Ministry of Transportation

Highway 401 Widening from Highway 403/410 Interchange to the Credit River, City of Mississauga, Region of Peel, 7 km
Design and Construction Report
G.W.P. 2150-01-00

Prepared by:

AECOM
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Mississauga, ON, Canada L4W 4P2

Project Number:

60213979

Date:

September 2015

HIGHWAY 401 IMPROVEMENTS
FROM HIGHWAY 410/403 INTERCHANGE TO
EAST OF THE CREDIT RIVER

DETAIL DESIGN STUDY

CITY OF MISSISSAUGA, REGIONAL MUNICIPALITY OF PEEL

CLASS ENVIRONMENTAL ASSESSMENT FOR PROVINCIAL TRANSPORTATION FACILITIES

GROUP 'B' PROJECT

MINISTRY OF TRANSPORTATION

CENTRAL REGION

GWP 2150-01-00

DESIGN AND CONSTRUCTION REPORT

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Ontario

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CITY OF MISSISSAUGA, REGIONAL MUNICIPALITY OF PEEL
G.W.P. 2150-01-00

DETAIL DESIGN STUDY

Prepared and Reviewed by:

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Approved by:

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Head, Environmental Planning
Ontario Ministry of Transportation

Jason White, P.Eng.
Manager of Engineering Office
Ontario Ministry of Transportation

SEPTEMBER 2015

The Public Record

This Design and Construction Report has been prepared under the Ontario Ministry of Transportation's *Class Environmental Assessment for Provincial Transportation Facilities* (2000), in compliance with the requirements of the Ontario *Environmental Assessment Act*.

A CD copy of this document has been submitted to the following office of the Ministry of the Environment and Climate change:

Ministry of the Environment and Climate Change
Central Region
5775 Yonge Street, 8th Floor
Toronto, ON M2M 4J1

A copy of this Design and Construction Report is available for review at the following locations:

Ministry of Transportation
Central Region
Environmental Section
1201 Wilson Avenue Building D,
3rd Floor, Downsview, ON M3M 1J8
Telephone: 416.235.5412

Monday-Friday: 8:30am to 4:30pm
Weekends: Closed

The City of Mississauga
Office of the City Clerk
300 City Centre Drive, 2nd Floor
Mississauga, ON L5B 3C1
Telephone: 905.615.4311

Monday–Friday: 8:30am to 4:30pm
Weekends: Closed

Courtneypark Branch Library
730 Courtneypark Drive West
Mississauga, ON L5W 1L9
Telephone: 905.615.4745

Monday-Friday: 8:00am to 9:00pm
Saturday: 9:00 am to 5:00 pm
Sunday: 1:00 pm to 5:00 pm

Region of Peel
Clerk's Office
10 Peel Centre Drive
Brampton, ON L6T 4B9
Telephone: 905.791.7800
Monday-Friday: 8:00am to 5:00pm
Weekends: Closed

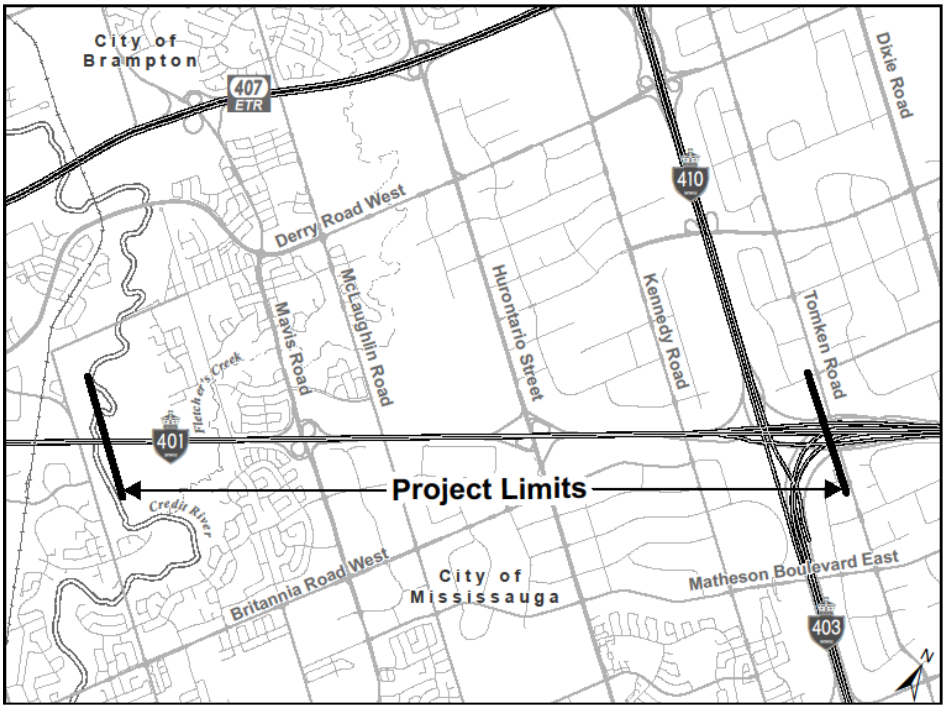
Ce document hautement specialise n'est disponsible qu'en anglais en vertue du reglement 411/97, qui en exempte l'application de Ia Loi sur les services en français. Pour de l'aide en français, veuillez communiquer avec le ministere des Transports, Bureau des services en français au: 905-704-2045 ou 905-704-2046.

Executive Summary

In 2011, the Ministry of Transportation (the Ministry, or MTO) retained AECOM Canada Limited (AECOM) to carry out the detail design for the ultimate widening of Highway 401 from the Highway 403/410 interchange to east of the Credit River, a distance of 7 km under GWP 2150-01-00. The project will complete the expansion of Highway 401 within the project limits from its current 6 lanes to a 12-lane core/collector system, as documented in the Transportation Environmental Study Report (TESR) for the *Preliminary Design of Highway 401 From Highway 410/403 Interchange to East of the Credit River (GWP 2149-01-00 and GWP 2150-01-00)*, August 2005. The TESR was approved in 2007 with Minister's Conditions.

The project area is shown on Figure E-1.

Figure E-1. Project Area



The proposed improvements are required to address deteriorating operating conditions, create opportunities for high occupancy vehicle infrastructure and incorporate existing and future traffic demands. The project will assist in facilitating the efficient and safe movement of goods and people to ensure the economic vitality of communities along the highway and throughout the province. This project is listed on the *2015-2019 MTO Southern Highways Program*, therefore funding has been secured for construction.

In order to accelerate the construction schedule, the detail design for the lengthening of the Mavis Road bridge over Highway 401, including associated interchange improvements, was completed and undertaken as a separate advance contract. In addition, the detail design for two (2) new ramps from Highway 401 eastbound to Highway 403 southbound and from Highway 403 northbound to Highway 401 westbound at the Highway 401/410/401 interchange was completed under the same contract. A Design and Construction Report (DCR) documenting the recommended design and associated environmental impacts and mitigation for GWP 2152-01-00 and GWP 2150-01-00 was filed for the 30-day review period from January 31, 2014 to March 3, 2014.

Through discussions with the City of Mississauga, it was requested to have the MTO study the need for a future extension of Belgrave Road from the Highway 401 eastbound off-ramp at Mavis Road easterly to the existing cul-de-sac west of Suffolk Court – a distance of approximately 200 m. The extension will provide a future direct connection to Mavis Road, thereby improving traffic service to commercial and industrial areas to the east. Consistent with the MTO Class EA, a TESR Addendum was prepared to document the design changes and associated environmental impacts to accommodate both the Highway 401 widening and the extension of Belgrave Road. The TESR Addendum was filed for the 30-day review period from June 10, 2015 to July 10, 2015. Please refer to Section 2.9.

This DCR has been prepared to document the detail design for the remainder of the highway expansion work (i.e., mainline from west of Hurontario Street to the Credit River).

Since more than five (5) years has passed since the 2005 Notice of Submission of the TESR (environmental clearance from the Minister was received in 2007), a five-year review was undertaken of the detail design and is provided in Section 3.3 of this DCR.

The proposed work for the ultimate widening of the Highway 401 from the Highway 403/410 interchange to the Credit River at a distance of seven (7) km will include:

- Expansion of Highway 401 from its current 6-lanes to a 12-lane core/collector system;
- Collector lanes consisting of three (3) general purpose lanes in each direction;
- Core lanes consisting of two (2) general purpose lanes and one (1) High Occupancy Vehicle (HOV) lane in each direction;
- HOV lanes from west of Mavis Road to east of Highway 410 to be opened following construction completion;
- Removal of the Second Line West structure over Highway 401 to accommodate the highway widening;
- New structures carrying the proposed collector lanes over Fletcher's Creek;
- Stormwater management strategy;
- High mast illumination on Highway 401 throughout the project limits; and
- Reconstruction of the existing highway pavement.

Government agencies, Aboriginal communities, municipalities, emergency service providers, interest groups and utility companies were notified at the beginning of the project in June 2011. The general public was notified via newspaper advertisements and letters, informing them of the project and to solicit their comments. A Public Information Centre was held in November 2013. Notification of the event occurred through advertisements in newspapers and direct mailings to the project contact list. Meetings were held with the City of Mississauga, Ministry of Natural Resources and Forestry, Credit Valley Conservation at key project milestones. Please refer to Section 2.

The Ministry of Natural Resources and Forestry (MNRF), Aurora Office has confirmed that Fletcher's Creek has been designated as habitat for Redside dace (*Clinostomus elongates*). Redside dace is listed as 'Endangered' under Ontario's *Endangered Species Act* (ESA, 2007) in which Section 9 prohibits harmful actions such as killing, harming, harassing and/or possession of this species. The MNRF has determined that the activities associated with this project will adversely affect Redside Dace and its habitat and therefore would be prohibited under Section 9 (species protection) and/or Section 10 (habitat protection) of the ESA 2007. In order to avoid contravention of the ESA 2007, a permit under Section 17(2)(c) will be obtained for works to proceed. Please refer to Section 4.1.1.

The MNRF has also confirmed the existence of active breeding ponds for Jefferson salamander (*Ambystoma jeffersonianum*) in Meadowvale Station Woods on the north side of Highway 401. Through discussions with the MNRF, a retaining wall will be constructed on the north side of Highway 401, from west of Second Line West to the western edge of the Meadowvale Station Woods ESA/ANSI as a measure of reducing the amount of vegetation removal within Jefferson Salamander regulated habitat. The construction of the retaining wall will effectively avoid the need for a permit under the *ESA*. Please refer to Section 4.1.2.10.

Mitigation measures developed for this project will be employed during the implementation of the recommended highway improvements to reduce or avoid environmental impacts. Please refer to Section 4.

Table of Contents

List of Figures

List of Tables

Appendices

1. Introduction

1.1 Summary Description of the Undertaking

In 2011, the Ministry of Transportation (the Ministry, or MTO) retained AECOM Canada Limited (AECOM) to carry out the detail design for the ultimate widening of Highway 401 from the Highway 403/410 interchange to east of the Credit River, a distance of 7 km under GWP 2150-01-00. The project will complete the expansion of Highway 401 within the project limits from its current 6 lanes to a 12-lane core/collector system, as documented in the Transportation Environmental Study Report (TESR) for the *Preliminary Design of Highway 401 From Highway 410/403 Interchange to East of the Credit River (GWP 2149-01-00 and GWP 2150-01-00)*, August 2005. The TESR was approved in 2007 with Minister's Conditions.

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Since more than five (5) years has passed since the 2005 Notice of Submission of the TESR (environmental clearance from the Minister was received in 2007), a five-year review was undertaken of the detail design and is provided in Section 3.3 of this DCR.

The project works for the expansion of Highway 401 from its current 6-lanes to a 12-lane core/collector system will include:

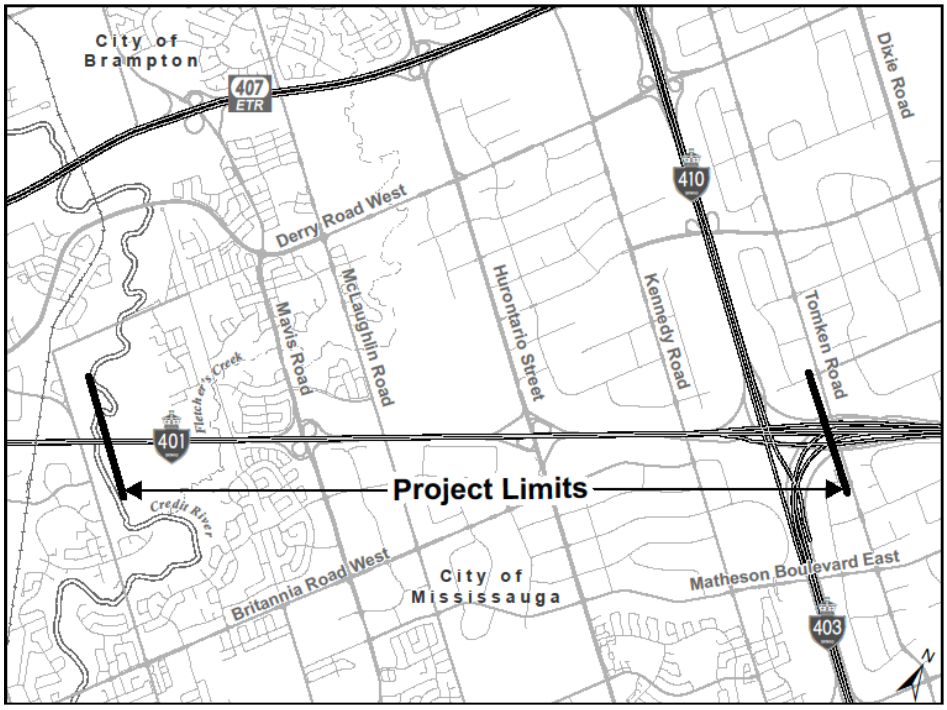
- Collector lanes consisting of three (3) general purpose lanes in each direction
- Core lanes consisting of two (2) general purpose lanes and one (1) High Occupancy Vehicle (HOV) lane in each direction
- HOV lanes from west of Mavis Road to east of Highway 410 to be opened following construction completion
- Removal of the Second Line West structure over Highway 401 to accommodate the highway widening

- New structures carrying the proposed collector lanes over Fletcher's Creek
- Stormwater management strategy
- High mast illumination on Highway 401 throughout the project limits
- Reconstruction of the existing highway pavement
- Provision for the Belgrave Road connection at Highway 401/Mavis Road interchange.

Further details are provided in Section 3 of this report.

The project area is shown on Figure 1-1.

Figure 1-1. Project Area



1.2 Related Studies

The following is a list of related studies within the Highway 401 corridor, in the vicinity of this project:

- **W.O. 07-20021 Highway 401 Improvements from East of the Credit River to Trafalgar Road (*Completed*)**
  A Preliminary Design and Class Environmental Assessment Study to identify the capacity and operational needs for this section of the Highway 401 corridor.
- **W.O. 07-20024 Highway 401 Improvements from Trafalgar Road to Regional Road 25 (*Completed*)**
  A Preliminary Design and Class Environmental Assessment Study to identify the capacity and operational needs for this section of Highway 401.
- **GTA West Corridor Environmental Assessment (EA) Study (*Ongoing*)**
  Individual EA Study to examine interregional long-term transportation needs between Highway 400 in York Region to Highway 401 in the Regions of Wellington and Halton to 2031 and to consider alternative solutions to provide better linkages between urban Growth Centres, including Downtown Guelph, Downtown Milton,

Brampton city Centre and Vaughan Corporate Centre, as identified in the *Growth Plan for the Greater Golden Horseshoe*, 2006.

1.3 Overview of the Class Environmental Assessment Process

1.3.1 Ministry of Transportation Class Environmental Assessment for Provincial Transportation Facilities

The Ministry of Transportation (MTO) Class Environmental Assessment for Provincial Transportation Facilities (Class EA) was approved under the *Ontario Environmental Assessment Act* (*OEAA*) in the Fall of 1999 and amended in 2000. This planning document defines the group of projects and activities and the environmental assessment processes that MTO has committed to follow for these projects. Provided that this process is followed, projects and activities included under the Class EA do not require formal review and approval under the *OEAA*.

The projects and activities in the Class EA are classified into four groups; this project is following the Class EA process for Group 'B' projects, which include: improvements to existing highways and freeways, new interchanges or modifications to traffic access, improvements to provincial transitways and ferryboat docks/terminals, and the establishment/improvement of provincial transportation facilities.

As required under the Class EA, four (4) formal EA documents have been developed for this project. They include:

- *GWP 2149-01-00 and 2150-01-00 Highway 401 Improvements, From Highway 410/403 Interchange to East of the Credit River Transportation Environmental Study Report* 2005, approved 2007 to document Preliminary Design
- *GWP 2152-01-00 and 2150-01-00 Highway 401/Mavis Road Interchange and New Ramps at the Highway 401/410/403 Interchange Design and Construction Report* 2014 to document the reconstruction of the Mavis Road interchange
- *GWP 2149-01-00 and 2150-01-00 Highway 401 Improvements, Highway 410/403 Interchange to East of the Credit River Transportation Environmental Study Report Addendum* (2015) to document the design changes and associated environmental impacts to accommodate both the Highway 401 widening and the extension of Belgrave Road
- This *Design and Construction Report*, prepared to document detail design for the remainder of the Highway 401 mainline expansion work.

The key steps in the detail design process are highlighted in Figure 1-2.

1.3.2 Transportation Environmental Study Report (August 2005)

The Ministry of Transportation has previously undertaken a review of Highway 401 improvements from the Highway 401/403/410 interchange to east of the Credit River. The recommended improvements were outlined in the *Transportation Environmental Study Report, Highway 401 Improvements* [*GWP 2149-01-00 and GWP 2150-01-00]* (August 2005) which received environmental clearance from the Minister of the Environment on July 17, 2007.

1.3.3 Purpose of the Design and Construction Report

This Design and Construction Report (DCR) has been prepared to document the development of the transportation plan to the design implementation level of detail and includes the process requirements of the Class EA for Provincial Transportation Facilities.

The Class EA and detail design process includes the following:

- EA study process that complies with the Class EA for Provincial Transportation Facilities (2000)
- Consultation with stakeholders
- Development of the recommended plan (building on the preferred preliminary plan)
- Identification of key environmental concerns associated with the recommended plan
- Incorporation of the environmental protection/mitigation into the design
- Development of environmental protection/mitigation requirements during construction
- An environmental monitoring/inspection program for project implementation
- Post-construction environmental protection/mitigation.

In undertaking the above, this DCR documents the design and construction contract requirements and fulfills commitments made during the preliminary design phase, as provided in the 2005 TESR.

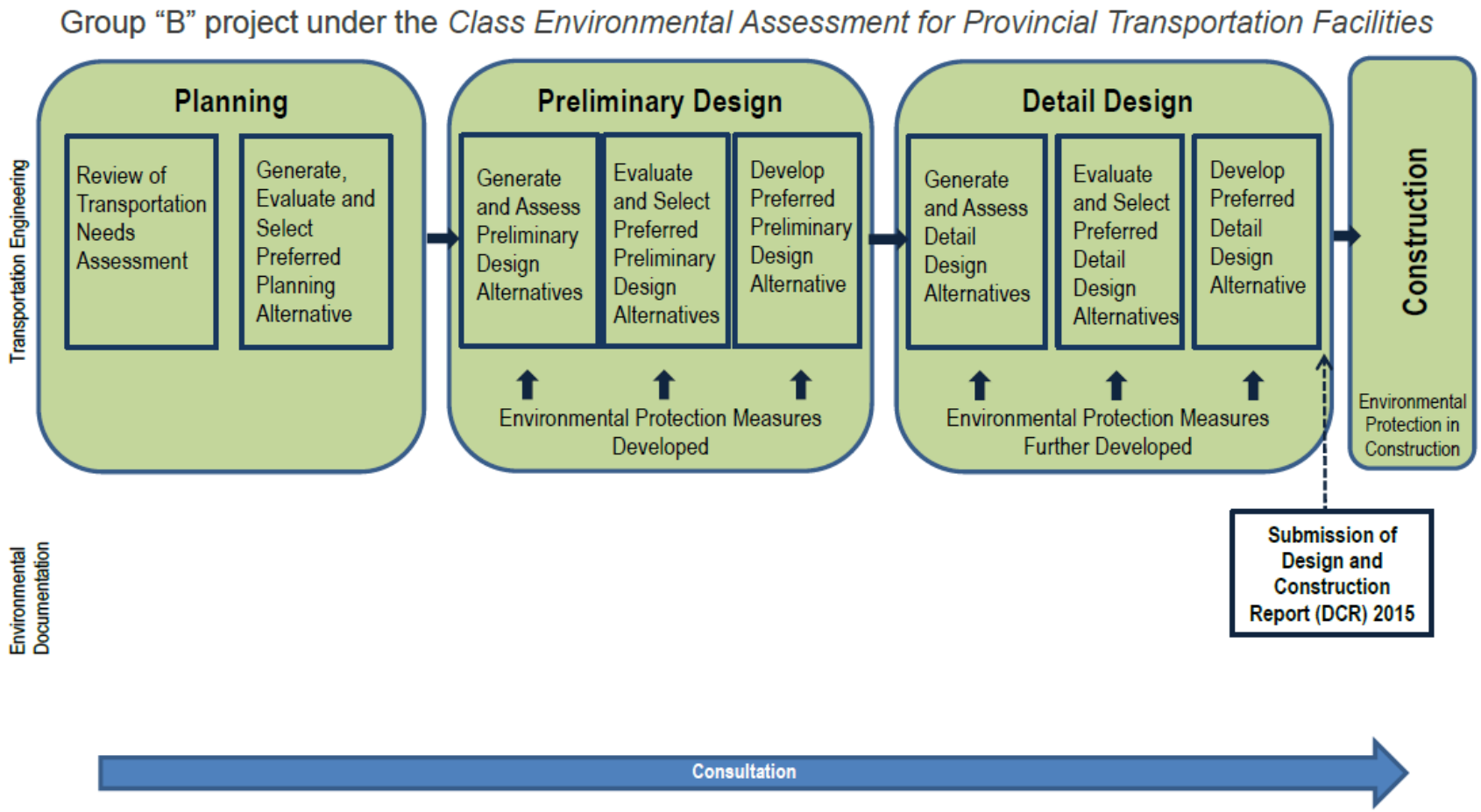
The DCR will be made available for a 30-day review period for external agencies and for the public. Any concerns raised by members of the public, interested groups or technical and external agencies during this review period should be discussed with the MTO or their consultant and all comments received during the review period will be considered by the MTO. As this project has already met the requirements of the *OEAA*, the DCR is not eligible for a request that the Minister of the Environment make a Part II Order ("bump-up") of the project, thereby requiring an individual environmental assessment.

