



# **Queen Elizabeth Way (QEW) Credit River Bridge Improvement Project**

**Design and Construction Report # 1**

*June 4, 2020*

**Ministry of Transportation Ontario**

# **Jacobs**

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## Executive Summary

The Queen Elizabeth Way (QEW) is a major east-west highway in the City of Mississauga. The project area extends from west of Mississauga Road to west of Hurontario Street, a distance of approximately 2.6 km. The project includes the following:

- New QEW Credit River Twin Bridge directly to the north of the existing bridge.
- Rehabilitation of the existing QEW Credit River Bridge.
- Reconstruction and reconfiguration of the existing QEW.
- Reconfiguration of the Mississauga Road Interchange including replacement of the Mississauga Road Overpass.
- Support facilities and features including landscaping, utilities, drainage and storm water management improvements, illumination, noise walls, Advanced Traffic Management System (ATMS).
- MTO is also working with the City of Mississauga to incorporate the City's active transportation initiatives for crossings over the Credit River and the QEW.

This Design and Construction Report # 1 (DCR 1) documents Advanced Works for the project. The purpose of the Advanced Works is to prepare the site for construction and will include:

- Site preparation (access, protective fencing, etc.).
- Temporary cofferdams in advance of design and construction of the new QEW north bridge over the Credit River (Twin Bridge).
- Marine archaeology works and supplementary utility works within the cofferdams' limits.

This report also documents a five-year review of the 2013 Transportation Environmental Study Report (TESR) completed in accordance with the requirements of the Class Environmental Assessment for Provincial Transportation Facilities (Class EA), which specifies that a review must be carried out if a project has not been constructed within five years of the Notice of Submission for the TESA.

### **Project Overview (Section 1)**

In 2013, the MTO completed a Preliminary Design and Class Environmental Assessment (EA) Study to determine a long-term strategy to address the rehabilitation needs of the QEW Credit River Bridge and to address the future requirements for the QEW from west of Mississauga Road to west of Hurontario Street. The 2013 Class EA generated and evaluated various design alternatives involving three components of the QEW within the project area: QEW Credit River bridge alternatives, QEW alignment alternatives, and interchange alternatives at Mississauga Rd. The evaluation resulted in the selection of a technically preferred alternative (TPA) that was presented in the June 2013 Transportation Environmental Study Report (TESR) titled "Transportation Environmental Study Report: Queen Elizabeth Way (QEW) from West of Mississauga Road to West of Hurontario Street" produced by McCormick Rankin. The key features of the TESA recommended plan were as follows:

- New Twin Bridge over the Credit River, north of the existing bridge.
- Rehabilitation of the existing Credit River Bridge.
- Improving the mainline highway cross-section to current standards.
- Reconfiguring the Mississauga Road Interchange.
- Replacing the Mississauga Road Overpass.

In 2017 a detail design assignment was initiated to prepare the TPA (rehabilitation and twinning to the north) for implementation as a traditional Design-Bid-Build (DBB) contract. Between 2017 and 2019 additional environmental investigations, impact assessment and agency/public consultation were completed in support of this detail design.

In 2019, the detail design process was postponed temporarily as the province decided to implement this project through a Design, Build, Finance (DBF) Public-Private Partnership (P3) procurement model. Procurement of the private sector Project Consortium (Project Co) is underway and anticipated to be completed in late 2020. Project Co will be responsible for the design, construction, and financing of the entire project through a single contract. Responsibility for the long-term maintenance and operation of the QEW and Credit River Bridge once the project is complete will remain with MTO.

To facilitate the beginning of design and construction, MTO is completing some Advanced Works for the Twin Bridge over the Credit River during the summer of 2020. The details of this work are outlined in this Design and Construction Report # 1.

### **Consultation (Section 2)**

In accordance with the consultation principles outlined in the MTO Class EA, the EA process provides for public and agency review at key stages during the project. Opportunities were provided throughout the EA process for interested agencies, groups and individuals to provide input and obtain information about the project. The primary tools and techniques that were used throughout the project's consultation process included:

- Public notifications.
- Website.
- Community Workshops.
- Public Information Centres.

Additional consultation was held with key agencies and interest groups, along with the City of Mississauga and Regional Municipality of Peel on an ongoing basis.

In support of DCR 1, a Notice of Study Commencement was published in local newspapers on April 23, 2020, and a Notice of Design and Construction Report Submission was published in local newspapers on June 4, 2020. Notifications letters were also sent to everyone on the project contact list including appropriate agencies, Indigenous communities, municipalities, emergency services, interest groups and stakeholders.

The project website (<http://www.gewcreditriver.ca>) provides information to interested parties and a means for the public to directly contact the Project Team via email at any time during the project. The project website is the identified location for review of DCR 1.

### **Detailed Description of the Recommended Plan (Section 3)**

The Advanced Works described in DCR 1 includes installation of temporary cofferdams around the east and west pier area of the proposed Twin QEW Credit River Bridge (future westbound). This site preparation work is required in advance of carrying out marine archaeology and supplementary utility works (to be carried out by Project Co) in advance of design and construction of the Twin Bridge. Design drawings for the cofferdams have been included in **Appendix A**.

### **Transportation Environmental Study Report Five Year Review (Section 4)**

The MTO Class EA document specifies that a review of a TESR must be carried out if a project has not been constructed within five years of the Notice of Submission for the TESR.

The five-year review considers any changes since the submission of the TESR. The changes may include new conditions in the project area, government policies, engineering standards or technologies for mitigation.

If significant changes are identified a TESR addendum must be prepared.

No significant changes were identified during the review and therefore, no TESR addendum was required. **Section 4** details the changes that were identified and why they were not considered significant.

### **Environmental Issues and Commitments (Section 5)**

**Section 5** outlines existing environmental conditions, environmental issues that were identified during design, and provides mitigation measures that will be implemented during implementation of the work to limit impacts to the environment. The section discusses fish and fish habitat, terrestrial ecosystems, landscaping, land use, construction noise, air quality, archaeology, built heritage, groundwater and soil contamination, designated substances and traffic management during construction. **Table 5-5** is provided at the end of **Section 5** summarizing the commitments.

All impacts identified during the project are sufficiently mitigated. Required permits and approvals are also documented in this section.

### **Environmental Permits and Approvals (Section 6)**

**Section 6** provides an overview of the various permitting and approvals requirements for the project. A noise by-law exemption and Permit to Take Water were determined to not be required for the cofferdams. Given the minor nature of impacts, permits under the Endangered Species Act, Canadian Navigable Water Act, and Fisheries Act were also determined to not be required. MTO has posted a notice of the work on the Common Project Search of the Navigation Protection Program for a 30-day review period, pursuant to *Canadian Navigable Waters Act*.

### **Monitoring (Section 7)**

During implementation of the work, the Contract Administrator (CA) will ensure that the mitigation measures and key design features are consistent with the contract and external commitments. The CA will continually review the effectiveness of environmental mitigation measures to provide the expected environmental protections.

## Glossary of Abbreviations

Abbreviation	Definition
ATMS	Advanced Traffic Management System
ANSI	Area of Natural and Scientific Interest
BHA	Butternut Health Assessor
CA	Contract Administrator
Class EA	Class Environmental Assessment for Provincial Transportation Facilities
CNWA	Canadian Navigable Waters Act
CRA	Commercial, Recreational or Aboriginal
CVC	Credit Valley Conservation
DBB	Design-Bid-Build
DBF	Design, Build, Finance
DCR 1	Design and Construction Report # 1
DFO	Fisheries and Oceans Canada
EA	Environmental Assessment
EAA	Environmental Assessment Act
ELC	Ecological Land Classification
ESA	Endangered Species Act
ESA	Environmentally Sensitive Areas
HADD	Harmful Alteration, Disruption, Destruction
HWM	High-water Mark
LOA	Letter of Advice
MBCA	Migratory Birds Convention Act
MECP	Ministry of the Environment, Conservation, and Parks
MH	Morrison Hershfield
MHSTCI	Ministry of Heritage, Tourism, Sport, and Cultural Industries
MNRF	Ministry of Natural Resources and Forestry
MTO	Ministry of Transportation Ontario
NAS	Natural Areas Survey
NHIC	National Heritage Information Centre
NPP	Navigation Protection Program
OBA	Ontario Butterfly Atlas
OBBA	Ontario Breeding Bird Atlas
OPSS	Ontario Provincial Standard Specification
ORAA	Ontario Reptile and Amphibian Atlas
P3	Public-Private Partnership
PHPPS	Provincial Heritage Property of Provincial Significance
PoE	Pathway of Effects
Project Co	Project Consortium
PSW	Provincially Significant Wetlands



