

# Environmental Standards and Practices

## *Envisioning a Greener Future with ESP!*

SUBMISSION FOR THE TRANSPORTATION ASSOCIATION OF CANADA'S  
ENVIRONMENTAL ACHIEVEMENT AWARD

## INTRODUCTION

Highways function to meet society's social and economic needs for safe and efficient transportation, travel opportunities, and the movement of goods and services. In doing so, highways exert various effects on the surrounding landscape, some of which may be positive, or at least neutral, but many of which can be negative.

The Ontario Ministry of Transportation (MTO) is the provincial agency responsible for Ontario's provincial highway program. The ministry must manage the provincial highway program in compliance with federal and provincial environmental legislation and government policy. To this end, the Provincial and Environmental Planning Office of MTO, develops policies and standards to support regulatory compliance, and support Ontario's environmental policies and initiatives, and to provide for a consistent and systematic approach to environmental management.

In 2001, the Ontario Ministry of Transportation (MTO) embarked on a long-term program to develop and implement a consistent and systematic approach to environmental management. The first step was the development of Environmental Standards and Practices (ESP). Ecoplans Limited With its recent completion, MTO is submitting the development of the ESP for TAC's Environmental Achievement Award.

The development of the ESP consisted of two main components:

- 1) the complete documentation of environmental standards and guidance for provincial transportation projects; and
- 2) an innovative, integrated and comprehensive management framework for disseminating, maintaining and expanding this guidance.

## ENVIRONMENTAL STANDARDS AND GUIDANCE

The first component in developing the ESP was developing the Environmental Protection Requirements (EPRs). Over sixty separate federal and provincial statutes, regulation and formal policies were identified as applicable to the environmental aspects of transportation planning and highway design, construction, operation and maintenance activities. The requirements from this regulatory setting (which are sometimes overlapping or complementary) were interpreted for MTO transportation projects and synthesizes into numbered statements organized by a standard set of environmental factors. The interpretation and synthesis was done in full cooperation with the various Regulatory Agencies to ensure a common interpretation. Also public input was solicited through the Ontario Environmental Bill of Rights Registry to involve the public in the process. The following is an example of an EPR that synthesized four pieces of legislation:

**CON-1** There shall be no release, discharge or addition to: 1) the natural environment (land, surface water, groundwater or air) of a contaminant that may cause adverse effects as defined by the Ontario *Environmental Protection Act (Part II s. 14(1))*; 2) surface water or groundwater, of a contaminant that may impair water quality as defined by *Ontario Water Resources Act s.29* or a substance deleterious to fish or fish habitat (*Fisheries Act s.34*); and 3) the natural environment of a toxic substance as defined by the *Canadian Environmental Protection Act s.64*.

CON-1 is the indexing identification – CON refers to the MTO environmental factor of Contaminated Property, Waste and Excess Materials Management.

Working in the environmental field, we can all realize the need and power of such clear and concise statements. It allows:

- 1) policy developers, project participants, regulatory agencies, and MTO consultants all to have a common understanding of the requirements;
- 2) project participants to easily find and understand the multitude of environmental requirements as it affects all or a specific environmental factor; and
- 3) a firm foundation to build environmental protection and mitigation practices.

The next step was the reevaluation, updating and documentation of MTO's environmental guidance and tools for highway management based on the EPR. Updating document is not new, but our methodology was original - **all documents were updated concurrently**. Although considerably more difficult, **this approach allowed for the**

**guidance to be consistent, comprehensive and integrated far beyond that of individual guides**. For example, MTO wove consistent guidance throughout numerous documents to address interrelated environmental issues. This novel approach is clearly illustrated in the *Environmental Standards and Practices User Guide* (see <http://www.mto.gov.on.ca/english/engineering/envirostandards/>).

