10 ENVIRONMENTAL EFFECTS AND MITIGATION OF THE TECHNICALLY AND ENVIRONMENTALLY PREFERRED ALTERNATIVE (TEPA)

This section identifies the impacts on environmental features resulting from the Technically and Environmentally Preferred Alternative (TEPA) as described in **Chapter 9** and discusses the proposed measures for mitigation. The TEPA refers to The Windsor-Essex Parkway, Plaza B1 and Crossing X-10B. The reader is referred to **Chapter 8** for a summary of the evaluation of the practical crossing, plaza and access road alternatives for further details on the selection of the TEPA. Technical reports addressing the mitigation for the TEPA have been prepared as part of this study to address the environmental and engineering factors outlined throughout this chapter. This chapter provides a summary of the key findings from these reports.

For more detailed information, the reader is referred to the following supporting documents:

- *Technically and Environmentally Preferred Alternative – Air Quality Impact Assessment Report (pending)*
- *Technically and Environmentally Preferred Alternative – Human Health Risk Assessment Report (pending)*
- *Technically and Environmentally Preferred Alternative – Social Impact Assessment Report (pending)*
- *Technically and Environmentally Preferred Alternative – Noise & Vibration Impact Assessment Report (pending)*
- *Technically and Environmentally Preferred Alternative – Natural Heritage Assessment Report (pending)*
- *Technically and Environmentally Preferred Alternative – Cultural Heritage Resource Assessment Report (pending)*
- *Technically and Environmentally Preferred Alternative – Stage 2 Archaeological Assessment Report (pending)*
- *Draft Practical Alternatives Evaluation Working Paper – Economic Impact (May 2008)(available)*
- *Draft Practical Alternatives Evaluation Working Paper – Waste and Waste Management (May 2008) (available)*
- *Draft Practical Alternatives Evaluation Assessment Report – Existing and Planned Land Use (May 2008) (available)*

It should be noted that these factors, with the exception of the Human Health Risk Assessment have been used at every evaluative stage leading to the development of the TEPA. The Human Health Risk Assessment was conducted for the TEPA.

To facilitate the reader's understanding of this section, some background information drawn from the technical reports is included for each factor.

The methodologies for the various investigations are consistent in the work plans which were a part of the approved *OEA Terms of Reference (ToR)*, May 2, 2004.

For each factor, including the Human Health Risk Assessment, the analysis of the environmental effects has been made of the future "No-Build" case and for the TEPA.

10.1 Air Quality

Assessing Air Quality Impacts

The Ontario Ministry of the Environment (MOE) as a component of the MOE standard setting process has developed a list of the Ambient Air Quality Criteria (AAQCs). The AAQCs are effect-based levels in air, with variable averaging time (e.g., 24-hour, 1 hour and 10 minutes) appropriate for the effect that it is intended to protect against. The AAQCs, which represent desirable levels in ambient air, are used for assessing general air quality and the potential for causing an adverse effect. The Standards Development Branch of the MOE publishes a set of guideline limits in *Ontario's Ambient Air Quality Criteria* (MOE, 2008). These criteria are not enforceable and with certain contaminants such as acrolein, the AAQCs are set below ambient background concentrations.

Federal Air Quality Objectives encompass three levels of air quality objectives: maximum desirable level (MDL), maximum acceptable level (MAL) and maximum tolerable level (MTL). The MAL is intended to provide adequate protection against effects on soil, water, vegetation, materials, visibility, personal comfort and well-being. The MAL is considered to be a realistic objective. Air quality effects of the TEPA and future No-Build have been assessed using a combination of existing air monitoring data and air dispersion modelling. Air dispersion modelling must be used to assess the impacts of future changes, such as implementation of the alternatives, and changes in fuels, vehicle technologies and traffic volumes. The predictive air quality model (CAL3QHCR) used is specifically designed to assess impacts from roads and highways. The model incorporates the differences between moving vehicles, and queued vehicles that are idling, as well as differences in road elevations and other parameters.

Potential air quality effects from roadways decrease with increasing distance from the roadway. Therefore, the greatest effects will occur immediately adjacent to the roadway.

The existing air quality is greatly influenced by local and long range (cross-border) contaminants generated in upwind urban and industrial areas. The predominant wind directions in Windsor are from the west to southwest, which bring contaminants from the heavily industrialized areas of Detroit, nearby communities and beyond. Air quality impacts in the area are dominated by the substances that combine to produce smog or acid rain. A report by the Ministry of the Environment on *Transboundary Air Pollution in Ontario (2005)* indicates that for Windsor, eliminating all Ontario sources of emissions of $PM_{2.5}$ and NO_2 will have no impact on air quality during smog days due to the significant contribution from transboundary sources. **Table 10.1** summarizes the applicable available criteria from the MOE and Environment Canada.

TABLE 10.1 - AIR QUALITY CRITERIA FOR ASSESSED CONTAMINANTS

Contaminant	Averaging Time	MOE AAQC µg/m³ (ppb)	Federal AQ Objective or Maximum Acceptable Level (MAL) (µg/m³)
NO_x (as NO_2)	1 h	400 (200)	400
	24 h	200 (100)	200
	Annual	-	100[1]
$PM_{2.5}$	24 h	30	30 *
PM_{10}	24 h	50 (interim)	-
PM	24 h	120	120
	Annual	60	70
Acrolein	24 h	0.08	-
	½ hr	0.24	-
SO_2	1 hr	690	900
	24 hr	275	310
	Annual	55	62
Carbon Monoxide (CO)	1 hr	36,200	36,200
	8 hr	15,700	15,700
Carbon Dioxide (CO_2)	-	-	-
VOC	-	-	-
1,3 Butadiene	-	-	-
Benzene	-	-	-
Acetaldehyde	½ hr	500	-
	24 hr	500	-
PAHs[2]	24 hr-	22.5	-
Formaldehyde	24 hr	65	-

Notes NO_x – nitrogen oxides – sum of nitrogen dioxide (NO_2) and nitric oxide (NO)
$PM_{2.5}$ includes all particulate matter with an aerodynamic diameter less than 2.5 µm – considered respirable
[1] MAL is for NO_2
- Indicates no criterion available
comes into force in 2010
2 – surrogate of naphthalene used

ASSESSMENT METHODOLOGY

The analysis was completed using the following approach:

- Compile data on contaminants listed in the *Air Quality Work Plan* (refer to List of Supporting Documents), which was approved by regulatory agencies;
- Determine background concentrations;
- Input traffic data for future conditions with TEPA (including access road, plaza and crossing);
- Calculate pollutant emissions from the highway corridor for existing and future conditions;
- Use air dispersion model (CAL3QHCR) with meteorological data from Windsor Airport to determine future air pollutant concentrations in the vicinity of the corridor (essentially all of west Windsor) and at sensitive receptor locations (such as schools and residences); and,
- Compare pollution concentrations corresponding to future "Build" and future "No-Build" conditions.

Data on the existing air pollutant concentrations in the Windsor area was obtained from the two MOE air monitoring stations located on College Avenue and on University Avenue.

Traffic projections were developed for the EA study for all main roads in the corridor for each year considered in the assessment, which were 2015, 2025 and 2035. This included the future "No-Build" case (i.e. expected traffic volumes if no new access road/crossing is built), as well as for the TEPA.

Emission rates from these vehicles were input into the CalTrans CAL3QHCR roadway dispersion model, which is accepted for use in Ontario by the MOE and is supported by Environment Canada. Improvements in fuels and technologies legislated to occur over the next several years and historical fleet turnover rates were considered in these emission rates. The model incorporated meteorological data from Windsor Airport, to determine predicted air pollutant concentrations at over 2400 receptor locations in West Windsor.

PREDICTED AIR QUALITY IMPACTS

In general, the air quality assessment shows that potential impacts from The Windsor-Essex Parkway would be small and limited to areas in close proximity to the road. Overall the implementation of The Windsor-Essex Parkway will slightly mitigate future transportation related air quality impacts within the study area over the future "No-Build" alternative because it provides a wide right-of-way and improvements in traffic flow, by eliminating stop-and-go conditions caused by the traffic signals that exist in the Highway 3 / Huron Church Road corridor today.

The study found that in comparing future conditions to existing conditions for both future "No-Build" and with The Windsor-Essex Parkway, air quality will improve for gaseous pollutants due to newer engine technologies and fuels despite the predicted increase in traffic due to population growth, but could slightly deteriorate for particulate based compounds due to road dust arising from increased traffic flows.

The results of the study show, that the existing air quality in the study area is typical of an urban setting, which is characterized by elevated pollutant concentrations in relation to rural areas, with periodic compromised air quality due to particulate based contaminants, which typically occurs during smog events.

Overall, based on the results of the study, the air dispersion modeling demonstrated that the potential air quality impacts arising from either future "No-Build" or TEPA would be very small and limited to nearby the roads.

In general terms, The Windsor-Essex Parkway will mitigate future transportation related air quality impacts within the study area for gaseous contaminants but may result in a higher concentrations of PM within a limited distance from The Windsor-Essex Parkway. However, by implementing The Windsor-Essex Parkway, air quality improvements will be realized outside the Area of Continued Analysis, as traffic will be returned to the corridor, instead of infiltrating throughout local streets.

Results for air quality in the vicinity of the proposed plaza will decrease within approximately 250 m from the Plaza property boundary by 2035. The highest impacts will likely occur within 50 to 100 m of the boundary. Given the location of the plaza in an industrial area, impacts to sensitive areas are avoided.

The results for the proposed crossing indicate that the maximum predicted concentrations of $PM_{2.5}$ and NOx are generally similar to those of The Windsor-Essex Parkway. Given the location of the crossing impacts to air quality for sensitive areas are not predicted.

The Ministry of the Environment (MOE) publishes air quality conditions in different locations, including Windsor, in Ontario through their Air Quality Index (AQI). This information is available to the public on an hourly basis. The AQI is an indicator of air quality based on the highest pro-rated hourly pollutant measurements of six common air contaminants, of which NO_2 and $PM_{2.5}$ are considered. The range of concentration of the contaminants determines the Air Quality Index. When $PM_{2.5}$ is the driver for air quality, a change of about 6 $\mu g/m^3$ is required to move the Index from one rating to another. For NO_2 the concentration differences required to move the Index from one rating to another is about 100 $\mu g/m^3$.

Air quality impacts generally follow expected trends based on the changes in vehicle emission factors and increases in traffic volumes over time. In summary, results of the modelling indicate that:

- the concentrations of the contaminants decrease as the distance from the roadway increases;
- with the exception of 1hr concentrations of $PM_{2.5}$ and NOx under maximum conditions in the vicinity of the proposed plaza, there are no differences in concentrations relating to The Windsor-Essex Parkway that would cause the AQI to be degraded;
- gaseous contaminants generally reduce over time, though the reduction is partially off-set by the increase in traffic; and
- the PM concentrations increase with time, as traffic volumes are predicted to increase from 2015 through 2035.

While not specifically included in the analysis, traffic conditions along Huron Church Road north of the E.C. Row towards the Ambassador Bridge are expected to decrease by approximately 20% with The Windsor-Essex Parkway. Congestion and traffic queuing should also decrease accordingly, thereby resulting in further air quality improvements.

Mitigation Measures

The construction of the TEPA has the potential to affect the air quality in the vicinity of the site during the construction phase. As with any construction site, these emissions will be of relatively short duration and are unlikely to have any long-lasting effect on the surrounding area. Dust impacts should be mitigated through the use of proper controls, such as:

- periodic watering of unpaved (unvegetated) areas;
- periodic watering of stockpiles;
- limiting speed of vehicular travel;
- use of water sprays during the loading, unloading of materials;
- sweeping and/or water flushing of the entrances to the construction zones; and,
- use of calcium chloride.

Road sweeping practices in accordance with maintenance standards will be employed to reduce silt loading on The Windsor-Essex Parkway.

These types of controls aid in minimizing impacts to the environment during the construction phase.

10.1.1 Human Health Risk Assessment

The primary objective of the Human Health Risk Assessment (HHRA) was to help determine the potential for an overall adverse effect on human health for residents in the immediate area of the TEPA.

Human Health Risk Assessments are used to determine if a particular chemical poses a significant risk to human health. If it were possible to prevent humans from being exposed to chemicals then there would be no need to conduct a risk assessment. Since it is impossible to prevent such exposure, and since exposure to many naturally occurring substances also pose health risks, risk assessments become an important tool in evaluating these risks.

Risk assessment helps scientists and regulators identify serious health hazards and determine ways to reduce exposure so that there is no significant health risk to the public. The term “human health risk assessment” is often misinterpreted because people think that a risk assessment will provide information as to whether an exposure to a chemical causes a current health problem or symptom that they are experiencing. Risk assessments do not provide this information; studies that look for these types of linkages are generally epidemiological studies. These studies generally include a survey of health problems in a community and provide a comparison of these health problems to other cities, communities or populations as a whole.

While both of these types of studies are important, health risk assessments and epidemiological studies have different objectives. Most epidemiological studies examine whether past chemical exposures may be responsible for documented health problems in a specific group of people whereas Human Health Risk Assessments evaluate whether current or future chemical exposures will pose health risks to a broad population such as a city or a community. The scientific methods used in a Human Health Risk Assessment cannot be used to link individual illnesses to past exposures to chemicals; additionally, health risk assessments and epidemiological studies cannot prove that a specific chemical caused an individual’s illness.

The methods followed in this risk assessment are consistent with procedures outlined by regulatory agencies such as Environment Canada, Health Canada, the Canadian Council of Ministers of the Environment (CCME) and the United States Environmental Protection Agency (U.S. EPA) and the Ontario Ministry of the Environment. Regulatory bodies use risk assessments to determine drinking water guidelines, site clean-up criteria, and the safe use of pesticides, to name a few. Human Health Risk Assessments use both sound science and professional judgment and are a constantly developing process.

Health Canada has carried out a preliminary epidemiological study in the Windsor area related to mortality and cancer incidence for the period 1979-1999. The results suggest a potential risk for diseases associated with long-term air pollution exposure such as bronchitis, emphysema, lung cancer and lung cancer incidence and mortality from circulatory diseases. These diseases were attributed to

transborder air pollution but are preliminary in nature and further studies are underway to assess chronic cardiorespiratory outcomes in relation to air and traffic pollution.

Human Health Risk Assessment Process

Three horizon years (2015, 2025 and 2035) were evaluated in the risk assessment.

The methods followed in this risk assessment comply with procedures outlined by regulatory agencies such as Ontario Ministry of the Environment, Environment Canada, Health Canada, the Canadian Council of Ministers of the Environment (CCME) and the United States Environmental Protection Agency (U.S. EPA).

The chemicals of concern identified in the Air Quality Impact Assessment (refer to **Section 10.1**) were gaseous air pollutants (nitrogen oxides (NO_2), and sulphur dioxide (SO_2)), fine particulate matter ($PM_{2.5}$), and volatile organic compounds (VOC) such as acrolein, acetaldehyde, benzene, formaldehyde and 1,3-butadiene. The Human Health Risk Assessment used four different steps as provided in the various regulatory frameworks. They are:

- the problem formulation stage, in which the various chemicals of concern, receptors, exposure pathways, and scenarios are identified;
- the exposure assessment, where predicted exposures are calculated for the various receptors and chemicals of concern;
- the hazard assessment, in which exposure limits for the chemicals of concern are determined; and,
- the risk characterization stage, where the exposure and hazard assessment steps are integrated.

Since the TEPA for the Detroit River International Crossing is currently in the planning stage, it is not possible to directly measure emissions associated with the proposed roadway, their potential effect on the ground level air concentrations or possible health outcomes in the community. Therefore, various mathematical models for the prediction of emission rates were used. These are summarized in the document entitled *Technically And Environmentally Preferred Alternative - Air Quality Impact Assessment* (refer to List of Supporting Documents) to determine the exposure to various human receptors considered to be representative of the community. The risk assessment included exposure through inhalation and ingestion of chemicals associated with vehicle emissions through direct deposition to vegetation, as well as deposition to soils and uptake by vegetation.

Assessment Methodology

The Human Health Risk Assessment involved a comparative evaluation between the TEPA for the Detroit River International Crossing and the existing conditions or future "No-Build" scenario in the local area as outlined in the Air Quality Impact Assessment (**Section 10.1**).