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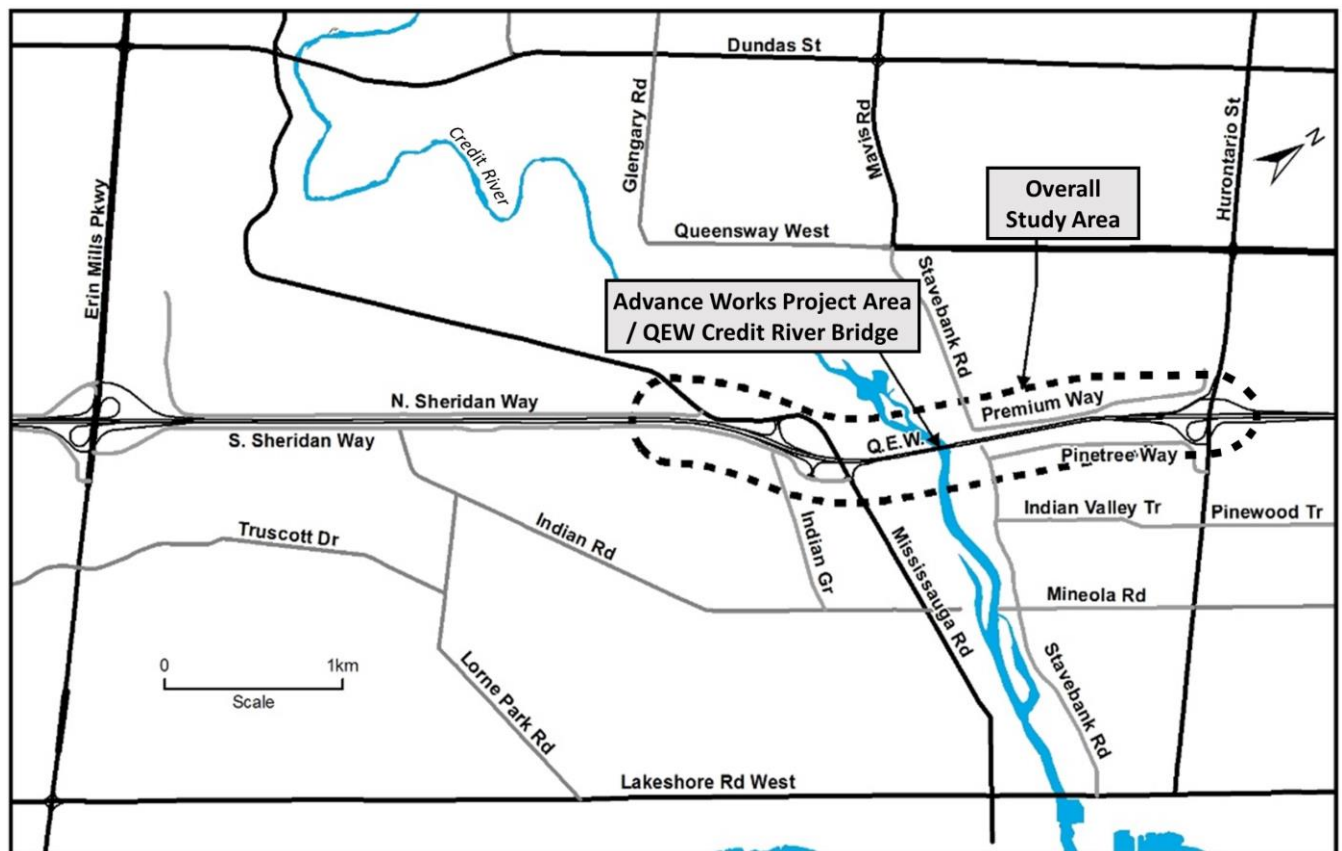
PTTW	Permit to Take Water
QEW	Queen Elizabeth Way
ROW	Right-of-way
SAR	Species at Risk
SARA	Federal Species at Risk Act
TESR	Transportation Environmental Study Report
TNPI	Trans-Northern Pipelines Inc.
TPA	Technically preferred alternative

# 1. Project Overview

## 1.1 Project Background

The QEW was built as a four-lane highway from Toronto to Niagara Falls and Fort Erie and is Canada's first superhighway. The highway was dedicated the Queen Elizabeth Way in 1939 and officially opened in 1940. The QEW is a critical component of the provincial highway network and is one of Ontario's most important transportation facilities in terms of commuter and trade traffic – carrying more than 165,000 vehicles per day. The 250 m long QEW Credit River Bridge, located in the City of Mississauga, is over 80 years old and recent investigations of the bridge determined that it is in need of major repair. To address the condition of the QEW Credit River Bridge and the future transportation requirements of this segment of the QEW, the Ministry of Transportation Ontario (MTO) is proposing improvements to approximately 2.6 km of the QEW from west of Mississauga Road to west of Hurontario Street including the Credit River crossing as shown in Figure 1-1.

Figure 1-1: QEW Credit River Improvement Project Overall Study Area



In 2013, the MTO completed a Preliminary Design and Class Environmental Assessment (EA) Study to determine a long-term strategy to address the rehabilitation needs of the QEW Credit River Bridge and to address the future requirements for the QEW from west of Mississauga Road to west of Hurontario Street.

The 2013 Class EA generated and evaluated various design alternatives involving three components of the QEW within the project area: QEW Credit River bridge alternatives, QEW alignment alternatives, and interchange alternatives at Mississauga Rd. The evaluation resulted in the selection of a technically preferred alternative (TPA) that was presented in the June 2013 Transportation Environmental Study Report (TESR) titled

"Transportation Environmental Study Report: Queen Elizabeth Way (QEW) from West of Mississauga Road to West of Hurontario Street" produced by McCormick Rankin.

In 2017 a detail design assignment was initiated to prepare the TPA (rehabilitation and twinning to the north) for implementation as a traditional Design-Bid-Build (DBB) contract. Between 2017 and 2019 additional environmental investigations, impact assessment and agency/public consultation were completed in support of this detail design.

In 2019, the province decided to implement this project through a Design, Build, Finance (DBF) Public-Private Partnership (P3) procurement model. A private sector consortium ('Project Co') will be responsible for the design, construction, and financing of the project through a single contract. Responsibility for the long-term maintenance and operation of the QEW and Credit River Bridge once the project is complete will remain with MTO.

The overall QEW Credit River Improvement Project includes the following:

- New QEW Credit River Bridge directly to the north of the existing bridge.
- Rehabilitation of the existing QEW Credit River Bridge.
- Reconstruction and reconfiguration of the existing QEW.
- Reconfiguration of the Mississauga Road Interchange including replacement of the Mississauga Road Overpass.
- Support facilities and features including landscaping, utilities, drainage and storm water management improvements, illumination, noise walls, Advanced Traffic Management System (ATMS).
- MTO is also working with the City of Mississauga to incorporate the City's active transportation initiatives for crossings over the Credit River and the QEW.

This overall work package will be completed by Project Co, including both the detailed design and construction.

## 1.2 Summary Description of the Undertaking

MTO has prepared Design and Construction Report # 1 (DCR 1), for Advanced Works ("the Undertaking"). These Advanced Works include site preparations along the Credit River Bridge, temporary cofferdams to facilitate in-water isolation (to be completed by MTO) for marine archaeology and supplemental utility works such as pipeline removals to be completed by Project Co. This work is required to facilitate design and construction of the new Twin Bridge.

## 1.3 Environmental Assessment Act Process

The purpose of Ontario's Environmental Assessment Act (EAA) is to help protect and conserve Ontario's environment by ensuring that projects subject to the Act follow a planning process leading to environmentally sound decision making. The MTO Class EA for Provincial Transportation Facilities (2000) (Class EA) outlines the environmental assessment process to be followed for specific groups of provincial transportation projects. The Class EA is a planning document approved under the EAA that provides a streamlined process that projects or activities within a defined "class" must follow. Provided this process is followed, projects and activities included under the Class EA do not require formal review and approval under the EAA.

This project is following the Group 'B' requirements of the MTO Class EA process. Extensive consultation with various stakeholders was undertaken as part of the 2013 Preliminary Design and Class EA Study. That study resulted in the filing of the TESR in 2013. A review of the TESR must be carried out if a project has not been constructed within five years of the Notice of Submission for the TESR, this DCR 1 includes a review of the TESR.

## 1.4 Purpose of Design and Construction Report # 1(DCR 1)

This Design and Construction Report # 1 (DCR 1) documents the detail design and environmental protection requirements for Advanced Works. This work includes:

- Site preparation (access, protective fencing, etc.).
- Temporary cofferdams in advance of design and construction of the new QEW Twin Bridge over the Credit River (Twin Bridge).
- Marine archaeology and supplementary utility works to be carried out by Project Co within the footprint of the cofferdams.

Subsequent DCRs will be prepared by Project Co to document the detail design and environmental protection requirements for the balance of the project.

This DCR also documents the TESR five-year review process per the requirements of the Class EA that specifies that a review of the TESR must be carried out if a project has not been constructed within five years of the Notice of Submission for the TESR. The five-year review considers changes which have taken place since the submission of the TESR including changes to the design, overall study area environment, new government policies, new engineering standards or new technologies for mitigation. If significant changes are identified, a TESR Addendum is required.

DCR 1 is available for a 30-day public review and comment period commencing June 4, 2020 and ending July 4, 2020 on the project website: <http://www.qewcreditriver.ca/>.

To obtain additional information, to provide comments on this DCR, or if you have any accessibility requirements in order to participate in this project, please contact one of the Project Team members listed below:

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## 2. DCR 1 Consultation Process

The environmental assessment process implemented for this project is consistent with the requirements for a Group 'B' project under the MTO Class EA.

In accordance with the consultation principles outlined in the MTO Class EA, the project process provided for public and agency review at key stages during the project. Opportunities will continue to be provided throughout the project for interested agencies, groups and individuals to provide input and obtain information about the project.

The primary tools and techniques that were used for DCR 1 included:

- Public notifications.
- Website.