### **Main ESP Documents**

Some of the documents were updated from previous versions while others are new. All documents were updated or developed through extensive consultation with provincial and federal regulatory agencies and internal stakeholders, as well as through public consultation using the Environmental Bill of Rights Registry. The documents will

#### **WORDS OF SUPPORT:**

*The EPRs are a tangible step forward in environmental management at MTO. The EPRs provide for a consistent identification and interpretation of the legislative, regulatory and policy requirements. This "common interpretation" is accessible and understandable to those involved in the planning and design process. It will also assist stakeholders involved in the review and approval process including the public*

Dave McAvoy, Supervisor -  
Environmental Unit, Planning and  
Design Section/Engineering Eastern  
Region.

continue to be updated over time, as regulatory requirements and ministry processes and procedures change. **In addition to the Environmental Protection requirements, the twelve main ESP documents include:**

- **Environmental Standards and Practices User Guide**
- **Environmental Reference for Contract Preparation**
- **Environmental Guide for Wildlife in the Oak Ridges Moraine**
- **2006 MTO/DFO/MNR Protocol for Protecting Fish and Fish Habitat on Provincial Transportation Undertakings and the supporting Environmental Guide for Fish and Fish Habitat**
- Environmental Reference for Highway Design
- Environmental Guide for Built Heritage and Cultural Heritage Landscapes
- Environmental Guide for Contaminated Property Identification and Management
- Environmental Guide for Erosion and Sediment Control During Construction of Highway Projects
- Environmental Guide for Noise
- Environmental Guide for Patrol Yard Design
- Environmental Glossary

**WORDS OF SUPPORT:**

*The Environmental Guides for Fish and Fish Habitat, and Erosion and Sediment Control were extremely good quality and included the latest approaches to using DFO's Risk Management Framework approach. The "Fish Guide" is used frequently as a reference document by DFO staff.*  
Dave Gibson, Fish Habitat Biologist  
- Fisheries & Oceans Canada

Given the limitation of the Award application, only the merits of the documents in **green text** will be espoused here. However, all of the above documents can be found at the MTO website: <http://www.raqs.mto.gov.on.ca/techpubs/eps.nsf/epsww?OpenView&Start=1&Count=30&Expand=4#4>.

***Environmental Standards and Practices User Guide (User Guide)***

The User Guide provides an easy-to-follow environmental management "road map" for all members of multi-disciplinary transportation project design teams, regulatory agencies and the public. The User Guide:

- defines various potential typical and important environmental impacts associated with transportation projects, relates those impacts to legislative and other requirements; outlines the management options for avoiding, minimizing, mitigating or compensating the impacts; provides references for the management options; and provides limitations and considerations to those options.

- strengthens environmental management on transportation projects by highlighting the use of alternative and cost effective avoidance, minimization, or off-set techniques; and ensures easy access to and consistent consideration of techniques across all MTO regions of the province;

The project participants and stakeholders are provided with a common understanding of issues to facilitating communication with each other in order to develop integrated and innovative approaches to environmental protection and mitigation.

**We are not aware of any other agency that has developed environmental guidance documents specifically to help cross-disciplinary project participants, regulators and the public participate more meaningfully in transportation project design and construction.**

An example of the “road-map” approach is included in the appendix to this submission.

### ***Environmental Reference for Contract Preparation (ERCP)***

The ERCP provides guidance, in a standard format, to design teams on how to approach environmental concerns for a list of factor-specific or construction activity-specific topics to meet the Environmental Protection Requirements. Designer Notes contained in each factor or activity specific section identify the environmental concerns and best practices for avoiding, minimizing and mitigating impacts in construction, as well as providing a cross-reference to related Ontario Provincial Standard Specifications and MTO Standard Special Provisions.