The possibility of short-term (1 hour, 8 hour, 24 hour) and long-term (annual) adverse human health outcomes were assessed based on exposures at the maximum concentration that would occur at different areas along the roadway. The use of the maximum predicted pollutant concentrations in each area covered the range of air concentrations that potentially could occur from activities on the roadway. Conservative assumptions of exposure were used in the assessment to ensure that risks were not underestimated and this most likely resulted in an over-estimate of exposure. One example of a cautious assumption is that it was assumed that residents were exposed to vehicle emissions 24 hours a day, 7 days a week over their entire lifetime.

The Human Health Risk Assessment results were expressed as deterministic hazard quotients and cancer risk levels for long-term exposures, as well as hazard quotient values for both short-term and long-term exposures to gaseous air pollutants. In general, regulatory agencies such as Health Canada, the Ontario Ministry of the Environment and the U.S. EPA concur that a hazard quotient value below one (1) (for assessing gaseous air pollutants since they include background), a hazard quotient of 0.2 (for pathways assessment examining direct and indirect exposure from air pathways) and an incremental life-time cancer risk level of one in a million (1×10^{-6}) are not considered significant and are legislated by the Ontario Ministry of the Environment. The use of an incremental risk limit of 1×10^{-6} as set out by the Ontario Ministry of the Environment is more stringent than the 1×10^{-5} incremental risk limit that is acceptable to Health Canada and the U.S. EPA.

Predicted Human Health Risks

The short-term and long-term health risk associated with exposure to the gaseous air pollutants (SO_2 and NO_2) was assessed based on using a hazard quotient value of 1 since background exposures were taken into account. The results showed that:

- The emissions of sulphur dioxide (SO_2) arising from vehicles traveling along the roadway for the future "No-Build" and TEPA scenarios were similar to background. Therefore, short-term risks arising from exposure to SO_2 were no different to background and the TEPA does not result in any increased risk in comparison to the future "No-Build" scenario. Given that the annual concentrations for SO_2 for the TEPA are no different than future "No-Build" and background the same conclusion (as short term) would hold for long-term exposure to SO_2.
- The short-term and long-term risks associated with NO_2 were similar to background. In general, the short term and long term risks associated with exposure to NO_2 for the TEPA are lower than the future "No-Build" scenario, indicating that there is less risk to residents in communities surrounding The Windsor-Essex Parkway for the TEPA scenario.

There are no health based thresholds for Total Particulate Matter; the World Health Organization has concluded that fine particulate matter ($PM_{2.5}$) is more hazardous to health than coarser particles. Fine particulate matter ($PM_{2.5}$) background concentrations in the Windsor area are relatively high and are above health based toxicity reference values. The predicted concentrations for background exposure to $PM_{2.5}$ accounts for a significant portion of the hazard quotient for both the future "No-Build" and TEPA scenarios. In general, the TEPA scenario results in lower hazard quotients than the future "No-Build" scenario. Thus, the results of the risk assessment associated with $PM_{2.5}$ demonstrate that in general, future risks to residents in communities adjacent to the TEPA will be lower than the future "No-Build" scenario.

The incremental cancer risk values for long-term exposure to carcinogenic VOCs were above the regulatory risk level of one-in-a-million (1×10^{-6}) as was background exposure. However, the incremental risks for the TEPA were no different than the risks associated with background. Thus, the TEPA does not result in increased incremental cancer risks over background.

Hazard quotients for non-carcinogenic VOCs (predicted exposure dose ÷ chronic toxicity reference value) for background, future "No-Build" and the TEPA scenarios were below 0.2 for benzene and 1,3-butadiene. Hazard quotients for acrolein, acetaldehyde and formaldehyde were all above 0.2 for background for the future "No-Build" and the TEPA scenarios. However, the hazard quotients for the TEPA were no different than the risks associated with background. Thus, the TEPA does not result in increased incremental adverse health risks over background.

Conclusions

Based on the risk assessment, the following key conclusion can be drawn:

- Predicted concentrations of gaseous air pollutants, fine particulate matter, and Volatile Organic Compounds for the future "No-Build" and TEPA scenarios are not much different from each other and background. Thus, the TEPA does not result in an increased health risk over the future "No-Build" or background scenarios.

An evaluation of the uncertainties in various measurements and methods used in the risk assessment indicated that the risks have been over-estimated as a result of the assumptions made about exposure which were generally conservative (i.e. assumptions were made to overestimate exposures). The results of this uncertainty analysis support the overall conclusion of the assessment that the TEPA does not result in an increased health risk over the future "No-Build" or background scenarios.

10.2 Socio-Economic Environment

10.2.1 Noise and Vibration

The Ontario Ministries of Transportation (MTO) and Environment (MOE) have developed a series of policies and guidelines for assessing noise impacts from transportation projects which must be applied to all MTO projects in the province. In general terms, the noise impact is determined by comparing the predicted noise levels after implementation of the TEPA with the predicted future "No-Build" noise levels experienced by sensitive receptors. Typically, where the predicted TEPA noise exceeds the future "No-Build" noise levels by 5 or more decibels (dB), mitigation measures to reduce the predicted levels to within 5 dB of the future "No-Build" levels, are to be considered.

Vibration impact is usually evaluated in terms both human response to building vibration and potential for structural damage to buildings. It is generally accepted that 0.14 mm/sec is the threshold of vibration perception for the average person. As the vibration level increases from this threshold, the average person will become increasingly uncomfortable. At 50 mm/sec, vibrations are likely to cause structural damage to buildings. Sources of vibration include traffic and construction activities.

Assessment Methodology

The methodology for estimating noise levels consisted of the following key steps for evaluation of the TEPA:

- Traffic data were established for the base year (2006), as well as for future years (2015, 2025 and 2035), representing baseline conditions and conditions for the TEPA. Also, certain key information was determined, including Annual Average Daily Traffic (AADT), percentage of automobiles, percentage of heavy and medium trucks, speed limit, road elevation, local topography, surrounding ground conditions, etc.
- Sensitive noise receptors along the TEPA route were identified. The receptors selected for assessment were those that were anticipated to be those likely to have the greatest impact (i.e. subject to frontline exposure) by the TEPA. Multiple receptors were selected to capture the anticipated variations in exposure to noise from traffic based on the alignment of existing roads, and variations in traffic volumes. On this basis, a total of 41 receptors were selected along The Windsor-Essex Parkway.
- Baseline (future "No-Build") and TEPA noise levels were estimated at each of the receptors, using the MOE's STAMSON traffic noise model. This was performed for 2015, 2025, and 2035. The key inputs to the STAMSON noise model are: traffic volume, percentage of automobiles, percentage of heavy and medium trucks, posted speed limit, road gradient, road surface type, local topography, surrounding ground surface cover, noise source height, receptor height and source to receptor distance.
- The impact of the plaza/crossing was assessed based on two groups of receptors; a total of 21 and 13 receptors were identified in Sandwich Towne and areas between Ojibway Parkway to Malden Road, respectively.
- The CADNA-A noise model was used to estimate receptor noise levels for the plaza and crossing. This model can be used to predict noise levels from both stationary and mobile noise sources. The modelling approach considered vehicle queuing, idling and acceleration. The key inputs to this model included maximum hourly vehicular traffic (cars and trucks), plaza layout, vehicle sound levels, and locations of vehicles at plaza sites.

The methodology used for estimating vibration impacts consisted of the following key steps:

- Identify areas within the proximity to The Windsor-Essex Parkway that were potentially vulnerable to ground-bourne vibrations.
- Receptors within the potentially vulnerable areas were identified for vibration monitoring.
- Ground vibration levels were measured at two locations (side by side) at each of eight receptors. The traffic at each location was monitored over a period of 30 minutes. The monitoring was conducted over two different days to identify any differences in the vibration patterns. (Note: If traffic is busy, truck speed reduces considerably, thereby reducing the vibration levels).

Predicted Noise and Vibration Impacts

The following points summarize the noise and vibration impacts predicted at receptor locations near the TEPA:

- Without mitigation, noise exceedances of >5 dB were observed at many of the receptors along The Windsor-Essex Parkway when compared to the future "No-Build" sound levels. In several cases, an exceedance of >10 dB was predicted.
- The noise generated solely from the plaza location is not expected to cause a high noise impact at the receptors closest to the plaza. In most cases, the receptors are more than 50 m (164 ft) away from the plaza. However, the noise modeling results show that a high noise impact (> 10 dB above future "No-Build" receptor sound levels) is predicted for some of the receptors in closest proximity to the approach roadway to the plaza. The potentially affected receptors are located in the Ojibway Parkway to Malden Road area.
- Baseline vibration levels were measured in 2006 at eight locations, including areas close to a church and houses. The Windsor-Essex Parkway plan was reviewed to identify residences, hospitals and other potentially vulnerable receptors, within 25 m from the edge of the roadway. The results showed for the most part that, the levels measured were within the threshold of perception

limit of 0.14 mm/sec. These levels decay slowly with distance at close proximities to the road edges and should the roadway contain an expansion joint, etc., these levels may increase to the threshold level of perception. Hence, as a precautionary measure, receptors within 25 m from the edge of the roadway were counted as potential locations where vibration levels could potentially reach the threshold value of 0.14 mm/sec

- In terms of construction related noise, additional details on construction equipment quantities, work schedules and duration will be available during subsequent phases of design. However, based on past experience, it is anticipated that activities such as clearing, excavation, soil compaction, roadway construction, etc., would increase sound levels at receptor locations in close proximity to construction staging and work areas. A wide variety of mitigation measures can be employed to reduce construction noise at receptor locations. These measures are discussed in the next section.

Mitigation Results

While a number of specific mitigation measures are identified below, there will be an opportunity for refinement to these measures during the subsequent design phases of the project and through ongoing consultation with residents during the next stages of the project.

- Mitigation measures were identified to address operation effects for the TEPA as outlined below: In all cases, for receptors located in areas along The Windsor-Essex Parkway, the proposed 5 m high noise barrier where required was effective in reducing the predicted project noise to within 5 dB of the estimated baseline noise levels, except for night time at one receptor located in Spring Garden Road. The noise barrier locations are illustrated in the plan included in **Appendix B** – Conceptual Noise Mitigation Plans.
- The installation of a 5 m high acoustic barrier along the segment of the proposed approach roadway that leads to the Plaza is sufficient to mitigate noise levels for receptors in the Ojibway Parkway to Malden Road area.
- The vibration measurements, for the most part, were within the threshold of perception limit of 0.14 mm /sec for all locations measured. It is determined that vibration mitigation measures are not required for the TEPA since vibration levels are not expected to approach 50 mm/sec which is the threshold for structural damage.

The following measures will be undertaken to mitigate noise during the construction phase of the TEPA:

- Ensure that all construction equipment used is in good repair, fitted with functioning mufflers, and complies with the noise emission standards outlined in MOE guidelines.
- To the greatest extent possible, limit the most noisy construction activities to daytime hours.
- Where the sequencing of construction permits, permanent noise barriers and/or berms may be built during the early phases of construction in order to reduce construction noise levels at receptor locations.
- Maximize the distance between the construction staging areas and nearby receptors to the greatest extent possible.
- Maintain construction haul roads to prevent potholes and ruts to avoid the loud noise caused by construction vehicles travelling over uneven road surfaces.
- Develop a process for receiving, investigating and addressing construction noise complaints received from the public.

Consultation with communities will continue during the design and construction stages, to provide additional opportunities for input on noise mitigation measures.

Conclusions

Based on the noise and vibration analyses completed, the following key conclusions can be drawn:

- Without mitigation, there is a potential for high noise impacts from the TEPA.
- Mitigation measures were identified to address operation effects for the TEPA as outlined below: In all cases, for receptors located in areas along The Windsor-Essex Parkway, the proposed 5 m high noise barrier where required was effective in reducing the predicted project noise to within 5 dB of the estimated baseline noise levels, except for night time at one receptor located in Spring Garden Road. These receptors could potentially benefit from lower noise levels with The Windsor-Essex Parkway in place as compared to the future “No-Build” alternative".
- For the Plaza, a potential noise impact was identified for receptors in the Ojibway Parkway to Malden Road areas that are in the vicinity of the proposed approach roadway. However, the receptor sound levels can be reduced to within 5 dB above the future “No-Build” sound levels with a 5 m high acoustic barrier installed on the proposed approach roadway.
- Through the use of best practices, noise can be mitigated during the construction and operating phase.
- There will be opportunities for public input into specific noise mitigation measures during the next stages of design and construction.

10.2.2 Protection of Community and Neighbourhood Characteristics

Social impacts occur when a project negatively or positively affects the way of life or lifestyle enjoyed by people, their social patterns, the social structure or character of communities, and/or the local or regional services and facilities. The Social Impact Assessment (SIA) examined the effects to areas within South and West Windsor, and the Towns of LaSalle, and Tecumseh as a result of the proposed project. Within these broader communities a number of smaller neighbourhood communities were identified and also studied as part of the social impact assessment.

Assessment Methodology

The methodology and tools for predicting the social impacts of the proposed Windsor-Essex Parkway, Plaza, and Crossing included both quantitative and qualitative data. Social data collection for this study included use of the social household questionnaire data, public consultation activities and comment forms, context sensitive solution workshops, and the review of information provided by the Ministry of Transportation (MTO) property agents. In addition, input from other disciplines was also incorporated.

The household questionnaire was initially administered to residents potentially displaced by one or more of the practical alternatives in July 2006. The household questionnaire was intended to capture information about the affected population, their sense of attachment (tenure, status of ownership),

property usage, and the perceived effect of the TEPA on their use and enjoyment of their property. Due to design refinements, including the addition of the green space buffer with The Windsor-Essex Parkway, additional households, not previously approached to complete a questionnaire, were identified. In addition, those households within the TEPA that did not previously complete a questionnaire were also identified. For all of these households, residents were provided an opportunity to complete the questionnaire by telephone over a two week period in late August 2008.

A similar approach was taken in July 2006 for identifying and collecting data from social features displaced or potentially disrupted by the project. A facility-specific questionnaire was developed to collect data for potentially displaced or disrupted social features and was administered during an interview with the facility manager. The questionnaire and interviews collected information on programs, the service catchment area, number of users, and access to the facilities.

The Public Information Open Houses (PIOH) held June 18 & June 19, 2008 and the Context Sensitive Solution Workshop held on June 24 & 25, 2008 (CSS) provided the opportunity to obtain qualitative data from attendees. The PIOH and CSS were particularly helpful in gaining insight with respect to:

- Neighbourhood community character and cohesiveness;
- Satisfaction with the community as a place to live;
- Perceptions of the various components (tunnel locations, length, green space usage) of The Windsor-Essex Parkway alternative and related issues/concerns on how the proposed access road, may or may not effect residents and the community; and
- Unique features related to individual properties, and/or the neighbourhoods within the area of investigation.

Several neighbourhood meetings were also conducted at the request of residents (including two with Spring Garden/Bethlehem and Armanda Street residents, and one with Oliver Estates). These neighbourhood meetings were particularly helpful in gaining insight with respect to:

- Specific neighbourhood concerns;
- Specific neighbourhood design improvements, and
- Perceptions of how the TEPA would impact residents and the neighbourhood.

Predicted Social Impacts

The Windsor-Essex Parkway

In response to consultation input during the analysis and evaluation of practical alternatives, The Windsor-Essex Parkway was designed to address community objectives expressed by municipalities and residents. These objectives included the removal of truck traffic from local streets and an overall improvement to the quality of life for residents living adjacent to the existing transportation corridor. Other benefits provided by The Windsor-Essex Parkway include improving cross border traffic flow, separation of local and freeway traffic, the addition of over 300 acres of a green space buffer between the freeway/local service roads and adjacent residents, eleven tunnels providing greater connectivity between neighbourhood communities on both sides of the Highway 3/Huron Church Road corridor; and, providing opportunities for 20 km of recreational trails.

The Windsor-Essex Parkway will result in displacement of approximately 360 homes, located along the periphery of neighbourhoods from Howard Avenue to Ojibway Parkway; changes to cohesion and character in some neighbourhood communities; the loss of 48 businesses; and, overall disruption and nuisance effects to both residents and the travelling public during the construction period.

Community neighbourhoods from Ojibway Parkway to Malden Road, Spring Garden Road, Bethlehem Avenue, Kendleton Court, Reddock Avenue, Talbot Road (Highway 3), and Oliver Estates will experience a greater change in character and cohesion than other neighbourhood communities located along the corridor due predominately to the loss of residential properties in the neigbhourhood.

The social features that are displaced by the project serve the broader community, and include the Montessori Pre-School, the Royal Canadian Legionand the Heritage Park Alliance Church, and Trillium Court Housing. In all cases, the Ministry of Transportation will assist these parties where possible to help ensure a seamless transition for the relocation of the facilities, programs and services offered by these social features.

