approached with caution, these facilities and sites would not preclude a route, bridge, or other transportation project.

UNDISCOVERED SITES

In Ontario, the test of whether a site is contaminated is determined by the presence of an adverse effect, which is broadly defined under the *Ontario Environmental Protection Act*. Owners of properties where an adverse effect has been determined to exist or which has migrated onto adjacent properties must notify the appropriate authority (usually the Ministry of the Environment).

Notification to the Occurrence Reporting Incidence System (ORIS) is also required if a spill or release occurs on-site. If a Record of Site Condition (RCS) in relation to the contamination has been filed, it is listed in a searchable database that is available for use in the planning of transportation routes. However, in Ontario, contaminated sites, which are undergoing remediation are not necessarily public information unless a clean up order or other legislative instrument has been enacted to control the contamination. The Ministry of the Environment will only release information regarding contamination issues if permission from the owner of the property is obtained under the *Freedom of Information Act*.

In addition, known impacts to soil or groundwater on a property that are demonstrated not to have migrated off-site or which do not fit the definition of an adverse effect were not necessarily required to be reported. Typically these types of sites may have low levels of contamination that are stable in the environment but which would be disturbed if redevelopment occurred.

While they should be approached with caution, these sites would not preclude a route, bridge, or other transportation project.

EXHIBIT 4.12 – LANDFILLS AND HAZARDOUS WASTE SITE LOCATIONS

4.5 Cultural Resources

This section provides a summary of archaeological and built heritage features within the Preliminary Analysis Area based on review of secondary source information. The information presented in this section of the report represents a summary of more detailed information contained in the *Environmental Overview Paper – Canadian Existing Conditions Volume 1*.

4.5.1 Archaeological Resources

PREVIOUS ARCHAEOLOGICAL RESEARCH

In order that an inventory of archaeological resources could be compiled for the Preliminary Analysis Area, three sources of information were consulted:

- Site record forms for registered sites housed at the Ontario Ministry of Culture;
- Published and unpublished documentary sources; and,
- In-house archaeological files.

In Ontario, information concerning archaeological sites is stored in the *Ontario Archaeological Sites Database* (OASD) maintained by the Ontario Ministry of Culture. This database contains archaeological sites registered within the Borden system. Under the Borden system, Canada has been divided into grid blocks based on latitude and longitude. A Borden block is approximately 13 km east to west, and approximately 18.5 km north to south. Each Borden block is referenced by a four-letter designator, and sites within a block are numbered sequentially as they are found. The Preliminary Analysis Area under review is located in the Borden blocks AbHa, AbHr, AaHs, and AaHr.

According to the OASD, a total of 64 sites have been registered within the Preliminary Analysis Area. A general overview of the cultural affiliations of the identified sites is provided below. For more detailed information, the reader is referred to the *Environmental Overview Paper – Canadian Existing Conditions Volume 1*.

- 14 – Underdetermined Pre-Contact;
- 11 – Archaic;
- 15 – Historic Euro-Canadian;
- 8 – Unknown;
- 6 – Woodland;
- 1 – Historic Pioneer; and,
- 1 – 20th Century Euro-Canadian.

The remaining 8 sites have been characterized as being a combination of the above affiliations.

PHYSIOGRAPHY AND ASSESSMENT OF PRE-CONTACT ARCHAEOLOGICAL POTENTIAL

The Preliminary Analysis Area is located within the St. Clair Clay Plains physiographic region of Southern Ontario. Adjoining Lake St. Clair in Essex and Kent Counties and the St. Clair River in Lambton County are extensive clay plains covering 587 928 ha[14]. Essex County and the southwestern part of Kent County have a fairly uniform environment and may be discussed together as a sub-region[15]. Lying between the basins of Lake Erie and Lake St. Clair, the surface is a till plain overlaying the Cincinnati Arch, which, in this area, is a low swell in the bedrock[16] . The surface drainage of the plain is nearly all northward to Lake St. Clair, but the gradient is extremely low and the drainage divide near Lake Erie is rather vague[17]. The prevailing soil type is Brookston clay loam, a dark-surfaced gleycolic soil developed under a swamp forest of elm, black and white ash, silver maple, and other moisture-loving tress[18].

Potable water is the single most important resource necessary for any extended human occupation or settlement. Since water sources have remained relatively stable in south central Ontario after the Pleistocene era, proximity to water can be regarded as a useful index for the evaluation of archaeological site potential. Indeed, distance from water has been one of the most commonly used variables for predictive modelling of site location. More specifically, the Detroit River, designated as a Canadian Heritage River in 2001 (and an American Heritage River in 1998), would have served as a vital resource for both pre-contact and historic settlement. The Detroit River is the first River to have dual designations.

The Ontario Ministry of Culture *Primer on Archaeology, Land Use Planning and Development in Ontario*[19] stipulates that undisturbed lands within 300 m of a primary water source, and undisturbed lands within 200 m of a secondary water source, are considered to exhibit archaeological potential.

ASSESSMENT OF HISTORIC ARCHAEOLOGICAL POTENTIAL: SUMMARY OF REVIEW OF HISTORICAL MAPS AND EURO-CANADIAN HISTORY

The 1881 *Essex Supplement in Illustrated Atlas of the Dominion of Canada* was reviewed to determine the potential for the presence of historical archaeological remains within the Preliminary Analysis Area dating from the nineteenth century (Exhibit 4.13).

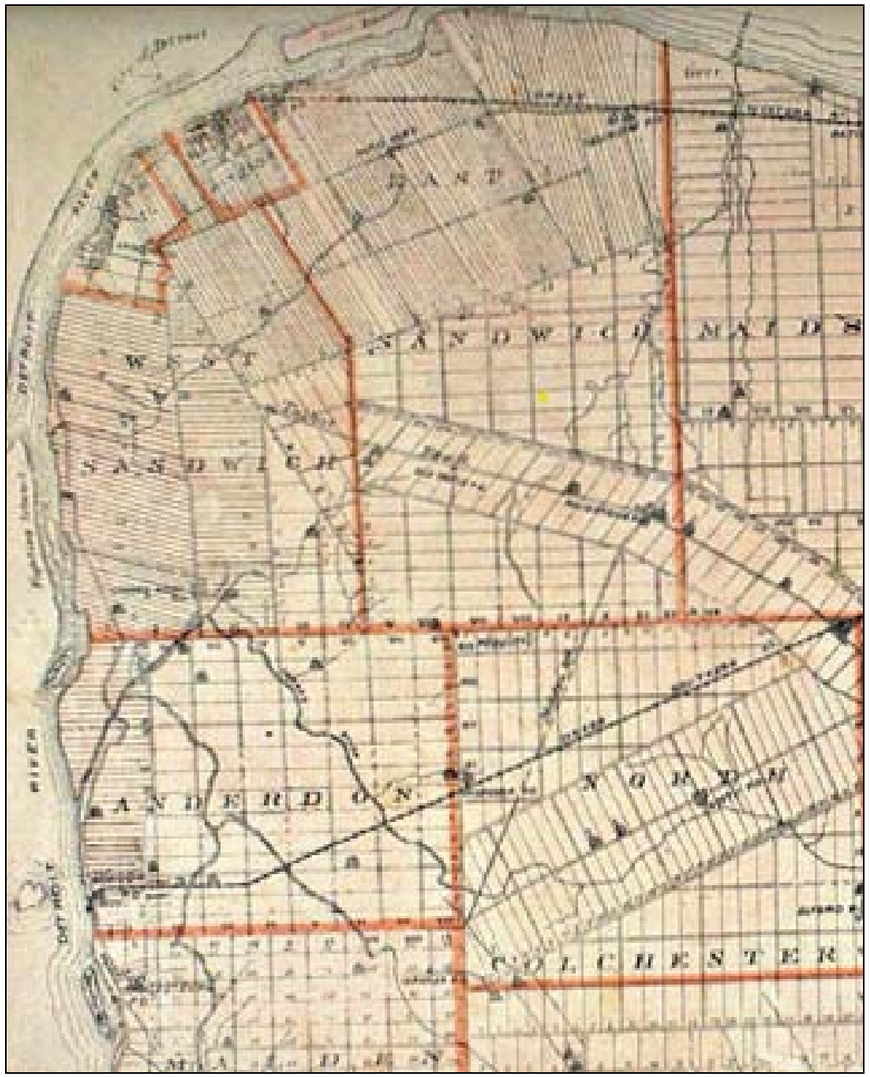
The Detroit River has been an important asset for the development of Essex County. The first European settlement in the area was in 1701 when Sieur De Lamonthe Cadillac and approximately 100 civilians and military members settled in Fort Pontchartrain on the Detroit side of the river (the north side of the current Detroit River)[20].

European settlement remained largely on the Detroit side until 1748, when the Jesuit mission to the

[14] Chapman, L.J. and F. Putnam. 1984. *The Physiography of Southern Ontario.* Ontario Geological Survey, Special Volume 2. pp. 147 Ontario Ministry of Natural Resources, Toronto.
[15] Ibid. pp 147-149.
[16] Ibid.
[17] Ibid.
[18] Ibid.
[19] Ministry of Culture. 1993. Conserving a Future for a Past: Archaeology, Land Use Planning and Development in Ontario. An Educational Primer and Comprehensive Guide for Non Specialists. pp. 12-13.
[20] Archaeological Services Inc. 2002. Ontario–Michigan Border Transportation Planning/Need and Feasibility Study: Ontario Portion, Cultural Heritage Assessment. Existing Conditions.

Huron Indians was established on the south shore near the foot of the present Huron Church Road and the Ambassador Bridge. From 1748 to 1760, a French agricultural settlement developed in this area paralleling a similar settlement across the water[21].

EXHIBIT 4.13 – LOCATION OF THE PRELIMINARY ANALYSIS AREA AS DEPICTED IN THE 1881 ESSEX SUPPLEMENT IN ILLUSTRATED ATLAS OF THE DOMINION OF CANADA



[21] Ibid.

Although Fort Pontchartrain surrendered to the British in 1760 and the Detroit side of the river was again officially surrendered to the United States in 1783, both sides remained under British control until 1796, when U.S. forces took up actual occupation of Detroit. During this period, the settlement continued to grow and remained predominantly French in population. Few buildings from the period of French settlement have survived, although the street pattern of the City still reflects the French method of agricultural land division (i.e., long narrow farms fronting the river).

In 1797, the original Sandwich Towne was established to accommodate persons of both French and British origin from the U.S. who wished to remain under British rule following American occupation of Detroit. This constituted the first urban settlement in what is now the City of Windsor, and also the first significant migration of English-speaking people into the Windsor area. Sandwich developed over the following decades as the seat of government and the courts for the County of Essex[22].

As the chief port-of-entry to the region opposite Detroit, the Town of Windsor (now the downtown area) was already catching up to Sandwich, in terms of population, when the Great Western Railway (now part of the CNR system) chose Windsor as its termination point in 1854. The arrival of the railway also marked the beginning of significant industrial development in Windsor, and sparked the foundation of the third of Windsor's oldest settlements, Walkerville.

In 1857, Hiram Walker established his distillery at the point east of downtown where the Great Western Railway first met the waterfront. On his lands running south of the river, Walker planned a complete town, including provisions for industry, commerce, residences and agriculture (Walker Farms). The housing, a large part of which was built by Walker's own contractors, ranged from E. Chandler Walker's estate of Willistead (1906), built in the style of a Tudor manor house, to blocks of row housing for his industrial workers (1880s)[23].

Although the Ford Motor Car Company was established in Windsor as early as 1904 to gain the benefit of Imperial trade preferences, it was the period during and following World War I that saw the auto industry assume predominance in the city. An area known as Ford City was developed around the industrial complex. Numerous large residences were built overlooking the river at that time although most have since been demolished[24].