**The ERCP is for environmental specialists who are not experts at construction contract preparation. The ERCP provides them with the information and tools to successfully use provincial and ministry standards. This enhances the contractor’s understanding of the work and improves environmental protection and mitigation on the ground.**

#### ***WORDS OF SUPPORT:***

*The ERCP provides an excellent framework to support the uniform use of environmental standards across the province and makes our design and construction processes as efficient as possible.”*

Gary Todd, Manager - Design and Contract Standards Office, MTO

### Environmental Guide for Wildlife in the Oak Ridges Moraine (Wildlife Guide)

The Wildlife Guide provides the most current approaches to managing wildlife and transportation interaction in Canada. Although useful elsewhere in the province, the “Wildlife Guide” was originally created to address the Environmental Protection Requirements related to facilitating wildlife movement and maintaining ecological integrity within the Oak Ridges Moraine (an environmentally sensitive, geological landform in south central Ontario, covering 190,000 hectares). The increased recognition that highway design and landscape ecology are intertwined, has led to the heightened consideration of roadway effects on wildlife and corresponding wildlife mitigation strategies. The guidance provided in the Wildlife Guide is based on an extensive literature review of the current scientific knowledge supplemented by professional experience. Much of the content is presented as a tool kit through the use of Fact Sheets (see Appendix). The Fact Sheets are interlinked for easy access to information. Pictures are used to illustrate the text. The reference list provides a snapshot of the current information and hyperlinks to internet sites have been provided.

#### WORDS OF SUPPORT:

*It is hard to imagine there being a more thorough reference than the ESP on environmental considerations for any type of development, let alone highway design. I believe that the Environmental Guide for Wildlife in the Oak Ridges Moraine with its highway mitigation strategies is an example of why the project is a noteworthy achievement.*

Greg Pulham, Senior Policy Advisor  
– Ontario Ministry of Natural Resources

The Wildlife Guide represents the state-of-the-art in wildlife/transportation interactions. It’s valuable information on assessment, mitigation techniques and accessible lay-out make this document a valuable resource for environmental specialists in this area. Recently, staff from Michigan State Department of Transportation was so impressed they presented the Wildlife Guide to key transportation ecologists in the United States. Also, the Wildlife Guide is becoming a commonly cited document in wildlife/transportation interaction training (e.g., Wildlife Migration Data Requirements for Transportation Corridor Impacts Analysis and Mitigation, Coastal Training Program, California).

## Fish and Fish Habitat - Protocol and Guide

The 2006 MTO/DFO/MNR Protocol for Protecting Fish and Fish Habitat on Provincial Transportation Undertakings gives MTO the responsibility and accountability to self-screen for the likelihood of projects resulting in the harmful alteration, disruption, or destruction of fish habitat (HADD) under the federal Fisheries Act. MTO's Environmental Guide for Fish and Fish Habitat provides comprehensive and specialized guidance required to support its implementation. The Protocol reflects DFO's new Environmental Process Modernization Plan (EPMP) which has been introduced to modernize and streamline regulatory programs.

The Protocol as supported by the Fish Guide provides a streamlining of projects and focuses DFO involvement on higher-risk projects usually requiring Fisheries Act Authorizations. This represents a saving in time and effort by both MTO and DFO on lower-risk projects thereby freeing up resources to focus on higher-risk situations. We achieve better protection of fisheries resources and improved use of resources. MTO is currently the only agency that has responsibility and accountability to self-screen for HADD.

## THE MANAGEMENT FRAMEWORK

The second component consisted of creating the ESP framework in recognition that the documents would need careful and ongoing management. Based on the international Environmental Management System standard (ISO 14001), the framework was specifically designed to:

- manage the massive amount of information developed;
- adapt and grow the ESP as requirements change and techniques improve;
- train staff and service providers; and
- provide the most current information to MTO staff and its agents, environmental regulatory agencies, stakeholder groups, and the public.

The structure of the ESP documents was specifically designed to allow easily updating and web-based access. Where appropriate, document sections are stand alone documents that can be:

### WORDS OF SUPPORT:

*The Protocol and supporting Fish Guide supports our Habitat Program by streamlining project reviews and improves allocation of our resources to higher-risk projects. It is a model that is now being looked at by other partners nationally.*

Gareth A. Goodchild, AI Habitat Coordinator - Fisheries & Oceans Canada

- 1) Updated easily as requirements and practices change without having to “reopen” entire documents.
- 2) Referenced by factor area (for example terrestrial ecosystems or archaeology).