These engagement opportunities involved stakeholders such as local elected officials, agencies, Indigenous groups, and the general public.

### 2.1 Public Notification

A Notice of Study Commencement for the Advanced Works package was published in English in the Toronto Star and Mississauga News on April 23, 2020 and in French in Le Métropolitain on April 23, 2020. Letters to everyone on the overall project contact list including appropriate agencies, Indigenous communities, municipalities, emergency services, interest groups and stakeholders were distributed by mail and email during the week of April 20, 2020.

A Notice of Submission of Design and Construction Report # 1 was placed in English in the Toronto Star and Mississauga News and in French in Le Métropolitain on June 4, 2020 to notify the public of the DCR review period and review locations. The DCR is available for review from June 4, 2020 to July 4, 2020 on the project website at: <http://www.gewcreditrivier.ca>. Letters/emails were sent notifying government agencies, Indigenous communities, municipalities, emergency services and members of the public on the project mailing list of the DCR submission and the 30-day public review period.

The public and agency contact list that was compiled during the 2013 Class EA process was updated at the beginning of the Detail Design study in 2017, and updated continually in 2018, 2019, and 2020 as people requested to be added/removed from the list. A copy of the current agency/municipal contact list can be found in **Appendix B**.

Copies of the notification materials are provided in **Appendix C**.

A summary of the comments received and Project Team responses since the April 23, 2020 publication of the Notice of Study Commencement is provided in **Appendix D**.

### 2.2 Project Website

A project website (<http://www.gewcreditrivier.ca>) was set up to provide information to interested parties and to provide a means for the public to directly contact the Project Team via email at any time during the project.

The website hosts all pertinent project information for public review. The contents of the website included:

- Project Overview.

- Documents.
- Links.
- Contact Us.

The project website is the identified location for review of DCR 1.

### 2.3 Government Agencies

Government agencies such as Ministry of the Environment, Conservation, and Parks (MECP), Ministry of Natural Resources and Forestry (MNRF), Fisheries and Oceans Canada (DFO), Ministry of Heritage, Tourism, Sport, and Cultural Industries (MHSTCI) and Credit Valley Conservation (CVC) were consulted throughout development of the overall project to discuss the approach, environmental effects, mitigation measures, and permitting requirements.

DFO and MNRF were consulted directly to address changes to the Fisheries Act in 2019 and determine the likelihood of Harmful Alteration, Disruption, Destruction (HADD) of fish habitat under the Fisheries Act. A Letter of Advice (LOA) was issued by DFO in February 2020 outlining the expected impacts as a result of the project and the required mitigation measures. These measures are outlined in **Section 5.1.2**. A copy of the LOA can be found in **Appendix F**. MTO and Project Co will continue to consult with DFO and MNRF over the course of the project.

### 2.4 Indigenous Communities

The following Indigenous communities have been consulted at key milestones and will continue to be consulted for the duration of the project. For DCR 1, this included the Notice of Study Commencement of Detail Design and Notice of Design and Construction Report Submission:

- Six Nations of the Grand River.
- Huron-Wendat Nation.
- Mississaugas of the Credit First Nation.
- Haudenosaunee Development Institute.

### 3. Detailed Description of the Design

This project extends approximately 2.6 km along the Queen Elizabeth Way (QEW) from west of Mississauga Road to west of Hurontario Street in the City of Mississauga, Region of Peel. This section of the QEW and existing Credit River Bridge were originally constructed in 1935 and widened to the current six lanes in the 1960s. The existing bridge has deteriorated and a major structural rehabilitation is required.

The overall intent of the project is to rehabilitate the existing QEW Credit River Bridge which is in need of significant repair to lengthen its service life. To do this, a new bridge will first be built to the north of the existing bridge. This will allow six lanes of QEW traffic to operate on the new Twin Bridge while the existing bridge is closed to traffic and rehabilitated. Once the existing bridge is rehabilitated, the new bridge will carry only westbound traffic and the existing bridge will carry only eastbound traffic. There will still be three lanes in each direction but the additional space available on both the existing and the new bridge will provide enough space to: bring shoulders up to current design standards; improve sight distances; improve the eastbound speed change lane; and, provide an eastbound auxiliary lane to Hurontario Street interchange.

#### 3.1 Major Features of DCR 1

DCR 1 has been developed to allow MTO to construct temporary cofferdams on the east and west sides of the Credit River.

The proposed Advanced Works described in DCR 1 will include the following:

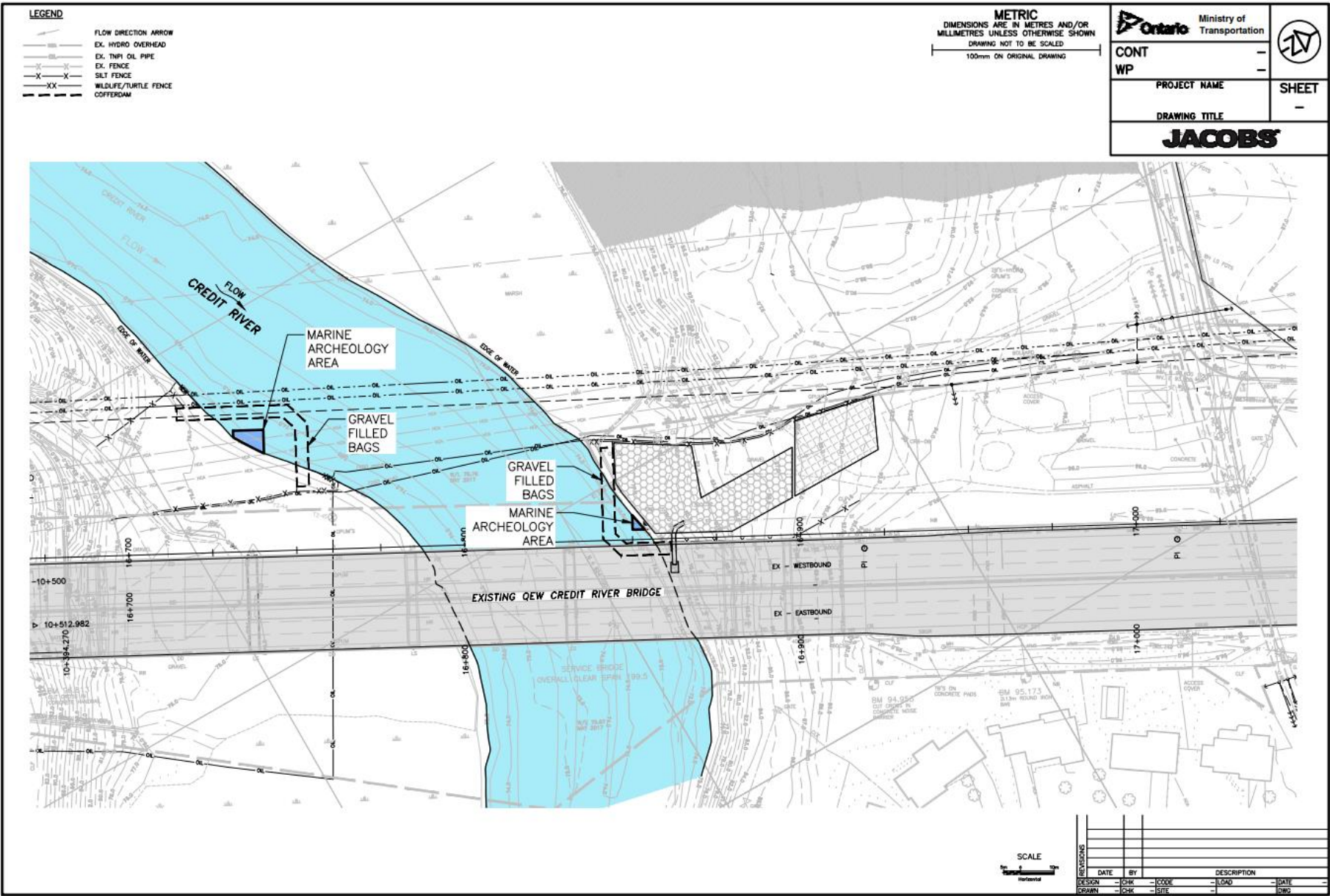
- Installation of gravel filled bags (temporary cofferdams) at both east and west pier locations, to create in-water isolation areas to allow for marine archaeology to be carried out by MTO and for Project Co to begin supplementary utility works as necessary within the cofferdam limits,. In advance of Project Co's detail design for the Twin Bridge.
- Minor archaeology works within the Credit River.
- Erosion and Sediment Control installations.
- Wildlife exclusion measures.
- Seeding of disturbed areas.

The Advanced Works also enables future works by Project Co including:

- Construction of site access to the Credit River.
- Pipeline removals from within the cofferdam limits.



Figure 3-1: Plan illustrating the Advanced Works





## 4. Transportation Environmental Study Report Five Year Review

The MTO Class EA document specifies that a review of the TESR must be carried out if a project has not been constructed within five years of the Notice of Submission for the TESR. The five year review considers any changes since the submission of the TESR. The changes may include new conditions in the project area, government policies, engineering standards or technologies for mitigation.