Additional information about this project is also available by contacting key Project Team members, as follows:

Mr. John Klowak, P.Eng.
Consultant Project Manager
AECOM Canada Limited
30 Leek Crescent
Richmond Hill, ON L4B 4NK
Tel: 905-882.4401
Fax: 905-882.4399
Email: John.Klowak@aecom.com

Mr. Paul Ahn, P.Eng.
MTO Project Engineer
Highway Engineering, Peel & Halton
1201 Wilson Avenue, 4th Floor
Downsview, ON, M3M 1J8
Phone: 416-235-4949
Fax: 416-235-3576
Email: Paul.Ahn@ontario.ca

Figure 1-2. Study Process



1.3.4 Canadian Environmental Assessment Act, 2012

The Canadian Environmental Assessment Act (CEAA) was repealed and replaced with CEAA 2012 which received Royal Assent on July 6, 2012. Changes to CEAA include replacing "triggers" with the CEAA 2012 Regulation Designating Physical Activities list. A proponent is not required to complete the federal EA Process if a project is not on this list. It has been determined that the Highway 401 Widening from Highway 403/410 Interchange to Credit River does not include physical activities identified on the list and is therefore not a Designated Project. Therefore this project is not subject to the federal EA process.

1.4 Environmental Protection Requirements

1.4.1 Endangered Species Act 2007

'Endangered' is defined as a species facing imminent extinction or extirpation in Ontario.

Subsection 9(1) of the *Endangered Species Act, 2007* (ESA) states in part that:

> *No person shall,*
> *(a) Kill, harm, harass, capture or take a living member of a species that is listed on the Species at Risk in Ontario List as an extirpated, endangered or threatened species.*

Clause 10(1)(a) of the ESA states that:

> *No person shall damage or destroy the habitat of a species that is listed on the Species at Risk in Ontario List as an endangered or threatened species.*

Provided the applicable legislated requirements in subsection 17(2) of the ESA are met, the Minister may issue a permit to a person under subsection 17(1) of the Act that authorizes the person to engage in an activity that would otherwise be prohibited by subsection 9(1) or 10(1) of the *Act*. Of relevance to the proposed Highway 401 undertaking is the 17(2)(c) permit. This permit may be issued for authorizing activities where the activity:

> *Has the main purpose not to assist in the protection or recovery of the species, but through specific and mandatory conditions outlined in the permit will result in an overall benefit to the species within a reasonable time.*

As confirmed by the Ministry of Natural Resources and Forestry (MNRF) Aurora Office, Fletcher's Creek has been designated as habitat for Redside dace (*Clinostomus elongates*). Redside dace is listed as 'Endangered' under Ontario's *Endangered Species Act* (ESA, 2007) in which Section 9 prohibits harmful actions such as killing, harming, harassing and/or possession of this species. The MNRF has determined that the activities associated with this project will adversely affect Redside Dace and its habitat and therefore would be prohibited under Section 9 (species protection) and/or Section 10 (habitat protection) of the ESA 2007. In order to avoid contravention of the ESA 2007, a permit under Section 17(2)(c) is required for works to proceed.

The MNRF has also confirmed the existence of active breeding ponds for Jefferson salamander (*Ambystoma jeffersonianum*) in Meadowvale Woods on the north side of Highway 401. In this case, Jefferson salamander regulated habitat is considered an area that is within 300 m of the confirmed breeding pond which provides suitable foraging, dispersal, migration or hibernation conditions and any wetland, pond or vernal/temporary pool that would provide suitable breeding conditions. Through discussions with the MNRF, a strategy has been developed to effectively avoid the need for a permit for the Jefferson Salamander, which will be discussed later in this report.

1.4.2 Migratory Birds Convention Act, 1994

The federal *Migratory Birds Convention Act* is applied through:

The Regulations Respecting the Protection of Migratory Birds that states that "[…] no person shall disturb, destroy or take a nest, egg […] of a migratory bird." This law protects all birds aside from the introduced species European Starling (*Sturnis vulgaris*), House Sparrow (*Passer domesticus*), and Rock Pigeon (*Columba livia*). Bird nests that are destroyed during the course of construction and other related activities is referred to as "incidental take" and is illegal except under the authority of a permit obtained through the Canadian Wildlife Service (CWS).

Requirements under the *Migratory Birds Convention Act* would apply to this project at the time of pre-construction vegetation clearing and during construction, should nests be found. No vegetation clearing will be permitted during the nesting period. Generally, the period during which vegetation clearing is prohibited is between the end of March to August 15.

2. Consultation Process

The consultation for this Class EA and detail design project that is described in the following sub-sections builds upon the consultation developed and undertaken during the preliminary design and EA.

2.1 Consultation Plan

A consultation plan for this detail design assignment was prepared in recognition of the integral role that stakeholders play in the project process. The stakeholders groups include the following:

- General public, including adjacent property owners
- Federal and provincial government agencies (including conservation authorities)
- Municipal staff and councils
- Utility companies.

In keeping with the MTO protocol, First Nations were consulted as nations rather than as stakeholders.

The consultation plan was designed to fulfill the following objectives:

- Ensure that the stakeholder groups identified above and First Nations have an opportunity to participate in the project process, as well as contribute to decisions at an appropriate time
- Ensure that factual information was provided to stakeholders and First Nations, as soon as reasonably possible
- Make contact with government agencies to obtain background technical information and policy advice
- Make contact with owners of adjacent property that may be impacted by the project recommendations.

The details of the consultation plan were consistent with the consultation requirements of MTO's *Class Environmental Assessment for Provincial Transportation Facilities* (2000) and *Environmental Reference for Highway Design* (2013) and are provided in the following subsections.

Stakeholder input was incorporated into the project findings and recommendations, as appropriate and written responses were provided to all written stakeholders input (letters, emails, Public Information Centre (PIC), comment sheets).

All project correspondence to/from the public was collected in accordance with the *Freedom of Information and Protection of Privacy Act.* Accordingly, with the exception of personal contact information, all public comments are part of the public record.

2.2 Project Contact

A project contact/mailing list was developed and continually updated to support mailing out of letters at the following points of the study:

- Notice of Commencement
- Notice of Public Information Centre (PIC)
- Notice of TESR Addendum (Belgrave Road extension)
- Notice of DCR Filing.

The project contact/mailing list initially included First Nations, federal government agencies, area Members of Provincial Parliament (MPP), Members of Parliament (MP), provincial government agencies (including conservation

authorities), municipal staff and politicians, the owners of property from whom land is required and members of the public who had requested to be kept on the mailing list from the 2005 EA. The project mailing list was also updated from comments received following the issuance of the Notice of Commencement, Notice of PIC and those received through the project website. The number of contacts on this list increased as the overall project proceeded.

2.3 Notification of Project Commencement

The Notice of Commencement of detail design was placed in the following newspapers:

- Toronto Star (English) – Tuesday, June 21, 2011
- Mississauga News (English) – Wednesday, June 22, 2011
- L'Express de Toronto (French) – Tuesday, June 28, 2011.

The Notice provided details regarding the process to be followed, solicited input from interested and affected parties, requested members of the public to identify themselves if they wished to be added to the project mailing lists and provided the address, telephone number and email address of both the MTO and AECOM Project Managers.

External agencies (including government agencies, municipalities) and utility companies were first notified of the start of detail design electronically, via e-mail on June 21, 2011 due to a nation-wide Canada Post strike. Once Canada Post resumed mailing operations, a hard-copy notification, which included a map and External Agency Comment Sheet, was mailed on June 27, 2011. Input was requested by July 25, 2011. First Nations were notified of project commencement on June 20, 2011.

Copies of the notice, emails and letters are provided in **Appendix A**.

2.4 Project Website

A website for the overall project was developed to provide background information and project updates: www.401expansion-mississauga.ca. Visitors to the website were also given an opportunity to submit comments directly to the MTO Project Manager.

2.5 Consultation with External Agencies

The federal, provincial and municipal governments, along with MPs and MPPs that were contacted during this project include the following:

Federal Agencies
- Canadian Environmental Assessment Agency
- Fisheries and Oceans Canada
- Environment Canada
- Aboriginal Affairs and Northern Development Canada
- Transport Canada
- Canadian Transportation Agency
- NAVCanada

Provincial Agencies
- Ministry of Aboriginal Affairs
- Ministry of Agriculture and Food
- Ministry of Energy and Infrastructure

Municipal Agencies
- Region of Peel
- Peel Region Police
- City of Mississauga
- City of Brampton
- Peel District School Board
- Dufferin-Peel Catholic District School Board
- TransHelp
- Mississauga Board of Trade

MP & MPPs
- MPP, Mississauga-Streetsville
- MP, Mississauga-Streetsville
- MPP, Mississauga-Brampton South

- Ministry of Environment and Climate Change
- Ministry of Natural Resources and Forestry
- Ministry of Municipal Affairs and Housing
- Ministry of Tourism, Culture and Sport
- Credit Valley Conservation Authority
- Toronto and Region Conservation Authority
- Ontario Provincial Police
- GO Transit and Metrolinx
- MP, Mississauga-Brampton South

Consultation with government agencies facilitated identification of key issues/concerns and working to cooperatively develop mutually agreeable planning solutions/strategies in a timely manner.

As the project progressed, government agencies were provided with notification of the PIC and notification of the filing of the DCR. Follow-up was undertaken during the project as appropriate, with respect to issues and concerns that were identified.

A summary of specific issues raised (including reference to the respective agency) during the project is provided below.

City of Mississauga

Meetings were held with the City of Mississauga to discuss opportunities for the City and MTO to work together and identify issues and solutions to benefit both parties. Items of discussion directly related to this project included traffic staging during reconstruction of the Mavis Road interchange, removal of Second Line West bridge crossing and a future extension of Belgrave Road from the Highway 401 eastbound off-ramp at Mavis Road easterly to the existing cul-de-sac west of Suffolk Court (documented in an Addendum to the 2005 TESR in June 2015). Meeting minutes are provided in **Appendix A**.

Ministry of Natural Resources and Forestry

Meetings were held with the Ministry of Natural Resources and Forestry (MNRF) - Aurora District, throughout the project to identify and develop mitigation strategies to minimize impacts on sensitive species, as well as develop an overall benefit through the design of the highway widening for those Species at Risk to be impacted by the proposed works. Meeting minutes are provided in **Appendix A**.

Credit Valley Conservation Authority

A meeting was held with the Credit Valley Conservation Authority (CVC), together with the MNRF and the City of Mississauga on November 25, 2011 (as described above). Meeting minutes are provided in **Appendix A**.

Ministry of the Environment and Climate Change

Meetings were held in February and July 2013 with the Ministry of the Environment and Climate Change (MOECC), together with CVC and MNRF, to discuss and obtain buy-in for the updated stormwater management strategy. An additional meeting will be held in September 2015 with the MOECC, CVC, MNRF and the City of Mississauga to discuss and obtain buy-in for the restoration/compensation strategy in order to satisfy the Minister's Conditions of EA approval for vegetation removals within Meadowvale Station Woods Environmentally Sensitive Area.

2.6 Consultation with First Nations

The First Nations and First Nations agencies contacted as part of the project, included:

- Union of Ontario Indians, Nipissing First Nation
- Association of Iroquois and Allied Indians
- Coordinator for the Williams Treaties
- Mississauga of Scugog Island First Nation
- Chippewas of Georgina Island First Nation
- Chippewas of Mnjikaning First Nation
- Hiawatha First Nation
- Beausoleil First Nation
- Alderville First Nation
- Curve Lake First Nation
- Mississaugas of the New Credit First Nations
- Six Nations Haudensaunee Confederacy Council
- Six Nations of the Grand River Territory
- Métis Consultation Unit
- Credit River Métis Council

As the design progressed, First Nations were provided with notification of the PIC and Notification of Submission for the DCR.

2.7 Consultation with Utility Companies

The following utility companies were contacted to identify conflicts which may result from the project:

- Bell Canada
- Enbridge Gas Distribution Inc.
- Rogers Cable
- Hydro One
- Trans Northern Pipelines
- Greater Toronto Airport Authority
- Orangeville-Brampton Railway.

As the design progressed, utility companies were provided with notification of the PIC and Notification of Filing of the DCR.

2.8 Public Information Centre (PIC)

2.8.1 Notification of the PIC

The Notice of PIC was advertised in English and French in the following newspapers:

- Toronto Star (English) – Wednesday, November 6, 2013
- Mississauga News (English) – Wednesday, November 6, 2013
- L'Express de Toronto (French) – Tuesday, November 5, 2013.

The Notice provided the PIC purpose, location, timing and format; invited stakeholders to attend; and provided the address, telephone number and email address of both the MTO and AECOM Project Managers. The Notice directed individuals to consult the website for project details and material presented at the PIC.

Notification letters (with a copy of the Notice) were mailed on October 30, 2013, to the names on the project contact/mailing list, including:

- Government agencies and municipalities
- Utility companies
- First Nations.

Affected property owners and individuals that had requested to be added to the mailing list were notified on November 4, 2013.

A copy of the external agency notification materials, including newspaper advertisement, and notification letter are available in **Appendix A**.

2.8.2 PIC Organization and Logistics

The PIC was held on Wednesday, November 13, 2013 at Meadowvale Village Hall, 6970 Second Line West, and Mississauga, Ontario between 3:00 pm and 4:00 pm for external agencies and First Nations and between 4:00 pm and 8:00 pm for the general public. The PIC was held to inform attendees of the key findings and recommendations of the project and to receive and respond to questions, comments and concerns. The overall format for the PIC was an informal drop-in centre setting, whereby participants could view display boards containing information about the project and speak one-on-one with MTO personnel and/or AECOM Project Team representatives. The following display boards were shown at the PIC:

- Welcome to the PIC
- Purpose of the PIC and Purpose of the Project
- Project Background
- Design Features
- Class Environmental Assessment Process
- Existing Environmental Conditions – Natural Environment
- Existing Environmental Conditions – Socio-Economic Environnent
- Noise Assessment
- Key Changes from the 2005 TESR
- Fletcher's Creek Crossing (two (2) slides)
- Lighting System Improvements including Existing and Proposed Illumination Plan (two (2) slides)
- Construction Staging – Mavis Road
- Proposed Construction Staging – Removal of the Second Line West;
- Potential Environmental Impacts and Mitigation for the Natural and Socio-Economic and Cultural Environments (2 slides)
- Proposed Belgrave Extension (2 slides)
- Next Steps in the Class EA Process
- Remain Involved in the Project.

The presentation materials were uploaded to the project website. In addition, roll plans were presented that displayed the proposed design and construction staging. A copy of the display boards can be seen in **Appendix A**. It is noted that one (1) PIC was held during detail design for the entire Highway 401 expansion project from Highway 403/410 interchange to the Credit River, which includes the design features that are the subject of this DCR.

Participants were encouraged to fill in and submit a Comment Sheet to gauge feedback on the project. Comment sheets could be submitted during the PIC or emailed/faxed/mailed to members of the Project Team by December 13, 2013.

Project Team representatives from MTO and AECOM present at the PIC included the following:

Ministry of Transportation	AECOM Canada Limited
Ms. Miao Zhou – Senior Project Manager	Mr. Brian Ruck – Project Manager
Mr. Larry Sarris – Environmental Planner	Ms. Mirjana Osojnicki – Environmental Planner
Ms. Astrid Poei – MTO Communications	Mr. David McNull – Highway Engineer
MTO Property Representatives	

2.8.3 PIC Attendance

Over the course of the afternoon/evening, twenty-six (26) individuals signed in/attended. Attendees included local residents, a representative from the Mississauga Fire and Emergency Services, City of Mississauga Councillor and other members of the public interested in the project.

2.8.4 Summary of PIC Participant Feedback

The following agency correspondence was received from the Public Information Centre Notification (**Appendix A**). As noted above, the PIC held in November, 2013 was for the entire Highway 401 expansion from west of Hurontario Street to the Credit River.

Table 2-1. Agency Correspondence from Public Information Centre Notification

Agency	Comment	Response/Action
Alderville First Nation Letter received November 5, 2013	As per the Alderville First Nation Consultation Protocol, this project is deemed a Level 3, having minimal potential to impact our First Nations' rights. Request to be kept apprised of any archaeological findings, burial sites or any environmental impacts.	Comment noted and will be included in contract documentation.
Peel District School Board Letter received November 8, 2013	Peel District School Board is interested in this project since there is a school in the vicinity of the project area. Request to be informed of project updates.	Will update, as required.
Region of Peel (Transportation) Email received November 11, 2012	Advised of staff changes and request to update contact information.	Project mailing list updated.
Region of Peel (Planning) Email received November 27, 2013	Advised of staff changes and request to update contact information.	Project mailing list updated.
Curve Lake First Nation Email received December 2, 2013	Please notify if human remains or artifacts are encountered.	Comment noted and will be included in contract documentation.
Ministry of Aboriginal Affairs Email received December 11, 2013	Project appears to be located in an area where First Nations may have existing or asserted rights or claims in Ontario's land claims process or litigation that could be impacted by your project. Advised to contact the Mississaugas of New Credit First Nation.	Mississaugas of the New Credit First Nation are on the project mailing list. No Action.
Peel District School Board Email received December 10, 2013	Inquiry whether sound fencing will be incorporated into the highway design as Peel District School Board has a secondary school located just north of the study area.	MTO's noise policy does not require sound attenuation for education facilities located adjacent to an existing highway; hence there is no warrant for noise control adjacent to the school.

2.8.4.1 Comments Received

There were no comment sheets submitted during the PIC, however several individuals took comment sheets with them, while others indicated that they may submit comments via email or the project website. Comments received and responses provided following the PIC are found in **Appendix A**.

Relevant verbal comments received at the PIC specific to the content of this DCR are recorded in Table 2-2.