The heart of the framework is MTO’s public (internet) and internal (intranet) sites. The public site intended to disseminate the ESP document and provide access to the current versions of documents. This site can be browsed by either document or the user can change the view to factor specific (e.g., contaminated property/excess materials management). As shown the table below, this generates a list of hyperlinks to documents and sections of documents relevant to that factor including all relevant forms.

▼ Contaminated Property/Excess Materials Management

- EPRs - Section 8
- Excess Materials Management Protocol
- ESP User Guide - Section 9
  - ESP User Guide Checklist 9.A
- ERD - Section 3.6
- Environmental Guide for Contaminated Property Identification and Management
  - Preliminary Site Screening Form
- ERCP - Section 8

Go to MTO public site and see it for yourself:

<http://www.raqsbc.mto.gov.on.ca/techpubs/eps.nsf/epsfawv?OpenView&Start=1&Count=30&Expand=6#6>

MTO internal site is referred to as *EnviroSource*. This is the document management site for MTO’s Environmental Standards and Practices. It facilitates the review and revision process for existing documents and the development process for new ones to support the Ministry’s environmental assessment process. EnviroSource also provides for internal information exchange and communication between MTO’s environmental functions staff in head office and the regions. A screen-capture picture is included in the appendix. With the roll-out of updates to the broader Government’s web sites, MTO plans to integrate the public site into EnviroSource.

## SUMMARY

With the implementation of the ESP, MTO is anticipating reduced costs and improved environmental performance. We believe that the ESP could serve as a model for other transportation agencies seeking to develop a similar comprehensive, consistent and systematic framework of tools to meet their environmental requirements and sustainability goals.



# APPENDIX

To Environmental Standards and Practices

*Envisioning a Greener Future with ESP!*

**Environmental Standards and Practices User Guide:**

Example Road-Map for wetland encroachment – see next table for management options