No significant changes were identified during the five-year review of the "*Transportation Environmental Study Report Queen Elizabeth Way (QEW) from West of Mississauga Road to West of Hurontario Street Preliminary Design and Class Environmental Assessment Study GWP 08-20008*" and therefore, a TESR addendum is not required. **Table 4-1** describes the changes made since the submission of the June 2013 TESR. Project Co will be responsible for completing the final detailed design, including consultation with stakeholders, and adhering to the results of this Five Year Review. The reference concept design for the entire project is provided in **Appendix E**.

Table 4-1: Summary of Changes to the TESR-recommended Plan

Description and Reason for Change	Impact and Significance of Change
<b>Kenollie Creek and Stavebank Creek Culverts</b>	
<p><u>2013 TESR Recommendation</u></p> <p>The TESR recommended that the culverts be extended to the north to accommodate the widening of the highway.</p> <p><u>Reference Concept Design</u></p> <p>The existing Stavebank Creek culvert under the QEW is a 63.0 m long 1.22 m x 1.22 m concrete box culvert and the culvert under Premium Way is a 32.0 m long 1.22 m x 1.22 m concrete box culvert. Both culverts will be replaced with a single 1.8 m x 1.2 m concrete box culvert 110.72 m in length.</p> <p>The existing Kenollie Creek culvert is a 74.0 m 2.5 m x 1.86 m open footing concrete culvert which is proposed to be replaced by an 82.19 m 3.0 m x 2.1 m concrete box culvert with fisheries substrate.</p> <p>The proposed dimensions are based on the reference design, however discussions with TNPI indicate additional minor changes to the length of proposed culverts may be necessary and will be reviewed by Project Co and documented in subsequent DCRs.</p>	<p>After further investigations during the Detail Design it was determined that the culverts were deteriorated enough to warrant replacement and that completing the replacements now would be more cost effective than replacing them in the future. Given that the TESR recommended the extension of the culverts and, that the Stavebank Creek culvert is being replaced in the same location and Kenollie Creek culvert is being replaced along a new alignment immediately to the east of the existing culvert there are no significant impacts as a result of this change.</p>
<b>Stormwater Management Dry Pond</b>	
<p><u>2013 TESR Recommendation</u></p> <p>The TESR recommended a dry stormwater management pond on the east bank of the Credit River near Stavebank Road and Premium Way.</p>	<p>The proposed dual cell dry pond is contained within the same extents as the original pond design. Design capacity of the stormwater management pond has not changed and</p>

Description and Reason for Change	Impact and Significance of Change
<p><u>Reference Concept Design</u></p> <p>The design of the pond has been revised to accommodate the City of Mississauga's Active Transportation project, provide access to hydro utility poles in the area, and avoid impacts to TNPI pipelines.</p>	<p>therefore is not considered a significant change.</p>
Stormwater Management Wet Pond	
<p><u>2013 TESR Recommendation</u></p> <p>The TESR recommended a wet stormwater management pond within the QEW Mississauga Road Interchange located on the north side between the westbound off-ramp and Mississauga Road. The pond is expected to control the peak flows up to the 100-year storm event.</p> <p><u>Reference Concept Design</u></p> <p>The design of the pond was revised to address concerns of potential flooding impacts to Mississauga Road in the event of a 100-year storm event. A floodplain storage area was developed in the Northwest Quadrant of the interchange.</p>	<p>The proposed floodplain storage area will improve the post development uncontrolled 100-year spill from the wet pond to pre-development levels.</p>
Illumination	
<p><u>2013 TESR Recommendation</u></p> <p>The TESR recommended High Mast Light poles throughout the project area with the exception of the installation of existing "ER" heritage lighting poles across the Credit River Bridge.</p> <p><u>Reference Concept Design</u></p> <p>The recommended plan only requires High Mast Light poles in the area of the Mississauga Road Interchange. In other areas, conventional light poles will be installed in the median. The ER light poles will be installed along the north side of the new bridge and south side of the existing Credit River Bridge.</p>	<p>The change in the illumination design is not considered significant as the lighting levels will meet the same standards as the original plan and will also help control light spill outside of the MTO right-of-way.</p>
Listing of Several Species of Bats under the Endangered Species Act	
<p><u>2013 TESR Recommendation</u></p> <p>During the Preliminary Design and Class EA, Little Brown Myotis, Northern Myotis, and Tri-colored bats were not listed as a Species at Risk (SAR), therefore no impacts as a result of the project were identified.</p>	<p>The vegetation communities with potential habitat for these species will be protected to the greatest extent possible. In consultation with MNRF, it was determined that the impact to potential habitat for these species will be minimal. Therefore vegetation was removed prior to March 31.</p>

Description and Reason for Change	Impact and Significance of Change
<p><u>Reference Concept Design</u></p> <p>Since the TESR, Little Brown Myotis, Northern Myotis, and Tri-colored bats were listed as 'Endangered' under the Endangered Species Act and therefore the species and their habitat are now afforded protection under the Act. There is potential habitat for all three species and Eastern Small-Footed Myotis in the area of the project.</p>	<p>Due to the lack of cavity trees within the limits of disturbance as well as the availability of bat maternity habitat in the adjacent treed areas, impacts to potential SAR bat maternity roosting in these areas are not anticipated as a result of the proposed project. Provided the mitigation measures are adhered to, this project will not adversely impact SAR bats or their habitat and therefore this change is not considered significant.</p> <p>For more information on the impacts and mitigations for the Advanced Works, see <b>Section 5.2.2.5</b>. More detailed mitigation measures and actions regarding SAR bats roosting in the area will be documented in subsequent DCRs for the overall design and construction by Project Co.</p>
Refinements to the Mississauga Road Interchange Ramps and Intersections	
<p><u>2013 TESR Recommendation</u></p> <p>The TESR recommended right turn channels at the intersection of Mississauga Road and South Sheridan Way and at the north ramp terminal on Mississauga Road.</p> <p>Additionally, it provided recommended design for the on/off ramps of the interchange.</p> <p><u>Reference Concept Design</u></p> <p>The recommended plans remove these channelized right turns in favour of right turn lanes to increase safety for pedestrians and cyclists crossing at these intersections.</p> <p>Upon examining the TESR recommended ramp configurations, it was determined that the ramps could be adjusted to increase safety at the ramps and improve operations of the ramps. The adjustments included geometric refinements to the curves of the ramps and a reduction to the length of the tapered lane for the QEW westbound off ramp to Mississauga Road. The tapered lane was reduced to the standard length for tapered lanes.</p>	<p>The overall footprints of the intersections do not change significantly and the impact to traffic is minimal considering the increased safety for pedestrians/cyclists.</p> <p>The changes in ramp configurations is also not considered significant as it provides a benefit to safety/operations or in the case of the tapered lane to Mississauga Road, the adjustment was to match it to design standards.</p>

Description and Reason for Change	Impact and Significance of Change
<p><b>Twin Bridge East Pier Construction</b></p> <p><u>2013 TESR Recommendation</u></p> <p>The TESR recommended that the east pier of the new bridge be placed on the bank of the Credit River. This would allow for construction to take place in the dry (water levels permitting) and have limited or no impacts to fish or fish habitat for the pier construction.</p> <p><u>Reference Concept Design</u></p> <p>The recommended plan determined that a portion of the east pier (1.4 m<sup>2</sup>) may be required to be constructed in the water at the edge of the Credit River in addition to rock protection being placed around the pier (56 m<sup>2</sup>). In order to construct the pier and place the rock protection in the dry, a cofferdam (141 m<sup>2</sup> of temporary impact) will be required to isolate the area. The use of the rock protection has increased the footprint of the pier.</p> <p>There is the potential for change to the location of the piers from the 2013 TESR recommendation which will be documented as required in subsequent DCRs by Project Co.</p>	<p>In order to mitigate the impacts to fish and fish habitat as a result of the pier and rock protection, the type of rock used will be chosen in order to meet necessary requirements for American Eel habitat. This then provides a benefit rather than an impact.</p> <p>Approvals have been obtained from the appropriate agencies.</p>
<p><b>QEW Eastbound Lane Configuration</b></p> <p><u>2013 TESR Recommendation</u></p> <p>The TESR recommended that the lane configuration of the Eastbound QEW across the existing Credit River Bridge include three travelling lanes and one auxiliary lane. The auxiliary lane would continue from the Mississauga Road/QEW eastbound on-ramp until becoming the off-ramp at Hurontario Street.</p> <p><u>Reference Concept Design</u></p> <p>The recommended plan adds an additional auxiliary lane across the existing Credit River Bridge. Instead of the Mississauga Road/QEW eastbound on-ramp continuing to Hurontario Street, the South Sheridan Way/QEW eastbound on-ramp does not taper and becomes the off-ramp at Hurontario Street. The Mississauga Road/QEW eastbound on-ramp tapers shortly after passing over the existing Credit River Bridge.</p>	<p>The impact of this change is positive given that the South Sheridan Way/QEW eastbound on-ramp now has a longer merge lane than the 2013 TESR recommendation and the Mississauga Road/QEW eastbound on-ramp has a longer merge lane than the merge lane at the South Sheridan Way/QEW eastbound on-ramp under the 2013 TESR recommendation, resulting in both ramps providing more opportunity for vehicles to merge with the flow of traffic.</p> <p>No widening of the bridge deck was required to facilitate this change as once the new Twin Bridge is constructed there is additional width to accommodate this lane on the existing bridge. Therefore this change is not considered significant.</p>

