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Canada-United States-Ontario-Michigan Border Transportation Partnership

Draft Practical Alternatives Evaluation Working Paper

Natural Heritage

July 2007
Version 1

EXECUTIVE SUMMARY

Assessing the project impacts on natural heritage features such as fisheries, vegetation, wildlife and designated natural areas is an important part of the Detroit River International Crossing (DRIC) Environmental Assessment. The analysis of natural heritage features entailed collection and review of existing information, personal communications with local experts and detailed, multi-season field investigations. An area of investigation (AOI) located within the area of continued analysis (ACA) was defined for each biological discipline based on the potential for displacement or disturbance effects.

VEGETATION AND VEGETATION COMMUNITIES

The DRIC study team investigated all vegetation communities located within the AOI to classify vegetation communities, inventory plants and confirm the presence/absence of species at risk.

How the Analysis was Done

Background information was obtained from the Ministry of Natural Resources (MNR), Essex Region Conservation Authority (ERCA) and local field naturalists. Field investigations were performed in April, May, June, July, August and October 2006, throughout the growing season. Vegetation communities were delineated on air photos and refined through ground truthing. The Ecological Land Classification (ELC) system was used to describe vegetation communities.

A plant survey was conducted in each vegetation community to identify composition, structure and function. Representative photographs were taken. Species at risk were identified in the field where possible or photographs or samples were taken for identification or verification purposes. The locations of species at risk were recorded using a Global Positioning System (GPS), where possible.

Results

Nine types of vegetation communities located in the AOI are considered provincially or globally rare. A total of 618 species of vascular plants were identified, 63 of which are considered provincially rare. Eight plant species are regulated as Endangered, Threatened or Special Concern in the schedules to the *Species at Risk Act* (SARA).

MOLLUSCS AND INSECTS

The DRIC study team screened the AOI and its vicinity for the presence/absence of rare molluscs and insects.

How the Analysis was Done

Secondary source data on molluscs and insects of the Windsor area was collected through literature searches, review of databases and personal communications with local experts. Background data collected was reviewed and compiled into two databases

(molluscs and insects). The scope of the investigation was limited to provincially rare species.

Results

Currently nine species of molluscs, including two classes of Mollusc phyla, the Mussels (Bivalves) and the Snails (Gastropods) are listed as Endangered and one as Threatened by the Committee on the Status of Wildlife in Canada (COSEWIC), and eight species are listed as Endangered by the Committee on the Status of Species at Risk in Ontario (COSSARO). There is the potential that these species may occur in the AOI, but no comprehensive field investigations have been conducted of the Windsor area. Several of these species likely occurred in the Detroit River historically. Data obtained from the MNR indicates that nine rare species of Bivalves and two rare species of Gastropods occur in the vicinity of the AOI.

Over 2055 species of insects have been reported from the Ojibway Prairie Complex. The Ojibway Prairie Complex and its vicinity is the only site for 16 Canadian species and 6 Ontario species records. It is one of a few sites for 37 Canada species and 29 Ontario species records. The insect, *Loxocera ojibwayensis*, is a small Psilidae fly (Diptera) that was discovered at the Ojibway Prairie, and it is the only known site in the world for this species. One-hundred-and-thirteen important species are known from the Ojibway Prairie Complex and its vicinity and an additional seven species of dragonflies (Odonata) potentially occur there as well. These 113 species are broken up into one species of Diptera (true flies), 22 species of Auchenorrhyncha Hemiptera (hoppers), 13 species of Heteroptera Hemiptera (true bugs), 41 species of Hymenoptera (bees and wasps), 17 species of Lepidoptera (moths and butterflies), 13 species of Odonata (damselflies and dragonflies), and six species of Orthoptera (grasshoppers, crickets and katydids). The Monarch is known to occur in the AOI and its vicinity; and it is regulated as Special Concern in Schedule 1 of SARA.

FISH AND FISH HABITAT

The DRIC study team investigated all watercourses and waterbodies located within the AOI to confirm the presence/absence of fish and fish habitat and species at risk.

How the Analysis was Done

Background information was obtained from the Department of Fisheries and Oceans Canada (DFO), MNR and ERCA. Field investigations were performed in May, September and October 2006. The fish community was investigated at 58 stations using backpack electrofishing equipment, minnow traps, dip nets or through direct observation. Fish habitat along 38 watercourse reaches was characterized and photographed. The Detroit River bed in the vicinity of the proposed piers was also videotaped using underwater video camera and sediment was sampled.

Results

Most watercourses in the AOI are designated as agricultural municipal drains and are altered by agricultural or urban development. No watercourses or waterbodies in the AOI support coolwater or coldwater fish communities, with the exception of the Detroit River. The Detroit River, Turkey Creek, Lennon Drain, McKee Creek and Cahill Drain directly

support warmwater sportfish communities (i.e. bass, sunfish, etc.). Remaining fish habitat supports warmwater baitfish communities (i.e. minnows, chubs, etc.). Many watercourses function as municipal agricultural drains and do not directly support fish habitat. No critical fish habitat or fish species at risk were identified in inland watercourses. Species at risk and their habitat is present in the Detroit River; however, no specialized habitat for species at risk is located in the vicinity of the proposed piers.

WILDLIFE AND WILDLIFE HABITAT

The DRIC study team investigated all wildlife habitats located in the AOI to identify important habitat for wildlife, inventory wildlife and confirm the presence/absence of species at risk.

How the Analysis was Done

Background information was obtained from the MNR, ERCA and local field naturalists. Field investigations were performed in March, April, May, June, July, August, September, October and November 2006 and February 2007. Wildlife habitat was delineated on air photos and refined through ground truthing. ELC was used to describe wildlife habitat, where appropriate.

Wildlife was identified through direct observation, vocalizations, tracks, scats and browse. One hundred and twenty point-count breeding bird surveys were performed at 60 stations. Species at risk were identified in the field and a photograph was taken for verification purposes. The locations of species at risk were recorded using a GPS, where possible.

Results

One hundred and twenty-four wildlife habitat units were identified in the AOI, many of which meet the criteria for "significance" in Ontario. A total of 139 wildlife species were recorded in the AOI including 11 reptiles and amphibians, 108 birds and 20 mammals. Breeding bird surveys identified a total of 50 species of breeding birds in the AOI. Red-headed Woodpecker, regulated as Special Concern in Schedule 3 of SARA, was confirmed breeding in the Brighton Beach area. Three eastern foxsnake and four Butler's gartersnake were recorded in the AOI. Both species are regulated as Threatened in Schedule 1 of SARA. Other Threatened, Schedule 1 SARA species known to occur in the Ojibway Prairie Complex, including eastern massasauga and eastern hog-nose snake, were not recorded in the AOI.

DESIGNATED NATURAL AREAS

The DRIC study team investigated all designated natural areas in the AOI and its vicinity.

How the Analysis was Done

Secondary source information on Areas of Natural and Scientific Interest (ANSI), Provincially Significant Wetlands (PSW), Environmentally Sensitive Areas (ESA), Provincial Nature Reserves, Candidate Natural Heritage Sites (CNHS), Carolinian Canada sites, Canadian Heritage Rivers and municipal land use designations was collected and reviewed to identify the location and type of designated natural areas.

Results

The Ojibway Prairie Provincial Nature Reserve is a 65 ha parcel that is regulated under the *Provincial Parks Act* to protect one of the largest remnants of tallgrass prairie and oak savannah in Ontario. The Ojibway Prairie Complex is a provincially significant life science ANSI that is comprised of the following areas: Ojibway Prairie Provincial Nature Reserve; Ojibway Park; Titcombe Road North; Spring Garden Road; Black Oak Woods; and, Prairie Remnants (Southeast of Nature Reserve). A total of five ESAs are located in the AOI and its vicinity including: Ojibway Prairie Complex (#3); Sandwich West Woodlot/Lasalle Woods (#18); Ojibway Black Oak Woods (#19); Spring Garden Road Prairie (#29); and, St. Clair College Prairie (#49). Three areas are designated as Natural Environment by the Town of LaSalle Official Plan, including: Southeast of the Nature Reserve ANSI; the Spring Garden Forest ANSI; and, the LaSalle Woods. Three areas are designated as Natural Heritage by the City of Windsor Official Plan, including: Ojibway Prairie Complex; Oakwood Bush and the eastern section of Malden Park; and, three areas are designated as Special Policy Area "A" including two areas of the Titcombe Road North ANSI, a section of the Spring Garden Forest ANSI and the St. Clair College Prairie ESA. A total of three CNHSs are identified in LaSalle and ten CNHSs are identified in Windsor. There are no PSWs located in the AOI. The Detroit River is designated as a Canadian Heritage River.

EVALUATION OF PRACTICAL ALTERNATIVES

The natural heritage discipline conducted an evaluation of seven crossing and plaza combinations and 18 access road combinations. The evaluation was conducted using five criteria:

- Impacts to ecological landscapes located in the right-of-way (ROW);
- Impacts to terrestrial communities/ecosystems located in the ROW;
- Impacts to aquatic communities/ecosystems located in the ROW;
- Impacts to species/population at risk located in the ROW; and,
- Impacts to designated natural areas located on adjacent lands within 120 metres of the ROW.

Indicators were used, where appropriate, to measure the number, area, type and significance of natural heritage features.

An arithmetic evaluation was conducted using the simple additive weighting method. Weights were assigned to criteria and indicators to reflect their level of importance. The results of the arithmetic evaluation were reviewed against the original data to ensure that the numerical results could be supported through reasoned argument. The evaluation of the practical alternatives using natural heritage criteria resulted in the identification of preferred plazas, crossings and access roads.

Plazas and Crossings

- The most preferred crossing and plaza is Crossing C to Plaza C. Crossing C to Plaza C is most preferred because it avoids the natural heritage features associated with the Brighton Beach area and the area north of Chappus Road. Crossing A to Plaza A

is least preferred because it will displace natural heritage features located in the Brighton Beach area and the area north of Chappus Road.

- Plaza B1 from Crossing C has the greatest potential to disturb designated natural heritage features located on adjacent lands, due to its close proximity to the Black Oak Woods ANSI/ESA.
- The alternatives involving Plaza A are least preferred, with the exception of Plaza A from Crossing C through C-G (Ojibway Parkway) which is the second most preferred alternative because it avoids the Brighton Beach area.
- An impact score of "3" (low impact) was assigned to Crossing C to Plaza C; an impact score of "2" (moderate impact) was assigned to Crossing C to Plaza A through C-G, Crossing C to Plaza B and Crossing B to Plaza B1; and, an impact score of "1" (high impact) was assigned to Crossing C to Plaza A through C-E-G, Crossing B to Plaza A and Crossing A to Plaza A.

Access Roads

- There is no significant difference among access roads based on vertical profile (i.e. at grade (Alternative 1), depressed (Alternative 2) or tunnel (Alternative 3)) Any advantages gained with a tunnel are negated by the increased complexity and risk to surface water, groundwater and adjacent natural heritage features.
- All access roads that connect Plaza B or C with the existing Highway 401 are preferred to access roads that connect Plaza A with the existing Highway 401 because they result in less displacement of rare vegetation communities in the Malden Road area.
- An impact score of "3" (low impact) was assigned to all access roads that connect Plaza B or C with the existing Highway 401 and an impact score of "2" (moderate impact) was assigned to all access roads that connect Plaza A with the existing Highway 401.

Environmental Protection Measures

All crossings, plazas and access roads will result in the displacement of provincially rare vegetation communities, wildlife habitat and species at risk. Since total avoidance cannot be achieved, environmental protection measures will be required to address the impacts of displacement and disturbance on natural heritage features.

Provincially Rare Vegetation Communities

The goal of the DRIC study team is to maintain no net loss of the area or function of provincially rare vegetation communities, including tallgrass prairies. Several mitigation strategies are available to compensate for the loss of provincially rare vegetation communities including, in order of preference: enhance existing natural remnants; enlarge existing natural remnants; and, establish new tallgrass prairie communities.

Species at Risk

The proposed facility will result in the loss of plant and animal species and their habitat that are provincially rare, listed by COSEWIC and COSSARO, or regulated under SARA. The DRIC study team will consider opportunities to avoid, integrate, or salvage and relocate plant species at risk to the extent possible. The success rate for capture and

relocation of Butler's gartersnake or eastern foxsnake is unknown. Management strategies for species at risk will be discussed with regulatory agencies and comply with species at risk legislation.

Groundwater

Groundwater is known to play an important role in sustaining tallgrass prairie communities. The tallgrass prairie communities are sustained by the surficial sand, silt and fill layer (surface aquifer) that is saturated by rainfall. Creating permanent, open, and depressed highways within the native clays using slopes or supported with retaining walls (that do not cut off groundwater pressure gradients from adjacent higher grades) will result in a permanent lowering of the groundwater level within the clay soils. It is anticipated that if low permeability in situ walls (e.g. contiguous caisson walls or concrete diaphragm walls) are used for excavation support or for permanent below grade structures, that the influence of the excavation on near-surface groundwater would be minimal. As a result, no changes to the composition or structure of the tallgrass prairies are anticipated if cut-off walls are used.

Surface Water

A depressed or tunnel highway profile along the access route will require alteration of these surface water features through diversion, enclosure, siphoning or aquaducting depending on the characteristics of the watercourse and the depth of the highway below existing grades. Any harmful alteration of these watercourses is subject to the requirements of the *Fisheries Act*. Since none of these watercourses directly support critical fish habitat, the full suite of environmental protection options, including fish habitat compensation to maintain no net loss of the productive capacity of fish habitat, are available.

REMAINING ACTIVITIES

The evaluation of crossings, plazas and access roads by the natural heritage discipline will be incorporated into the multi-disciplinary evaluation of practical alternatives. A site-specific impact assessment will be performed and environmental protection measures will be identified once a technically preferred alternative is selected. No additional field investigations are proposed at this time.

PREFACE

The Detroit River International Crossing (DRIC) Environmental Assessment Study is being conducted by a partnership of the federal, state and provincial governments in Canada and the United States in accordance with the requirements of the *Canadian Environmental Assessment Act* (CEAA), the *Ontario Environmental Assessment Act* (OEAA), and the U.S. *National Environmental Policy Act* (NEPA). In 2006, the Canadian and U.S. Study Teams completed an assessment of illustrative crossing, plaza and access road alternatives. This assessment is documented in two reports: *Generation and Assessment of Illustrative Alternatives Report - Draft (November 2006)* (Canadian side) and *Evaluation of Illustrative Alternatives Report (December 2006)* (U.S. side). The results of this assessment led to the identification of an Area of Continued Analysis (ACA) as shown in Exhibit 1.

Within the ACA, practical alternatives were developed for the crossings, plazas and access routes alternatives. The evaluation of practical crossing, plaza and access route alternatives is based on the following seven factors:

- Changes to Air Quality
- Protection of Community and Neighbourhood Characteristics
- Consistency with Existing and Planned Land Use
- Protection of Cultural Resources
- Protection of the Natural Environment
- Improvements to Regional Mobility
- Cost and Constructability

This report pertains to the Protection of the Natural Environment factor and is one of several reports that will be used in support of the evaluation of practical alternatives and the selection of the technically and environmentally preferred alternative. This report will form a part of the environmental assessment documentation for this study.

Additional documentation pertaining to the evaluation of practical alternatives is available for viewing/downloading at the study website (www.partnershipborderstudy.com).

Practical Alternatives Evaluation Working Paper

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1.0 INTRODUCTION

The Ontario *Environmental Assessment Act* (OEAA) and the *Canadian Environmental Assessment Act* (CEAA) require assessment of all aspects of a project on the environment. The role of the natural heritage discipline in the Detroit River International Crossing Study is to assess the environmental effects of crossings, plazas and access roads on the biophysical environment. Input is provided during site and route selection, preliminary design, detail design and construction to avoid, minimize or mitigate the potential effects of the project on natural heritage.

"Protection of the natural environment" is one of seven factors being used to evaluate practical alternatives in the Detroit River International Crossing Study. This Working Paper presents the data and analysis of the practical alternatives, as it pertains to natural heritage, and provides a starting point to assess the environmental effects of the technically preferred alternative. Additional work will be undertaken later in the study to complete the assessment of effects, and to identify mitigation measures that may be required to eliminate or reduce the effects. This additional work, together with the information in this report, will also lay the foundation for meeting the requirements of CEAA. The specific requirements of CEAA, and the manner in which these requirements are being coordinated in this study, are outlined in the Federal Environmental Assessment Guidelines that have been prepared for this project and are available on the project website.

Natural heritage is defined in Ontario as:

> "features and areas, including significant wetlands, significant coastal wetlands, fish habitat, significant woodlands, significant valleylands, significant habitat of endangered and threatened species, significant wildlife habitat, and significant areas of natural and scientific interest, which are important for their environmental and social values as a legacy of the natural landscapes of an area" (OMMAH 2005).

The natural heritage discipline is guided by government legislation, regulations, policies and guidelines within federal, provincial and municipal jurisdictions. The major impetus for the natural heritage investigation includes:

- *Canadian Biodiversity Strategy;*
- Canada *Fisheries Act;*
- Canada *Species at Risk Act;*
- Canada *Migratory Birds Convention Act;*
- Canada *Wildlife Act;*
- *Canadian Federal Policy on Wetland Conservation;*
- *Ontario Biodiversity Strategy;*
- Ontario *Endangered Species Act;*
- Ontario *Fish and Wildlife Conservation Act;*
- *Ontario Water Resources Act;*
- Ontario *Planning Act* and the *Provincial Policy Statement;*

- Ontario *Conservation Authorities Act; and*
- *Implementation Strategy: Areas of Natural and Scientific Interest.*

As outlined in the Natural Heritage Work Plan (Border Transportation Partnership 2005), consideration of natural heritage is incorporated into all four stages of the site and route selection process. The purpose of natural heritage input at each step is described below.

Preliminary Analysis Area

To profile the natural heritage areas and features located in the Preliminary Analysis Area and identify opportunities for and constraints to facility siting.

Illustrative Alternatives

To evaluate on a comparative basis the natural heritage areas and features influenced by illustrative alternatives, including crossings, plazas and access roads to contribute to the identification of practical alternatives.

Practical Alternatives

To evaluate on a comparative basis the natural heritage areas and features influenced by practical alternatives including crossings, plazas and access roads to contribute to the identification of conceptual alternatives.

Conceptual Alternatives

To evaluate on a comparative basis the natural heritage areas and features influenced by conceptual alternatives including crossings, plazas and access roads to contribute to the identification of the technically preferred alternative.

The natural heritage discipline also assesses the significant adverse effects of the technically preferred alternative on natural heritage and identifies environmental protection measures.

At each stage of the study process, similar tasks occur. These tasks include:

Task 1 – Define Area of Investigation

Identify the study area for the purposes of investigating the potential effects of the project.

Task 2 – Data Collection

Identify the type, source, level of detail and methods to be used to obtain information.

Task 3 – Data Analysis

Identify how the information will be interpreted to determine the significance and sensitivity of natural heritage features.

Task 4 – Evaluate Alternatives

Identify the natural heritage criteria and indicators that will be used to compare alternatives.

Task 5 – Conduct Impact Assessment

Identify the range of potential environmental effects to be assessed.

Task 6 – Recommend Environmental Protection Measures

Identify the range of potential environmental protection measures to be assessed. Environmental protection measures typically include avoidance, minimization, mitigation, compensation and monitoring.

These tasks are summarized for each stage of the study process in Table 1. This Practical Alternatives Evaluation Working Paper presents the results of each task of the natural heritage investigation for the evaluation of practical alternatives.

Task 2, Data Collection, identified in Table 1 was revised for the evaluation of practical alternatives. The original approach was to conduct preliminary, single-season pedestrian surveys for each practical alternative and detailed, multi-season pedestrian surveys for each conceptual alternative. However, to accommodate an entire year of field investigations within the project schedule, detailed, multi-season pedestrian surveys were performed at the practical alternatives stage. This modification had no influence on the natural heritage investigation other than a much broader area was investigated at a greater level of detail than originally anticipated.

TABLE 1.
NATURAL HERITAGE INVESTIGATION BY STUDY STAGE

Study Stage[1]	Ecological Analysis Level	Task 1 Define Area of Investigation	Task 2 Data Collection	Task 3 Data Analysis	Task 4 Evaluate Alternatives	Task 5 Impact Assessment	Task 6 Environmental Protection Measures
Stage 1 – Define Study Area	Ecodistrict - 1:250,000 scale	Preliminary Analysis Area	• Secondary source • Air photo interpretation	Identify designated/ regulated natural heritage features to determine national, provincial, regional and local significance.	• Avoid, where feasible, designated/regulated natural heritage features located within Preliminary Analysis Area.	Opportunities/ Constraints Analysis	• Avoidance
Stage 2 – Illustrative Alternatives	Ecosection - 1:100,000 scale	Illustrative routes, plazas, plaza extensions and crossings rights-of-way, footprints and adjacent zones of influence	• Secondary source • Air photo interpretation • Windshield/ aerial surveys	Identify designated/ regulated natural heritage features to determine national, provincial, regional and local significance.	• Compare potential loss of designated/regulated natural heritage features located within rights-of-way and footprint areas (extent, significance). • Compare potential disturbance to designated/regulated natural heritage features located within adjacent zones of influence (extent, significance).	Opportunities/ Constraints Analysis	• Avoidance
Stage 3 – Practical Alternatives	Ecosite - 1:10,000 scale	Practical routes, plazas, plaza extensions and crossings rights-of-way, footprints and adjacent zones of influence	• Secondary source • Air photo interpretation • Preliminary single season pedestrian surveys	Identify landscapes, ecosystems/communities and populations/species to determine national, provincial, regional and local significance and sensitivity to impacts.	• Compare potential loss of terrestrial and aquatic landscapes, ecosystems/communities and populations/species located within rights-of-way and footprint areas (extent, type, significance, sensitivity). • Compare potential disturbance to terrestrial and aquatic landscapes, ecosystems/communities and populations/species located within adjacent zones of influence (extent, type, significance, sensitivity).	Generic Impacts	• Avoidance • Minimization • Generic mitigation

TABLE 1.
NATURAL HERITAGE INVESTIGATION BY STUDY STAGE

Study Stage[1]	Ecological Analysis Level	Task 1 Define Area of Investigation	Task 2 Data Collection	Task 3 Data Analysis	Task 4 Evaluate Alternatives	Task 5 Impact Assessment	Task 6 Environmental Protection Measures
Stage 4 – Concept Design Alternatives	Ecoelement - 1:1,000 scale	Concept design routes, plazas, plaza extensions and crossings rights-of-way, footprints and adjacent zones of influence	• Secondary source • Air photo interpretation • Detailed multi-season pedestrian surveys	Identify landscapes, ecosystems/communities and populations/species to determine national, provincial, regional and local significance and sensitivity to impacts.	• Compare potential loss of terrestrial and aquatic landscapes, ecosystems/communities and populations/species located within rights-of-way and footprint areas (extent, type, significance, sensitivity). • Compare potential disturbance to terrestrial and aquatic landscapes, ecosystems/communities and populations/species located within adjacent zones of influence (extent, type, significance, sensitivity).	Conceptual Site-Specific Impacts	• Avoidance • Minimization • Conceptual site-specific mitigation, compensation and monitoring

[1] Detail Design is not currently included in the Detroit River International Crossing Route Planning and Environmental Assessment Study

2.0 PRACTICAL ALTERNATIVES

A total of three crossings, three plazas and five access roads were generated within the Area of Continued Analysis (ACA). A variation on Plaza B was generated and identified as Plaza B1. The combination of crossings and plazas resulted in the generation of seven potential crossing and plaza alternatives. A number of variations on access roads were also generated resulting in a total of 18 potential access roads to connect existing Highway 401 with Plazas A, B/B1 and C. The ACA is presented in Figure 1.

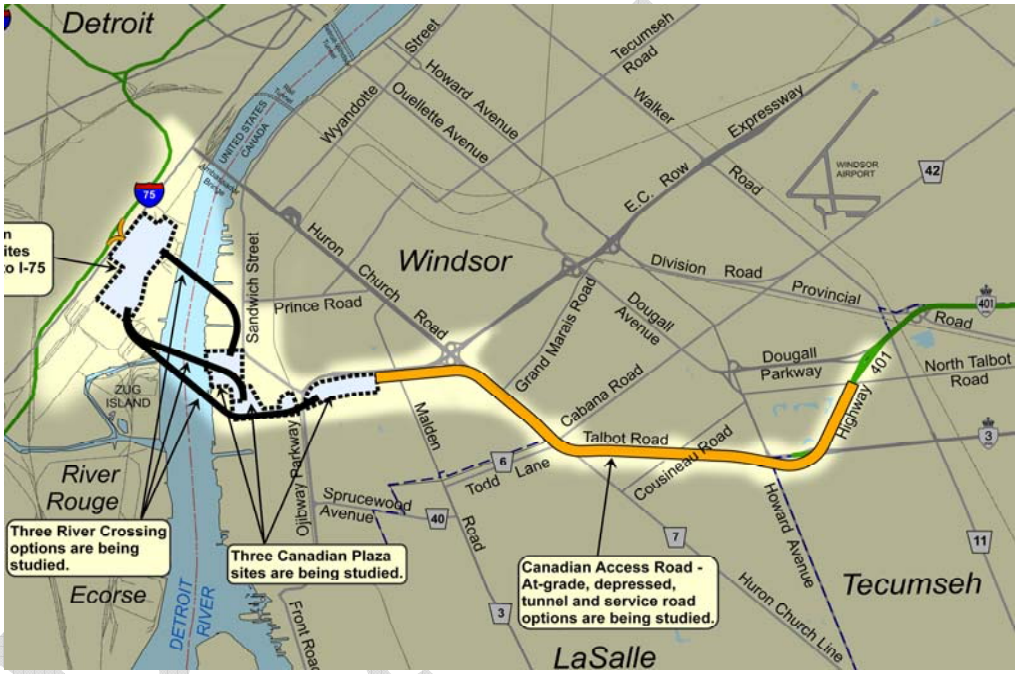


FIGURE 1. KEY PLAN OF THE AREA OF CONTINUED ANALYSIS

2.1 Area of Investigation

The area of investigation (AOI) is specific to each biological discipline (i.e. vegetation, fisheries, wildlife, etc.) and is based on the level of detail of secondary source information, the area of influence of the project and the level of effort required for field investigations.

2.1.1 Vegetation and Vegetation Communities

The AOI for vegetation and vegetation communities includes all lands located within the maximum footprint area of the combined practical alternatives and adjacent lands located within 120 m of the right-of-way. This area corresponds approximately with the ACA.

2.1.2 Molluscs and Insects

The AOI for molluscs and insects includes the ACA and its vicinity.

2.1.3 Fish and Fish Habitat

The AOI for fish and fish habitat includes the ACA. Benthic invertebrates were surveyed at several stations located within the ACA and its vicinity.

2.1.4 Wildlife and Wildlife Habitat

The AOI for wildlife and wildlife habitat includes all lands located within the maximum footprint area of the combined practical alternatives and adjacent lands located within 120 m of the right-of-way. This area corresponds approximately with the ACA.

2.1.5 Designated Natural Areas

The AOI for designated natural areas includes the ACA and its vicinity.

2.2 Data Collection

The methods for data collection are specific to each biological discipline. Data was collected from secondary source information, personal communications and detailed, multi-season field investigations.

2.2.1 Vegetation and Vegetation Communities

The geographical extent, composition, structure and function of vegetation communities were identified through air photo interpretation and field investigations. Air photos were interpreted to determine the limits and characteristics of vegetation communities. In the office, a coding system was used to identify each polygon according to its general location. These polygons were confirmed, refined and classified through field investigations. Data collection sheets, including a checklist of vascular plants likely to occur in the AOI and vegetation community forms, were prepared in the office for completion in the field. Botanical inventories prepared previously for Areas of Natural and Scientific Interest (ANSIs), Environmentally Sensitive Areas (ESAs), Evaluated Wetlands and Candidate Natural Heritage Sites (CNHSs) were reviewed to familiarize the botanists with floral composition of the AOI and to assist with field identification. Information collected in the field was transcribed and verified in the office.

Field investigations of natural/semi-natural vegetation were conducted by LGL Limited on: April 17-21, 2006; May 15-19, 2006; June 12-16, 2006; July 24-28, 2006; August 21-24, 2006; and, October 2-6, 2006. Field crews typically consisted of two to four botanists working in tandem. Vegetation communities were surveyed several times throughout the year to capture the optimal growing season for the flora present.

Vegetation communities were classified according to the *Ecological Land Classification (ELC) for Southern Ontario: First Approximation and Its Application* (Lee *et al.* 1998). The vegetation communities were sampled using a plotless method for the purpose of determining general composition and structure of the vegetation. Plant species status was reviewed for Canada (Committee on the Status of Endangered Wildlife in Canada

(COSEWIC) 2006), Ontario (Committee on the Status of Species at Risk in Ontario (COSSARO) 2006) and for Essex County (Oldham 1993). Vascular plant nomenclature follows Newmaster *et al.* (1998), with a few exceptions.

Every attempt was made to identify vascular plants in the field. Where a conclusive identification could not be made in the field, plant material was collected for examination in the laboratory. A GPS unit was used to record the location of species at risk whose identify could be confirmed in the field. Many species at risk and representative vegetation communities were also photographed for verification purposes.

2.2.2 Molluscs and Insects

The mollusc and insect investigation is based on secondary source information collected in 2006 through literature searches, review of databases and personal communications with local experts. Data was requested and obtained via email, fax, letter, personal communications, and from published and unpublished literature. The following organizations were contacted directly for data:

- Department of Fisheries and Oceans Canada – Sarnia District Office and Burlington District Office (Great Lakes Laboratory for Fisheries and Aquatic Sciences);
- Environment Canada – Karner Blue Recovery Team;
- Ontario Ministry of Natural Resources – Natural Heritage Information Centre (NHIC), Peterborough and Chatham Area Office;
- Essex Region Conservation Authority;
- Ojibway Nature Centre;
- Toronto Entomology Association (Ontario Insects);
- Toronto Zoo;
- University of Guelph – insect collection, and entomology and mollusc researchers; and
- University of Windsor – fisheries and mollusc researchers.