The automotive industry changed Windsor from a relatively slow-growing collection of border communities to a rapidly growing, modern, industrial city. By the early 1930s, the separate border cities of Windsor, East Windsor (Ford City), Walkerville and Sandwich amalgamated politically into a single community with a population of more than 100,000.

During World War II, industrial production increased dramatically, attracting many new workers and resulting in substantial residential growth within the city and in the surrounding townships. In 1966 the city annexed the Towns of Riverside and Ojibway, and parts of Sandwich East, Sandwich South and Sandwich West Townships[25].

South of Windsor along the Detroit River is the Town of Amherstburg. Amherstburg came into being around 1796 when a portion of the Fort Malden military reserve was laid out as a town site and settled

[22] Archaeological Services Inc. 2002. Ontario–Michigan Border Transportation Planning/Need and Feasibility Study: Ontario Portion, Cultural Heritage Assessment. Existing Conditions.
[23] Ibid.
[24] Ibid.
[25] Ibid.

by United Empire Loyalists from Detroit. However, the region's European history can be traced even earlier to the early French explorers, the days of French rule and the arrival of French traders and settlers in the 1730s. By 1763, when France surrendered Canada to the British, several hundred French settlers were scattered along the Detroit River. The French colony continued to flourish under British rule, and few British settlers came to the area until the American Revolution brought an influx of Loyalists. The first to take up land grants in the vicinity of Amherstburg were members of Butler's Rangers who came in 1784[26].

By 1851, the settlement of Amherstburg was separated from the Township of Malden and incorporated as a village with town powers. Amherstburg was incorporated as a town in 1878 and by the 1880s it had become a thriving mercantile and manufacturing centre. Amherstburg is also known as an important stop along the Underground Railway that helped black slaves escape from their servitude south of the border. By the 1840s, Amherstburg had become the centre of Ontario's Black population[27].

Although separated out in the 19th century, Amherstburg amalgamated with the neighbouring Townships of Anderdon and Malden in January of 1999 to create the Town of Amherstburg. Anderdon Township was surveyed as a part of Essex County in 1839, but settlement had already begun prior to that date in the northern portion around the River Canard by French people coming south from Sandwich Township and in the southern portion by United Empire Loyalists. By 1850 there were 774 settlers in the township, concentrated in two main settlements, Gordon on the shore of the Detroit River, and McGregor on the eastern boundary. In the 1860s the Canada Southern Railway was built through the township and this encouraged growth in the largely agricultural township. There remains only three small communities of any size within the original historic boundary: Auld, River Canard and McGregor[28].

Malden Township was surveyed as part of Essex County in the early 19th century and it likewise contained a mix of early French and Loyalist settlers. Like Anderdon, Malden's rural economy benefited greatly from the construction of the Canada Southern Railway, which constructed a branch line from Amherstburg to Essex[29].

SUMMARY

For the Euro-Canadian period, the majority of early 19th century farmsteads (i.e., those which are arguably the most potentially significant resources and whose locations are rarely recorded on nineteenth century maps) are likely to be captured by the basic proximity to water model outlined above, since these occupations were subject to similar environmental constraints. An added factor, however, is the development of the network of concession roads through the course of the nineteenth century. These transportation routes frequently influenced the siting of farmsteads. Accordingly, undisturbed lands within 100 m of an early settlement road are also considered to have potential for the presence of Euro-Canadian archaeological sites.

Therefore, depending on the degree of previous land disturbance, it may be concluded that there is potential for the recovery of historic cultural material within the Preliminary Analysis Area. Furthermore, it should be noted that not every feature of potential interest today would have been illustrated on the nineteenth century mapping.

4.5.2 Cultural Heritage Resources

The cultural heritage assessment considered cultural heritage resources in the context of improvements to specified areas, undertaken for this study within the Preliminary Analysis Area pursuant to the *Ontario Environmental Assessment Act*. This assessment addresses above ground cultural heritage resources more than 40 years old. The findings of the cultural heritage assessment are summarized in the *Environmental Overview Paper – Canadian Existing Conditions Volume 1*.

Changes to transportation corridors have the potential to affect cultural heritage resources in a variety of ways. These include the loss or displacement of resources through removal or demolition and the disruption of resources by the introduction of physical, visual, audible or atmospheric elements that are not in keeping with the resources and/or their setting.

For the purposes of this assessment, the term cultural heritage resources was used to describe both cultural landscapes and built heritage features. A cultural landscape is perceived as a collection of individual built heritage features and other related features that together form farm complexes, roadscapes and nucleated settlements. Built heritage features are typically individual buildings or structures that may be associated with a variety of human activities, such as historical settlement and patterns of architectural development.

DATA COLLECTION

For the purposes of determining the existence of previously identified built heritage features and cultural landscapes within the Preliminary Analysis Area, contact was made with the City of Windsor's Heritage Planner and the Town of Amherstburg. The Ministry of Culture's *Ontario Heritage Properties Database* was consulted, as was the Parks Canada listing of National Historic Sites.

Historical research was conducted for the purposes of identifying broad agents or themes of historical change and cultural landscape development in this area.

Previously identified heritage resources were then categorized according to their heritage protection status and their inclusion on municipal, provincial and federal inventories and heritage designation lists. All heritage sites and heritage sensitive areas were mapped using GIS data co-ordinates.

HERITAGE SENSITIVE AREAS

The following areas have been identified through various data sources and are considered to be of special heritage significance. They represent aggregate areas of historic activity and resources, and are depicted in Exhibit 4.14.

Ambassador Bridge

The Ambassador Bridge, built in 1929, is listed on the *Ontario Heritage Bridge List*. This list includes approximately 90 heritage bridges of provincial significance. It helps to ensure that the significance of these bridges is taken into account when municipalities undertake construction projects covered by the *Ontario Environmental Assessment Act*.

[26] Archaeological Services Inc. 2002. Ontario–Michigan Border Transportation Planning/Need and Feasibility Study: Ontario Portion, Cultural Heritage Assessment. Existing Conditions.
[27] Ibid.
[28] Ibid.
[29] Ibid.

Sandwich

The original Sandwich Towne retains a number of buildings of the pre-Confederation era that are of historical significance and/or which exemplify the Neo-classical and Georgian styles of architecture, which were in vogue during the first half of the 19th century. A number of designated heritage properties can be found along the following streets: Russell Street, Sandwich Street, Peter Street, Detroit Street, Mill Street, Brock Street, Chippewa Street, South Street, Watkins Street and Prince Road.

Highway 18 (Ojibway Parkway)

Highway 18 (Ojibway Parkway) is a heritage highway and is generally considered to be the oldest road in Ontario.

Huron Church Road

Between University Avenue and Wyandotte Street West, Huron Church Road has several properties of heritage interest.

Town of Windsor

Due to numerous fires and the continuous redevelopment of the area over the decades, few of the early buildings in downtown Windsor still exist, but a number of late 19th century and early twentieth century buildings remain, including in particular a number of larger, upper income houses in areas immediately adjacent to the downtown area. Of particular heritage interest is Victoria Avenue, along which several designated properties are situated.

Highway 3 (The Talbot Road)

First surveyed by Colonel John Talbot beginning in 1809, the Talbot Road (now Highway 3) was interrupted by the War of 1812, but reached Essex County in 1818. The Talbot Road was surveyed to follow a natural ridge of glacial moraine which stretched from Windsor to Point Pelee. It was termed a “corduroy road” for in areas of swampy land, three inch planks, flattened on the upward side, were laid down side by side across the road. Highway 3 (the Talbot Road) is celebrated with a provincial plaque west of St. Thomas that attests to its heritage interest and value. Significant villages along the route include Oldcastle and Maidstone.

Highway 46 (The Middle Road)

The Middle Road was surveyed by Colonel Talbot (and incorporated a native trail). The Settlers along the Middle Road were largely immigrants from Ireland who came to escape the potato famine of the 1840s. Along the Middle Road and up toward Lake St. Clair the "Irish Settlement" grew, and fourth and fifth generation descendants remain today. The village of Maidstone was the centre of the Irish community.

Amherstburg

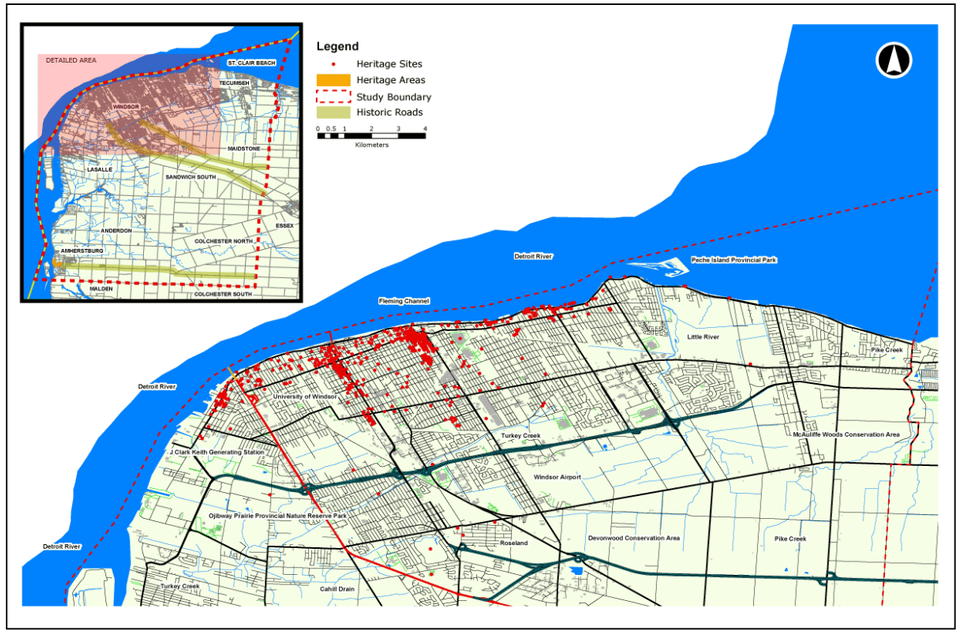
Bounded by the Detroit River to the west, Alma Street to the north, the Lowes Side Road to the south and Meloche Road to the east, and situated approximately 32 km southwest of Windsor across from Boblo Island (Bois Blanc), Amherstburg is one of the oldest towns in the province. A preliminary inventory of heritage properties was completed in 1976 and it has not been updated. However, the following streets have the highest concentration of heritage structures and are therefore considered to be of particular heritage interest: Brock Street, George Street, King Street, Seymour Street, Sandwich Street, Bathurst Street, Ramsay Street, Dalhousie Street, North Road, Rankin Avenue, Richmond Street, Murray Street, Gore Street, Simcoe Street, and Park Street.

Despite its modern business establishment and plants, Amherstburg retains its historic atmosphere. In the older section of town the streets are narrow and houses front directly on the sidewalk.

Fort Malden National Historic Park

Located on Laird Avenue in Amherstburg, Fort Malden preserves elements of the second fort built by the British on the eastern bank of the Detroit River to defend the Canadian border from American attack in the first half of the 19th century. The first post, known as Fort Amherstburg, was constructed in 1796 near the mouth of the Detroit River where it empties into Lake Erie. This post was the headquarters for the British forces in southwest Upper Canada during the War of 1812. Fort Malden was erected after the war and rebuilt in 1838-40 and served once again as a centre for the British defence during the Upper Canada Rebellion of 1837-39. Today the 4.5 ha (11 acres) site includes remains of the 1840-period earthworks and four buildings, including a restored and furnished 1819 brick barracks.