Table 2-2. Verbal Comments Received at the Public Information Centre

Comment	Response
Mississauga Fire and Emergency Services representative inquired about the timing of construction and advised that further discussion between MTO and EMS will be required prior to construction.	Comments noted.
Two (2) individuals requested website information.	AECOM staff provided the project website address.
Three (3) individuals inquired about the timing of construction.	AECOM/MTO staff advised at that time the estimated construction commencement for the Mavis Road structure will be in 2014.
City Councillor inquired about the need for noise barriers at the Mavis road/Highway 401 interchange, as well as the timing of the removal of the Second Line West structure.	MTO advised that an updated Noise review was conducted during detail design and determined that noise barriers are not warranted and provided updated scheduling information. City staff also advised the Councillor of the planned study for a pedestrian/cycling crossing of Highway 401 once the Second Line structure is removed.
Two (2) residents inquired about the timing of the removal of the Second Line West structure and indicated their support of the removal. As long-time Second Line West residents, they have known about the removal for a very long time and believe that the closure of the road will increase the value of their existing home and a new house they are building next door.	AECOM/MTO staff provided updated scheduling information regarding for the removal of the Second Line West structure and subsequent construction of the Highway 401 mainline contract.
One (1) individual inquired about light spillage from the high mast lighting into residential areas.	AECOM advised that high mast lighting is being designed to minimize light spillage into residential areas through the use of shielded luminaries.
Three (3) residents inquired about a pedestrian crossing of Highway 401 following the removal of the Second Line West structure.	City of Mississauga Staff advised that the City will be undertaking a separate Municipal Class EA Study for a new pedestrian/cycling crossing of Highway 401.
One (1) individual inquired about the Species at Risk (SAR) within the study area and potential impacts of the highway widening to Meadowvale Station Woods.	MTO staff advised that there is SAR with habitat within the project area. MTO is in the process of obtaining a permit under the *Endangered Species Act*, 2007 and has met several times with the MNR. Further discussions are planned.
Two (2) individuals inquired about noise impacts from the widening of Highway 401. Both are residents in the vicinity of Mavis Road and Highway 401 and wondered if noise barriers would be installed.	MTO advised that an updated Noise review was conducted during detail design and determined that noise barriers are not warranted.

A summary of relevant public comments received following the Public Information Centre is provided in Table 2-3.

Table 2-3. Summary of Public Comments Received Following the Public Information Centre

Number of Comments	Comments
Four (4)	Request to be added to the project mailing list.
Sixteen (16)	Residents raised concerns that Highway 401 will be widened; however a noise wall will not be installed for the northwest corner of the Mavis Road and Highway 401. Also expressed concern for safety and quality of life.
Nine (9)	Residents were not aware that a meeting was being held.
Six (6)	Resident inquired if there will be another meeting held to discuss noise impacts/solutions at the northwest corner of Highway 401/Mavis Road.
One (1)	Resident inquired about the schedule for the removal of the Second Line West structure and the status of the Creditview Road bridge over Highway 401.
One (1)	Resident raised concerns and provided possible solutions for vehicular travel once the Second Line West structure is removed.
One (1)	Resident raised concern about traffic on Sombrero Way

2.9 Filing of the Addendum to the Transportation Environmental Study Report

The Ontario Government Notice of Filing of the Addendum to the Transportation Environmental Study Report (TESR) was placed in the following newspapers:

- Mississauga News (English) – June 5, 2015
- L'Express de Toronto (French) – June 3, 2015.

It should be noted that the Notice of TESR Addendum Filing was not published in the Toronto Star; this change was identified during the Public Information Centre in November 2013.

2.10 Filing of the Design and Construction Report

The Ontario Government Notice of Filing of the DCR is being placed in the following newspapers:

- Toronto Star (English) – September 2, 2015
- Mississauga News (English) – September 4, 2015
- L'Express de Toronto (French) – September 8, 2015.

The notice will announce the commencement of the 30-day public and regulatory agency review period for the DCR, the locations where the DCR can be viewed and the closing dates for comments to be submitted.

Notification letters for the filing of the DCR (with a copy of the Notice) will be provided to the names on the project contact/mailing list.

3. Detailed Description of the Recommended Design

The purpose of this section is to:

- Provide major features of the recommended design
- Outline construction staging
- Emphasize the environmental protection/mitigation components of the recommended design
- Provide an assessment of Class EA requirements with respect to detail design refinements incorporated into the recommended plan.

The recommended plan is outlined in Section 1.1 and the details are provided in the sub-sections below. Drawings of the recommended plan are provided in **Appendix B** of this report.

3.1 Major Features of the Proposed Work

The proposed work for the widening of the Highway 401 from 403/410 interchange to Credit River will include:

- Expansion of Highway 401 from its current 6-lanes to a 12-lane core/collector system
- Collector lanes consisting of three (3) general purpose lanes in each direction
- Core lanes consisting of two (2) general purpose lanes and one (1) High Occupancy Vehicle (HOV) lane in each direction
- HOV lanes from west of Mavis Road to east of Highway 410 to be opened following construction completion
- Removal of the Second Line West underpass over Highway 401 to accommodate the highway widening
- New structures carrying the proposed collector lanes over Fletcher's Creek
- Stormwater management strategy
- High mast illumination on Highway 401 throughout the project limits
- Reconstruction of the existing highway pavement
- Provision for the Belgrave Road connection at Highway 401/Mavis Road interchange.

3.1.1 Roadside Safety Improvements

A clear zone will be provided in accordance with the Roadside Safety Manual and Central Region directives. For the through lanes on the highway, the minimum clear zone requirement is 10 m on tangent. A 10 m clear zone will be provided for the temporary detours which satisfies a 120 km/hr design speed for Highway 401 mainline construction. Safety features include:

- Tall Wall median barrier
- Concrete barrier in the outer separators and where appropriate for treatment of roadside hazards
- Rumble strips will be provided along Highway 401 in accordance with Ministry policy.

Slope flattening (4:1 or flatter) is preferred for the disposal of excess material and with the intent of eliminating a guiderail and/or roadside protection systems. Foreslopes of 4:1 are included, where feasible in the corridor.

3.1.2 Operational Safety Improvements

As a measure of improving operational safety, diamond grooving will be utilized on the constructed section of Highway 401 east of Mavis Road to Highway 410/403 interchange, as part of this contract.

3.1.3 Structures

There are four (4) structures within the project limits, as listed below:

3.1.3.1 Site# 24-736 1&2 – Mavis Road Underpass (Currently under construction – anticipated completion Summer 2016)

- Existing 6-lane bridge with sidewalks to be maintained – no proposed deck widening;
- Includes the construction of two (2) new spans to accommodate the Highway 401 collector lanes; and
- Existing and proposed vertical clearances exceed 5.0 m requirement for all spans.

***A separate Design and Construction Report was completed for the extension of the Mavis Road interchange in January 2014 under GWP 2152-01-00.*

3.1.3.2 Site# 24-129-C – Fletcher's Creek Culvert

- Existing 48.8 m long concrete box culvert with two cells to be removed and replaced with two (2) new CPCI girder bridge type structures (69 m width/24 m length & 19 m wide/26 m length).

3.1.3.3 Site# 24-130 – Second Line West Underpass

- Existing crossing is a 2-lane, 10.4 m wide 4-span continuous concrete T-beam bridge that will be removed in order to accommodate the widening of the highway;
- City of Mississauga will be constructing a pedestrian/cyclist structure at the same location as the existing vehicular underpass, once it is removed (a separate Schedule 'C' Municipal Class Environmental Assessment was completed by the City of Mississauga in January 2015). The proposed pedestrian/cyclist structure will be a three-span steel box girder bridge with two (2) piers between the future Highway 401 core/collector lanes. The structure will be approximately 120 m in length with an open rail concept which meets MTO bridge requirements. The design of the structure was closely co-ordinated with the MTO and provides a minimum vertical clearance of 5.3 m across the entire future Highway 401 cross-section. The 4.4 m wide deck will accommodate a 4 m wide pedestrian/cyclist path north and south of Highway 401 which will allow for two-way travel for both pedestrians and cyclists; and
- A portion or all of the proposed pedestrian/cyclist structure will be constructed within the Highway 401 widening contract, subject to municipal funding.

3.1.3.4 Site# 24-537-C –Concrete Culvert Crossing - 'Cattle Crossing' of the Tributary of the Credit River

- The existing 3.1 m x 2.5 m culvert is believed to have been constructed for the passage of cattle when the original Highway 401 severed agricultural lands in this area.
- This culvert is to be removed and replaced with a smaller 2.4 m x 1.2 m embedded concrete box culvert to accommodate local drainage and provide fish refuge within this tributary.

3.1.4 Drainage

The project area generally slopes westward from a high point near McLaughlin Road to the Credit River and is serviced by a series of storm sewer systems via culverts and ditches. Similarly, the east limit of the project at the Highway 403/410 interchange drains to a tributary of Etobicoke Creek, while the remainder of the project west of Hurontario Street drains to Cooksville Creek, Fletcher's Creek and the Credit River.

There are a total of 12 minor Corrugated Steel Pipe (CSP) culverts throughout the project area which were found to be in poor condition. Based on the recommendations in the Highway 401 *Drainage and Hydrology Design Report*

(2015), all existing CSP culverts will be replaced as part of this contract, including those located in the Mavis Road interchange and ramps.

The proposed highway work is classified as a freeway and the minor system was based on the 10-year storm; the major flow system design is the 100-year storm.

3.1.5 Illumination

High Mast Lighting (HML) will be provided for the project area and the existing illumination on Highway 401 will be removed. In addition, the HML at the Mavis Road interchange will be upgraded to meet current standards and to reduce the amount of light trespass onto private properties.

Special measures will be applied to control light and minimize light spillage into environmentally sensitive and residential areas:

- 'Environmentally Sensitive Area' extends from Second Line West to the Credit River
- 'Residential Zone' covers the section of Highway 401 between Mavis Road and Second Line West.

In some sections, HML will be supplemented by lower conventional lighting poles to minimize light spillage. High mast lighting poles will be located in the median for the main sections of the Highway 401 core/collector system and located strategically within the Mavis Road interchange to provide uniform coverage of Highway 401 and access ramps. Shielded HML fixtures have been selected to significantly reduce glare and create a well-defined lighting corridor while controlling lighting levels beyond the MTO Right-of-Way.

3.1.6 Utilities and Pipelines

The following utilities are located within the project limits and require relocation:

- Bell
- Rogers
- Enersource Hydro Mississauga
- Region of Peel – Sanitary Sewer.

Consultation with these utilities has been ongoing and all necessary relocation will be completed prior to construction.

No pipelines have been identified within the project limits.

3.1.7 Advanced Traffic Management System (ATMS)

The installation of ATMS signage just east of the Credit River at the western limit of the project will be included in this contract. This work will include some minor shoulder widening to accommodate the ATMS pad and guiderail installation.

3.1.8 Signage

Signage and pavement markings will be upgraded in accordance with the Manual of Uniform Traffic Control Devices of Ontario and Kings Highway Guide Signing Policy Manual. Signage upgrades will extend from east of the Highway 403/410 interchange in the east to the Mississauga Road interchange in the west.

3.1.9 Fencing

Existing fencing, where impacted, will be replaced at the MTO property line. Wildlife fencing west of Second Line West will be installed to minimize wildlife collisions by directing wildlife to crossings at the Credit River and Fletcher's Creek.

3.1.10 Retaining Wall

A retaining wall totaling 420 m in length, with an approximate fill height of 5.5 m and an approximate cut height of 5.0 m, will be constructed on the north side of Highway 401, from west of Second Line West to the western edge of the Meadowvale Station Woods ESA. The retaining wall was included in the highway design as a measure of reducing the amount of vegetation removal within Jefferson Salamander regulated habitat. This measure has been approved by MNRF through consultation (please refer to meeting minutes in **Appendix A**) and will avoid the need for a permit under the *Endangered Species Act*.

3.1.11 Property Requirements

Property acquisition to facilitate the Highway 401 widening has been completed.

3.1.12 Noise Wall Relocation

An existing 150 m long x 1.8 m high developer-installed noise structure in the south-west quadrant of the Mavis Road interchange will be relocated and replaced in-kind to allow for the re-aligned eastbound off-ramp.

3.1.13 Active Transportation Infrastructure

As mentioned earlier in Section 3.1.3.3, the existing Second Line West underpass will be removed under this contract in order to accommodate the highway widening. Either a portion or all of a new pedestrian/cyclist bridge across Highway 401 will be constructed as part of this contract, pending municipal funding. A separate Municipal Class EA study was completed in January 2015 for the new pedestrian/cyclist bridge.

3.2 Construction Staging

The Highway 401 staging plan is described below:

Stage 1:

- Existing number of Highway 401 lanes (6) maintained.
- Construction of new Highway 401 collector lanes from Credit River to the existing 'stubs' near McLaughlin Road Underpass.
    - Construction will be primarily outside the existing Highway 401 lanes, with minimal disturbance to existing operations
- Partial removal of existing Fletcher's Creek culvert.
- New Fletcher's Creek structures under the future Highway 401 eastbound (EB) and westbound (WB) collector lanes will be constructed.
- New retaining walls at Meadowvale Station Woods.
- Closure and demolition of Second Line West underpass.
    - Authorized only after Mavis Road structure (Contract #2014-2006) is completed.

2nd Line Closure

The removal of the Second Line West structure will require the temporary full closure of Highway 401 in the eastbound and westbound direction from Mavis Road to Mississauga Road. Closure will take place over the

weekend for an approximately 8 hour period; from 12 am to 8 am on a Sunday. A Communication Plan will be developed to include:

- PVMS signs advising motorists in advance of and during construction;
- Notification to transit and emergency services;
- Media notification; and
- Signage along all detour routes.

Detours will ensure that traffic avoids travel through residential neighbourhoods and are subject to approval by the City of Mississauga and the Regional Municipality of Peel. Possible detour routes include Mavis Road, Derry Road West, Britannia Road West, Queen Street North and Mississauga Road.

Stage 2 & 3:

- Existing number of Highway 401 lanes (6) maintained.
- Construction of collectors at existing ramp locations. Temporary Mavis Road ramps detoured to newly constructed collector lanes.
    - The construction and realignment of ramps and associated detours will require temporary nightly ramp closures.

Stage 4:

- Existing number of Highway 401 lanes (6) maintained.
- Highway 401 core traffic to be 'flipped' to the collector lanes at the project limits.
- Highway 401 traffic will continue within the collector lanes for the remainder of the construction.
- Reconstruction and widening of existing Highway 401 lanes into new core lanes.
- Removal of the remainder of existing Fletcher's Creek culvert and construction of new structure under the core lanes.
- Replacement of existing median storm sewer.
- Installation of new median High Mast Lighting.

Stage 5:

- All proposed general purpose lanes (10) open; HOV lanes not operational during this stage.
- Move core-collector 'split' to Credit River.
- Construction of Highway 401 EB outer separator.

As noted above, HOV lanes from west of Mavis Road to east of Highway 410 will be opened following construction completion.

3.3 Transportation Environmental Study Report Five Year Review

The *Class Environmental Assessment for Provincial Transportation Facilities* (2000) specifies the following in Section 6.4.2 of the document:

- For any portion of a project for which construction has not commenced within five (5) years of the Notice of Submission for a TESR (that is submitted during preliminary design), and a DCR has not been submitted during that five (5) year period, the proponent must carry out a review of the not-constructed portions of the project before construction may begin.
- If there are no changes to the original concept of the project as described in the TESR, then a DCR will be prepared to document the design decisions and the result of the five-year review. The DCR will be made available for a 30-day public review period, but there is no bump-up opportunity.
- If significant changes to the project are identified through the reviews, then a TESR addendum must be prepared. Only the changes identified in the Addendum are eligible for bump-up during the 30-day review.

Since more than five (5) years has passed since the 2005 Notice of Submission of the TESR (environmental clearance from the Minister was received in 2007), a five-year review was undertaken and a summary of the insignificant changes are identified in Table 3-1 below. From an environmental perspective, the changes noted below are characterized as neutral or beneficial and do not alter the original concept of the project. Changes made during the detail design were discussed and endorsed by relevant agencies (e.g., MOECC, MNRF, CVC, City of Mississauga), where feasible.

Table 3-1. Summary of Changes From 2005 Transportation Environmental Study Report

Description and Reason for Change	Impact and Significance of Change
1. Changes to Design and Environmental Mitigation Commitments in the Transportation Environmental Study Report	
1.1 Drainage	
2005 TESR Recommendation A stormwater management (SWM) pond identified for the north side of Highway 401 and Second Line West has been removed from the design. Recommended Plan The SWM strategy for the area draining to Fletcher's Creek will include a series of small wetlands within the Mavis Road interchange.	The new SWM strategy will benefit the environment through reduced tree clearing on the north side of Highway 401, thus reduced species-at-risk impacts; while meeting the 2005 TESR requirements to provide enhanced water quality treatment. Removal of the SWM pond at Second Line West allows for additional vegetation restoration in this area once Second Line West is closed. No additional property is required as the small wetlands within the Mavis Road interchange are located within the MTO right-of-way.
1.2 Wildlife Fencing	
2005 TESR Recommendation Wildlife fencing was not included in the 2005 TESR. Recommended Plan Installation of wildlife fencing from west of Second Line West to the Credit River, on either side of Highway 401.	Installation of wildlife fencing will direct animals to safe crossings at the Credit River and Fletcher's Creek.
1.3 Fletcher's Creek Culvert Replacement	
2005 TESR Recommendation Identified the need for the addition of one (1) cell to the core lanes and two (2) rigid frame structures over the new collector lanes. Recommended Plan Existing 48.8 m long concrete box culvert with two cells to be removed and replaced with two (2) new CPCI girder bridge type structures (69 m width/24 m length & 19 m wide/26 m length).	The clear span bridges will allow for infrastructure upgrades within the Highway 401 core/collector expansion; additional room for construction access and enhancement to the Species at Risk (SAR) designated watercourse, instrumental in the success of *Endangered Species Act* permit negotiations with MNRF. The Fletcher's Creek clear span bridges will provide increased crossing opportunities and dry passage for wildlife under the widened highway.
1.4 Addition of Eastbound Transfer From Collector to Core Lane	
Recommended Plan An eastbound transfer from collector to core has been added to the highway design address traffic equalization concerns from the future extension of the Highway 401 C-D system to the west beyond Mississauga Road.	Minor additional property required (from an existing property taking identified in the 2005 TESR) for the new transfer lane on the south side of Highway 401.
2. Changes to Environmental Constraints/Mitigation Identified in the Transportation Environmental Study Report	
2.1 Species at Risk	
2005 TESR During Preliminary Design and EA, Jefferson Salamander was not listed as a Species at Risk, therefore no impacts as a result of the highway widening were identified. The 2005 TESR did identify that vegetation removal on the north side of Highway 401, extending 14 m into Meadowvale Station Woods ESA and covering a length of 550 m, would be required due to grading for the highway widening.	The construction of a retaining wall on the north side of Highway 401, between Second Line West and the west side of the Meadowvale Station Woods ESA significantly reduces the amount of vegetation removal within Jefferson Salamander regulated habitat. As such, there will be minimal loss of forest habitat on the north side of the highway (approximately 0.9 ha). This approach has been developed in consultation with the MNRF and subsequently approved. As a result, a permit under the *Endangered Species Act* will not be required.

Description and Reason for Change	Impact and Significance of Change
Recommended Plan Since 2011, the Jefferson Salamander is listed as 'Endangered' under the *Endangered Species Act*, therefore the species and its habitat are afforded protection under the Act. Jefferson Salamander and its habitat are present within Meadowvale Station Woods ESA, therefore the Highway 401 widening has been designed to reduce the amount of habitat removal on the north side of Highway 401, between Second Line West and the west side of the ESA.	

4. Environmental Concerns and Protection / Mitigation Incorporated During Construction

This section outlines the potential direct and indirect environmental effects associated with the project. A number of commitments for additional work or environmental impact mitigation measures related to this project were identified in the 2005 TESR. These commitments are carried forward in the following sections. This section also describes the mitigation measures that will be implemented to minimize the effects. Mitigation includes planning decisions, design features, construction requirements, construction constraints and possibly follow-up monitoring requirements.

The Contract Administrator and Contractor will be made aware of and instructed to properly manage all environmental issues that may arise during construction. Standard and non-standard special provisions will be included in the contract documents to address specific environmental and operational concerns.