Background data collected was reviewed and compiled into two databases (molluscs and insects), since all of the data received related to these two invertebrate groups. Nomenclature and taxonomy follows the University of Guelph Insect Collection Ojibway Prairie Species List, recent journal articles and the NHIC.

Federal and provincial rankings administered by COSEWIC and COSSARO were considered during the species review. Due to the lack of evaluations of invertebrate species by COSEWIC and COSSARO, "S-ranks" were also considered during the investigation as many more invertebrates have received an S-rank. S-ranks are a ranking system for a species status in Ontario and are also applied by the NHIC. Species with an S-rank of S1 to S3 are considered extremely rare, very rare or rare within the province and were used to limit the scope of the investigation.

2.2.3 Fish and Fish Habitat

All watercourses/waterbodies located within the AOI were investigated to determine the presence/absence of fish habitat and the characteristics of the fish community present. Field investigations were conducted by LGL Limited on: May 3-5, 2006; September 18-21, 2006; and, October 5, 2006.

The fish community was surveyed by visual observation or by fish collections using a backpack electrofishing unit, dip net or minnow trap at a total of 58 stations. The location of sampling stations is presented in Figure 2 and described in Table 2. Prior to field investigations, a Permit to Collect Fish for Scientific Purposes was obtained from the MNR Area Office in Chatham and the Department of Fisheries and Oceans was contacted to determine if a Species at Risk Permit was required. All fish captured were identified in the field or preserved in alcohol for laboratory identification.

Fish habitat was characterized along each stream reach located within the AOI. Stream reaches were delineated using the boundary of the ACA, road or highway crossings or the confluence with another watercourse. The habitat survey was carried out following the MTO Environmental Manual - Fisheries (MTO 1994), the Draft Environmental Reference for Highway Design (MTO 2002) and in accordance with the MTO/MNR Fisheries Protocol (1993). Physical features were surveyed in sufficient detail to enable mapping and identification of key habitat types. The physical habitat attributes assessed included:

- Stream dimensions and flow conditions;
- Water quality, including conductivity, pH , temperature and water colour;
- Stream morphology;
- Groundwater discharge areas;
- Substrate characteristics;
- Stream bank stability;
- In-stream cover;
- Riparian vegetation;
- Stream canopy cover;
- Stream gradient;
- Macrophytic (aquatic) vegetation;
- Instream barriers to fish movement;
- Critical habitats; and
- Potential fish habitat compensation measures.

LEGEND

- Maximum Footprint Area of Combined Alternatives
- Benthic Sampling Station
- Fish Sampling Station
- Bird Point-Count Survey Station

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

BENTHIC, FISH, AND BIRD POINT-COUNT SURVEY STATIONS

LGL Limited
environmental research associates

Project:	TA4137	**Figure:**	2
Date:	February 2007	**Prepared By:**	MWF
Scale:	1 : 35,000	**Checked By:**	GNK

TABLE 2.
FISH SAMPLING STATIONS

Station No.	GPS Coordinates	Drains	Habitat
1	0328333 4684598	Large Bay	Fish habitat
2	0328042 4683627	McKee Creek	Fish Habitat
3	0327835 4683101	Ditch	Not Fish Habitat
4	0327675 4682830	Healy Drain	Not Fish Habitat
5	0327582 4682648	Healy Drain	Seasonal Fish Habitat
6	0327120 4682805	Healy Drain	Seasonal Fish Habitat
7	0327060 4682524	Broadway Drain	Seasonal Fish Habitat
8	0327564 4682464	Healy Drain	Not Fish Habitat
9	0327433 4682299	Broadway Drain	Not Fish Habitat
10	0327491 4682145	Pond	Not Fish Habitat
11	0328028 4682098	Broadway Drain	Not Fish Habitat
12	0328099 4682253	Healy Drain	Not Fish Habitat
13	0328421 4681784	Susan Drain	Not Fish Habitat
14	0328591 4681910	NoName Drain	Not Fish Habitat
15	0328976 4681555	Susan and NoName	Not Fish Habitat
16	0328467 4682497	McKee Creek	Fish Habitat
17	0328823 4682421	McKee Drain	Fish Habitat
18	0329205 4682444	McKee Drain	Fish Habitat
19	0329110 4682267	McKee Drain	Fish Habitat Downstream Only
20	0329305 4682215	McKee Drain	Not Fish Habitat
21	0329696 4681545	Titcombe Drain	Seasonal Fish Habitat
22	0330185 4682207	Vernal pool	Not Fish Habitat
23	0329759 4681811	Titcombe Drain	Seasonal Fish Habitat
24	0330594 4681942	Basin Drain	Not Fish Habitat
25	0330569 4681911	Basin Drain	Not Fish Habitat
26	0330562 4681875	Basin Drain	Fish Habitat
27	0331273 4681458	Youngstown Drain	Seasonal Fish Habitat
28	0330924 4681537	Youngstown Drain	Seasonal Fish Habitat
29	0330822 4681556	Youngstown Drain	Seasonal Fish Habitat
30	0330700 4681553	Basin Drain	Fish Habitat
31	0330714 4681496	Basin and Youngstown	Fish Habitat
32	0330778 4681487	Youngstown Drain	Seasonal Fish Habitat
33	0330352 4681030	Basin Drain	Fish Habitat
34	0331391 4681255	Marentette Drain	Not Fish Habitat
35	0331082 4680897	Marentette Drain	Not Fish Habitat
36	0331256 4680379	Marentette and Turkey	Not Fish Habitat
37	0330880 4680589	Wetland	Not Fish Habitat
38	0331652 4680693	Turkey Creek	Fish Habitat
39	0331543 4680078	Standing water	Not Fish Habitat
40	0332332 4679259	Lennon Drain	Fish Habitat
41	0332477 4678862	Cahill Drain	Fish Habitat
42	0332915 4678928	Cahill and Talbot	Fish Habitat
43	0333348 4678533	Talbot Drain	Not Fish Habitat
44	0335132 4676696	Howard Ave, Noname, Dickson	Not Fish Habitat
45	0335166 4676667	Burke, NoName	Not Fish Habitat

TABLE 2.
FISH SAMPLING STATIONS

Station No.	GPS Coordinates	Drains	Habitat
46	0335467 4676542	Dickson, Benson	Fish Habitat
47	0335900 4677241	Burke Drain	Fish Habitat
48	0336718 4677364	Collins Drain	Seasonal Fish Habitat
49	0336309 4677566	Collins and Wolfe	Fish Habitat (Wolfe)
50	0336072 4677640	NoName	Not Fish Habitat
51	0335714 4677723	Wolfe Drain	Fish Habitat
52	0335269 4677923	NoName and Wolfe	Fish Habitat (Wolfe)
53	0334095 4678714	Cahill Drain	Fish Habitat
54	0333789 4678642	Cahill and Wolfe	Fish Habitat
55	0333191 4678972	Cahill and Wolfe	Fish Habitat
56	0332540 4679315	Lennon Drain	Fish Habitat
57	not recorded	pond	Fish Habitat
58	not recorded	McKee Creek	Fish Habitat

Data was recorded in the field using the standard MTO Field Collection Record forms and representative photographs were taken.

In addition, benthic samples were collected from six stations in the AOI (Stations 3 and 9) and its vicinity (Stations 1, 4, 5 and 6). Stations 2, 7 and 8 are located on watercourses located outside the AOI. The location of benthic sampling stations is presented in Figure 2. Samples were collected on March 9, 2005 (Stations 1 and 3), and March 10, 2005 (Station 4, 5, 6, and 9) using the traveling kick and sweep transect method. Three samples were taken at each station, two from riffles and one from a pool. Benthic organisms from each transect were identified separately and then replicate samples from each station were combined to achieve sufficient populations for analysis.

A habitat and substrate survey of the Detroit River at the locations of the proposed bridge piers in Canadian waters was conducted on October 5, 2006 using an underwater video camera and Ekman dredge. At each pier location, a SeaViewer underwater camera was deployed over the side of the boat and data recorded to a hand-held video recorder. GPS coordinates along transects were recorded simultaneously through a feature on the video camera system. The captain of the boat controlled the drift speed with an electric trolling motor. Several drifts were made at the southern bridge pier and one at the northern bridge pier. Data were recorded to the digital video tape in the hand held camcorder and transferred to DVD at a later time. Once all of the video runs were completed at the sites, the substrate was investigated using an Ekman dredge.

2.2.4 Wildlife and Wildlife Habitat

The purpose of the field investigations was to document wildlife habitat and wildlife occupation and to characterize the nature, extent and significance of animal usage within the AOI. Existing information on wildlife species previously found within the AOI came from various sources. The Ontario Herpetofaunal Summary Database of the Natural Heritage Information Center (NHIC) provided amphibian and reptile lists, locations and status. The Ontario Breeding Bird Atlas (OBBA) program provided up-to-date lists of birds breeding within specific areas of Ontario while information from The Conservation

Priorities for the Birds of Southern Ontario provided lists of migratory bird species in Essex County designated as species for habitat protection by local municipalities. It also ranks bird species highly sensitive to disturbances of their breeding habitats. The Atlas of the Mammals of Ontario provided locations of species found in Essex County. More specific information about wildlife previously documented around the AOI came from communications with personnel from the Ontario Ministry of Natural Resources and the Ojibway Prairie Nature Center in Windsor.

Wildlife habitat was delineated on air photos and refined through ground-truthing. The Ecological Land Classification (ELC) system was used to describe wildlife habitat, where appropriate. In many cases, similar wildlife habitat polygons were combined into a single polygon to reduce duplication, while in others cases new wildlife habitat polygons were delineated in areas not classified according to ELC. For this reason, the wildlife habitat polygons do not correspond exactly with the vegetation community polygons. Several areas, including factories, retail outlets and residential areas with high density could not be accessed or do not support wildlife habitat; hence, these areas were not investigated. The methods described in the Significant Wildlife Habitat Technical Guide (MNR 2000) were used to establish the significance of wildlife habitat.

Methods used to collect in-field information were tailored to each vertebrate class (ie. amphibians, reptiles, birds and mammals). Once the specific wildlife units within the AOI were mapped and the methods of investigation were established, diurnal and nocturnal investigations took place. Data was collected by a field crew of one or two biologists working in tandem using aerial photo maps, a GPS unit, binoculars, cameras, a headlamp, field notebooks and a laptop computer. Field investigations were conducted on: April 12-14 and 18-21, 2006; May 1-4, 2006; June 4-7, 11-16, 18-24 and 29-30, 2006; July 1, 2006; September 17-21, 2006; November 22-23, 2006; and, February 21-23, 2007.

Herpetofauna (reptiles and amphibians) were inventoried using the Visual Encounter Survey (VES) method (Heyer, et al. 1994). Data was collected by simply searching for animals in a likely habitat at a likely time. Reptile investigations started in late spring and early summer after species came out of their hibernacula. Following the VES methodology, early morning searches for snakes in suitable habitats included flipping over rocks, logs, boards, shingles or any material snakes would hide under through the night. From mid to late morning, rocks, logs and ashphalt pathways, used for basking areas, were also investigated. By the afternoon, searches turned to habitats considered as snake hunting and feeding areas, like cultural meadows and areas in and around wetlands. Also, sheets of wood, laid out in different habitats to attract snakes for use as cover and warmth, were checked in the morning and late afternoons for activity. Turtles were found by investigating their potential habitats, like creek drains or ponds, and observing them basking on logs in ponds during late mornings, swimming on the bottom of ponds in search of food or crossing over roads and pathways when moving from pond to pond during the day.

For amphibians, in the spring and early summer season when frog and toad activity was at its peak, nightly road cruises by vehicle and breeding call surveys were employed. By identifying frog and toad breeding calls during evening road cruises, locations of important breeding areas were found. Daytime searches of wetlands, identified as potential amphibian breeding areas, were also made. After the breeding season, wetlands were searched for amphibian egg masses and/or tadpoles to identify any frog or toad species found in these locations.

Prior to conducting bird surveys, aerial photos of the AOI and its surroundings were checked to see if there were areas of continuous forests, cultural thickets, etc. that could potentially be used as spring and fall migration corridors. These maps were also used to determine where preferred nesting habitats could exist during the breeding season. Any potential areas were then ground-truthed by simply observing and recording species in chosen habitats at the right time of year. During the spring and fall seasons, specific habitats throughout the AOI were monitored for areas of large bird movements and stopover points.

Two inventory methods were used to determine the breeding bird composition and locations of breeding activity in the AOI: the point-count method (Ralph et al. 1995; Bibby et al. 1997); and, nest surveys. Due to the large size of the AOI and the need to represent as many of the habitats as possible, non-random locations were selected for point-counts. These specific locations, selected in areas that maximized the amount of habitats covered per count, increased the number of species recorded in as short of time as possible. Each point-count station was recorded using a hand-held GPS unit. A total of 60 point-count stations were censused twice, a minimum of seven days apart, for a total of 120 point-count surveys. The locations of the point-count survey stations are shown in Figure 2. Point-counts were started 30 minutes before dawn and stopped by 0900 to 0930 hours. Five minutes of suitable bird observation and bird call listening times were standard per station (time increased to 10 minutes in areas of high environmental noise such as traffic or industrial activities). Station locations were at least 125 m or more apart to prevent bird identification overlap. The criteria of the BBA breeding bird survey was used for identifying breeding bird behaviour (eg. carrying food to young, territorial song, etc.) as evidence of birds breeding within a location. Evening spot checks were also made in habitats considered to have owl species. Tape recordings of owl calls were played to induce a response for species identification.

The second method used to identify species composition consisted of a nest survey performed in the summer and fall seasons. This was undertaken as a secondary method of data collection to determine breeding bird occurrence in particular habitats. In the summer season, most nests were located by focusing on the breeding behaviour of particular bird species. Early morning observations of female returning to their nests after morning forages were used to identify their nest location. Observations of other behavioural signals (eg. carrying nest-building materials, copulations, territorial disputes, etc.) were used to lead an observer to areas of high nest probability or directly to the nest itself. In the fall season, when breeding season was over and tree foliage disappeared, clumps of structured grasses in trees or fecal deposits under tree nest holes were used to identify nests. Nest locations were recorded and habitat types noted.

Mammals were inventoried using a variety of methods, such as the identification of tracks, trails, sounds, scats, smells and individual species behavioral signs, such as plant cuttings, nest sites, lodges, etc. (Wilson et al. 1996). As many habitats as possible were searched using the VES method. The investigatior simply walked through an area searching for mammals using the variety of methods mentioned above. Evening road cruises by vehicle were made to spot mammals crossing roadways. Early morning walks just before sunrise and late afternoon walks just before dark were also made to catch mammal movements to and from their daytime haunts. These investigations were repeated in the same wildlife areas more than once to increase the accuracy of the species composition recorded. Species locations and the habitats they were sighted in were recorded. Daily mammal movement corridors which showed important connections between habitats were also recorded. Bats however, being volant mammals of the night, were difficult to identify in the field without the proper equipment. Since high frequency

bat detectors were unavailable, secondary source information was relied upon to determine the species present in the AOI.

Any species at risk found in the field had its location recorded with a GPS unit and a photograph taken for verification, where possible. Data collected in the field from each of the vertebrate class investigations was transferred into a laptop computer on a daily basis. Field note observations, GPS coordinates and photographs were downloaded into wildlife tables for future analysis. This data was analysized and used to determine the locations of sensitive habitats in the AOI.

2.2.5 Designated Natural Areas

Information on designated natural heritage areas was derived from the secondary sources consulted during the preparation of the Environmental Overview Report (Border Transportation Partnership 2005). The information contained in the Environmental Overview Report was reviewed, updated and augmented to reflect the revised AOI.

2.3 Data Analysis

2.3.1 Vegetation and Vegetation Communities

2.3.1.1 Vegetation Species

A total of 618 vascular plant taxa were recorded in the AOI. One-hundred and eighty-six taxa or 30 percent of the recorded flora are considered introduced and non-native to Ontario. Sixty-three species are considered Extremely Rare, Very Rare or Rare within the province (S1-S3) and eight are regulated under the federal *Species at Risk Act*. The acronyms and definitions used to assign global, federal and provincial importance to species are presented in Appendix A. A list of vascular plants identified in the AOI is presented in Appendix B.

2.3.1.2 Vegetation Communities

Vegetation communities located in the AOI consist primarily of recently disturbed communities, including Cultural Woodlands (CUW1), Cultural Meadows (CUM1-1), Cultural Thickets (CUT1) and Cultural Savannahs (CUS1). In the past, these areas would have been dominated by a mixture of tallgrass prairie and natural savannah. As a result of anthropogenic influences, there has been a reduction in the frequency of fire, and an increase in agricultural activities and urban development. Non-prairie herbaceous plant species have invaded and now dominate the meadows and ground cover. Woody species have increased due to the lack of fire and now dominate in the form of CUW1, CUT1 and CUS1 communities. Despite the influence that humans have had on the composition and structure of the vegetation communities located within the AOI, remnant patches of Tallgrass Prairie (TPO2-1) exist on the periphery of the Ojibway Prairie Complex. The location of vegetation communities is presented in Figure 3. A detailed description of community types and their corresponding polygon codes is presented in Appendix C. The general structure and composition of the predominant vegetation community types are described.

Vegetation Communities

CUM1-1	Dry-Moist Old Field Meadow Type
CUP1-3	Red Oak Deciduous Plantation Type
CUP3	Coniferous Plantations
CUP3-3	Scotch Pine Coniferous Plantation Type
CUS1	Mineral Cultural Savannah Ecosite
CUS1-1	Hawthorn Cultural Savannah Type
CUT1	Mineral Cultural Thicket Ecosite
CUT1-4	Gray Dogwood Cultural Thicket Type
CUW1	Mineral Cultural Woodland Ecosite
FOD1-3	Dry-Fresh Black Oak Deciduous Forest Type
FOD1-4	Dry-Fresh Mixed Oak Deciduous Forest Type
FOD2-2	Dry-Fresh Oak-Hickory Deciduous Forest Type
FOD4	Dry-Fresh Deciduous Forest Ecosite
FOD7-1	Fresh-Moist White Elm Lowland Deciduous Forest Type
FOD7-2	Fresh-Moist Ash Lowland Deciduous Forest Type
FOD7-3	Fresh-Moist Willow Lowland Deciduous Forest Type
FOD7-4	Fresh-Moist Black Walnut Lowland Deciduous Forest Type
FOD8	Fresh-Moist Poplar-Sassafras Deciduous Forest Ecosite
FOD8-1	Fresh-Moist Poplar Deciduous Forest Type
FOD8-2	Fresh-Moist Sassafras Deciduous Forest Type
FOD9	Fresh-Moist Oak-Maple-Hickory Deciduous Forest Ecosite
MAM2	Mineral Meadow Marsh Ecosite
MAM2-10	Bluejoint Mineral Meadow Marsh Type
MAS2-1	Cattail Mineral Shallow Marsh Type
OAO	Open Aquatic
SWD1-3	Pin Oak Deciduous Swamp Type
SWD3-3	Swamp Maple Mineral Deciduous Swamp Type
TPO2-1	Fresh-Moist Tallgrass Prairie Type
TPS3-1	Fresh-Moist Pin Oak-Bur Oak Tallgrass Savannah Type
TPW2-1	Fresh-Moist Black Oak-White Oak Tallgrass Woodland Type
TPW2-2	Fresh-Moist Pin Oak Tallgrass Woodland Type

LEGEND

- Maximum Footprint Area of Combined Alternatives
- Vegetation Community Boundary

Provincially Rare Vegetation Community (S Rank)

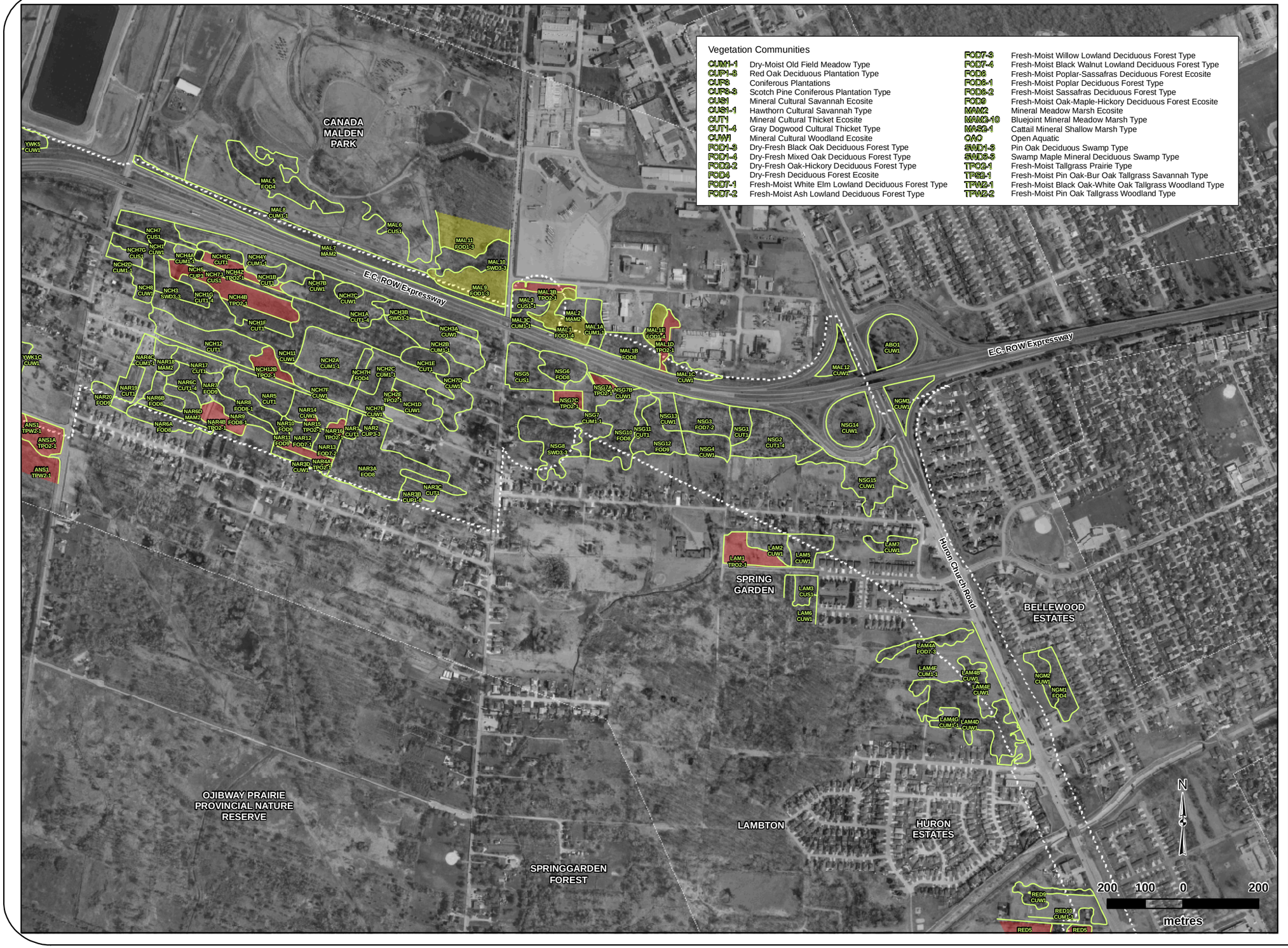
- S1
- S2/S3
- S3 or S3/S4

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

ELC VEGETATION COMMUNITIES LOCATED IN THE AREA OF INVESTIGATION

LGL Limited
environmental research associates

Project:	TA4137	**Figure:**	3a
Date:	February 2007	**Prepared By:**	MWF
Scale:	1 : 10,000	**Checked By:**	GNK



Vegetation Communities

CUM1-1	Dry-Moist Old Field Meadow Type
CUP1-3	Red Oak Deciduous Plantation Type
CUP3	Coniferous Plantations
CUP3-3	Scotch Pine Coniferous Plantation Type
CUS1	Mineral Cultural Savannah Ecosite
CUS1-1	Hawthorn Cultural Savannah Type
CUT1	Mineral Cultural Thicket Ecosite
CUT1-4	Gray Dogwood Cultural Thicket Type
CUW1	Mineral Cultural Woodland Ecosite
FOD1-3	Dry-Fresh Black Oak Deciduous Forest Type
FOD1-4	Dry-Fresh Mixed Oak Deciduous Forest Type
FOD2-2	Dry-Fresh Oak-Hickory Deciduous Forest Type
FOD4	Dry-Fresh Deciduous Forest Ecosite
FOD7-1	Fresh-Moist White Elm Lowland Deciduous Forest Type
FOD7-2	Fresh-Moist Ash Lowland Deciduous Forest Type
FOD7-3	Fresh-Moist Willow Lowland Deciduous Forest Type
FOD7-4	Fresh-Moist Black Walnut Lowland Deciduous Forest Type
FOD8	Fresh-Moist Poplar-Sassafras Deciduous Forest Ecosite
FOD8-1	Fresh-Moist Poplar Deciduous Forest Type
FOD8-2	Fresh-Moist Sassafras Deciduous Forest Type
FOD9	Fresh-Moist Oak-Maple-Hickory Deciduous Forest Ecosite
MAM2	Mineral Meadow Marsh Ecosite
MAM2-10	Bluejoint Mineral Meadow Marsh Type
MAS2-1	Cattail Mineral Shallow Marsh Type
OAO	Open Aquatic
SWD1-3	Pin Oak Deciduous Swamp Type
SWDS-3	Swamp Maple Mineral Deciduous Swamp Type
TPO2-1	Fresh-Moist Tallgrass Prairie Type
TPS2-1	Fresh-Moist Pin Oak-Bur Oak Tallgrass Savannah Type
TPW2-1	Fresh-Moist Black Oak-White Oak Tallgrass Woodland Type
TPW2-2	Fresh-Moist Pin Oak Tallgrass Woodland Type

LEGEND

- Maximum Footprint Area of Combined Alternatives
- Vegetation Community Boundary

Provincially Rare Vegetation Community (S Rank)

- S1
- S2/S3
- S3 or S3/S4

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

ELC VEGETATION COMMUNITIES LOCATED IN THE AREA OF INVESTIGATION

LGL Limited
environmental research associates

Project: TA4137	**Figure:** 3b
Date: February 2007	**Prepared By:** MWF
Scale: 1 : 10,000	**Checked By:** GNK

Vegetation Communities

CUM1-1	Dry-Moist Old Field Meadow Type	FOD7-3	Fresh-Moist Willow Lowland Deciduous Forest Type
CUP1-3	Red Oak Deciduous Plantation Type	FOD7-4	Fresh-Moist Black Walnut Lowland Deciduous Forest Type
CUP3	Coniferous Plantations	FOD8	Fresh-Moist Poplar-Sassafras Deciduous Forest Ecosite
CUP3-3	Scotch Pine Coniferous Plantation Type	FOD8-1	Fresh-Moist Poplar Deciduous Forest Type
CUS1	Mineral Cultural Savannah Ecosite	FOD8-2	Fresh-Moist Sassafras Deciduous Forest Type
CUS1-1	Hawthorn Cultural Savannah Type	FOD9	Fresh-Moist Oak-Maple-Hickory Deciduous Forest Ecosite
CUT1	Mineral Cultural Thicket Ecosite	MAM2	Mineral Meadow Marsh Ecosite
CUT1-4	Gray Dogwood Cultural Thicket Type	MAM2-10	Bluejoint Mineral Meadow Marsh Type
CUW1	Mineral Cultural Woodland Ecosite	MAS2-1	Cattail Mineral Shallow Marsh Type
FOD1-3	Dry-Fresh Black Oak Deciduous Forest Type	OAO	Open Aquatic
FOD1-4	Dry-Fresh Mixed Oak Deciduous Forest Type	SWD1-3	Pin Oak Deciduous Swamp Type
FOD2-2	Dry-Fresh Oak-Hickory Deciduous Forest Type	SWD3-3	Swamp Maple Mineral Deciduous Swamp Type
FOD4	Dry-Fresh Deciduous Forest Ecosite	TPO2-1	Fresh-Moist Tallgrass Prairie Type
FOD7-1	Fresh-Moist White Elm Lowland Deciduous Forest Type	TPS2-1	Fresh-Moist Pin Oak-Bur Oak Tallgrass Savannah Type
FOD7-2	Fresh-Moist Ash Lowland Deciduous Forest Type	TPW2-1	Fresh-Moist Black Oak-White Oak Tallgrass Woodland Type
		TPW2-2	Fresh-Moist Pin Oak Tallgrass Woodland Type

LEGEND

- Maximum Footprint Area of Combined Alternatives
- Vegetation Community Boundary

Provincially Rare Vegetation Community (S Rank)

- S1
- S2/S3
- S3 or S3/S4

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

ELC VEGETATION COMMUNITIES LOCATED IN THE AREA OF INVESTIGATION

LGL Limited
environmental research associates

Project:	TA4137	**Figure:**	3c
Date:	February 2007	**Prepared By:**	MWF
Scale:	1 : 10,000	**Checked By:**	GNK

Vegetation Communities

CUM1-1	Dry-Moist Old Field Meadow Type
CUP1-3	Red Oak Deciduous Plantation Type
CUP3	Coniferous Plantations
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CUS1	Mineral Cultural Savannah Ecosite
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CUT1-4	Gray Dogwood Cultural Thicket Type
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FOD1-3	Dry-Fresh Black Oak Deciduous Forest Type
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FOD2-2	Dry-Fresh Oak-Hickory Deciduous Forest Type
FOD4	Dry-Fresh Deciduous Forest Ecosite
FOD7-1	Fresh-Moist White Elm Lowland Deciduous Forest Type
FOD7-2	Fresh-Moist Ash Lowland Deciduous Forest Type
FOD7-3	Fresh-Moist Willow Lowland Deciduous Forest Type
FOD7-4	Fresh-Moist Black Walnut Lowland Deciduous Forest Type
FOD8	Fresh-Moist Poplar-Sassafras Deciduous Forest Ecosite
FOD8-1	Fresh-Moist Poplar Deciduous Forest Type
FOD8-2	Fresh-Moist Sassafras Deciduous Forest Type
FOD9	Fresh-Moist Oak-Maple-Hickory Deciduous Forest Ecosite
MAM2	Mineral Meadow Marsh Ecosite
MAM2-10	Bluejoint Mineral Meadow Marsh Type
MAS2-1	Cattail Mineral Shallow Marsh Type
OAO	Open Aquatic
SWD1-3	Pin Oak Deciduous Swamp Type
SWD3-3	Swamp Maple Mineral Deciduous Swamp Type
TPO2-1	Fresh-Moist Tallgrass Prairie Type
TPS3-1	Fresh-Moist Pin Oak-Bur Oak Tallgrass Savannah Type
TPW2-1	Fresh-Moist Black Oak-White Oak Tallgrass Woodland Type
TPW2-2	Fresh-Moist Pin Oak Tallgrass Woodland Type

LEGEND

- Maximum Footprint Area of Combined Alternatives
- Vegetation Community Boundary

Provincially Rare Vegetation Community (S Rank)

- S1
- S2/S3
- S3 or S3/S4

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

ELC VEGETATION COMMUNITIES LOCATED IN THE AREA OF INVESTIGATION

LGL Limited
environmental research associates

Project:	TA4137	**Figure:**	3d
Date:	February 2007	**Prepared By:**	MWF
Scale:	1 : 10,000	**Checked By:**	GNK

Wooded Cultural Communities

CUW1 communities are dominated by a mixture of adventive woody species such as eastern cottonwood (*Populus deltoides* ssp. *deltoides*), Freeman's maple (*Acer X freemanii*) and Manitoba maple (*Acer negundo*) and they have less than 60 percent tree cover. CUS1 communities have a lower percent tree cover at less than 35 percent and are made up of Manitoba maple, black walnut (*Juglans nigra*) and eastern cottonwood. CUT1 communities are clusters of shrubs, including gray dogwood (*Cornus foemina* ssp. *racemosa*), staghorn sumac (*Rhus typhina*) and common buckthorn (*Rhamnus cathartica*). All three community types have a high percentage of species that are considered introduced and non-native to Ontario. Three Cultural Plantations (CUP) are present in the AOI including planted red oak (*Quercus rubra*), eastern white cedar (*Thuja occidentalis*) and Scots pine (*Pinus sylvestris*).