Description and Reason for Change	Impact and Significance of Change
QEW Alignment approaching Hurontario Street	
<p><u>2013 TESR Recommendation</u></p> <p>The TESR recommended an alignment of the QEW that accommodated all necessary utility relocations and was technically appropriate for the design and the information known at the time.</p> <p><u>Reference Concept Design</u></p> <p>The recommended plan changes the QEW alignment from the TESR recommendation by realigning the QEW west of Lynchmere Avenue to the north and east of Lynchmere Avenue to the south. This requires relocation of approximately 100 m of noise wall on the south side of the QEW. This change better accommodates utility relocations along Premium Way.</p>	<p>No property is required and the adjustment to the alignment provides better conditions for utility relocations without any negative impacts to the highway alignment. This change is not considered significant.</p>
Active Transportation Crossings	
<p><u>2013 TESR Recommendation</u></p> <p>The TESR identified future possible cycling/pedestrian crossings of the credit river at multiple locations, and the City and MTO committed to continued work to develop these crossings beyond the scope of the TESR.</p> <p><u>Reference Concept Design</u></p> <p>Two active transportation crossings were added to facilitate crossing of the QEW and crossing of the Credit River. The east-west crossing of the Credit River will be facilitated underneath the existing bridge structure, and the north-south crossing of the QEW will be on the west side of the Credit River Bridge. Details of the design will be documented in subsequent DCRs by Project Co.</p>	<p>The proposed reference will improve cycling and pedestrian access across both the Credit River and the QEW, in line with the prior recommendations to develop active transportation crossings.</p>

## 5. Environmental Issues and Commitments

The following is a description of the potential environmental effects, proposed mitigation measures, as well as approval and permit requirements. This information is part of the early detailed design works completed in 2018 and 2019 by Morrison Hershfield (MH) along with any relevant changes and/or updates to proposed mitigation measures. A summary of the information is provided in **Section 5.10**.

For the purpose of the DCR 1, the project limits are defined as the Credit River Valley and the QEW approaches to the Credit River Bridge. Proposed works and general area are shown in **Figure 3-1**.

### 5.1 Fish and Fish Habitat

#### 5.1.1 EXISTING CONDITIONS

##### 5.1.1.1 Credit River

Morrison Hershfield completed a *Fish and Fish Habitat Impact Assessment Report Queen Elizabeth Way (QEW) from West of Mississauga Road to West of Hurontario Street, Site no. 24-203 G.W.P. 2002-13-00* in February of 2019. Within the overall study area, the Credit River flows within a deep defined valley with a wide floodplain area dominated by wetlands. The river is generally turbid and underlain by finer silts and mud owing to its gentle gradient and backwater effects from Lake Ontario. There are no barriers to fish passage between Lake Ontario and the overall study area.

The Credit River within the overall study area supports a diverse warmwater fishery consisting of warmwater and coolwater sportfish including Northern Pike, Smallmouth Bass and Largemouth Bass, and various warmwater and coolwater bait/forage fish species. The overall study area also acts as an important migratory corridor for coldwater salmonid species including Chinook Salmon, Coho Salmon and Brown Trout in the fall, and Rainbow Trout in the spring, that move through the area to upstream spawning habitats. Atlantic Salmon, introduced as part of MNRF restoration efforts have been documented within the area as they smolt out to Lake Ontario in the spring and when they migrate upstream to spawning areas in the fall. The MNRF has indicated that the Lower Credit River provides potential habitat for American Eel an aquatic Species at Risk (SAR), designated as 'Endangered' under the provincial Endangered Species Act (ESA), and 'under consideration' for listing under the Federal Species at Risk Act (SARA).

A number of biological constraints, as they relate to fish and fish habitat exist within the overall study area. Although the overall study area has been previously disturbed due to the initial bridge construction and development of the surrounding land, the proposed works may impose disturbances to the riparian area during construction. Despite the temporary disturbances that may result from the proposed works, no watercourse realignments, or significant alterations within the river are proposed.

##### 5.1.1.2 Existing Conditions Summary

Background research and field studies coupled with MNRF consultation were used in the determination of habitat function and significance, including:

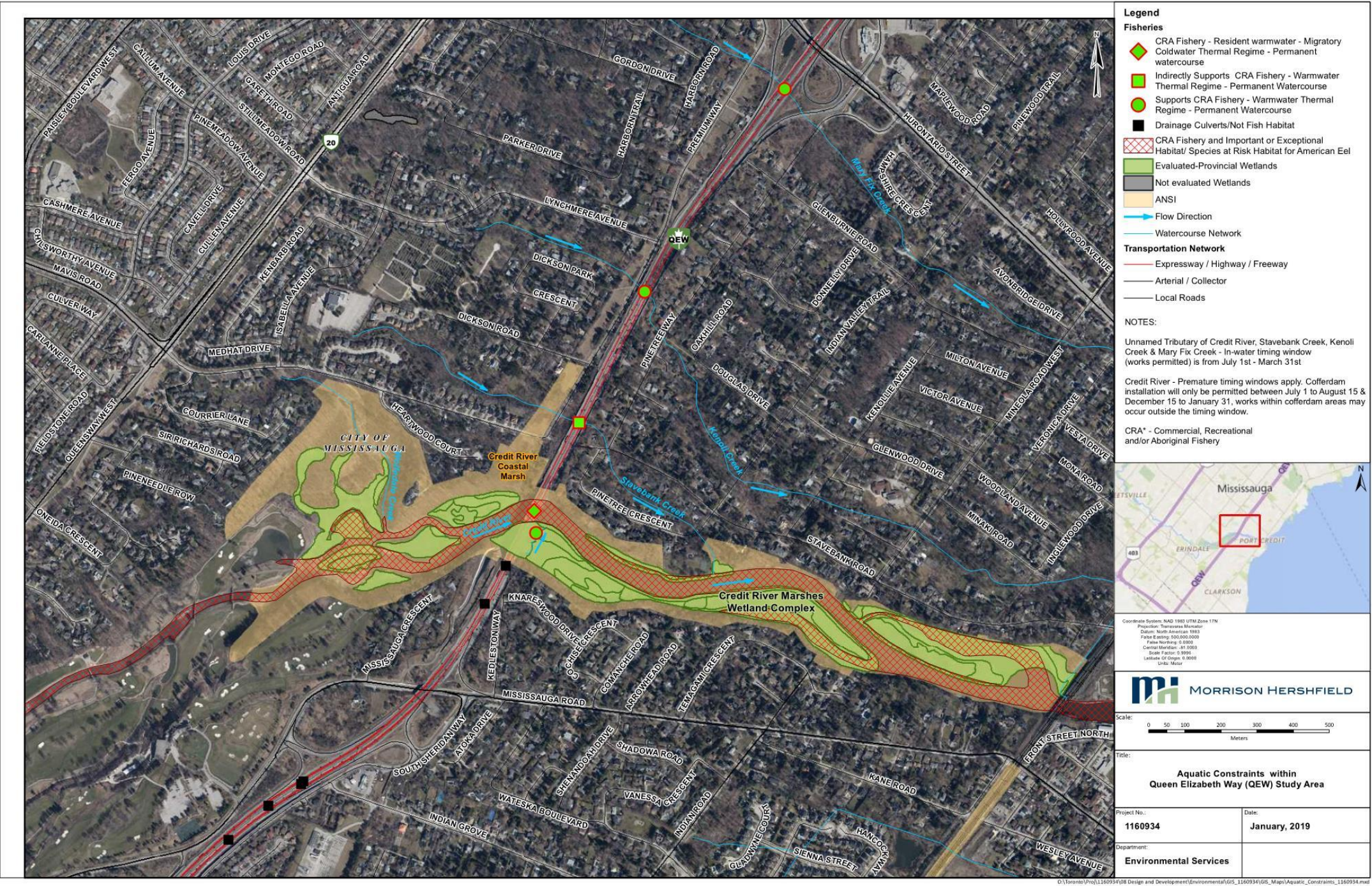
- Significant fish and fish habitat and critical habitat features.
- Aquatic resources and hydrology.
- Groundwater recharge, discharge and high groundwater table areas.
- Species at Risk (SAR).

**Table 5-1** provides a summary of the details for the Credit River Bridge project area including the waterbodies, UTM coordinates, and proposed works. Advanced Works will be focused around the Credit River bridge and as a result are not expected to directly impact the other noted waterbodies.