EXHIBIT 4.14 - HERITAGE RESOURCES WITHIN THE PRELIMINARY ANALYSIS AREA



Detroit River

As noted previously, the Detroit River is recognized as a Canadian Heritage River and American Heritage River. From either side it presents a view of a large urban cultural landscape and is itself a cultural landscape. This landscape takes in the shoreline and associated modifications –particularly for the loading/unloading of lake freighters, bridge features, and its recreational cottage developments up and downstream from the centers of Windsor and Detroit. It has been a focus of human occupation and transit for more than 6,000 years and continues to be distinctive in that it is significant

SUMMARY OF HERITAGE PROPERTIES IDENTIFIED IN THE PRELIMINARY ANALYSIS AREA

A total of 139 heritage properties have been identified within the Preliminary Analysis Area, and are categorized as follows:

- 9 – National Historic Sites of Canada
- 14 – Heritage Easement Sites
- 115 – Properties Protected under Part IV of the *Ontario Heritage Act*

In addition, the Ambassador Bridge is identified as an Ontario Heritage Bridge in the Ontario Heritage Bridge List compiled by the Ministry of Culture. Additional details with regard to each of the properties are included in the *Environmental Overview Paper – Canadian Existing Conditions Volume 1*.

4.6 Natural Environment

This section provides a summary of existing natural environmental conditions within the Preliminary Analysis Area. The information presented in this section of the report represents a summary of more detailed information contained in the *Environmental Overview Paper – Canadian Existing Conditions Volume 1*.

4.6.1 Geology / Subsurface Environment

GEOLOGY OF THE WINDSOR AREA

The subsurface conditions in the Windsor area are characterized by regionally extensive, flat-lying soil and bedrock strata including:

- Surface layers of miscellaneous fill materials associated with industrial, urban and suburban development, typically ranging in thicknesses of 1 to 4 m, though local areas of deeper fills may be present in some areas;
- Native deposits of sand and silt may be present at or near the surface in some locations, particularly in the west end of the City of Windsor and Town of LaSalle;
- Beneath the sand (where present) and overlying bedrock, are thick deposits of silty clay that start out relatively stiff near the surface and become gradually softer and weaker with increasing depth. In the western sections of the Preliminary Analysis Area, beneath the surficial sand deposits identified on Exhibit 4.15, the silty clay is generally less stiff than in the eastern part of the Preliminary Analysis Area, and in some areas this silty clay deposit is very soft;
- Bedrock throughout the Preliminary Analysis Area is generally encountered at depths of 20 m to 35 m but can be found as shallow as 2 m and as deep as 54 m in localized areas. In many areas, a thin layer of dense glacial till overlies the bedrock; and
- Salt formations are found within the bedrock stratigraphy at depths ranging from about 150 to 400m.

Exhibit 4.15 illustrates the general surficial sedimentary geology of the Preliminary Analysis Area based on geologic interpretation of widely-spaced sample locations and an understanding of geomorphologic processes. This figure has been prepared using data and mapping from government agencies in both Ontario and Michigan. Although the surficial sedimentary information is more spatially detailed for Ontario and the nomenclature somewhat different between the two jurisdictions, the general characteristics of the sediments are well known in both areas.

SEDIMENTARY GEOLOGY

The Preliminary Analysis Area is located in the physiographic region of southwest Ontario known as the St. Clair Clay Plains. Within this region, Essex County and the southwest part of Kent County are normally discussed as a sub-region known as the Essex Clay Plain. The clay plain was deposited during the retreat of the ice sheets (late Pleistocene Era) when a series of glacial lakes inundated the area. In general, the ice sheets deposited till in the area of Windsor and Detroit.

A large end moraine of glacial till is mapped in the area of Windsor-Detroit, generally trending northwest to southeast near the outlet of Lake St. Clair as illustrated by the dark-green areas in Exhibit 4.15. Outcrops of this moraine may also be found throughout Essex County near the terminus of Provincial Highway 401. In other areas, the lacustrine deposits overlie the hard glacial till.

The major clay stratum typically ranges in thickness from about 20 m to 30 m. Surficial layers or pockets of more typical layered lacustrine (lake deposited) silty clay, silt, or sand may be encountered overlying the extensive stratum of “till-like” silty clay. Silt and sand deposits, approximately 2 to 4 m thick, are often found near the ground surface in areas near the western side of Windsor and the southwestern limits of the Preliminary Analysis Area. A relatively thin stratum, approximately 1 to 6 m thick, of very dense or hard basal glacial till or dense silty sand is found directly overlying the bedrock surface.

Bedrock Geology

Within the Windsor area, the bedrock geology consists of an evaporate-carbonate sequence of rock formations. These include the Silurian Salina formation, the Devonian Bass Islands dolomite, the Detroit River Group, the Dundee Formation, and the Hamilton Group, respectively, with decreasing age and closer proximity to the ground or bedrock surface. The surface of the bedrock, beneath the overlying sediments, is relatively flat except for “a significant depression in the vicinity of the Windsor airport. The depression may represent a dissolution collapse of either the underlying carbonates or the lower Salina salt beds” [Hudec 1998].

Devonian Age bedrock of dolomite, shaly limestone, limestone and sandstone extends from the bedrock surface, found at depths of between 20 to 40 m, to depths of about 160 m below ground level. These bedrock formations are underlain by the Salina Group of formations that include thick salt beds at depths of about 270, 300, and 400 m below the ground surface. It is also known that relatively small volumes of petroleum are found within the limestone and dolomite strata.

Near the eastern limits of the Preliminary Analysis Area, the bedrock encountered beneath the sedimentary deposits is the Hamilton Group of limestone, shaly limestone, and mudstone formations. Near the southwest tip of Belle Isle, the uppermost bedrock formation is the Dundee limestone formation within the Hamilton Group. Approximately equidistant between Belle Isle and Fighting Island, the uppermost bedrock formation transitions to the Detroit River Group and the Lucas formation of dolomite in particular.

Groundwater Levels

Static groundwater levels within the overburden soil deposits are typically at about 1 to 3 m below the ground surface depending on specific locations and ground surface elevations. Groundwater within the underlying glacial till and bedrock in some areas, however, is known to be under artesian pressures (in which groundwater levels will rise above the ground surface for wells that penetrate the soil overburden and connect with groundwater in the bedrock). In these areas, particularly in the western part of the Preliminary Analysis Area, artesian pressures may be in the order of 2 to 3 m above the river level. In general, groundwater flow will be toward the Detroit River, Lake St. Clair and Lake Erie. Groundwater from within the bedrock is likely to be corrosive because of the salt deposits found at depth.

Gas

It is also known that in some areas the groundwater contains hydrogen sulphide that will be liberated from solution and become hydrogen sulphide gas at normal atmospheric pressures. Hydrogen sulphide gas is toxic at low concentrations. Methane gas has also been encountered during excavations into both soft ground and bedrock in the Windsor-Detroit area. Methane gas can present an explosion hazard if not adequately controlled during construction.

KEY SUBSURFACE CONDITIONS

The following provides a summary of key subsurface conditions that influenced the development of the various alternatives examined through the course of this study. Further details with regard to geotechnical deep drilling investigations undertaken to confirm subsurface conditions are provided in Chapter 7 of this report.

Salt Extraction Activities

Within the Windsor-Detroit area, salt has been extracted from beneath the ground surface since the mid to late 1800s. The salt has been extracted using two different methods: solution mining and underground rock salt mining. Salt extraction by solution mining involves pumping water into wells drilled into the salt formations, dissolving the salt with the pumped water, and extracting salt from the saline water (brine) which is returned to surface. Rock salt mining of the salt typically uses the room and pillar method, whereby mine shafts are excavated from the ground surface down to the level of the salt beds. At the level of the salt beds, rooms are excavated using drilling and blasting, and the rock salt is transported back to the surface in large buckets, or skips. The extraction of salt from deep formations results, in most cases, in subsidence of the ground surface.

Solution Mining

As a consequence of solution mining activities, large caverns have been formed where the salt was removed. Modern methods of cavern development control the shape and size of caverns quite carefully. However, it was not unusual, for the cavities surrounding older wells (those drilled prior to about 1970), to become accidentally interconnected or for accidental interconnection to adjacent aquifers to occur.

Single well caverns have been known to be approximately 200 to 300 m in diameter or more and more than 50 m in height. Caverns may be interconnected in rows as long as 1,000 m or more. Caverns created by single brine wells can be in the range of 0.2 to 1 million cubic metres in volume and that interconnected brine well caverns are typically on the order of 1 million cubic metres in volume or more.

The presence of brine well mining activities in the vicinity of a potential roadway or structure, could lead to the potential for general subsidence or a sudden collapse directly over these areas. The potential for collapse is generally thought to be greater for wells that were in operation prior to about 1980, but this potential depends to a great (and often indeterminate) extent on the well operational methods, local bedrock conditions, interconnection of cavities between wells, and the methods used to abandon or plug the wells.

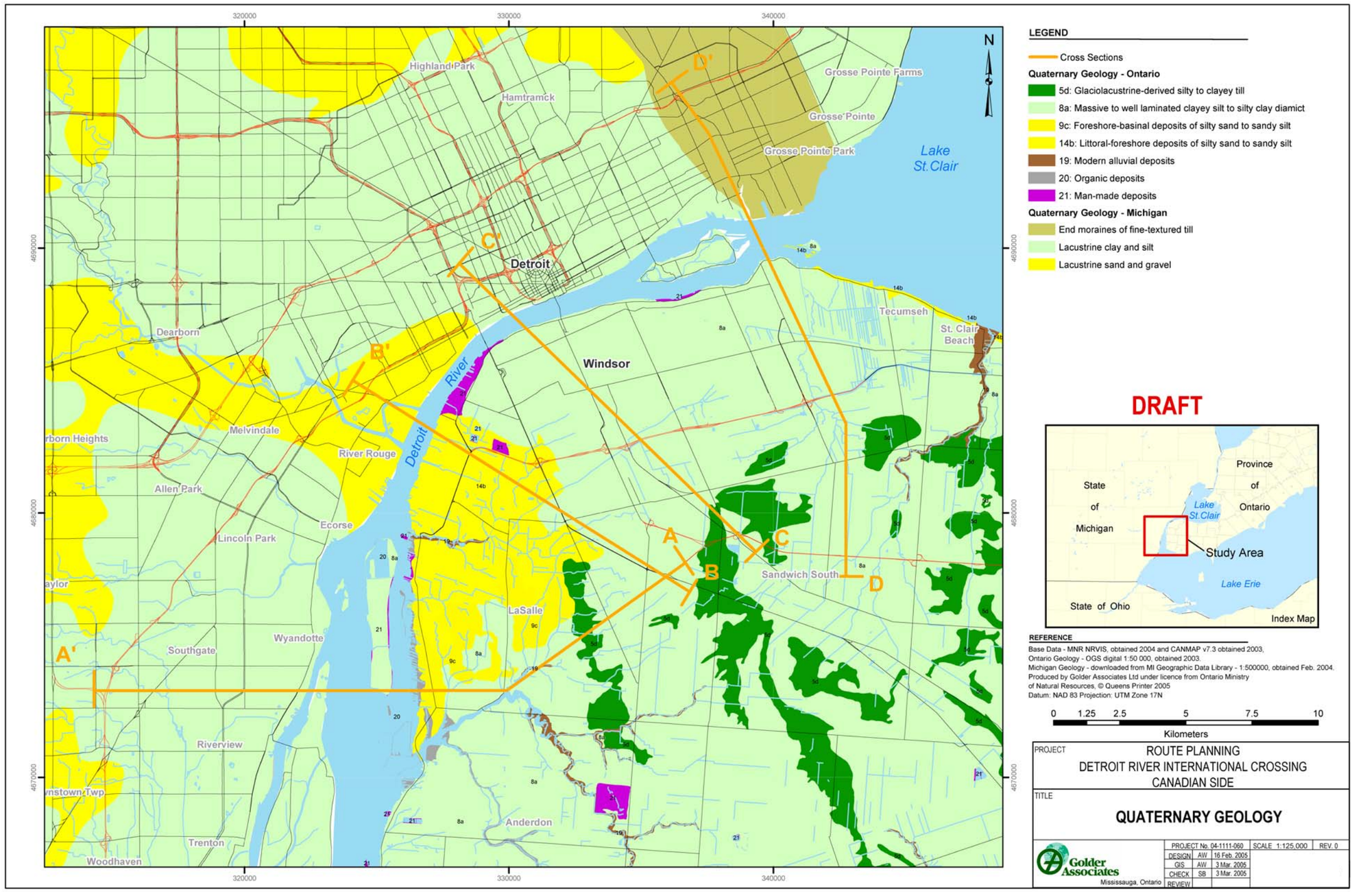
Room and Pillar Mining (Dry Mining)

Salt is also mined in a dry form, mainly for application as a highway de-icing agent. Underground mining of rock salt typically occurs using the “room and pillar” method, whereby mine shafts are sunk from the ground surface down to the level of the salt beds and rooms are then created by horizontal tunnelling. In room and pillar mining, the ore is excavated, leaving pillars to support the roof. Rooms and pillars are dimensioned depending on the depth of the mine and the strength of the rock in the roof and pillars and it is typical to design pillars to be stable for an indefinite time period. Generally, pillars are arranged in a regular pattern, like a checker board. The salt is mined by drilling and blasting, and it is then crushed and the rock salt is transported to the surface in a large box or skip suspended from wire hoisting ropes in the shaft.