4.1 Natural Environment

4.1.1 Fish and Fish Habitat

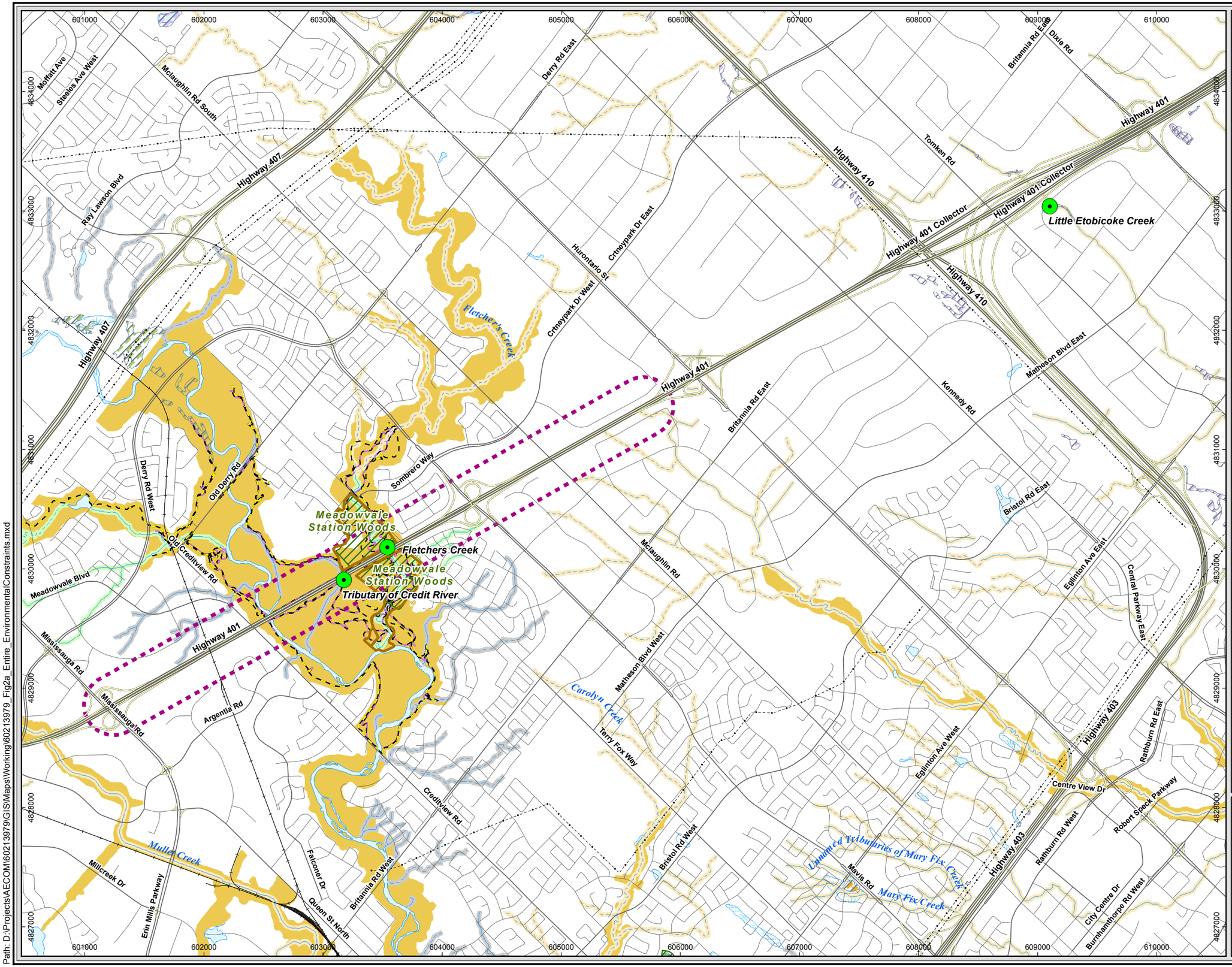
Existing conditions and impact assessment of fish and fish habitat for the Highway 401 corridor have been documented in detail in the *Fish and Fish Habitat Existing Conditions and Impact Assessment Report for Highway 401 Widening from Highway 403/410 Interchange to the Credit River*, August 2015 (*Fish Report*). The project area contains three (3) watercourses (Tributary of the Credit River, Fletcher's Creek and Little Etobicoke Creek). The Tributary of the Credit River and Fletcher's Creek are within the jurisdiction of Credit Valley Conservation Authority (CVC), whereas Little Etobicoke Creek is within the jurisdiction of Toronto and Region Conservation Authority (TRCA). All watercourses are located in the Region of Peel and within the City of Mississauga.

Figure 4-1 shows all three (3) stations investigated with the environmental constraints, and Figure 4-2 shows the main project area corridor with the environmental constraints.

The project area contains one (1) aquatic Species at Risk, Redside Dace (*Clinostomus elongatus*), found in Fletcher's Creek. Redside Dace is listed as Endangered by the province of Ontario and it, along with its habitat, is afforded protection under the *Endangered Species Act* (R.S.O. 2007). 'Endangered' is previously defined in Section 1.4.1 of this report.

Through discussions with MNRF Aurora District (please review Appendix A for Agency Correspondence), it has been determined that a 17(2)(c) permit will be required in order for the proposed works to proceed. The permit application process is documented under separate cover and will be obtained prior to construction.

Although there are considerable environmental constraints to highway widening, opportunities have been explored to improve aquatic habitat through re-design and reconstruction of existing culverts.



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Legend

- Study Locations
- Main Study Area Corridor
- Environmental Sensitive Area
- Credit River Conservation Regulation Area
- Life Science ANSI

Engineered Floodlines

- 100-Year floodline
- Regulatory floodline

Evaluated Wetlands

- Unknown
- Locally Significant Wetland
- Provincial Significant Wetland

Thermal Watercourse

- Permanent, No data
- Permanent, Coolwater
- Permanent, Unassigned
- Permanent, Warmwater
- Permanent, Coldwater
- Intermittent, Coldwater
- Intermittent, No data
- Intermittent, Coolwater
- Intermittent, Unassigned
- Intermittent, Warmwater

Water Featrures

- Intermittent Stream
- Permanent Stream
- Waterbody

Basemapping from Ontario Ministry of Natural Resources & Credit River Conservation Authority

N W E S

Metres

0 187.5 375 750 1,125 1,500

1:30,000

UTM Zone 17N, NAD 83

Highway 401 Widening

Entire Study Area Corridor Environmental Constraints

FIGURE 4-1

AECOM

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Legend

- Study Locations
- Main Study Area Corridor
- Environmental Sensitive Area
- Credit River Conservation Regulation Area
- Life Science ANSI

Engineered Floodlines

- 100-Year floodline
- Regulatory floodline

Evaluated Wetlands

- Unknown
- Locally Significant Wetland
- Provincial Significant Wetland

Thermal Watercourse

- Permanent, No data
- Permanent, Coolwater
- Permanent, Unassigned
- Permanent, Warmwater
- Permanent, Coldwater
- Intermittent, Coldwater
- Intermittent, No data
- Intermittent, Coolwater
- Intermittent, Unassigned
- Intermittent, Warmwater

Water Features

- Intermittent Stream
- Permanent Stream
- Waterbody

Basemapping from Ontario Ministry of Natural Resources & Credit River Conservation Authority

N W E S

Metres

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1:17,000

UTM Zone 17N, NAD 83

Highway 401 Widening

Main Study Area Corridor Environmental Constraints

FIGURE 4-2

AECOM

Table 4-1 below provides a summary of existing fish and fish habitat conditions in the Highway 401 project area.

Table 4-1. Summary of Existing Fish and Fish Habitat

Waterbody	Flow Regime	Thermal Regime	Substrate Type	Vegetation	Supports a Fishery	Fish Species Present
Tributary of Credit River (also known as 'Cattle Crossing')	Intermittent	Coolwater	Silt, muck	Instream vegetation: submergent, floating, emergent. Riparian vegetation: none upstream; woodland downstream	Directly	Bluntnose Minnow Brook Stickleback Central Mudminnow Common Shiner *Species list gathered through AECOM field investigations
Fletcher's Creek	Permanent	Coolwater	Boulder, cobble, clay, gravel, silt	Instream vegetation: minimal. Riparian vegetation: deciduous forest upstream and downstream	Directly	Blacknose Dace Bluegill Bluntnose Minnow Brassy Minnow Brook Stickleback Central Mudminnow Common Shiner Creek Chub Fantail Darter Fathead Minnow Goldfish Hornyhead Chub Iowa Darter Johnny Darter Largemouth Bass Longnose Dace Northern Hog Sucker Northern Redbelly Dace Pumpkinseed Rainbow Darter Rainbow Trout Redside Dace River Chub Spottail Shiner Stonecat White Sucker *Species list gathered through secondary source(CVC)
Little Etobicoke Creek	Permanent	Warmwater	Sand, gravel, cobble, boulder	Instream vegetation: minimal. Riparian vegetation: none upstream (stream buried); woodland downstream	None	None

Tributary of Credit River

The existing 56.6 m long, 3 m span non-ridged open footing concrete culvert will be replaced with an extended embedded box culvert with a 2.4 metre by 1.2 metre opening and 130 m length, in order to facilitate drainage from the north to the south side of Highway 401. The proposed crossing will be realigned diagonally underneath Highway 401 in order to match the existing alignment of the drainage feature. The proposed structure design has allowed for the restoration of two (2) permanent pools at the outlet and inlet. The proposed structure will be placed directly to the west of the existing culvert. This will facilitate a two-part staging, which will use the existing channel culvert as a diversion channel while completing construction on the new structure. A section of temporary piped diversion will be required on the south end of the existing culvert to compensate for the skew for construction staging purposes. This sequencing will allow for all in-water work to be completed within the warmwater fisheries timing window and will have the least amount of impact on surrounding fish communities.

The culvert length has increased by more than 45% of its original length and has been designed to accommodate a smaller opening. New culvert dimensions will result in a permanent loss of intermittent channel habitat. However, embedded culverts do have an opportunity to contain a natural substrate fill in order to create an environment similar to a natural watercourse. This can allow adjustments in substrate structure; sediment transport and aid in fish passage.

Refuge pool habitat, which provides the only seasonal refuge habitat in this reach and is therefore considered limiting habitat, will be temporarily displaced. However, since water flow and fish passage will be maintained during construction and construction will be limited to the appropriate in-water work timing windows, fisheries impacts related to construction are can be mitigated and thus, are considered temporary.

The following list describes design mitigation for Tributary of Credit River:

- Minor channel realignment to match the natural watercourse alignment
- Creation of a low flow channel to allow fish passage through the culvert
- Embedded culvert design containing a natural substrate to mimic natural channel conditions
- Providing refuge pools at inlet and outlet of culvert for low flow conditions.

All excavation works shall occur within the appropriate timing window. The existing culvert will be used as a diversion channel in addition to a small temporary piped diversion, thus maintaining flow during construction of the new structure. Erosion and sediment controls will be installed and maintained throughout the project study limits. Stream bank and riparian disturbance will be kept to a minimum and will be restored upon completion of works. In water work will be regularly monitored by a qualified environmental inspector. Application of the MTO/DFO operational guidelines and Best Management Practices (BMPs) will be applied throughout the project area.

Fletcher's Creek

The 2005 Transportation Environmental Study Report (TESR) included approval for the construction of new structures under the collector lanes and construction of an auxiliary culvert to accommodate peak flow events. In 2011, the project team re-evaluated the crossing and determined that the full replacement with two (2) clear span bridges allows for the following:

- Infrastructure upgrades within the Highway 401 core/collector expansion
- Additional room for construction access
- Enhancement to the Species at Risk (SAR) designated watercourse instrumental in the success of *Endangered Species Act ESA, 2007* permit negotiations with MNRF.

The existing 48.8 m long twin cell box culvert will be removed and replaced with two (2) separate bridges; a 69 m wide bridge with 24 m clear span carrying westbound and eastbound express and westbound collector lanes and a 19 m wide bridge with 26 m clear span carrying eastbound collector lanes. The clear span bridge structures will allow for the construction of a natural channel design underneath the widened highway.

Potential impacts from the proposed works can be reduced and/or eliminated with proper implementation of mitigation measures. These mitigation measures are aligned with Department of Fisheries and Oceans (DFO) Measures to Avoid Causing Harm to Fish and Fish Habitat (DFO, 2013), the MNRF Draft Guidance for Development Activities in Redside Dace Protected Habitat (2011) and follows the mitigation outlined in the O.Reg 242/08, Section 23.4 (9) of the ESA, 2007. There are no fisheries impacts related to design and net benefit to fish and fish habitat will result.

The following list describes design mitigations and habitat restoration proposed for Fletcher's Creek:

- Crossing has been designed such that it spans the majority of the historical meander width.
- Remove existing box culvert and reinstate natural channel cross-section and profile under bridges allowing for riffle/pool sequences that are specific to Redside Dace habitat.
- Placement of natural substrate through crossing to reinstate natural channel bottom.
- Promote local groundwater /surface water connection through removal of existing culvert bottom.
- Plant overhanging vegetation on channel banks to allow a variety of insects to congregate providing a food source for the Redside Dace.
- Diversify instream fish habitat cover and substrates by incorporating pool-riffle sequence throughout channel, keystones, embedded woody habitat on banks and cross logs within the creek.

The (Erosion and Sediment Control) ESC Plan will incorporate applicable elements as contained in the MNRF's draft document entitled Draft Guidance for Development Activities in Redside Dace Protected Habitat, 2011 and as outlined in O.Reg 242/08, Section 23.4 (9) of the ESA, 2007. All specific mitigation measures required as part of the ESA Permit 17(2)(c) approval are outlined in detail within the permit application, under separate cover.

Given the proximity of the construction site to Fletcher's Creek, daily monitoring of weather conditions, review of Credit Valley Conservation Authority (CVCA) and flood messages (via internet) and visual monitoring of flow conditions adjacent to the construction site will be required to ensure safe working conditions and reduce the potential for damage to equipment and environmental impacts during work within the valley corridor. In the event of an impending flood (e.g., > 2-year storm, large snowmelt, etc.) all construction equipment and materials will be removed from the valley corridor and work temporarily halted until flood waters recede and soils are sufficiently dried out to support construction equipment. A Contractor orientation will be provided to ensure the Contractor and all site staff are aware of the importance of maintaining proper sediment and erosion control measures for the duration of construction in the protection of Redside dace and other fish and aquatic habitat.

Little Etobicoke Creek

Although this watercourse was identified as being part of the project area at the beginning of the project, the limit of the work does not extend beyond Tomken Road (west of the creek). No further work is proposed at this crossing; therefore no impacts to fish and fish habitat are identified at this crossing.

4.1.1.1 Environmental Protection/Impact Mitigation

General Environmental Protection During Construction

Impacts to fish and fish habitat can be mitigated through best management practices during construction activities. Construction mitigation shall include:

- Installation and maintenance of erosion and sediment controls throughout the project limits.
- Monitoring of in-water works by a qualified environmental inspector or Fisheries Contracts Specialist.
- Application of MTO/DFO operational guidelines and best management practices.
- Application of MTO NSSPs.

Best Management Practices (BMPs) will be utilized during construction and standard environmental protection measures and procedures will be followed in carrying out the proposed construction-related activities. The following mitigation measures are recommended to protect water quality and fish habitat and to restore the project limits to its pre-construction condition:

- Construction in the watercourse and on the banks is permitted July 1 – September 15 (Redside Dace and coldwater timing window)
- Install appropriate erosion and sediment control measures as outlined in OPSS 805 which specifies materials for temporary control measures, construction details for temporary sediment barriers, flow checks, sediment traps, chutes, dewatering traps, turbidity curtains, and cofferdams, monitoring to ensure effectiveness, removal of accumulated sediment, and removal of temporary control measures. Prevent sediment from exceeding 25 mg/L above background levels during construction.
- Equipment working in or near a watercourse to be maintained and cleaned to avoid contaminant leakage to a watercourse, and to be equipped with a spill response kit; 30 m setback from water courses for equipment and vehicle maintenance, refueling and washing
- Contractor shall have a spill prevention and response contingency plan that addresses procedures for preventing and responding to spills, and the equipment (including a spill response kit) and resources that will be available.
- Manage all dewatering operations to prevent erosion and/or release of sediment-laden discharge as outlined in OPSS 518, which specifies settling ponds, sediment traps / basins and temporary erosion and sediment control measures to be used to filter and/or impound dewatering effluent to as to protect against erosion / sedimentation impacts
- Transfer any fish within the work area downstream using appropriate capture, handling and release methods and isolate the work area to prevent fish from re-entering to protect them from harm and minimize stress
- Re-stabilize exposed soils/surfaces draining to the watercourse, including ditches as outlined in OPSS 804, which specifies species composition and seed quality, cover material, and application requirements
- Re-install and re-stabilize watercourse banks using standard methods such as rip rap, erosion control blanket etc.
- Follow the Ontario Provincial Standard Specifications (OPSS) for:
  - OPSS 180 – *General Specification for the Management of Excess Materials*
  - OPSS 182 – *General Specification for Environmental Protection for Construction in Waterbodies and on Waterbody Banks*
  - OPSS 185 – *General Specification for Temporary Flow Control for Construction in Waterbodies*
  - OPSS 804 – *Construction Specification for Seed and Cover*
  - OPSS 805 – *Construction Specification for Temporary Erosion and Sediment Control Measures.*

4.1.1.2 Timing of In-Water Work

By restricting in-water works to the timing windows determined by MNRF, works will avoid the most sensitive periods for fish spawning, rearing and migration life phases.

Work within the Tributary of Credit River (in the watercourse and /or within the bankfull width) is permitted from July 1st to March 31st.

Work within Fletcher's Creek (in the watercourse and /or within the bankfull width) is permitted from July 1st to September 15th. Through discussions with the MNRF, Aurora District on February 4, 2015 approval was given for construction works to proceed in the regulated habitat (meander belt + 30 metres) during the months of May and June, provided all construction activities will be isolated using applicable erosion and sediment controls (ESC) within Redside Dace regulated habitat. MNRF have stated that a written letter of consent for works to be carried out within the regulated habitat during the months of May and June will be given upon receiving the final permit application.

4.1.1.3 Drainage and Stormwater Management

As part of this detail design, a stormwater management plan has been developed in consultation with the MOECC, MNRF and CVC and documented in the *Highway 401 Widening Stormwater Management Report (2013)*. Overall, the Highway 401 median drainage will be reconstructed to accommodate the increased pavement width and impervious areas. Drainage in the median has been designed to suit the ultimate grading and pavement design requirements. In addition, new closed drainage systems will be constructed in the outer separators.

The drainage network through the Mavis Road interchange has been designed to accommodate the realigned ramps (as required for the proposed Belgrave Road extension) and Highway 401 widening. This strategy has also accounted for the lowering of the southeast ramp under the proposed Belgrave connection. Local drainage design modifications (i.e. lower culverts) within the interchange will ensure that the existing drainage network is maintained.

For the area draining to Fletcher's Creek, a series of small wetlands will be constructed within the Mavis Road interchange, both north and south of Highway 401. Sufficient area within the interchange ramps will be provided for maintenance access and for drying of sediment removed during maintenance. A forebay will be provided at every storm sewer inlet to remove most of the coarser grained sediment prior to discharging to the wetland areas.

The total enhanced stormwater quality treatment area is proposed to be 15.2 ha, which is feasible based on highway and ramp profiles and potential storm sewer and outlet swale grades. The total area of new pavement is 11 ha. Therefore, the proposed solution addresses the TESR requirement of providing enhanced treatment for, as a minimum, an area equivalent to the area of new pavement, plus as much additional area as feasible.

As part of an 'overall benefit' strategy for Redside Dace developed in consultation with the MNRF, the MTO, and the City of Mississauga are currently discussing the feasibility of retrofitting two (2) existing stormwater management ponds situated immediately adjacent (easterly and westerly) to Fletcher's Creek, at a point approximately 1 km upstream of the Highway 401 crossing over Fletcher's Creek. The MNRF have indicated that deepening the 'bottom draw' outlets for both stormwater ponds up to the maximum allowable 3 m depth, in accordance with the Ministry of Environment and Climate Change (MOECC) *Stormwater Management Planning and Design Guidelines*, will reduce water temperatures. Because the water exiting the facility will be drawn from deepened pond bottom, it will be cooler than the water currently exiting the facility during the summer months, thus improving water quality to Fletcher's Creek (i.e. Redside Dace habitat) downstream of Second Line West and will mitigate historical thermal impacts and resulting in healthier more sustainable populations of Redside Dace.

4.1.1.4 Erosion and Sediment Control

To minimize potential environmental impacts from erosion processes, the following erosion and sedimentation control practices are recommended during construction works:

- Stabilize disturbed soils with temporary vegetative controls (i.e., annual seed).
- Preserve overland sheet flow and micro-drainage (avoid concentrated channel flows).
- Prevent disturbance of previously stripped and stabilized areas.
- Intercept and channel water runoff to local buffer strips, filter barriers or sediment traps before release into ditched and swales.
- Use and maintain structural BMPs (e.g., grass swales with sediment traps and check dams) within ditches and swales during construction activities until disturbed areas have stabilized.

In order to prevent rill erosion and sheet erosion on exposed surfaces, suitable temporary erosion and sediment control measures should be undertaken as part of the construction work proposed. The MTO Drainage Manual and the MOECC Stormwater Management Practices Planning and Design Manual describe measures to mitigate the impact of construction works on water quality and suggest appropriate design guidelines for the proposed structures.

Vegetative cover should be established on areas disturbed by construction to limit the impact of sheet flow erosion. The amount of sediment produced by a site is proportional to the area of soil exposed. Therefore, the size and gradients of the disturbed area should be kept to a minimum and re-vegetated as soon as possible after exposure of the soil. Existing vegetation should be retained where feasible. If vegetation is not available onsite, seeding and mulching should be performed to create an appropriate vegetative cover.