The displacement of businesses along the proposed access road will have limited overall economic impact. Despite the immediate loss of revenue and employment, the loss of business will be offset by gains in other businesses, or the displaced businesses will relocate to other areas.

Noise attenuation for the effects of The Windsor-Essex Parkway have been addressed by locating much of the roadway below grade and through the construction of noise barriers where necessary. Commitments are also being made to ensure that construction noise is addressed through specific measures outlined under the noise and vibration section of this report (**Section 10.2.1**).

Emergency service providers have been consulted and are aware that they will need to reassess their resources, level of service, access routes for The Windsor-Essex Parkway, and in general, their ability to access their entire area of coverage, in order to ensure provincially mandated response times are met.

During construction, MTO has committed to maintaining traffic flow in the Highway3/Huron Church Road corridor, and utilizing best practices for dust suppression and noise attenuation. Although by its very nature, the construction phase will result in disruption and nuisance effects to residents and the travelling public, the MTO commitment will minimize these impacts.

Plaza and Crossing

The plaza is located within the industrial lands along the Detroit River. Within the industrial park, there are only a handful of residents that did not move out with the creation of the industrial park. The five properties remaining will be displaced by the new plaza and crossing.

The only social feature to be displaced is the Erie Wildlife Rescue. This is a regional facility with unique requirements; however, its continued programming and services are not dependant on its existing location.

Generally, due to the presence of the industrial park, the plaza will have limited social impacts. As discussed in the Economic Impact Assessment (**Section 10.2.3**), there are impacts associated with the loss of industrial park space; however, from a community perspective, the plaza will not change community character, and will impact few residents.

Nuisance impacts to residential areas associated with the operation of the plaza and crossing are not anticipated, given the significant distance from these areas.

Mitigation Measures

The Windsor-Essex Parkway design was developed based on mitigating the predicted social impacts of the original five practical alternatives (the at-grade, below grade and tunnel alternatives) discussed in **Chapter 8**.

Other mitigation measures recommended to reduce the social impact on the broader and neighbourhood communities include those that are currently taking place and those actions that will take place during future design stages:

- Implementation of the "willing seller-willing buyer" property purchase program;
- Fair market value for properties required for the project;
- Develop and maintain regular communications with emergency services and the municipalities with regard to changes to the road network, municipal services, etc.
- Implement a communication process to manage disruption effects experienced by residents;
- For residents in Oliver Estates, assess the need for improvements to Montgomery Drive.
- For residents in the Ojibway Parkway /Spring Garden/Bethlehem area, protect and maintain and landscape as much as possible to enhance the lands between the residences and the facility.

Conclusion

Despite the potential for impacts for a project of this magnitude, community consensus dating back to the time of the *Planning Need and Feasibility (PNF) Study (2001 to 2004)* supports the need for the project. For those who are directly impacted (businesses and residences displaced), strategies such as advance purchases have been offered as detailed in the mitigation measures. As detailed in **Chapter 3**, meetings with residents directly impacted by the TEPA have occurred, resulting in adjustments to the TEPA and in some cases, additional property acquisition. For those neighbourhoods and residents that are more immediately impacted by the project, a wide range of strategies have been employed to mitigate predicted impacts.

The extensive level of consultation associated with this project has provided MTO with strong insights into community impacts and therefore the ability to design and mitigate around those impacts to the extent that is feasible. With the commitments that MTO has made with regard to minimizing impacts to the neighbourhoods during construction, that is, maintaining access and traffic flow, implementing best practices for dust suppression and noise attenuation, residents will experience effects typical to a highway construction project.

It is recognized that the project will impact the adjacent neighbourhood communities to varying degrees. Through continued consultation with those impacted, residents can be empowered to control and manage the changes that affect them and their quality of life. Similarly, while the displacement of businesses along the Highway 3/Huron Church Road corridor that serve the local neighbourhoods will potentially cause a change in social patterns and community function, the displacement of businesses along the proposed access road will have limited overall economic impact. Despite the immediate loss of revenue and employment, the loss of businesses will be offset by gains in other businesses, or the displaced businesses will relocate to other areas.

The result is that once the project has reached its operational phase, The Windsor-Essex Parkway will provide a solution to the long standing transportation problems in the area and will provide a greenspace buffer along the corridor, improved traffic flow, improved connectivity between neighbourhoods, and an overall improvement to air quality.

10.2.3 Economic Impacts

Individual business impacts were analysed in terms of two categories: Displaced businesses and disrupted businesses. Displaced businesses would cease to operate at their current location due to the physical alignment of The Windsor-Essex Parkway, plaza or crossing. These businesses will be financially compensated. A disruption to a business occurs when the proposed roadway, plaza or border crossing encroaches on a business' property, decreases the amount of passing traffic, or alters traffic access and/or visibility. When physical disruptions requiring property acquisition occur, financial compensation will be provided.

The positive and negative impacts of the alternatives on businesses beyond the ACA were also assessed. This included the impact of the alternatives on the businesses located along Huron Church Road north of the E.C. Row Expressway.

Through the property acquisition process, displaced businesses are offered fair market value for their businesses which will provide them an opportunity to relocate if they so choose. The *Economic Impact Assessment Report* (refer to List of Supporting Documents) documents that there are many opportunities for businesses to relocate.

Predicted Economic Impacts

The TEPA will result in the following direct economic impacts:

Access Road Alternatives	Number of Businesses Displaced	Number of Businesses Disrupted	Gross Revenues Displaced ($ Millions Average)	Number of Jobs Displaced	Assessed Property Value Displaced ($Millions)
Windsor-Essex Parkway	48	31	$43.60	361	$29.10
Plaza -Crossing	1	2	*Suppressed for confidentiality*	5	$0.13

Mitigation Measures

Besides financial compensation for physically disrupted businesses requiring property acquisition, several other forms of mitigation may be used to assist businesses:

- Allow signage at certain intersections/interchanges to make motorists aware of businesses/business clusters, as policies permit
- Efforts will be made during the construction phase to ensure access is maintained to operating businesses.
- The service road network will allow for adequate access to existing commercial corridors.

Conclusion

In summary, businesses displaced by the construction by the TEPA will have adequate opportunities to re-establish in suitable locations within the study area.

10.2.4 Impacts to Existing and Planned Land Use

The Windsor-Essex Parkway with its provision for buffer space adjacent to the corridor, and the opportunities for various recreational land uses such as trails and greenspace is consistent with local municipal planning policies.

Potential impacts result from land use being changed from either residential, commercial, open space, industrial, or vacant to a transportation-related use.

When examining the various Official Plan policies, The Windsor-Essex Parkway is consistent with the development strategy, healthy communities, environment, land use, infrastructure, urban design and heritage conservation policies of the *City of Windsor Official Plan* and greenway land use policies of the Town of LaSalle. The Windsor-Essex Parkway provides opportunities to connect communities and provide new open space and parklands in areas that previously did not have such land uses. In addition, The Windsor-Essex Parkway provides opportunities to create new recreation way land uses, as supported in the *Town of LaSalle Official Plan.*

The proposed plan will not have a significant impact on the development plans outlined in the Official Plans of the *City of Windsor, Town of Tecumseh, Town of LaSalle, and Essex County.* Opportunities to minimize potential property impacts associated with The Windsor-Essex Parkway will be reviewed during future design stages in consultation with municipalities.

The international plaza on the Canadian side of the bridge crossing will be situated within the former Brighton Beach residential neighbourhood, which is currently zoned for industrial land uses. Over time, most of the residences have been acquired and removed so the area is generally vacant. Heavy industrial land uses surround these sites and are considered more compatible with the activities that are associated with a plaza. Government and institutional land use impacts for the plaza consist of less than one hectare of impacts. Additionally, there are no agricultural land uses in the vicinity of the plaza crossing alternatives.

The bridge crossing is also located in a predominately industrial area, and will impact water dependant industrial land uses. Water dependant industrial land uses are often hard to relocate, due to the lack of available industrial waterfront property.

Conclusion

In summary, The Windsor-Essex Parkway provides opportunities to develop new recreation and open space land uses for both the *City of Windsor, Town of Tecumseh, Town of LaSalle and Essex County*. This is consistent with the existing official plan policies for all affected municipalities.

10.2.5 Property Acquisition Process

In order to reduce uncertainty for property owners affected by the TEPA, MTO and TC are proceeding with property acquisition on a willing buyer/willing seller basis. Compensation will be provided at fair market value, which is determined at the time of purchase by a property appraisal report forming the basis for negotiations. Other ancillary costs are negotiated on a case-by-case basis.

In some locations, it may be necessary to acquire property on a temporary basis, in order to facilitate a particular construction operation. Compensation will also be provided with respect to temporary property requirements. Upon completion of construction, temporary property will be returned to the owner. All reasonable attempts will be made to restore the land to its original condition.

If the Environmental Assessment (EA) study has been approved by the Minister of the Environment, MTO and TC will initiate purchase of all the remaining lands required for construction.

If an amicable agreement cannot be reached, MTO and TC will proceed in accordance with the provisions of the applicable Expropriations Act. MTO and TC respect owners rights under the laws of Ontario and Canada, and those rights will be fully explained to applicable residents.

Conclusion

The advance purchase process initiated by MTO and TC has been beneficial in reducing uncertainty for affected parties.

10.2.6 Waste and Waste Management

An area of investigation was established for the Waste and Waste Management report that encompasses directly impacted properties associated with the TEPA. For the purposes of this discussion, “directly impacted” properties refers to those properties in which all or a portion is situated within the proposed land requirements of the crossing, plaza or The Windsor-Essex Parkway. Neighbouring and adjacent properties that are not situated within the proposed property requirements have not been visited; however, as part of the evaluation of specific sites, adjacent properties were evaluated. This evaluation focused on the potential for the presence of pre-existing contaminants and wastes.

The MTO has established guidelines related to environmental protection, including “*Environmental Protection Requirements, for Transportation Planning and Highway Design, Construction, Operation and Maintenance, April 2004*” and the “*Environmental Standards and Practices User Guide, December 2006”* (ESP Guide). The ESP Guide is further divided into specific sections including **Section 9**, *Contaminated Property and Excess Materials Management* which covers the identification and management of contaminated property referred to as MTO’s contaminated property process.

Assessment Methodology

MTO’s contaminated property process has the following major stated goals:

- identify past and present site activities;
- evaluate the existing environmental liabilities, current environmental performance, and environmental risk of a property; and
- determine and undertake contamination management.

To achieve these goals, the process has been broken down into the following six (6) steps:

1) Contamination Overview Study (COS): is a general overview of the study area to identify properties/areas with the potential for site contamination.
2) Preliminary Site Screening (PSS) is a quick and broad review of a single property to determine the potential for contamination.

3) Phase 1 Environmental Site Assessment (ESA): is a detailed review and non-intrusive investigation to identify actual, or potential contamination on, in, or adjacent to, a property. The Phase I ESA must be prepared according to the *Canadian Standards Association Z768-01 Phase I Environmental Site Assessment.*

4) Phase 2 Environmental Site Assessment (ESA) is an intrusive site investigation to confirm and delineate the extent of suspected environmental liabilities and property contamination issues that have been identified in previous steps. The Phase II ESA is typically conducted as part of the future design phases.

5) Site Management is the management of contamination at the site and can include preparing the Remedial Work Plan / Site Management Plan, conducting remedial work and carrying out confirmatory sampling, and it may involve both facilities and property.

6) Risk Assessment is the management of the site based on the risk associated with the contamination on that specific site; this is unlike the above assessments that compare results to contaminant criteria.

The Contamination Overview Study (COS) undertaken for this study involved record reviews and study area reconnaissance. Collected data (i.e., base land use, select environmental databases, aerial photographs, available technical reports, historical topographic maps and fire insurance plans) was analyzed to identify known contaminated sites. Data was further analyzed to evaluate the relative potential and severity for contamination. Ratings of Known, High, Moderate or Low potential for contamination were applied to properties impacted by the TEPA. The assignment of ratings was based on the potential likelihood and severity of contamination based on land use and URS' estimate of relative risk. Properties that were rated Known, High or Medium were identified for further investigation.

RESULTS

In addition to the COS and PSS has been conducted on approximately 36 individual properties. To thoroughly evaluate each site, the review also included a review of historical aerial photographs, a review of available City Directories, a request for fire insurance plans and inspection reports provided by Risk Management Services (RMS, formerly CGI).

The properties visited to date have primary been commercial/light industrial properties which were initially developed in the 1950s and 1960s. Based on site visits, interviews, and historical information, the Areas of Concern (AOC) identified to date are associated with:

- former gasoline service stations,
- former landfills
- former vehicle repair facilities,
- former auto wreckers,
- facilities with on-site fuel storage,
- existing autobody shops,
- former coal and coal slag and coal ash storage facilities,
- industrial facilities with septic systems (which increase the likelihood of contaminants entering soil or groundwater), and
- potential for contaminated fill materials to have been imported to the sites during development.

No actual contamination has been noted on these properties; however the potential for contamination has been identified, based on previous usage. The types of contaminants that may have impacted soil or groundwater can cover a broad range, including, but not limited to:

- volatile organic compounds,
- waste materials, including material legally and illegally deposited,
- chlorinated solvents,
- polyaromatic hydrocarbons (PAHs)
- petroleum hydrocarbons,
- polychlorinated biphenyls (PCBs), and
- heavy metals.

Structures may contain asbestos-containing materials, lead-based paints, and PCBs in electrical equipment. To evaluate the presence of these materials, a Designated Substance Survey (DSS) may be required prior to demolition. A DSS will identify the type, location and concentration of any Designated Substances on-site so that applicable measures can be taken to ensure the safety of those working on the site and the general public during the removal.

MITIGATION

To reduce the uncertainty of whether contamination is present, Phase II ESAs are being conducted on properties identified as having contamination potential. The Phase II ESA is an intrusive investigation, involving sampling and analysis of soil, water or other components. To assess the environmental quality of the soil and groundwater, the laboratory analytical results will be compared to applicable site restoration standards provided in *Soil, Groundwater and Sediment Standards for Use Under Part XV.1* of the *Environmental Protection Act* (EPA), dated March 9, 2004 (MOE SCS). These standards are referred to in *Ontario Regulation 153* under the EPA called the *Record of Site Condition Regulation (O.Reg.153/04*). O. Reg. 153/04, which came into effect October 1, 2004, applies to properties that require the filing a Record of Site Condition (RSC) either due to a zoning bylaw change to a more sensitive use (e.g. industrial to residential) or for voluntary purposes. O.Reg.153/04 presents a methodology for the environmental assessment of properties in Ontario. Although O.Reg.153/04 does not apply to sites where an RSC is not filed, it is anticipated that the general requirements of the regulation will become the de facto guideline. It should be pointed out that the site restoration standards provided in Ontario Regulation 153/04 is currently under review and amendments are introduced which are expected to pass in the earlier part of 2009.

If contamination to soil and/or groundwater is identified, a Phase III ESA may be required. Phase III ESA generally defines the lateral and aerial extent of impacted zones and examines options for managing the contamination or cleaning up the site. Actions could include risk assessments to determine whether the contamination represents a potential threat to human health or the environment or remediation activities which could include excavation and off-site disposal, or on site treatment, in-situ or ex-situ remediation or monitoring of natural attenuation.

Conclusion

These standard practices for assessing contamination will ensure the contamination risks associated with properties acquired by the ministry are identified and mitigated.

10.3 Cultural Resources

10.3.1 Archaeological Resources

Archaeological resources are considered to be elements of the environment as defined in both the *Ontario and Canadian Environmental Assessment Acts* as well as the *Ontario Planning and Heritage Act* and in the *Provincial Policy Statement (2005)*.

Archaeological sites are generally described as the physical remains of past human activity. They can take a range of forms from small scatters of artifacts to the remains of structures and can range in size from a single, isolated object to large and complex sites containing thousands of artifacts covering a hectare or more. The relative significance of any one site is measured on the basis of its temporal and cultural associations, information and contextual values and degree of integrity or disturbance.

Archaeological Assessment in the development process is conducted in four stages:

Stage 1: Background Research and Assessment of Archaeological Potential,

Stage 2: Field Survey to identify sites that may be present within the study area,

Stage 3: Site testing to evaluate the character, age and extent of sites identified at Stage 2 and,

Stage 4: Mitigation through either avoidance or excavation and documentation.