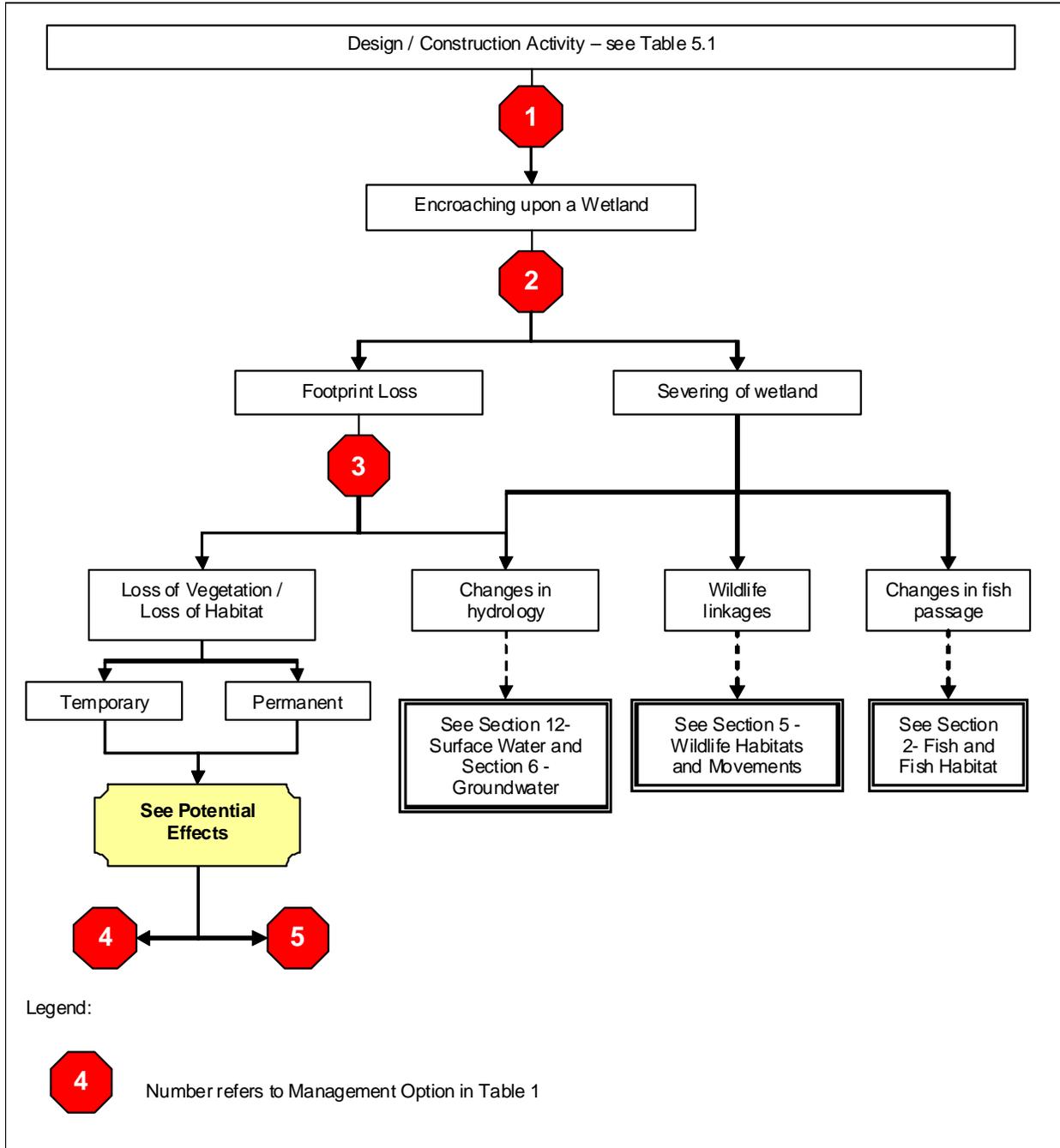
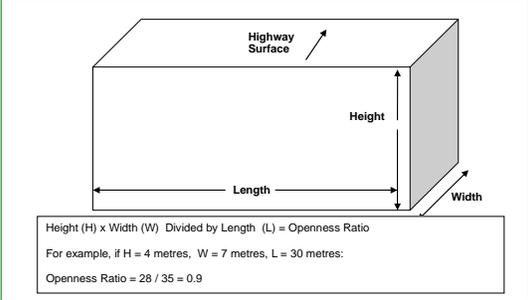