Finally, runoff from construction materials and any stockpiles shall be contained and discharged to prevent entry of sediment to watercourses. Where dewatering and / or culverts cleaned by hydraulic means are required, the effluent shall be discharged in a manner that prevents the entry of sediments to watercourses, or scouring and erosion at dewatering outlets. Erosion and sediment control measures shall not be placed in watercourses unless otherwise specified in the contract or by the Contract Administrator.

4.1.2 Terrestrial Environment

Existing conditions and impact assessment of terrestrial ecology features and wildlife field surveys undertaken for the Highway 401 corridor have been documented in detail in the *Terrestrial Natural Environment Existing Conditions and Impact Assessment Report for Highway 401 Widening from Highway 403/410 Interchange to the Credit River*, August 2015 (*Terrestrial Report*). Terrestrial field investigations took place on June 10 and November 11, 2011, as well as, on February 15, 16 and May 24, 25, 2012, July 15, August 22, 2014 and February 23, March 2 and June 5-15, 2015. Four (4) areas of interest were identified through background review and aerial photography interpretation as naturally occurring features requiring detailed surveys. These can be defined as: i) Woodland located in the south-west corner of the Highway 403/410 interchange, ii) Meadowvale Station Woods ESA/ANSI, iii) Woodland/wetland feature located west of Meadowvale Station Woods ESA/ANSI, and iv) Credit River Valleylands, as well as other vegetation patches along the highway corridor (Figure 4-3).

As a part of this project, historical and background information was assembled and reviewed including previous studies completed on behalf of the MTO. Additionally, applicable regulatory agencies were consulted regarding specific data, files and clarification. The assessment was conducted in accordance with the *Environmental Reference for Highway Design (ERHD, 2013)* and was undertaken in order to acquire up-to-date information and a photographic record for the project area. All vegetation communities were described following the descriptions and codes of the Ecological Land Classification (ELC) system (Lee et al. 1998). The assessment emphasized examining

vegetation communities that are potentially affected by the proposed works. All species of vascular plants encountered were recorded and checked for significance at the provincial and regional levels.

Background information concerning vegetation, wildlife species, as well as associated habitat within the project area was obtained from the MNRF and the Ontario Breeding Bird Atlas. The Natural Heritage Information Centre (2011) website was consulted to locate records of Species at Risk known from within 2 km of the project area. Significant natural areas within 1 km of the project area were also identified.

All encountered vertebrate wildlife species were recorded and breeding bird surveys were completed at the appropriate times of the year. Special emphasis was placed on documenting the presence of Species at Risk, either through encounter or identifying potentially suitable habitat.

4.1.2.1 Existing Significant Environmental Areas

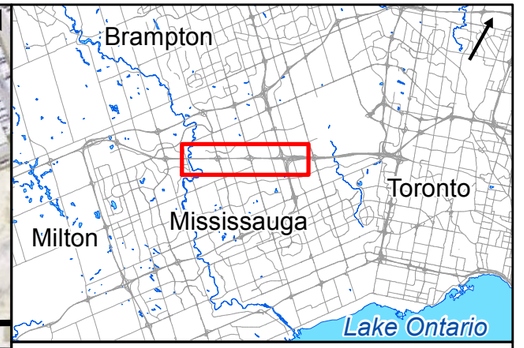
The project area contains a notable natural feature, Meadowvale Station Woods, which is identified as both an Environmentally Sensitive Area (ESA) and a Life Science Area of Natural and Scientific Interest (ANSI).

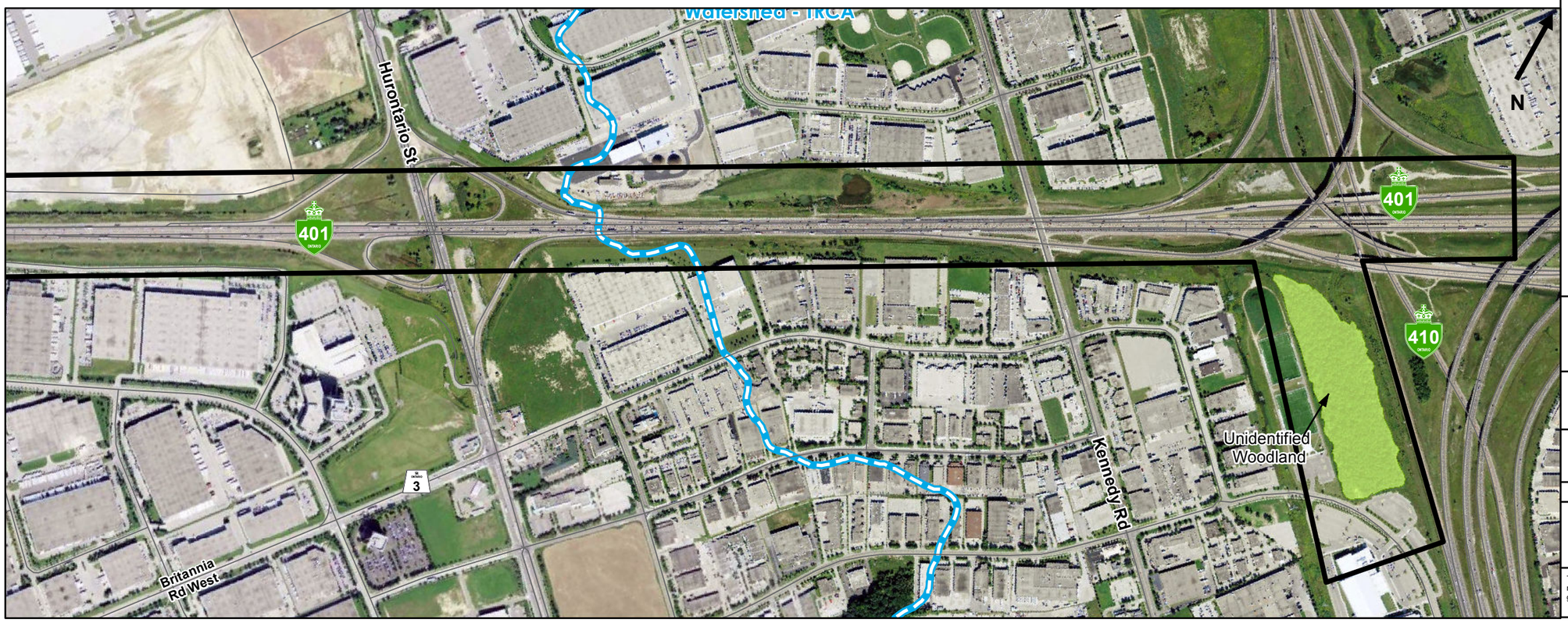
4.1.2.2 Wetlands

Wetland pockets in the Highway 403/410 interchange were assessed by AECOM biologists in summer 2014 in accordance with the MNRF's Ontario Wetland Evaluation System: Southern Manual (OMNR, 2013, 3rd Edition). The results from the evaluation found that in both biological and special features components, the wetland does not qualify as Provincially Significant.

4.1.2.3 Physiography and Soils

The project area is predominately till deposits, described as gritty to clayey silt till associated with the Halton Till Unit (Karrow 2005). In the Credit River Valley lands, the geology is characterized by fluvial deposits of clay, silt, sand and gravel units and deltaic and lacustrine deposits of gravel to gravelly sand. At the most eastern edge of the project area, bedrock outcrops are noted and are reported as shale and dolostone (Golder Associates Ltd. 2014).





Legend

- Study Limits
- Roads
- Waterbodies
- Watershed Boundary
- Wetlands (CVC 2009)
- Natural Site (City of Mississauga Natural Areas Survey - 2011)
- Significant Natural Site (City of Mississauga Natural Areas Survey - 2011)

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Meters

MTO Highway 401 Widening
HWY 403 - 410 to Credit River

Natural Heritage Features

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AECOM

FIGURE 4-3

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4.1.2.4 Groundwater

The existing groundwater conditions and impact assessment has been documented in the *Groundwater Assessment for Highway 401 from Highway 403/410 Interchange to the Credit River* (2014). Groundwater discharge and recharge areas were assessed based on local topographic and geological conditions. Recharge is expected to be limited in the project area due to shallow overburden units with generally low permeability deposits that will limit the amount of groundwater recharge. However, in the Credit River Valley area, more permeable alluvium deposits are mapped which are predicted to have higher recharge values. Additionally, groundwater discharge is expected to be limited to the surface watercourses, including the Credit River and Fletcher's Creek. The volume of discharge occurring will be dependent on the geology of the overburden units present.

Based on potential construction works and the hydrogeologic conditions, potential alterations to the groundwater regime include:

- Profile lowering and drainage improvements that have the potential to dewater or lower the local water table if the water table is intercepted and preferentially drained by ditches, swales or culverts.
- Construction of the new Fletcher's Creek structures may cause temporary impact to the groundwater regime; however this impact is expected to be negligible post-construction once water table conditions equilibrate around the new structures.
- Temporary alteration of the groundwater regime may occur as a result of any positive dewatering that is implemented during construction. It is anticipated that a Category 3 Permit to Take Water will be required. The impacts associated with the dewatering activities are expected to be temporary.

The presence of municipal water supply servicing within the majority of the project area indicates that MOECC Water Well Records are likely inactive, decommissioned or demolished.

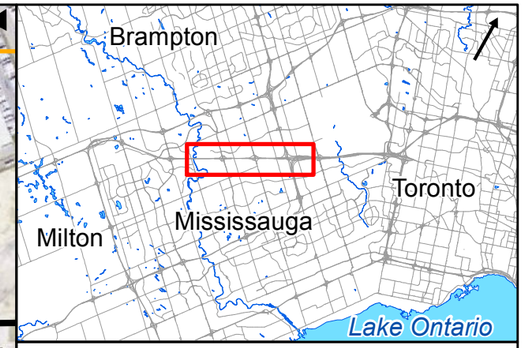
Goundwater impacts are not expected to be significant due to the low permeability of the shallow overburden. The potential for impacts is greater in the Credit River Valley lands where higher permeability deposits are reported, however it is considered unlikely that impacts would be significant.

4.1.2.5 Vegetation

The vegetation communities within the project area are divided between the four (4) areas of natural interest mentioned in Section 4.1.2. Please refer to Figure 4-4.

Woodland Located on South-West Corner of Highway 403/410 Interchange

The assessment of this area of natural interest has been previously documented in the, *Highway 401/Mavis Road Interchange and New Ramps at the Highway 401/410/403 Interchange Design and Construction Report (GWP 2152-01-00 and 2150-01-00)*.



Legend

- Study Limits
- Bat Habitat Assessment Plot Locations
- Anuran Call Survey Location (ANR)
- Roads
- Watercourses

ELC

CUM, MAM, SWT, CUW, MAS, FOD, SWD

ELC Code	Vegetation Type
CUM1-1	Dry-Moist Field Meadow Type
CUW1	Mineral Cultural Woodland Ecosite
MAS2-1	Cattail Mineral Shallow Marsh Type
MAM2	Mineral Meadow Marsh Ecosite
MAM2-2	Reed-Canary Grass Mineral Meadow Marsh Type
MAM2-10	Forb Mineral Meadow Marsh Type
FOD2-4	Dry Fresh Oak Hardwood Deciduous Forest Type
FOD5-2	Dry Fresh Sugar Maple Beech Deciduous Forest Type
FOD6-5	Fresh Moist Sugar Maple Hardwood Deciduous Forest Type
FOD7	Fresh Moist Lowland Decisuous Forest Ecosite
FOD7-2	Fresh Moist Ash Lowland Deciduous Forest Type
FOD7-3	Fresh Moist Willow Lowland Deciduoud Forest Type
FOD 9	Fresh Moist Oak Maple Hickory Deciduous Forest Ecosite
SWD2	Ash Mineral Deciduous Swamp Ecosite
SWD2-1	Black Ash Mineral Deciduous Swamp Type
SWD2-2	Green Ash Mineral Deciduous Swamp Type
SWD3	Maple Mineral Deciduous Swamp Type
SWD3-4	Manitoba Maple Mineral Deciduous Swamp Type
SWT2	Mineral Thicket Swamp Ecosite

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Meters

MTO Highway 401 Widening
HWY 403 - 410 to Credit River

Vegetation Communities and Survey Locations

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AECOM

FIGURE 4-4

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Meadowvale Station Woods ESA/ANSI

A total of four (4) ELC communities were delineated during field investigations. These can be divided into deciduous forest, shallow marsh, and deciduous swamp communities. Each community was comprised of the following:

Southern Portion of Meadowvale Station Woods ESA/ANSI

FOD6-5: Fresh Moist Sugar Maple – Hardwood Deciduous Forest Type – This community represents the majority of the feature. Fletcher's Creek runs under Highway 401, from north to south through this community. The dominant tree species observed within the canopy included sugar maple, red oak (*Quercus rubra*), shagbark hickory, and ironwood. Dominant shrub species throughout the community included riverbank grape (*Vitis riparia*), and poison-ivy (*Toxicodendron radicans*). Herbaceous species observed included goldenrod species (*Solidago sp.*), aster species, Canada goldenrod (Solidago Canadensis), tall white aster (*Symphyotrichum lanceolatum*), calico aster (*Symphyotrichum lateriflorum*), garlic mustard, and wild leek (*Allium burdickii*).

MAM2: Mineral Meadow Marsh Ecosite – This community is located in the most northern portion of the study area, bordered with a chainlink fence separating the feature from Highway 401. The dominant herbaceous species included common reed (*Phragmites australis*), reed canary grass (*Phalaris arundinacea*).

SWD3-4: Manitoba Maple Mineral Deciduous Swamp Type – This community is a small pocket located in the north end of the study area, which runs along portions of Fletcher's Creek. Through soil pit analyses, it was determined that gleying was apparent at 10 cm, within a 35 cm deep soil pit. Gleying is a grey colour in soil due to the reduction of iron formed by low oxygen levels as a result of water logging (Lee et al, 1998). The dominant tree species observed within the canopy include Manitoba maple (*Acer negundo*), white elm (*Ulmus Americana*), and willow species. The shrub layer was dominated by tartarian honeysuckle (*Lonicera tatarica*). The dominant herbaceous species included aster species, St. John's-wort species (*Hypericum sp*.), and fern species (*Dryopteris sp*.).

FOD7: Fresh-Moist Lowland Deciduous Forest Ecosite – This community is located in the northwestern edge of the study area, adjacent to a farmer's field. The adjacent FOD6-5 community to the east consists of topography which slopes down creating a change in community structure. The dominant tree species observed within the canopy include black walnut (*Juglans nigra*), red oak, and shagbark hickory. The shrub layer consists of tartarian honeysuckle and hawthorn species (*Crataegus sp.*). The dominant herbaceous species included red raspberry, (*Rubus idaeus*), goldenrod species (*Solidago sp.*), and sedge species (*Carex sp.*).

Northern Portion of Meadowvale Station Woods ESA/ANSI

FOD6-5: Fresh Moist Sugar Maple – Hardwood Deciduous Forest Type - This community represents the majority of the feature. Fletcher's creek runs under the 401, from north to south through this community. The dominant tree species observed within the canopy include sugar maple, shagbark hickory, American beech (*Fagus grandifolia*), and basswood (*Tilia americana*). Dominant shrub species throughout the community included riverbank grape (Vitis riparia), and poison-ivy (*Toxicodendron radicans*). Herbaceous species observed included goldenrod species (Solidago sp.), aster species, Canada goldenrod (*Solidago Canadensis*), tall white aster (*Symphyotrichum lanceolatum*), calico aster (*Symphyotrichum lateriflorum*), garlic mustard, and wild leek (*Allium burdickii*). This community becomes more open with less abundant trees near the chain-link fence separating the woodland from the highway.

It should be noted that Credit Valley Conservation Authority indicated the presence of butternut (*Juglans cinerea*) within the northern portion of Meadowvale Station Woods ESA/ANSI. Butternut was not observed during field investigations within the portion of woods near Highway 401.

Woodland/Wetland Feature Located West of Meadowvale Station Woods ESA/ANSI

A total of three (3) ELC communities were delineated during field investigations. These can be divided into meadow marsh, deciduous swamp and lowland deciduous forest. This feature is located to the west of Meadowvale Station Woods, and is situated in a low lying area, with a small watercourse running from north to south.

SWD4: Mineral Deciduous Swamp Ecosite – This community covers the entire length of the feature, running from the northeast edge to the southwest edge dominating the northern half of the feature. The dominant tree species observed within the canopy include white elm, willow species, green ash (*Fraxinus pennsylvanica*), and black walnut. The shrub species included tartarian honeysuckle, riverbank grape, common buckthorn, and staghorn sumac (*Rhus hirta*). The dominant herbaceous species included goldenrod species, wild carrot (*Daucus carota*), calico aster, and common burdock (*Arctium minus*).

MAM2-2: Reed-Canary Grass Mineral Meadow Marsh Type – This small community was located in the centre of the SWD4 community towards the northeast portion of the feature. The area is surrounded by lands with higher elevation; can be characterized as being in a bowl. The dominant herbaceous species observed within this community include reed-canary grass, cattail species and purple loosestrife.

FOD7: Fresh-Moist Lowland Deciduous Forest Ecosite – This is a long narrow community situated along a slope running from northeast to southwest. The dominant tree species observed within the canopy include basswood, green ash, and white elm.

Credit River Valleylands

A total of two (2) ELC communities were delineated during field investigations. These can be divided into lowland deciduous forest and dry-fresh deciduous forest. This feature is located along banks of the Credit River alongside Creditview Road and the Highway 401 overpass.

FOD7-3: Fresh-Moist Willow Lowland Deciduous Forest Type – This floodplain community is located on the downstream side of the Highway 401 bridge along the Credit River, where the land contains a steep slope. The dominant tree species include willow species, elm species and Manitoba maple. The shrub species include red-osier dogwood, buckthorn, and tartarian honeysuckle. The herbaceous species were dominated by reed-canary grass.

FOD2: Dry-Fresh Oak – Maple – Hickory Deciduous Forest Ecosite – A community comprised of oak and maple trees. This feature also occurs along the floodplain.

Hurontario to Mavis

The terrestrial communities are dominated by herbaceous vascular plant species with a mixture of grasses and forbs. Using the Ministry of Natural Resources protocols for defining vegetation communities into Ecological Land Classification units, two (2) definable areas occur. One consists of a mix of cultural upland meadow species, all of which are either considered very common, non-native or invasive. The other is comprised of plants which prefer moist conditions. These plants especially occur within the ditch areas that accept overland flow from storm events within the immediate area. These units are described as follows:

CUM 1-1: Cultural Meadow – This community dominates the area and is comprised of species typical of cultural meadow areas. Species include a mixture of Kentucky bluegrass (*Poa pratensis*), wild carrot (*Daucus carota*), common dandelion (*Taraxacum officinale)*, Canada thistle (*Cirsium arvense)*, clover (*Trifolium repens*), goldenrod

species (*Solidago sp*), crown vetch (*Coronilla varia*), common milkweed (*Asclepias syriaca*), oxeye daisy (*Chrysanthemum leucanthemum*), teasel (*Dipsacus sylvestris*), bull thistle (*Cirsium vulgare*), quack grass (*Agropyron repens*), bittercress (*Cardamine hirsute*), giant foxtail grass (*Setaria faberii*), orchard grass (*Dactylis glomerata*), curled dock (*Rumex crispus)* and shepherd's purse (*Capsella bursa-pastoris*). Dominant plant forms (i.e., grasses or forbs) alternate in areas, but overall the area is a mix of the two. All species are either common, non-native or invasive.

MAM 2-2: Reed Canary Grass Mineral Meadow Marsh Type – This community occurs within the ditch and contains reed canary grass (*Phalaris arundica*), common reed grass (*Phragmites australis*) and cattail (*Typha latifolia*). Closer to Mavis, a patch of purple loosestrife (*Lythrum salicaria*). No standing water was observed in the meadow marsh areas. The ditch area temporarily holds water from rain events to sustain these very common plant species. No permanent standing water was observed.

4.1.2.6 Tree Inventory

An ISA Certified Arborist was on site February 23 and March 2, 2015 to complete a tree inventory within the Meadowvale ESA/ANSI limits. All trees located within the Meadowvale ESA/ANSI that will require removal due to the widening of Highway 401 were tallied according to species and size categories. Trees within 5 m of the proposed grading limits were also tallied, as these trees will be structurally compromised by construction impacts and will require removal. Full details on the methods used to conduct the tree inventory can be found in the tree inventory memo prepared on March 3, 2015 of the *Terrestrial Report*.

Overall, a total of 2.2 ha of the Meadowvale Station Woods ESA/ANSI will be removed on the southern side due to the widening of Highway 401. Within the impacted area, a total of 514 trees >10cm diameter at breast height (dbh) will require removal as part of the construction.