Cultural Meadow

CUM1-1 communities consist of species that are typical of disturbed sites. Based on the species composition of these sites, it is likely that they are regularly mown (manicured) or ploughed. Grasses and invasive forbs, such as wild carrot (*Daucus carota*), common reed (*Phragmites australis*), tall goldenrod (*Solidago altissima* var. *altissima*), orchard grass (*Dactylis glomerata*), Canada goldenrod (*Solidago canadensis*) and Kentucky bluegrass (*Poa pratensis* ssp. *pratensis*) are dominant. Colonization of these areas by woody species is limited. Some of the cultural meadow communities were cultivated in the past.

Deciduous Forests

There was a wide range of successional stages in the deciduous forest communities in the AOI. Communities ranged from young through mid-aged to mature. Many of the forests contained a high percentage of native species, while others were dominated by non-native species. Deciduous forests occurred in both upland and lowland areas. Forests with dry to fresh soil conditions were dominated by black oak, white oak, shagbark hickory (*Carya ovata*), Manitoba maple and black locust (*Robinia pseudo-acacia*). Forests with fresh to moist soil conditions were dominated by American elm (*Ulmus americana*), red ash (*Fraxinus pennsylvanica*), black willow (*Salix nigra*), black walnut, eastern cottonwood, sassafras (*Sassafras albidum*), pin oak, swamp white oak (*Quercus bicolor*) and Freeman's maple. Natural succession and anthropogenic disturbances have resulted in high forest diversity with a total of 12 ELC forest community types.

Tallgrass Prairie

A proportion of the meadow communities contain a greater abundance of early successional tallgrass prairie species. These meadows have the potential to be classified as either meadow or forb prairie, but there is no classification within the ELC manual for early successional forb prairie communities. Thus, a criterion was used by LGL to classify forb prairies as either CUM1-1 or TPO2-1 communities. This criterion was the amount of anthropogenic disturbance and the ratio of introduced to tallgrass species. The forb prairies in the area of investigation contain wild bergamot (*Monarda fistulosa*), ironweed (*Vernonia gigantea*), Canadian tick-trefoil (*Desmodium canadense*), gray-headed coneflower (*Ratibida pinnata*), rough-headed bush-clover (*Lespedeza capitata*), tall

tickseed (*Coreopsis tripteris*), tall wild sunflower (*Helianthus giganteus*) and spiked blazing star (*Liatris spicata*). Conversely, the forb prairies contained a lesser proportion of tallgrass than in the tallgrass prairie communities. TPO2-1 communities have experienced the least amount of anthropogenic disturbance of the open communities found in the AOI. They contain a mixture of native tall grasses and prairie forbs, including Indian grass (*Sorghastrum nutans*), big bluestem (*Andropogon gerardii*), little bluestem (*Schizachyrium scoparium*), Virginia culver's root (*Veronicastrum virginicum*), colic-root (*Aletris farinosa*), ironweed and tall cord grass (*Spartina pectinata*). Past fire occurrence is evident in many of the healthy TPO2-1 communities.

Groundwater is known to play an important role in sustaining the tallgrass prairie communities. Hydrogeological conditions in the AOI consist generally of shallow surficial sand, silt and fill over unsaturated clayey silt over saturated silty clay over bedrock. The tallgrass prairie communities are sustained by the surficial sand, silt and fill layer (surface aquifer) that is saturated by rainfall. Percolation downwards from the surface aquifer through the unsaturated clayey silt (aquatard) to the deep aquifer (saturated clayey silt and bedrock) is very slow. The groundwater table in the surficial aquifer is located approximately 2 to 3 m below ground surface, depending on site-specific conditions and the amount of rainfall.

Oak Savannah and Woodland

One oak savannah community was found in the AOI and it was dominated by pin oak (*Quercus palustris*) and bur oak (*Quercus macrocarpa*). Two types of oak woodlands were encountered and they consist of black oak, white oak and pin oak. These communities contain many native drought resistant grasses and sedges, plus numerous tallgrass prairie forb species.

Wetlands

The wetlands in the AOI include swamps, marshes and open aquatic communities. The deciduous swamps are dominated by pin oak, Freeman's maple and eastern cottonwood. The meadow marshes are composed of common reed, European beggar-ticks (*Bidens tripartita*) and devil's beggar-ticks (*Bidens frondosa*), while the shallow marshes are made up of narrow-leaved cattail (*Typha angustifolia*). There was one small Open Aquatic (OAO) community that had an algal bloom in the mid-summer, which cleared up by the late summer.

2.3.1.3 Species at Risk

Eight species listed as Special Concern, Threatened or Endangered (SC, T or E) by COSEWIC or COSSARO and regulated under the *Species at Risk Act* were recorded during field investigations (colic-root, willow aster, Kentucky coffee-tree, spiked blazing star, Shumard oak, prairie rose, Riddell's goldenrod and butternut). Two species, summer snowflake, considered Globally Very Rare (G2) and butternut, considered Globally Rare to Uncommon (G3), were also recorded duing field investigations. Sixty-three species considered Extremely Rare (S1), Very Rare (S2) and Rare to Uncommon (S3) according to the NHIC were observed during field investigations. A list of provincially rare plant species located in the AOI is presented in Table 3.

TABLE 3.
PROVINCIALLY RARE VEGETATION SPECIES LOCATED IN THE AOI

#	Scientific Name	Common Name	COSEWIC	COSSARO	Grank	Srank
1	*Agalinis purpurea*	large purple agalinis			G5	S1
2	*Aristida purpurascens* var. *purpurascens*	arrow-feather three-awn			G5T?	S1
3	*Eupatorium altissimum*	tall joe-pyeweed			G5	S1
4	*Euthamia gymnospermoides*	viscid bushy goldenrod			G5	S1
5	*Juncus biflorus*	two-flowered rush			G5Q	S1
6	*Juncus brachycarpus*	short-fruited rush			G4G5	S1
7	*Ludwigia alternifolia*	rattle-box			G5	S1
8	*Pycnanthemum verticillatum* var. *pilosum*	hairy mountain-mint			G5T5	S1
9	*Rudbeckia fulgida*	orange coneflower			G5	S1
10	*Scleria triglomerata*	tall nut-rush			G5	S1
11	*Silphium terebinthinaceum* var. *terebinthinaceum*	prairie dock			G4G5 T4T5	S1
12	*Sisyrinchium albidum*	white blue-eyed-grass			G5?	S1
13	*Vitis labrusca*	fox grape			G5	S1
14	*Agalinis tenuifolia* var. *macrophylla*	slender-leaved agalinis			G4G5 Q	S1?
15	*Aletris farinose*	colic-root	THR SARA (1)	THR	G5	S2
16	*Asclepias purpurascens*	purple milkweed			G4G5	S2
17	*Asclepias sullivantii*	Sullivant's milkweed			G5	S2
18	*Aster praealtus* var. *praealtus*	willow aster	THR SARA (1)	THR	G5T?	S2
19	*Baptisia tinctoria*	wild indigo			G5	S2
20	*Campsis radicans*	trumpet creeper			G5	S2
21	*Carex squarrosa*	squarrose sedge			G4G5	S2
22	*Coreopsis tripteris*	tall tickseed			G5	S2
23	*Fraxinus profunda*	pumpkin ash			G4	S2
24	*Gaura biennis*	biennial gaura			G5	S2
25	*Gleditsia triacanthos*	honey locust			G5	S2
26	*Gymnocladus dioicus*	Kentucky coffee-tree	THR SARA (1)	THR	G5	S2
27	*Juncus marginatus*	grass-leaved rush			G5	S2
28	*Krigia biflora* var. *biflora*	two-flowered Cynthia			G5	S2
29	*Liatris aspera* var. *intermedia*	rough blazing star			G4G5 T?	S2
30	*Liatris spicata*	spiked blazing star	THR SARA (1)	THR	G5	S2
31	*Ludwigia polycarpa*	many-fruited false loosestrife			G4	S2
32	*Oxypolis rigidior*	cowbane			G5	S2
33	*Paspalum setaceum*	bristle-like paspalum			G5	S2
34	*Suaeda calceoliformis*	western seablite			G5	S2
35	*Thalictrum revolutum*	waxy meadow-rue			G5	S2
36	*Tradescantia ohiensis*	Ohio spiderwort			G5	S2
37	*Veronicastrum virginicum*	Virginia culver's-root			G4	S2

TABLE 3.
PROVINCIALLY RARE VEGETATION SPECIES LOCATED IN THE AOI

#	Scientific Name	Common Name	COSEWIC	COSSARO	Grank	Srank
38	*Ratibida pinnata*	gray-headed coneflower			G5	S2S3
39	*Agrimonia parviflora*	many-flowered agrimony			G5	S3
40	*Aureolaria flava*	yellow false foxglove			G5	S3
41	*Aureolaria pedicularia*	fern-leaved false foxglove			G5	S3
42	*Carex swanii*	swan's sedge			G5	S3
43	*Carex trichocarpa*	hairy-fruited sedge			G4	S3
44	*Carya glabra*	pignut hickory			G5	S3
45	*Carya laciniosa*	big shellbark hickory			G5	S3
46	*Eupatorium purpureum* var. *purpureum*	purple joe-pye-weed			G5T?	S3
47	*Galium pilosum* var. *pilosum*	hairy bedstraw			G5T?	S3
48	*Geum vernum*	spring avens			G5	S3
49	*Hypoxis hirsute*	yellow star-grass			G5	S3
50	*Juncus greenei*	Greene's rush			G5	S3
51	*Lithospermum caroliniense* var. *croceum*	plains puccoon			G4G5 T4T5	S3
52	*Lythrum alatum*	wing-angled loosestrife			G5	S3
53	*Nyssa sylvatica*	black gum			G5	S3
54	*Panicum sphaerocarpon*	rough-fruited panic grass			G5	S3
55	*Quercus palustris*	pin oak			G5	S3
56	*Quercus shumardii*	shumard oak	SC SARA (3)	SC	G5	S3
57	*Rosa setigera*	prairie rose	SC SARA (1)	SC	G5	S3
58	*Solidago riddellii*	Riddell's goldenrod	SC SARA (1)	SC	G5	S3
59	*Solidago rigida* ssp. *Rigida*	stiff-leaved goldenrod			G5T5	S3
60	*Vernonia gigantea*	ironweed			G5T	S3
61	*Juglans cinerea*	butternut	END SARA (1)	END	G3G4	S3?
62	*Vernonia missurica*	ironweed			G4G5	S3?
63	*Ornithogalum umbellatum*	summer snowflake			G2?	SE3

Many of the vegetation communities identified in the AOI are considered Provincially Extremely Rare (S1), Provincially Very Rare (S2) or Provincially Rare to Uncommon (S3), while others and/or the same communities are considered Globally Extremely Rare (G1) or Globally Very Rare (G2) (NHIC 1997). Notable communities include:

- 24 Fresh-Moist Tallgrass Prairies (TPO2-1) (G2 and S1);
- four Pin Oak Mineral Deciduous Swamps (SWD1-3) (G2 and S2S3);
- three Dry-Fresh Black Oak Deciduous Forests (FOD1-3) (S3);
- two Dry-Fresh Mixed Oak Deciduous Forests (FOD1-4) (S3S4);
- two Fresh-Moist Black Walnut Lowland Deciduous Forests (FOD7-4) (S2S3);
- two Fresh-Moist Black Oak-White Oak Tallgrass Woodlands (TPW2-1) (G2 and S1);
- one Dry-Fresh Oak-Hickory Deciduous Forest (FOD2-2) (S3S4);
- one Fresh-Moist Pin Oak-Bur Oak Tallgrass Savannah (TPS2-1) (G1 and S1); and
- one Fresh-Moist Pin Oak Tallgrass Woodland (TPW2-2) (G1 and S1).

A list of provincially significant vegetation communities located in the AOI ordered by S-rank is presented in Table 4. Based on a review of secondary source information, we believe that most of these rare vegetation communities and species are represented in the designated Ojibway Prairie Complex ANSI, although further field investigations in areas located outside of the AOI would be required to substantiate this opinion.

TABLE 4.
PROVINCIALLY RARE VEGETATION COMMUNITIES LOCATED IN THE AOI

ELC Code	ELC Description	G rank	S rank
TPO2-1	Fresh-Moist Tallgrass Prairie	G2	S1
TPS2-1	Fresh-Moist Pin Oak-Bur Oak Tallgrass Savannah	G1	S1
TPW2-1	Fresh-Moist Black Oak-White Oak Tallgrass Woodland	G2	S1
TPW2-2	Fresh-Moist Pin Oak Tallgrass Woodland	G1	S1
FOD7-4	Fresh-Moist Black Walnut Lowland Deciduous Forest	G4?	S2S3
SWD1-3	Pin Oak Mineral Deciduous Swamp	G2	S2S3
SWD1-3	Pin Oak Mineral Deciduous Swamp	G2	S2S3
SWD1-3	Pin Oak Mineral Deciduous Swamp	G2	S2S3
FOD1-3	Dry-Fresh Black Oak Deciduous Forest	G4?	S3
FOD1-4	Dry-Fresh Mixed Oak Deciduous Forest	G?	S3S4
FOD2-2	Dry-Fresh Oak-Hickory Deciduous Forest	G4?	S3S4

There were numerous vegetation communities that contain a high diversity of provincially rare (S1 to S3) species. Vegetation communities LAM1, ANS2C, ANS2, NAR15, NAR16, NCH12, ANS1, NHC4B, LAM2, YWK1, YWK1C, ANS2B, ANS2D, ESA5, HCL3, MAL3B, NAR1, NAR4A, NAR4C, NCH4Z and YWK1B contain ten to 18 S1 to S3 species. Vegetation communities ESA2, NSG5, OAK1B, RED12, RED13, BBA4F-L,N,P,R, HCL6, MAL1D, ESA4, MAL3, NAR4B, NCH12B, NCH2B, OAK1A, RED2, RED8, ANS1A, LAM3, LAM4D, MAL1, NCH2E, BBA1, BBA4EC, BBA4MB, ESA2, MAL10, MAL11, MAL1B, MAL9, NCH1A, NCH1B, NCH1C, NCH1D,NGM1, NGM2, OAK2, OAK3, OAK4, RED4 and RED7 contain five to nine S1 to S3 species. Ninety-eight other ELC communities

contain one to four S1 to S3 species. A complete list of vegetation communities and the species of rare plants identified in these communities is presented in Appendix D.

2.3.2 Molluscs and Insects

2.3.2.1 Molluscs

Molluscs are among the most conspicuous and familiar invertebrate animals and include such forms as clams, squids, octopods and snails. Data were reviewed and obtained on two classes of Mollusc phyla, the Bivalves (clams) and the Gastropods (snails).

Freshwater mussels (Unionids) are a type of Bivalve and are benthic sedentary animals with a life expectancy of 10 to 80 years depending on the species. Unionids spend the bulk of their life residing in the sediment of watercourses. However, as part of the larvae (glochidia) development, the offspring must attach to the gills of a host fish (or salamander for one species) and parasitize the host until they are sufficiently mature to drop off as juveniles. Many species of Unionids require specific host fish species for development. Unionids are among the most endangered organisms in North America (Metcalfe-Smith *et. al.* 2005), and considerable research has been done in Ontario to investigate our native species. In Ontario 28 of 41 native species are showing signs of decline (Metcalfe-Smith *et. al.* 2005), and 10 species are ranked federally and/or provincially as Endangered or Threatened (Table 5).

Much less is known of the terrestrial and aquatic Gastropods of Ontario. Gastropods are divided into three groups, the Prosobranchs, Opisthobrachs and the Pulmonates. The Prosobranchs and Opisthobrachs posses gills and are purely aquatic, but only the Prosobranchs are a freshwater species. Pulmonates have lungs that enable them to respire oxygen from freshwater and/or the air. There are approximately 485 species of Gastropods in North America, none of which are ranked federally or provincially in Ontario.

Screening for Mollusc Species of Significance

Mollusc investigations in the Windsor area have been largely limited to the Detroit River, and very little data is available on the terrestrial Gastropods or the Unionids and Gastropods inhabiting the inland watercourses. Historically, numerous native species of Unionids were known to inhabit the Detroit River, however recent studies indicate that no native Unionids remain in the Detroit River due to pollution, habitat loss and competition with zebra mussels (*Dreissena polymorha*) (T. Morris, J. Ciborowski, L. Corkum and G. Mackie pers. comm.). Screenings for the presence of native Unionids within the watercourses in the AOI and its vicinity were unable to confirm the presence of any federally or provincially ranked species. No known recent mollusc investigations have been conducted in the AOI and its vicinity (aside from the Detroit River). However, Snuffbox (*Epioblasma triquetra*) is known to occur within the County of Essex according to the NHIC.

TABLE 5.
SUMMARY OF SIGNIFICANT MOLLUSC SPECIES POTENTIALLY PRESENT IN THE AOI AND ITS VICINITY

Class	Family	Scientific Name	Common Name	Present	COSEWIC	COSSARO	SRank	Legal
Gastropoda	Pomatiopsidae	*Pomatiopsis lapidaria*	Slender Walker	?[E]			S3	FA
	Discidae	*Discus patulus*	Domed Disc	?[E]			S2S3	FA
	Philomycidae	*Philomycus carolinianus*	Carolina Mantleslug	?[E]			S1S2	FA
	Polygyridae	*Mesodon pennsylvanicus*	A Snail	Y			S1	FA
		Mesodon zaletus	Toothed Globe	Y			S1S2	FA
		Stenotrema barbatum	Bristled Slitmouth	?[E]			S2	FA
		Stenotrema hirsutum	Hairy Slitmouth	?[E]			S1	FA
		Xolotrema denotatum	A Snail	?[E]			S2S3	FA
	Succineidae	*Succinea ovalis*	A Snail	?[E]			S3S4	FA
	Zonitidae	*Glyphyalinia luticola*	A Snail	?[E]			S1S2	FA
Bivalvia	Unionidae	*Epioblasma torulosa rangiana*	Northern Riffleshell	?	END	END	S1	SARA(1), FA
		Epioblasma triquetra	Snuffbox	?[E]	END	END	S1	SARA(1), FA
		Lampsilis fasciola	Wavy-rayed Lampmussel	?	END	END	S1	SARA(1), FA
		Obovaria subrotunda	Round Hickorynut	?	END	END	S1	SARA(1), FA
		Pleurobema sintoxia	Round Pigtoe	?	END	END	S1	SARA(1), FA
		Ptychobranchus fasciolaris	Kidneyshell	?	END	END	S1	SARA(1), FA
		Quadrula quadrula	Mapleleaf	?	THR	Pending*	S2	SARA(Pending*), FA
		Simpsonaias ambigua	Mudpuppy Mussel	?	END	END	S1	SARA(1), FA
		Villosa fabalis	Rayed Bean	?	END	END	S1	SARA(1), FA
		Villosa iris	Rainbow	?	END	Pending*	S2S3	SARA(Pending*), FA

*Status not yet assigned, though anticipated shortly. COSEWIC and COSSARO are expected to list these species concurrently.

Present:
Y – confirmed present in the vicinity of the AOI
? – possibly present in the vicinity of the AOI
?[E] – possibly present in the vicinity of the AOI and known to occur in Essex County according to NHIC
?[T] – possibly present in the vicinity of the AOI and known to occur in the Town of Tecumseh
?[OD] – possibly present in the vicinity of the AOI and documented in extreme southern Ontario by the Odonate Database, NHIC

Currently nine species are ranked Endangered and one Threatened by COSEWIC, and eight species are ranked Endangered by COSSARO (Table 5). There is the potential that these species may occur in the AOI and its vicinity as no comprehensive field investigations have been conducted of the Windsor area, and several of these species likely occurred in the Detroit River historically. All Unionids are regulated under the *Fisheries Act*, and eight of the species are also listed under Schedule 1 of the *Species at Risk Act*. The two remaining species will likely be added to Schedule 1 of SARA in the near future and designated by COSSARO.

Data obtained from the MNR also indicates that two significant species of Gastropod occur in the AOI and its vicinity (Table 5). These two species (*Mesodon pennsylvanicus* and *Mesodon zaletus*) are ranked S1 and S1S2 respectively, meaning that they are Extremely Rare to Very Rare in Ontario. An additional eight provincially rare species are known to occur in the County of Essex and may occur in the AOI and its vicinity. There is the potential that these species and other rare Gastropods may occur in the AOI and its vicinity as no comprehensive field investigations has been conducted of the Windsor area. All aquatic Gastropods are regulated under the *Fisheries Act.*

Further investigation is required to determine the presence/absence of significant mollusc species in the AOI. Field investigations and habitat assessments are strongly recommended to screen for Unionids. Watercourses should be searched for living animals and discarded shells. Habitat assessments including inventories of water quality, connectivity, substrate, presence of host fish and other parameters is highly advised. Field investigations and habitat assessments using these sorts of techniques should also be applied for the screening of significant Gastropods.

2.3.2.2 Insects

There are an estimated 30,000 known species of insects in Canada and over 2055 species of insects have been reported in the Ojibway Prairie Complex alone. Insects are the most abundant fauna in the world, and there are over 26 Orders of insects, including mayflies, damselflies and dragonflies, grasshoppers, cockroaches, termites, earwigs, stoneflies, lice, true bugs, thrips, beetles, fleas, true flies, caddisflies, moths and butterflies, and wasps and ants. Insects are present in all habitats and have a wide variety of forms and life cycles. Insects are generally under-investigated and under-protected; however, some research has been conducted in the Ojibway Prairie Complex area by researchers from the University of Guelph and other institutions. Considerable data has been gathered on the insects of the Ojibway Prairie but a lot of research still remains to be done. This area is known for its high species diversity and many rare species due to its geographic location and significant habitats.

Screening for Species of Significance

The Ojibway Prairie Complex area has recently been relatively intensively investigated by entomologists, and there are several recent publications documenting researchers' findings. Given the sheer number of species present, most of the research efforts and publications have focused on select groups of insects. Records on insect species captured are maintained by the Ojibway Nature Centre and a database of insects of the Ojibway Prairie is maintained by the University of Guelph. In addition, there are several regular entomological activities organized at the Ojibway Prairie including an annual

butterfly count organized by the North American Butterfly Association and a dragonfly count organized by the Toronto Entomology Association, in conjunction with the Ojibway Nature Center.

Several species listed by COSEWIC and COSSARO were reviewed to determine if they were potentially present in the AOI and its vicinity. In Ontario, the following insects are listed by COSEWIC and COSSARO:

- Frosted Elfin (*Callophrys irus*) is listed as Extirpated by COSEWIC and Endangered (Regulated) by COSSARO;
- Karner Blue (*Lycaeides melissa samuelis*) is listed as Extirpated by COSEWIC and Endangered (Regulated) by COSSARO;
- Aweme Borer (*Papaipema aweme*) is listed as Endangered (no Schedule) by COSEWIC only;
- Monarch (*Danaus plexippus*) is listed as Special Concern by both COSEWIC and COSSARO; and
- West Virginia White (*Pieris virginiensis*) is listed as Special Concern by COSSARO only.

The Monarch is known to occur in the AOI and its vicinity; however, it is highly unlikely that the remainder of the above mentioned species occur in proximity to the AOI and its vicinity given their current distributions and habitat requirements.

Much of the data recently published on the insects in the vicinity of the AOI is documentation of new species for Canada, Ontario or the region. Compilation of this data and other records indicates that there are at least 113 species of conservation concern known from this area. This includes one species of Diptera (true flies), 22 species of Auchenorrhyncha Hemiptera (hoppers), 13 species of Heteroptera Hemiptera (true bugs), 41 species of Hymenoptera (bees and wasps), 17 species of Lepidopera (moths and butterflies), 13 species of Odonata (damselflies and dragonflies), and six species of Orthoptera (grasshoppers, crickets and katydids) (Table 6). Seven other species of Odonata may also be present based on data from the NHIC Odonata Database indicating that they occur in the County of Essex, Town of Tecumseh and/or extreme southern Ontario.

Of the 120 species present (or potentially present), 69 species have been assigned an S-rank of S1 to S3 indicating that they are Extremely Rare, Very Rare or Rare to Uncommon within the province and five species have a rank of S4 or S5. A further 46 species are ranked SNR as there is insufficient data to rank the species. Since many of these species are new records for Ontario or Canada and are under-documented, there is a strong likelihood that many of these species ranked SNR are also provincially rare.

The Monarch is listed as Special Concern by COSEWIC and regulated under Schedule 1 of the *Species at Risk Act*. The Monarch and five other species of butterflies are also regulated under the Ontario *Fish and Wildlife Conservation Act*, due to their interest to collectors. Monarchs are known to inhabit and migrate through the Windsor area; however, there are no known Monarch staging (stop over) areas in the vicinity of the AOI.

TABLE 6.
SUMMARY OF SIGNIFICANT INSECT SPECIES POTENTIALLY PRESENT IN THE AOI AND ITS VICINITY

Order	Family	Scientific Name	Common Name	Present	COSEWIC	COSSARO	Srank	Legal
Diptera	Psilidae	*Loxocera ojibwayensis*	A Fly	Y			SNR*	
Hemiptera	Cicadellidae	*Balclutha abdominalis*	A Leafhopper	Y			S1	
(Auchenorrhyncha)		*Chlorotettix fallax*	A Leafhopper	Y			S1	
		Chlorotettix spatulatus	A Leafhopper	Y			S2	
		Cuerna fenestella	A Leafhopper	Y			S1	
		Dorydiella kansana	A Leafhopper	Y			S1	
		Flexamia inflate	A Leafhopper	Y			S1	
		Flexamia prairiana	A Leafhopper	Y			S1	
		Graminella oquaka	A Leafhopper	Y			S1	
		Graminella pallidula	A Leafhopper	Y			S1	
		Hecalus flavidus	A Leafhopper	Y			S1	
		Laevicephalus unicoloratus	A Leafhopper	Y			S2	
		Limotettix elegans	A Leafhopper	Y			S1	
		Mesamia nigridorsum	A Leafhopper	Y			S1	
		Neokolla lugubris	A Leafhopper	Y			S1?	
		Xerophloea major	A Leafhopper	Y			S1	
		Xerophloea peltata	A Leafhopper	Y			S1	
	Delphacidae	*Delphacodes waldeni*	A Plant Hopper	Y			S1?	
		Megamelus metzaria	A Plant Hopper	Y			SNR	
	Derbidae	*Anotia westwoodi*	A Plant Hopper	Y			SNR	
	Flatidae	*Anormenis septentrionalis*	A Plant Hopper	Y			SNR	
		Ormenoides venusta	A Plant Hopper	Y			SNR	
	Membracidae	*Publilia reticulate*	A Tree Hopper	Y			S1?	