Each stage represents a distinct element in the overall process of archaeological assessment and each builds on the results of previous stages. To date, Stage 1 and 2 archaeological assessments have been conducted for a significant portion of the proposed TEPA.

Assessing Impacts to Archaeological Resources

In Ontario, the Ministry of Culture (MCL) acts as the regulatory body for the conduct of archaeological and heritage assessments and their concurrence with all work and reporting is a regulatory requirement under the *Ontario Heritage Act*. The identification and assessment of impacts to archaeological resources, including reporting, is conducted under archaeological licence issued by the Ministry of Culture (MCL). Standards for field methodology for work by archaeological consultants are described in two technical guidelines set out by MCL. *The Archaeological Assessment Technical Guidelines* (1993) describes the requirements that must be met in order to satisfy the Ministry of Culture that all work is completed appropriately. The Draft *Standards and Guidelines for Consulting Archaeologists* (2006) set out the standards and practices for archaeologists in greater detail. However, they have not been formally adopted by MCL. As a matter of policy, the Ministry of Transportation (MTO) mandates that consultants working on MTO projects adhere to the 2006 Draft standards. The 2006 Standards have been followed throughout the EA study.

Assessment Methodology

The methodology for the archaeological assessment consisted of the following key steps for evaluation of the TEPA:

As part of the assessment of the illustrative and practical crossing, plaza and access road alternative a Stage 1 Assessment of archaeological potential was completed for the original study area and Area of Continued Analysis (refer to **Chapter 4** and **Chapter 7**, respectively). This required detailed research on known archaeological resources within these area as well as land-use history and physiographic conditions including drainage, soils, vegetation cover and land disturbance. This assessment included a detailed field review of the study area to verify the research results. From this research and field review, a determination was made regarding the potential for encountering archaeological resources within the study area.

Stage 2 Assessment was undertaken in those areas determined to have archaeological potential. Because the TEPA passes through an area that is largely urbanized, the main determinant of overall survey coverage is access to individual properties.

Stage 2 assessment was conducted using two methods – Pedestrian and test-pit survey. In the case of the former, open lands that are suitable for cultivation are ploughed and allowed to weather for at least two weeks. Following weathering, the subject lands are surveyed at five metre intervals to identify any archaeological materials visible on the ground surface.

Test Pit Survey was used in areas that have forest, scrub, or other, heavy vegetation cover or are too small (*i.e.* less than one hectare) to allow for plough access. This form of survey consisted of digging small (30cm by 30 cm) test-holes at regular intervals across each property. The survey interval for most projects is five metres. All soils from the test-pits are screened through 6mm mesh to aid in the identification of archaeological materials. In both pedestrian and test-pit surveys, all identified site locations are systematically recorded using hand-held GPS units and subsequently mapped at 1:5000 or larger scale.

Upon completion of Stage 2 Assessment, those sites considered to be of potential significance are recommended for Stage 3 Assessment. Stage 3 Assessment requires the excavation of a series of one metre by one metre test units across the site area to firmly establish its size, age, cultural affiliation, and whether there are intact subsurface features present across the site.

Upon completion of Stage 3, a determination is made as to whether the site warrants a further Stage 4 assessment, mitigation or can be considered free of further archaeological concerns. The main criteria for determining whether a site has archaeological significance are:

1. *Information potential for the site*. This is includes evaluation of the site's integrity (extent of past disturbances to the site, extent of a multi-component mix to deposits, etc.), Rarity or Representativeness (locally, regionally and provincially), Cultural-Temporal Affiliations. (age, aboriginal/European pioneer associations, etc.), Potential Data Productivity (settlement and artifact distribution data, subsistence and ecological data, cultural behaviour, artifacts yields, etc.), Site Context (temporal and spatial, inter-site relationships, demonstrated relationship to known historic events, people, etc.), Potential for the presence of human remains
2. *Perceived Value potential.* This is the value the site may have to a local community or specific groups. As noted in the 1993 Technical Guidelines, a site may have low information potential but still have a high value because of its significance to a particular cultural group or because it can be used for educational opportunities.

Predicted Impacts to Archaeological Resources

A Stage 1 and preliminary Stage 2 Archaeological Assessments of areas with archaeological potential within or in close proximity to the proposed TEPA, and for which permission to enter had been obtained was undertaken for 496 parcels, or 55% of the 902 parcels in The Windsor-Essex Parkway). Forty-three archaeological sites have been identified in this area (14 Aboriginal, 17 Historic and 6 with both an aboriginal and historic component), and recommended 29 of these for further Stage 3 assessment. Twenty-four of the 29 sites lie within the TEPA.

A Stage 2 assessment of the project area for the TEPA was conducted and survey crews investigated 146 parcels (16% of the 902 parcels in the project). There remain 260 parcels that await Stage 2 assessment, with 253 pending permissions to enter. There are currently 7 properties outstanding (incomplete or pending ploughing) for which permissions to enter have been granted. Twenty-three (14 Aboriginal and 9 Euro-Canadian) additional archaeological sites have been identified and 7 of these (4 Aboriginal and 3 Euro-Canadian) have been recommended for Stage 3 assessment.

Mitigation Measures

Mitigation of impacts to archaeological sites takes only two forms: Avoidance and Mitigative Excavation. Avoidance often includes measures to stabilize a site to protect against erosion and other passive impacts. Where a site is avoided it is often necessary to designate the site area as "off limits" for construction equipment to prevent against damage to artifacts and features.

Mitigative excavation involves the complete excavation and recording of all site areas to be disrupted or otherwise altered by an undertaking. Where only a portion of the site is subject to impacts protective measures will be required to ensure that remaining site areas are not damaged by construction and operational activities.

The mitigative requirements in advance of construction of the TEPA are not known at this phase of the project because the archaeological assessment has not been completed to the extent that would allow for determination of all impacts and required mitigation alternatives.

For the construction phase the following measures apply:

- Should deeply buried archaeological remains be found on the property during construction activities, the Manager, Heritage Operations unit, Ontario Ministry of Culture, should be notified immediately.
- In the event that human remains are encountered during construction, the proponent must immediately contact both the Ontario Ministry of Culture and Registrar or Deputy Registrar of the Cemeteries Regulation Unit of the Ontario Ministry of Government Services, Consumer Protection branch.

Conclusions

Based on the archaeological assessment completed to date, the following key conclusions can be drawn:

- Archaeological resources have been identified within the TEPA.
- The exact nature, extent and significance of these resources will not be known until the completion of the Stage 2 and 3 assessments within the TEPA.
- Upon completion of Stage 2 & 3 assessment, determination of the extent of impacts to significant archaeological resources can be made.
- Where significant archaeological resources are encountered, mitigation will be required. This will entail either avoidance or mitigative excavation.

10.3.2 Built Heritage Resources

Built Heritage Resources are described under three broad headings: Built Heritage Features (BHF), Built Heritage Resources (BHR) and Cultural Landscape Units (CLU). Generally, a BHF is understood to be "an individual part of a cultural heritage landscape such as buildings or structures of various types, cemeteries, planting and landscaping structures, etc that contribute to the heritage character of the cultural heritage landscape". In other words the Term Built Heritage Feature acts as a catch-all term that includes individual BHR and CLU features.

A BHR is defined as "one or more significant buildings, structures, monuments, installations or remains associated with architectural, cultural, social, political, economic or military history and identified as being important to a community. These resources may be identified through designation or heritage conservation easement under the Ontario Heritage Act, or listed by local, provincial or federal jurisdictions".

Cultural landscapes are "(a) defined geographical area of heritage significance that has been modified by human activities and is valued by a community. It involves a grouping(s) of individual heritage features such as structures, spaces, archaeological sites and natural elements, which together form a significant type of heritage form, distinctive from that of its constituent elements or parts. Examples may include, but are not limited to, heritage conservation districts designated under the *Ontario Heritage Act*; and villages, parks, gardens, battlefields, main streets and neighborhoods, cemeteries, trail ways and industrial complexes of cultural heritage value".

The analysis of impacts to Built Heritage features within the TEPA has included four major elements:

- The identification of BHF's within the TEPA,
- Assessment of Cultural Heritage value or interest for all identified BHF's,
- Description of Impacts; and,
- Identification of mitigation options and requirements.

Assessing Impacts to Built Heritage Features

As described in the Ministry of Transportation's *Environmental Guide for Built Heritage and Cultural Landscapes* the assessment of impacts to identified Built Heritage Features (BHF) includes preparation of detailed documentary research for a historical review, determination of heritage value for individual BHF's, followed by the specific description of impacts.

The Practical Alternative Evaluation Working Paper, Cultural Heritage (March 2008, hereafter *Working Paper 2008* refer to List of Supporting Documents) has identified 13 Built Heritage Features within the TEPA. A detailed documentary research was conducted for all features identified to be of potential interest within the revised TEPA. This research included reference to Registry Plans and abstracts, local histories, archival maps, and secondary sources. Based on these findings, a field review of these features, and the application of the Criteria listed in Regulation 9/06 of the *Ontario Heritage Act (R.S.O.*

1990), seven Built Heritage Features have been rejected as potential Cultural Heritage Resources, while six (five residences and one institutional structure) are recommended for continuing analysis and determination of impacts. These include5 residential structures and a single CLU. All six features are considered to be of Cultural Heritage Value or Interest.

Predicted Built Heritage Impacts

Impacts to Built Heritage Resources are generally classed as direct or indirect. Direct impacts include loss or significant alteration of BHF's and loss of overall contextual integrity as a result of an undertaking. Indirect impacts are generally less severe and include, but are not limited to, encroachment of non-sympathetic elements in proximity to a feature and introduction of noise, dust, vibration and other elements that may affect the long-term stability and integrity of the resource. For the EA, all of the impacts to identified BHF are direct. In all, there are six BHR's for which, removal of the structure will be required.

The following features have some potential as heritage resources according to the Criteria for determining Cultural Heritage Value or Interest for architectural, historical or community associative reasons. This is based on their application of Ontario Regulations 9/06 and 10/06. Further investigation is recommended for the following:

- BHR 1: 2746 Talbot Road, Windsor
- BHR 2: Legion Branch 594, 3920 Huron Church Line Road, La Salle
- BHR 7: 2310 Spring Garden Road, Windsor
- BHR 8: 2290 Spring Garden Road, Windsor
- BHR 9: 2284 Spring Garden Road, Windsor
- BHR 19: 2369 Spring Garden Road, Windsor

Mitigation Measures

Mitigation measures were investigated for the six Built Heritage Features. All mitigation options will require a Built Heritage Resource Documentation Report. This report includes detailed photo-documentation of the structure and a plan of salvage for character contributing architectural elements.

Only two mitigation options are considered practical for the TEPA:

1. Relocation of individual structures within the City of Windsor or,
2. Salvage of significant architectural elements followed by demolition.

Where relocation is recommended, the City of Windsor Heritage Committee should be consulted.

Conclusions

Based on the Built Heritage analyses completed for the TEPA, the following key conclusions can be drawn:

- Without mitigation, there is a potential for the loss of six heritage features with cultural heritage value or interest within the TEPA.
- A Built Heritage Documentation Report will be required for all six Built Heritage Features.
- Relocation of individual structures may be done through MTO's Heritage House Relocation programme.
- For those features not deemed sufficiently noteworthy for relocation, salvage and demolition will be recommended.

10.4 Natural Environment

The potential environmental impacts on fisheries, vegetation, wildlife and designated natural areas associated with the TEPA as well as proposed mitigation measures have been assessed as described in the following sections.

10.4.1 Natural Heritage

Natural heritage is defined in Ontario as:

"features and areas, including significant wetlands, significant coastal wetlands, fish habitat, significant woodlands, significant valley lands, 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 investigation is guided by government legislation, regulations, policies and guidelines within federal, provincial and municipal jurisdictions. The primary source documents for the natural heritage investigation included:

- Canadian Biodiversity Strategy;
- Federal Fisheries Act;
- Federal Species at Risk Act;
- Federal 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.

In addition, the Ontario Ministry of Transportation (MTO) has developed environmental practices and standards for highway design and construction. The environmental practices include environmental

design criteria, stormwater management practices/best management practices, *Ontario Provincial Standards, Standard Special Provisions* and *Non-standard Special Provisions*. The environmental standards developed by MTO involve a comprehensive, current and consistent end-results oriented approach to environmental compliance that encompasses all environmental factors for all highway activities from planning through to operation and maintenance.

Assessing Natural Heritage Impacts

MTO has developed a guidance document for assessing natural heritage impacts from transportation projects. The *Environmental Reference for Highway Design (MTO 2006)* provided a framework for natural heritage investigations including defining the study area, collecting data, determining significance, assessing environmental effects and identifying environmental protection measures. In addition, the *MTO/DFO/MNR Fisheries Protocol (2006)* establishes a procedure for addressing fisheries issues on MTO projects.

Assessment Methodology

A description of the methods for data collection and analysis and the results of the analysis for the Area of Investigation are summarized in **Chapter 7** and documented presented in the *Practical Alternatives Evaluation Working Paper – Natural Heritage* (refer to List of Supporting Documents). For the TEPA, the natural heritage investigation served to update, verify and augment existing conditions information and to conduct effects assessment, including identification of mitigation and monitoring measures as it pertains to natural heritage.

The impact assessment is specific to each biological discipline (i.e. vegetation, fisheries, wildlife, etc.) and is based on two general categories of impacts: displacement and disturbance effects. Displacement effects include loss or destruction of natural heritage areas, attributes or functions located within the TEPA. Disturbance effects include disruption or disturbance to natural heritage areas, attributes or functions located on adjacent lands within 120 m of The Windsor-Essex Parkway and plaza site. A summary of the results of the impact assessment for each biological discipline is presented in the sections below.

10.4.2 Wildlife and Wildlife Habitat

Assessment Methodology

In 2008 the spring and summer wildlife investigations concentrated around the four wildlife species at risk identified in 2006 during the practical alternatives stage: Golden-winged Warbler, Red-headed Woodpecker, Butler's garter snake (*Thamnophis butleri*) and Eastern foxsnake.

Field observations were undertaken throughout the spring and summer months in areas where the two bird species at risk had been recorded in 2006 and in potentially new habitats in the study area. A mark-recapture population study was initiated for Butler's gartersnake and radio telemetry study to track Eastern foxsnake movements was also initiated to determine locations of their hibernacula.

The Golden-winged Warbler was observed in the Brighton Beach area in 2006, while the Red-headed Woodpecker was observed in the Black Oak Woods in 2006. Intensive observations during the 2008 spring migration and breeding season failed to confirm the presence of these species in the study area.

The Butler's gartersnake population study determined that approximately 200 adult snakes inhabit the study area. Over 50 neonates were also discovered in August confirming that the population is reproducing successfully. A number of hibernacula locations for this species were found in the same area.

One Eastern foxsnake was tracked and its movements in the fall led to areas of potential hibernacula which will be further investigated next spring. Based on anecdotal evidence, numerous easterm foxsnake hibernacula exist within the proposed area of The Windsor-Essex Parkway.

Potential Environmental Effects

The construction of the TEPA will result in the displacement of wildlife and wildlife habitat and potential mortality to species at risk. Portions of provincially significant wildlife habitat may be lost. Areas located adjacent to the right-of-way may be affected by light trespass, noise and human intrusion during the construction and operations phase. The Windsor-Essex Parkway may also create barriers to wildlife movement.

Portions of the habitat of the Butler's gartersnake and Eastern foxsnake may be displaced by construction of The Windsor-Essex Parkway. It is possible that a new crossing of the Detroit River may result in migratory and resident bird mortality along the Detroit River, given that the Detroit River is host to large bird migrations and resident bird populations. Studies indicate that avian mortalities at tall structures have been found to be a function of structure size, visibility, migration times, weather conditions, and lighting.[1] The degree to which the new crossing may result in bird mortality depends on these factors, as well as the species, population size and the behaviour of the migratory and resident birds present. In general, lighting should be kept to a minimum and used only where necessary for safety purposes. Architectural lighting to highlight the aesthetics of the bridge should be developed in consideration with the effect of the migrating birds.

Mortality to wildlife species may also result during clearing and grubbing activities during construction.

Mitigation Measures

Extensive efforts have been made to avoid and minimize impacts to Butler's gartersnake and Eastern foxsnake populations including refinements to the alignment of The Windsor-Essex Parkway. Habitat restoration and enhancement will be implemented to create new and higher quality habitat for these species. A snake barrier will be installed along side portions of the construction area to prevent snakes from entering the work zone and redirect snake movements to safer areas, like the restored habitat. Permanent snake barriers will also be installed to prevent snake mortality during facility operation. Options for permanent protection of critical Butler's gartersnake habitat will be developed in later consultation phases.