Subsidence also occurs over room and pillar mines, though it is more easily predicted since the size of pillars can be easily controlled and it is possible to install support in the mine roof if there is any indication of instability. Subsidence may occur in the context of underground mining due to the gradual deformation or, occasionally, the sudden collapse, of the pillars that remain after salt extraction. Since the pillars are generally very large, it is rare for sudden collapse to occur and so the most common type of subsidence is a very slow, widespread sinking of the ground surface across the entire mining area. As ore is mined from the rooms, the load carried by the overlying “roof” rock is transferred to the pillars.

The presence of deep salt mining activities within a possible route could lead to the potential for general subsidence. General subsidence of the type observed over room and pillar mines in the Windsor area is unlikely to cause significant concerns for highway pavements or embankments, in that repairs could be made if and when needed, but may be undesirable for bridge structures.

EXHIBIT 4.15 - QUATERNARY GEOLOGY



4.6.2 Aquatic Habitat and Communities

The Preliminary Analysis Area encompasses a very large area of Essex County. In addition to the Detroit River, the PAA includes the following five main subwatersheds:

- Pike Creek;
- Little River;
- Turkey Creek;
- Big Creek; and,
- Canard River.

The locations of the corresponding watercourses are presented in Exhibit 4.16, and a summary of each watershed is provided in following sections of this report.

The Detroit River and the inland subwatersheds within the Preliminary Analysis Area fall under the jurisdiction of the Essex Region Conservation Authority (ERCA) and the Ontario Ministry of Natural Resources (OMNR) Aylmer District.

Heavy impacts associated with agricultural and/or urban development affect all of these subwatersheds[30]. These impacts include both physical (e.g., channelization, barriers) and chemical (e.g., metals, organic compounds, nutrients) factors[31]. Despite these impacts, the fish communities in these subwatersheds are relatively diverse and most stations sampled historically were found to contain fish[32]. The fish communities found in each of these subwatersheds, as well as in the Detroit River, are discussed briefly below.

Fish species found in the Detroit River are documented by Manny et al. 1988 (in MDNR and MOE 1991). A summary of the fish species known to inhabit the Detroit River is presented in the *Environmental Overview Paper – Canadian Existing Conditions Volume 2*. Fish communities in the subwatersheds of the Detroit River have been sampled historically by the OMNR (1978; 1979; 1980; 1984), the ERCA (1999; 2000; 2001) and others (Gartner Lee 2001). Fish occurrence records for the five inland watersheds and one municipal drain that were provided by the ERCA are also summarized in the *Environmental Overview Paper – Canadian Existing Conditions Volume 2.*

PIKE CREEK

The watercourses within this watershed were sampled at 16 stations historically, with one station sampled twice (17 sampling events). Fish were collected at all but two stations. Available mapping indicates that the watercourses within this watershed, which flow generally north into Lake St. Clair, are in a relatively natural state (i.e., excessive channelization is not evident). A total of 28 species were collected from the Pike Creek watershed, including several sportfish. Fish were well distributed throughout the watershed and the number of species varied from three to 16 per station. Sportfish were collected from 12 of the 14 stations at which fish were present, which indicates that good habitat conditions exist throughout the watershed.

LITTLE RIVER

The Little River flows in a northerly direction and discharges into the upstream end of the Detroit River near Peche Island. Much of this watercourse appears to be heavily channelized, with few areas in a natural state. The upper portion of the watershed consists of channelized ditches that parallel the concession roads to the southeast of the Windsor Airport. This watershed was sampled for fish 19 times at 14 locations; and no fish were captured at six locations. The locations at which no fish were collected were all in the upper portion of the watershed at crossings of Highway 401. Despite the apparently poor habitat conditions in the upper part of the watershed, the Little River supports 25 species of fish, including several sportfish. As with the Pike Creek watershed, fish species were well distributed within the Little River watershed with the number of species captured at each station ranging from two to 15. Sportfish were collected from seven of the eight stations at which fish were collected, indicating that fairly good habitat conditions exist within the lower portions of the watershed.

TURKEY CREEK

Turkey Creek discharges into the Detroit River near the upstream end of Fighting Island. It receives water from many municipal/agricultural drains and has been channelized throughout the watershed. The upper portion of Turkey Creek flows out of South Windsor and through several parks and small residential areas before discharging into the Detroit River. Many of the drains, which historically likely conveyed agricultural run-off, now flow through residential areas. Several of these still flow out of agricultural land. Some of the drains that contribute flow to Turkey Creek are the Cahill, Lennon, Lepain and Tourangeau Drains. The Turkey Creek watershed was sampled for fish at five locations, two within the higher density residential area; one in the lower density residential area along Turkey Creek, and the other two in the drains associated with Brunet Park. All five stations contained fish, with a total of 19 species captured. Each station was sampled only once. The number of species captured at each station ranged from two to 16, with a mean of six species per station. At least one species of sportfish was found at each of the sampling locations indicating the presence of fairly good habitat conditions at these locations.

BIG CREEK

The headwaters of Big Creek are located within the Preliminary Analysis Area in the Town of Amherstburg. This watercourse flows in a north-to-south direction and discharges into Lake Erie. Fish were collected eight times at five stations within the Preliminary Analysis Area. A sixth station was also sampled, but no fish were captured. A total of nine species were collected, including three sportfish species. Diversity at the stations was comparatively low, with two stations at which only one species was captured. Sportfish were collected from three of the five stations at which fish were captured.

CANARD RIVER

The Canard River watershed occupies the most area within the Preliminary Analysis Area. It flows in a northwesterly direction through mainly rural lands and discharges into the Detroit River opposite Grosse Ile. It was sampled 27 times at 19 stations, all of which contained fish. The stations were spread throughout the watershed and likely represented a diversity of habitats. A total of 36 species were recorded from the watershed, including several sportfish species. Sportfish were collected from all but one of the 19 stations, indicating favourable habitat conditions throughout the watershed.

[30] URS Canada Inc. Canada - U.S. - Ontario - Michigan Border Transportation Partnership Planning/Need and Feasibility Study: Environmental Overview Report (Amended). January, 2005.
[31] Ibid.
[32] Ibid.

EXHIBIT 4.16 - WATERCOURSES WITHIN THE PRELIMINARY ANALYSIS AREA

MARENTETTE DRAIN

This small drain empties into the Detroit River south of the Town of LaSalle at Grassy Island. It flows through agricultural lands and consists of two main branches: the Marentette Drain and the Gignac Drain. ERCA records show that this drain was sampled for fish at one location in 2001. Two species were captured here, including one sportfish.

DETROIT RIVER

Previous reports indicate that at least 65 species of fish inhabit the Detroit River (Manny et al. 1988 in MDNR and MOE 1991). These species include many sportfish as well as migratory species that use the river to move between Lakes Erie and St. Clair. Diverse habitat exists within the river, especially in the wetlands which are used by warmwater species for many of their life functions (spawning, nursery, foraging, etc.). Several provincially significant wetlands exist within the river or are associated with tributary rivermouths. These wetlands cover an area of 462.5 ha (1143 acres)[33]. As reported in MDNR and MOE (1991), 41 fish species have been reported to spawn within the Detroit River and an additional seven species are suspected of spawning. Manny et al.[34] reported that 25 species use the river as nursery habitat, including both warm and coldwater species.

4.6.3 Vegetation and Vegetation Communities

Within the County of Essex, tallgrass prairie and oak savannah vegetation communities were widespread prior to the 20th century. These open communities were maintained by climate and periodic fire events. Since the early 20th century, these communities have rapidly declined with increased settlement and subsequent fire suppression in these areas[35].

Natural vegetation communities within the Preliminary Analysis Area are restricted to areas that are not currently in use for residential, industrial or agricultural purposes. As such, they are limited in number, size and connectivity with other natural vegetation communities. The majority are within or around designated natural areas such as Provincial Parks, Areas of Natural and Scientific Interest (ANSIs), evaluated wetlands, Environmentally Significant Areas (ESAs) and Candidate Natural Heritage Sites (CNHSs). These communities include fragmented oak-hickory forests, oak savannahs, thickets, tallgrass prairies, forb prairies and old field cultural meadows.

Forest communities include those in dry-fresh upland locations and those in fresh-moist lowland locations. Upland forested communities are typically dominated by oak (*Quercus* sp.), hickory (*Carya* sp.), and maple (*Acer* sp.), with associations of sassafras (*Sassafras albidum*), white ash (*Fraxinus americana*), butternut (*Juglans cinera*), basswood (*Tilia americana*), beech (*Fagus grandifolia*), tulip-tree (*Liriodendron tulipifera*), ironwood (*Ostrya virginiana*), trembling aspen (*Populus tremuloides*) and black cherry (*Prunus serotina*). Lowland forested communities are typically dominated by swamp white oak (*Quercus bicolor*), pin oak (*Q. palustris*), silver maple (*Acer* saccharinum), red ash (*Fraxinus pennsylvanica*), white elm (*Ulmus americana*) and red maple (*Acer rubrum*).

In some locations, fire suppression has allowed for the establishment of shrub species. Common shrub thicket species include hawthorns (*Crataegus* sp.), gray dogwood (*Cornus foemina* ssp. *racemosa*), silky dogwood (*C. amomum*), smooth sumac (*Rhus glabra*), common blackberry (*Rubus alleghaniensis*) and riverbank grape (*Vitis riparia*). In other locations the invasion of non-native species into grasslands has resulted in their conversion to old field meadow communities with fewer grass species. In locations where prairie grassland has been maintained, dominant species include big bluestem (*Andropogon gerardii*), tall cord grass (*Spartina petcinata*), Indian grass (*Sorghastrum nutans*), ironweed (*Vernonia gigantea*), showy tick-trefoil (*Desmodium canadense*), giant goldenrod (*Solidago gigantea*), grass-leaved goldenrod (*Euthamia graminifolia*) and many others.

Wetland communities are predominantly riverine, and associated with the Detroit River or its tributaries. These communities are typically marshes dominated by narrow-leaved emergent species such as cattails (*Typha sp.*), reed-canary grass (*Phalaris arundinacea*), or floating leaved and submerged aquatic plants.

Based on secondary sources, a total of 615 plant species have been documented in the Preliminary Analysis Area. Of these species, 133 or 21.6 per cent are considered introduced and non-native to southern Ontario. The majority of these 615 species have been identified in designated natural areas within the City of Windsor and the Town of LaSalle.