TABLE 6.
SUMMARY OF SIGNIFICANT INSECT SPECIES POTENTIALLY PRESENT IN THE AOI AND ITS VICINITY

Order	Family	Scientific Name	Common Name	Present	COSEWIC	COSSARO	Srank	Legal
Hemiptera	Aradidae	*Neuroctenus simplex*	A Flat Bug	Y			S1S3	
(Heteroptera)	Coreidae	*Chariesterus antennator*	A Leaf-footed Bug	Y			S1S2	
		Euthochtha galeator (Fabricius)	A Leaf-footed Bug	Y			S1S3	
	Cydnidae	*Pangaeus bilineatus*	A Burrowing Bug	Y			S2S4	
	Geocoridae	*Isthmocoris piceus (Say)*	A Big-eyed Bug	Y			S2S4	
	Lygaeidae	*Lygaeus turcicus (Fabricius)*	Small Milkweed Bug	Y			S1S3	
	Nabidae	*Hoplistoscelis sordidus*	A Damsel Bug	Y			S4	
	Pentatomidae	*Amaurochroa ovalis*	A Stink Bug	Y			S1?	
		Dendrocoris humeralis	A Stink Bug	Y			S2S4	
		Stiretrus anchorago fimbriatus (Say)	A Stink Bug	Y			S1S3	
	Rhyparochromidae	*Cryphula trimaculata*	A Seed Bug	Y			S1?	
		Ozophora picturata (Uhler)	A Seed Bug	Y			S1S3	
	Tingidae	*Leptopharsa heidemanni*	A Lace Bug	Y			S1	
Hymenoptera	Andrenidae	*Perdita (Cockerellia) bequaerti bequaerti*	A Minning Bee	Y			SNR*	
	Crabronidae (Astatinae)	*Astata nubecula*	An Aculeate Wasp	Y			SNR*	
	Crabronidae	*Bicyrets quadrifasciatus*	A Digger Wasp	Y			SNR*	
	(Bembicinae)	*Clitemnestra bipunctata*	A Digger Wasp	Y			SNR*	
		Didineis texana	A Digger Wasp	Y			SNR*	
		Epinysson mellipes	A Digger Wasp	Y			SNR*	
		Epinysson tramosericus	A Digger Wasp	Y			SNR*	
		Epinysson tuberculatus	A Digger Wasp	Y			SNR*	
		Hoplisoides placidus	A Digger Wasp	Y			SNR*	
		Nysson simplicicornis	A Digger Wasp	Y			SNR*	
		Nysson subtilis	A Digger Wasp	Y			SNR*	

TABLE 6.
SUMMARY OF SIGNIFICANT INSECT SPECIES POTENTIALLY PRESENT IN THE AOI AND ITS VICINITY

Order	Family	Scientific Name	Common Name	Present	COSEWIC	COSSARO	Srank	Legal
Hymenoptera	Crabronidae	*Ectemnius dilectus*	A Digger Wasp	Y			SNR*	
(continued)	(Crabroninae)	*Ectemnius scaber*	A Digger Wasp	Y			SNR*	
		Entomognathus lenapeorum	A Digger Wasp	Y			SNR*	
		Entomognathus memorialis	A Digger Wasp	Y			SNR*	
		Oxybelus cressonii	A Digger Wasp	Y			SNR*	
		Oxybelus decorosus	A Digger Wasp	Y			SNR*	
		Oxybelus subcornutus	A Digger Wasp	Y			SNR*	
		Tachysphex antennatus	A Digger Wasp	Y			SNR*	
		Tachysphex apicalis	A Digger Wasp	Y			SNR*	
		Tachytes crassus	A Digger Wasp	Y			SNR*	
		Tachytes harpax	A Digger Wasp	Y			SNR*	
		Tachytes intermedius	A Digger Wasp	Y			SNR*	
	Crabronidae	*Diodontus virginianus*	A Digger Wasp	Y			SNR*	
	(Pemphredoninae)	*Mimumesa leucopus*	A Digger Wasp	Y			SNR*	
		Mimumesa longicornis	A Digger Wasp	Y			SNR*	
	Crabronidae	*Cerceris astarte*	A Digger Wasp	Y			SNR*	
	(Philanthinae)	*Cerceris cruces*	A Digger Wasp	Y			SNR*	
		Cerceris echo	A Digger Wasp	Y			SNR*	
		Cerceris finitima	A Digger Wasp	Y			SNR*	
		Cerceris fumipennis	A Digger Wasp	Y			SNR*	
		Cerceris halone	A Digger Wasp	Y			SNR*	
		Cerceris insolita	A Digger Wasp	Y			SNR*	
		Cerceris kennicottii	A Digger Wasp	Y			SNR*	
		Crabro snowii	A Digger Wasp	Y			SNR*	
		Philanthus lepidus	A Digger Wasp	Y			SNR*	
	Megachilidae	*Stelis costalis*	A Cuckoo Leaf-Cutting Bee	Y			SNR*	
	Sphecidae	*Ammophila nigricans*	A Digger Wasp	Y			SNR*	
		Cerceris bicornuta	A Digger Wasp	Y			SNR*	
		Isodontia elegans	A Digger Wasp	Y			SNR*	
		Sphex pensylvanicus	A Spider Wasp	Y			SNR*	

TABLE 6.
SUMMARY OF SIGNIFICANT INSECT SPECIES POTENTIALLY PRESENT IN THE AOI AND ITS VICINITY

Order	Family	Scientific Name	Common Name	Present	COSEWIC	COSSARO	Srank	Legal
Lepidoptera	Hesperiidae	*Amblyscirtes hegon*	Pepper and Salt Skipper	Y			S3?	
		Erynnis brizo	Sleepy Duskywing	Y			S1	
		Erynnis martialis	Mottled Duskywing	Y			S2	FWCA(P)
		Euphyes dukesi	Duke's Skipper	Y			S2	
		Poanes massasoit	Mulberry Wing	Y			S3	
		Thorybes bathyllus	Southern Cloudywing	Y			S2S3	
	Lycaenidae	*Satyrium caryaevorum*	Hickory Hairstreak	Y			S3S4	
	Noctuidae	*Papaipema baptisiae*	Wild Indigo Borer Moth	Y			S1	
		Papaipema cerussata	Ironweed Borer Moth	Y			S1	
		Papaipema sciata	Culver's-root Borer Moth	Y			S1	
	Nymphalidae	*Asterocampa celtis*	Hackberry Emperor	Y			S2	
		Asterocampa clyton	Tawney Emperor	Y			S2S3	
		Danaus plexippus	Monarch	Y	SC	SC	S4	SARA(1), FWCA(P)
	Papilionidae	*Papilio cresphontes*	Giant Swallowtail	Y			S2	FWCA(P)
		Papilio glaucus	Eastern Tiger Swallowtail	Y			S4S5	FWCA(P)
		Papilio polyxenes	Black Swallowtail	Y			S5	FWCA(P)
		Papilio Troilus	Spicebush Swallowtail	Y			S4	FWCA(P)

TABLE 6.
SUMMARY OF SIGNIFICANT INSECT SPECIES POTENTIALLY PRESENT IN THE AOI AND ITS VICINITY

Order	Family	Scientific Name	Common Name	Present	COSEWIC	COSSARO	Srank	Legal
Odonata	Aeshnidae	*Aeshna clepsydra*	Mottled Darner	?[E, OD]			S3	
		Epiaeschna heros	Swamp Darner	Y			S2S3	
		Nasiaeschna pentacantha	Cyrano Darner	?[E]			S3	
	Coenagrionidae	*Argia tibialis*	Blue-tipped Dancer	?[E]			S3	
		Enallagma aspersum	Azure Bluet	Y			S3	
		Enallagma basidens	Double-striped Bluet	Y			S3	
		Ischnura hastate	Citrine Forktail	Y			S2	
	Gomphidae	*Arigomphus villosipes*	Unicorn Clubtail	?[E]			S1S2	
		Gomphus descriptus	Harpoon Clubtail	?[T]			S3	
		Gomphus fraternus	Midland Clubtail	?[E]			S3	
		Gomphus graslinellus	Pronghorn Clubtail	Y			S2	
		Gomphus vastus	Cobra Clubtail	Y			S1	
		Ophiogomphus carolus	Riffle Snaketail	?[T]			S2	
		Progomphus obscurus	Common Sanddragon	Y			S1	
		Stylurus notatus	Elusive Clubtail	Y			S2	
	Libellulidae	*Celithemis eponina*	Halloween Pennant	Y			S3	
		Libellula semifasciata	Painted Skimmer	Y			S2	
		Libellula vibrans	Great Blue Skimmer	Y			S1	
		Perithemis tenera	Eastern Amberwing	Y			S3	
	Macromiidae	*Macromia taeniolata*	Royal River Cruiser	Y			S1	

TABLE 6.
SUMMARY OF SIGNIFICANT INSECT SPECIES POTENTIALLY PRESENT IN THE AOI AND ITS VICINITY

Order	Family	Scientific Name	Common Name	Present	COSEWIC	COSSARO	Srank	Legal
Orthoptera	Acrididae	*Dicromorpha viridis*	A Short-Winged Green Grasshopper	Y			S1?	
		Melanoplus scudderi scudderi	Scudder's short-winged grasshopper	Y			S1?	
		Melanoplus walshii	A Short Horned Grasshopper	Y			S3S4	
	Gryllidae	*Anaxipha exigua*	Say's Bush Cricket	Y			S2S4	
		Neoxabea bipunctata	Two-spotted Tree Cricket	Y			S1?	
	Tettigoniidae	*Microcentrum rhombifolium*	A Katydid	Y			S2S3	

*SNR – insufficient data to rank, though potentially afforded a significant rank due to new published records.

Present:
Y – confirmed present in the vicinity of the area of continued analysis
? – possibly present in the vicinity of the area of continued analysis
$?^{E}$ – possibly present in the vicinity of the area of continued analysis and known to occur in Essex County according to NHIC
$?^{T}$ – possibly present in the vicinity of the area of continued analysis and know to occur in the Town of Tecumseh
$?^{OD}$ – possibly present in the vicinity of the area of continued analysis and documented in the region by the Odonate Database, NHIC

The data presented in Table 6 represents the significant species for groups of insects which are tracked and/or have been recently documented by researchers. No doubt given the data in Table 6 and the sheer abundance of insect species likely present, numerous other significant species also occur in the vicinity of the AOI that have yet to be reported.

The Ojibway Prairie Complex and its vicinity are entomologically significant and home to many of Canada's rarest insect species and habitats. One new species of fly has recently been discovered here, and the Ojibway Prairie is also home to many rare species and new or significant records for Ontario and Canada. The area within and surrounding the Ojibway Prairie has always been an entomological gem, for amateurs and researches, and will likely continue to yield further discoveries.

Since the Ojibway Prairie is located partially in the AOI and similar habitats exist outside of the Ojibway Prairie Complex, efforts should be made to determine what further insect species of significance occur in the area. Sensitive species and locations should be identified through field investigations, further research and correspondence. Areas falling within the AOI should also be further investigated to determine if significant populations or habitat exist. Members of the entomology community should be further consulted to ascertain additional sensitivities. Impacts to Monarchs should also be further evaluated and efforts should also be taken to identify the main areas used by Monarchs for protection and/or mitigation.

The Entomological Importance of the Ojibway Prairie Complex and its Vicinity

The Ojibway Prairie Complex and its vicinity is a unique area composed of tallgrass prairies, savannahs, Carolinian zone vegetation, wetlands and forests. The diversity of rare habitats and plant species contributes towards the high diversity and rarity of insect species present.

The Ojibway Prairie Complex is truly one of the most entomologically unique and important areas in Canada. A review of recent publications on new records for Ontario and Canada indicates that there are many species which can only be found in the Ojibway Prairie, or at a few other locations (Buck & Marshall 2006, Buck, Paiero & Marshall 2005, Marshall, Paiero & Buck 2005, Marshall, Paiero & Lonsdale 2004, Buck 2003, Paiero & Buck 2003, Paiero & Marshall 2003, and Hamilton 1994).

New records include 16 new species for Canada and six new species for Ontario, which have only been found at the Ojibway Prairie. A further 37 new records for Canada and 29 for Ontario have only been found at the Ojibway Prairie and a few other sites. Amazingly, a new species to science was recently discovered in Ojibway Prairie (Buck & Marshall 2006). This insect, *Loxocera ojibwayensis*, is a small Psilidae fly (Diptera) that has been named after the Ojibway Prairie, which is the only known site in the world for this species. A list of the species with the new occurrence record details is provided in Table 7, including four new local records of significant Orthoptera (grasshoppers).

TABLE 7.
SUMMARY OF RECENT SIGNIFICANT RECORDS FROM OJIBWAY PRAIRIE COMPLEX VICINITY

Order	Family	New Canadian Record & Only Site is Ojibway	New Canadian Record, with a Few Known Sites	New Ontario Record & Only Site is Ojibway	New Ontario Record, with a Few Known Sites	Significant Local Record
Diptera	Psilidae	• *Loxocera ojibwayensis**				
Hemiptera (Auchenorrhyncha)	Cicadellidae	• *Chlorotettix fallax* • *Hecalus flavidus* • *Limotettix elegans* • *Neokolla lugubris*	• *Balclutha abdominalus* • *Chlorotettix spatulatus*	• *Cuema fenestella* • *Xerophloea major* • *Xerophloea peltata*	• *Dorydiella kansaa* • *Flexamia inflata* • *Flexamia prairiana* • *Graminella oquaka* • *Graminella pallidula* • *Mesamia nigridorsum* • *Laevicephalus unicoloratus*	
	Delphacidae	• *Delphacodes waldeni*			• *Megamelus metzaria*	
	Derbidae	• *Anotia westwoodi*				
	Flatidae	• *Ormenoides venusta*	• *Anormensis septentrionalis*			
	Membracidae	• *Publilia reticulata*				

TABLE 7.
SUMMARY OF RECENT SIGNIFICANT RECORDS FROM OJIBWAY PRAIRIE COMPLEX VICINITY

Order	Family	New Canadian Record & Only Site is Ojibway	New Canadian Record, with a Few Known Sites	New Ontario Record & Only Site is Ojibway	New Ontario Record, with a Few Known Sites	Significant Local Record
Hemiptera (Heteroptera)	Aradidae		• *Neuroctenus simplex*			
	Coreidae		• *Chariesterus antennator*			
	Cydnidae				• *Pangaeus bilineatus*	
	Lygaeidae	• *Lygaeus turcicus (Fabricius)*				
	Nabidae		• *Hoplistoscelis sordidus*			
	Pentatomidae	• *Stiretrus anchorago fimbriatus (Say)*	• *Amaurochroa ovalis* • *Dendrocoris humeralis*			
	Rhyparochromidae		• *Cryphula trimaculata*	• *Ozophora picturata (Uhler)*		
	Tingidae	• *Leptopharsa heidemanni*				

TABLE 7.
SUMMARY OF RECENT SIGNIFICANT RECORDS FROM OJIBWAY PRAIRIE COMPLEX VICINITY

Order	Family	New Canadian Record & Only Site is Ojibway	New Canadian Record, with a Few Known Sites	New Ontario Record & Only Site is Ojibway	New Ontario Record, with a Few Known Sites	Significant Local Record
Hymenoptera	Andrenidae	• *Perdita b. bequaeti*				
	Crabronidae (Astatinae)				• *Astata nubecula*	
	Crabronidae (Bembicinae)		• *Didineis texana* • *Nysson simplicicornis* • *Bicyrets quadrifasciatus* • *Epinysson tuberculatus* • *Hoplisoides placidus* • *Didineis latimana* • *Epinysson tramosericus* • *Nysson subtillis*		• *Clitemnestra bipunctata* • *Epinysson mellipes*	
	Crabronidae (Crabroninae)	• *Entomognathus lenapeorum*	• *Ectemnius scaber* • *Oxybelus cressonii* • *Oxybelus decorosus* • *Tachytes intermedius* • *Entomognathus memorialis* • *Oxybelus subcornutus* • *Tachytes crassus* • *Tachytes harpax* • *Solierella plenoculoides* • *Trypoxylon attenuatum*	• *Tachysphex apicalis*	• *Ectemnius dilectus* • *Miscophus americanus* • *Plenoculus davisi* • *Rhopalum rufigaster* • *Tachysphex antennatus*	

TABLE 7.
SUMMARY OF RECENT SIGNIFICANT RECORDS FROM OJIBWAY PRAIRIE COMPLEX VICINITY

Order	Family	New Canadian Record & Only Site is Ojibway	New Canadian Record, with a Few Known Sites	New Ontario Record & Only Site is Ojibway	New Ontario Record, with a Few Known Sites	Significant Local Record
Hymenoptera (continued)	Crabronidae (Pemphredoninae)		• *Diodontus virginianus* • *Mimumesa longicornis*		• *Diodontus minutus* • *Mimumesa leucopus*	
	Crabronidae (Philanthinae)	• *Cerceris insolita*	• *Cerceris echo*	• *Cerceris finitima*	• *Cerceris crucis* • *Cerceris kennicottii* • *Crabro snowii* • *Cerceris astarte* • *Cerceris fumipennis* • *Cerceris halone* • *Philanthus lepidus*	
	Megachilidae		• *Stelis costalis*			
	Sphecidae		• *Cerceris bicornuta*		• *Isodontia elegans* • *Ammophila nigricans* • *Sphex pensyvanicus*	
Lepidoptera	Noctuidae	• *Papaipema cerussata* • *Papaipema sciata*	• *Papaipema baptisiae*			

TABLE 7.
SUMMARY OF RECENT SIGNIFICANT RECORDS FROM OJIBWAY PRAIRIE COMPLEX VICINITY

Order	Family	New Canadian Record & Only Site is Ojibway	New Canadian Record, with a Few Known Sites	New Ontario Record & Only Site is Ojibway	New Ontario Record, with a Few Known Sites	Significant Local Record
Orthoptera	Acrididae		• *Dicromorpha viridis* • *Melanoplus scudderi scudderi* • *Melanoplus walshii*			• *Melanoplus d. differentialis*
	Gryllidae		• *Neoxabea bipunctata*			• *Anaxipha exigua* • *Oecanthus niveus*
	Tettigoniidae					• *Microcentrum rhombifolium*
Total		17*	37	6	29	4

*The Diptera record is for a newly identified and discovered species.

2.3.3 Fish and Fish Habitat

2.3.3.1 Fish Species

Based on fisheries information provided by the Essex Region Conservation Authority (ERCA) and field investigations, a total of 21 species of fish inhabit streams located in the AOI, excluding the Detroit River. The fish community located in "inland" watercourses/waterbodies is comprised of resident warmwater sport and bait fish. Northern pike were observed spawning in several small drains located in the Chappus Road area. Table 8 presents the fish occurrence records for the watercourses containing fish as well as the historical fish records provided by ERCA.

Fish species in the Detroit River were recently sampled by four gear types (seine net, boat electrofishing, hoop net and Windemere trap) in the shallow offshore water of the Detroit River during July and August 2003 (Lapointe, Corkum and Mandrak 2005). The reach of the Detroit River sampled included Canadian waters from the confluence with Turkey Creek to the confluence with the River Canard. A total of 38 species of fish were captured. Based on this recent survey and historic fish records, a total of 69 species of fish are reported from the Detroit River. Table 9 presents the fish species known to inhabit the Detroit River.

TABLE 8.
FISH SPECIES OCCURRENCE RECORDS FOR THE AOI EXCLUDING THE DETROIT RIVER

Common Name	Scientific Name	COSEWIC	COSSARO	Srank	Basin Drain	Burke Drain	Cahill Drain	Dickson Drain	G. Marais Drain	Lennon Drain	McKee Creek	McKee Drain	Titcombe Drain	Wolfe Drain	Pond
central mudminnow	*Umbra limi*			S5			152	46							
northern pike	*Esox lucius*			S5								17	23		
goldfish	*Carassius auratus*			SE			152		38	153					
common carp	*Cyprinus carpio*			SE			152		38						
golden shiner	*Notemigonus crysoleucas*			S5			152								
hornyhead chub	*Nocomis biguttatus*	NAR	NAR	S4					38						
striped shiner	*Luxilus chrysocephalus*	NAR	NAR	S4			152								
spotfin shiner	*Cyprinella spliloptera*			S5			152								
fathead minnow	*Pimephales promelas*			S5	26		152		38, 150, 151	40, 153				55	
bluntnose minnow	*Pimephales notatus*	NAR	NAR	S5			152		38	40					
emerald shiner	*Notropis atherinoides*			S5			152		150						
minnow family	Cyprinidae						152			153					
white sucker	*Catostomus commersoni*			S5			152								
black bullhead	*Ameiurus melas*			S4			152				2				
black crappie	*Pomoxis nigromaculatus*			S4											X
rock bass	*Ambloplites rupestris*			S5			152					2			
largemouth bass	*Micropterus salmoides*			S5			152		38	40					
smallmouth bass	*Micropterus dolomieu*			S5					38						
green sunfish	*Lepomis cyanellus*	NAR	NAR	S4		47	152		150, 151						
bluegill	*Lepomis macrochirus*			S5					38						
pumpkinseed	*Lepomis gibbosus*			S5			152		38	40, 153					

Station information:

Historical:
ERCA (May 2000) – 152, 153
ERCA (April 2001) –150, 151

LGL Surveys:
LGL (May 2006) - 17, 23
LGL (September 2006) – 2, 26, 38, 40, 46, 47, 55, X

TABLE 9.
FISH SPECIES OCCURRENCE RECORDS FOR THE DETROIT RIVER

Common Name	Scientific Name	COSEWIC	COSSARO	Srank	Legal Status
sea lamprey	*Petromyzon marinus*			SE	
lake sturgeon	*Acipenser fulvescens*	NAR	NAR	S3	
spotted gar	*Lepisosteus oculatus*	THR	THR	S2	PA
longnose gar	*Lepisosteus osseus*			S4	
bowfin	*Amia calva*			S4	
American eel	*Anguilla rostrata*			S5	
alewife	*Alosa pseudoharengus*			SE	
gizzard shad	*Dorosoma cepedianum*			S4	
mooneye	*Hiodon tergisus*			S4	
chinook salmon	*Oncorhynchus tshawytscha*			SE	
coho salmon	*Oncorhynchus kisutch*			SE	
pink salmon	*Oncorhynchus gorbuscha*			SE	
rainbow trout	*Oncorhynchus mykiss*			SE	
brown trout	*Salmo trutta*			SE	
lake trout	*Salvelinus namaycush*			S5	
lake whitefish	*Coregonus clupeaformis*			S5	
rainbow smelt	*Osmerus mordax*			S5	
northern pike	*Esox lucius*			S5	
muskellunge	*Esox masquinongy*			S4	
goldfish	*Carrasius auratus*			SE	
common carp	*Cyprinus carpio*			SE	
silver chub	*Macrhybopsis storeriana*	SC	SC	S2	
golden shiner	*Notemigonus crysoleucas*			S5	
bluntnose minnow	*Pimephales notatus*	NAR	NAR	S5	
emerald shiner	*Notropis atherinoides*			S5	
pugnose minnow	*Opsopoeodus emiliae*	SC	SC	S2	
blacknose shiner	*Notropis heterolepis*			S5	
spottail shiner	*Notropis hudsonius*			S4	
sand shiner	*Notropis stramineus*			S4	
mimic shiner	*Notropis volucellus*			S5	
quillback	*Carpiodes cyprinus*			S4	
longnose sucker	*Catostomus catostomus*			S5	
white sucker	*Catostomus commersoni*			S5	
northern hog sucker	*Hypentelium nigricans*			S4	
bigmouth buffalo	*Ictiobus cyprinellus*	SC	SC	SU	
smallmouth buffalo	*Ictiobus bubalus*				
spotted sucker	*Minytrema melanops*	SC	SC	S2	
redhorse (unidentified)	*Moxostoma sp.*				
silver redhorse	*Moxostoma* anisurum			S4	
golden redhorse	*Moxostoma* erythrurum	NAR	NAR	S4	
shorthead redhorse	*Moxostoma macrolepidotum*			S5	
river redhorse	*Moxostoma carinatum*	SC	SC	S2	
yellow bullhead	*Ameiurus natalis*			S4	
black bullhead	*Ameiurus melas*			S4	
brown bullhead	*Ameiurus nebulosus*			S5	
channel catfish	*Ictalurus punctatus*			S4	
stonecat	*Noturus flavus*			S4	
trout-perch	*Percopsis omiscomaycus*			S5	
burbot	*Lota lota*			S5	

TABLE 9.
FISH SPECIES OCCURRENCE RECORDS FOR THE DETROIT RIVER

Common Name	Scientific Name	COSEWIC	COSSARO	Srank	Legal Status
banded killifish	*Fundulus diaphanous*			S5	
brook silverside	*Labidesthes sicculus*	NAR	NAR	S4	
four horn sculpin	*Myoxocephalus quadricornis*			S2?	
white perch	*Morone Americana*			SE	
white bass	*Morone chrysops*			S4	
rock bass	*Ambloplites rupestris*			S5	
green sunfish	*Lepomis cyanellus*	NAR	NAR	S4	
largemouth bass	*Micropterus salmoides*			S5	
smallmouth bass	*Micropterus dolomieu*			S5	
bluegill	*Lepomis macrochirus*			S5	
pumpkinseed	*Lepomis gibbosus*			S5	
black crappie	*Pomoxis nigromaculatus*			S4	
white crappie	*Pomoxis annularis*			S4	
logperch	*Percina caprodes*			S5	
yellow perch	*Perca flavescens*			S5	
sauger	*Sander canadense*			S4	
walleye	*Sander vitreus*			S5	
freshwater drum	*Aplodinotus grunniens*			S5	
round goby	*Neogobius melanostomus*			SE	
tubenose goby	*Proterorhinus marmoratus*			SE	

2.3.3.2 Fish Habitat

Drainage within the AOI is provided by a number of municipal agricultural drains that flow towards the Detroit River. The major drains that transverse the access route include Cahill Drain, Lennon Drain and Grand Marais Drain (Turkey Creek) and Wolfe Drain parallels the access route on the north side of Highway 3 from the existing Highway 401 to Cahill Drain. The following watercourses/waterbodies are located in the AOI:

- Detroit River;
- Basin Drain;
- Benson Drain;
- Broadway Drain;
- Burke Drain;
- Cahill Drain;
- Collins Drain;
- Dickson Drain;
- Grand Marais Drain (Turkey Creek);
- Healy Drain;
- Lennon Drain;
- Marentette Drain;
- McKee Creek;
- No Name Drain associated with Benson Drain;
- No Name Drain associated with Susan Drain;
- No Name Drain tributary of Wolfe Drain (at Highway 401);
- No Name Drain tributary of Wolfe Drain (at Howard Ave);
- Susan Drain;
- Talbot Drain;
- Titcombe Drain;
- Wolfe Drain;
- Youngstown Drain; and
- Unnamed pond.

All of the above listed waterbodies were surveyed for fish habitat potential. Appendix E presents a summary of the fish habitat assessment survey completed by LGL Limited in May and September 2006. The watercourses and fish habitat located in the AOI are presented in Figure 4.

LEGEND

- Maximum Footprint Area of Combined Alternatives
- Drainage
- Drainage - Important Fish Habitat
- Drainage - Marginal Fish Habitat
- Drainage - Not Fish Habitat
- Fish Habitat
- Seasonal Fish Habitat
- No Fish Habitat

Data Sources: LGL Limited field surveys, Essex Region Conservation Authourity, Spring 2006 aerial photography.

WATERCOURSES AND FISH HABITAT LOCATED IN THE AREA OF INVESTIGATION

LGL Limited
environmental research associates

Project:	TA4137	**Figure:**	4a
Date:	February 2007	**Prepared By:**	MWF
Scale:	1 : 10,000	**Checked By:**	GNK

LEGEND

- Maximum Footprint Area of Combined Alternatives
- Drainage
- Drainage - Important Fish Habitat
- Drainage - Marginal Fish Habitat
- Drainage - Not Fish Habitat
- Fish Habitat
- Seasonal Fish Habitat
- No Fish Habitat

Data Sources: LGL Limited field surveys, Essex Region Conservation Authourity, Spring 2006 aerial photography.

WATERCOURSES AND FISH HABITAT LOCATED IN THE AREA OF INVESTIGATION

LGL Limited
environmental research associates

Project: TA4137	**Figure:** 4b
Date: February 2007	**Prepared By:** MWF
Scale: 1 : 10,000	**Checked By:** GNK

LEGEND

- Maximum Footprint Area of Combined Alternatives
- Drainage
- Drainage - Important Fish Habitat
- Drainage - Marginal Fish Habitat
- Drainage - Not Fish Habitat
- Fish Habitat
- Seasonal Fish Habitat
- No Fish Habitat

Data Sources: LGL Limited field surveys, Essex Region Conservation Authourity, Spring 2006 aerial photography.

WATERCOURSES AND FISH HABITAT LOCATED IN THE AREA OF INVESTIGATION

LGL Limited
environmental research associates

Project: TA4137	**Figure:** 4c
Date: February 2007	**Prepared By:** MWF
Scale: 1 : 10,000	**Checked By:** GNK

LEGEND

- Maximum Footprint Area of Combined Alternatives
- Drainage
- Drainage - Important Fish Habitat
- Drainage - Marginal Fish Habitat
- Drainage - Not Fish Habitat
- Fish Habitat
- Seasonal Fish Habitat
- No Fish Habitat

Data Sources: LGL Limited field surveys, Essex Region Conservation Authourity, Spring 2006 aerial photography.

WATERCOURSES AND FISH HABITAT LOCATED IN THE AREA OF INVESTIGATION

LGL Limited
environmental research associates

Project: TA4137	**Figure:** 4d
Date: February 2007	**Prepared By:** MWF
Scale: 1 : 10,000	**Checked By:** GNK

Heavy impacts associated with agricultural and/or urban development affect all of these watercourses. These impacts include both physical (e.g., channelization, piping, barriers); and chemical (e.g., metals, organic compounds, nutrients) (MDNR and MOE 1991). None of the watercourses, with the exception of the Detroit River, support an important migratory fishery. Despite the extent of alteration that has occurred in watercourses located within the AOI, several of the larger watercourses continue to sustain warmwater sportfish and baitfish communities.