The presence/absence of Eastern foxsnake hibernacula within the study area will be investigated during the subsequent design stages to determine the potential for impacts. The creation of new snake nesting areas and hibernacula will occur to compensate for any losses of habitat. Snakes will be captured and relocated prior to construction to avoid mortality.

Habitat restoration and enhancement will be used to replace habitat lost during construction. Areas of habitat to be retained will be clearly marked in the field and protected from construction activities. Wildlife salvage will be carried out prior to clearing/grubbing to reduce the risk of wildlife mortality. Restoration and enhancement of habitat located along The Windsor-Essex Parkway will be used at

[1] Manville, A.M. II. 2000. *The ABCs of Avoiding Bird Collisions at Communications Towers: The Next Steps*. Proceedings of the Avian Interactions Workshop, December 2, 1999. Charleston S.C., Electric Power Research Institute.

strategic locations to reconnect significant wildlife habitat located on both sides of The Windsor-Essex Parkway.

The site plan for the inspections plaza incorporates several mitigation measures including: landscaping and the establishment of setbacks and a stormwater detention pond. On the south side of the inspections plaza, a stormwater detention pond is proposed in association with a vegetative buffer. The stormwater detention pond also provides buffer width between the plaza and the Black Oak Woods to the south.

Where practical, lighting used at the plaza should be focused downwards and shielded where necessary to prevent light spillage into nearby natural areas such as the Black Oak Woods. Wildlife salvage should be performed on-site prior to vegetation removals. Vegetation removals will be avoided in the vicinity of species at risk and their habitat during the growing season.

Disturbance to wildlife during the operations phase will be mitigated through fencing berming, light shielding and prohibiting access to significant wildlife habitat by humans. Measures to mitigate potential bird mortality from the Detroit River Bridge will be investigated in greater detail during later design phases.

A continued study of the Butler's garter snake population and the restoration area should be carried out once the TEPA is constructed. The effects of The Windsor-Essex Parkway's proximity to the remaining Butler's garter snake population and their hibernacula should be monitored. A strategy should be developed to ensure permanent protection of the Butler's garter snake population and their habitat.

Eastern Foxsnake tracking should continue to determine their egg laying sites and hibernacula sites. Knowing these locations could assist in preventing future conflicts with this species. Education programs to inform the public of the benefits and harmlessness of snakes should be promoted.

The species, populations and behaviours of migratory and resident bird species should be further studied in the vicinity of the Detroit River crossing. Radar studies, acoustic studies and point count surveys should be carried out to provide input to bridge design and lighting.

CONCLUSIONS

The population of Butler's gartersnake and Eastern foxsnake are anticipated to remain stable following construction of this project

The bridge design will be developed during later design phases. The selection of the technically and environmentally preferred bridge type (suspension or cable-stay) should take into consideration the potential adverse effects of bridge design on migratory birds. Enhancement and restoration of habitat located along The Windsor-Essex Parkway will result in a net gain of habitat quantity and quality and will re-establish connections between designated natural areas. Tunnels in selected areas including the Oakwood Tunnel will provide the opportunity to reduce existing barriers for wildlife and enhance wildlife movement.

Two permits and approvals under the *Ontario Endangered Species Act,* 2007 and the federal *Species at Risk Act* will need to be obtained during future design stages. Detailed mitigation strategies will be developed in order to obtain the permits.

10.4.3 Vegetation and Vegetation Communities

A rare vascular plant survey in all vegetation communities located within the TEPA and the adjacent lands within 120 m of the right-of-way and plaza site was conducted to confirm the presence/absence of species at risk and to classify additional vegetation communities not inventoried in 2006. The study was designed to investigate potential effects of encroachment by the TEPA on species of conservation concern. The rare vascular plant survey examined the study area for species regulated by the federal *Species At Risk Act* and the new *Ontario Endangered Species Act, 2007*. Field investigations were performed in June, July, August, September and October 2008, to provide reliable information on rare vascular plant species presence, location, population size and management concerns.

ASSESSMENT METHODOLOGY

A floristic survey of the area in the vicinity of the TEPA of investigation was carried out to ensure that all species encountered were sufficiently evaluated to confirm or to rule out the possibility of rarity. Information on rare vascular plants, native biodiversity, and elements of special concern was collected locally from the Essex Region Conservation Authority (ERCA), provincially (Natural Heritage Information Centre (NHIC)) and federally (Committee on the Status of Endangered Wildlife in Canada (COSEWIC). Descriptions, illustrations and photographs of all potentially rare vascular plant species present were collected and compiled for field use. A series of approximately parallel transects in a search unit was used to maximize coverage of the area. Spacing of the transects depended on the density of the vegetation cover, visibility and plant morphology.

The location and abundance of each specimen/colony was recorded in the field using a differential GPS unit. Points, lines and polygons were used to delineate the location of each rare vascular plant population. Lines were used when rare vascular plants were located in a linear pattern, while polygons were used when rare vascular plant species were situated in a non-linear pattern. UTM coordinates recorded on the PDA were downloaded and mapped on an orthorectified digital air photo using GIS.

RESULTS

Vegetation Communities

A total of 5.08 ha of high significance (S1-S3 SRank), 6.52 ha of moderate significance (natural ELC) and 80.99 ha of low significance (cultural) vegetation communities are located within the TEPA. 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. These low significance vegetation communities have been further subdivided through the use of floristic quality assessment (FQI) into 39.06 ha of moderate FQI (< 35) and 41.93 ha of low FQI (< 20) vegetation communities.

A total of 24.02 ha of high significance, 16.73 ha of moderate significance and 53.46 ha of low significance vegetation communities are located on adjacent lands within 120 m of the TEPA. The low significance vegetation communities are broken down into 0.04 ha of high FQI (> 35), 21.01 of moderate FQI and 32.41 ha of low FQI vegetation communities.

Species At Risk

A total of eight species at risk regulated as threatened or special concern under the federal *Species at Risk Act* and the *Ontario Endangered Species Act*, 2007 are found within the TEPA. This total includes 418 climbing prairie rose, 929 colicroot, two planted common hoptree, one planted dwarf hackberry,

951 dense blazing star, 20 Kentucky coffee-tree, 1,285 Riddell's goldenrod and 11,676 willowleaf aster located within the right of way for The Windsor-Essex Parkway and the plaza site. No rare ELC communities or rare vascular plants are present within the right of way for the proposed crossing. The adjacent lands located within 120 m of The Windsor-Essex Parkway right of way and plaza site support one American chestnut, 511 climbing prairie rose, 14 colicroot, 2,114 dense blazing star, 21 Kentucky coffee-tree, 443 Riddell's goldenrod, 24 Shumard oak, 27,874 willowleaf aster.

Potential Environmental Effects

Construction of the TEPA may result in the loss of area, attributes or ecological function of vegetation communities. Vegetation, vegetation communities and species at risk will be displaced within the TEPA and potentially indirectly impacted in the adjacent 120 m lands by physical destruction, clearing and other construction requirements. Alterations in water quantity may affect the soil moisture regimes of adjacent vegetation communities.

Operation of the TEPA will require winter maintenance activities such as sanding, which may introduce exotic invasive plant species into the TEPA, unless the soils are adequately sterilized to remove unwanted seeds and fruits. Salting in the winter may affect salt intolerant plant species adjacent to The Windsor-Essex Parkway. Modifications to baseflow and increased imperviousness of the natural lands within the grading limits have the potential to alter water quantity changing the soil moisture regime of neighboring vegetation communities.

During construction, areas located within the plaza that are to remain in a natural state (i.e. perimeter buffers, etc.) should be clearly marked in the field using construction fencing. Construction fencing should also be used around the perimeter of the inspections plaza to mark the limit of construction areas and sensitive off-site areas including the Black Oak Woods. Edge management measures should be identified during later design stages to reduce edge effects such as windrow, increased light and wind penetration, drainage modifications and invasion by exotic or invasive plant species. Erosion and sedimentation control shall be used on-site during construction to prevent the migration of sediments and stormwater off-site. Rare, threatened and endangered plant species located within the footprint of plaza facilities should be transplanted prior to vegetation removals. Landscape plantings within the plaza site should be limited to native, non-invasive species typical of the tallgrass prairies/Carolinian forest. Restoration, enhancement and land securement opportunities should be explored for lands adjacent to the plaza site, in particular, the Black Oak Woods.

Mitigation Measures

The area for vegetation removals has been minimized to the extent possible based on the selection of the TEPA and the associated refinements, Areas that should be protected during construction will be delineated prior to construction start and no activities will be permitted in these areas.

The landscape plan will identify areas for protection, enhancement and restoration. The landscaping plan will include detailed prescriptions for vegetation management including edge management plans, soil management plans, use of native and non-invasive plant materials, prairie disturbance regimes, control of exotic and invasive species and management of species at risk. The landscaping plan will be prepared in later design stages.

Restoration and enhancement measures included in the landscaping plan will be designed to achieve no net loss of vegetation area, attributes or function as a result of this project. An array of restoration and enhancement techniques will be identified including seeding, planting (plugs and seedlings) or transplanting (sod) that includes only native species present within the TEPA. Appropriate locations for removal of invasive exotic plant species through the use possible measures such as herbicides, weed torches and prescribed burns will also be identified. The above mitigation techniques will also be employed with the objective of achieving a net benefit to all regulated species at risk populations within the TEPA.

Opportunities to forge partnerships with parties to relocate species to lands in public ownership, to otherwise restore and enhance these lands with native and endangered species and to transfer lands within The Windsor-Essex Parkway to parties that can best protect sensitive areas will be sought.

Vegetation removals will be avoided in the vicinity of species at risk and their habitat during the growing season.

Follow-Up and Monitoring

During construction, an environmental inspector should schedule site visits during critical stages (such as prior to and during clearing operations) to ensure that construction activities are not causing any harm in areas that are to be protected. Post-construction monitoring should occur to ensure successful plant establishment and reproduction. Prairie management should be an ongoing and long-term process that should involve the cooperation of appropriate parties to remove invasive exotics, burn as frequently as possible, protect high significance vegetation communities and species at risk.

Conclusions

A total of approximately 100 ha of vegetation communities will be removed to construct the TEPA. At the same time, the design of The Windsor-Essex Parkway affords the opportunity to establish approximately 100 ha of green space using restoration and enhancement approaches. As a result, the proposed project is expected to result in an overall net benefit to vegetation communities and to species at risk populations. In addition, there are opportunities to partner in enhancements to other lands in public ownership adds another opportunity for overall benefits. MTO will consider entering into agreements with organizations for the transfer and long-term management of surplus lands.

Two permits under the *Ontario Endangered Species Act, 2007* and the federal *Species At Risk Act* will need to be obtained during future design stages. Detailed mitigation strategies will be developed in order to obtain the permits.

10.4.4 Molluscs and Insects

Assessment Methodology

During the evaluation of practical alternatives stage secondary source data on molluscs and insects was reviewed and compiled into two databases (molluscs and insects). For the assessment of the TEPA impacts, the scope of the investigation was limited to provincially and federally regulated species present.

Results

Based on a review of secondary sources of information and discussions with regulatory agencies and experts on aquatic invertebrates, no provincially or federally regulated mollusc species at risk are known to occur in the study area. As a result, no impacts to mollusc species at risk are anticipated.

One provincially and federally regulated species of insect is known to occur in the study area: the Monarch (*Danaus plexippus*). The Monarch is regulated as Special Concern in Schedule 1 of the federal *Species At Risk Act* and Schedule 5 of the new OESA.

Potential Environmental Effects

Vegetation clearing and grubbing for construction has the potential to impact Monarchs, since the larval stage feeds exclusively on milkweed and the adults feed upon nectar flowers, which are found in prairies, meadows and gardens, as well as more disturbed areas. Not only will clearing activities remove host plants, they may also kill juveniles and adults. Contaminants from emissions and spills, as well as those used for highway and roadside maintenance have the potential to poison host plants and the Monarchs themselves. Mowing of vegetation, if conducted from late spring to early fall, can remove larval feeding plants (milkweeds) and adult nectar plants as well.

Mitigation Measures

Impacts to Monarchs cannot be avoided entirely given the magnitude and nature of the proposed works, and the cosmopolitan nature of this species. The area for vegetation removals has been minimized to the extent possible, and areas that should be protected during construction will be delineated prior to construction start. To avoid impacts to species at risk and their critical habitat, vegetation removals will be avoided in the vicinity of species at risk and their habitat during the growing season.

The areas for restoration and enhancement will result in the creation of new Monarch habitat as those areas will be intentionally or naturally seeded by host plants. Following construction other disturbed areas that revegetate are also likely to self-seed with host plants and create additional Monarch habitat.

The construction limits will be delineated with sensitive areas identified prior to the start of construction. Good housekeeping practices will be employed to prevent the contamination of habitat adjacent to the work area. In the event of an upset or spill, a quick and effective response to contain the spill and clean up the area will be employed. No follow-up or monitoring programs specific to Monarchs are recommended.

Conclusion

No significant adverse effects to Monarchs are anticipated as a result of this project. The mitigation measures prescribed for Monarchs will also reduce potential impacts to other insect species.

10.4.5 Fish and Fish Habitat

Assessment Methodology

In April 2008, a detailed field investigation of fish habitat and fish presence was conducted in areas of known or potential Northern Pike (*Esox lucius)* spawning and in areas that would likely be altered by the proposed project. Detailed air photos were used to record fish habitat and Northern Pike presence within Cahill, Wolfe and Collins Drains, Lennon Drain, Youngstown Drain, Basin Drain, Titcombe Drain and McKee Drain/Creek. Other, smaller drains were investigated for fish habitat presence, specifically for potential Northern Pike habitat, during the spring spawning period for this species.

Northern Pike presence, and the presence of spawning habitat, was identified in Cahill and Wolfe Drains, Lennon Drain, Titcombe Drain and McKee Creek (the portion nearest the Detroit River). Northern Pike were absent from Collins Drain, Wolfe Drain upstream of Talbot Road/Highway 3, Cahill Drain upstream of Talbot Road/Highway 3, Youngstown Drain, Basin Drain and McKee Drain, although all of these watercourses/drains were connected to downstream Northern Pike habitat. Most habitat within the study area can be categorized as having low overall sensitivity and significance with few having moderate to high sensitivity.

Potential Effects to Fish and Fish Habitat

Impacts to fish and fish habitat have the potential to occur as a result of the construction and operation of the TEPA.

Permanent loss and/or impacts to fish habitat may result from the following:

- Barriers to fish passage: the construction of submerged culverts at Cahill and Lennon Drains may cause barriers to fish passage that will be permanent in nature.
- Loss of fish habitat: the loss of habitat through enclosure or physical destruction will likely occur in 10 of the 15 watercourses/drains within the study area (excluding the Detroit River). The enclosures may result from five culvert extensions and three new crossings. Physical destruction may occur at four watercourses/drains where realignment may be required. Although occurring within the construction phase of the project, these effects will be permanent.
- Effects to Water Quality and Quantity: The TEPA will increase the overall impervious area and traffic loadings. This may potentially have a negative impact on the recipient watercourses by increasing the peak flows and the pollutant loadings. This will lead to negative watercourse impacts such as degraded fish habitat, increased floodlines upstream and increased erosion downstream.

Details of stormwater quality and quality assessment are outlined in **Section 9.3.7**.

Construction related impacts of building of the TEPA may result in the following:

- Changes to water quality and quantity: water quality may be affected through activities associated with general construction and site preparation, which could release sediments to the watercourses/drains. The refueling of construction vehicles and the oils, greases and other lubricants used in their maintenance have the potential to affect water quality. In-water work, and associated damming and unwatering have the potential to alter water quantity. These effects are temporary in nature.
- Alterations to baseflow: these effects are consistent with those listed for water quantity above. Groundwater drawdown may be required to construct below grade sections of The Windsor-Essex Parkway. This may result in temporary reductions in baseflow within watercourses. These effects are temporary in nature.
- Mortality of fish species: during construction, the direct mortality of fish is possible in areas where unwatering occurs. Fish could become entrained or impinged on pump intakes or stranded in unwatered areas. Increased sedimentation and the discharge of deleterious substances from spills also have the potential to cause mortality of fish.

Impacts as a result of operations phase for the TEPA on fish and fish habitat include the following:

- Changes to water quality and quantity: winter maintenance activities (sanding, salting) have the potential to affect water quality through release into the watercourses/drains. The increased imperviousness of the drainage area for the watercourses/drains has the potential to alter water quantity through increased run-off and decreased infiltration.