Further details with regard to vegetation and vegetation communities are provided in the *Environmental Overview Paper – Canadian Existing Conditions Volume 2.*

4.6.4 Wildlife and Wildlife Habitat

The Preliminary Analysis Area is comprised of urban, industrial, rural, agricultural and natural heritage features with numerous protected parks. Most of the natural heritage areas within the City of Windsor are located in the protected zones of the Ojibway Prairie Complex in the southwest corner of the municipality. Within the Town of LaSalle numerous natural areas, such as the Turkey Creek and Carnard Ecosystem management areas, are also protected with large expansive agricultural areas of creeks and drains making up the southern part of the Detroit River Watershed that runs down to the Canard River. This river opens into the provincially significant Canard River Mouth Marsh, which is adjacent to another provincially significant marsh located on Fighting Island. From the Canard River to Amherstburg, open agricultural areas and a few natural heritage features surrounding Big Creek and its tributaries, dominating the habitat of this region.

The determination of wildlife inhabiting the Preliminary Analysis Area was collected from secondary sources that covered as much of the area as possible. One hundred forty-nine species of wildlife were recorded. Of these, thirty-three species were herpetofauna, most of which were recorded along creeks or within prairie grasslands and forests of the natural heritage areas, and eighty-eight species of birds were documented breeding within the Preliminary Analysis Area. In addition, thousands of migrating birds, comprising many more species, stage in the Detroit River and adjacent marshes each spring and fall. The 28 species of mammals that have also been recorded within the Preliminary Analysis Area finalize the wildlife totals. A summary of the wildlife recorded in the Preliminary Analysis Area based on secondary sources is provided in the *Environmental Overview Paper – Canadian Existing Conditions Volume 2*.

[33] URS Canada Inc. Canada - U.S. - Ontario - Michigan Border Transportation Partnership Planning/Need and Feasibility Study: Environmental Overview Report (Amended). January, 2005.
[34] Manny, B. A., T. A. Edsall and E. Jawarski. 1988. The Detroit River, Michigan: An ecological profile biological report. US Fish and Wildlife Service, US Department of Interior. Contribution No. 683 of the National Fisheries Research Centre - Great Lakes. Ann Arbor, MI.
[35] OMNR. 1997. Resource Management Plan for Ojibway Prairie Provincial Nature Reserve (Ontario Parks). Ontario Ministry of Natural Resources, Chatham Area Office. 26 pp. + maps.

4.6.5 Designated Natural Areas

A number of Evaluated Wetlands, Areas of Natural and Scientific Interest (ANSIs) and Environmentally Significant Areas (ESAs) and one Provincial Nature Reserve are located within the Preliminary Analysis Area. Two of these natural heritage features have also been evaluated by Carolinian Canada. These features are illustrated in Exhibit 4.17, and summarized in Table 4.6.

In addition, the City of Windsor and the Town of LaSalle have both undertaken biological inventories of the remnant forest and prairie habitat features not already designated and afforded some form of preservation status in planning documents allow for the determination of whether these areas should be included under an Open Space/Greenway system policy to assist in their preservation. These areas are referred to as Candidate Natural Heritage Sites (CNHSs). This section provides a summary of these features within the Preliminary Analysis Area.

PROVINCIAL NATURE RESERVES

Provincial Nature Reserves are areas selected to represent the distinctive natural communities and landforms in Ontario. Ojibway Prairie is a 65 ha (161 acres) Provincial Nature Reserve that was regulated under the *Provincial Parks Act* in 1977 to protect one of the largest remnants of tallgrass prairie and oak savannah in Ontario (OMNR 2002). The dominant feature of this nature reserve is the tallgrass prairie plant community. Within the Ojibway Prairie Provincial Nature Reserve, 533 flowering plant species have been documented, of which more than 60 are of prairie and western affinity. It is home to more than 60 plants that are rare in Ontario as well as a number of animal species that are representative of prairie habitats (Pratt 1979; OMNR 2002).

Vegetation communities in Ojibway Prairie include Old Field (27.5 ha [68 acres]), Forb Prairie (17 ha [42 acres]), Tallgrass Prairie (11.5 ha [28 acres]), Thickets (3 ha [7.5 acres]), Oak Savannah (4.5 ha [11 acres]), and Black Oak/Red Hickory Forest (1.5 ha [3.7 acres]). While some early successional tallgrass prairie species occur in Old Field communities, the majority of species with a prairie affinity are located within the remaining vegetation communities. The Ojibway Prairie contains two vegetation communities that are globally and provincially rare. Moist-Fresh Tallgrass Prairie Type (TPO2-1) and Moist-Fresh Black Oak Tallgrass Savannah Type (TPS2) both have a global rank of G1 (Extremely Rare – having less than five occurrences in the overall range) and a provincial rank of S1 (Extremely Rare in Ontario – having less than five occurrences in the province).

The Ojibway Prairie provides habitat for three nationally and provincially 'Threatened' wildlife species listed on SARA, Schedule 1, including eastern foxsnake (*Elpahe gloydi*), Butler's gartersnake (*Thamnophis butleri*) and eastern hog-nosed snake (*Heterodon platirhinos*). Purple twayblade (*Liparis liliifolia*) and eastern prairie fringed orchid (*Platanthera leucophaea*), both nationally and provincially 'Endangered' and listed on SARA, Schedule 1, are present in the reserve. Colicroot (*Aletris farinosa*) and willowleaf aster (*Symphotrichum praealtum*), both nationally and provincially 'Threatened' and listed on SARA, Schedule 1, are present in the reserve. Several provincially, regionally and/or locally significant species are also present in the Ojibway Prairie.

EVALUATED WETLANDS

Evaluated wetlands in the Preliminary Analysis Area are predominantly riverine, and the majority are associated with the Detroit River. These evaluated wetlands include:

- Detroit River Marshes;
- Canard River Marshes;
- Fighting Island Wetland; and,
- Turkey Creek Wetland.

Detroit River Marshes

Wetlands located along the Detroit River are remnants of the submergent and land-based wetlands that once made up the more extensive Detroit River Wetland. Presently, the Detroit River Marshes Provincially Significant Watershed (PSW) is a 575 ha (1421 acres) coastal wetland complex comprised of six individual wetlands, including river marshes, Grassy Island, Turkey Island and the north and south ends and east side of Fighting Island. Wetland types include marsh (96 per cent) and swamp (4 per cent) and the dominant vegetation forms include submergent vegetation (59.4 per cent) and emergent vegetation (29.5 per cent). The site type of this wetland is 100 percent riverine, and soils have not been designated (Wormington and Fraser 1985a).

Submergent species such as pondweed (*Potamogeton* sp.), milfoil (*Myriophyllum* sp.) and grassleaf mud-plantain (*Heteranthera dubia*) are dominant in more than 59 per cent of this wetland, by area. Robust emergents such as cattail, reed (*Phragmites* sp.) and bulrush (*Scirpus* sp.) are common in marsh portions of this wetland. Smartweeds (*Polygonum* sp.), sedges (*Carex* sp.) and meadowsweet (*Spiraea* sp.) are also present in marsh communities. Species such as willow (*Salix* sp.), dogwood (*Cornus* sp.) and sumac (*Rhus* sp.) dominate swamp portions of this wetland.

This wetland provides breeding and/or feeding habitat for three nationally and provincially 'Threatened' wildlife species listed on SARA, Schedule 1, including eastern foxsnake, Butler's gartersnake and eastern massasauga (*Sistrurus catenatus*). It also provides habitat for swamp rose-mallow (*Hibiscus moscheutos*), a species listed on SARA, Schedule 3 and as 'Special Concern' both nationally and provincially. Several provincially, regionally and/or locally significant species are also present in this wetland.

Canard River Marshes

The Canard River Marshes PSW is a 416 ha (1028 acres) coastal wetland complex comprised of two individual wetlands. This wetland is 100 per cent marsh and the dominant vegetation forms include emergent vegetation, floating plants and submergent vegetation. The site type of this wetland is 100 percent riverine with 100 percent organic soils[36].

Submergent and floating-leaved vegetation and unvegetated water portions of this marsh comprise 50 per cent of this wetland, by area. Species in this community include water lily, and pickerel weed (*Pontederia cordata*). Together, robust emergents and narrow-leaved emergents are dominant in 48 per cent of this wetland, by area. Robust emergents include cattail and reed, and narrow-leaved emergents include grasses. Swamp portions of this wetland are dominated by species such as willows, red maple, silver maple, red-osier dogwood (*Cornus stolonifera*), black ash (*Fraxinus nigra*), green ash (*F. pennsylvanica*), white elm and swamp white oak.

[36] Parker, B. and J. Dawson. 1984. Wetland Data Record and Evaluation – Canard River. Second Edition. Ontario Ministry of Natural Resources. 1984. Manuscript. 12 pp. + 2 pp. supplement.

This wetland provides breeding and/or feeding habitat for Least Bittern (*Ixobrychus exilis*), a nationally and provincially 'Threatened' species listed on SARA, Schedule 1. It provides habitat for swamp rose-mallow, a species listed on SARA, Schedule 3 and as 'Special Concern' both nationally and provincially. Several provincially, regionally and/or locally significant species are also present in this wetland.

Fighting Island Wetland

Fighting Island Wetland PSW is a 113 ha (279 acres) coastal wetland comprised of 94 per cent marsh and six per cent swamp. Dominant vegetation forms include emergent vegetation and submergent vegetation in marsh portions and deciduous trees in swamp portions. This wetland is a dyked wetland, the site type is 100 per cent riverine and soils have not been designated (Wormington and Fraser 1985b).

Robust emergents such as cattail and reed are dominant in more than 75 per cent of this wetland, by area. Narrow-leaved emergents such as rice cut grass (*Leersia oryzoides*) and sedges are also present in these communities. Open water portions of this wetland contain species such as coontail (*Ceratophyllum* sp.), pondweed and milfoil. Species such as willow and dogwood dominate swamp portions of this wetland.

This wetland provides breeding and/or feeding habitat for three nationally and provincially 'Threatened' wildlife species listed on SARA, Schedule 1, including Least Bittern, eastern foxsnake and Butler's gartersnake. It provides habitat for swamp rose-mallow, a species listed on SARA, Schedule 3 and as 'Special Concern' both nationally and provincially. Several provincially, regionally and/or locally significant species are also present in this wetland.

Turkey Creek Wetland

Turkey Creek Wetland PSW is a 32 ha (79 acres) coastal wetland comprised of 77 per cent marsh and 23 per cent swamp. Dominant vegetation forms include emergent vegetation and submergent vegetation in marsh portions and deciduous trees and tall shrubs in swamp portions. This wetland is 80 percent riverine site type and 20 per cent riverine at river mouth site type with 100 per cent organic soils[37].

The majority of marsh areas in this wetland are dominated by robust emergents such as cattail. Narrow-leaved emergents such as rice cut grass are also present in marsh areas. Open water portions of this wetland contain submergent species such as pondweed and milfoil. Species such as willow and dogwood dominate swamp portions of this wetland.

This wetland provides breeding and/or feeding habitat for two nationally and provincially 'Threatened' wildlife species listed on SARA, Schedule 1, including eastern foxsnake and eastern massasauga. Several provincially, regionally and/or locally significant species are also present in this wetland.

AREAS OF NATURAL AND SCIENTIFIC INTEREST

ANSIs in the Preliminary Analysis Area include several provincially and regionally significant Life Science ANSIs. According to the OMNR (1998; 2004a), the Ojibway Prairie Complex provincially significant Life Science ANSI is comprised of the following areas:

- Ojibway Prairie Provincial Nature Reserve;
- Prairie Remnants (Ojibway Park) Life ANSI;
- Prairie Remnants (Titcombe Road North) Life ANSI;
- Prairie Remnants (Spring Garden Road) Life ANSI;
- Prairie Remnants (Black Oak Woods) Life ANSI; and,
- Prairie Remnants (Southeast of Nature Reserve) Life ANSI.

Ojibway Prairie Provincial Nature Reserve

The Ojibway Prairie Provincial Nature Reserve is discussed previously in this section.