The Detroit River and the inland watersheds within the AOI fall under the jurisdiction of the Essex Region Conservation Authority (ERCA), the Ontario Ministry of Natural Resources (OMNR) Aylmer District and the Department of Fisheries and Oceans (DFO). Most of the inland watercourses located in the AOI have been classified as drains by the ERCA using the Agricultural Municipal Drains Class Authorization System (DFO 1999). A single unconnected pond is found at the eastern limits of the AOI. Water courses that were confirmed to support fish habitat are described below.

Basin Drain

This watercourse is listed as a type F municipal drain, indicating that it is intermittent, and the temperature regime and potential fish species are unknown. LGL determined that this watercourse is permanent and supports a warmwater baitfish community downstream of the E.C. Row Expressway. Here the channelized watercourse flows through a muck and clay lined channel. Riparian vegetation consists of trees, shrubs and herbaceous vegetation. This fish habitat is considered marginal. Upstream of the E.C. Row Expressway the watercourse is mostly piped underground with a pool of open water upstream of the expressway. This upstream reach of Basin Drain is not fish habitat as the buried culvert under the expressway is a barrier to fish migration.

Benson Drain

This watercourse is listed as a type F municipal drain, indicating that it is intermittent, and the temperature regime and potential fish species are unknown. LGL determined that this watercourse is likely intermittent as flows were low in May and September 2006. It was determined that this watercourse likely supports a warmwater baitfish community as central mudminnow were captured downstream of South Talbot Road in Dickson Drain. This channelized watercourse flows through a clay lined channel. Riparian vegetation consists of trees, shrubs and herbaceous vegetation. This fish habitat is considered marginal.

Broadway Drain

This watercourse is listed as a type F municipal drain, indicating that it is intermittent, and the temperature regime and potential fish species are unknown. LGL determined that this watercourse is likely intermittent as there was no flow, and only standing pools of water in September 2006. It was determined that this watercourse likely supports a seasonal fish community when flows in the Detroit River are high enough to allow fish to migrate upstream over the gravel beach barrier. Only the reach downstream of Sandwich Street was determined to be fish habitat as the hot water entering the channel from a pipe at Sandwich Street likely presents a thermal barrier to fish movement. This channelized watercourse flows through a detritus lined channel. Riparian vegetation consists of trees, shrubs and fragmites. This fish habitat is considered marginal.

Burke Drain

This watercourse is listed as a type F municipal drain, indicating that it is intermittent, and the temperature regime and potential fish species are unknown. LGL determined that this watercourse is likely intermittent as there was no flow, and only standing pools of water in September 2006. It was determined that this watercourse supports a warmwater sportfish community. This channelized watercourse flows through a detritus and muck lined channel. Riparian vegetation consists of cattails. This fish habitat is considered marginal. Downstream of South Talbot Road this watercourse was dry and is not fish habitat.

Cahill Drain

Cahill Drain is separated into two reaches, one upstream of the confluence with Wolfe Drain, the other downstream of the confluence with Wolfe Drain. The upstream reach is listed as a type F municipal drain, indicating that it is intermittent, and the temperature regime and potential fish species are unknown. The upstream reach is listed as a type E drain, indicating that it is permanent, the temperature regime is warmwater and sportfish are present. LGL determined that this watercourse is permanent warmwater fish habitat. Only baitfish were captured in Wolfe Drain between the two reaches, however habitat potential exists for sportfish. Upstream of Wolfe Drain this channelized watercourse flows through a clay lined channel with herbaceous riparian vegetation. This fish habitat is considered marginal. Downstream of Wolfe Drain the channel is much larger and flows over a muck substrate. Here there is some channel definition and habitat heterogeneity. Riparian vegetation consists of trees, shrubs, and herbaceous vegetation. This fish habitat is considered important.

Collins Drain

This watercourse is listed as a type F municipal drain, indicating that it is intermittent, and the temperature regime and potential fish species are unknown. LGL determined that this watercourse is likely intermittent as flows were low in May and September 2006. It was determined that this watercourse likely supports a warmwater baitfish community as fathead minnow were captured downstream in Wolfe Drain, and no barrier to fish migration exists. This channelized watercourse flows through a clay and silt lined channel. Riparian vegetation consists of cattails and fragmites. This fish habitat is considered marginal.

Dickson Drain

This watercourse is listed as a type F municipal drain, indicating that it is intermittent, and the temperature regime and potential fish species are unknown. LGL determined that this watercourse is likely intermittent as flows were low in May and September 2006. It was determined that this watercourse supports a warmwater baitfish community. This channelized watercourse flows through a clay lined channel. Riparian vegetation consists of trees, shrubs and herbaceous vegetation. This fish habitat is considered marginal. The reach upstream of South Talbot Road was determined to be ephemeral and not fish habitat.

Grand Marais Drain (Turkey Creek)

This watercourse is listed as a type E municipal drain downstream of Huron Church Road, indicating that it is permanent, the temperature regime is warmwater and sportfish are

present. The reach upstream of Huron Church Road is unclassified. LGL determined that this watercourse is permanent and supports a warmwater sportfish community. This watercourse flows through a concrete lined channel. Even though fish habitat is homogenous, it supports a relatively diverse warmwater community. There is no riparian vegetation throughout this reach as the banks are also concrete lined. This reach is regularly cleaned out to maintain flood control. Despite the presence of sportfish, this fish habitat is considered marginal as the habitat exists in a concrete lined channel.

Healy Drain

This watercourse is listed as a type F municipal drain, indicating that it is intermittent, and the temperature regime and potential fish species are unknown. LGL determined that this watercourse is likely intermittent as there was no flow, and only standing pools of water in September 2006. It was determined that this watercourse likely supports a seasonal fish community when flows in the Detroit River are high enough to allow fish to migrate upstream over the gravel beach barrier. Only the reach downstream of Sandwich Street was determined to be fish habitat as the buried culvert under Sandwich Street is a barrier to fish movement. This channelized watercourse flows through a detritus lined channel, which is choked with fragmites. This fish habitat is considered marginal.

Lennon Drain

This watercourse is listed as a type E municipal drain downstream of Huron Church Road, indicating that it is permanent, the temperature regime is warmwater and sportfish are present. LGL determined that this watercourse is permanent and supports a warmwater sportfish community. Upstream of Talbot Road, the channelized watercourse flows through a silt, clay and geotextile substrate, with manicured grasses and a few trees as riparian vegetation. Between Talbot Road and Huron Church Line, the channelized watercourse flows through a riprap lined channel with herbaceous vegetation and a few shrubs providing shade to the channel. Downstream of Huron Church Line the watercourse flows through a clay channel with manicured grasses and a few trees as riparian vegetation. This fish habitat is considered important.

McKee Drain

This watercourse is listed as a type F municipal drain, indicating that it is intermittent, and the temperature regime and potential fish species are unknown. LGL determined that this watercourse is likely intermittent as there was no flow, and only standing pools of water in September 2006. It was determined that this watercourse likely supports a seasonal fish community as a northern pike was observed upstream of the E.C. Row Expressway in May 2006. This channelized watercourse flows through a muck and detritus lined channel, which is choked with fragmites. Upstream of Matchette Road the watercourse is piped under a residential property. This pipe is a barrier to fish migration and the watercourse upstream of this pipe is not fish habitat. This fish habitat is considered important.

McKee Creek

This watercourse is listed as a type E municipal drain downstream of Sandwich Street, indicating that it is permanent, the temperature regime is warmwater and sportfish are present. The reach upstream of Sandwich Street is listed as a type F drain, indicating that

it is intermittent, the temperature regime and potential fish species are unknown. LGL determined that this watercourse is permanent and supports a warmwater sportfish community. This channelized watercourse flows through a muck lined channel. The banks upstream of Sandwich Street are lined with sheet piling. The riparian vegetation consists of fragmites, cattails, and herbaceous vegetation. Downstream of Sandwich Street, the channel flows through a series of double culverts and flows into a canal. A local fisherman indicated that in the spring walleye and perch often migrate upstream but are limited by the size of the double culverts and most cannot make it past this barrier. The removal of this barrier presents an excellent opportunity for habitat enhancement. This fish habitat is considered important.

Titcombe Drain

This watercourse is listed as a type F municipal drain, indicating that it is intermittent, and the temperature regime and potential fish species are unknown. LGL determined that this watercourse is intermittent as there was no flow, and only standing pools of water in September 2006. It was determined that this watercourse likely supports a seasonal fish community as a northern pike was observed in May 2006. This channelized watercourse flows through a silt and detritus lined channel. Riparian vegetation consists of trees, shrubs, herbaceous vegetation and manicured grasses. This fish habitat is considered important.

Wolfe Drain

Downstream of the confluence with Cahill Drain, the watercourse is listed as a type E municipal drain, indicating that it is permanent, the temperature regime is warmwater and sportfish are present. Upstream of the confluence with Cahill Drain, the watercourse is listed as a type F municipal drain, indicating that it is intermittent, and the temperature regime and potential fish species are unknown. LGL determined that this watercourse supports permanent warmwater baitfish habitat as flows were moderate in May and September 2006. Only baitfish were captured upstream of Talbot Road, however habitat potential exists for sportfish. This channelized watercourse flows through a clay lined channel. There is very little habitat heterogeneity. Riparian vegetation consists of shrubs, trees, and herbaceous vegetation. This fish habitat is considered important.

Youngstown Drain

This watercourse is listed as a type F municipal drain, indicating that it is intermittent, and the temperature regime and potential fish species are unknown. LGL determined that this watercourse is likely intermittent as there was little flow in May and September 2006. It was determined that this watercourse likely supports a seasonal fish community. This channelized watercourse flows through a silt lined channel. Riparian vegetation consists mainly of herbaceous species. This fish habitat is considered marginal.

Unnamed Pond

This waterbody is unclassified. LGL determined the waterbody to be permanent and to support a warmwater sportfish community. It appears to be man-made and it is not connected to any nearby drains. Substrate in the pond appears to be clay and muck. A few riparian trees and shrubs are found around the pond. This fish habitat is considered important.

Detroit River

Previous reports indicate that at least 69 species of fish inhabit the Detroit River (Manny *et al*. 1988 *in* MDNR; MOE 1991 and LaPointe, Corkum and Mandrak 2005). These species are listed in Table 9 and 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). Several provincially significant wetlands exist within the river or are associated with tributary river mouths. These wetlands cover an area of 462.5 ha. 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*. (1988 *in* MDNR and MOE 1991) reported that 25 species use the river as nursery habitat, including both warm and coldwater species.

The investigation in the vicinity of the bridge piers was compromised by turbid water conditions. Strong northeast winds stirred up sediment in Lake St. Clair which were conveyed downstream in the Detroit River. As a result, visibility was reduced to less than 20 cm. For this reason, the camera, which is equipped with strong LED lights, did not record many features of the Detroit River bottom as it requires relatively clear water to operate. The strong current also made proper deployment difficult. Despite these problems, some substrate features were recorded intermittently by the underwater camera. These included short aquatic vegetation which was rooted to the substrates and details that enabled the camera to discern clay, sand and gravel substrates. No large or distinct habitat features (i.e. boulders, logs, etc.) were observed. The Ekman dredge did not deploy correctly due to the strong current and great depth (10-15 m). As a result, no full grab samples were taken. However, some substrate was attached to the Ekman as it was on the bottom of the river and consisted of clay and a clay/sand mix. The low-lying aquatic vegetation seen on the underwater video was also attached to some of the grab samples. The fish habitat in the Detroit River in the vicinity of the bridge piers is considered important.

2.3.3.3 Benthic Invertebrates

The Hilsenhoff Biotic Index (HBI) was used to evaluate water quality at benthic sampling stations. HBI values give us an indication of the levels of organic pollution in the water. Other metrics were also used to interpret water quality and habitat conditions at these stations such as species richness and percentage of intolerant species. Table 10 provides a summary of the metrics and HBI values for combined replicates for sampling stations. Results from individual replicates are not shown as they had too few organisms in each sample to analyze HBI values. Stations 2, 7 and 8 are located on watercourses found outside the AOI; therefore, they are not described.

The benthic surveys reveal that the habitat quality at all sampling stations is poor. All stations have been highly altered. Stations 1 and 6 in Cahill Drain have been channelized. Stations 3 and 4 in Turkey Creek have been straightened and have a concrete channel. Station 5 in Turkey Creek has had gabion reinforcement of the bank. Station 9 in Lennon Drain has been channelized and filled with rip rap material.

TABLE 10.

SUMMARY OF BENTHIC DATA FOR STATIONS LOCATED IN THE AREA OF INVESTIGATION

	Station 1 Cahill Drain	Station 3 Turkey Creek	Station 4 Turkey Creek	Station 5 Turkey Creek	Station 6 Cahill Drain	Station 9 Lennon Drain
Date sampled	9March05	9March05	10March05	10March05	10March05	10March05
abundance	338	256	196	125	293	347
richness	16	15	4	7	8	14
EPT abundance	5	0	0	2	0	0
EPT richness	2	0	0	1	0	0
% EPT	1.48%	0.00%	0.00%%	1.60%	0.00%	0.00%
# intolerant	2	3	1	1	0	2
% tolerant	80.00%	73.73%	75.00%	80.00%	100.00%	75.00%
% oligochaetes	26.63%	50.78%	0.00%	2.40%	6.83%	6.63%
% grazers	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
HBI	6.80	6.14	5.98	7.43	6.18	7.36
Water quality	Fairly Poor	Fair	Fair	Fairly Poor	Fair	Fairly Poor

Station 1 – Cahill Drain Downstream of Huron Church Line

Habitat conditions at this station were homogeneous. Substrate consisted of mainly silt. Riparian vegetation was composed of old field species with some shrubs and trees.

Water quality rating from the HBI value for this station was Fairly Poor. This indicates that there is significant organic pollution at this station. One species of mayfly (Ephemeroptera), and one species of caddisfly (Trichoptera) were found at this station. These organisms are usually indicators of good water quality, however the mayfly genus *Caenis* found at this station is tolerant of degraded habitat conditions. Percentage of tolerant organisms at this station was very high indicating that while species richness is average, the species present are tolerant of poor habitat and water quality conditions. Oligochaetes (worms) are found in habitats with fine sediments and a higher oxygen demand. The high percentage of oligochaetes at this station is an indicator of the poor habitat conditions. The lack of grazers at this station is an indicator of the lack of allochtonous material (such as leaf litter) in this system.

Station 3 - Turkey Creek Downstream of Huron Church Road

Habitat conditions at this station were homogeneous. Substrate consisted of a concrete channel with some gravel, sand, and silt. Riparian vegetation was limited to old field species along the concrete banks. Upstream of the sample station, there is no riparian vegetation as the banks are concrete.

Water quality rating from the HBI value for this station was Fair. This indicates that there is fairly significant organic pollution at this station. No mayflies (Ephemeroptera), stoneflies (Plecoptera), or caddisflies (Trichoptera) were found at this station. These organisms are usually indicators of good water quality. Their absence may indicate that water quality at this station is poor. Percentage of tolerant organisms at this station was very high indicating that while species richness is average, the species present are tolerant of poor habitat and water quality conditions. The high percentage of oligochaetes at this station is an indicator of the poor habitat conditions. The lack of grazers at this

station is an indicator of the lack of allochtonous material (such as leaf litter) in this system.

Station 4 - Turkey Creek Downstream of Dominion Boulevard

Habitat conditions at this station were homogeneous. Substrate consisted of a concrete channel with some sand, and silt deposits. There was no riparian vegetation as the banks were concrete.

Water quality rating from the HBI value for this station was Fair. This indicates that there is fairly significant organic pollution at this station. Species richness was low at this station indicating that habitat diversity is low and conditions are degraded. No mayflies, stoneflies , or caddisflies were found at this station. Their absence may indicate that water quality at this station is poor. Percentage of tolerant organisms at this station was very high indicating that while species richness is average, the species present are tolerant of poor habitat and water quality conditions. Chironomids accounted for 99.5% of the sample. These organisms occupy the same habitat niche as the oligochaetes indicating the poor habitat conditions at this station. The lack of grazers at this station is an indicator of the lack of allochtonous material (such as leaf litter) in this system.

Station 5 – Turkey Creek Downstream of Malden Road

Habitat conditions at this station were more diverse then the rest of the stations. Substrate consisted of mainly silt with some cobble. Riparian vegetation was composed of old field species with some shrubs. Only one replicate was taken at this station, as only one transect downstream of the bridge was shallow enough to wade. Water depth was high upstream and downstream of the bridge.

Water quality rating from the HBI value for this station was Fair. This indicates that there is fairly significant organic pollution at this station. Species richness was low at this station indicating that habitat diversity low and conditions are degraded. One species of caddisfly was found at this station that is somewhat intolerant of degraded habitat conditions. Percentage of tolerant organisms at this station was very high indicating that the species present are tolerant of poor habitat and water quality conditions. The lack of grazers at this station is an indicator of the lack of allochtonous material (such as leaf litter) in this system.

Station 6 – Cahill Drain Downstream of Malden Road

Habitat conditions at this station were homogeneous. Substrate consisted of mainly sand and silt. Riparian vegetation was composed of old field species with some shrubs.

Water quality rating from the HBI value for this station was Fair. This indicates that there is fairly significant organic pollution at this station. Species richness was low at this station indicating that habitat diversity low and conditions are degraded. No mayflies, stoneflies, or caddisflies were found at this station. Their absence may indicate that water quality at this station is poor. Percentage of tolerant organisms was 100%, indicating that the species present are tolerant of poor habitat and water quality conditions. The lack of grazers at this station is an indicator of the lack of allochtonous material (such as leaf litter) in this system.

Station 9 – Lennon Drain Downstream of Huron Church Line

Habitat conditions at this station were homogeneous. Substrate consisted of rip rap. Riparian vegetation was composed of old field species with some shrubs.

Water quality rating from the HBI value for this station was Fairly Poor. This indicates that there is significant organic pollution at this station. No mayflies, stoneflies, or caddisflies were found at this station. Their absence may indicate that water quality at this station is poor. Percentage of tolerant organisms at this station was very high indicating that while species richness is average, the species present are tolerant of poor habitat and water quality conditions. The lack of grazers at this station is an indicator of the lack of allochtonous material (such as leaf litter) in this system.

2.3.3.4 Species at Risk

Five species of fish historically reported from the Detroit River are considered to be at risk in Ontario. No species at risk are reported from inland watercourses located within the AOI. Spotted gar (*Lepisosteus oculatus*) is ranked S2 and is considered to be Threatened by both COSEWIC and COSSARO. Its general provincial status is "at risk" likely due to its restricted range within Ontario, and it is tracked by the NHIC. Two cyprinid species reported from the Detroit River are also considered to be at risk: silver chub (*Macrhybopsis storeriana*) and pugnose minnow (*Opsopoeodus emiliae*). Both are ranked S2 and are considered of Special Concern by COSEWIC and COSSARO. Both are currently tracked by the NHIC and have a general provincial status of "sensitive". The last two species of concern are both in the sucker family: bigmouth buffalo (*Ictiobus cyprinellus*) and river redhorse (*Moxostoma carinatum*). The bigmouth buffalo is ranked SU, meaning that it is unrankable at this time as more data is needed. The river redhorse is ranked S2. Both of these species are considered of Special Concern by COSEWIC and COSSARO. The general provincial status of the bigmouth buffalo is "undetermined" and the river redhorse general provincial status is "sensitive". The proposed location of the bridge piers does not support critical habitat for any of these known species at risk.

2.3.4 Wildlife and Wildlife Habitat

2.3.4.1 Wildlife Species

The natural heritage features of the AOI were divided into 124 wildlife habitat units. These units formed the basic habitats around which most of the terrestrial vertebrates were recorded, SARA species were searched for and priority species of conservation concern were noted. Four continuous seasons of data collection and in-field wildlife investigations within and around these wildlife units resulted in the compilation of 139 species (11 herpetofauna, 108 birds and 20 mammals). A list of terrestrial vertebrates recorded in the AOI is presented in Appendix F.

Four amphibian species and seven reptile species were recorded in the AOI. Amphibians include frogs and toads since no salamanders were located anywhere in the the AOI. The absence of salamanders from the AOI was expected based on discussions with local experts and review of secondary information.

The majority of the amphibians were found at specific vernal ponds and creek drains during the breeding season. As a result, these locations were identified as important amphibian breeding areas. American toad (*Bufo americanus*) and/or western chorus frog (*Pseudacris triseriata*) were found in most of the breeding areas recorded. Only one pond, located near the east limits of the AOI, had green frog (*Rana clamitans*) egg masses. Chorus frogs were located predominantly in or around vernal pools within woodlots, whereas American toads and green frogs preferred ponds or creek drains in open areas. No leopard frog egg masses were found in any of the ponds investigated although adults were seen around creek drains throughout the summer.

Of the reptiles observed, snakes were recorded most often. The eastern foxsnake (*Elaphe gloydi*) was recorded on numerous occasions in wooded areas, along creeks, under buildings or under log piles in residential backyards. The other four species were located in tallgrass prairies, cultural meadows and cultural thickets under boards, tiles, rocks, or whatever they could hide under during the evenings and early mornings. Of these, Butler's gartersnake (*Thamnophis butleri*) was recorded only in the open tallgrass prairie (TPO2-1) habitats between Chappus Road and E.C. Row Expressway. Based on discussions with local experts, Butler's gartersnake was present in Malden Park prior to the construction of the E.C. Row Expressway and conversion of Malden Park into parkland. However, this population has been extirpated from Malden Park and one of the few remaining areas for Butler's gartersnake outside of the Ojibway Prairie is the area between Chappus Road and the E.C. Row Expressway. This species has a strong affinity to prairie communities and a very small home range; therefore, it is very sensitive to habitat loss. A migrating painted turtle (*Chrysemys picta*) was found along Broadway Street just north of the Black Oak Woods. A snapping turtle (*Chelydra serpentina*) was observed in a creek drain north of Armanda Street near the east Chappus Road extension.

Birds comprised 108 of the 139 wildlife species recorded, with representatives in every habitat. Field survey data showed that 50 of these species were breeding birds that nested in about 75 % of the designated wildlife habitat units. The results of the breeding bird survey are presented in Appendix G. A list of the bird species recorded during the point-count surveys is presented in Appendix H. Most of the remaining 58 species, observed primarily in the spring and fall seasons, were considered non-residents or migrants. These migrants were observed moving through the western two-thirds of the area of investigation, using the Detroit River, Black Oak Woods, Ojibway Park, Ojibway Prairie Provincial Nature Reserve, Spring Garden Forest, the deciduous forests around Reddock Avenue and the St. Clair College Prairie ESA as migration corridors. Many of the forests, woodlots and cultural thickets, north of these major natural heritage features and within the area of investigation, were being used as continuations of these major north-south migration corridors. Areas like the forests, woodlots and cultural thickets of Brighton Beach, the Malden Park forest connecting with the woodlots and cultural thickets around Chappus Street, the woodlots around E.C. Row Expressway just north of Spring Garden Park and the woodlots and cultural thickets on the south side of Talbot Road opposite St. Clair College, all contained hundreds of migrating birds during the spring and fall seasons and contributed to the continuation of a series of bird migration corridors going through the AOI. The entire AOI is located within two continental bird migration corridors associated with the Atlantic and Mississippi Flyways. The large forest on the west side of Huron Church Road, just south of Turkey Creek (north and south of Reddock Avenue) was identified as a stop-over area for birds of prey on migration. Hundreds of Broad-winged Hawks (*Buteo platypterus*), Red-tailed Hawks (*Buteo jamaicensis*),

Coopers Hawk (*Accipter cooperii*), Goshawk (*Accipiter gentilis*) and Turkey Vultures (*Cathartes aura*) stopped in this forest to roost while on their journey southward.

Two species of swallows were located on the Turkey Creek Bridge on Huron Church Road. Up to 20 nests were found on the ceiling cross beams but only 11 were considered active at the time of investigation. Eight Barn Swallow (*Hirundo rustica*) nests, located on the ceiling beams at the center of the bridge, and three Cliff Swallow (*Petrochelidon pyrrhonota*) nests, located on the outside ceiling beams, were recorded.

Two wildlife units contained a large number of migratory bird nests as compared to most of the other units. W-BBA9 and W-NSG7 contained multiple nests from species such as Brown Trasher (*Toxostoma rufum*), Gray Catbird (*Dumetella carolinensis*), American Robin (*Turdus migratorius*), American Goldfinch (*Carduelis tristis*), Willow Flycatcher (*Empidonax traillii*), Yellow Warbler (*Dendroica petechia*) and Mourning Dove (*Zenaida macroura*). The diversity of migratory bird species centralized in such small areas makes these habitats highly important.

Based primarily on evidence from signs such as trails, tracks, scats, smells, sounds, etc., evidence for mammal activity was recorded in every habitat type. Incidental observations were made of red fox (*Vulpes vulpes*) carrying food to their pups in wildlife unit W-BBA9 and 3 fox pups playing in the early morning hours opposite W-BBA4. The only European hare (*Lepus europaeus*) recorded was spotted in the cultural meadow of W-BBA20 whereas eastern cottontails (*Sylvilagus floridanus*) were observed in open areas thoughout the AOI. Individuals were seen moving through the cultural meadows in W-CH12 and W-LAM6 or feeding around human habitations such as St. Clair College or the residence front lawns along Montgomery Drive just west of Talbot Road. Grey squirrel (*Sciurus carolinensis*) dreys were found in nearly every forest and woodlot. The abundance of raccoons (*Procyon lotor*) was recorded primarily from observing their trails and tracks going from habitat to habitat. White-tailed deer (*Odocoileus virginianus*) was also recorded in nearly every habitat type. Tracks, trails, scats, bedding areas and direct observations indicated their presence in cultural meadows, cultural thickets, marshes and forests throughout the AOI. Road kills were another method used to determine mammal presence in particular habitats. Opossums (*Didelphis virginianus*) were found along Broadway Street just east of Ojibway Parkway and along Talbot Road next to a meadow marsh on the south side of the Heritage Park Alliance Church.

Migration corridors for mammals were seen through every habitat and connecting each of the habitat types. Of particular note, the Cahill Drain, connecting the St. Clair College Prairie ESA on the north side of Highway 3 to the deciduous swamp located on the south side of Highway 3 was heavily traveled by mammals in both summer and winter. Tracks of small mammals, muskrat (*Ondatra zibethica*), red fox, coyote (*Canis latrans*) and raccoon were recorded along Cahill Drain and under Highway 3 going in both directions. White-tailed deer showed no evidence of travel through the culvert but used the creek drain for travel on the north side of Highway 3. The fact that corridors were so abundant indicated high mammal activity and the importance of the remaining natural heritage features found in the AOI.

Winter investigations indicated that most of the AOI had a limited amount of wildlife activity. Herpetofauna were in hibernation and most of the breeding bird species had left the area. Only a few winter bird species remained using particular habitats as winter feeding areas. Trails and tracks showed that a few mammal species used certain

portions of the AOI for traveling and bedding down. Fox and coyote used frozen creek drains, open fields and human made paths through woodlots for winter travel. Raccoons, especially during their late winter breeding season, travelled from woodlot to wooldlot. Random white-tailed deer travel corridors, to and from feeding areas, existed in the forests and cultural thickets between Turkey Creek and Cabana Road, between Spring Garden Road and E.C. Row Expressway and between Armanda Street and E.C. Row Expressway. Only a few deer bedding areas found in the AOI were located in the forested area of wildlife unit W-CH2 around Chappus Road north of Armanda Street. Most of the deer bedding areas appeared to be outside the AOI, concentrated in the Spring Garden Forest ANSI, while most of the feeding areas appeared to be in the AOI.

2.3.4.2 Wildlife Habitat

All the wildlife units contained one or more of 13 habitat types recognized in the AOI. These habitat types are described below. A detailed assessment of the significance of each wildlife habitat unit is presented in Appendix I. By analyzing each of the habitat types throughout the AOI, a pattern of species composition per habitat type became evident. The location of wildlife habitat units located in the AOI is presented in Figure 5.

Deciduous Forests and Cultural Woodlots

Many wildlife species used the deciduous forests (FOD) and cultural woodlots (CUW) as migration corridors, living spaces and breeding areas. Besides their use for the seasonal migration of birds (noted above), mammals regularly used these habitats as corridors for daily movements to and from their feeding and resting areas in various habitats. Small mammals, red fox (*Vulpes vulpes*), raccoon (*Procyon lotor*), and white-tailed deer (*Odocoileus virginianus*) are a few species that used FODs and CUWs as a food source. Raccoons and other small mammals also used specific trees within the habitat for hibernation den sites while white-tailed deer used certain areas for winter deer yards protecting them from the elements. Forests and woodlots were also important breeding areas for wildlife. Chorus frogs were recorded calling and breeding at many of the vernal ponds found within some of these woodlots. Up to 23 species of migratory birds, many considered species of conservation priority, were recorded using the forests and woodlots for nest sites. Red-tailed Hawk, Eastern Wood Pewee (*Contopus virens*) and Baltimore Oriole (*Icterus galbula*) nested in the forest canopies while the understory contained nests of Indigo Bunting (*Passerina cyanea*), Wood Thrush (*Hylocichla mustelina*) and American Robin to name a few. Cavities in the trunks of dead standing trees were used by Tree Swallows (*Tachycineta bicolor*) and Black-capped Chickadees (*Poecile atricapillus*), whereas Downy Woodpecker (*Picoides pubescens*) and Northern Flicker (*Colaptes auratus*) excavated their own cavities in the trunks of live trees. Many of the woodlot trees were also used as den sites by small mammals and raccoons and dreys were constructed in them by gray squirrels (*Sciurus carolinensis*) for raising their young.