- Alterations to baseflow: these effects are consistent with those listed for water quantity above.
- Changes in water temperature: the thermal regime of the receiving watercourses/drains may be altered by storm water run-off or removal of riparian vegetation that provides shading, especially during summer, when run-off can become superheated through contact with paved surfaces resulting in thermal shock when it reaches fish habitat.

Mitigation of Potential Effects to Fish and Fish Habitat

The following mitigation measures can be employed to address the above noted impacts of the construction and operation of the TEPA.

Permanent loss and/or impacts to fish habitat may be mitigated by the following:

- Barriers to fish passage: Culverts, designed using fish-friendly methods, and channels, designed using natural channel design principles, should not form barriers to fish passage during operations. Fish passage systems should be designed and operated at Cahill and Lennon Drains to provide safe fish passage across The Windsor-Essex Parkway which bypass the submerged culverts. Fish locks are being proposed to raise and lower migrating fish across The Windsor-Essex Parkway thereby maintaining access to upstream spawning areas. This method has proven to be effective in other similar applications.
- Loss of fish habitat: The extent of fish habitat affected can be minimized through engineering structures to fit within the smallest possible footprint areas. Culvert lengths and extensions can be minimized through the use of headwalls, wingwalls and guide rails and extensions should match the inverts of the existing culverts and streambeds. New crossing structures should be constructed using fish-friendly designs including appropriate horizontal and vertical clearances, open bottoms, countersinking, etc. Realigned channels should be designed using natural design principles to enhance new habitat over existing habitat. Riparian vegetation should be maintained where possible. A fish habitat compensation plan will be prepared during later design stages to ensure no net loss of the productive capacity of fish habitat.
- Effects to Water Quality and Quantity: Stormwater runoff from the within the existing study area of The Windsor-Essex Parkway does not currently receive quality or quantity treatment. Stormwater runoff associated with The Windsor-Essex Parkway and the plaza will be treated in stormwater management wet ponds designed in accordance to the MOE document "Stormwater Management Planning and Design Manual" for Enhanced Protection Level. This will require the removal of 80% of total suspended solids (TSS), as well as providing erosion attenuation of the 25mm storm for 24 hours. In addition, the stormwater management ponds will provide quantity storage to control peak flows from The Windsor-Essex Parkway to pre-development rates. This approach will lead to overall enhancements to water quality and net benefits to fish and fish habitat for receiving watercourses along The Windsor-Essex Parkway and will prevent water quality impacts to the Detroit River associated with operation of the plaza. In addition, deck drains are not proposed on the crossing and runoff will be collected for quality treatment prior to discharging to the river.
- In addition, the removal of 30 entrance culverts and the plan to provide a natural channel configuration for a significant area of the Wolfe Drain will result in a gain of fish habitat.

Stormwater quality control that will be provided with The Windsor-Essex Parkway will lead to an overall enhancement to water quality and a net benefit to fisheries.

Construction related impacts of building of The Windsor-Essex Parkway may be mitigated by the following:

- Changes to water quality and quantity: best construction practices should be employed to reduce the potential for spills and materials/equipment from entering water. Maintenance, fuelling and storage should occur at least 30 m from watercourses/drains. Debris should be prevented from entering watercourses/drains and a spill response plan should be developed. Sediments should be prevented from reaching sensitive areas through erosion and sediment controls and exposed soils stabilized as soon as possible. A storm water management plan should be developed and implemented to treat run-off during operations.
- Alterations to baseflow: the increases in impervious surfaces and areas of soil compaction should be minimized to facilitate as much infiltration of surface water as possible. Management of storm water through the development and implementation of a storm water management plan will address potential reductions in baseflow. Methods that encourage infiltration will be investigated. Flows in watercourses will be monitored during dewatering activities and measures will be implemented in the event that baseflow is significantly affected.
- Barriers to fish passage: water flow should be maintained during construction.
- Mortality of fish species: the magnitude of effects should be minimized through the employment of timing windows for in-water work, commencing work only when all materials are present and staging of work to minimize duration. Work should be performed in the dry and isolated fish should be captured and relocated by qualified personnel.

Impacts as a result of operations phase on fish and fish habitat can be mitigated by the following:

- Changes to water quality and quantity: in general, storm water management throughout the TEPA will improve water quality and quantity (through attenuation of peak run-off flows) over what exists currently. Run-off from the crossing and plaza will be collected and conveyed to stormwater detention facilities for treatment. No deck drains will be provided on the bridge.
- Alterations to baseflow: a storm water management plan should be developed and implemented to ensure that reductions in baseflow do not occur.
- Changes to water temperature: a storm water management plan will be developed which will address the treatment of run-off and investigate methods to reduce its temperature prior to discharge into receiving watercourses/drains.
- Barriers to fish passage: culverts, designed using fish-friendly methods, and channels, designed using natural channel design principles, should not form barriers to fish passage during operations. Fish passage systems should be designed and operated at Cahill and Lennon Drains to provide safe fish passage across The Windsor-Essex Parkway which bypass the submerged culverts. Fish locks are the preferred option for a fish passage system.

Monitoring

An environmental inspector will need to be present on site during critical in-water work activities. Post-construction monitoring is typically prescribed in the federal *Fisheries Act* authorization. The terms and conditions of the federal *Fisheries Act* authorization will be met. Post-construction monitoring, if prescribed, will determine the effectiveness of environmental protection and compensation measures, identify problem areas and recommend corrective measures.

The performance of the fish locks should be monitored for at least two years after construction to ensure that they are functioning properly. The target species for the locks is Northern Pike. During spring migration (March/April), a fish passage study using mark-recapture or radio-telemetry could assist in determining the effectiveness of fish passage. Both techniques apply in the assessment of passage success. In order to assess downstream passage, similar studies should be repeated later in the spring (late April/May) to see if fish are successfully migrating back to summer habitats.

Conclusions

A Letter of Intent and Application will be prepared during later design stages to secure a federal *Fisheries Act* authorization for this project. Watercourse reaches will be restored and enhanced to maintain no net loss of the productive capacity of fish habitat as a result of this project. A fish passage system, likely fish locks, will ensure that fish will have access to upstream habitats in Cahill and Lennon Drains in perpetuity. Enhancements to realigned reaches and the removal of entrance culverts along Wolfe Drain will augment the productive capacities of these systems and will result in an overall net gain of habitat area.

10.4.6 Designated Natural Areas

Designated natural areas or environmental policy areas are identified by regulatory agencies or municipalities for conservation purposes. These areas include: Areas of Natural and Scientific Interest (ANSIs); Provincially Significant Wetlands (PSWs); Environmentally Sensitive Areas (ESAs); Candidate Natural Heritage Sites (CNHS) and areas designated for protection in municipal official plans.

Assessment Methodology

Secondary source information on designated natural areas was collected and reviewed to identify the extent and major ecological functions for which the area was designated. Field investigations were used to confirm and reconcile the boundaries of the designated natural areas where encroachment may occur. The *Ontario Wetland Evaluation System* (OMNR 2002) was also used to evaluate the significance of several wetland units located in the study area.

Numerous designated natural areas are located in the study area for the TEPA including:

- Detroit River Canadian Heritage River;
- Black Oak Woods ANSI, ESA and CNHS;
- Ojibway Park ANSI, ESA and CNHS;
- Spring Garden Forest ANSI, ESA and CNHS;
- St. Clair College Prairie ESA and CNHS;
- Oakwood Bush CNHS;
- Canada Malden Park CNHS;
- Candidate Natural Heritage Site TC2; and,
- Potential PSWs to be determined.

Additional designated natural areas identified during the practical alternatives stage are located beyond the vicinity of for the TEPA.

Potential Environmental Effects

The potential environmental effects on designated natural areas are similar to the effects on vegetation and wildlife. Construction of the TEPA may result in the loss of area or ecological function for which an area is identified. Operation of the TEPA is not anticipated to result in significant impacts.

Mitigation Measures

Mitigation measures for the loss of area or ecological function of designated natural areas are similar to the mitigation measures identified for vegetation and wildlife. In addition, MTO will discuss the dedication of protected, enhanced or restored lands with appropriate agencies to ensure permanent protection and conservation.

Follow-Up and Monitoring

Monitoring requirements are similar to those identified for vegetation and wildlife.

Conclusions

A total of 5.47ha of designated natural area will be displaced by the TEPA including the Black Oak Woods (1.68ha of a total area of 46 ha), Ojibway Park (0.51ha of a total area of 64 ha), TC2 (3.28ha of a total area of 9.0 ha) and 27.06ha of designated natural area which is located on adjacent lands. However, the major ecological functions for which these areas are identified will be maintained. Further opportunities are created, as noted below, for the dedication of new areas for protection.

As discussed, in the next section, the landscaping plan prepared for the TEPA identifies close to 100 ha of MTO-owned lands that are available for protection, enhancement and restoration. Opportunities to dedicate portions of these lands to appropriate parties for protection will be discussed at later design stages. Lands will be available to be dedicated for protection including provincially rare vegetation communities, habitat for species at risk, wildlife corridors and other ecological functions. As a result, a net gain in the extent of designated natural areas with important ecological functions will result from the TEPA.

10.4.7 Landscape Plan

The landscape plan represents an overall mitigation strategy to help ensure the TEPA is designed and constructed in a manner that is sensitive to community expectations. The plan sets out guidelines that will direct the planning and design of the open spaces, natural areas and trails associated with the TEPA. This plan also outlines a strategy for including aesthetic and design considerations in all new construction, including, but not limited to, structural elements, landscaping, barriers, way finding, and lighting.

A key focus of the TEPA is to provide additional greenspace and recreational opportunities for surrounding communities. The plan includes over 300 acres of greenspace / parklands. The types of greenspaces will be consistent with community goals and landscaping concept.

The proposed TEPA is unique from an urban design and landscape standpoint in the following ways:

- its integration into the adjacent communities through the inclusion of open spaces accessible by pedestrians such as landscaped tunnels and open spaces adjacent to the roadway and embankments;

- the opportunity that it provides for ecological restoration and enhancement, including linking existing natural heritage areas;
- its inclusion of a multi-use trail system;
- the opportunity to provide an enhanced gateway to Canada, Ontario and the City of Windsor after crossing the border from Detroit.

The Windsor-Essex Parkway will be experienced both by drivers on the highway and service roads and by members of adjacent communities. The Windsor-Essex Parkway will also serve as an international gateway and as an integral part of the urban fabric of the adjacent communities. The Windsor-Essex Parkway will require a unique approach to its urban design and the design of its open spaces, natural areas and multi-use trail system. As a major national gateway, the facility will be designed as a landmark that will be known not only for its function but its form and presence within the landscape.

Elements of the plaza must also be designed in recognition of its importance as a gateway and to buffer its presence in the vicinity of sensitive natural area.

Context-Sensitive Solutions

The Detroit River International Crossing study included an extensive consultation process that incorporated several types of events designed to inform stakeholders about the study and to generate feedback and public/stakeholder input on the evolving study. Landscape and urban design issues were introduced and discussed with stakeholders within a Context-Sensitive Solutions (CSS) approach.

"Context sensitive solutions (CSS) “is a collaborative, interdisciplinary approach that involves all stakeholders to develop a transportation facility that fits its physical setting and preserves scenic, aesthetic, historic and environmental resources, while maintaining safety and mobility. CSS is an approach that considers the total context within which a transportation improvement project will exist.

Events such as Bus Tours, Public Information Open Houses, and Workshops helped to shape a suitable approach in establishing urban, landscape and aesthetic designs of the TEPA. A variety of visualization tools including three-dimensional models, precedent images, photo-simulations and video allowed stakeholders to clearly understand the landscape, aesthetic and urban design implications of the practical alternatives and later the TEPA.

Introducing Landscape Principles and Themes

At public workshops in June 2006, landscape & urban design issues were introduced and broadly discussed in relation to the practical alternatives. Opportunities for mitigation were discussed and precedent images were presented.

Landscape Impacts and Visualizations

At public workshops in October 2006 a series of themes was introduced as possible landscape and urban design treatments for the TEPA. Each theme was applied to representative areas within each of the practical alternatives through the use of photo-simulations and sketch images.

The three themes were created in order to gauge interest in different approaches to design. The “Motor City” theme showed an approach to landscape and urban design that, while historically sensitive to the local history of automotive production, was at the same time focused on contemporary design. The “Rose City” theme showed an approach to design that was highly ornate, higher-maintenance and included design references from the late 19th and early 20th century. Public reaction was strongly in favour of “Carolinian”, the theme that reflected the least ornate, most ecologically sensitive, and maintenance conscious design.

From these workshops, it was clear that landscape, environmental and urban design for the TEPA should respect local natural heritage, focus on connections between human and natural communities and should consider maintenance of large open spaces as part of the design.

In August 2007, a PIOH was held that included high-resolution photo-simulations of the tunnels and a series of views of the facility from adjacent areas.

Moving Forward with Landscape Solutions

Following the establishment of the TEPA, consultation regarding landscape and urban design solutions turned towards the establishment of the urban design, aesthetic and landscape guidelines outlined in this report.

In July 2008, a draft landscape zone plan was discussed at public workshops. It was clear from the workshops that stakeholders remained focused on ecological principles and a green facility. Additionally, it was clear that the open spaces associated with the TEPA should be focused primarily on providing a passive rather than active recreation function and that the most ecologically sensitive solutions should be pursued.

Landscape Mitigation

The following measures have been identified during the assessment and CSS process as appropriate means of mitigating the landscape and visual impacts of the proposed TEPA.

Urban Design & Aesthetic Planning

As a gateway to Canada, the TEPA will be a major landmark and a cultural symbol. As such, the visual and aesthetic impact of the facility and its integration into the landscape will be the subject of an urban design and aesthetic plan for the highway. This plan will serve to unify all the visible aspects of the facility into a central visual and formal theme that can be deployed throughout future design by various design professions. The urban design and aesthetic plan will address the visual aspects of the form, finish and materials used in the landscape and open spaces as well as in proposed structures (e.g. bridges, abutments, retaining walls, noise attenuation and safety barriers). The urban design and aesthetic plan will establish streetscaping principles for the TEPA. The urban design and aesthetic plan will adhere to CSS principles and will be developed as part of a consultation process with local stakeholders. The aesthetic planning process will also allow for the establishment of partnerships with federal, provincial and local arts councils to provide for the creation and funding of public art associated with gateway features.

Landscape Design & Planning

Open spaces that are associated with The Windsor-Essex Parkway will be designed according to the following principles:

UNIFIED: The open spaces associated with The Windsor-Essex Parkway will be considered as a unified whole. These spaces will be planned to function in an integrated manner and to present a unified aesthetic and visual environment for drivers and community users.

GREEN: The vision for The Windsor-Essex Parkway is to create a green corridor that supports new, viable natural communities and links existing natural areas.

CONNECTION: The Windsor-Essex Parkway is an opportunity to create connections between communities. Emphasis will be placed on creating connections rather than destinations.

INTEGRATION: The Windsor-Essex Parkway passes through three municipalities, the Towns of Tecumseh and LaSalle within Essex County, and the City of Windsor. Plans for The Windsor-Essex Parkway open spaces must integrate seamlessly within the urban design, parks and recreation plans for these three municipalities as well as local and regional natural heritage/greenlands systems.

GATEWAY: The Windsor-Essex Parkway will be designed as a unique and recognizable gateway into Canada, to Windsor-Essex and to Ontario.

Future landscape planning and design phases will include a CSS-based consultation process with local stakeholders to establish appropriate site-specific landscape treatments.

Landscape Elements

The landscape plan produced during later design phases will include the following landscape elements:

Landforming & Berms

Detailed grading can mitigate landscape and visual impacts by:

- Its use in the creation of habitat and fisheries compensation areas;
- creating aesthetic interest;
- creating gateway features; and,
- visual and noise screening.

Locations for detailed grading will be identified as required to fulfill these functions. Detailed grading can contribute to accommodating the fill generated from excavation.

Vegetation

Vegetation within the proposed facility will perform a variety of mitigation functions, depending on its location and adjacencies. Vegetation functions include:

- screening;
- ecological restoration, enhancement and protection;
- wildlife habitat and linkage;
- aesthetics; and,
- erosion protection.

Species and size combinations as well as methods of planting, establishment and maintenance will vary according to the function or combinations of functions performed by proposed vegetation in specific areas. Vegetation strategies will adhere to guidelines for ecological restoration, enhancement and protection outlined in the *Technically and Environmentally Preferred Alternative – Natural Heritage Assessment Report* (refer to List of Supporting Documents).