**Figure 5-1** indicates the areas of opportunities and constraints with respect to fish and fish habitat within the overall study area. Spring aquatic field surveys were completed on June 06, 2017. Summer field investigations were completed on July 21, 2017 and August 24, 2018. The results of these investigations are described in **Table 5-2**  
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Figure 5-1: Aquatic Ecosystem Opportunities and Constraints<sup>1</sup>



<sup>1</sup> From Morrison Hershfield Fish and Fish Habitat Impact Assessment Report Queen Elizabeth Way (QEW) from West of Mississauga Road to West of Hurontario Street Site No. 24-203, February 2019



Table 5-1: Summary of Existing Fish and Fish Habitats at Credit River

Waterbody	Latitude & Longitude	Flow	Thermal Regime	Fish Habitat	Fish Species Present	Substrate Type	Vegetation	Constraints and Opportunity	Important, Exceptional Fish Habitat	Species at Risk / Critical Habitat Present	In-Water Works Timing Window
Credit River	43.556717 -79.609875	Permanent	Resident warmwater & Migratory coldwater	CRA fishery (Directly)	<b>MH Field Survey:</b> Pumpkinseed <b>MNRF:</b> Atlantic Salmon, American Eel, Black Crappie, Brook Trout, Brown Bullhead, Brown Trout, Chinook Salmon, Coho Salmon, Common Carp, Freshwater Drum, Lake Sturgeon, Largemouth Bass, Longnose Gar, Northern Pike, Pumpkinseed, Rainbow Smelt, Rainbow Trout, Rock Bass, Smallmouth Bass, White Bass, White Perch, White Sucker, Yellow Perch <b>CVC:</b> Bluntnose Minnow, Brown Bullhead, Common Shiner, Creek Chub, Fantail Darter, Golden Shiner, Johnny Darter, Logperch, Longnose Dace, Northern Hog Sucker, Northern Pike, Pumpkinseed, Rainbow Darter, River Chub, Rock Bass, Rosyface Shiner, Smallmouth Bass, Spotfin Shiner, Stonecat, White Sucker, Yellow Perch	Gravel, sand, silt, clay, muck & detritus	Emergent (cattail, grasses, phragmites spp., Arrowhead, Pickerelweed) Submergent (None) Floating (Duckweed)	Works at the Credit River bridge should be controlled to minimize sediment transport to protect important habitat within the Credit River	The Credit River provides a migration corridor for adults of various salmonids. Additionally, potential spawning habitat for warmwater sportfish including Smallmouth Bass, Largemouth Bass and Northern Pike may be present in the vicinity of the Credit River Bridge.	American Eel habitat may be present within the Credit River in the vicinity of the overall study area	July 1 <sup>st</sup> – August 15 <sup>th</sup> (August 31 <sup>st</sup> , in 2020) and December 15 <sup>th</sup> – January 31 <sup>st</sup>

### 5.1.2 POTENTIAL IMPACTS AND MITIGATION MEASURES

A detailed Aquatic Effects Assessment using the PoE diagrams was completed to determine if any residual effects have the potential to persist due to the isolated areas associated with cofferdams to be installed in advance of carrying out Marine Archaeology and supplementary utility works. The installation of cofferdams in the Credit River will result in the following residual effects:

- Temporary impacts to approximately 319 m<sup>2</sup> of fish habitat as a result of installation of gravel-filled bags on the west (178 m<sup>2</sup>) and east (141 m<sup>2</sup>) banks of the Credit River.

As noted in **Section 5.1.1.1** the Credit River provides habitat for American Eel, an aquatic Species at Risk (SAR). MNRF has determined that the mitigation measures MTO is proposing are sufficient to mitigate impacts to the species habitat.

DFO issued a Letter of Advice (LOA) on February 5, 2020, indicating that the project will not result in serious harm to fish providing appropriate mitigation measures are implemented. After discussions with MNRF on the potential for impacts to American Eel, MNRF also determined that the mitigation measures MTO is proposing are sufficient to mitigate impacts to the species habitat. Consultation with DFO and MNRF is ongoing, and will continue over the duration of the project.

#### 5.1.2.1 General Fish and Fish Habitat Protection Measures

In order to protect fisheries and aquatic habitat resources within the cofferdam installation limits, the Contractor's operations shall be controlled to prevent the entry and re-suspension of deleterious materials while carrying out the project activities. Works in-water and along the banks of the Credit River will be minimized where possible and comply with operational constraints that are in the Contract.

Additional protection measures to protect fish and fish habitat within the Advanced Works project limits will include the following:

- Due to the presence of resident warmwater fish species and migratory coldwater fish species, any required in-water works will only be permitted between July 1st to August 15<sup>th</sup> (extended to August 31 for 2020) and December 15th to January 31st within the Credit River. Once containment measures are installed at Credit River, work may occur within the watercourse and along the banks outside of the permitted in-water timing window.

The following mitigation measures will also be applied during construction to protect fish and fish habitat during construction activities:

- When possible, schedule work to avoid wet and rainy periods that may increase erosion and sedimentation.
- Contain all in-water works using site isolation as per Ontario Provincial Standard Specification (OPSS) 182 – General Specification for Environmental Protection for Construction in Waterbodies and on Watercourse Banks, designed and installed according to relevant Contract Specifications to delineate temporary in-water work zones to allow work in the dry and maintain clean flow downstream/around the work zone at all times. Maintain the natural flow regime for any diversion works.
- Retain a qualified environmental professional to perform fish salvage within isolated, enclosed or dewatered areas at the work site and safely relocate them according to a License to Collect Fish for Scientific Purposes (as per OPSS 182).
- Minimize duration of in-water work and conduct instream work during periods of low flow when possible to further reduce the risk to fish and their habitat and to allow work in water to be contained.

- When temporary flow control must be undertaken for the work it will be per *Ontario Provincial Standard Specification (OPSS) 517 – Construction Specification for Dewatering*. The Contractor will make reasonable efforts to avoid changing flow and water levels.
- All exposed soils or disturbed areas that drain into a waterbody will be treated with seed and cover according to OPSS 804 – Construction Specification for Seed and Cover, as soon as possible after exposure or upon completion of the work in or around the waterbody or on the waterbody bank.
- The Contractor will monitor construction activities in and around watercourses and ensure all related mitigation measures are properly installed, maintained and are functioning effectively. Cofferdams will be monitored, inspected and evaluated and altered/maintained as necessary.
- Maintain an appropriate depth and flow (i.e. base flow and seasonal flow of water) for the protection of fish and fish habitat.

Site restoration measures will be undertaken by Project Co as part of the overall construction contract and will be further detailed in subsequent DCRs.

#### 5.1.2.2 Dewatering

The control of water from dewatering operations will be conducted in accordance with OPSS 517 which includes:

- When using a pump, control the intake to prevent entry of fish and other aquatic wildlife (screen any water intakes or outlet pipes to prevent entrainment or impingement of fish in accordance with the DFO code of practice).
- Dewatering operations will be directed to a sediment control device or natural attenuation area prior to discharge to watercourses, if a natural attenuation area is used, a minimum 30 m setback will be maintained from the receiving watercourse.
- Dewater gradually to reduce the potential for stranding fish.

#### 5.1.2.3 Erosion and Sediment Control

The disturbance and release of sediments may have direct negative effects to fish and fish habitat such as respiratory stress, reduced feeding efficiency and loss of nursery/rearing habitat in downstream areas. Sediment impacts which are not properly contained may affect local fish populations as well as habitats downstream within the Credit River. To mitigate these potential impacts, the following erosion and sediment control measures will be implemented:

- Use effective erosion control measures including topsoil and seed, silt fence barriers, and erosion control blankets as per OPSS 804 and SP: Erosion and Sedimentation Control-General.
- Design and implement erosion and sediment controls to contain/isolate the work zone, manage site drainage/runoff and prevent erosion of exposed soils and migration of sediment into waterbodies at all stages of the project using details outlined in OPSS 805 – Construction Specification for Temporary Erosion and Sediment Control Measures. Erosion and sediment control measures will be maintained until all disturbed ground has been permanently stabilized, suspended sediment has resettled to the bed of the waterbody or settling basin and runoff water is clear.
- Minimize vegetation removal where possible and proper clearing and utilize grubbing techniques. All retained vegetation will be delineated and protected. Removal of vegetation shall be in accordance with OPSS 182 and clearing shall be completed in accordance with the specifications outlined in OPSS 201 – Construction Specification for Clearing, Close Cut Clearing, Grubbing and Removal of Surface and Piled Boulders.

- Implement site isolation/containment measures (i.e. cofferdams) to isolate areas where in-water work is required. Site isolation will be implemented as per OPSS 182 and designed according to relevant Contract Specifications.
- Implement measures for containing and stabilizing waste material (e.g., dredging spoils, construction waste and materials, commercial logging waste, uprooted or cut aquatic plants, accumulated debris) above the HWM of nearby waterbodies to prevent re-entry.
- Store and stabilize all stockpiled materials, including but not limited to excavated overburden and topsoil, excess materials, construction debris and containers in a manner that prevents them from entering any waterbody.
- Inspect and maintain erosion and sediment control measures and structures during the course of the works.
- Repair erosion and sediment control measures and structures if damage occurs.
- Remove non-biodegradable erosion and sediment control materials once site is stabilized.

#### 5.1.2.4 Bank Re-vegetation and Stabilization

Clearing of riparian vegetation will be kept to a minimum whenever possible and use of existing trails, roads or cut lines methods such as swamp mats and pads to avoid disturbance to the riparian vegetation and prevent soil compaction is recommended. Additional measures to avoid impacts to bank vegetation and stability include:

- Minimize the removal of natural woody debris, rocks, sand or other materials from the banks, the shoreline or the bed of the waterbody below the normal high water mark. If material is removed from the waterbody, set it aside and return it to the original location once construction activities are completed.
- Stabilize shoreline or banks disturbed by any activity associated with the project as soon as possible to prevent erosion and/or sedimentation through re-vegetation with native species (seed) suitable for the site.
- If replacement rock reinforcement/armouring is required to stabilize eroding or exposed areas, ensure that appropriately-sized, clean rock is used; and that rock is installed at a similar slope to maintain a uniform bank/shoreline and natural stream/shoreline alignment.