LEGEND

- Maximum Footprint Area of Combined Alternatives
- Wildlife Habitat Unit

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

WILDLIFE HABITAT UNITS LOCATED IN THE AREA OF INVESTIGATION

LGL Limited
environmental research associates

Project: TA4137	**Figure:** 5a
Date: February 2007	**Prepared By:** MWF
Scale: 1 : 10,000	**Checked By:** GNK

LEGEND

- Maximum Footprint Area of Combined Alternatives
- Wildlife Habitat Unit

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

WILDLIFE HABITAT UNITS LOCATED IN THE AREA OF INVESTIGATION

LGL Limited
environmental research associates

Project: TA4137	**Figure:** 5b
Date: February 2007	**Prepared By:** MWF
Scale: 1 : 10,000	**Checked By:** GNK

LEGEND

- Maximum Footprint Area of Combined Alternatives
- Wildlife Habitat Unit

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

WILDLIFE HABITAT UNITS LOCATED IN THE AREA OF INVESTIGATION

LGL Limited
environmental research associates

Project: TA4137	**Figure:** 5c
Date: February 2007	**Prepared By:** MWF
Scale: 1 : 10,000	**Checked By:** GNK

LEGEND

- Maximum Footprint Area of Combined Alternatives
- Wildlife Habitat Unit

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

WILDLIFE HABITAT UNITS LOCATED IN THE AREA OF INVESTIGATION

LGL Limited
environmental research associates

Project: TA4137	**Figure:** 5d
Date: February 2007	**Prepared By:** MWF
Scale: 1 : 10,000	**Checked By:** GNK

Cultural Thickets

Being continuations of the some of the larger fragmented FOD and CUW migration corridors, cultural thickets (CUT) were also used by migratory birds as stop over areas for feeding while on their seasonal migrations. Many CUTs surrounded creek drains and provided protection from the elements for amphibian species breeding there. Numerous garter snakes (*Thomnophis sirtalis*) were recorded using this habitat for hunting during the day and hiding through the night. CUTs also linked larger habitats together so mammals used them as daily movement corridors from feeding areas to resting areas. Track evidence through corridors showed heavy use of CUTs by raccoon, red fox, coyote (*Canis latrans*) and white-tailed deer. Of most importance, CUTs provided a large number of breeding birds with a well protected habitat for their nests. Up to 14 species of migratory birds were recorded to use CUTs in the AOI for breeding. For example, wildlife unit W-NSG7 recorded numerous Gray Catbird nests, plus nests of Yellow Warbler, American Goldfinch and American Robin. Breeding bird evidence then accounted for another three to four species added to this unit.

Cultural Meadows

Cultural meadows (CUM), found in more wildlife units in the AOI than any other habitat, were used by wildlife as migration corridors, feeding and breeding areas. American toads were recorded many times in the habitat using it as a food source while Dekay's brown snakes (*Storeria decayi*) were recorded migrating through it to get to a wetter forest environment. Grassland bird species were recorded using these CUMs for food sources with increased numbers recorded during the migration periods. This habitat is also a breeding area for bird species such as Field Sparrow (*Spizella pusilla*), Savannah Sparrow (*Passerculus sandwichensis*) and Eastern Kingbird (*Tyrannus tyrannus*). White-tailed deer bedding areas were found throughout numerous CUMs in the area of investigation as were trails and tracks of raccoon, fox and coyote using these habitats as a travel corridors and feeding zones.

Cultural Savannahs

Ten cultural savannahs were identified as wildlife habitat units. Breeding evidence for at least 12 species of migratory birds, such as Orchard Oriole (*Icterus spurius*), Gray Catbird, American Goldfinch, Willow Flycatcher and Yellow Warbler, was found. Numerous mammal corridors extended through these habitats connecting feeding areas and dwelling areas in surrounding habitats.

Tallgrass Prairies

Although represented in numerous wildlife units within the area of investigation, the area each tallgrass prairie (TPO) represents is relatively small in comparison to other habitats. However, they contain some of the most unique wildlife species. Every snake species recorded in the AOI was found in the TPO habitats. Snakes used this habitat for hunting their prey and as corridors to neighboring habitats. Two of these species, Butler's gartersnake and eastern foxsnake, are regulated under SARA. Bird nests and breeding bird behaviours indicated that species, such as Willow Flycatcher and Field Sparrow, nested in this habitat. Trail evidence also indicated that the TPO's were used by mammals as potential feeding areas and as movement corridors among surrounding habitats.

Meadow Marsh and Shallow Marsh

These meadows (MAM and MAS) attract wildlife species dependant on a greater amount of water during their life cycle. Many snake species, like foxsnakes, are attracted to these habitats for a food source. Up to 15 species of birds were recorded within MAMs and MASs of the AOI. Some species recorded, like American Woodcock (*Scolopax minor*), Yellow Warbler and Common Yellowthroat (*Geothlypis trichas*), prefer to breed in this type of habitat. Numerous mammal species, like cottontail (*Sylvilagus floridanus*), opossum (*Didelphis virginianus*), raccoon and deer used these habitats for feeding. Numerous trails throughout these habitats also showed their use as movement corridors among surrounding habitats.

Deciduous Swamps

Four wildlife units contained deciduous swamps (SWD). A combination of both forest and wetland species, such as Baltimore Oriole, Common Grackle (*Quiscalus quiscula*), Carolina Wren, Cooper's Hawk, Common Yellowthroat and Song Sparrow, were recorded. Trails and tracks from deer, coyote and raccoon were also observed.

Cultural Plantations

Not known for their biodiversity, cultural plantations (CUP) recorded a limited variety of wildlife. Foxsnakes were recorded moving through these habitats when located next to human residences. No breeding birds were recorded within these habitats but several species were observed using them as feeding areas. Mammals used them as protective migration corridors moving to and from surrounding habitats.

Open Water

The only open water (OAO) found was a pond in one of the agricultural areas. Trails leading to the pond indicated its use as a water and food source for mammals. Amphibians, such as green frog, bred there because it is a permanent water source. Birds, such as tree swallows, fed over the water and appeared to be nesting in the dead trees located on the northwest side of the pond.

Agricultural Areas

These areas are not recognized by the ecological land classification system (ELC), but were recorded as wildlife habitat units because of their uniqness as breeding habitats to many species of birds. Found predominantly at the east end of the AOI, bird species such as Horned Larks (*Eremophila alpestris*), Killdeer (*Charadrius vociferus*), Spotted Sandpiper (*Actitis macularius*) and Vesper Sparrow (*Pooecetes gramineus*), used these tilled open fields to nest in. The edges of these agricultural fields consisted of tree rows, thickets and creek drains that provided additional nesting habitats. Kingbirds, Savannah Sparrows, Song Sparrows (*Melospiza melodia*), Canada Geese (*Branta canadensis*) and Mallard (*Anas platyrhynchos*) were all recorded nesting on the periphery of these agricultural fields.

Residential Areas

Also not recognized by ELC, these wildlife habitat units contained wildlife species particularly adapted to human presence. Snakes, such as the foxsnake, were recorded dwelling in backyard wood piles or under garages of individual homes. Birds, like Catbirds, Chipping Sparrows (*Spizella passerina*) and Mourning Doves, nested on or in close proximity to the residences themselves. Opportunistic mammals, like white-tailed deer, raccoon, striped skunk (*Mephitis mephitis*) and eastern chipmunk (*Tamias striatus*) used residential areas for foraging and den sites.

2.3.4.3 Species at Risk

None of the amphibians recorded in the AOI are regulated by legislation. Four of the reptile species are regulated under the *Fish and Wildlife Conservation Act* (FWCA). Two of these species, Butler's gartersnake and eastern foxsnake, are also listed as Schedule 1 species under the *Species at Risk Act*. Butler's gartersnake was found in two separate locations on the south side of E.C. Row Expressway in wildlife units W-CH10 and W-CH22. Three foxsnakes were observed in two different field locations while another three were reported by local residents in two separate residential areas. Two of the three foxsnakes found during the investigations were located along the shoreline of Turkey Creek just west of the Huron Church Road Bridge. The other was found basking on the asphalt walkway just south of Spring Garden Road at the northwest corner of wildlife habitat unit W-LAM1. Two of the residential reports were in the woodlot and a residence backyard on the north side of Armanda Street, while the other was reported dwelling under the back corner of a garage next to a residence along the north side of Reddock Street just west of Huron Church Road. Both of these residential locations were verified by local biologists. The eastern Massasauga (*Sistrurus catenatus catenatus*) and the eastern hog-nosed snake (*Heterodon platirhinos*), both designated as Threatened by COSEWIC and COSSARO and regulated under the FWCA and Schedule 1 of SARA, occur in the Ojibway Prairie Complex, but none were observed during field investigations.

The *Migratory Birds Convention Act* (MBCA) regulates 90 of the 108 bird species recorded. The *Fish and Wildlife Conservation Act* (FWCA) regulates eleven species, primarily the birds of prey. The only avian species regulated by SARA is the Red-headed Woodpecker found in the Black Oak Woods between Ojibway Parkway and Matchette Road. The Red-headed Woodpecker is listed as Special Concern (SC) in Schedule 3 of SARA. Locally, 38 bird species are considered priority species of conservation concern by Bird Studies Canada for Essex County. Of these, 32 species are ranked as highly sensitive to any disturbances in or around their habitat.

Fifteen of the mammals recorded are regulated under the FWCA. No mammal species found in the area of investigation are regulated under SARA. The status of terrestrial vertebrate species recorded in the AOI is presented in Appendix F.

2.3.5 Designated Natural Areas

A number of Areas of Natural and Scientific Interest (ANSIs) and Environmentally Significant Areas (ESAs) and one Provincial Nature Reserve are located within the AOI. One of these natural heritage features has also been evaluated by Carolinian Canada. 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 protection in planning documents to determine if these areas should be included under an Open Space/Greenway system policy. These areas are referred to as Candidate Natural Heritage Sites (CNHSs). This section provides a summary of these designated natural areas located in the AOI and its vicinity. The location of designated natural areas is presented in Figure 6.

2.3.5.1 Provincial Nature Reserve

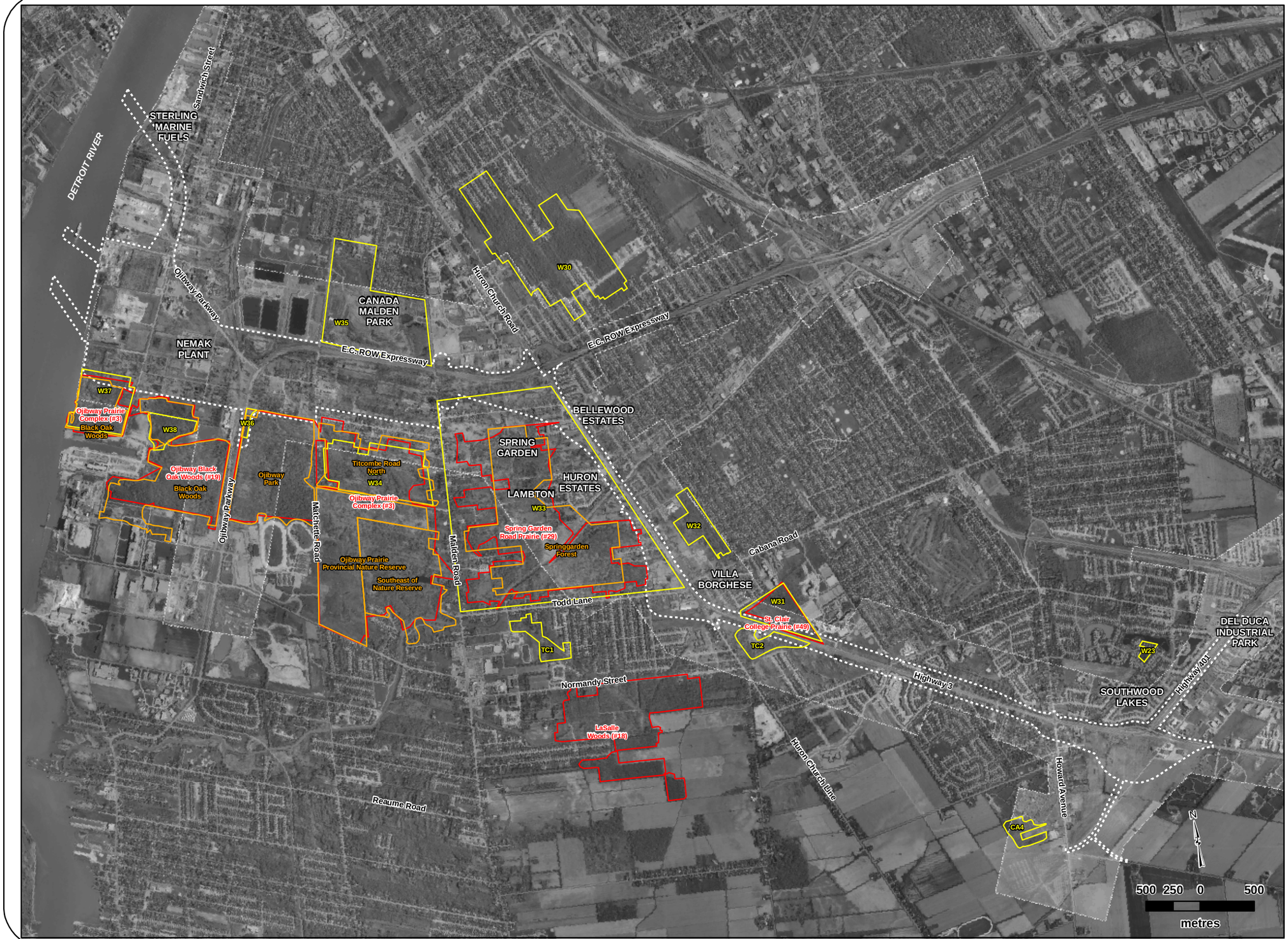
Provincial Nature Reserves are areas selected to represent the distinctive natural communities and landforms in Ontario. Ojibway Prairie is a 65 ha Provincial Nature Reserve that was regulated under the *Provincial Parks Act* in 1977 to protect one of the largest remnants of tallgrass prairie and oak 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 over 60 are of prairie and western affinity. It is home to over 60 plants that are rare in Ontario as well as a number of animal species representative of prairie habitats (Pratt 1979; OMNR 2002). The Ojibway Prairie Provincial Nature Reserve forms one component of the Ojibway Prairie Complex ANSI.

Vegetation communities in the Provincial Nature Reserve include Old Field (27.5 ha), Forb Prairie (17 ha), Tallgrass Prairie (11.5 ha), Thickets (3 ha), Oak Savannah (4.5 ha), and Black Oak/Red Hickory Forest (1.5 ha). 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 Provincial Nature Reserve 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 Provincial Nature Reserve 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 prairire 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 Provincial Nature Reserve.

2.3.5.2 Evaluated Wetlands

There are no evaluated wetlands located in the AOI.



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	**Figure:** 6
Date: February 2007	**Prepared By:** MWF
Scale: 1 : 35,000	**Checked By:** GNK

2.3.5.3 Areas of Natural and Scientific Interest

ANSIs in the AOI 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.

These areas are identified on Figure 6.

Ojibway Prairie Provincial Nature Reserve

A summary of the features of the Ojibway Prairie Provincial Nature Reserve was presented previously.

Ojibway Park

Ojibway Park is a 64 ha 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*).

Data collected by LGL Limited to date does not provide details as to the presence/absence of significant species in this portion of the Ojibway Prairie Complex provincially significant Life Science ANSI (OMNR 2002).

Spring Garden Road

This 165 ha site consists of tallgrass prairie and oak savannah 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 in the City of Windsor (Woodliffe 1994).

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 (Woodliffe 1994). 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 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 (Oldham 1994).

Black Oak Woods

This 46 ha 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).

Southeast of Nature Reserve

This 40 ha site located to the southeast of Ojibway Prairie Provincial Nature Reserve contains species and communities with a prairie affinity (OMNR 2002). Data collected by LGL Limited to date does not specify the communities located within this portion of the Ojibway Prairie Complex provincially significant Life Science ANSI, nor does it provide details as to the presence/absence of significant species.

2.3.5.4 Environmentally Significant Areas

A number of ESAs are located in the AOI and its vicinity. Sixty-three (63) potential ESAs were inventoried in 1981 and/or 1982 and summarized by Oldham (1983). 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. At that time, two ESAs were established within the AOI, including:

- Ojibway Black Oak Woods ESA (ESA #19); and
- Spring Garden Road Prairie ESA (ESA #29).

An update of ESAs within Essex County was undertaken in 1991 to evaluate supplementary sites, including previously considered sites and newly identified candidate ESA sites. At that time, a resolution was passed that all PSWs and ANSIs in Essex County be included as ESAs (information on ESAs that are also ANSIs was provided previously). The Ojibway Prairie Complex ESA was designated as ESA #3 through this decision. 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 ANSIs, the following ESAs were identified in the AOI and its vicinity:

- St. Clair College Prairie ESA (ESA #49); and
- Sandwich West Woodlot/LaSalle Woods ESA (ESA #18).

A brief description of these ESAs is presented in Table 11 and their locations are shown in Figure 6.

2.3.5.5 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.

Members include Conservation Authorities, Federation of Ontario Naturalists, Ontario Stewardship, federal and provincial departments and ministries, Canadian Botanical Association, Ontario Federation of Agriculture, and other groups. Dynamic Partnerships are the key to effective program delivery in this complex region. Since 1984 Carolinian Canada has provided a mechanism for cooperation between different levels of government, agencies, conservation authorities and non-government organizations.

TABLE 11.
SUMMARY OF ENVIRONMENTALLY SIGNIFICANT AREAS IN THE AOI AND ITS VICINITY

ESA Name/ Number	Significant Landforms	Linkage System	Migratory Stopover	Significant Communities	Significant Habitats/ Hydrological Significance	Diversity	Significant Species	Size	Research/ Education	Aesthetic and/or Historical Values
Ojibway Prairie Complex (#3)	See Section 2.3.5.1 Provincial Nature Reserve									
Sandwich West Woodlot/ LaSalle Woods (#18)		Linkage with Turkey Creek and Ojibway Prairie via a hydro corridor		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	
Ojibway Black Oak Woods (#19)		Linkage with Ojibway Prairie		Species assemblages include species with a prairie affinity			One SARA, Schedule 2 species, several provincially and locally significant species			
Spring Garden Road Prairie (#29)		Linkage with Ojibway Prairie		Considered to be one of the best prairie remnants remaining in Essex County	Prairie habitat		Three SARA, Schedule 1 species, one SARA, Schedule 2 species, several provincially and locally significant species			Impressive display of fall-blooming prairie wildflowers
St. Clair College Prairie (#49)					Species assemblages include species with prairie and savannah affinities	Good	Three SARA, Schedule 1 species, several provincially and locally significant species		The St. Clair College of Applied Arts and Technology is adjacent to this ESA	

In 1984, 38 sites were identified as critical natural areas in a study by the identification sub-committee of Carolinian Canada. These sites total 40,800 acres in area. Since 1984, conservation efforts in Carolinian Canada have been directed towards securing these sites through a number of mechanisms that included purchase, municipal designation, landowner contact and private stewardship, and education and public awareness. A land acquisition and stewardship program from 1987-1992 secured over 15,000 acres through voluntary agreements with landowners. This landowner contact program was an innovative, ground-breaking program that spawned many subsequent initiatives. A further ~2,000 acres was purchased for conservation. Today a total of 14,500 acres of the sites is owned by conservation groups. The acquired Carolinian Canada sites are managed by different conservation organizations and by private landowners for conservation purposes. Today, Carolinian Canada promotes innovative and comprehensive approaches to conserving our natural heritage. Through the Big Picture Project, Carolinian Canada has adopted a new conservation vision of an integrated natural heritage network that connects and enhances these islands of green.

One of the 38 Carolinian Canada sites is present within the AOI, the Ojibway Prairie Remnants (Site #31). The Ojibway Prairie Remnants site is now encompassed within the Ojibway Prairie Complex ANSI.

2.3.5.6 Candidate Natural Heritage Sites

The City of Windsor and the Town of LaSalle have both undertaken biological inventories of the remnant forest and prairie habitat features to determine their local significance. These Candidate Natural Heritage Sites (CNHSs) are summarized in Town of LaSalle (1996) for the Town of LaSalle and in City of Windsor (1992) for the City of Windsor. The location of CNHSs is presented in Figure 6.

In the Town of LaSalle, CNHSs were evaluated based on several physical and ecological criteria, including:

- Significant Ravine, Valley, River, and Stream Corridors;
- Habitat of Endangered, Threatened, and Vulnerable Species;
- Significant Woodlands;
- Significant Wildlife;
- Significant Wetland;
- Significant Ecological Function;
- Diversity;
- Significant Species;
- Significant Communities;
- Significant Earth Feature; and
- Condition.

Table 12 presents a summary of the LaSalle CNHSs located in the AOI and its vicinity.

In the City of Windsor, CNHSs were evaluated based on several physical and ecological criteria, including:

- Significant Ecological Function;
- Diversity;
- Significant Communities;
- Significant Species;
- Size;
- Representation;
- Condition; and
- Significant Earth Science Features.

Table 13 presents a summary of the Windsor CNHSs located in the AOI and its vicinity.

2.3.5.7 Canadian Heritage Rivers System

The Detroit River flows in a north-south direction connecting Lake St. Clair in the north to Lake Erie in the south. Acting as an international border, the river connects American and Canadian communities culturally and economically. More than 14,000,000 vehicles and 8,000 commercial ships cross the Detroit River annually. It also serves many ecological functions as part of the Great Lakes watershed.

The importance of the Detroit River as a natural heritage feature is only one component of its function. Parks Canada designated the Detroit River as a Canadian Heritage River, which recognizes its importance to Canadian history and culture. The Detroit River received American Heritage River designation in 1998 and Canadian Heritage River designation in 2001, making it the first River with dual designations.

The Canadian Heritage River System (CHRS) is a public trust, promoted by local citizens. The program is administered by the Canadian Heritage Rivers Board, whose members are appointed by the Federal, Provincial and Territorial governments. The CHRS was established in 1984 to conserve and protect the best examples of Canada's river heritage, to give them national recognition, and to encourage the public to enjoy and appreciate them. Parks Canada is responsible for submitting recommendations to the Minister of new heritage rivers and providing other forms of support to the CHRS. The CHRS is governed by the *Canadian Heritage Rivers System Charter* and implemented by a *Strategic Plan*.

For a river to become a Canadian Heritage River there are two steps in the process: nomination and designation. The Minister of the Environment and the Provincial/Territorial Minister of the nominating government must grant formal approval of both the nomination and designation. To be considered for nomination, a River must meet the following criteria:

- the nomination must come officially by the participating government, but are generated by private citizens and groups;

TABLE 12.
TOWN OF LASALLE CANDIDATE NATURAL HERITAGE SITES IN THE AOI AND ITS VICINITY

Candidate Natural Heritage Site	Significant Ravine, Valley, Stream Corridor	Habitat of Endangered, Threatened, Vulnerable Species	Significant Woodland	Significant Wildlife Habitat	Significant Ecological Function	Overall Diversity	Number of Significant Species Present	Significant Communities	Significant Earth Feature	Condition
TC1		Colicroot, Dense Blazing Star, rairie Rose	3.0 ha	Yes	Groundwater recharge, stormwater retention, hydrological flow	High	22	Tallgrass Prairie, Black Oak-Pignut Hickory Forest, Pin Oak-Swamp White Oak Swamp		Good
TC2	Connects LaSalle Woodlot ESA and St. Clair College Prairie	Prairie Rose, Spiked Blazing Star		Yes		High	8		Sand ridge	Disturbed
CA4		Shumard Oak, Prairie rose	6.1 ha	Yes	Groundwater recharge, stormwater retention, hydrogeological flow, linkage area	Low	5	Shumard Oak-Shellbark Hickory Forest		Disturbed

TABLE 13.
CITY OF WINDSOR CANDIDATE NATURAL HERITAGE SITES IN THE AOI AND ITS VICINITY

Candidate Natural Heritage Site	Significant Ecological Function	Diversity	Significant Communities	Number of Significant Species Present	Size	Representation	Condition	Significant Earth Features
W23	Stormwater retention				12.0 ha			
W30		Good		28	98.0 ha		Good	
W31		Good	Tallgrass Prairie, Savannah-like Forest	38	15.0 ha		Good	
W32	Stormwater retention	Good	Tallgrass Prairie, Upland Carolinian Forest	59	17.0 ha	Representative communities of the natural landscape of the City of Windsor that are not adequately represented in existing protected areas		
W33	Part of a linkage system that includes Spring Garden Prairie, the Ojibway Prairie Complex, LaSalle Woodlot, Black Oak Heritage Park and C.N.H.S. #37 and #38	Good	Tallgrass Prairie	77	170.0 ha	Contains the only dry-phase prairie remnant in Windsor, is the only remaining habitat in Windsor for the Eastern Massasauga and a number of butterfly species, and contains the best representation of Cattail Marsh in Windsor	Good	
W34	Provides linkage through the Ojibway Prairie Complex, serves as a migratory bird stopover	Good	Black Oak Savannah	18	30.0 ha	Presence of many rare plants and animals also found in the Ojibway Prairie Nature Reserve	Good	
W35		Good		15	10.3 ha		Good	

TABLE 13.
CITY OF WINDSOR CANDIDATE NATURAL HERITAGE SITES IN THE AOI AND ITS VICINITY

Candidate Natural Heritage Site	Significant Ecological Function	Diversity	Significant Communities	Number of Significant Species Present	Size	Representation	Condition	Significant Earth Features
W36	Linkage through the Ojibway Prairie/Black Oak Complex				1.7 ha		Good	
W37	Linkage between the natural areas of the Ojibway region and the Detroit River			7	24.8 ha		Good	
W38	Linkage between the natural areas of the Ojibway region, Black Oak Heritage Park and C.N.H.S. #37			10	77.0 ha		Good	Sand dune

- criteria for consideration include:
  - outstanding natural, cultural and/or recreational values;
  - high level of public support;
  - demonstrated that sufficient measures will be put in place to ensure that those values will be maintained;
- the participating government agrees to pursue nomination;
- the nominated river must meet the criteria set by the CHRS Board; and
- the nomination must be recommended to the responsible Ministers.

It is unclear as to which group nominated the Detroit River for CHRS status. However, the CHRS website provides links to the Detroit River Canadian Cleanup Committee, Detroit River Remedial Action Team and Detroit River Remedial Action Plan, each of which appear to be Canadian based.

A River officially becomes designated once a management plan/heritage strategy is lodged with the CHRS Board by the nominating government. Production of the management plan/heritage strategy is based on public consultation and consensus.

The CHRS has no legislative authority. Nominations are driven by volunteers through partnerships and community involvement. Guidelines are in place to ensure that candidate rivers meet the selection and integrity criteria to become a Canadian Heritage River.

2.3.5.8 Municipal Land Use Designations

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.

Two areas within the AOI are designated as Natural Environment: the Southeast of Nature Reserve ANSI and the Spring Garden Forest ANSI. The LaSalle Woods, located in the vicinity of the AOI, is also designated as Natural Environment.

Areas designated as Natural Environment include: woodlots; wetlands; and prairie communities. These areas are recognized as playing an important role in keeping people physically, mentally and spiritually healthy. Permitted uses in these areas include: passive recreation; wildlife management; conservation uses; and, buildings/structures associated with these uses. The official plan states that 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 areas designated Natural Heritage shall be via public purchase, private stewardship, conservation easements and management agreements.

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 regulated by the Official Plan, which is approved under the *Planning Act*. The Official Plan, the Provincial Policy Statement and the *Planning Act* afford protection for provincially, regionally and locally significant designated natural areas.

City of Windsor

Legal Status of Plan

The City of Windsor Official Plan (2004) 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 decision on November 1, 2002. This is an office consolidation of the Plan which incorporates the approved Plan plus subsequent Amendments.

Environmental Designations

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 6.8, Volume 1 of the Official Plan identifies permitted uses for each of the land use designations in the City. The Natural Heritage designation governs natural heritage areas located in the City.

Permitted uses within the Natural Heritage designation include nature reserves and wildland 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.

Several overlays are subcategories to the land use designations and are identified as *'Development Constraint Area'* on Schedule C of the City's Official Plan. These

Constraint Areas, including Natural Heritage, Environmental Policy Areas and Candidate Natural Heritage Sites, afford various levels of protection to the City's natural environmental features.

Natural Heritage Policies identify areas under provincial protection (ie. Provincially Significant Wetlands and ANSIs). Environmental Policy Areas identify 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 contain potentially significant and/or sensitive environmental features or functions, which are subject to an Environmental Evaluation Report to determine if development is appropriate.

Several natural heritage land use designations are identified in the Schedules to the Official Plan. Three areas located in the AOI are designated as Natural Heritage: Ojibway Prairie Complex, Oakwood Bush and the eastern section of Malden Park. Two areas of the Titcombe Road North ANSI, a section of the Spring Garden Forest ANSI and the St. Clair College Prairie ESA are designated as Special Policy Area "A".

Secondary Planning Areas

The Official Plan – Volume 2 contains several Secondary Plans, some of which have natural feature components. The Spring Garden Planning Area is located in the AOI.

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.

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 parts/all of the identified area; land exchange; donations/gifts/bequeaths from individuals/corporations; conservation easements; stewardship agreements; and other measures.

Environmental land use designations in the City of Windsor are governed by the Official Plan, the Provincial Policy Statement and the *Planning Act*. These laws, policies and plans afford protection to provincially, regionally and locally significant natural heritage areas.

2.4 Evaluate Alternatives

2.4.1 Practical Alternatives

There are five potential alternatives for the proposed access road and seven different combinations for plaza-crossing locations. The location of crossings, plazas and access roads are presented in Figure 7.