Table 1 Environmental Management Options for Encroaching Upon Wetlands

Possible Management Options	References	Considerations
<b>Avoidance / Prevention</b>		
<p><b>1</b> <b>Set location of design feature to avoid wetland.</b>                      Note: To protect the features and functions of wetlands and retained vegetation areas, a vegetated buffer<sup>1</sup> is usually needed. The extent of buffer will need to be determined on a project-specific basis and/or may be recommended by Federal or Provincial agencies or based on municipal approaches, which achieve the same objectives.</p>	<p><b>MTO</b>                      Primary references for design considerations in modifying size and/or location include:</p> <ul style="list-style-type: none"> <li>Geometric Design Standards for Ontario Highways</li> <li>Roadside Safety Manual.</li> </ul>	Limited ability to relocate some elements (like alignment) in the design stage.
<b>Control / Mitigation</b>		
<p><b>2</b> <b>Minimize loss of area / vegetation through location:</b>                      Locate the footprint outside the wetland and retain a vegetated buffer wherever possible. If the wetland cannot be avoided locate the footprint as close to the wetland edge as possible to avoid fragmenting and severing the feature.</p>	<p><b>MTO</b>                      Primary references for design considerations in modifying size and/or location include:</p> <ul style="list-style-type: none"> <li>Geometric Design Standards for Ontario Highways</li> <li>Roadside Safety Manual.</li> </ul>	The severance of wetlands or other wildlife habitat can interfere with wildlife movement – see Section 5 of this User Guide regarding wildlife movements.
<p><b>3</b> <b>Minimize loss of area / vegetation through reducing footprint:</b>                      Reduce the footprint of the transportation project through flexibility in transportation project design standards including:</p> <ul style="list-style-type: none"> <li>Use alternative interchange designs;</li> <li>Reduced median widths in cross-section; and</li> <li>Minimize fill placement into wetlands and vegetation areas through, for example, increased embankment slope.</li> </ul>	<p><b>MTO</b>                      Primary references for design considerations in modifying size and/or location include:</p> <ul style="list-style-type: none"> <li>Geometric Design Standards for Ontario Highways</li> <li>Roadside Safety Manual.</li> </ul>	Safety requirements and other design considerations can severely restrict where these options can be used.
<p><b>Utilize overpass structures to minimize loss of area</b> (as well as reduce severing impacts). To minimize impact, structures can be designed to maintain as much light and moisture under the structures as possible by: open medians; reduced cross-section area; etc.</p>	<p><b>MTO</b>                      For structures, the main references include:</p> <ul style="list-style-type: none"> <li>MTO's Structural Manual; and</li> <li>CSA's Canadian Highway Bridge Design Code (CAN/CSA-S6-00).</li> </ul>	Structures have been used for very sensitive valley systems to minimize the disruption of valley slopes and bottomlands. This can be an expensive option.
<p><b>4</b> <b>Restore temporarily disturbed areas:</b>                      Use a landscape planting plan and consider maximizing the retention and reuse of original vegetation and topsoil during stabilization and revegetation.                      Use a salvage and reuse strategy to retain and reuse original vegetation and topsoil that includes: required removal, storage, handling and placement locations and practices. The strategies should include direction to contractors regarding stripping, stockpiling and reusing the soil and seedbank as part of right-of-way stabilization and vegetation.  <b>NOTE:</b> Any restoration of terrestrial ecological features shall utilize ecological restoration principles where the right-of-way crosses or is adjacent to significant wildlife habitats, woodlots, wetlands and /or valley lands</p>	<p><b>Other</b>                      Wetlands Environmental Assessment Guideline (Miko 1998).                      Native Plant Resource Guide for Ontario (2001 – 2002) Society for Ecological Restoration – Ontario Chapter.</p>	Restoration of ecological features is project-specific and there are no general guidance documents.
<b>Replacement / Compensation</b>		
<p><b>5</b> <b>Replace lost wetland areas to soften impacts</b> and provide or re-instate some wetland, vegetation or wildlife habitat area either on-site (within the Right-of-Way) or in other areas.</p>	<p><b>Other</b>                      Wetlands Environmental Assessment Guideline (Miko 1998).                      Native Plant Resource Guide for Ontario (2001 – 2002). Society for Ecological Restoration – Ontario Chapter.</p>	There is little opportunity for meaningful compensation within the Right-of-Way. Replacement in other areas may require additional property acquisition and/or planting.

<sup>1</sup> A buffer is a vegetated zone located between natural resources and adjacent areas that are subject to human alteration (Castelle et al. 1994). Other treatments, such as berming and fencing, can constitute physical (separation) buffers that may or may not be associated with a vegetated buffer.