Restoration of riparian vegetation and disturbed watercourse areas will be included in subsequent DCRs by Project Co.

#### 5.1.2.5 Operation of Machinery

Operation and storage of construction machinery may result in the introduction of fluids, invasive species and noxious weeds into the Credit River. The Contractor will ensure that machinery arrives on site in a clean condition and is maintained free of fluid leaks, invasive species and noxious weeds for the duration of construction. The Contractor must also ensure that:

- Whenever possible, limit heavy machinery access to areas within the existing ROW and along the banks of the Credit River. The watercourse will not be crossed (i.e. forded) or treated as machinery staging at any time.
- Whenever possible, operate machinery on land above the high water level in a manner that minimizes disturbance to the banks and bed of the waterbody.
- Wash, refuel and service machinery and store fuel and other materials for the machinery a minimum of 30 m from any surface water features to prevent any deleterious substances from entering the water.
- Have spill kits onsite and drip pans under all non-mobile machinery.

- Contractors shall follow the Clean Equipment Protocol for Industry (Halloran, Anderson, Hayley and Tassie, Danielle, 2013).

Applicable OPSS for Equipment Use includes *OPSS 182*.

#### 5.1.2.6 Contaminant and Emergency Spill Response

For the proposed activities described in DCR 1, the Contractor must develop a response plan that is to be implemented immediately in the event of a sediment release or spill of a deleterious substance. The Contractor must also keep emergency spill kits on site (and in heavy machinery) in case of emergency.

The Contractor shall also ensure that:

- Materials such as paint, primers, rust solvents, degreasers, grout, poured concrete or other chemicals do not enter the watercourse.
- Demolition debris such as concrete, asphalt, rebar, etc. do not enter the watercourse.
- Building material used in a watercourse has been handled and treated in a manner to prevent the release or leaching of substances into the water that may be deleterious to fish.
- Clean-up measures are suitably applied so as not to result in further alteration of the bed and/or banks of the watercourse.
- Clean-up and disposal of deleterious substances is appropriately performed.

All spills shall be reported to the Ministry of Environment, Conservation and Parks (MECP) Spills Action Centre (1-800-268-6060) as well as to DFO and MNRF Aurora District if there is potential for significant impacts to fisheries and/or wildlife resources.

#### 5.1.3 ENHANCEMENT MEASURES

There is no requirement for enhancements and compensation measures at any of the sites, however, the Credit River Fisheries Management Plan has identified fisheries management objectives for the lower Credit River which include protection of migratory routes of various coldwater salmonid species and management of recreational fisheries for Northern Pike, Smallmouth Bass and Largemouth Bass in the Lower Credit River.

Project Co will be responsible for appropriate riparian planting to restore and enhance the bank areas disturbed during construction as part of the overall project and will be documented in subsequent DCRs.

### 5.2 Terrestrial Ecosystems

*Terrestrial Ecosystems Existing Conditions and Impact Assessment Report Queen Elizabeth Way (QEW) from West of Mississauga Road to West of Hurontario Street Agreement No. 2015-E-0033* was previously prepared by Morrison Hershfield in December of 2018 as part of the early detailed design works. The results and conclusions are summarized below, and the terrestrial characteristics of the overall study area are depicted in **Figure 5-2**.

#### 5.2.1 EXISTING CONDITIONS

##### 5.2.1.1 Wetlands

There are no unevaluated wetlands within the overall project area, however, evaluated, Provincially Significant Wetlands (PSW) are present. Portions of the Credit River Marshes Wetland Complex PSW are located within the project limits. These wetland areas were classified as MASM1, MAMM1, and MAMM2 communities (refer to

**Figure 5-5** and **Figure 5-6**) during field investigations completed by MH biologists in 2017. Significant Wetlands are discussed further in **Section 5.2.1.9**. Refer to **Figure 5-2** for the locations of the Credit River Coastal Marshes along the Credit River.

#### 5.2.1.2 Vegetation Communities

The overall project area contains a total of twenty-two Ecological Land Classification (ELC) communities, including four (4) wetland communities, eleven treed communities, two (2) shrub communities, one (1) meadow community, and four (4) built/cultural communities. Refer to the ELC mapping of the project area in **Figure 5-3**, **Figure 5-4**, **Figure 5-5**, **Figure 5-6**, and **Figure 5-7**. A description of ELC communities and a list of all plant species observed within the overall project area are provided in the above noted existing conditions report.

As part of Morrison Hershfield's 2017 field investigations, community classification was completed with consideration of both the 1998 ELC protocol as well as the Southern Ontario Ecological Land Classification: Vegetation Type List (Lee, 2008). A description of each community based on the 2017 field investigations is provided in the above noted existing conditions report.

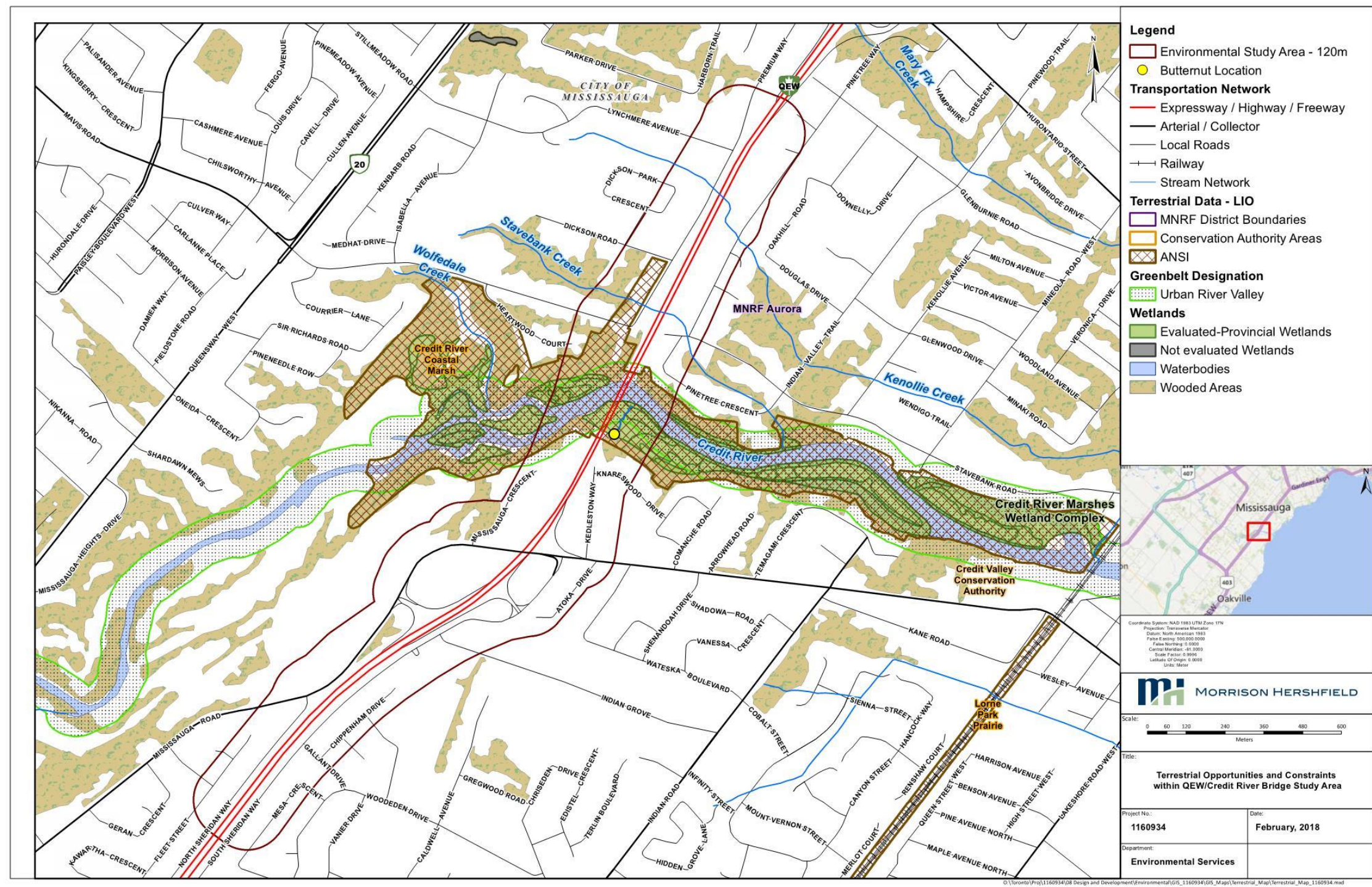
#### 5.2.1.3 Rare Vegetation

One species at risk (SAR) plant, Butternut, was identified in the vicinity of the DCR 1 works. MH biologists completed surveys for Butternuts and other SAR plants within the possible limits of construction impact and for an additional 50 m. Several potential Butternuts were recorded, therefore, a Butternut Health Assessor (BHA) completed an assessment on all potential Butternuts identified, which was audited by MNRF. Based on the results of the assessment, it was determined that one (1) true Butternut was present within the project area. Refer to **Figure 5-2** for the mapped location of the Butternut tree.