Ojibway Park

Ojibway Park is a 64 ha (158 acres) site dominated by a Swamp White Oak Mineral Deciduous Swamp (SWD1-1), which has a provincial rank of S2S3 (Very Rare to Uncommon in Ontario – having five to 100 occurrences in the province). Prairie, savannah and woodland communities are also present. At least three different prairie communities have been identified in the park based on differing herbaceous layer species assemblages. Woody species in savannah and woodland communities include pin oak, swamp white oak, black oak (*Q. velutina*), and red maple.

Slender bush-clover (Lespedeza virginica), which is nationally and provincially 'Endangered' and listed on SARA, Schedule 1, is present in Ojibway Park. Several provincially, regionally and/or locally significant species are also present in Ojibway Park (OMNR 2002).

Titcombe Road North

This 40 ha site consists of tallgrass prairie and oak woodland communities. At least three different prairie communities have been identified in the Titcombe Road North ANSI based on differing herbaceous layer species assemblages. Woody species in woodland communities include black oak, white oak (*Quercus alba*) and red hickory (*Carya ovalis*).

Spring Garden Road

This 165 ha (408 acres) consists of tallgrass prairie and oak savannah site communities, all of which have a provincial rank of S1 ('Extremely Rare' in Ontario – having less than five occurrences in the province). Other vegetation communities present in Spring Garden Road ANSI include a large wetland and old field communities. The wetland was originally an artificially constructed lagoon and is presently the largest remaining wetland within the City of Windsor[38].

Spring Garden Road ANSI is home to approximately 475 species of plants, 66 species of breeding birds, 14 species of mammals, 10 species of reptiles, four species of amphibians and 66 species of butterflies. Many of the plant species have a prairie affinity[39]. Purple twayblade, which is nationally and provincially 'Endangered' and listed on SARA, Schedule 1, is present in Spring Garden Road ANSI. Two nationally and provincially 'Threatened' species listed on SARA, Schedule 1 are present including

[37] Wormington, A. and D. Fraser. 1985c. Wetland Data Record and Evaluation – Turkey Creek. Second Edition. August 1985. Ontario Ministry of Natural Resources, Chatham. Manuscript. 22 pp. + 2 maps + 3 pp. supplement.

[38] Woodliffe, P. A. 1994. Spring Garden Road Prairie. OMNR, Chatham. Unpublished letter. 3 pp. + map.
[39] Ibid.

colicroot and dense blazing star (*Liatris spicata*). American chestnut (*Castanea dentata*), which is nationally and provincially 'Threatened' and listed on SARA, Schedule 2, and prairie rose (*Rosa setigera*) and Riddell's goldenrod (*Solidago riddellii*), which are listed on SARA, Schedule 1 and as 'Special Concern' both nationally and provincially, are present in Spring Garden Road ANSI. Several provincially, regionally and/or locally significant species are also present in Spring Garden Road ANSI[40].

Black Oak Woods

This 46 ha (114 acres) site is dominated by a Moist-Fresh Black Oak-White Oak Tallgrass Woodland community (TPW2-1). This community type has a global rank of G1 ('Extremely Rare' – having less than five occurrences in the overall range) and a provincial rank of S1 ('Extremely Rare' in Ontario – having less than five occurrences in the province). Dominant tree species include black oak and white oak, with some particularly large specimen trees situated at the north end of the woodland.

This ANSI is home to at least 24 prairie indicator species. Purple twayblade, which is nationally and provincially 'Endangered' and listed on SARA, Schedule 1, willowleaf aster (*Symphotrichum praealtum*), which is nationally and provincially 'Threatened' and listed on SARA, Schedule 1, and American chestnut, which is nationally and provincially 'Threatened' and listed on SARA, Schedule 2 are all present in Black Oak Woods ANSI. Several provincially, regionally and/or locally significant species are also present in Black Oak Woods ANSI (OMNR 2002).

Regionally Significant Life Science ANSIs

In addition, two regionally significant Life Science ANSIs are located within the Preliminary Analysis Area, including:

- Canard River Kentucky Coffee-tree Woods; and,
- Canard River Scout Camp.

These regionally significant Life Science ANSIs are also designated as ESAs.

ENVIRONMENTALLY SIGNIFICANT AREAS

A number of Environmental Significant Areas (ESAs) are located within the Preliminary Analysis Area. Sixty-three (63) potential ESAs were inventoried in 1981 and/or 1982 and summarized by Oldham[41]. These ESAs were evaluated based on several physical, ecological and social criteria, including:

- Significant Landforms;
- Linkage System;
- Migratory Stopover;
- Significant Communities;
- Hydrological Significance;
- Diversity;
- Significant Species;
- Size;
- Research/Education; and,
- Aesthetic/Historical.

A location was deemed to be an ESA if at least two of the ten criteria were met. Eight ESAs were established within the study, including:

- Allied Chemical Brine Wells ESA;
- Canard River Kentucky Coffee-tree Woods ESA;
- Canard River Scout Camp ESA;
- Devonwood ESA;
- Sandwich West Woodlot (LaSalle Woods) ESA;
- Ojibway Black Oak Woods ESA;
- Spring Garden Road Prairie ESA; and,
- Upper Big Creek Woods ESA.

An update of ESAs within the County of Essex was undertaken in 1991 to evaluate supplementary sites, including previously considered sites and newly identified candidate ESA sites. A resolution was passed that all PSWs and ANSIs in the County of Essex be included as ESAs. An ESA update report was prepared by ERCA (1994), which detailed the criteria met by locations not already designated as a PSW or ANSI. In addition to the above-referenced PSWs and ANSIs, six additional ESAs were identified within the Preliminary Analysis Area, including;

- Fairplay Woods ESA;
- New Canaan Woods ESA;
- Peche Island ESA;
- Green Dragon Woods ESA;
- Reaume Prairie ESA; and,
- St. Clair College Prairie ESA.

A summary of the ESAs located within the Preliminary Analysis Area which have no other designation (e.g., PSW or ANSI) is presented in **Table** 4.6 and illustrated in **Exhibit** 4.17.

CAROLINIAN CANADA SITES

Carolinian Canada is a coalition of groups, agencies and individuals working to halt the loss of and achieve a substantial increase in the size and quality of natural communities characteristic of Carolinian Canada.

Two Carolinian Canada sites are present within the Preliminary Analysis Area, the Ojibway Prairie Remnants (site #31) and the Canard River Kentucky Coffee-tree Woods (site #32). The Ojibway Prairie Remnants site is now encompassed within the Ojibway Prairie Complex ANSI, and the Canard River Kentucky Coffee-tree Woods site is now encompassed within the Canard River Kentucky Coffee-tree Woods ESA.

[40] Oldham, M. J. 1994. Spring Garden Road Plant List. Natural Heritage Information Centre, Peterborough. Unpublished list. 7 pp.
[41] Oldham, M. J. 1983. Environmentally Significant Areas of the Essex Region. Essex Region Conservation Authority, Essex, Ontario. 426 pp.

EXHIBIT 4.17 – DESIGNATED NATURAL AREAS IN THE PRELIMINARY ANALYSIS AREA

LEGEND

- Maximum Footprint Area of Combined Alternatives
- Area of Natural and Scientific Interest
- Candidate Natural Heritage Site
- Environmentally Significant Area

Data Sources: LGL Limited field surveys, Spring 2006 aerial photography.

DESIGNATED NATURAL AREAS LOCATED IN THE AREA OF INVESTIGATION

LGL Limited
environmental research associates

Project: TA4137	
Date: February 2007	**Prepared By:** MWF
Scale: 1 : 35,000	**Checked By:** GNK

TABLE 4.6 – SUMMARY OF ENVIRONMENTALLY SIGNIFICANT AREAS IN THE PAA

ESA Name (ESA Number)	Significant Landforms	Linkage System	Migratory Stopover	Significant Communities	Significant Habitats/ Hydrological Significance	Diversity	Significant Species	Size	Research/ Education	Aesthetic and/or Historical Values
Canard River Scout Camp (#1)	n/a	Connected to the longest stretch of relatively continuous woodland in Essex County.	n/a	Largest upland wooded area remaining on the Canard River.	n/a	Good	Two SARA, Schedule 1 species, several provincially and locally significant species.	35 ha	Scout Camp.	Sites with adequate trails through continuous woodland are uncommon in Essex County.
Canard River Kentucky Coffee-tree Woods (#2)	n/a	Forms part of a wooded corridor along the Canard River.	n/a	The only example of a lowland forest community containing Kentucky Coffee-tree in the Essex Region.	n/a	Good	Three SARA, Schedule 1 species, several provincially and locally significant species.	99 ha	n/a	n/a
Ojibway Prairie Complex (#3)	See Section 4.6.6									
Canard River Marsh (#13)	See Section 4.6.6									
Allied Chemical Brine Wells (#14)	n/a	n/a	Used by migrating shorebirds and waterfowl.	Unusual inland assemblage of halophytic (salt-tolerant) plants.	The alkaline, salt-rich soil and water provide unusual habitat.	n/a	Three SARA, Schedule 1 species, several provincially and locally significant species.	180 ha	Researched and documented by Catling and McKay in Canadian Field-Naturalist.	n/a
Sandwich West Woodlot/LaSalle Woods (#18)	n/a	Linkage with Turkey Creek and Ojibway Prairie via a hydro corridor.	n/a	Species assemblages include species with a prairie affinity.	Prairie habitat.	Good	Six SARA, Schedule 1 species, one SARA, Schedule 2 species, several provincially and locally significant species.	115 ha	Associated with Brunet Park. Potential for scientific research on prairie flora and fauna.	n/a
Ojibway Black Oak Woods (#19)	n/a	Linkage with Ojibway Prairie.	n/a	Species assemblages include species with a prairie affinity.	n/a	n/a	One SARA, Schedule 2 species, several provincially and locally significant species.	67 ha	n/a	n/a
Spring Garden Road Prairie (#29)	n/a	Linkage with Ojibway Prairie.	n/a	Considered to be one of the best prairie remnants remaining in Essex County.	Prairie habitat.	n/a	Three SARA, Schedule 1 species, one SARA, Schedule 2 species, several provincially and locally significant species.	145 ha	n/a	Impressive display of fall-blooming prairie wildflowers.

ESA Name (ESA Number)	Significant Landforms	Linkage System	Migratory Stopover	Significant Communities	Significant Habitats/ Hydrological Significance	Diversity	Significant Species	Size	Research/ Education	Aesthetic and/or Historical Values
Peche Island (#30)	One of five main islands in the Detroit River.	n/a	n/a	n/a	n/a	Good	Five SARA, Schedule 1 species, several provincially and locally significant species.	40 ha	n/a	Used as a fishing station, both by natives and by settlers. It contains the foundation of a summer residence constructed by the famous distiller Hiram Walker.
Fighting Island (#32)	Largest of the five main islands in the Detroit River.	n/a	Used as a feeding stop for migratory waterfowl.	Carolinian forest communities present.	n/a	Good	One SARA, Schedule 1 species, one SARA, Schedule 3 species, several provincially and locally significant species.	148.8 ha	n/a	Occupied by the Wyandot Native Americans until 1820. Well known for its role in the Patriot War (1837-38). Promoted as a resort area from 1890-1918.
Upper Big Creek Woodlot (#33)	n/a	Linkage along Big Creek to Big Creek Marsh (#15).	n/a	Species assemblages include species with a prairie affinity.	Habitat for eastern foxsnake, Butler's gartersnake, White-eyed Vireo and Yellow-breasted Chat.		Four SARA, Schedule 1 species, one SARA, Schedule 3 species, several provincially and locally significant species.	97 ha	Resident snakes researched and documented by Freedman and Catling in Canadian Field-Naturalist.	n/a
New Canaan Valley (#36)	n/a	Longest natural linkage in the region (12 km) and linkage with Canard River Kentucky Coffee-tree Woods (#2)	n/a	Communities which are provincially unusual include buttonbush thickets and yellow pond-lily/lizard's tail marshes.	The Canard River is the region's largest natural watercourse. New Canaan Valley provides floodwater storage capacity and flow attenuation	Good	One SARA, Schedule 1 species, one SARA, Schedule 3 species, several provincially and locally significant species.	220 ha	n/a	Named after the New Canaan Settlement founded by runaway slaves from the U. S. in the 1850s. Union Cemetery is located in the ESA. A portion of a railroad built by Hiram Walker is located in the ESA.
Fairplay Woods (#38)	Contains portions of a river channel which predates 19th century settlement. Provides an example of pre-settlement channel configuration and capacity.	n/a	n/a	n/a	Provides floodplain storage and reserve flow capacity for Pike Creek.	Good	One SARA, Schedule 1 species, one SARA, Schedule 3 species, several provincially and locally significant species.	48 ha	n/a	n/a