Environmental Guide for Wildlife in the Oak Ridges Moraine: Example fact sheet

Wildlife Mitigation Approaches		Wildlife Crossing Structure
<b>Wildlife Underpass: Large Culvert</b>		
DESCRIPTION	<ul style="list-style-type: none"> <li>Defined as structures at least 1.5 m in height/width or greater;</li> <li>Box culvert is 4-sided, typically with a concrete bottom, rectangular or square-shaped – can also have an open bottom configuration;</li> <li>Box culverts can be arranged in series forming multiple chambers;</li> <li>Culverts may also be arch shaped, with high or low profile, with bottoms or bottomless;</li> <li>Openness ratio (OR) is a measure of the “see-throughness” or tunnel effect of a structure which has implications for wildlife use (for some species). It is relevant for culverts (see Figure 0.1);</li> <li>Existing culverts may be modified with ledges added to facilitate terrestrial wildlife movement.</li> </ul>	
 <p>Figure 0.1 Openness Ratio Calculation for Culvert / Underpass</p>	 <p>Figure 0.2 Concrete Box Culvert, Kitchener</p>	
 <p>Figure 0.3 Open Arch-style Culvert – Double Cell</p>	 <p>Figure 0.4 Multi-Cell Pre-cast Open Bottom Culvert, Markham</p>	
TARGET WILDLIFE GROUPS	<ul style="list-style-type: none"> <li>Depending on structure dimensions, wildlife groups ranging from small mammals and amphibians up to ungulates can be accommodated;</li> <li>Culverts under 2 m in height will typically allow passage for small and mid-size wildlife species but are generally too small for ungulates;</li> <li>OMNR Parry Sound, infrared detection monitoring of box culvert use on Hwy 69 reported broad range of wildlife detected inside culvert (amphibians, reptiles, and small to mid-size mammals).</li> </ul>	

Wildlife Mitigation Approaches	Wildlife Crossing Structure
<b>Wildlife Underpass: Large Culvert</b>	
APPLICATION SUITABILITY	<ul style="list-style-type: none"> <li>Numerous examples worldwide – have been in place for many years and typically installed for drainage reasons;</li> <li>Culverts at water crossings can employ open bottom design with footings or can be counter sunk with a single box or multi-cell design. The counter sunk approach can provide both low flow conditions and terrestrial movement opportunities with proper design. The open bottom design requires special design consideration to maintain low flow channel integrity coupled with terrestrial passage. Design consideration must also ensure that fish movement requirements are met. The Drainage and Fisheries documents prepared as part of the Standard Environmental References provide additional guidance in this regard. In addition, the reader is directed to the final version of the TRCA/DFO <i>Urban Stream Crossing Design Guide</i> when completed.</li> <li>Dedicated wildlife culvert designs or culvert modifications for wildlife use are less frequent but are emerging in North America, Europe and Australia;</li> <li>Tunnel “see-throughness” and tunnel effects were first identified in the 1970s and are being increasingly considered in current designs;</li> <li>Ledges constructed of wood, concrete or earth have been added to existing Dutch waterway culverts to facilitate terrestrial wildlife passage (see Veenbaas and Brandjes, 1999).</li> </ul>
ADVANTAGES	<ul style="list-style-type: none"> <li>Culvert designs can provide for multi-species use which is beneficial.</li> </ul>
DISADVANTAGES	<ul style="list-style-type: none"> <li>Passages may be noisy, depending on traffic volume;</li> <li>Culverts may not match the ambient temperature, moisture and light regimes preferred by various wildlife;</li> <li>Flooding and ice formation may discourage use by certain animals.</li> </ul>
IMPLEMENTATION CONSIDERATIONS	<ul style="list-style-type: none"> <li>Planning for multi-species use with a mix of strategies (larger bridges at valleys, expanded creek culverts with dry land component, smaller equalization culverts at wetland locations, amphibian tunnels [if warranted]) is recommended;</li> <li>In some cases, provision of a number of regularly spaced culverts (150-300 m spacing) may be more cost-effective than poor placement of a few larger structures. Site-specific conditions and professional judgment will be required;</li> <li>Considerations in retrofitting or designing wildlife ledges for culverts:             <ul style="list-style-type: none"> <li>Netherlands work has reviewed wildlife use of wood planks, concrete and earth berm ledges installed within culverts over waterways;</li> <li>Extended earth banks within the culvert were 1.5 to 3.5 m wide. Wood planks fixed to culvert walls were 0.25 to 0.6 m wide. Floating wood planks 0.3 m wide were installed in some culverts (adjust to water level changes). Concrete ledges 0.4 to 1.3 m wide were installed in some culverts. Plastic gutters 0.25 m wide and covered with sand were also tested;</li> <li>All ledges were used to varying degrees by small to mid-size wildlife provided that the culverts did not experience heavy human use;</li> <li>All ledges were used by mammals (62% of target species). About 75% were used by amphibians. The broader the ledges were, the more frequently they were used and by more species. Extended banks were used by a range of species.</li> </ul> </li> <li>Wildlife monitoring work in Alberta has documented Black Bear use of culverts ranging from 2.5 to 4 m high, 7 to 13 m wide, and 25 to 68 m long, with Openness Ratios ranging from 0.2 to 1.2.</li> </ul>
CONSTRUCTION COSTS	<ul style="list-style-type: none"> <li>Costs are moderate to high, depending on size and materials;</li> <li>Concrete box culvert 3 x 2.5 m is roughly \$150,000 to \$170,000. Elliptical metal culvert 7 x 4 m is roughly \$200,000 to \$240,000 (greater cost associated with more fill cover for protection and additional time to bolt culvert pieces together). Smaller structures will be lower in cost (typically under \$100,000). These cost estimates have been adjusted from costs for Trans-Canada highway structures summarized in Forman et al. (2003).</li> </ul>
MAINTENANCE IMPLICATIONS	<ul style="list-style-type: none"> <li>Culverts and bridges are typically inspected for safety and maintenance measures. Standard inspection criteria could be expanded with wildlife use in mind to include vegetation control and woody debris blockages in and around culvert entrances to allow for openness and accessibility;</li> <li>Maintenance is required for damage due to erosion and deposition of sediments often due to poor construction;</li> <li>Maintenance activities must consider protection of nesting migratory birds and other wildlife species as discussed in <a href="#">Section 6.0</a>;</li> <li>The Environmental Protection Requirements WLD-1 and CON-2 detail the prohibitions on the discharge of oil, oil wastes or any other substances harmful to migratory birds in any waters or any area frequented by migratory birds. Design measures must be identified to ensure that any cleaning or maintenance materials are properly stored, handled and controlled to prevent substance release to aquatic or terrestrial habitat. The Environmental Reference for Contract Preparation identify specific environmental protection measures during construction.</li> </ul>