2.4.1.1 Access Roads

Each of the five access road alternatives (1A, 1B, 2A, 2B & 3) has differing road alignments in certain segments of the access road, which results in slightly different impacts. The five alternatives for the proposed access road differ based on the built-form of highway and/or access roads. The access road alternatives include:

- Alternative 1A is an at-grade six-lane freeway with one-way service roads on either side.
- Alternative 1B is a below grade six-lane freeway with one-way service roads on either side.
- Alternative 2A is an at-grade six-lane freeway with two-way services roads located south of the freeway.
- Alternative 2B is a below grade six-lane freeway with two-way service roads located south of the freeway.
- Alternative 3 is a cut and cover tunnelled six-lane freeway underneath Huron Church/Highway 3 corridor. Huron Church/Highway 3 would remain and be used as service roads.

2.4.1.2 Plazas and Crossings

There are three different proposed locations for a new border crossing in the west Windsor area and four plaza alternatives. Seven plaza/crossing combinations have been proposed:

- Crossing A-Plaza A is a bridge crossing south of the Brighton Beach Power Generation Station and plaza located south of E.C. Row Expressway, east of Ojibway Parkway. The approach road between the plaza and crossing generally runs along side Broadway Street.
- Crossing B-Plaza A is a bridge crossing north of the Brighton Beach Power Generation Station and plaza located south of E.C. Row Expressway, east of Ojibway Parkway. The approach road runs alongside Sandwich and Broadway Streets.
- Crossing C-Plaza A is a bridge crossing in the industrial portlands near Russell Street/Sandwich Street and plaza located south of E.C. Row Expressway, east of Ojibway Parkway. There are two possible connecting road options, one runs alongside Sandwich Street and Broadway Avenue through Brighton Beach, while the other is along Sandwich Street and the western extension of Ojibway Parkway.

LEGEND

CROSSINGS, PLAZAS AND ACCESS ROADS

LGL Limited
environmental research associates

Project: TA4137	**Figure:** 7
Date: February 2007	**Prepared By:** URS
Scale:	**Checked By:** GNK

- Crossing B-Plaza B1 is a bridge crossing north of the Brighton Beach Power Generation Station directly connected to a plaza located at the southern end of Sandwich Street, connecting to the new crossing via of Broadway Street.
- Crossing C-Plaza B is a bridge crossing in the industrial portlands near Russell Street/Sandwich Street and plaza located at the southern end of Sandwich Street, north of Broadway Street. The approach road runs generally alongside Sandwich Street.
- Crossing C-Plaza C is a bridge crossing in the industrial portlands near Russell Street and Sandwich Street and plaza located west of Sandwich Street, south of Prospect Avenue. The approach road runs alongside Sandwich Street.

2.4.2 Evaluation Criteria

Comparative criteria were developed to evaluate the practical alternatives based on the approach described in the *Draft Natural Heritage Work Plan* (Border Transportation Partnership 2005). The natural heritage evaluation criteria addressed three levels of biological organization: landscapes; ecosystems/communities; and, populations/species and two areas of project influence: right-of-way; and, adjacent lands. The right-of-way study area included all lands located within the footprint of each practical alternative, including crossings, plazas and access roads. The adjacent lands study area included all lands located within 120 metres of the footprint of each practical alternative, including crossings, plazas and access roads. The 120 metre distance for adjacent lands was based on historical precedent, accepted environmental practice and a recognition that most disturbance effects to natural heritage features occur within 120 metres of the proposed facility. The performance measure, criteria, indicators, and data sources used to evaluate practical alternatives are presented in Table 14.

2.4.2.1 Impacts to Ecological Landscapes Located in the ROW

A landscape is a heterogeneous land area composed of a cluster of interacting ecosystems that is repeated in similar form throughout. Landscapes vary in size, down to a few kilometers in diameter. Three types of landscapes are recognized: patch; corridor; and, matrix. A patch is a non-linear surface area differing in appearance from its surroundings. Patches can be isodiametric, elongated, ring or peninsula shaped. A corridor is a narrow strip of land that differs from the matrix on either side. Corridors can be line, strip or stream. A matrix is the most extensive and most connected landscape element type present, which plays the dominant role in landscape functioning (Forman and Godron 1986).

Significance

The significance of the landscape unit was assessed based on professional judgement and application of the principles of landscape ecology (Forman and Godron 1986). The significance of ecological landscapes was categorized as follows:

- Natural heritage features that display a high level of prominence in the landscape based on size, shape, number, type and/or configuration (i.e. pattern and connectivity) were considered of “high” significance. The Detroit River was identified as a landscape unit with a high level of prominence in the landscape. The Ojibway Prairie Complex is also considered to have a high level of prominence in the landscape, but this landscape unit will not be fragmented or severed by any of the practical alternatives.

TABLE 14.
NATURAL HERITAGE CRITERIA USED TO EVALUATE PRACTICAL ALTERNATIVES

Performance Measure	Criteria	Indicator	Data Source
Ecological Landscapes	Impacts to Ecological Landscapes Located in the ROW	• Landscape name and type (patch, corridor, matrix) • Landscape significance (high, moderate, low)	• Aerial photographs • Field investigations • Plan and Profile
Communities/ Ecosystems	Impacts to Terrestrial Communities/ Ecosystems Located in the ROW	• Community name and type (ELC) • Area displaced by crossing, plaza and access road footprint (ha) • Community significance (high, moderate, low)	• Aerial photographs • Field investigations • Plan and Profile
	Impacts to Aquatic Communities/ Ecosystems Located in the ROW	• Community name • Area displaced by crossing, plaza and access road footprint (ha) • Community significance (high, moderate, low, negligible)	• Aerial photographs • Field investigations • Plan and Profile
Populations/ Species	Impacts to Species at Risk Located in the ROW	• Species name • Number of species at risk (provincial rank S1 to S3)	• Field investigations • Plan and Profile
Designated Natural Areas	Impacts to Designated Natural Areas Located on Adjacent Lands	• Area name and type (ANSI, ESA, CNHS) • Area disturbed within 120 m of crossing, plaza and access road footprint (ha)	• Aerial photographs • Plan and Profile • ANSI, ESA, CNHS reports and maps

- Natural heritage features that display a moderate level of prominence in the landscape based on size, shape, number, type and/or configuration were considered of "moderate" significance. Major stream corridors, such as Turkey Creek, were identified as landscape units with a moderate level of prominence in the landscape. Matrices, and strip corridors with high connectivity to adjacent natural heritage features, were also identified as landscape units with a moderate level of prominence in the landscape.
- Natural heritage features that display a low level of prominence in the landscape based on size, shape, number, type and/or configuration were considered of "low" significance. Minor stream corridors, patches and strip and line corridors with low

connectivity to adjacent natural heritage features were identified as landscape units with a low level of prominence in the landscape.

2.4.2.2 Impacts to Terrestrial Communities/Ecosystems Located in the ROW

Terrestrial communities/ecosystems include any land-based environment, from small to large, in which plants and animals interact with the chemical and physical features of the environment. In Ontario, the Ecological Land Classification for Southern Ontario is used to classify terrestrial communities/ecosystems based primarily on vegetation structure and composition and soil characteristics.

Significance

The significance of terrestrial communities/ecosystems was catergorized as follows:

- All vegetation communities ranked S1 to S3 by the Natural Heritage Information Centre (NHIC) were considered of "high" significance. The NHIC has ranked many vegetation communities located in Ontario based on rarity. Vegetation communities ranked S1, S2 and S3 are considered provincially rare by the NHIC and were attributed a "high" level of significance by the study team.
- Natural vegetation communities ranked S4 to S5 or not ranked by the NHIC were considered of "moderate" significance. Natural vegetation communities that were found to be in a state more typical of pre-human settlement were assigned a "moderate" level of significance.
- Cultural vegetation communities ranked S4 to S5 or not ranked by the NHIC were considered of "low" significance. Cultural vegetation communities occur as a result of human influence and were assigned a "low" level of significance.

While it was recognized that these definitions tend to generalize the significance of vegetation communities, this approach was considered reasonable for the purposes of evaluating practical alternatives.

2.4.2.3 Impacts to Aquatic Communities/Ecosystems Located in the ROW

Aquatic ecosystems/communities include any watery environment, from small to large, in which plants and animals interact with the chemical and physical features of the environment. Types of aquatic communities/ecosystems are typically classified as lentic (i.e. waterbodies such as ponds, lakes and oceans) and lotic (i.e. watercourses such as ditches, agricultural drains, streams and rivers).

Significance

The significance of aquatic communities/ecosystems was categorized was follows:

- Aquatic communities that directly support critical fish habitat were considered of "high" significance. Critical fish habitats require a high level of protection because of their importance in sustaining subsistence, commercial or recreational fisheries, their rareness, their high productive capacity, the sensitivity of certain life stages of the fish species they support, etc. No watercourses located in the AOI directly support critical fish habitat.

- Aquatic communities that directly support important fish habitat were considered of "moderate" significance. Important fish habitats require a moderate level of protection and may include areas utilized by fish for feeding, growth and migration which, while important to the fish stock, are not considered critical. Areas in this category usually contain a relatively large amount of similar habitat that is readily available to the stock. Habitat that has been disrupted by past human activity may also fall into this category.
- Aquatic communities that directly support marginal fish habitat were considered of "low" significance. Marginal fish habitats require a minimal level of protection and have a low productive capacity. These habitats contribute marginally to fish production, but do have reasonable potential for enhancement or restoration.
- Aquatic communities that do not directly support fish habitat were considered of "negligible" significance. Areas that do not directly support fish habitat may contribute to the maintenance of fish habitat elsewhere in the system through baseflow, temperature moderation or chemical and organic inputs.

2.4.2.4 Impacts to Species at Risk Located in the ROW

Species at risk is used here as a general term that indicates that a species is of conservation concern due to reduced populations, limited distribution or habitat loss. For evaluation purposes, species at risk included all vascular plants and terrestrial vertebrate species ranked S1 to S3 by the NHIC.

2.4.2.5 Impacts to Designated Natural Heritage Features Located on Adjacent Lands

Designated natural heritage features included Areas of Natural or Scientific Interest (ANSIs), Environmentally Sensitive Areas (ESAs) and Candidate Natural Heritage Sites (CNHSs). There are no Provincially Significant Wetlands (PSWs) located in the AOI. No differentiation among these types of designated natural heritage areas was made based on significance for the purposes of evaluation. Natural heritage areas with multiple designations (i.e. the same area is designated as an ANSI/ESA/CNHS) were counted only once to represent the actual area disturbed and to avoid double-counting.

2.4.3 Evaluation Method

Natural heritage information, including ELC polygons, wildlife habitat polygons, stream reaches, designated natural heritage areas, etc. were delineated on aerial photographs, digitized and entered into the GIS. Attribute information, including ELC code, species at risk, habitat type, etc. were entered into the GIS database and linked to the geographical information. The footprint occupied by each practical alternative and adjacent lands located within 120 metres of the footprint were also digitized and entered into the GIS. The GIS was then used to superimpose the facility footprint and adjacent lands over the natural heritage information. A GIS algorithm was used to output the name, type, area and significance of each ELC polygon area overlapped by the footprint of each practical alternative. For adjacent lands, the GIS algorithm output the type and area of each designated natural area polygon overlapped within 120 metres of the footprint of each practical alternative. Data

was output by segment to an Excel spreadsheet for analysis. The raw information output by the GIS algorithm is maintained on file by LGL Limited. This raw information was then analyzed based on significance (high, moderate, low and negligible) for each criterion, where relevant, and totalled. The analysis of significance by segment is presented in Appendix J. The data for each segment was then added together to derive a total to be used to evaluate crossings, plazas and access roads from end to end. The data used to evaluate crossings, plazas and access roads from end to end are presented in Table 15. The crossings, plazas and access roads superimposed on the ELC vegetation communities and watercourses are presented in Appendix K.

The evaluation of alternatives was based on the number, area, type and significance of natural heritage features to be displaced or disturbed by the transportation facility. Generally, the practical alternatives with the greatest impact (number or area) to the most important natural heritage features (type and significance) were considered less preferred than the practical alternatives that resulted in the least impact to the least important natural heritage features.

An arithmetic evaluation method was used to compare practical alternatives using criteria and indicators. Criteria are the standards used to compare alternatives (i.e. impacts to ecological landscapes located in the ROW); indicators are the measurement units used to compare alternatives (i.e. number, area, significance, etc.). The indicators and criteria were assigned weights to reflect the level of importance of each indicator and criterion in decision-making. At the indicators level of analysis, each indicator for a criterion was weighted such that the total weight for all indicators for a criterion totaled one. At the criteria level of analysis, each criterion was weighted such that the total weight for all criteria totaled one. Weighted scores were then added to derive a total weighted score for each crossing and plaza and each access road. This evaluation method is often referred to as simple additive weighting.

The rationale for assigning weights at the indicators level of analysis was to assign a greater weight to indicators with a greater level of significance (i.e. “high,” “moderate,” “low” and “negligible”). For “impacts to ecological landscapes located in the ROW,” “high” was not assigned a weight because all crossing and plaza alternatives affected one “high” significance landscape (Detroit River) and no access road alternatives affected “high” significance landscapes. Because “high” was not considered decision relevant, a weight of 0.65 was assigned to “moderate” and 0.35 was assigned to “low.” For “impacts to terrestrial communities/ecosystems located in the ROW,” the greatest weight was assigned to “high” (0.6), followed by “moderate” (0.3) and then “low” (0.1). For “impacts to aquatic communities/ecosystems located in the ROW,” weights were assigned to “moderate” (0.6), followed by “low” (0.3) and then “negligible” (0.1). Because there were no watercourses or waterbodies with “high” significance and “high” was not considered decision relevant, greater importance was placed on “moderate,” “low” and “negligible.” “Impacts to species at risk located in the ROW” and “impacts to designated natural areas located on adjacent lands” were not assigned a weight because these two criteria each had only one indicator.

TABLE 15.
DATA USED TO EVALUATE CROSSINGS, PLAZAS AND ACCESS ROADS END TO END

Performance Measure			Ecological Landscapes			Communities / Ecosystems									Populations / Species	Designated Natural Areas
Criteria / Indicator			Impacts to Ecological Landscapes			Impacts to Terrestrial Communities / Ecosystems				Impacts to Aquatic Communities / Ecosystems					Impacts to Species at Risk	Impacts to Designated Natural Areas
Measurement / Units			Landscape Number and Significance			Community Area and Significance				Community Area and Significance					Number of Species	Area (ha)
Plaza	From Crossing	Segment	Number of Landscapes			Area Displaced (ha)			Total Area (ha) Displaced	Area Displaced (ha)				Total Area (ha) Displaced	Provincially Rare Specimens / Colonies	Total Area (ha) Disturbed
			High	Moderate	Low	High	Moderate	Low		High	Moderate	Low	Neg.			
A	A	A-G	1	2	2	2.98	1.83	27.77	32.58	0.00	0.10	0.01	0.11	0.22	232	7.38
	B	B-G	1	2	2	2.70	1.82	26.24	30.77	0.00	0.10	0.03	0.18	0.31	223	2.38
	C	C-E-G	1	2	3	2.69	2.74	25.44	30.87	0.00	0.13	0.03	0.15	0.31	231	1.48
	C	C-G	1	2	1	2.70	2.73	22.86	28.29	0.00	0.13	0.01	0.11	0.25	186	1.73
B	C	C-G	1	3	6	2.02	2.09	36.56	40.68	0.00	0.21	0.13	0.30	0.64	195	14.82
B1	B	B-G	1	2	5	1.09	1.19	42.79	45.07	0.00	0.17	0.07	0.35	0.59	185	10.96
C	C	C-G	1	2	7	0.89	2.11	33.23	36.23	0.00	0.19	0.19	0.18	0.56	153	7.77

TABLE 15.
DATA USED TO EVALUATE CROSSINGS, PLAZAS AND ACCESS ROADS END TO END

Performance Measure	Ecological Landscapes			Communities / Ecosystems									Populations / Species	Designated Natural Areas
Criteria / Indicator	Impacts to Ecological Landscapes			Impacts to Terrestrial Communities / Ecosystems				Impacts to Aquatic Communities / Ecosystems					Impacts to Species at Risk	Impacts to Designated Natural Areas
Measurement / Units	Landscape Number and Significance			Community Area and Significance				Community Area and Significance					Number of Species	Area (ha)
Routes	Number of Landscapes			Area Displaced (ha)			Total Area (ha) Displaced	Area Displaced (ha)				Total Area (ha) Displaced	Provincially Rare Specimens / Colonies	Total Area (ha) Disturbed
	High	Moderate	Low	High	Moderate	Low		High	Moderate	Low	Neg.			
Alt1A-Plaza A	0	3	19	1.43	7.25	16.35	25.03	0.00	0.39	0.85	0.06	1.29	142	54.49
Alt1A-Plaza B or C	0	3	19	0.44	3.14	13.51	17.10	0.00	0.39	0.74	0.03	1.16	102	44.34
Alt1AOpt2-Plaza A	0	3	19	1.53	7.79	17.32	26.63	0.00	0.31	0.45	0.09	0.85	134	54.82
Alt1AOpt2-Plaza B or C	0	3	19	0.50	3.68	14.41	18.58	0.00	0.31	0.17	0.03	0.51	92	44.67
Alt1B-Plaza A	0	3	19	1.46	7.29	17.03	25.78	0.00	0.40	0.83	0.08	1.32	152	54.18
Alt1B-Plaza B or C	0	3	19	0.43	3.18	13.69	17.30	0.00	0.40	0.74	0.03	1.17	112	44.10
Alt1BOpt2-Plaza A	0	3	19	1.46	7.29	17.04	25.79	0.00	0.40	0.84	0.07	1.32	152	54.51
Alt1BOpt2-Plaza B or C	0	3	19	0.54	3.82	14.92	19.28	0.00	0.28	0.18	0.03	0.49	103	44.62
Alt2A-Plaza A	0	3	19	2.22	7.65	18.35	28.22	0.00	0.38	0.87	0.05	1.30	162	55.54
Alt2A-Plaza B or C	0	3	19	1.19	3.64	14.92	19.75	0.00	0.38	0.71	0.02	1.11	122	46.07
Alt2AOpt2-Plaza A	0	3	19	2.22	7.80	18.66	28.68	0.00	0.08	0.26	0.05	0.40	155	55.26
Alt2AOpt2-Plaza B or C	0	3	19	1.18	3.79	15.46	20.43	0.00	0.08	0.16	0.02	0.26	116	45.79
Alt2B-Plaza A	0	3	19	1.86	7.60	17.61	27.07	0.00	0.38	0.87	0.05	1.31	145	53.88
Alt2B-Plaza B or C	0	3	19	0.82	3.60	14.28	18.70	0.00	0.38	0.77	0.02	1.17	105	44.41
Alt2BOpt2-Plaza A	0	3	19	1.86	7.75	18.23	27.84	0.00	0.38	0.87	0.05	1.31	145	53.61
Alt2BOpt2-Plaza B or C	0	3	19	0.82	3.75	14.90	19.47	0.00	0.38	0.77	0.02	1.17	105	44.14
Alt3-Plaza A	0	3	19	1.48	7.41	14.36	23.25	0.00	0.37	0.39	0.06	0.82	131	53.50
Alt3-Plaza B or C	0	3	19	0.50	3.40	11.46	15.36	0.00	0.37	0.28	0.02	0.67	92	43.38

The rationale for assigning weights at the criteria level of analysis was based on professional judgement taking into consideration the importance of the natural heritage features and the potential effects of the new highway facility. "Impacts to terrestrial communities/ecosystems located in the ROW" measures the area and significance of vegetation communities that will be displaced by a new transportation facility. Because a number of these vegetation communities are provincially and globally rare, the community/ecosystem level of biological organization is considered the most important, and replacement of provincially and globally rare vegetation communities requires dedicated management efforts, this criterion was assigned a weight of 0.4.

"Impacts to aquatic communities/ecosystems located in the ROW" measures the area and significance of aquatic communities that will be altered by a new transportation facility. Since many of the aquatic communities have been degraded and restoration is more easily achieved than is the case with complex/rare terrestrial ecosystems, this criterion was assigned a weight of 0.2.

"Impacts to species at risk located in the ROW" measures the number of rare specimens/colonies that will be displaced by a new transportation facility. The loss of provincially rare plant and animal species was considered important; however, many of these provincially rare specimens/colonies are located in provincially rare communities that already received a weight of 0.4 under the "impacts to terrestrial communities/ecosystems located in the ROW" criterion. For this reason, "impacts to species at risk located in the ROW" was assigned a weight of 0.2 to add further emphasis to the importance of "impacts to terrestrial communities/ecosystems located in the ROW," but not too much weight to result in a double or triple counting of impacts.

"Impacts to ecological landscapes located in the ROW" measures the number and significance of landscape units that will be lost or fragmented by the transportation facility. Since this criterion is similar to "impacts to terrestrial/aquatic communities/ecosystems located in the ROW," which was already assigned a combined weight of 0.6, this criterion was assigned a weight of 0.1.

"Impacts to designated natural areas located on adjacent lands" measures the area of important natural heritage features located nearby that may be disturbed by a new transportation facility. The effects of disturbance are considered less severe and more easily mitigated than the effects of displacement; therefore, this criterion was considered less important. However, because the features located on adjacent lands are designated for protection, their importance is increased. As a result, a weight of 0.1 was assigned to this criterion.

The values were then multiplied by the weights to derive a weighted indicator score and a weighted criterion score for each practical alternative. The results of the weighting of indicators are presented in Table 16 and the results of the weighting of criteria are presented in Table 17. A lower weighted score reflects less environmental impact and is thus preferred to a higher weighted score.

TABLE 16.
WEIGHTED INDICATORS FOR CROSSINGS, PLAZAS AND ACCESS ROADS END TO END

Performance Measure			Ecological Landscapes				Communities / Ecosystems									Populations / Species	Designated Natural Areas
Criteria / Indicator			Impacts to Ecological Landscapes				Impacts to Terrestrial Communities / Ecosystems				Impacts to Aquatic Communities / Ecosystems					Impacts to Species at Risk	Impacts to Designated Natural Areas
Measurement / Units			Landscape Number and Significance				Community Area and Significance				Community Area and Significance					Number of Species	Area (ha)
Plaza	From Crossing	Segment	Number of Landscapes			Weighted Score	Area Displaced (ha)			Weighted Score	Area Displaced (ha)				Weighted Score	Provincially Rare Specimens/Colonies	Total Area (ha) Disturbed
			High	Moderate	Low		High	Moderate	Low		High	Moderate	Low	Neg.			
A	A	A-G	1	2	2	1.40	2.98	1.83	27.77	5.11	0.00	0.10	0.01	0.11	0.07	232	7.38
	B	B-G	1	2	2	1.40	2.70	1.82	26.24	4.79	0.00	0.10	0.03	0.18	0.09	223	2.38
	C	C-E-G	1	2	3	1.50	2.69	2.74	25.44	4.98	0.00	0.13	0.03	0.15	0.10	231	1.48
		C-G	1	2	1	1.30	2.70	2.73	22.86	4.73	0.00	0.13	0.01	0.11	0.09	186	1.73
B	C	C-G	1	3	6	2.10	2.02	2.09	36.56	5.50	0.00	0.21	0.13	0.30	0.20	195	14.82
B1	B	B-G	1	2	5	1.70	1.09	1.19	42.79	5.29	0.00	0.17	0.07	0.35	0.16	185	10.96
C	C	C-G	1	2	7	1.90	0.89	2.11	33.23	4.49	0.00	0.19	0.19	0.18	0.19	153	7.77
Indicator Weight			0.60	0.30	0.10	1.00	0.60	0.30	0.10	1.00	0.00	0.60	0.30	0.10	1.00	1.00	1.00

TABLE 16.
WEIGHTED INDICATORS FOR CROSSINGS, PLAZAS AND ACCESS ROADS END TO END

Performance Measure	Ecological Landscapes				Communities / Ecosystems									Populations / Species	Designated Natural Areas
Criteria / Indicator	Impacts to Ecological Landscapes				Impacts to Terrestrial Communities / Ecosystems				Impacts to Aquatic Communities / Ecosystems					Impacts to Species at Risk	Impacts to Designated Natural Areas
Measurement / Units	Landscape Number and Significance				Community Area and Significance				Community Area and Significance					Number of Species	Area (ha)
Route	Number of Landscapes			Weighted Score	Area Displaced (ha)			Weighted Score	Area Displaced (ha)				Weighted Score	Provincially Rare Specimens / Colonies	Total Area (ha) Disturbed
	High	Moderate	Low		High	Moderate	Low		High	Moderate	Low	Neg.			
Alt1A-Plaza A	0	3	19	8.60	1.43	7.25	16.35	4.67	0.00	0.39	0.85	0.06	0.49	142	54.49
Alt1A-Plaza B or C	0	3	19	8.60	0.44	3.14	13.51	2.56	0.00	0.39	0.74	0.03	0.46	102	44.34
Alt1AOpt2-Plaza A	0	3	19	8.60	1.53	7.79	17.32	4.98	0.00	0.31	0.45	0.09	0.33	134	54.82
Alt1AOpt2-Plaza B or C	0	3	19	8.60	0.50	3.68	14.41	2.84	0.00	0.31	0.17	0.03	0.24	92	44.67
Alt1B-Plaza A	0	3	19	8.60	1.46	7.29	17.03	4.77	0.00	0.40	0.83	0.08	0.50	152	54.18
Alt1B-Plaza B or C	0	3	19	8.60	0.43	3.18	13.69	2.58	0.00	0.40	0.74	0.03	0.47	112	44.10
Alt1BOpt2-Plaza A	0	3	19	8.60	1.46	7.29	17.04	4.77	0.00	0.40	0.84	0.07	0.50	152	54.51
Alt1BOpt2-Plaza B or C	0	3	19	8.60	0.54	3.82	14.92	2.96	0.00	0.28	0.18	0.03	0.23	103	44.62
Alt2A-Plaza A	0	3	19	8.60	2.22	7.65	18.35	5.46	0.00	0.38	0.87	0.05	0.49	162	55.54
Alt2A-Plaza B or C	0	3	19	8.60	1.19	3.64	14.92	3.30	0.00	0.38	0.71	0.02	0.44	122	46.07
Alt2AOpt2-Plaza A	0	3	19	8.60	2.22	7.80	18.66	5.54	0.00	0.08	0.26	0.05	0.13	155	55.26
Alt2AOpt2-Plaza B or C	0	3	19	8.60	1.18	3.79	15.46	3.39	0.00	0.08	0.16	0.02	0.10	116	45.79
Alt2B-Plaza A	0	3	19	8.60	1.86	7.60	17.61	5.16	0.00	0.38	0.87	0.05	0.50	145	53.88
Alt2B-Plaza B or C	0	3	19	8.60	0.82	3.60	14.28	3.00	0.00	0.38	0.77	0.02	0.46	105	44.41
Alt2BOpt2-Plaza A	0	3	19	8.60	1.86	7.75	18.23	5.26	0.00	0.38	0.87	0.05	0.50	145	53.61
Alt2BOpt2-Plaza B or C	0	3	19	8.60	0.82	3.75	14.90	3.11	0.00	0.38	0.77	0.02	0.46	105	44.14
Alt3-Plaza A	0	3	19	8.60	1.48	7.41	14.36	4.55	0.00	0.37	0.39	0.06	0.35	131	53.50
Alt3-Plaza B or C	0	3	19	8.60	0.50	3.40	11.46	2.47	0.00	0.37	0.28	0.02	0.31	92	43.38
Indicator Weight	0.00	0.65	0.35	1.00	0.60	0.30	0.10	1.00	0.00	0.60	0.30	0.10	1.00	1.00	1.00

TABLE 17.
WEIGHTED CRITERIA FOR CROSSINGS, PLAZAS AND ACCESS ROADS END TO END

Performance Measure			Ecological Landscapes		Communities / Ecosystems				Populations / Species		Designated Natural Areas		Total Weighted Score
Criteria / Indicator			Impacts to Ecological Landscapes		Impacts to Terrestrial Communities / Ecosystems		Impacts to Aquatic Communities / Ecosystems		Impacts to Species at Risk		Impacts to Designated Natural Areas		
Plaza	From Crossing	Segment	Weighted Indicator Score	Weighted Criterion Score	Weighted Indicator Score	Weighted Criterion Score	Weighted Indicator Score	Weighted Criterion Score	Provincially Rare Specimens /Colonies	Weighted Criterion Score	Total Area (ha) Disturbed	Weighted Criterion Score	
A	A	A-G	1.40	0.14	5.11	2.05	0.07	0.01	232	46.40	7.38	0.74	49.34
	B	B-G	1.40	0.14	4.79	1.92	0.09	0.02	223	44.60	2.38	0.24	46.91
	C	C-E-G	1.50	0.15	4.98	1.99	0.10	0.02	231	46.20	1.48	0.15	48.51
		C-G	1.30	0.13	4.73	1.89	0.09	0.02	186	37.20	1.73	0.17	39.41
B	C	C-G	2.10	0.21	5.50	2.20	0.20	0.04	195	39.00	14.82	1.48	42.93
B1	B	B-G	1.70	0.17	5.29	2.12	0.16	0.03	185	37.00	10.96	1.10	40.41
C	C	C-G	1.90	0.19	4.49	1.80	0.19	0.04	153	30.60	7.77	0.78	33.40
Criteria Weight			0.10		0.40		0.20		0.20		0.10		1.00

TABLE 17.
WEIGHTED CRITERIA FOR CROSSINGS, PLAZAS AND ACCESS ROADS END TO END

Performance Measure	Ecological Landscapes		Communities / Ecosystems				Populations / Species		Designated Natural Areas		Total Weighted Score
Criteria / Indicator	Impacts to Ecological Landscapes		Impacts to Terrestrial Communities / Ecosystems		Impacts to Aquatic Communities / Ecosystems		Impacts to Species at Risk		Impacts to Designated Natural Areas		
Route	Weighted Indicator Score	Weighted Criterion Score	Weighted Indicator Score	Weighted Criterion Score	Weighted Indicator Score	Weighted Criterion Score	Provincially Rare Specimens / Colonies	Weighted Criterion Score	Total Area (ha) Disturbed	Weighted Criterion Score	
Alt1A-Plaza A	8.60	0.86	4.67	1.87	0.49	0.10	142	28.4	54.49	5.45	36.68
Alt1A-Plaza B or C	8.60	0.86	2.56	1.02	0.46	0.09	102	20.4	44.34	4.43	26.81
Alt1AOpt2-Plaza A	8.60	0.86	4.98	1.99	0.33	0.07	134	26.8	54.82	5.48	35.20
Alt1AOpt2-Plaza B or C	8.60	0.86	2.84	1.14	0.24	0.05	92	18.4	44.67	4.47	24.91
Alt1B-Plaza A	8.60	0.86	4.77	1.91	0.50	0.10	152	30.4	54.18	5.42	38.68
Alt1B-Plaza B or C	8.60	0.86	2.58	1.03	0.47	0.09	112	22.4	44.10	4.41	28.80
Alt1BOpt2-Plaza A	8.60	0.86	4.77	1.91	0.50	0.10	152	30.4	54.51	5.45	38.72
Alt1BOpt2-Plaza B or C	8.60	0.86	2.96	1.18	0.23	0.05	103	20.6	44.62	4.46	27.15
Alt2A-Plaza A	8.60	0.86	5.46	2.18	0.49	0.10	162	32.4	55.54	5.55	41.10
Alt2A-Plaza B or C	8.60	0.86	3.30	1.32	0.44	0.09	122	24.4	46.07	4.61	31.27
Alt2AOpt2-Plaza A	8.60	0.86	5.54	2.21	0.13	0.03	155	31	55.26	5.53	39.63
Alt2AOpt2-Plaza B or C	8.60	0.86	3.39	1.36	0.10	0.02	116	23.2	45.79	4.58	30.02
Alt2B-Plaza A	8.60	0.86	5.16	2.06	0.50	0.10	145	29	53.88	5.39	37.41
Alt2B-Plaza B or C	8.60	0.86	3.00	1.20	0.46	0.09	105	21	44.41	4.44	27.59
Alt2BOpt2-Plaza A	8.60	0.86	5.26	2.11	0.50	0.10	145	29	53.61	5.36	37.43
Alt2BOpt2-Plaza B or C	8.60	0.86	3.11	1.24	0.46	0.09	105	21	44.14	4.41	27.61
Alt3-Plaza A	8.60	0.86	4.55	1.82	0.35	0.07	131	26.2	53.50	5.35	34.30
Alt3-Plaza B or C	8.60	0.86	2.47	0.99	0.31	0.06	92	18.4	43.38	4.34	24.65
Criteria Weight	0.10		0.40		0.20		0.20		0.10		1.00

2.4.3 Results

The total weighted scores were used to establish a level of preference for practical alternatives. The total weighted scores for practical alternatives are presented in Table 18. The results of the arithmetic evaluation were then reviewed in light of the information to gain an appreciation for the advantages and disadvantages of each practical alternative and to confirm that the arithmetic evaluation was sound. The results of the qualitative and quantifative evaluations are presented below.