4.1.2.7 Birds

In addition to the review of previous studies and incidental observations, a breeding bird survey was conducted in June 2011, between the hours of 6:30 a.m. and 9:00 a.m. Weather conditions included temperatures of 12 -15^{o}C, varying cloud cover ranging from 10% – 100% and winds of up to 3 on the Beaufort Scale with no precipitation. The breeding bird survey included an area search of a variety of habitats within the project area including cultural meadows, agricultural fields and deciduous forests associated with the Meadowvale Station Woods ESA/ANSI. The area search focused on the communities adjacent to the existing Highway 401 where proposed works will be conducted, from east of the Credit River to Second Line West.

A total of nineteen (19) bird species were observed during the breeding bird surveys. An additional five (5) bird species were recorded as incidentals during other field investigations including House Sparrow (*Passer domesticus*), House Finch (*Carpodacus mexicanus*), Common Grackle (*Quiscalus quiscula*), Tree Swallow (*Tachycineta bicolor*) and Northern Cardinal (*Cardinalis cardinalis*). The complete list of bird species observed within the project area can be found in Appendix F of the Terrestrial Report.

Most species observed are considered common and typical of areas that are highly developed. Virtually no birds were heard in the forest community on the south side of the highway. However, it was noted that the noise from the existing highway was moderate to loud causing difficulty in songbird detection. Additionally, it is anticipated that current noise volumes likely cause avoidance of the area by many forest songbirds.

Of note, there were approximately forty-one (41) cliff swallow nests observed on the culvert over Fletcher's Creek. Individuals were observed flying in and out of the culvert and foraging over the creek and fields. In June 2015, one bird Species at Risk, Barn Swallow, was observed flying within the Fletcher's Creek culvert. This species is listed as

Threatened provincially and is afforded protection under the ESA. Several significant bird species were identified in the Terrestrial Environment Report completed by MMM (2004). Breeding bird surveys completed in 2002 by MMM recorded Wood Thrush (*Hylocichla mustelina*) and Eastern Wood Pewee (*Contopus virens*) within the Meadowvale Station Woods ESA/ANSI. Both species were up-listed to *Special Concern* provincially in June 2014. These species were not observed during breeding bird surveys completed by AECOM in 2011.

All other bird species observed are fairly common to abundant and widespread in southern Ontario.

4.1.2.8 Herpetofauna

A review of background information, as well as correspondence with MNRF, identified the presence of breeding amphibians within the Meadowvale Station Woods ESA/ANSI. Regulated habitat for Jefferson Salamander (*Ambystoma jeffersonianum*) and associated polyploids (i.e., hybrids of Jefferson Salamanders and Blue-Spotted Salamanders (*Ambystoma laterale*) was confirmed within the Meadowvale Stations Woods ESA/ANSI forest communities north of Highway 401 by the Aurora District MNRF Species at Risk Biologist (Pers. Comm. Mark Heaton 2014). This species and its habitat will be discussed further in Section 4.1.2.10 below.

During a site visit conducted on October 1, 2014, eastern red-backed salamanders (*Plethodon cinereus*) were observed within the Meadowvale Station Woods ESA/ANSI north of Highway 401. Approximately three (3) individuals were observed under logs within the deciduous forest communities on site. This species was also observed in moderate numbers during a site investigation completed in June 10, 2011.

4.1.2.9 Mammals

During a background review, three (3) SAR mammal species were identified as potentially occurring within the project area. Northern myotis (*Myotis septentrionalis*), Eastern Small-footed Bat (*Myotis leibii*) and little brown myotis (*Myotis lucifugus*) are listed as Endangered provincially and are therefore afforded protection under the ESA. As such, bat habitat surveys were completed in June 2015 to determine the potential presence of these species within the project area.

As a large number of cavity trees are proposed for removal, it is necessary to determine if the cavities provide suitable habitat for SAR bat species. In order to determine use by SAR bats, acoustic monitoring has been completed during the roosting season (April 30 to September 1) as per the *Bat and Bat Habitat Surveys of Treed Habitats Protocol* (MNRF 2014) and consisted of ten (10) consecutive survey nights. Impacts and mitigation measures with respect to SAR bat species will be discussed further in Section 4.1.2.10.

Additionally, through the review of background information including the MTO Deer Monitoring Study completed by Dougan & Associates (2008), it was noted that White-tailed Deer (*Odocoileus virginianus)* are prevalent within portions of the project area including the Meadowvale Station Woods ESA/ANSI. Deer activity has been noted within both the north and south portions of the ESA/ANSI with movement between the habitat patches occurring within the existing Fletcher's Creek culvert.

Terrestrial components will be incorporated into the new span bridges proposed over Fletcher's Creek. This wildlife crossing will provide more suitable conditions for wildlife use including a larger opening which will increase light and air penetration. Additionally, wildlife fencing will be installed on both the north and south sides of Highway 401 from Second Line West to the Credit River to direct/encourage local wildlife to use the crossing, as well as the crossing at the Tributary to Credit River.

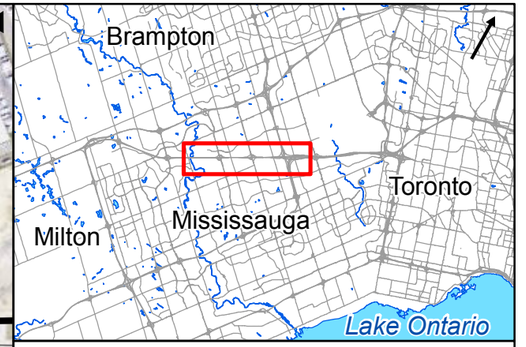
4.1.2.10 Species at Risk

A total of twenty-four (24) SAR species were identified as having potentially suitable habitat within the project area. During site investigations, the majority of these habitats were deemed unsuitable due to factors including limited size of suitable communities, unsuitable vegetation composition or distance to developed/disturbed areas.

Two (2) terrestrial SAR species, Jefferson Salamander and Butternut were confirmed within the north portion of the Meadowvale Station Woods ESA/ANSI, based on consultation with MNRF, Aurora District. In addition, three bat species (Northern Myotis (*Myotis septentrionalis*), Small-footed Bat (*Myotis leibii*) and Little Brown Myotis (*Myotis lucifugus*)) have been confirmed within the south portion of Meadowvale Station Woods ESA/ANSI. Details on these species will be described in more detail below.

Jefferson Salamander Habitat - Jefferson Salamander is listed as *Endangered* provincially and as *Threatened* under Schedule 1 of the SARA. This species and its habitat are therefore afforded protection under the *ESA*.

Habitat for the Jefferson Salamander consists of deciduous or mixed upland forests with suitable breeding ponds. Suitable breeding ponds are often ephemeral in nature being fed by groundwater, springs or spring runoff, and are devoid of predatory fish. Additionally, breeding ponds must also contain attachment sites for egg masses and exist for the duration of larval development (COSEWIC 2010). The embryonic period from egg deposition to hatching ranges between three (3) to fourteen (14) weeks while the larval period lasts between two (2) to four (4) months. This means that ponds must contain water for at least three (3) to eight (8) months, dependent on seasonal time of



Legend

- Study Limits
- Jefferson Salamander Regulated Habitat
- Roads
- Watercourses
- Waterbodies

0 187.5 375 750
Meters

MTO Highway 401 Widening
HWY 403 - 410 to Credit River

Terrestrial SAR Habitat

August 2015	1:11,000	Datum: NAD83, Zone 17N Source: LIO
P#: 60213979	V#:	

AECOM

FIGURE 4-5

Map location: \\CAHAM1FP001\Data\hometalpur.mnr\EA Projects\60213979_Hwy401Widening\MXD\60213979_Figure 4_Confirmed SignificantWildlifeHabitat_23-03-2015.mxd
Date Saved: 2015-03-27 1:05:44 PM

egg deposition and water temperature. Egg masses are normally attached to submerged twigs or branches. Prey items in ponds include a variety of invertebrates as well as other amphibian larvae or tadpoles (COSEWIC 2010).

Meadowvale Stations Woods ESA/ANSI consists of deciduous swamp and upland forested communities that provide suitable habitat for Jefferson Salamander. A confirmed Jefferson Salamander breeding pond was identified by the MNRF (Mark Heaton – SAR Biologist, Aurora District) within the Meadowvale Station Woods ESA/ANSI, north of Highway 401. Regulated habitat for Jefferson Salamander, therefore consists of the confirmed breeding pond and an area of 300 metres from the wetland that provides suitable foraging, dispersal, migration or hibernation conditions (ESA O. Reg. 242/08).

It should be noted that there is also a potential suitable breeding pond within the southern portion of Meadowvale Station Woods ESA/ANSI. Here, there have been observations of breeding Blue-spotted Salamander by CVCA staff. This salamander can also breed and hybridize with Jefferson Salamander. Therefore, there is potential for Blue-spotted Salamander to have the genetic code for Jefferson Salamander (COSEWIC, 2010). Jefferson dominated polyploidy have not been recorded within the south pond.

A retaining wall along the north side of Highway 401 from Second Line West to the west edge of Meadowvale Station Woods ESA/ANSI will be constructed which will significantly reduce vegetation removals within this area. Vegetation removal will largely be limited to the existing right-of-way which currently consists of cultural meadow and does not provide any suitable habitat for this species. Through the implementation of the retaining wall and mitigation measures, it is anticipated that there will be no impacts to Jefferson Salamander or their habitat, as a result of the proposed Highway 401 widening.

Butternut Habitat - Butternut is a tree species listed as *Endangered* both provincially and federally under Schedule 1 of the SARA. Butternut typically grows alone or in small groups in deciduous forest. This species prefers, moist, well-drained soil and is often found along streams. Additionally, this species is intolerant to shade and can be found growing in sunny openings and forest edges (OMNRF 2014l and COSEWIC 2003). Butternut is reported in the northern portion of Meadowvale Station Woods ESA/ANSI, however, it was not observed during field investigations, including a tree inventory conducted within and adjacent to the proposed highway widening.

Northern Myotis – Northern Myotis is listed as *Endangered* provincially. This species and its habitat receive protection under the *ESA*. This species is associated with boreal forests, choosing to roost under loose bark and in cavities of trees (OMNRF 2014i). A bat habitat assessment was completed which confirmed the presence of cavity trees within the south portion of the Meadowvale Station Woods ESA/ANSI. Further acoustic monitoring took place in June 2015 which indicated the presence of this species. *Endangered Species Act* implications will need to be considered with respect to development within the Meadowvale Station Woods ESA/ANSI.

Small-footed Bat - Small-footed bat is listed as *Endangered* provincially and therefore receives protection under the *ESA*. This species roosts in a variety of habitats including in or under rocks or rock outcrops, in buildings, under bridges, in caves, mines or hollow trees (OMNRF 2014j). A bat habitat assessment was completed and confirmed the presence of cavity trees within the south portion of the Meadowvale Station Woods ESA/ANSI. Further acoustic monitoring took place in June 2015 which indicated the presence of this species. *Endangered Species Act* implications will need to be considered with respect to Meadowvale Station Woods ESAANSI.

Little Brown Myotis – Little Brown Myotis is listed as *Endangered* provincially. This species and its habitat receive protection under the *ESA*. During the day Little Brown Myotis roost in trees and buildings. This species often prefers attics, abandoned buildings and barns for summer colonies where they can raise their young (OMNRF 2014k). A bat habitat assessment was completed and confirmed the presence of cavity trees within the south portion of the Meadowvale Station Woods ESA/ANSI. Further acoustic monitoring took place in June 2015 which indicated the

presence of this species. Therefore, *Endangered Species Act* implications need to be considered with respect to Meadowvale Station Woods ESA/ANSI.

A bat habitat assessment was conducted to determine the presence of bat maternity roosting habitat. This assessment included plots to determine the presence of suitable cavity tees. A snag density of 8.75 snags/ha was calculated for the portion of the ESA/ANSI located south of Highway 401. A total of eighteen (18) cavity trees were identified within the proposed Highway 401 widening footprint located along the north boundary of the ESA/ANSI south of the existing highway during the tree inventory. As the number of trees proposed for removal consists of 72% of the identified cavity trees within the ESA/ANSI, the proposed development will result in some habitat loss. Further acoustic monitoring took place in June 2015 which confirmed the presence of these species. Mitigation recommendations with respect to loss of bat habitat are discussed below. The remainder of vegetation communities affected by the proposed highway widening will result in the loss of marginal habitat as these communities are heavily influenced by human disturbance.

4.1.2.11 Description of the Proposed Work and Impact Assessment

There are two key stages in the development and management of the proposed Highway 401 widening during which potential environmental effects may occur. These include the construction stage and the post-construction stage. The majority of short-term impacts will be related to the construction stage of site development. Generally, these impacts are temporary in nature and are preventable through proper construction practices and site inspection. Long-term impacts are related to the highway widening, as well as post-construction activities. Many of these impacts can be mitigated through road design and environmentally sound management practices.

The potential short-term environmental impacts associated with the proposed development relate primarily to construction activities. Many of the potential short-term impacts are commonly encountered with land development and therefore, have associated standard mitigation measures. The potential short-term impacts associated with the proposed Highway 401 widening are described below:

Sediment and Erosion – Clearing and grading of the land for construction will require the removal of vegetation and exposure of soils which can result in sediment run-off discharging into nearby terrestrial communities. Exposed soils can result in sediment deposition within terrestrial communities which may interrupt the ability of vegetation to photosynthesize thereby suffocating it.

Construction Activities - The use of machinery and vehicles on site could result in leaks or spills of oil, gasoline and other fluids which could enter the surrounding natural communities. These impacts can be limited and even avoided with proper machinery inspections and maintenance as well as establishing areas away from natural heritage features that are dedicated to re-fueling and storing machinery.

Damage and Disturbance to Adjacent Natural Features - During site clearing and grading, heavy machinery could damage trees and shrubs within adjacent natural heritage features. Impacts to adjacent natural features include damage to trees, soil compaction and herbaceous vegetation trampling. Damage to trees by machinery including root damage and soil compaction can affect a tree's ability to grow and absorb nutrients and water. Impacts including tree damage and vegetation trampling of adjacent natural features can be mitigated with the installation of tree protection fencing along the Meadowvale Station Woods ESA/ANSI boundary/development limit to exclude machinery and construction personnel.

Disturbance to General Wildlife – Construction activities within the project area can result in excess noise and lighting which can potentially disturb breeding birds and other residential wildlife within the adjacent natural heritage areas. A certain degree of disturbance can be avoided by restricting construction activities to certain times of day

and outside of breeding/nesting periods for any sensitive bird species identified within the project area. Restricting activities outside of the nesting period will avoid nest abandonment and incidental take.

With the implementation of the mitigation measures, the above-listed impacts will be avoided or lessened during the construction phase.

The sources of potential long-term impacts of the highway widening include the road design and layout, site grading and drainage, as well as operation and maintenance.

Highway Design and Footprint – The design of the proposed Highway 401 widening has considered the protection of natural heritage features and functions within the project area. More specifically, the proposed highway widening will include the construction of a retaining wall along the north side of the highway, from Second Line West to the west side of Meadowvale Station Woods ESA/ANSI. This retaining wall has been included within the road design to reduce the amount of grading required within the Meadowvale Station Woods ESA/ANSI, therefore significantly reducing vegetation removals within Jefferson Salamander Habitat in the north part of the Meadowvale Station Woods ESA/ANSI. The footprint of the proposed road widening will also result in the loss of vegetation within the Meadowvale Station Woods ESA/ANSI, south of Highway 401.

Loss of Native Vegetation – The proposed highway widening will require the removal of vegetation including portions of vegetation communities found adjacent to the existing highway. This includes the removal of approximately 7.2 ha of Dry-Moist Field Meadow Type which consists of linear communities along the edge of the highway. The majority of field communities are heavily disturbed and contain exotic and invasive species including common Buckthorn, common reed, and purple loosestrife. However, loss of vegetation also includes the removal of vegetation within the south portion of the Meadowvale Station Woods ESA/ANSI (FOD6-5). Table 4-2 provides a summary of vegetation communities affected by the proposed road widening and the approximate areas of vegetation loss within each community type (excluding the south portion of Meadowvale Staton Woods ESA/ANSI). There are no significant ELC communities within the proposed highway widening footprint. Additionally, no significant plant species were observed within the communities proposed for removal.

Table 4-2. Summary of ELC Communities and Removal (Excluding Meadowvale Station Woods South of Highway 401)

ELC Community Affected	Approximate Area of Vegetation Loss (Hectares)	Location(s)
CUM1-1 Dry-Moist Field Meadow Type	7.2	This community is found through the project area, largely within the highway right-of-way.
MAM2 Mineral Meadow Marsh Ecosite	0.20	This community is located within the Meadowvale Station Woods ESA/ANSI.
MAM2-2 Mineral Meadow Marsh Ecosite	0.23	Communities are found throughout the project area including within the Meadowvale Station Woods ESA/ANSI and the unidentified woodland southwest of the Highway 403/410 interchange.
MAM2-10 Forb Mineral Meadow Marsh Type	0.53	Communities are present within the unidentified woodland southwest of the Highway 403/410 interchange as well as southeast corner of Mavis Road and Highway 401.
MAS2-1 Cattail Mineral Shallow Marsh Type	0.11	This community is located within the north portion of the unidentified woodland southwest of the Highway 403/410 interchange.
FOD6-5 Fresh-Moist Sugar Maple Hardwood Deciduos Forest Type	1.74	This community is predominately found within the Meadowvale Station Woods ESA/ANSI.

ELC Community Affected	Approximate Area of Vegetation Loss (Hectares)	Location(s)
FOD5-2 Dry-Fresh Sugar Maple Beech Deciduous Forest Type	0.17	This community is present at the north end of the unidentified woodland southwest of the 403/410 Interchange.
FOD7 Fresh-Moist Lowland Deciduous Forest Ecosite	0.25	This community is predominately found within the Meadowvale Station Woods ESA/ANSI, north of Highway 401.
FOD9 Fresh Moist Oak Maple Hickory Deciduous Forest Type	0.87	This community is present within the unidentified Woodland at the southwest corner of the Highway 403/410 Interchange
SWD3 Maple Mineral Deciduous Swamp Type	0.06	Communities are predominately present within the Meadowvale Station Woods ESA/ANSI.
SWD2-2 Green Ash Mineral Deciduous Swamp Type	0.07	Communities are present within the unidentified woodland southwest of the Highway 403/410 interchange
SWD2-1 Black Ash Mineral Deciduous Swamp type	0.56	Communities are present within the unidentified woodland southwest of the Highway 403/410 interchange
CUW1 Mineral Cultural Woodland Ecosite	0.28	This community is located at the northwest corner of McLaughlin Rd. and Highway 401.
Total	12.3	

Loss of General Wildlife Habitat – The Highway 401 widening has been designed to reduce the amount of habitat removal required within the Meadow Station Woods ESA/ANSI on the north side of Highway 401 between Second Line West and the west side of the ESA/ANSI. As such, there will be minimal loss of forest habitat (FOD 7) on the north side of the highway (approximately 0.25 ha). However, grading will still be required on the south side of the highway and as such, will result in the loss of Mineral Meadow Marsh (MAM2-10), Fresh-Moist Sugar Maple Hardwood Deciduous Forest Type (FOD6-5), Fresh-Moist Oak Maple Hickory Deciduous Forest Type (FOD9) and Maple Mineral Deciduous Swamp Type (SWD3). Table 4-3 displays the areas of vegetation loss within these communities. The proposed highway widening will result in the loss of approximately 1.74 ha of FOD6-5. This community was identified as potential SAR bat habitat during the bat habitat assessment completed on March 12, 2015, as well as tree inventories completed in February and March, 2015. Additionally, these communities have been identified as habitat for Blue-spotted Salamander.

Table 4-3. ELC Communities Proposed for Removal Within Meadowvale Station Woods ESA/ANSI South of Highway 401

ELC Community Affected	Approximate Area of Vegetation Loss (Hectares)
FOD9 Fresh Moist Oak Maple Hickory Deciduous Forest Type	0.18
FOD6-5 Fresh-Moist Sugar Maple Hardwood Deciduous Forest Type	1.52
MAM2-10 Forb Mineral Meadow Marsh Type	0.44
SWD3 Maple Mineral Deciduous Swamp Type	0.06
Total	2.2

Disturbance to Wildlife and Wildlife Movement – Meadowvale Station Woods provides movement opportunities for local wildlife. Historically, the highway has posed a challenge for both wildlife and motorists. Due to safety issues with motorist-deer collisions, wildlife fencing was previously installed along the stretch of highway from the Credit River to Second Line West. This fencing provides a barrier that directs wildlife movement under the highway through the existing twin-cell culvert at Fletcher's Creek. These measures have proven effective at providing

movement opportunities for wildlife while substantially reducing wildlife-vehicle collisions along this stretch of highway.