ESA Name (ESA Number)	Significant Landforms	Linkage System	Migratory Stopover	Significant Communities	Significant Habitats/ Hydrological Significance	Diversity	Significant Species	Size	Research/ Education	Aesthetic and/or Historical Values
Devonwood (#45)	n/a	n/a	n/a	Unique woodlot contains eight oak species plus hybrids.	n/a	n/a	Two SARA, Schedule 1 species, one SARA, Schedule 3 species, several provincially and locally significant species.	40 ha	Presence of eight oak species plus hybrids provides an opportunity to study this group.	n/a
St. Clair College Prairie (#49)	n/a	n/a	n/a	n/a	Species assemblages include species with prairie and savannah affinities.	Good	Three SARA, Schedule 1 species, several provincially and locally significant species.	15 ha	The St. Clair College of Applied Arts and Technology is adjacent to this ESA.	n/a
Green Dragon Woods (#62)	n/a	Forms part of a wooded corridor along the Canard River.	n/a	n/a	The floodplain contains oxbows and braided channels which provide flood storage capacity and reduce main channel velocity.	n/a	One SARA, Schedule 1 species, one SARA, Schedule 3 species, several provincially and locally significant species.	32 ha	n/a	n/a
Reaume Prairie (#64)	n/a	n/a	n/a	Considered to be one of the best prairie remnants remaining in Essex County.	n/a	Good	Four SARA, Schedule 1 species, one SARA, Schedule 3 species, several provincially and locally significant species.	14 ha	n/a	n/a
Detroit River Marshes (#77)	See Section 4.6.6									

Note: “n/a” indicates that this criterion does not apply to the Environmentally Significant Area.

4.7 Transportation Network

This section provides an overview of the existing transportation system in the Preliminary Analysis Area (PAA), comprising the road, rail and marine border crossing facilities and the supporting transportation infrastructure for the Detroit River and St. Clair River crossings.

BRIDGE AND TUNNEL CROSSINGS

There are three road crossings between southeast Michigan and southwest Ontario. These include the Ambassador Bridge and Detroit-Windsor Tunnel, which cross the Detroit River in Windsor-Detroit, as well as the Blue Water Bridge, which crosses the St. Clair River in Sarnia-Port Huron.

Ambassador Bridge

The Ambassador Bridge was opened in 1929 and connects the local road network in west Windsor with the U.S. interstate system in southwest Detroit. From entrance to exit, the suspension bridge is 2.8 km long, and rises as high as 46 m above the Detroit River at its centre. Two lanes in each direction are provided along its length; currently one is used for cars and one for commercial vehicles. All tolls are collected on the U.S. side of the bridge, although toll collection facilities also exist on the Canadian side on the approach to the bridge.

For entry to the U.S., Department of Homeland Security (DHS) operates separate border processing facilities for commercial vehicles and for passenger cars. Commercial vehicles are routed via a ramp from the bridge to a processing area below and to the east of the bridge with 13 primary inspection booths. Passenger cars continue straight ahead from the bridge to 12 primary inspection booths. Toll booths are provided after primary inspection for cars and commercial vehicles.

For entry to Canada, Canada Border Services Agency (CBSA) operates ten passenger car and ten truck primary inspection lanes. Secondary inspection for cars occurs beyond the primary inspection booths. Secondary inspection for commercial vehicles is located off-site at Malden Road, approximately two kilometres south, and west of Huron Church Road, although there is a small area for secondary commercial inspection at the plaza.

Detroit-Windsor Tunnel

The Detroit–Windsor Tunnel was opened in 1930 and connects downtown Windsor and downtown Detroit. The tunnel is approximately 1.6 km long and extends 23 m below the surface of the Detroit River. The tunnel is illuminated and ventilated. One lane is provided in each direction. The tunnel has a height clearance of 4.0 m and a 330-degree bend, which restricts the types of commercial vehicles that can use this crossing.

Primary inspection facilities are provided at the entry to both Canada and the U.S. Due to the downtown location of the plazas, the space for secondary commercial inspection is limited and most secondary inspection for commercial vehicles is carried out off-site.

There are 12 primary inspection lanes on the U.S. side, including three booths available for use by commercial vehicles. Secondary inspection for cars is carried out immediately adjacent to the primary inspection with 23 spaces available. In Canada, there are 12 primary inspection lanes, with commercial vehicle primary inspection lanes to the east of the tunnel exit portal and leading onto Goyeau Street. Primary inspection lanes for cars are on the west side of the tunnel exit portal, leading onto Park Street. Secondary inspection for cars is located directly after passing through the primary inspection. Secondary inspection for commercial vehicles is located off-site at Hanna Street, approximately 1.5 km south of the tunnel plaza, although there is a small area for secondary commercial inspection on the plaza itself.

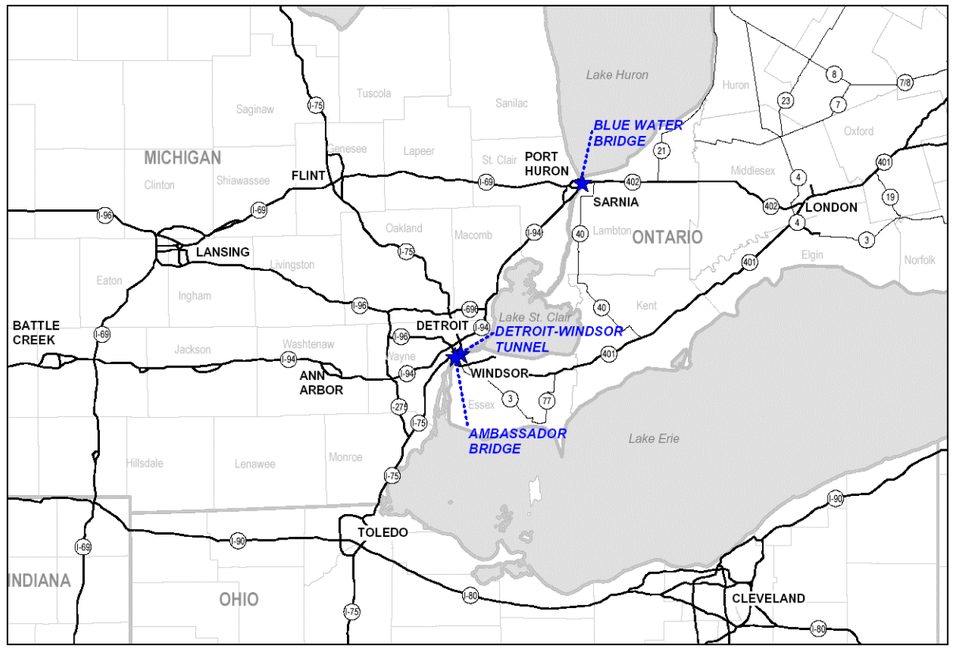
Blue Water Bridge

The Blue Water Bridge was opened in 1938. The original three-lane, 1.88 km cantilever truss bridge over the St. Clair River connects Sarnia and Port Huron. A second three-lane, 1.86 km continuous tied arch bridge was opened in 1997 to allow the closure of the first span for major deck rehabilitation. In 1999, both spans were open to traffic, providing a significant increase in roadway capacity.

HIGHWAY SYSTEM

The road border crossings in the Preliminary Analysis Area are served by a network of provincial highways in Ontario and interstate highways in Michigan. The layout of the highway network in the broad geographic Preliminary Analysis Area is a key aspect of cross-border route selection (see Exhibit 4.18).

EXHIBIT 4.18 - SOUTHWEST ONTARIO / SOUTHEAST MICHIGAN HIGHWAY SYSTEM



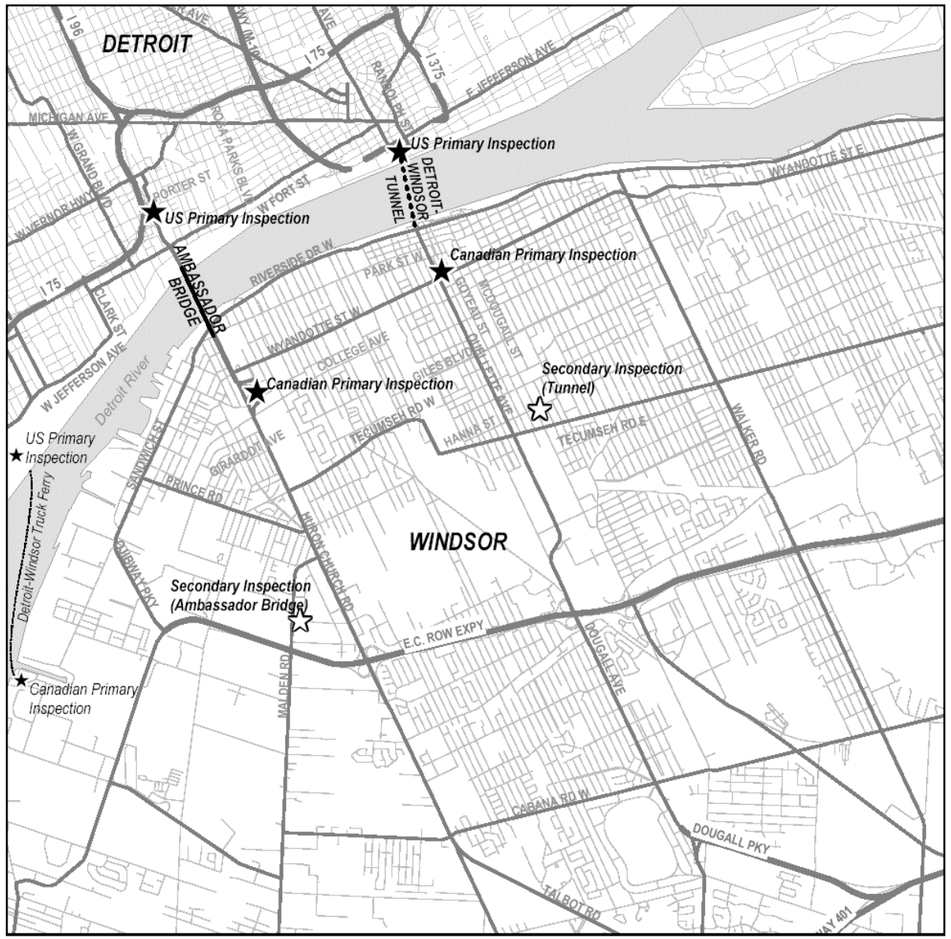
Highway 401 is the dominant corridor in Canada, extending from beyond the Greater Toronto Area to Windsor, with local road access to the Ambassador Bridge. In Detroit, the Ambassador Bridge connects with the interstate system, with the main long distance travel flows being I-75 for travel to south U.S. and I-94 for travel west to Chicago and beyond.

For travel via Sarnia-Port Huron, Highway 402 branches off of Highway 401 west of London towards Sarnia, where it connects with the Blue Water Bridge. In the U.S., I-94 connects with the Blue Water Bridge and provides freeway access south to Detroit. I-69 provides a westward connection from Port Huron, linking with I-94 near Battle Creek. For trips from Highway 401 to points west via I-94 or south via I-69, the routes using the Ambassador Bridge and the Blue Water Bridge are almost equal in length.