2.4.3.1 Access Roads

The access roads are illustrated in Figure 7 and Appendix K.

Review of Information

Access Road 1A from Plaza A will result in the loss of 25.03 ha of terrestrial communities and 1.29 ha of aquatic communities. This includes 1.43 ha of provincially rare vegetation communities and 142 specimens/colonies of species at risk. A total of 54.49 ha of designated natural areas is located on adjacent lands. Access Road 1A from Plazas B or C will result in the loss of 17.10 ha of terrestrial communities and 1.16 ha of aquatic communities. This includes 0.44 ha of provincially rare vegetation communities and 102 specimens/colonies of species at risk. A total of 44.34 ha of designated natural areas is located on adjacent lands. Option 2 from Plaza A will result in the loss of 26.63 ha of terrestrial communities and 0.85 ha of aquatic communities. This includes 1.53 ha of provincially rare vegetation communities and 134 specimens/colonies of species at risk. A total of 54.82 ha of designated natural areas is located on adjacent lands. Option 2 from Plazas B or C will result in the loss of 18.58 ha of aquatic communities and 0.51 ha of aquatic communities. This includes 0.50 ha of provincially rare vegetation communities and 92 specimens/colonies of species at risk. A total of 44.67 ha of designated natural areas is located on adjacent lands.

Access Road 1B from Plaza A will result in the loss of 25.78 ha of terrestrial communities and 1.32 ha of aquatic communities. This includes 1.46 ha of provincially rare vegetation communities and 152 specimens/colonies of species at risk. A total of 54.18 ha of designated natural areas is located on adjacent lands. Access Road 1B from Plazas B or C will result in the loss of 17.30 ha of terrestrial communities and 1.17 ha of aquatic communities. This includes 0.43 ha of provincially rare vegetation communities and 112 species at risk. A total of 44.10 ha of designated natural areas is located on adjacent lands. Option 2 from Plaza A will result in the loss of 25.79 ha of terrestrial communities and 1.32 ha of aquatic communities. This includes 1.46 ha of provincially rare vegetation communities and 152 specimens/colonies of species at risk. A total of 54.51 ha of designated natural areas is located on adjacent lands. Option 2 from Plazas B or C will result in the loss of 19.28 ha of terrestrial communities and 0.49 ha of aquatic communities. This includes 0.54 ha of provincially rare vegetation communities and 103 specimens/colonies of species at risk. A total of 44.62 ha of designated natural areas is located on adjacent lands.

TABLE 18.
TOTAL WEIGHTED SCORES FOR CROSSINGS, PLAZAS AND ACCESS ROADS END TO END

Plaza	From Crossing	Section	Total Weighted Score	Relative Impact Score
C	C	C-G	33.40	3
A	C	C-G	39.41	2
B1	B	B-G	40.41	2
B	C	C-G	42.93	2
A	B	B-G	46.91	1
A	C	C-E-G	48.51	1
A	A	A-G	49.34	1
Access Roads			Total Weighted Score	Relative Impact Score
Alt3-Plaza B or C			24.65	3
Alt1AOpt2-Plaza B or C			24.91	3
Alt1A-Plaza B or C			26.81	3
Alt1BOpt2-Plaza B or C			27.15	3
Alt2B-Plaza B or C			27.59	3
Alt2BOpt2-Plaza B or C			27.61	3
Alt1B-Plaza B or C			28.80	3
Alt2AOpt2-Plaza B or C			30.02	3
Alt2A-Plaza B or C			31.27	3
Alt3-Plaza A			34.30	2
Alt1AOpt2-Plaza A			35.20	2
Alt1A-Plaza A			36.68	2
Alt2B-Plaza A			37.41	2
Alt2BOpt2-Plaza A			37.43	2
Alt1B-Plaza A			38.68	2
Alt1BOpt2-Plaza A			38.72	2
Alt2AOpt2-Plaza A			39.63	2
Alt2A-Plaza A			41.10	2

Access Road 2A from Plaza A will result in the loss of 28.22 ha of terrestrial communities and 1.30 ha of aquatic communities. This includes 2.22 ha of provincially rare vegetation communities and 162 specimens/colonies of species at risk. A total of 55.54 ha of designated natural areas is located on adjacent lands. Access Road 2A from Plazas B or C will result in the loss of 19.75 ha of terrestrial communities and 1.11 ha of aquatic communities. This includes 1.19 ha of provincially rare vegetation communities and 122 specimens/colonies of species at risk. A total of 46.07 ha of designated natural areas is located on adjacent lands. Option 2 from Plaza A will result in the loss of 26.68 ha of terrestrial communities and 0.40 ha of aquatic communities. This includes 2.22 ha of provincially rare vegetation communities and 155 specimens/colonies of species at risk. A total of 55.26 ha of designated natural areas is located on adjacent lands. Option 2 from Plazas B or C will result in the loss of 20.43 ha of aquatic communities and 0.26 ha of aquatic communities. This includes 1.18 ha of provincially rare vegetation communities and 116 specimens/colonies of species at risk. A total of 45.79 ha of designated natural areas is located on adjacent lands.

Access Road 2B from Plaza A will result in the loss of 27.07 ha of terrestrial communities and 1.31 ha of aquatic communities. This includes 1.86 ha of provincially rare vegetation communities and 145 specimens/colonies of species at risk. A total of 53.88 ha of designated natural areas is located on adjacent lands. Access Road 2B from Plazas B or C will result in the loss of 18.70 ha of terrestrial communities and 1.17 ha of aquatic communities. This includes 0.82 ha of provincially rare vegetation communities and 105 species at risk. A total of 44.41 ha of designated natural areas is located on adjacent lands. Option 2 from Plaza A will result in the loss of 27.84 ha of terrestrial communities and 1.31 ha of aquatic communities. This includes 1.86 ha of provincially rare vegetation communities and 145 specimens/colonies of species at risk. A total of 53.61 ha of designated natural areas is located on adjacent lands. Option 2 from Plazas B or C will result in the loss of 19.47 ha of terrestrial communities and 1.17 ha of aquatic communities. This includes 0.82 ha of provincially rare vegetation communities and 105 specimens/colonies of species at risk. A total of 44.14 ha of designated natural areas is located on adjacent lands.

Access Road 3 from Plaza A will result in the loss of 23.25 ha of terrestrial communities and 0.82 ha of aquatic communities. This includes 1.48 ha of provincially rare vegetation communities and 131 specimens/colonies of species at risk. A total of 53.50 ha of designated natural areas is located on adjacent lands. Access Road 3 from Plazas B or C will result in the loss of 15.36 ha of terrestrial communities and 0.67 ha of aquatic communities. This includes 0.50 ha of provincially rare vegetation communities and 92 specimens/colonies of species at risk. A total of 43.38 ha of designated natural areas is located on adjacent lands.

All access roads will impact 22 ecological landscapes of moderate to low sensitivity.

Access Roads 1A, 1B and 3 will encroach on the St. Clair College Prairie ESA; Access Roads 2 and 2A will not.

Conclusions

All access roads that connect Plazas B or C with the existing Highway 401 result in less displacement of provincially rare vegetation communities than access roads that connect Plaza A with the existing Highway 401. The access road destined for Plazas B or C with the highest level of displacement of provincially rare vegetation communities (Alternative 2A) performs better than the access road destined for Plaza A with the lowest level of displacement of provincially rare vegetation communities (Alternative 1A). The same holds true for impacts to species at risk where the worst access road destined for Plazas B or C (Alternative 2A) performs better than the best access road to Plaza A (Alternative 3). For impacts to designated natural areas located on adjacent lands, the worst access road destined for Plazas B or C (Alternative 2A) also performs better than the best access road to Plaza A (Alternative 3).

For impacts to aquatic communities, all access roads that connect Plaza B or C with the existing Highway 401 perform better than their Plaza A counterpart. All access roads result in the same number and significance of ecological landscapes that will be displaced.

The evaluation of practical alternatives is based on the impacts of displacement that will occur within the footprint area of the proposed facility, and disruption that will occur on adjacent lands within approximately 120 metres of the proposed facility. These criteria address the impacts of the proposed crossing, plaza and access road based on its horizontal plan, but they do not take into consideration the vertical profile of the proposed access road.

Alternative 1 and its permutations include a new access road located at grade, Alternative 2 and its permutations include a new access road located several metres below grade/depressed, and Alternative 3 and its permutations include a new access road located entirely below grade in a tunnel. The vertical profile of the new access roads present advantages and disadvantages related to hydrology and hydrogeology.

For example, an at-grade access road will have the least impact on surface water, because watercourses can be spanned with a bridge or culvert. A depressed or tunnel access road requires modification to watercourses through diversion, enclosure, siphoning or aquaducting. The potential impacts associated with these drainage modifications are not considered in the arithmetic evaluation of practical alternatives, but must be considered in the reasoned argument evaluation. Similarly, a depressed or tunnel access road will require dewatering during construction which could have a potential impact on adjacent natural heritage features. While the effects of dewatering can be mitigated using cut-off walls, timing and duration restrictions, artificial recharge and other methods, these construction techniques are more complex and pose a higher risk to adjacent natural heritage features.

Based on the results of the quantitative and qualitative evaluations, there is no significant difference between Alternative 1 (at-grade), Alternative 2 (depressed) and Alternative 3 (tunnel) based on potential impacts to natural heritage features. The potential environmental effects associated with a tunnel can be mitigated, although this alternative is considered more complex and poses a greater risk to surface water and groundwater features. As a result, at-grade and depressed alternatives are considered slightly preferred to tunnel alternatives, but these alternatives do not offer a significant advantage or disadvantage for natural heritage features when compared to a tunnel.

The difference among access roads is more closely related to their destination. All access roads that lead to Plazas B or C are preferred to access roads that lead to Plaza A. As a result, access roads leading to Plazas B or C were assigned an impact score of “3” (low impact), while access roads leading to Plaza A were assigned an impact score of “2” (moderate impact).

2.4.3.2 Crossings and Plazas

The crossings and plazas are illustrated in Figure 7 and Appendix K.

Review of Information

Plaza A from Crossing A will result in the loss of 32.58 ha of terrestrial communities and 0.22 ha of aquatic communities. This includes 2.98 ha of provincially rare vegetation communities and 232 specimens/colonies of species at risk. A total of 7.38 ha of designated natural areas is located on adjacent lands within 120 m of the facility footprint. Five ecological landscapes will be impacted by this alternative.

Plaza A from Crossing B will result in the loss of 30.77 ha of terrestrial communities and 0.31 ha of aquatic communities. This includes 2.70 ha of provincially rare vegetation communities and 223 specimens/colonies of species at risk. A total of 2.38 ha of designated natural areas is located on adjacent lands. Five ecological landscapes will be impacted by this alternative.

Plaza A from Crossing C through C-E-G near Brighton Beach will result in the loss of 30.87 ha of terrestrial communities and 0.31 ha of aquatic communities. This includes 2.69 ha of

provincially rare vegetation communities and 231 specimens/colonies of species at risk. A total of 1.48 ha of designated natural areas is located on adjacent lands. Six ecological landscapes will be impacted by this alternative.

Plaza A from Crossing C through C-G along the Ojibway Parkway will result in the loss 28.29 ha of terrestrial communities and 0.25 ha of aquatic communities. This includes 2.70 ha of provincially rare vegetation communities and 186 specimens/colonies or species at risk. A total of 1.73 ha of designated natural areas is located on adjacent lands. Four ecological landscapes will be impacted by this alternative.

Plaza B from Crossing C will result in the loss of 40.68 ha of terrestrial communities and 0.64 ha of aquatic communities. This includes 2.02 ha of provincially rare vegetation communities and 195 specimens/colonies of species at risk. A total of 14.82 ha of designated natural areas is located on adjacent lands. Ten ecological landscapes will be impacted by this alternative.

Plaza B1 from Crossing B will result in the loss of 45.07 ha of terrestrial communities and 0.59 ha of aquatic communities. This includes 1.09 ha of provincially rare vegetation communities and 185 specimens/colonies of species at risk. A total of 10.96 ha of designated natural areas is located on adjacent lands. Eight ecological landscapes will be impacted by this alternative.

Plaza C from Crossing C will result in the loss of 36.23 ha of terrestrial communities and 0.56 ha of aquatic communities. This includes 0.89 ha of provincially rare vegetation communities and 153 specimens/colonies of species at risk. A total of 7.77 ha of designated natural areas is located on adjacent lands. Ten ecological landscapes will be impacted by this alternative.

Plaza B will encroach on the Black Oak Woods ANSI/ESA. No other plazas will encroach on designated natural areas.

Conclusions

The crossings and plazas that displace the least area of provincially rare vegetation communities are preferred given the high level of importance assigned to these features by the DRIC study team. As a result, Plaza C is the most preferred plaza, followed by Plazas B and B1, followed by Plaza A.

Crossing C to Plaza C will result in the least displacement of provincially rare vegetation communities and species at risk and a relatively low to moderate level of potential disturbance to designated natural areas located on adjacent lands. This combination has a relatively higher level of displacement of ecological landscapes and aquatic communities than the other alternatives. The total weighted score for this alternative is considerably lower than the total weighted score for the next best alternative making this alternative clearly preferred to the other alternatives.

Crossing C to Plaza B and Crossing B to Plaza B1 will result in a lower level of displacement of provincially rare vegetation communities and species at risk than Plaza A and its associated crossings, with the exception of Crossing C to Plaza A through C-G, which will displace fewer species at risk. Crossing C to Plaza B and Crossing B to Plaza B1 have the greatest potential to disturb designated natural heritage features located on adjacent lands, as these plazas are located adjacent to the Black Oak Woods ANSI, ESA and CNHS. The

southeast corner of Plaza B will displace a small area of the Black Oak Woods ANSI, ESA and CNHS. No other plazas or crossings will displace any designated natural heritage areas. Plaza B and B1 are located in the Brighton Beach area. While both of these plazas are preferred to Plaza A (except Crossing C to Plaza A through C-G), they do not perform as well as Plaza C.

Plaza A and its associated crossings have the least impact on ecological landscapes, terrestrial communities, aquatic communities and designated natural areas located on adjacent lands. However, Plaza A and its associated crossings have the greatest impact on provincially rare vegetation communities and species at risk (with the exception of Crossing C to Plaza A through C-G). Given the importance assigned to these provincially rare vegetation communities and species at risk by the DRIC study team, Plaza A and its associated crossings are considered least preferred.

The exception is Plaza A from Crossing C through segment C-G which is the second most preferred alternative because it has the least displacement of ecological landscapes, the least displacement of terrestrial and aquatic communities and a relatively moderate level of displacement of species at risk. While Plaza A is least preferred from a natural heritage perspective, segment C-G is the most preferred because it avoids the natural heritage features associated with the Brighton Beach area. The connection between Crossing C and Plaza A along Ojibway Parkway (Segment C-G) verses through the Brighton Beach area (Segment C-E-G) increases the preference of this alternative from least preferred to the second most preferred, on par with the Plaza B and Plaza B1 alternatives.

Based on the results of the quatitative and qualitative evaluations, Plaza C from Crossing C stands alone as the alternative with the least relative impact to natural heritage features and was assigned an impact score of “3” (low impact). Plaza A from Crossing C (Segment C-G), Plaza B1 from Crossing B and Plaza B from Crossing C, represent the alternatives with the next least relative impact to natural heritage features and were assigned an impact score of “2” (moderate impact). The remaining Plaza A alternatives, including Plaza A from Crossing B, Plaza A from Crossing C (Segment C-E-G) and Plaza A from Crossing A represent the alternatives with the greatest relative impact to natural heritage features and were assigned an impact score of “1” (high impact).

2.5 Assessment of Impacts

The *Draft Natural Heritage Work Plan* (Border Transportation Partnership 2005) indicates that the assessment of impacts will be addressed in a generic manner at the practical alternatives stage. The rationale for this approach is that site-specific environmental effects cannot be assessed until a technically preferred alternative is selected. However, the information contained in Table 15 and described previously that was used to evaluate practical alternatives provides a good indication of the potential impacts of each practical alternative on landscape ecology, terrestrial and aquatic ecosystems/communities, species at risk and adjacent designated natural areas. Based on a review of this table, it is concluded that all crossing, plaza and access road alternatives will result in the loss of provincially rare vegetation communities and species at risk. It is not possible to avoid all of these important natural heritage features. The practical alternatives that avoid or reduce the area or number of these valued ecosystem components are considered preferred by the natural heritage discipline. Given that is is not possible to avoid all provincially rare vegetation communities

and species at risk, mitigation measures are required to reduce the adverse effects of the project on natural heritage.

2.6 Environmental Protection Measures

The *Draft Natural Heritage Work Plan* (Border Transportation Partnership 2005) indicates that the environmental protection measures to be considered at the practical alternatives stage include avoidance of natural heritage features, minimization of the loss of natural heritage features and generic mitigation measures typically incorporated into the design of linear transportation facilities. Once again, given that it is not possible to avoid all provincially rare vegetation communities and species at risk, generic mitigation strategies are required to reduce the adverse effects of the project.

It should be noted that the most important natural heritage features (i.e. the Ojibway Prairie Complex, the Detroit River Marshes, etc.) located in the preliminary analysis area were mostly avoided during the evaluation of illustrative alternatives and in establishing the ACA. Avoidance is considered the most effective environmental protection measure and it has been the primary goal of the DRIC study team throughout the route planning study.

2.6.1 Provincially Rare Vegetation Communities

In the case of provincially rare vegetation communities, in particular tallgrass prairies, the goal of the Border Transportation Partnership is to ensure no net loss of the area or function of these natural heritage features. A number of compensation strategies are available to offset this adverse effect in order of preference including: enhance existing natural remnants; enlarge existing natural remnants; and, establish new tallgrass prairies. These strategies are generic since the ultimate selection of a compensation strategy will depend on the condition and availability of suitable sites.

2.6.1.1 Enhance Existing Natural Remnants

This strategy is the most preferred compensation approach, since it benefits an existing community and may not require an intensive management effort. This approach identifies existing remnants of tallgrass prairie in the local area that are showing inherent prairie features or functions such as prairie flora, sandy soils or lack of tree cover. This strategy involves an assessment of the needs of the natural community, which may include one or many management techniques such as planting, burning, or tree cutting. There are many examples of restoring (improving quality) remnant tallgrass prairie communities including the Ojibway Prairie in Windsor, Ontario, High Park in Toronto, Ontario and the Konza Prairie in Kansas.

2.6.1.2 Enlarge Existing Natural Remnants

This strategy involves adding new area to an existing prairie remnant. This is likely to involve a more intensive restoration strategy to establish site conditions suitable for prairie plants. Plantings can be achieved through collection and hand broadcast of seed from the adjacent unit or through the natural spread of prairie seed.

2.6.1.3 Establish New Tallgrass Prairie

This strategy involves the establishment of tallgrass prairie communities on newly disturbed, existing agricultural or degraded land. This is likely to involve the most intensive restoration strategy to recreate the ecology of a natural prairie community. This type of restoration has been successfully conducted through three methods; seeding, planting seedlings, or by transferring sod from an intact prairie. Commonly, a seeding approach is undertaken which requires a long time to fully establish due to the germination cycle of seeds. Also, done equally often is the planting of plant plugs, which is more expensive but gives a quicker response. Transferring sod from an intact prairie can be quite successful due to the transfer of soil microorganisms, seed bank, and soil materials. This approach requires a careful and immediate placement once removed to ensure the viability of all biota in the sod.

All of the above strategies to establish new tallgrass prairie require an active plan including long term management. This plan needs to be site-specific to conditions such as soil types, topography, and soil moisture. Prairie has been established on a variety of existing agricultural fields or other degraded sites. However, the condition of the existing site will determine how effective the restoration will be (endpoint) and how much initial preparation is required.

In addition to site preparation, the plan needs to document planting methods, species selection, and long term management. Prairies are maintained by disturbance, historically, through wildfire. Ideally, prairies should be periodically subjected to a prescribed fire (Delaney et al. 2000, Schramm 1990). The incorporation of fire needs to be considered at the onset of the project since it may affect site selection, species selection as well as who will carry out the long term management.

This approach also has an inherent unpredictability, as restoration is an applied science which is subject to weather, introduced species, and timing. It is also important to stress that current restoration methods are unable to restore exact plant diversity in tallgrass prairie, as would be seen in a remnant tallgrass prairie (Martin et al. 2005). Van Dyke et al. suggest that to achieve high-functioning native prairie communities large areas are required as well as long term efforts including introductions of species of high conservation value. Several examples where this strategy has been applied include the Pioneer Prairie in Texas, Fermilab in Batavia, Illinois and roadside planting projects undertaken in Ontario and elsewhere.

Roadside planting projects have been undertaken throughout the United States and Ontario. The Ontario Ministry of Transportation has undertaken research on this subject and has produced a report entitled “Wildflower and Prairie Seeding Recommendations for Ontario Roadsides.” This document reviews a number of approaches, and describes the most effective strategies for roadside plantings including topics such as soil preparation, seed mixes and maintenance. Thus success can be achieved with careful initial assessment of conditions and the implementation of an appropriate plan.

2.6.2 Species at Risk

The proposed project will result in the loss of plant and animal species and their habitat that are provincially rare (S1 to S3), listed by COSEWIC and COSSARO (Endangered, Threatened or Special Concern) or regulated under the *Species at Risk Act*.

Environmental protection measures typically used to mitigate the loss of species at risk and their habitat include avoidance, integration and relocation. The DRIC study team has made every reasonable attempt to avoid provincially rare habitats and species at risk. However, in areas where avoidance cannot be achieved, attempts will be made to incorporate species at risk and their habitat into site plans to the extent feasible. Once these opportunities have been exhausted, salvage and relocation efforts will be considered. The DRIC study team will explore salvage opportunities for plants including: transplanting of live plant material; the collection and broadcasting of seeds; and, the stripping, relocation and placement of sod.

The DRIC study team conducted a preliminary investigation into the feasibility of capturing and relocating eastern foxsnake (*Elaphe gloydi*) and Butler's gartersnake (*Thamnophis butler*). The investigation included a review of scientific publications and communication with experts in the field of snake relocation. The results of the review of scientific publications proved inconclusive as no research has been conducted to determine if Butler's gartersnake or eastern foxsnake can be successfully captured and relocated.

Several biologists in Ontario and the United States, currently studying the feasibility and success rates of relocated snakes were contacted to obtain opinions on the possibility of a relocation program with Butler's gartersnake and eastern foxsnake. Despite the fact that these biologists would be considered experts in this field, they had little information to offer, due to the absence of experience or information related to the relocation of Butler's gartersnake and eastern foxsnake (Pratt, personal communication, 2007). Eastern Massasauga snakes bred in captivity at the Metro Toronto Zoo were recently introduced into the Ojibway Prairie Complex with mixed results. Several of these introduced snakes found winter hibernacula on their own, but others had to be actively encouraged to enter hibernacula (Pratt, personal communication 2007).

Based on the results of the preliminary investigation, the success rate for relocation of Butler's gartersnake and eastern foxsnake is unknown. Given the Butler's gartersnake's affinity to tallgrass prairies and its limited home range (< 300 m), relocation may present a challenge. On the other hand, eastern foxsnake may be more suitable for relocation given its compatibility with many habitat types (including human-made) and its broad home range. The capture and relocation of these two snake species as a mitigation strategy for this project offers an excellent opportunity to conduct primary scientific research.

The strategies for managing species at risk and their habitats will be developed in consultation with regulatory agencies and in compliance with the Canada *Species at risk Act* and the new *Ontario Endangered Species Act*.

2.6.3 Groundwater

Based on a review of groundwater conditions by Golder Associates (2006) it was determined that creating permanent, open, and depressed roadways within the native clays using slopes or supported with retaining walls (that do not cut off groundwater pressure gradients from adjacent higher grades) will result in a permanent lowering of the groundwater level within the clay soils. Based on the limited available information, and for preliminary planning purposes, it is anticipated that the zone of influence of such groundwater lowering within the silty clay should be assumed to be a distance equal to about 5 to 10 times the depth of cut. Such groundwater lowering will induce settlement within the silty clay subsoils within this zone. It is anticipated that if low permeability in situ walls (e.g. contiguous caisson walls or concrete

diaphragm walls) are used for excavation support or for permanent below grade structures, that the influence of the excavation on near-surface groundwater would be minimal. As a result, no changes to the composition or structure of the tallgrass prairies are anticipated if cut-off walls are used. Further refinement of this zone of influence and the magnitude of potential settlement requires additional site-specific investigation and analyses.

2.6.4 Surface Water

A depressed or tunnel highway profile will require alteration of existing watercourses through diversion, enclosure, siphoning or aquaducting depending on the characteristics of the watercourse and the depth of the highway below existing grade. Any harmful alteration of these watercourses is subject to the requirements of the *Fisheries Act*. Since none of these watercourses directly support critical fish habitat, the full suite of environmental protection options, including fish habitat compensation to maintain no net loss of the productive capacity of fish habitat, are available. Environmental protection measures to be employed for each watercourse crossing will be determined in consultation with regulatory agencies and in compliance with the *Fisheries Act*.

A more detailed assessment of impacts and recommendations for environmental protection measures will be performed at the concept design alternatives stage.

2.7 Conclusions

The ACA identified during the evaluation of illustrative alternatives avoids most of the important natural heritage features associated with the designated Ojibway Prairie Complex. Data collection and analysis performed within the ACA to evaluate practical alternatives confirms the presence of remnant natural heritage features that support provincially rare species and their habitat. Some of the practical alternatives avoid more of the provincially rare species and habitats than others; none of the practical alternatives avoid all natural heritage features of provincial importance.

The practical alternatives that are most preferred by the natural heritage discipline include Crossing C to Plaza C and all access roads that lead to Plazas B or C. With the exception of Crossing C to Plaza A along the Ojibway Parkway (Segment C-G), Plaza A is the least preferred plaza alternative and destination for access roads. At-grade and depressed highway profiles are considered slightly more preferred than a tunnel due to less potential risk to natural heritage features, but there is no significant difference among these highway profile alternatives because the area that will be displaced by the highway footprint is similar.

Environmental protection measures that go beyond avoidance will be required to minimize, mitigate and compensate for adverse environmental effects on natural heritage features. By using the full suite of environmental protection measures including habitat restoration, none of the practical alternatives will result in significant adverse environmental effects on natural heritage features. Site-specific environmental impacts and environmental protection measures will be analyzed for the technically preferred alternative during the concept alternatives stage.

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