Multi-Use Trails & Crossings

The Windsor-Essex Parkway will include approximately 20 km of multi-use trails that will run from end-to-end and will cross the highway and service roads connecting communities on either side of The Windsor-Essex Parkway.

The proposed multi-use trail system associated with The Windsor-Essex Parkway will not only allow pedestrians, cyclists and rollerbladers to travel from end-to-end without encountering a motor vehicle, it will also connect communities to each other along and across The Windsor-Essex Parkway.

The vision for the trail system is to provide:

- a trail that can be used as a neighbourhood amenity for strolling, exploration and exercise;
- a trail that can be used as a viable active (non-motorized) transportation corridor through Windsor, Tecumseh and Lasalle, connecting to important neighbourhoods in a dynamic city; and,
- a trail that connects communities to each other across The Windsor-Essex Parkway, providing safe routes to school, neighbours, parks, local businesses and community facilities.

The multi-use trail is part of an active transportation network for the city of Windsor and will be integrated into existing and planned regional and local cycling and active transportation networks.

Landscape Amenities

A limited number of rest stops and meeting areas will be incorporated into the open spaces within The Windsor-Essex Parkway. These rest stops will include landscape amenities that will function as:

- Lookouts to major views;
- Meeting places;
- Rest for pedestrians & cyclists;
- Safety & EMS access; and,
- Amenities may include signage, shelter, washrooms, benches, fountains, emergency telephones, etc.

Landscape Types

Each of the landscape types listed below employs a different combination of landscape elements such as detailed grading, vegetation, multi-use trails and landscape amenities to create site-appropriate mitigation measures. Where these landscape types are adjacent to the service road or municipal roads that cross The Windsor-Essex Parkway, streetscaping and urban design principles established in the Urban Design and Aesthetic Plan will be applied.

Gateway Landscapes function to provide an aesthetic, sculptural and memorable gateway to Windsor, Ontario and Canada. They will integrate gateway and welcome features including monumental landforms into the design.

Screening Landscapes create a visual and noise screen / barrier to buffer residences and natural features. The screening landscape is a combination of one or more screening methods (sound barrier, vegetation, berming, fence), depending on the site characteristics and safety and engineering requirements.

Stormwater Management Landscapes combine stormwater management with landscape amenity & recreation elements and are located in areas where stormwater management ponds are planned.

Ecological Landscapes are the predominant landscape type within the TEPA. Ecological landscapes will provide natural open spaces that knit the TEPA into the natural landscape of the city and provide a setting for a multi-use trail system. There are three main types: ecological protection landscapes, where existing sensitive habitat and vegetation are protected; ecological enhancement landscapes, where the ecological function and complexity of existing habitat and open spaces is improved; and ecological restoration landscapes, where new habitat will be created to extend and connect habitat within and around the TEPA.

Roadside Landscapes are located on the embankments of the freeway portion of The Windsor-Essex Parkway as well as between ramps and access roads and other areas inaccessible to pedestrians. This landscape type includes geometrically strong plantings, mowing patterns and structural elements that provide a green, aesthetic driving experience for users of the freeway portion of The Windsor-Essex Parkway.

The Multi-Use Trail travels through the various landscape types and allows pedestrians and cyclists to experience the landscape of the TEPA. Construction materials and alignments of the Multi-use trail will vary depending on site and landscape type.

CONCLUSION

CSS workshops using visualizations, photography, and three-dimensional modelling have helped establish a suitable approach to the urban, landscape and aesthetic design of the TEPA. Mitigation measures to reduce or improve visual and landscape impacts will include:

- the development of clear urban design and aesthetic guidelines to guide all aspects of future design;
- the use of landforming and vegetation strategies to improve views, aesthetics, ecological function and screening; and,
- the inclusion of a multi-use trail system and pedestrian accessible open space within the facility.

These mitigation measures will improve the visual character, aesthetic presence and landscape impact of the TEPA. The result of the landscape and visual impact mitigation will be a landscape that is unified, green, connected, integrated, and functions as a culturally significant gateway.

10.5 Summary of Environmental Effects and Mitigation

ID #	Environmental Element/Concern and Potential Impact	Concerned Agencies	Summary of Environmental Effects and Mitigation
1.0	AIR QUALITY	MOE/ EC/ MTO	In general, the air quality assessment shows that potential impacts from The Windsor-Essex Parkway would be small and limited to areas in close proximity to the road. Overall the implementation of The Windsor-Essex Parkway will slightly mitigate future transportation related air quality impacts within the study area over the future "no-build" alternative because it provides a wide right-of-way and improvements in traffic flow, by eliminating stop-and-go conditions caused by the traffic signals that exist in the Highway 3 / Huron Church Road corridor today. Results for air quality in the vicinity of the plaza will decrease within approximately 250 m from the Plaza property boundary by 2035. The highest impacts will likely occur within 50 to 100 m of the boundary. Given the location of the plaza in an industrial area, impacts to sensitive areas are avoided. The results for the crossing indicate that the maximum predicted concentrations of $PM_{2.5}$ and NOx are generally similar to those of The Windsor-Essex Parkway. Given the location of the crossing impacts to air quality for sensitive areas are not predicted. Road sweeping practices in accordance with maintenance standards will be employed to reduce silt loading on The Windsor-Essex Parkway. Various mitigation measures will be employed during construction to minimize adverse air quality effects such as dust impacts through the use of proper controls, such as: • periodic watering of unpaved (unvegetated) areas; • periodic watering of stockpiles; • limiting speed of vehicular travel; • use of water sprays during the loading, unloading of materials; • sweeping and/or water flushing of the entrances to the construction zones; and, • use of calcium chloride. These types of controls aid in minimizing impacts to the environment during the construction phase.
2.0	HUMAN HEALTH RISK ASSESSMENT	HC / EC	• The emissions of sulphur dioxide (SO_2) arising from vehicles traveling along the roadway for the future "No-Build" and TEPA scenarios were similar to background. Therefore, short-term risks arising from exposure to SO_2 were no different to background and the TEPA does not result in any increased risk in comparison to the future "No-Build" scenario. Given that the annual concentrations for SO_2 for the TEPA are no different than future "No-Build" and background the same conclusion (as short term) would hold for long-term exposure to SO_2. • The short-term and long-term risks associated with NO_2 were similar to background. In general, the short term and long term risks associated with exposure to NO_2 for the TEPA are lower than the future "No-Build" scenario, indicating that there is less risk to residents in communities surrounding The Windsor-Essex Parkway for the TEPA scenario. • In general, the TEPA scenario results in lower hazard quotients than the future "No-Build" scenario. Thus, the results of the risk assessment associated with $PM_{2.5}$ demonstrate that in general, future risks to residents in communities adjacent to the TEPA will be lower than the future "No-Build" scenario.

ID #	Environmental Element/Concern and Potential Impact	Concerned Agencies	Summary of Environmental Effects and Mitigation
3.0	NOISE & VIBRATION	MOE/ MTO	***Noise Mitigation During Construction and Operation*** The following measures will be undertaken to reduce noise during the operating phase: • Mitigation measures were identified to address operation effects for the TEPA as outlined below: In all cases, for receptors located in areas along The Windsor-Essex Parkway, the proposed 5 m high noise barrier where required was effective in reducing the predicted project noise to within 5 dB of the estimated baseline noise levels, except for night time at one receptor located in Spring Garden Road. The following measures will be undertaken to mitigate noise during the construction phase of the TEPA: • Ensure that all construction equipment used is in good repair, fitted with functioning mufflers, and complies with the noise emission standards outlined in MOE guidelines; • To the greatest extent possible, limit the most noisy construction activities to daytime hours; • Where the sequencing of construction permits, permanent noise barriers and/or berms may be built during the early phases of construction in order to reduce construction noise levels at receptor locations; • Maximize the distance between the construction staging areas and nearby receptors to the greatest extent possible; • Maintain construction haul roads to prevent potholes and ruts to avoid the loud noise caused by construction vehicles travelling over uneven road surfaces; • Develop a process for receiving, investigating and addressing construction noise complaints received from the public; and, Consultation with communities will continue during the design and construction stages, to provide additional opportunities for input on noise mitigation measures. • Based on the field monitoring results, it is expected that the vibration levels caused by the TEPA will comply with MOE criteria. For this reason, no measures are being proposed to mitigate vibration levels.
4.0	PROTECTION OF COMMUNITY AND NEIGHBOURHOOD CHARACTERISTICS	MTO/ MOE	***Protection of Community and Neighbourhood Characteristics*** Mitigation measures recommended to reduce the social impact on the broader and neighbourhood communities include: • Implementation of the “willing seller-willing buyer” property purchase program; • Fair market value for properties required for the project; • Implement a communication process to manage disruption effects experienced by residents; • Develop and maintain regular communications with emergency services and the municipalities with regard to changes to the road network, municipal services, etc.; • For residents in the Ojibway Parkway /Spring Garden/Bethlehem area, protect and maintain and landscape as much as possible to enhance the lands between the residences and the facility; and, • For residents in Oliver Estates, assess the need for improvements to Montgomery Drive.

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5.0	ECONOMIC IMPACTS	MTO	***Economic Impacts*** Through the property acquisition process, displaced businesses are offered fair market value for their businesses, which will provide them an opportunity to relocate if they so choose. The *Draft Practical Alternatives Evaluation Working Paper – Economic Impact (May 2008)* documents that there are many opportunities for businesses to relocate. Besides financial compensation for physically disrupted businesses requiring property acquisition, several other forms of mitigation may be used to assist businesses: • Allow signage at certain intersections/interchanges to make motorists aware of businesses/business clusters, as policies permit; • Efforts will be made during the construction phase to ensure access is maintained to operating businesses; and, • The service road network will allow for adequate access to existing commercial corridors.
6.0	WASTE AND WASTE MANAGEMENT	MTO/ MOE	***Waste and Waste Management*** If contamination to soil and/or groundwater is identified on properties being acquired, a Phase III ESA may be required. Phase III ESA generally defines the lateral and aerial extent of impacted zones and examines options for managing the contamination or cleaning up the site. Actions could include risk assessments to determine whether the contamination represents a potential threat to human health or the environment or remediation activities, which could include excavation and off-site disposal, or on site treatment, in-situ or ex-situ remediation or monitoring of natural attenuation. Should any contaminated materials be encountered during construction, caution will be exercised while handling and disposing of contaminated materials. Excess materials will be managed in accordance with normal MTO practices (as governed by OPSS 180, or the most current standard at the time of construction).
7.0	ARCHAEOLOGICAL RESOURCES	MCL / MTO	***Archaeological Resources*** The mitigative requirements in advance of construction of the TEPA are not known at this phase of the project because the archaeological assessment has not been completed to the extent that would allow for determination of all impacts and required mitigation alternatives. However, assessments have been completed on areas exhibiting the greatest archaeological potential, therefore further significant archaeological finds are not anticipated. The following Ministry of Culture conditions apply should archaeological resources be encountered during construction: • Should deeply buried archaeological remains be found on the property during construction activities, the Manager, Heritage Operations unit, Ontario Ministry of Culture, should be notified immediatelyl; and, • In the event that human remains are encountered during construction, the proponent should immediately contact both the Ontario Ministry of Culture and Registrar or Deputy Registrar of the Cemeteries Regulation Unit of the Ontario Ministry of Government Services, Consumer Protection branch.
8.0	BUILT HERITAGE RESOURCES	MCL / MTO	***Built Heritage Resources*** All mitigation options will require a Built Heritage Resource Documentation Report. This report includes detailed photo-documentation of the structure and a plan of salvage for character contributing architectural elements. Only two mitigation options are considered practical for the TEPA: • Relocation of individual structures within the City of Windsor; or

ID #	Environmental Element/Concern and Potential Impact	Concerned Agencies	Summary of Environmental Effects and Mitigation
			• Salvage of significant architectural elements followed by demolition. Where relocation is recommended, the City of Windsor Heritage Committee should be consulted.
9.0	WILDLIFE AND WILDLIFE HABITAT	MNR/ MTO	**Wildlife and Wildlife Habitat Mitigation Measures** Extensive efforts have been made to avoid and minimize impacts to Butler's gartersnake and Eastern foxsnake populations including refinements to the alignments of The Windsor-Essex Parkway. The following mitigation measures can be employed to address impacts to these species and others as a result of the construction and operation of The Windsor-Essex Parkway. • Habitat restoration and enhancement will be implemented to create new and higher quality habitat. • Areas of habitat to be retained will be clearly marked in the field and protected from construction activities. • Wildlife salvage will be carried out prior to clearing/grubbing to reduce the risk of wildlife mortality. • Restoration and enhancement of habitat located along The Windsor-Essex Parkway will be used at strategic locations to reconnect significant wildlife habitat located on both sides of The Windsor-Essex Parkway. • A snake barrier will be installed along side portions of the construction area to prevent snakes from entering the work zone and redirect snake movements to safer areas, like the restored habitat. • Options for permanent protection of critical Butler's gartersnake habitat will be developed in later consultation phases. • The creation of new snake nesting areas and hibernacula will occur to compensate for any losses of habitat. • Snakes will be captured and relocated prior to construction to avoid mortality. • Areas of habitat to be retained will be clearly marked in the field and protected from construction activities. • Restoration and enhancement of habitat located along The Windsor-Essex Parkway will be used at strategic locations to reconnect significant wildlife habitat located on both sides of The Windsor-Essex Parkway. • Disturbance to wildlife during the operations phase will be mitigated through berming, light shielding and prohibiting access to significant wildlife habitat by humans. • Measures to mitigate potential bird mortality from the Detroit River crossing such as bridge design and lighting will be investigated in greater detail during future design phases. • The effects of The Windsor-Essex Parkway's proximity to the remaining Butler's garter snake population and their hibernacula should be monitored. • Monitoring could be a continued process and a strategy should be developed to ensure permanent protection of the Butler's garter snake population and their habitat. • Foxsnake tracking should continue to determine their egg laying sites and hibernacula sites. Knowing these locations could assist in preventing future conflicts with this species. • To avoid impacts to species at risk and their critical habitat, vegetation removals should not occur during the growing season in specified areas. • Permits under the *Ontario Endangered Species Act, 2007* and the federal *Species At Risk Act* will need to be obtained during future design stages. Detailed mitigation strategies will be developed in order to obtain the permits.

ID #	Environmental Element/Concern and Potential Impact	Concerned Agencies	Summary of Environmental Effects and Mitigation
			The following mitigation measures can be employed to address impacts to these species and others as a result of the construction and operation of the plaza and crossing. • The site plan for the inspections plaza incorporates several mitigation measures including: berming, landscaping, the establishment of buffer areas/setbacks and a stormwater detention pond. • On the south side of the inspections plaza, a stormwater detention pond is proposed in association with a vegetative buffer. • The stormwater detention pond enhances the buffer width between the inspection plaza and the Black Oak Woods to the south. • On the west side of the inspections plaza, a 30 m setback is proposed from the Detroit River to inspection plaza. The 30 m setback will be maintained and enhanced with a vegetative buffer to screen the plaza from view, to promote wildlife passage along a naturalized shoreline and to reduce the potential for erosion to occur. • Lighting used at the inspections plaza should be focused downwards and shielded where necessary to prevent light spillage into nearby natural areas such as the Black Oak Woods. • Wildlife salvage should be performed on-site prior to vegetation removals. Vegetation removals will be avoided in the vicinity of species at risk and their habitat during the growing season.
10.0	VEGETATION AND VEGETATION COMMUNITITES	MNR / MTO / MUNICIPALITIES	**Vegetation and Vegetation Communities** A total of approximately 100 ha of vegetation communities will be removed to construct the TEPA. At the same time, the design of The Windsor-Essex Parkway affords the opportunity to establish approximately 100 ha of green space using restoration and enhancement approaches. As a result, the proposed project is expected to result in an overall net benefit to vegetation communities and to species at risk populations. In addition, there are opportunities to partner in enhancements to other lands in public ownership adds another opportunity for overall benefits. The following mitigation measures can be employed to address impacts to Vegetation and Vegetation Communities as a result of the construction and operation of the TEPA. • The area for vegetation removals has been minimized to the extent possible based on the selection of the TEPA and the associated refinements. Areas that should be protected during construction will be delineated prior to construction start and no activities will be permitted in these areas. • The landscape plan will identify areas for protection, enhancement and restoration. The landscaping plan will include detailed prescriptions for vegetation management including edge management plans, soil management plans, use of native and non-invasive plant materials, prairie disturbance regimes, control of exotic and invasive species and management of species at risk. The landscaping plan will be prepared in later design stages. • Restoration and enhancement measures included in the landscaping plan will be designed to achieve no net loss of vegetation area, attributes or function as a result of this project. An array of restoration and enhancement techniques will be identified including seeding, planting (plugs and seedlings) or transplanting (sod) that includes only native species present within the TEPA. Appropriate locations for removal of invasive exotic plant species through the use possible measures such as herbicides, weed torches and prescribed burns will also be identified. The above mitigation techniques will also be employed with the objective of achieving a net benefit to all regulated species at risk populations within the TEPA. • Opportunities to forge partnerships with parties to relocate species to lands in public ownership, to otherwise restore and enhance these lands with native plants and species at risk and to transfer lands within The Windsor-Essex Parkway to parties that can best protect sensitive areas will be sought.