ROAD SYSTEM

Exhibit 4.19 illustrates the local road system and access roads in the vicinity of the Ambassador Bridge and the Detroit-Windsor Tunnel.

EXHIBIT 4.19 – LOCAL ROAD SYSTEM



Canadian Access Roads

Huron Church Road is the main access road to the Ambassador Bridge on the Canadian side; this six-lane urban arterial road links Highway 401 to the Ambassador Bridge via Highway 3/Talbot Road. The posted speed limit on Huron Church Road is 80 km/h from Highway 3/Talbot Road to Pulford Street (south of the E.C. Row Expressway), and 60 km/h from Pulford Street to College Avenue, near the bridge plaza. There are 17 signalized intersections on Huron Church Road and Highway 3/Talbot Road between Highway 401 and the Ambassador Bridge.

In consideration of the high commercial vehicle volumes, overhead signs direct commercial vehicles to use the centre lane, local traffic to use the right lane, and international cars to use the left lane. Further north, at Northwood Street (north of the E.C. Row Expressway) cars are directed to use the left lane, while commercial vehicles use the centre and right lanes.

Significant development and facilities along Huron Church Road also contribute to traffic levels on this route. Significant traffic generators along Huron Church Road include, from north to south, the University of Windsor at College Avenue, Assumption High School at Wyandotte Street, the University Mall at Tecumseh Road, and, further south on the Highway 401/Huron Church Road corridor, St. Clair College on Talbot Road.

The Detroit-Windsor Tunnel is accessed from Goyeau Street, an arterial road in the central business district. From Highway 401, the route to the tunnel follows the urban arterial roads of Dougall Avenue/Ouellette Avenue, then Wyandotte Street and Goyeau Street to the tunnel entrance in downtown Windsor. For trips arriving in Canada from the tunnel, exit from the tunnel into Windsor is onto Park Street, then either onto Goyeau Street or Ouellette Avenue. The route along Dougall Avenue/Ouellette Avenue is a four-lane urban arterial road. The Dougall Avenue exit on westbound Highway 401 is signed on the highway as a route to the Detroit-Windsor Tunnel, although the primary function of these roads are as local roads.

U.S. Access Roads

For traffic using the Ambassador Bridge, cars and commercial vehicles have many route options, given the close proximity to several Interstate freeways. Cars exit onto Porter Street, which has ramps at signalized intersections to/from I-75 and I-96 and intersects with service roads paralleling the freeways. All commercial vehicles entering the U.S. from the Ambassador Bridge follow a ramp to the truck customs inspection facility, and then exit onto West Fort Street, south of the plaza. Commercial vehicles can link with I-75 by travelling west on Fort Street then north on Clark Street, or by travelling east then north on Rosa Parks Boulevard. I-75 provides a connection south toward Ohio and north toward northern Michigan. It can also be used to access I-96, which connects to western Michigan and is the link to I-94 for travel toward Chicago. The arrangement from the bridge to the Interstate freeway systems is a confusing arrangement for drivers and hazardous due to the high level of weaving traffic. The Ambassador Bridge Gateway Project, which is currently under construction and is expected to be completed by December 2009, will address these traffic issues.

At the Detroit-Windsor Tunnel, commercial vehicles are part of the same traffic stream as cars. All traffic entering or leaving the Detroit-Windsor Tunnel must pass through the signalized intersection of the tunnel access to the south, Randolph Street to the north, and Jefferson Avenue to the east and west. Interstate 375 and M-10 (John C. Lodge Freeway) link with Jefferson Avenue in close proximity to the tunnel. The M-10 provides access to the I-96 and I-75 freeways from the tunnel.

RAIL SYSTEM

The rail network serving the Preliminary Analysis Area roughly parallels the U.S. interstate/Ontario provincial road system. Exhibit 4.20A is a map of the rail network and operators.

A Canadian National Railway (CN) line runs from London to Sarnia parallel to the Highway 402 corridor, and continues through Port Huron, following I-69 to Battle Creek, then continues toward Illinois and beyond. VIA rail and Amtrak passenger services use this line, although the one through-train was discontinued in 2004. Another CN line roughly follows the Highway 401 corridor from London to Windsor, carrying VIA passenger service. The line continues through Detroit, northwest toward Flint. Amtrak passenger services are available on this line from Detroit to Pontiac. In Canada, this line roughly parallels a Canadian Pacific Railway (CPR) line from London to Windsor. The CPR line continues through Detroit to Lansing, Chicago (via trackage rights), and beyond. A CN line connects Detroit and Port Huron on the Michigan side.

Other rail operators have connections in Detroit. A Norfolk Southern (NS) line, used by Amtrak, runs between Detroit and Chicago roughly along I-94. Another NS line runs south toward Toledo then branches east and west. An Indiana & Ohio Railway (IORY) line runs south toward Cincinnati. CSX Transportation (CSXT) lines run north toward Saginaw, and south toward Cincinnati or Columbus. A Tuscola and Saginaw Bay Railway Company (TSBY) line connects in Ann Arbor to service northwest Michigan. A CSXT line also links Sarnia and Chatham on the Canadian side, roughly along the Highway 40 corridor.

For rail freight, two underground railway crossings are located at Sarnia-Port Huron and at Windsor-Detroit. The former is owned and controlled by CN and the latter, comprised of one well-used line and one unused line, is controlled by CPR and owned by a joint venture of CPR and Borealis Infrastructure Fund. The locations of the Detroit-Windsor tunnels are also shown in Exhibit 4.20B.

During the 1990s, both crossings were expanded to accommodate larger vehicles. The CN tunnel at Sarnia accommodates the largest vehicles that operate across the North American railway system. CPR expanded one of the two existing tunnels between Detroit and Windsor to the maximum dimensions structurally possible; this is not quite as large as the CN tunnels and cannot accommodate double-stack domestic containers; however, it is capable of handling double-stack international containers, intermodal trailers on flat cars (TOFC), as well as domestic auto tri-level cars, which were the primary target market.

EXHIBIT 4.20A – RAIL SYSTEM: SOUTHEASTERN MICHIGAN/SOUTHWEST ONTARIO

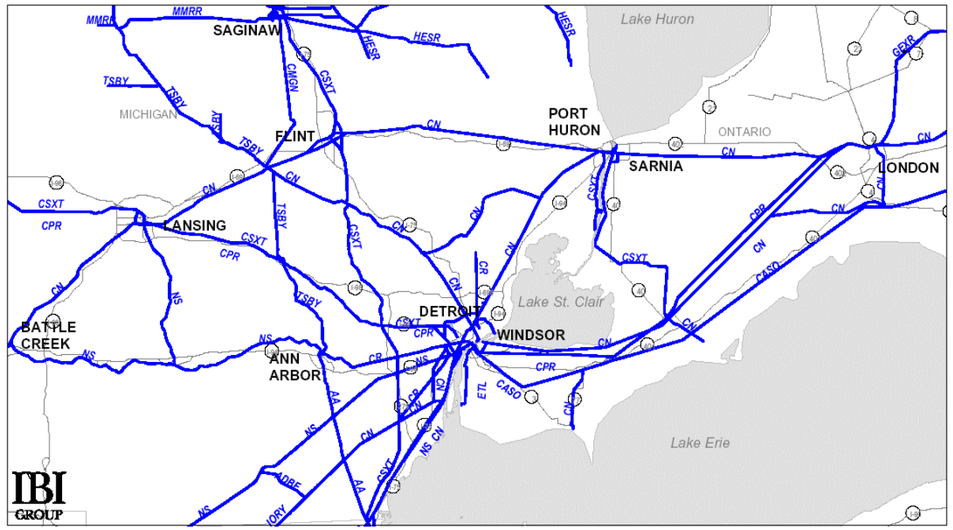
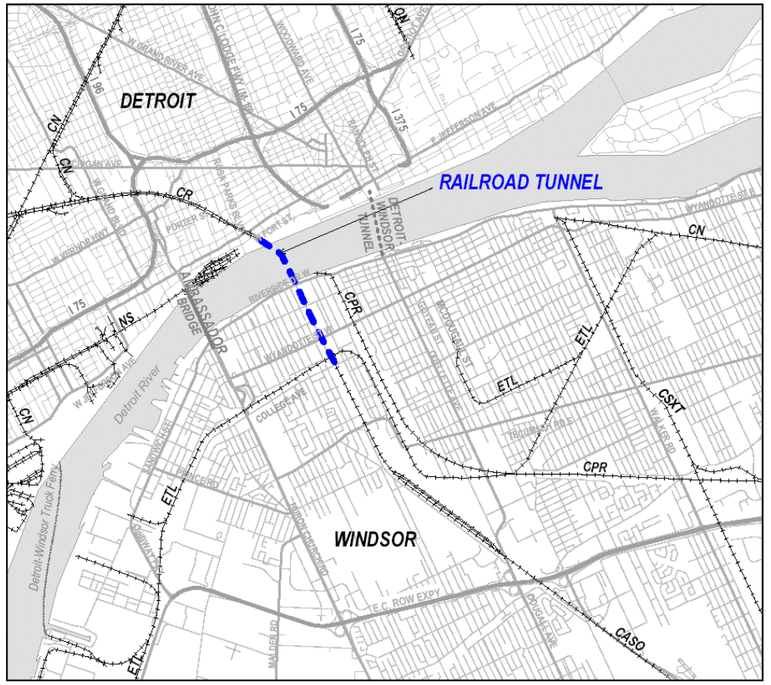


EXHIBIT 4.20B – RAIL SYSTEM: WINDSOR-DETROIT



MARINE SYSTEM

There are currently three ferry services operating in the Preliminary Analysis Area, consisting of the Walpole Island Ferry, Marine City Ferry and Detroit–Windsor Truck Ferry. The locations of these are shown in Exhibit 4.21. Each service has relatively limited vehicle capacity.

The Walpole Island Ferry provides daily service at 20-minute headways between Algonac, Michigan and Walpole Island, Ontario at the northern end of Lake St. Clair, weather permitting. Two boats are available, each capable of servicing 20 passenger cars and/or small commercial vehicles. Ferries leave Walpole Island from 6:20 a.m. to 9:45 p.m., and return from Marine City from 6:50 a.m. to 10:00 p.m. The one-way cost is approximately $4 US and travel time is six minutes.

The Marine City Ferry operates daily between Marine City, Michigan and Sombra, Ontario, weather permitting. Two boats are used when busy. The ferries can transport 12 passenger cars each, but will also take commercial vehicles. The larger of the two ferries can hold up to two tractor trailers or larger vehicles up to 80,000 pounds gross weight each. The service runs approximately every 15 minutes, seven days a week year round at a cost of $5 US per car each way and $2 for foot passengers. Ferries leave Sombra from 6:40 a.m. to 10:15 p.m., and return from Marine City from 7:00 a.m. to 10:30 p.m. Travel time is seven minutes.

The Detroit-Windsor Truck Ferry was started in 1990 for the purpose of handling commercial vehicles carrying dangerous goods (Classes 1, 3, 7 and 8), which are banned from the bridge and tunnel crossings in accordance with Michigan State law. The ferry also handles over-sized loads that cannot use the bridge or tunnel, but its use is not restricted to these two markets. The ferry operates hourly 10 hours per day and can accommodate eight trucks per crossing.

The truck ferry provides a significant distance savings to commercial vehicles carrying dangerous goods or heavy loads by allowing them to cross at Windsor-Detroit as opposed to having to travel to alternate ports that support this market. The alternative for vehicles with dangerous goods within the Preliminary Analysis Area is Port Huron-Sarnia. Heavy vehicles must cross much further away by land between Minnesota and Ontario. It is estimated that more than 50 per cent of the trips using the ferry crossing are from London (i.e., the point at which travel distances across the corridor via Port Huron-Sarnia and Windsor-Detroit are similar) inward, with a similar market range on the Michigan side.

EXHIBIT 4.21 – MARINE SYSTEM