Changes to Groundwater Discharge/Recharge – A reduction in groundwater recharge to the subsurface will occur as a result of the construction of impermeable surfaces. However, based on the relatively large regional areas from which the local watershed and aquifers derive recharge, the potential reduction in overall groundwater recharge is not expected to be significant. Similarly, given the relatively small area of surficial impact caused by potential construction activities, a decrease in discharge is not expected to be significant. Additional details on impacts on groundwater recharge and discharge can be found within the *Groundwater Assessment Report* (2014).

Highway Maintenance – Road maintenance activities including salt application can result in negative impacts to adjacent natural features and fauna. Increasing the existing highway from 6-lanes to 12-lane will require additional maintenance including salt applications. The increase in salt within the adjacent natural features can result in the decline of native vegetation within adjacent natural features such as the Meadowvale Station Woods ESA/ANSI.

4.1.2.12 Environmental Protection/Impact Mitigation

As part of the consultation between the project team and regulatory agencies, avoidance and mitigation measures were developed to reduce or eliminate potential impacts to the natural environment. For the purpose of this report, such measures have been divided into three (3) categories:

1. **Avoidance Measures** - Avoidance include the design of a plan that considered the protection of natural heritage features and functions by keeping the development envelope outside of the natural feature where possible.
2. **Standard Mitigation Measures** - Standard mitigation involves the implementation of measures designed to eliminate or reduce impacts by designing facilities or including natural elements that filter or prevent impacts.
3. **Compensation and Restoration Mitigation Measures** - Compensation and restoration mitigation involves the replacement or restoration of a feature and/or function that may be lost as a result of the construction and long-term presence of the development.

The following describes the measures recommended to reduce or eliminate impacts associated with the proposed Highway 401 widening.

<u>Avoidance Measures</u>

As described in Section 4.1.2.10, the proposed Highway 401 widening includes the construction of a retaining wall on the north side of Highway 401 from Second Line West to the west side of Meadowvale Station Woods ESA/ANSI. This design concept was established and approved by the Aurora District MNRF staff to reduce the amount of clearing and grading required for highway construction. The retaining wall option has therefore avoided potential impacts to Jefferson Salamander and its habitat identified within the north portion of the Meadowvale Station Woods ESA/ANSI. This habitat has also been identified as Candidate Bat Maternity Roosting habitat. The construction of a retaining wall along the north portion of the highway will also substantially reduce the amount of tree removal north of the proposed highway widening. This avoids additional removal of potential bat roosting habitat.

<u>Construction Mitigation Measures</u>

Standard mitigation measures are typically associated with construction related impacts. These mitigation measures are commonly implemented with development projects and include measures to reduce or eliminate potential impacts to the natural environment. The following measures will be included in the contract documents.

Installation of Fencing – The installation of fencing, including tree protection fencing and silt fencing, will reduce or eliminate construction-related impacts such as damage to trees or sediment loading in adjacent natural heritage features. This measure will substantially reduce or even eliminate the potential for sediment loading into the adjacent Meadowvale Station Woods ESA/ANSI. Additionally, wildlife barrier fencing will be installed on the north and south sides of Highway 401, West of Meadowvale Station Woods prior to construction in order to eliminate wildlife from entering the construction zone and the existing highway. This fencing will exclude most wildlife present within the adjacent natural features including mammals such as white-tailed deer, as well as reptiles and amphibians such as snakes, turtles or frogs from entering the highway right-of-way and direct them to the Fletcher's Creek and Tributary of Credit River crossings. Screening for birds at all culvert locations will be erected in respect of the breeding bird nesting window. Proper installation and maintenance are necessary to ensure that impacts are mitigated effectively.

Timing Restrictions – Restricting construction related activities outside of sensitive periods for local or significant wildlife species can limit disturbance during life cycle stages. Construction-related activities should be limited to the daylight hours (i.e. 7am to 7pm) in order to reduce the amount of noise disturbance. Additionally, vegetation clearing will occur outside of the breeding bird nesting (i.e., April 1st to August 15th) to avoid incidental take and reduce impacts to breeding birds within the Meadowvale Station Woods ESA/ANSI. Recommended timing windows are also important in reducing the effects of construction on bat maternity roosting habitat and potential SAR bat habitat. All tree removal will be conducted outside of the bat roosting period (April 30th to September 1st). Additionally, construction adjacent to the Meadowvale Station Woods ESA/ANSI should occur during the daylight hours to reduce noise and light effects on roosting and foraging bats within the adjacent deciduous forest.

Laydown Areas/Refueling Stations – Construction activities can result in the trampling of adjacent vegetation communities and the compaction of soil. The establishment of designated laydown areas away from natural heritage features should be implemented to limit the area of disturbance caused by construction equipment. Additionally, these areas should be designated for as refueling stations so that any spills or leaks are contained and outside of the adjacent natural features.

Directional Lighting – In the event that construction must occur during the night time hours (i.e. 7 pm to 7 am) it is highly recommended that directional lighting be used to limit disturbance to bat roosting and foraging habitat. This will also reduce light pollution within the adjacent natural features and provide reprieve for native fauna.

Erosion and Sediment Controls – Mitigation measures must be used for erosion and sediment control to prohibit sediment from entering the identified natural areas (i.e., Meadowvale Station Woods, Fletcher's Creek and Tributary to Credit River) during construction. The primary principles associated with sedimentation and erosion protection measures are to: (1) minimize the duration of soil exposure, (2) retain existing vegetation, where feasible, (3) encourage re-vegetation, (4) divert runoff away from exposed soils, (5) keep runoff velocities low, and (6) trap sediment as close to the source as possible. To address these principles, the following mitigation measures are recommended:

- Typical erosion control measures such as light duty, heavy duty silt fencing, coco mats, straw bale/waddles, rock check dam etc. will be used, as required.
- All identified sediment and erosion control measures should be installed according to Ontario Provincial Standard Specifications Drawings.
- Excess silt fence should be maintained on-site, prior to the commencement of grading operations and throughout the duration of the construction, in the case of an emergency or repair.
- Silt fencing positioning should be incorporated into initial detailed design drawings and contract specifications.
- Protect all exposed surfaces and control all runoff during constructions.

- All erosion control measures must be in place prior to the start of construction and remain in place until restoration is complete and disturbed areas are stabilized against erosion. Maintain all erosion control measures during construction.
- Erosion and sediment control measures will be visually inspected daily during environmental monitoring, and following storm events.
- Straw bales/waddles to be used in localized areas to minimize sediment and intercept runoff.
- Maintain and replace straw bales/waddles as necessary.
- All excavated materials requiring stockpiling shall be kept away a minimum distance of 30 metres from all watercourses and Meadowvale Station Woods ESA/ANSI.
- All surfaces susceptible to erosion should be re-vegetated through the placement of seed, mulch or sod immediately upon completion of construction activities.

Erosion and Dust Controls – In addition to the installation of silt fencing other measures to reduce or eliminate sediment loading into the adjacent natural features includes temporary siltation ponds, riprap swales and hay-bale check dams can be installed prior to construction activities. Similarly, to mitigate dust deposition, a dust suppressant can be applied to areas of exposed soils to reduce or eliminate dust generation.

Peripheral Vegetation Protection - During construction of facilities, roads and ditches adjacent to the identified natural areas, heavy equipment could damage peripheral vegetation from contact, excavation and/or soil compaction. Dust coated vegetation can reduce photosynthesis, increase susceptibility to disease and lead to death. It is anticipated that perimeter plants would be most susceptible to such effects. The following recommendations are made to mitigate these potential impacts:

- Prior to heavy machinery working adjacent to identified Natural Areas, a fence barrier for tree protection (OPSD 220.10) should be installed outside the drip-line of the significant features to protect any vegetation that is to be retained and is in the vicinity of exposure to damage by machinery.

Wildlife Protection Protocol (Including Species at Risk) – A Wildlife Protection Protocol should be completed prior to site clearing. The protocol should outline construction mitigation measures such as wildlife exclusionary barrier types and locations as well as wildlife and SAR encounter procedures. The Wildlife Protection Protocol should include fact sheets on Species at Risk and general wildlife that may be encountered on site – species fact sheets should include species descriptions, representative photographs, habitat descriptions as well as their provincial/federal status. In the event that wildlife, including SAR are encountered on-site, the protocol outlined below should be followed:

- Work in the immediate vicinity of the observation is to come to a stop.
- Should an ecologist/biologist not be on-site, one should be contacted immediately.
- Ecologist/Biologist will notify the District MNRF Biologist within 48 hours of any observation of Endangered and Threatened species and/or immediately for any species going to a wildlife custodian
- It is not necessary to notify the District MNRF Biologist with observations of Special Concern species (i.e., Snapping Turtle) or general wildlife sightings (i.e., deer, raccoon etc.);
- A 30 m setback from the area of the species location should be applied to allow the species to vacate the area naturally within a 24 hour period and then exclusionary fencing is to be installed following MNRF protocol.
- Should a species be encountered during construction activities completed during the winter months, the species should immediately be placed in appropriate containers and stored in a dark, warm, quiet place and be transported to an appropriate wildlife sanctuary/rehabilitation facility as soon as possible. Onsite ecologists/biologists will advise of the transportation arrangements and consult with MNRF to notify them of the transportation.
- Onsite ecologists/biologists will call the wildlife sanctuary/rehabilitation facility prior to transporting the individual.

- Work is to not commence again in the immediate area of the observation until further instructed by onsite ecologists/biologists.
- Should a wildlife species be observed and on-site personnel are not able to accurately identify it, the onsite Ecologist/Biologist is to be contacted immediately for proper identification. Photographs of the species and a description of the species location are to be recorded upon observation if possible.

Compensation and Restoration Mitigation Measures

Vegetation - While being the least desirable measure, compensation for loss of vegetation or habitat, or the restoration of degraded areas can offer a means of providing a net benefit to the natural features and functions that contribute to an overall natural heritage system.

The proposed Highway 401 Widening will result in the loss of 12.27 ha of natural heritage features including 3.31 ha of forested communities, 7.2 ha of cultural meadow and 1.76 ha of wetland. A compensation plan is therefore being prepared to compensate for the loss of vegetation within and adjacent to the Meadowvale Station Woods ESA/ANSI. Plantings within the compensation areas will include native species that are present within the Meadowvale Station Woods ESA/ANSI. A list of plant species proposed for compensation plantings can be found in Table 4-4.

Table 4-4. Compensation Plantings List

Scientific Name	Common Name
Deciduous Trees	
Acer saccharum	Sugar Maple
Betula papyifera	Paper Birch
Carya cordiformis	Bitternut Hickory
Carya ovata	Shagbark Hickory
Fagus grandiflora	American Beech
Juglans nigra	Black Walnut
Ostrya virginiana	Ironwood
Populus Balsamifera	Balsam Poplar
Prunus serotine	Black Cherry
Quercus alba	White Oak
Quercus marcocarpa	Bur Oak
Querus rubra	Red Oak
Ulmus Americana	American Elm
Tilia Americana	Basswood
Conifer Trees	
Pinus strobus	White Pine
Tsuga Canadensis	Hemlock
Shrubs	
Amelancheir arborea	Downy Serviceberry
Amelancheir laevis	Allegheny Serviceberry
Cornus racemosa	Gray Dogwood
Cornus stolonifera	Red-osier dogwood
Corylus cornuta	Beaked hazelnut
Prunus pensylvanica	Chokecherry
Sambucus racemosa	Red Elberberry
Viburnum acerifolium	Maple-leaf Virburnum
Viburnum lentago	Nannyberry

Opportunities for restoration/compensation are also available within the grading limits of the proposed Highway 401 widening. These areas make up an additional 0.36 ha for compensation/restoration. Similarly, these areas should be planted with native tree and shrub species as outlined in Table 4-4. Restoring these areas will help with creating habitat and maintaining ecological integrity of the Meadowvale Station Woods ESA/ANSI.

The details of this restoration/compensation plan are currently on-going and will be confirmed and finalized with the City of Mississauga, MNRF, CVC and MOECC prior to construction. The restoration/compensation plan will satisfy a Condition of EA approval for the 2005 TESR.

Species at Risk (Bats) - Under Ontario Regulation (O.Reg.) 242/08 of the *Endangered Species Act* a Notice of Activity must be completed and submitted to the MNRF for SAR Bat species prior to any proposed activities. The notice of activity provides information including a description of the proposed activity, the proposed start and end dates for the activity, the location of the habitat that will be the object of activity as well as a notice of the fact that the activity will impact the identified species.

Additionally, a mitigation plan is required, under Sub-section 7 of the *ESA*, that outlines mitigation measures taken to compensate for habitat loss as well as outline monitoring required. This mitigation plan does not need to be submitted to the MNRF however, it does need to be retained on record for 5 years for potential auditing purposes. This document may be requested by the MNRF and must be provided to them within 14 days of the request.

Species at Risk (Barn Swallow) - One (1) Bird Species at Risk, Barn Swallow, was observed in flight within the Fletcher's Creek box-culvert. This species is considered Threatened provincially and is afforded protection under the *ESA*. Under Ontario Regulation 242/08 of the *Endangered Species Act*, any proposed activities that result in the removal of barn swallow nests require the submission of a Notice of Activity. The Notice of Activity provides information on the description of activities, the proposed start and end dates, the location of the building or structure proposed for alteration as well as a notice of the fact that activity will impact barn swallow habitat.

Similar to SAR bat, a mitigation plan is required under O.Reg. 242/08 which outlines the following:

- The name and contact information of the person who is proposed to carry out an activity
- A description of the activity the person proposes to carryout, including the start and end times
- A description of the building or structure that is the object of the activity
- The number, location and description of barn swallow nests located on the building or structure, and the amount of area suitable for nesting that the building or structure provides
- Methods and timing for monitoring efforts.

As mentioned, this document needs to be maintained for the clients records for 5 years as the MNRF may request it for auditing purposes.

4.2 Socio-Economic Environment

4.2.1 Noise

A Noise Assessment was completed as part of the 2005 TESR. Since the 2005 TESR was completed, the project has been divided into two (2) phases. The highway expansion from the Highway 403/410 Interchange to just west of the Hurontario interchange was completed as part of the constructed portion to the east (GWP 2149-01-00); the remainder of the expansion to the Credit River was the subject of an updated noise review undertaken as part of this detail design. Both typical asphalt and concrete surfaces were included as part of this review. This updated noise assessment was based on the latest MTO standard, as documented in the 2006 Environmental Guide for Noise (the Guide) which is more stringent than the criteria used in the 2005 TESR. In addition, the noise assessment has been completed using predicted 2031 traffic volumes.

Under the Guide, the "noise impact" is defined as the difference between the "No Project" and the "With Project" future noise levels during the subject year of assessment, which is typically 10 years post-construction. The Guide

requires that the most exposed side of a dwelling unit be assessed as part of an initial screening. If the initial screening indicates that noise mitigation investigation is required, the point of assessment for determining the noise mitigation requirements is the Outdoor Living Area (OLA), as defined in the MTO Noise Guide.

Predicted noise levels were assessed at noise sensitive areas. Land uses designated as noise sensitive by the Guide consist of the following:

- Private homes such as single family residences
- Townhouses
- Multiple unit buildings, such as apartments with OLA's for use by all occupants
- Hospitals, nursing homes for the aged, where there are OLA's for the patients.

A review of the project area indicates that there are noise sensitive areas on the north and south sides of Highway 401, west of Mavis Road. A third noise sensitive area was identified in the TESR, however that location has since been demolished and is now zoned for employment purposes by the City of Mississauga. The noise sensitive areas assessed are representative of the worst case noise sensitive areas within 600 m of the edge of the highway pavement.

Traffic noise predictions indicate that the project is expected to have a low to medium perceived noise impact with the widening of Highway 401 in the OLA. Due to administrative, technical, and economic reasons, noise mitigation is not considered feasible as a noise barrier on either side of the highway will not reduce noise levels by a minimum of 5 dBA in the OLA of the first row of houses, as required by the MTO Guide.

Construction noise varies based upon a variety of factors such as time and location of operation, size and concurrent use of equipment and staging of construction. General recommendations to minimize the impact of construction noise have been provided in Table 4-5.

Noise levels are enforced within the City of Mississauga through Noise Control By-law No. 360-79, as amended. As documented in the By-law, none of the provisions noted in the By-Law shall apply to prohibit the noise arising out of or created by construction or construction equipment between the hours of 7:00 am and 5:00 pm. According to Schedule 2, Section 5 of the By-law, the description of activity that entails the operation of any equipment in connection with construction is prohibited from 19:00 one day to 07:00 next day, 17:00 one day to 07:00 next day (for residential areas), as well as all day on Sundays and Statutory Holidays for both residential and non-residential areas.

The City of Mississauga has confirmed that a Noise By-Law exemption will not be required for night-time construction activities outside the permitted hours for noise. A requirement for public notification will be included in the contract documentation for affected residents within a 500m radius prior to the overnight construction activities. In addition, Ward 5 and Ward 11 councillors will be notified of the overnight construction activities.

Noise complaints will be responded to in accordance with the MTO/MOE "Noise Protocol".

As noted earlier in Section 3.1.12, an existing 150 m long x 1.8 m high developer-installed noise structure in the south-west quadrant of the Mavis Road interchange will be relocated and replaced in-kind to allow for the re-aligned eastbound off-ramp.

4.2.2 Property Waste and Contamination

In order to assess historical and current land uses and to identify properties with the potential to have impacted the study area, a Phase II Environmental Site Assessment was completed and documented in the *Limited Subsurface Investigation, Highway 401 From Highway 410/403 to the Credit River* (2012).

Historical spills at five (5) locations on MTO property and within the MTO right-of-way were identified as issues of environmental concern. The spill locations included:

- Highway 401 eastbound, 2 km east of Mississauga Road (2 spills reported at this location)
- Highway 401 westbound, west of Mavis Road (4 spills reported at this location)
- Highway 401 eastbound at Mavis Road (2 spills reported at this location)
- Highway 401 eastbound at McLaughlin Road (1 spill reported at this location)
- Highway 401 westbound, 100 m east of McLaughlin Road (I spill reported at this location).

In order to investigate these spill locations, eight boreholes were advanced and eleven soil samples were submitted for laboratory analysis of petroleum hydrocarbons fraction (PHC) F1 to F4, benzene, toluene, ethylbenzene and xylenes (BTEX) and/or Ontario Regulation (O.Reg.) 153/04 metals and organics.

Based on the analytical results of the soil samples, lead was measured at a concentration of 136 µg/g in one soil sample at the Mavis Road interchange, which is in excess of the MOEE Table 3 soil quality Standard of 120 µg/g. In addition, further soil samples were collected by the MTO in this area on May 20, 2015 for the analysis of lead and all seven (7) soil sample lead concentrations were below the Table 2 and 3 standards. No other concentrations in excess of the applicable Table 3 soils quality Standards were identified in the remaining soil samples for the parameters tested. It should be noted that during construction of the Mavis Road interchange (GWP 2152-01-00), no lead was detected. Detectable petroleum hydrocarbons were identified in some soil samples but at concentrations below the applicable Table 3 Standards.

Based on the above, no soil quality concerns were identified with respect to historical fuel spills. Exceedances of the applicable groundwater standards are not anticipated based on the hydrocarbon concentrations detected in soil at the test locations. Should hydrocarbon impacted soil be encountered during construction, a Qualified Person ('QP', as defined by O.Reg. 153/04, as amended) should be retained to assess the potential environmental risk and management options for the impacted soil.

To ensure the excess materials identified are managed and disposed in accordance with all applicable laws, regulations and best practices, appropriate provisions will be incorporated into the contract documents.

The management of excess material will occur in accordance with Ontario Provincial Standard Specification 180 (OPSS 180), General Specification for the Management and Disposal of Excess Material. The final contract package will emphasize reducing, reusing and recycling excess materials generated during construction. Excess earth material will be utilized for slope flattening to the greatest extent possible.

In the event that contaminated soil or groundwater is encountered during construction, the *Ontario Environmental Protection Act* and the Ontario Ministry of the Environment Spills Response and Contaminated Procedures will be complied with.

4.2.3 Air Quality

An air quality impact assessment was undertaken as part of detail design for the proposed widening of Highway 401 and documented in the *Highway 401 Widening – From Highway 401/410/403 Interchange to Credit River Detail Design – air Quality Assessment Report* (August 2015). The air quality assessment did not warrant any mitigation measures for the ultimate widening of Highway 401. However, construction activities have the potential to generate dust in the vicinity. As with any construction site, these emissions will be of relatively short duration and are unlikely to have any long-lasting effects on the surrounding area. Air quality impacts of construction related activities can be effectively mitigated through the following actions:

- Construction activities are scheduled to avoid overlapping construction activities in any one area; and
- The number of machines operating in any one area is minimized at any given point in time.