# ENVIRONMENTAL STANDARDS AND PRACTICES: ENVISIONING A GREENER FUTURE WITH ESP!

<b>Wildlife Mitigation Approaches</b>	<b>Wildlife Crossing Structure</b>
<b>Wildlife Underpass: Large Culvert</b>	
REFERENCES	Brudin, 2003; Forman and Hesbner, 1996; Forman et al., 2003; USDA, 2004; Federal Highway Association, 2002; Jackson, 1999; Clevenger, 1998; Jackson and Griffin, 1998; Scheick and Jones; 1999; Normal et al, 1998; Veenbaas and Brandjes, 1999; Evink, 2002; Woodhouse et al. (MNR) 2002; Brown et al. (MNR) 2004.

## Environmental Standards and Practices: Intranet Site (EnviroSource) Screen Capture

The screenshot shows the EnviroSource intranet site in Microsoft Internet Explorer. The browser address bar shows the URL: <http://portal.mto.ad.gov.on.ca/sites/MTO/PP/TP/PEP/EnviroSource/default.aspx>. The site header includes navigation links: Home, Documents and Lists, Create, Site Settings, Help, and a search bar. The main content area is titled "EnviroSource Home" and features a "Quick Launch" sidebar on the left with categories like Documents, Information Bulletins and Reports, and Training Materials. The main content area contains a "Welcome to EnviroSource!" message and a section for "Announcements" with three entries: "Final ESP Overview for Users now available", "Revised PTTW Training Sheet in Environmental Reference for Training", and "New DFO Ontario Operational Statement Notification Form - Version 3.0". A "Links" section on the right lists various government and organizational websites.