ID #	Environmental Element/Concern and Potential Impact	Concerned Agencies	Summary of Environmental Effects and Mitigation
			• Vegetation removals will be avoided in the vicinity of species at risk and their habitat during the growing season. • Two permits under the *Ontario Endangered Species Act, 2007* and the federal *Species At Risk Act* will need to be obtained during future design stages. Detailed mitigation strategies will be developed in order to obtain the permits. *Monitoring Activities* • During construction, an environmental inspector will make frequent random site visits to ensure that construction activities are not causing any harm in areas that are to be protected. • Post-construction monitoring should occur to ensure successful plant establishment and reproduction. • Prairie management should be an ongoing and long-term process that should involve the cooperation of appropriate parties to remove invasive exotics, burn as frequently as possible, protect high significance vegetation communities and species at risk.
11.0	MOLLUSCS AND INSECTS	MNR / MTO	**Molluscs and Insects** The following mitigation measures can be employed to address impacts to Molluscs and Insects as a result of the construction and operation of the TEPA. • Impacts to Monarchs cannot be avoided entirely given the magnitude and nature of the proposed works, and the cosmopolitan nature of this species. The area for vegetation removals has been minimized to the extent possible, and areas that should be protected during construction will be delineated prior to construction start. No significant adverse effects to Monarchs are anticipated as a result of this project. The mitigation measures prescribed for Monarchs will also reduce potential impacts to other insect species. • To avoid impacts to species at risk and their critical habitat, vegetation removals will be avoided in the vicinity of species at risk and their habitat during the growing season. The areas for restoration and enhancement will result in the creation of new Monarch habitat, as those areas will be intentionally or naturally seeded by host plants. Following construction other disturbed areas that re-vegetate are also likely to self-seed with host plants and create additional Monarch habitat. The construction limits will be delineated with sensitive areas identified prior to the start of construction. Good housekeeping practices will be employed to prevent the contamination of habitat adjacent to the work area. In the event of an upset or spill, a quick and effective response to contain the spill and clean up the area will be employed. No follow-up or monitoring programs specific to Monarchs are recommended.
12.0	FISH AND FISH HABITAT	MTO/ MNR/ DFO	**Fish and Fish Habitat** • The construction of submerged culverts at Cahill and Lennon Drains may cause barriers to fish passage that will be permanent in nature. • The loss of habitat through enclosure or physical destruction will likely occur in 10 of the 15 watercourses/drains within the study area (excluding the Detroit River), The enclosures may result from five culvert extensions and three new crossings. Physical destruction may occur at four watercourses/drains where realignment may be required. Although occurring within the construction phase of the project, these effects will be permanent. • Effects to Water Quality and Quantity: The TEPA will increase the overall impervious area and traffic loadings. This may potentially have a negative impact on the recipient watercourses by increasing the peak flows and the pollutant loadings. This will lead to negative watercourse impacts such as degraded fish habitat, increased floodlines upstream and increased erosion downstream. The following mitigation measures can be employed to avoid or reduce impacts of the construction and operation of the TEPA. Permanent loss of fish

ID #	Environmental Element/Concern and Potential Impact	Concerned Agencies	Summary of Environmental Effects and Mitigation
			habitat may be mitigated by the following: • Barriers to fish passage: Culverts, designed using fish-friendly methods, and channels, designed using natural channel design principles, should not form barriers to fish passage during operations. Fish passage systems should be designed and operated at Cahill and Lennon Drains to provide safe fish passage across The Windsor-Essex Parkway, which bypass the submerged culverts. Fish locks are being proposed to raise and lower migrating fish across The Windsor-Essex Parkway thereby maintaining access to upstream spawning areas. This method has proven to be effective in other similar applications. • Loss of fish habitat: The extent of fish habitat affected can be minimized through engineering structures to fit within the smallest possible footprint areas. Culvert lengths and extensions can be minimized through the use of headwalls, wingwalls and guide rails and extensions should match the inverts of the existing culverts and streambeds. New crossing structures should be constructed using fish-friendly designs including appropriate horizontal and vertical clearances, open bottoms, countersinking, etc. Realigned channels should be designed using natural design principles to enhance new habitat over existing habitat. Riparian vegetation should be maintained where possible. A fish habitat compensation plan will be prepared during later design stages to ensure no net loss of the productive capacity of fish habitat. • Effects to Water Quality and Quantity: Stormwater runoff from the within the existing study area of The Windsor-Essex Parkway does not currently receive quality or quantity treatment. Stormwater runoff associated with The Windsor-Essex Parkway and the plaza will be treated in stormwater management wet ponds designed in accordance to the MOE document "Stormwater Management Planning and Design Manual" for Enhanced Protection Level. This will require the removal of 80% of total suspended solids (TSS), as well as providing erosion attenuation of the 25mm storm for 24 hours. In addition, the stormwater management ponds will provide quantity storage to control peak flows from The Windsor-Essex Parkway to pre-development rates. This approach will lead to overall enhancements to water quality and net benefits to fish and fish habitat for receiving watercourses along The Windsor-Essex Parkway and will prevent water quality impacts to the Detroit River associated with operation of the plaza. In addition, deck drains are not proposed on the crossing and runoff will be collected for quality treatment prior to discharging to the river. • In addition, the removal of 30 entrance culverts and the plan to provide a natural channel configuration for a significant area of the Wolfe Drain will result in a gain of fish habitat. • Stormwater quality control that will be provided with the Windsor-Essex Parkway will lead to an overall enhancement to water quality and a net benefit to fisheries. Construction related impacts of building of the TEPA may be mitigated by the following: • Changes to water quality and quantity: best construction practices should be employed to reduce the potential for spills and materials/equipment from entering water. Maintenance, fuelling and storage should occur at least 30 m from watercourses/drains. Debris should be prevented from entering watercourses/drains and a spill response plan should be developed. Sediments should be prevented from reaching sensitive areas through erosion and sediment controls and exposed soils stabilized as soon as possible. A storm water management plan should be developed and implemented to treat run-off during operations. • Alterations to baseflow: the increases in impervious surfaces and areas of soil compaction should be minimized to facilitate as much infiltration of surface water as possible. Management of storm water through the development and implementation of a storm water management plan will address potential reductions in baseflow. Methods that encourage infiltration will be investigated. Flows in watercourses will be monitored during dewatering activities and measures will be implemented in the event that baseflow is significantly affected. • Barriers to fish passage: water flow should be maintained during construction. • Mortality of fish species: the magnitude of effects should be minimized through the employment of timing windows for in-water work, commencing work only when all materials are present and staging of work to minimize duration. Work should be performed in the dry and

ID #	Environmental Element/Concern and Potential Impact	Concerned Agencies	Summary of Environmental Effects and Mitigation
			isolated fish should be captured and relocated by qualified personnel. Impacts as a result of operations phase for the TEPA on fish and fish habitat can be mitigated by the following: • Changes to water quality and quantity: in general, storm water management throughout the project area will improve water quality and quantity (through attenuation of peak run-off flows) over what exists currently. Run-off from the crossing will be collected and conveyed to stormwater detention facilities for treatment. No deck drains will be provided on the bridge. • Alterations to baseflow: a storm water management plan should be developed and implemented to ensure that reductions in baseflow do not occur. • Changes to water temperature: a storm water management plan will be developed which will address the treatment of run-off and investigate methods to reduce its temperature prior to discharge into receiving watercourses/drains. • Barriers to fish passage: Culverts, designed using fish-friendly methods, and channels, designed using natural channel design principles, should not form barriers to fish passage during operations. Fish passage systems should be designed and operated at Cahill and Lennon Drains to provide safe fish passage across The Windsor-Essex Parkway which bypass the submerged culverts. Fish locks are the preferred option for a fish passage system. *Monitoring Activities* • An environmental inspector should be present on site during critical in-water work activities. Post-construction monitoring is typically prescribed in the federal Fisheries Act authorization. The terms and conditions of the federal Fisheries Act authorization will be met. Post-construction monitoring, if prescribed, will determine the effectiveness of environmental protection and compensation measures, identify problem areas and recommend corrective measures. • The performance of the fish locks should be monitored for at least two years after construction to ensure that they are functioning properly. The target species for the locks is Northern Pike. During spring migration (March/April), a fish passage study using mark-recapture or radio-telemetry could assist in determining the effectiveness of fish passage. Both techniques apply in the assessment of passage success. In order to assess downstream passage, similar studies should be repeated later in the spring (late April/May) to see if fish are successfully migrating back to summer habitats.
13.0	DESIGNATED NATURAL AREAS	MNR/ MTO	**Designated Natural Areas** The landscaping plan prepared for the TEPA identifies close to 100 ha of MTO-owned lands that are available for protection, enhancement and restoration. Opportunities to dedicate portions of these lands to appropriate parties for protection will be discussed at later design stages. Lands will be available to be dedicated for protection including provincially rare vegetation communities, habitat for species at risk, wildlife corridors and other ecological functions. As a result, a net gain in the extent of designated natural areas with important ecological functions will result from the TEPA. • Mitigation measures for the loss of area or ecological function of designated natural areas are similar to the mitigation measures identified for vegetation and wildlife. *Monitoring Activities* Monitoring requirement are similar to those identified for vegetation and wildlife.

ID #	Environmental Element/Concern and Potential Impact	Concerned Agencies	Summary of Environmental Effects and Mitigation
14.0	URBAN DESIGN AND AESTHETICS	MTO / MUNICIPALITIES	**Urban Design and Aesthetic Plan** • This urban design and aesthetic plan will serve to unify all the visible aspects of the facility into a central visual and formal theme that can be deployed throughout future design by various design professions. The urban design and aesthetic plan will establish streetscaping principles for the TEPA. • The urban design and aesthetic plan will adhere to CSS principles and will be developed as part of a consultation process with local stakeholders.
15.0	LANDSCAPE PLAN	MTO / MUNICIPALITIES	**Landscape Plan** Mitigation measures to reduce or improve visual and landscape impacts will include: • the development of clear urban design and aesthetic guidelines to guide all aspects of future design; • the use of landforming and vegetation strategies to improve views, aesthetics, ecological function and screening; and, • the inclusion of a multi-use trail system and pedestrian-accessible open space within the TEPA. These mitigation measures will improve the visual character, aesthetic presence and landscape impact of the TEPA. The result of the landscape and visual impact mitigation will be a landscape that is unified, green, connected, integrated, and functions as a culturally significant gateway.

10.6 Commitments to Future Work

The following outlines commitments to future environmental work to be undertaken during subsequent design stages of this project.

10.6.1 Air Quality

The air quality modeling demonstrates that overall, implementation of TEPA will slightly reduce future transportation related air quality impacts within the study area. Therefore, the TEPA will act as a small mitigation measure for future transportation related air quality impacts within Windsor Region.

Best practices for maintenance will be employed to minimize dust levels from operation of The Windsor-Essex Parkway and thereby minimizing the risk of localized elevated fine particulate matter levels.

10.6.2 Socio – Economic Environment

Noise

Where the project noise exceeds the background/existing noise levels by 5 or more decibels (dB), mitigation measures including sound barriers are to be considered for the project. Additionally, final recommendations with respect to the location, height, etc. of noise barriers, berms or a combination of both will be reviewed during future design stages.

Consultation with communities will continue during the design and construction stages, to provide additional opportunities for input on noise mitigation measures during both the construction and operation stage.

Existing and Future Land use

Opportunities to minimize potential property impacts associated with the TEPA will be reviewed during future design stages in consultation with municipalities and property owners.

Property and Waste Contamination

To reduce the uncertainty of whether contamination is present, a Phase II ESA should be conducted during future design phases. Phase III work will be undertaken as necessary to further investigate and mitigate possible contamination as necessary.

10.6.3 Natural Environment

Follow-up work, including field investigations will be undertaken as required to facilitate the development of mitigation measures,compensation plans, and to obtain necessary permits and approvals.

Wildlife and wildlife habitat

The following measures will be employed during future design stages:

- Options for permanent protection of critical Butler's gartersnake habitat will be developed in later consultation phases.
- The presence/absence of Eastern foxsnake hibernacula within the vicinity of the TEPA will be investigated during subsequent design stage to determine the potential for impacts.
- A continued study of the Butler's garter snake population and the restoration area is necessary once the proposed highway is completed.

Migratory Birds

Migratory bird species have been identified. However, populations and behaviours of migratory and resident bird species should be further studied in the vicinity of the Detroit River crossing. Radar studies, acoustic studies and point count surveys should be carried out to provide input to bridge design.

Vegetation

Effective techniques for mitigating impacts for individual species at risk and significant plant communities will be further investigated in discussion with agencies and other interested parties toward the achievement of overall net benefits and permitting under the *Ontario Endangered Species Act, 2007* and the federal *Species At Risk Act.*

Molluscs and Insects

The following measures will be employed during subsequent design stages to protect Monarch populations and habitat:

- Opportunities to minimize vegetation removals will continue to be examined in the design stage, and areas that should be protected during construction will be delineated prior to construction start.
- Following construction other disturbed areas that revegetate are also likely to self-seed with host plants and create additional Monarch habitat.
- The construction limits will be delineated with sensitive areas identified prior to the start of construction.

Fisheries

Measures to mitigate impacts to fish habitat will be developed in the subsequent design phase in consultation with Fisheries and Oceans Canada. A Letter of Intent and Application will be prepared during subsequent design stages to secure the required federal *Fisheries Act* authorizations for this project.

Designated Natural Areas

MTO will discuss the dedication of protected, enhanced or restored lands located within the right-of-way for The Windsor-Essex Parkway to appropriate agencies and other stakeholders to ensure permanent protection, conservation and research.

Landscape plan

The overall Landscape Plan for the TEPA will be developed through ongoing consultation with the adjacent communities. The multi-use trail is part of an active transportation network for the City of Windsor and will be integrated into existing and planned regional and local cycling and active transportation networks.

EMERGENCY SERVICE

Emergency service providers have been consulted and are aware that they will need to reassess their resources, level of service, access routes for the freeway, and in general, their ability to access their entire area of coverage, in order to ensure provincially mandated response times are met. Future consultation with emergency services will take place. Additional resources required should be identified and planned for.

10.6.4 Cultural Environment

Assessments of Archaeological Resources and Built Heritage Resources will continue during subsequent design stages.

10.7 Project Monitoring

PROJECT SPECIFIC TECHNICAL MONITORING

During construction, MTO or its agent will ensure that the implementation of the mitigating measures and key design features are consistent with the approvals of the EA and in accordance with the contract. In addition, MTO or its agent will assess the effectiveness of its environmental mitigating measures to ensure the following:

- Individual mitigating measures are providing the expected control and/or protection;
- Composite control and/or protection provided by mitigating measure is adequate;
- Additional mitigating measures are provided as required for any unanticipated environmental conditions which may develop during construction;
- Information is available for the overview assessment of mitigating measures; and,
- Environmental monitoring, after a project is completed, may involve follow-up monitoring of significant measures and /or significant concerns.

10.7.1 Implementation of Environmental Monitoring Framework

INSPECTION BY CONSTRUCTION ADMINISTRATION STAFF

Construction is subject daily to general on-site inspection to ensure the execution of the environmental component of the work and to deal with environmental problems that develop during construction. This is the primary method for compliance monitoring.

SITE VISITS BY ENVIRONMENTAL STAFF

Regular site visits by well qualified and experienced Construction Administration environmental staff to ensure mitigation elements are being carried out. The timing and frequency of such site visits will be determined by the schedule of construction operations, the sensitivity of environmental concerns and the development of any unforeseen environmental problems during construction.