Other means of mitigating exposure to construction related emissions will include:

- Ensuring the use of heavy equipment that is in good condition of maintenance and compliant with applicable federal regulations for off-road diesel engines;
- Ensuring all machinery is maintained and operated in accordance with the manufacturers specifications;
- Using equipment sized for the particular job and operating equipment at optimum rated loads;
- Minimizing idling time and posting signage to this effect around the construction site;
- Locating stationary equipment (e.g., generators, compressors etc.) as far away from sensitive receptors as practical; and
- Implementing those measures (to be performed by the Contractor) to minimize the generation of dust via materials handling, vehicle movement and wind erosion.

It is further recommended that mitigation measures detailed in *"Best Practices for the Reduction of Air Emissions from Construction and Demolition Activities (March 2005)"* prepared by Cheminfo for Environment Canada be implemented, where practical.

4.2.4 Road Network and Construction Staging

Construction staging plans have been developed to minimize impacts to motorists during demolition and construction. During removal of the Second Line West structure, Highway 401 will be closed for approximately an 8 hour period and traffic will be detoured as described in Section 3.2.

4.2.5 Emergency Spill Response

Direct responsibility for containment and clean-up of spills and abandoned materials on MTO highway facilities rests with the owner of the material and person in control of the material at the time of the spill or abandonment.

Where spills or abandoned material occur on MTO highway facilities, MTO may assist where persons legally responsible cannot be located or not able to respond. MTO assistance may include notification of authorities, provision of equipment and materials and traffic management.

In the event of a spill of MTO material by MTO staff, MTO will undertake all notification, containment and cleanup responsibilities required by provincial and federal legislation.

4.2.6 Emergency Services

Emergency Medical Services (EMS), such as local medical services, fire and police, will be notified of the start of construction/construction staging, highway closures and detours to minimize delay in emergency response times during and after construction.

4.2.7 Navigability

A review of the *Navigable Protection Act* (NPA) for Fletcher's Creek determined that the watercourse is not navigable. Therefore, the provisions of the NPA do not apply and an approval is not required.

4.2.8 Cultural Environment

4.2.8.1 Archaeological Resources

The Stage 2 Archaeological Assessment (AA), from Highway 403/410 Interchange to the Credit River was completed in August 2012. Areas previously assessed during the Stage 1 and 2 AA for the preliminary design, disturbed features and areas of low archaeological potential were not subjected to systematic survey. A shovel test pit survey was conducted at 5-metre intervals within the remaining undisturbed grass margins and wooded areas on the south side of Highway 401, from Second Line West to approximately 500 m east of the Credit River that primarily encompasses the area for the new core to collector transfer. Despite careful scrutiny, no archaeological remains were encountered. The project area was cleared of further archaeological concern.

The Stage 2 AA was filed with MTCS and a letter of compliance was received on March 5, 2013 (**Appendix A**).

4.2.8.2 Built and Cultural Heritage Resources

In October 2012, a Cultural Heritage Evaluation Report (CHER) was completed for the Second Line West Underpass located on Highway 401 in the City of Mississauga. The assessment concluded that the Second Line West Underpass is not considered provincially important and worthy of inclusion on the Ontario Heritage Bridge List. MTO Central Region is proposing to remove this bridge.

In April 2013, a Cultural Heritage Assessment of Cultural Heritage Landscapes and Cultural Heritage Resources for the entire project area. No mitigation measures are recommended for Highway 401 corridor as previous widening activities have altered the original design and thus, resulted in the paving of the grass median (Unterman McPhail Associates, 2013).

4.2.9 Landscaping

To compensate for the loss of trees and vegetation within the highway right-of-way, the MTO will replace and plant trees at a 1:1 ratio along the corridor, within Meadowvale Station Woods and within a portion of City of Mississauga lands, on the south side of Highway 401, west of Meadowvale Station Woods. An extensive landscaping plan has been developed for the Highway 401 corridor which includes:

- Fletcher's Creek habitat enhancements
- Vegetative screening in the north-west quadrant of Highway 401 and the Mavis Road interchange
- Mavis Road interchange to accommodate enhanced drainage treatments
- Vegetative restoration/compensation within the City of Mississauga lands, west of Meadowvale Station Woods ESA to address a Condition of Approval for the 2005 TESR.

4.3 Construction Contract Provisions

The following subsections outline the environmental specifications that have been incorporated into the Contract Documents. As such, these specifications are to be followed by the Contractor in carrying out the work.

4.3.1 Ontario Provincial Standard Specifications (OPSS)

The following Environmental OPSSs apply to this Contract:

- OPSS 100 – General Conditions of Contract
- GC 3.03: Contractor shall alter method, equipment or work force at any time Contract Administrator considers Contractor's' actions to be damaging to the environment.
- GC 3.07.01: The presence of Species at Risk as defined under the federal Species at Risk Act, 2002 and/or the provincial Endangered Species Act, 2007 not otherwise identified in the Contract Documents.
- GC 3.07.05: Contractor shall suspend operations if items which may indicate an archaeological find are exposed.
- GC 3.07.06: If the Contractor encounters Species at Risk as defined in clause GC 3.07.01 not otherwise identified in the Contract Documents within the Contract limits that are likely to be impacted by the Contractor's operations:
  - The Contractor shall immediately notify the Contract Administrator and suspend operations within the area identified by the Contract Administrator.
  - Work shall remain suspended within that area until otherwise directed by the Contract Administrator in writing, according to subsection GC 7.11, Suspension of Work.
  - Any delay in the completion date of the Contract that is caused by such a cessation of construction operations shall be considered to be beyond the Contractor's control according to clause GC 3.07.01.
  - Any increases in the cost of the work to be done that are caused by such a cessation of construction operations shall be considered as a Change in the Work according to clause GC 3.10.01.01.
  - Any work directed or authorized in connection with the unexpected presence of Species at Risk shall be considered as Changes in the Work according to clause GC 3.10.01, Changes in the Work.
- GC 3.11.03.01.09: Contractor responsible for obtaining all regulatory approvals from any Change Proposal.
- GC 3.11.03.05: Contractor shall submit a traffic management plan that maintains the minimum standards for environmental protection where a change to construction staging is proposed.
- GC 7.07.03: Contractor shall control dust such that it does not affect traffic, enter surface waters, or escape beyond the ROW to cause a nuisance to residents and businesses.
- GC 7.09.01: Contractor shall at all times provide pedestrian and vehicle access to properties adjoining the work.
- GC 7.10.01: Contractor shall obtain any permits, licenses and certificate required for performance of the work.
- GC 7.13.02: Contractors's environmental incident management under legislation protecting the environment and natural resources shall include containment, notification to proper authority, cleanup in accoradance with the Contractor's plan that demonstrates satisfactory management of environmental incidents.
- OPSS 180 – Specification for the Management of Excess Material
- OPSS 182 – General Specification for Environmental Protection for Construction in Waterbodies and on Waterbody Banks
- OPSS 185 – General Specification for Temporary Flow Control for Construction in Waterbodies
- OPSS 206 – Construction Specification for Grading
- OPSS 506 – Construction Specification for Dust Suppression
- OPSS 518 – Construction Specification for Control of Water from Dewatering Operations
- OPSS 801 – Construction Specification for the Protection of Trees
- OPSS 802 – Construction Specification for Topsoil
- OPSS 803 – Construction Specification for Sodding

- OPSS 804 – Construction Specification for Seed and Cover
- OPSS 805 – Construction Specification for Temporary Erosion and Sediment Control.

4.3.2 Standard Special Provisions (SSPs)

The following Environmental SSPs are included with this Contract:

- 101F21 – Occupational Health and Safety Act Compliance – List of Designated Substances
- 110F10 – Use of Air Cooled Iron Blast Furnace Slag as Granular Material
- 199F12 – Environmentally Sensitive Areas
- 199F31 – Environmental Exemptions and Permits
- 199F33 – Construction Noise Constraints
- 805F01 – Amendment to OPSS 805, Construction Specification for Temporary Erosion and Sediment Control Measures

4.3.3 Non-Standard Special Provisions (NSSP)

The Contract includes the following Environmental NSSPs:

- General Environmental Protection Requirements
- Erosion and Sedimentation Control - General
- Management of Excess Earth with Salt Impacts
- Emergency Service Providers
- Migratory Bird Protection
- Species at Risk
- Prevention of Asian Long Horned Beetle Infestation
- General Wildlife Protection
- General Tree Protection
- Management of Effluent from Concrete Cutting/Grinding
- Spill Prevention and Response Contingency Plan
- Equipment Refueling and Washing
- Notification to Contractor for Redside Dace Monitoring Work Occuring in Fletcher’s Creek.

4.4 Summary of Environmental Protection / Mitigation Requirements during Construction

The following exhibit provides a summary of the key environmental concerns for the Mavis Road interchange.

Table 4-5. Summary of Environmental Protection / Mitigation Requirements During Construction

I.D.#	Issues/Concerns Potential Effects	Concerned Agencies	I.D.#	Mitigation/Protection/Monitoring
General Environmental Protection Requirements				
1	General Environmental Protection	MTO	1.1	• The general requirement to protect the natural environment from impacts and damage, including physical damage, emissions, and local access; and • Control of materials, equipment, construction method, construction disturbance limits, and work timing/staging duration, in order to achieve the foregoing.
Natural Environment Concerns and Commitments				
2	Fisheries and Watercourse Impacts • Potential for impacts to fish habitat in Tributary to the Credit River and Fletcher's Creek	MNRF	2.1	• Maintain fish habitat through structures with fisheries resources by providing natural substrate and channel form. • Apply timing constraints for construction • Contract package to include appropriate timing restrictions and mitigation design (i.e. open bottom culvert, clear span bridge where possible) • Manage fisheries impacts and mitigation in accordance with the Federal *Fisheries Act* and the MTO/DFO/MNR Fisheries Protocol. • Reinstate and expand culvert inlet and outlet at Fletcher's Creek and enhance pools at inlet and outlet of culvert at the Tributary of Credit River.
3	Wildlife Impacts • Potential for wildlife passage through existing culverts at Tributary to the Credit River and Fletcher's Creek. • Potential for wildlife encounters.	MNRF	3.1	• A wildlife crossing will be established at Fletcher's Creek that allows for increased light, air penetration and a larger opening to make it more attractive to wildlife crossing the highway and provides enhancement to the SAR designated watercourse. • Wildlife fencing will be provided along Highway 401 within the Meadowvale Station Woods to encourage/direct wildlife to use the Fletcher's Creek crossing as well as the crossing at Tributary to Credit River. • Wildlife Management Protocol should be implemented prior to site clearing to outline construction mitigation measures such as wildlife exclusionary barrier types and locations as well as wildlife and SAR encounter procedures. Protocol should include fact sheets on Species at Risk and general wildlife that may be encountered on site – species fact sheets should include species descriptions, representative photographs, habitat descriptions as well as their provincial/federal status.
4	Bird Impacts (on or adjacent to structures/culverts)	MNRF	4.1	• Vegetation and site clearing will take place between September and March 31st and avoid the months of April until August, in accordance with the *Migratory Birds Convention Act*.

I.D.#	Issues/Concerns Potential Effects	Concerned Agencies	I.D.#	Mitigation/Protection/Monitoring
				• Bird netting/screening will be placed under/within structures/culverts in advance of construction to deter birds from nesting.
5	Species at Risk • Loss of habitat for Species at Risk due to construction	MTO/MNRF	5.1	• A permit will be obtained under the *Endangered Species Act* for the area of the Meadowvale Station Woods and crossing of Fletcher's Creek prior to construction for one Species at Risk. Requirements outlined in the permit will be strictly adhered to. • Tree and site clearing will take place between September and March 31st and avoid the months of April until August, in accordance with the *Migratory Birds Convention Act* and to avoid the bat roosting period (April 30th to September 1st). • Notice of Activity under Ontario Regulation (O.Reg.) 242/08 of the *Endangered Species Act* to be submitted to the MNRF for SAR Bat and bird species prior to any proposed activities. Preparation of a mitigation plan under Sub-section 7 of the *ESA*, that outlines mitigation measures taken to compensate for habitat loss and outlines required monitoring.
6	Vegetation impacts • Loss of vegetation due to construction	MNRF	6.1	• Contract documents to include operational constraints and special provisions with respect to vegetation removal. • Compensation plan developed in consultation with the City of Mississauga, MNRF, CVC and MOECC will be implemented prior to construction.
7	Groundwater/Surface water	MTO/MOECC		• Drainage will be designed to manage stormwater quality and quantity, and will include a series of small wetlands within the Mavis Road interchange for the area draining to Fletcher's Creek • Obtain permit to Take Water for dewatering activities exceeding 50,000 L/day • Re-fuelling during construction will occur in designated areas.
8	Soil erosion and sediment control • Excavation and grading activities associated with construction may result in erosion and generation of sediment carried into the watercourses within the project limits	MTO	8.1	• Sedimentation control measures consisting of the installation of silt fencing, as per Ontario Standard Drawings, will be installed prior to construction and any surface grading. Plans will be developed and reviewed by the CVC and MNRF. • Erosion and sediment control practices will focus on two separate targets: minimizing site erosion; and, keeping any eroded material on site. Best management practices for erosion and sediment control include: - Silt fence barriers, erosion control blanket, and rock flow checks will be implemented during construction to prevent migration of sediment to the watercourses within the project area and all other natural features; - Rip rap or other stabilizing systems will be installed at outlets or spillways; and - Stabilization and re-vegetation of all disturbed surfaces will be established as soon as possible with the most appropriate treatments available.
9	Spill Prevention and Response	MTO	9.1	• Contractor shall have a spill prevention and response contingency plan that addresses procedures for preventing and responding to spills, and the equipment (including a spill

I.D.#	Issues/Concerns Potential Effects	Concerned Agencies	I.D.#	Mitigation/Protection/Monitoring
				response kit) and resources that will be available.
			9.2	• Refuelling precautions will be taken • Refueling will be conducted only in designated areas preferably situated on an impermeable surface.
			9.3	• Construction equipment required to be in good condition.
10	Management of excess material and property contamination	MTO	10.1	• Management of excess materials will be dealt with in accordance with normal MTO practices (regulated by OPSS 180).
			10.2	• Lead paint on guard rails will be managed in accordance with the *Ontario Occupational Health and Safety Act* (Reg. 843) *and Ontario Environmental Protection Act (*Reg. 347).
Socio-Economic Environment Concerns and Commitments				
11	Noise • Highway operational noise • Potential noise increase during construction activities	MTO/MOECC/City of Mississauga	11.1	A noise analysis was carried out to assess the potential impacts of the proposed highway conditions. The analysis determined that no additional noise mitigation measures are warranted. • The contractor will be required to maintain equipment in good operating condition to prevent unnecessary noise and restrict idling of equipment to the minimum necessary to perform the work.
			11.2	• Complaints about noise will be investigated in accordance with the MTO/MOECC noise Protocol.
			11.3	• Adhere to the municipal noise by-law. Public notification will be included in the contract document for affected residents within a 500 m radius, as well as municipal councilors prior to overnight construction activities.
12	Air Quality • Potential increase in dust during construction	MTO/MOECC	12.1	• Dust suppressants will be used during construction. • Construction equipment will be required to conform to emissions standards and the idling of equipment will be restricted to ensure that air quality is not unduly impacted. • .
13	Property Impacts • Limited property requirements for widening	MTO	13.1	• Property acquisition to facilitate the Highway 401 widening has been completed.
14	Emergency Access • Temporary or permanent change to emergency access	OPP/Peel Region	14.1	• MTO will notify OPP and emergency medical services of construction staging, start of construction, temporary closure of Highway 401 for the removal of the Second Line West structure, etc. to minimize delay in emergency response times during and after construction.
15	Utilities • Potential impacts to existing utilities	Region of Peel Enersource Hydro – Mississauga Rogers	15.1	• Utility relocations will be coordinated prior to construction.

I.D.#	Issues/Concerns Potential Effects	Concerned Agencies	I.D.#	Mitigation/Protection/Monitoring
		Bell		
16	Traffic • Motorists may experience delays and disruption during construction	MTO	16.1	• Collector lanes will be generally constructed first thereby minimizing traffic disruptions on Highway 401. • Allow for closure of lanes only once additional capacity of the network has been provided. • Short-term closures will be limited to off-peak and/or nighttime hours, including removal of Second Line West structure.
Cultural Environment Concerns and Commitments				
17	Archaeology • Potential impact to archaeological resources	MTCS	17.1	• A Stage 2 Archaeological Assessment recommended that no further archaeological concern is warranted for lands with the project area. • If any archaeological and/or historical resources be discovered during construction, they may be a new archaeological site and therefore subject to Section 48(1) of the *Ontario Heritage Act*. Construction must cease immediately and a licensed consultant archaeologist must be engaged to carry out archaeological fieldwork in compliance with Section 48(1) of the *Ontario Heritage Act*. • Work in the area would not resume until cleared by the Ministry of Tourism, Culture and Sport.
18	Impact to cultural heritage landscape (Highway 401 Roadscape)	MTCS	18.1	• No mitigation required.

5. Environmental Monitoring / Inspection Program for Project Implementation

5.1 Overview of Environmental Monitoring / Inspection Program for Project Implementation

Environmental monitoring / inspection is a component of the overall monitoring / inspection program for project implementation.

The environmental monitoring / inspection for project implementation has the following components:

- On site construction administrator to oversee the work
- Environmental monitoring plans
- Design package handover meeting
- Pre-construction notifications
- pre-construction environmental monitoring / inspection
- environmental monitoring during construction
- post-construction environmental monitoring / inspection.

As part of the Ministry of Transportation's continuing commitment to environmental stewardship, comprehensive construction and post-construction monitoring programs will be instituted on this undertaking. The programs will assess the effectiveness of environmental mitigation and compensation measures, as well as the degree of compliance with environmental mitigation and protection measures committed to during the construction period.

5.2 Environmental Monitoring / Inspection During Construction

During construction, the Contractor and Contract Administrator will ensure that implementation of mitigating measures and key design features are consistent with contractual requirements and commitments to external stakeholders. This will be achieved through the establishment of an environmental inspection approach that includes the use of an Environmental Inspector operating under the direction of the Contract Administrator, in compliance with MTO's Construction Administration and Inspection Task Manual (May, 2014) (CAIT Manual). The CAIT Manual task descriptions provide guidance to those involved in inspection on Ministry of Transportation construction contracts, to ensure that the quality and quantity of the work is in accordance with Ministry specifications, standards, drawings, policies and procedures.

The project will be subject to periodic on-site environmental inspection to ensure that the execution of the environmental component of the work is occurring as planned and to deal with any environmental problems that may develop during construction. The periodic on-site inspection will be supplemented by the support of environmental specialists retained by the Contract Administrator, as required, to assure the proper implementation of site-specific mitigation or remediation measures.

5.3 Post-Construction Environmental Monitoring / Inspection

The purpose of the post-construction monitoring and environmental inspection program is to ensure, to the extent possible, that lands disturbed as a result of construction activities will be restored to their original use and condition as soon as possible after construction.

5.4 Legal Agreements and Approvals

The following approvals will be obtained as applicable. No Federal approvals are currently required for this contract.

City of Mississauga

Cost-sharing agreements with the City of Mississauga have been initiated for various aspects of the project including modifications to the Highway 401 – Mavis Road W-N/S terminal intersection, construction of either a portion or all of a new pedestrian/cyclist bridge across Highway 401 and provisions for landscaping and vegetation restoration/compensation within City of Mississauga lands.

Ministry of Natural Resources and Forestry (MNRF)

As discussed earlier in Section 4.1.1, aquatic Species-at-Risk (SAR) are located within the project limits. A permit from the Ministry of Natural Resources and Forestry (MNRF) under Section 17.2(c) of the ESA, 2007 will be obtained as a result of the loss of riparian habitat for the replacement of the Fletcher's Creek culvert and highway widening in the Meadowvale Station Woods area.

As discussed earlier in Section 4.1.2.12, under Ontario Regulation (O.Reg.) 242/08 of the *Endangered Species Act* a Notice of Activity must be completed and submitted to the MNRF for SAR Bat and bird species prior to any proposed activities. Additionally, a mitigation plan is required, under Sub-section 7 of the *ESA*, that outlines mitigation measures taken to compensate for habitat loss and outlines required monitoring.

Permit to Take Water

PTTW will be required.

Municipal Noise Exemption By-Law Permit

Noise exemption permit is not required.

NAVCanada

Due to the proximity of the project to Pearson International Airport and the proposed design of high mast lighting for Highway 401 between the Credit River and McLaughlin Road. NAV CANADA must be notified upon completion of construction. **Appendix A** contains a Construction Completion notice to be completed by the Contractor upon completion of the works.