The National Heritage Information Centre (NHIC) provided records for several rare plants within 1 km of the project area including Virginia Bluebells (*Mertensia virginica*), Field Sedge (*Carex conoidea*), Clinton's Clubrush (*Trichophorum clintonii*), Early-branching Panicgrass (*Dichanthelium praecocius*), and Sundial Lupine (*Lupinus perennis*). Two (2) of these, Field Sedge and Clinton's Club Rush are considered extirpated from Peel Region (Ecoplans/MMM, 2012), and the remaining species were not recorded within the project area limits during field investigations.



Figure 5-2: Terrestrial Opportunities and Constraints<sup>2</sup>



<sup>2</sup> *Terrestrial Ecosystems Existing Conditions and Impact Assessment Report Queen Elizabeth Way (QEW) from West of Mississauga Road to West of Hurontario Street Agreement No. 2015-E-0033*



Figure 5-3: ELC Communities 1<sup>3</sup>



<sup>3</sup> Terrestrial Ecosystems Existing Conditions and Impact Assessment Report Queen Elizabeth Way (QEW) from West of Mississauga Road to West of Hurontario Street Agreement No. 2015-E-0033



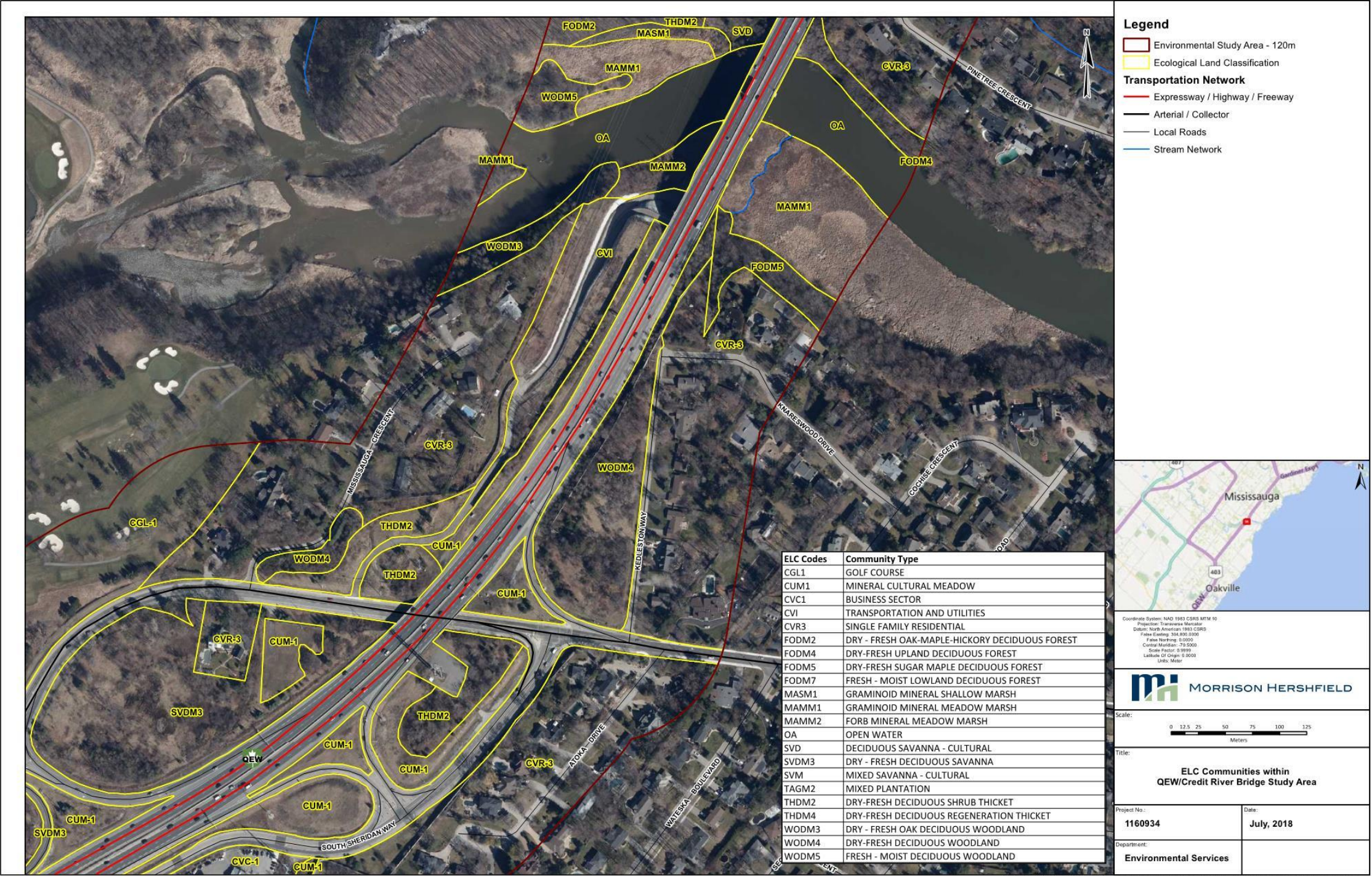
Figure 5-4: ELC Communities 2<sup>4</sup>



<sup>4</sup> Terrestrial Ecosystems Existing Conditions and Impact Assessment Report Queen Elizabeth Way (QEW) from West of Mississauga Road to West of Hurontario Street Agreement No. 2015-E-0033



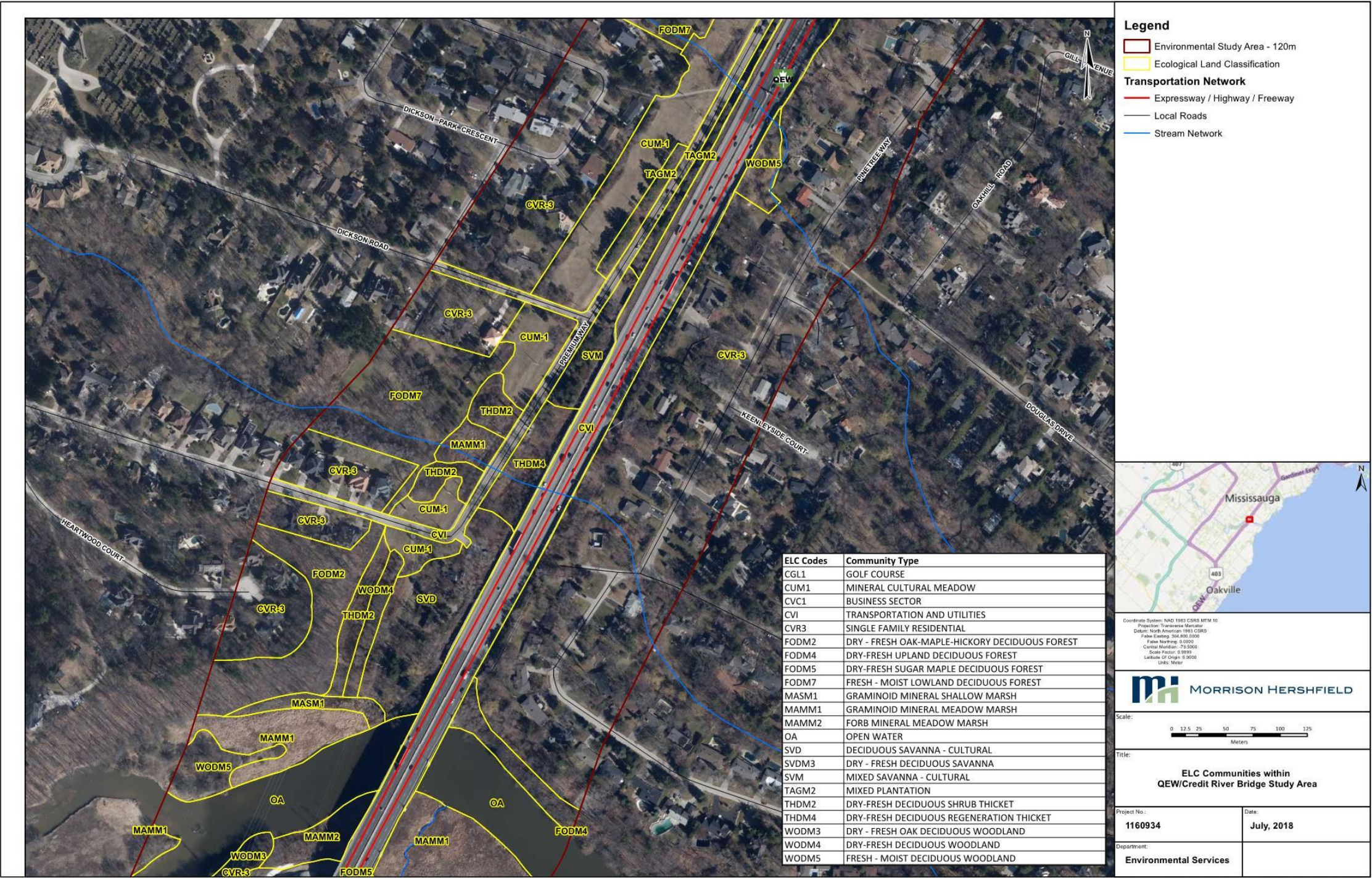
Figure 5-5: ELC Communities 3<sup>5</sup>



<sup>5</sup> Terrestrial Ecosystems Existing Conditions and Impact Assessment Report Queen Elizabeth Way (QEW) from West of Mississauga Road to West of Hurontario Street Agreement No. 2015-E-0033



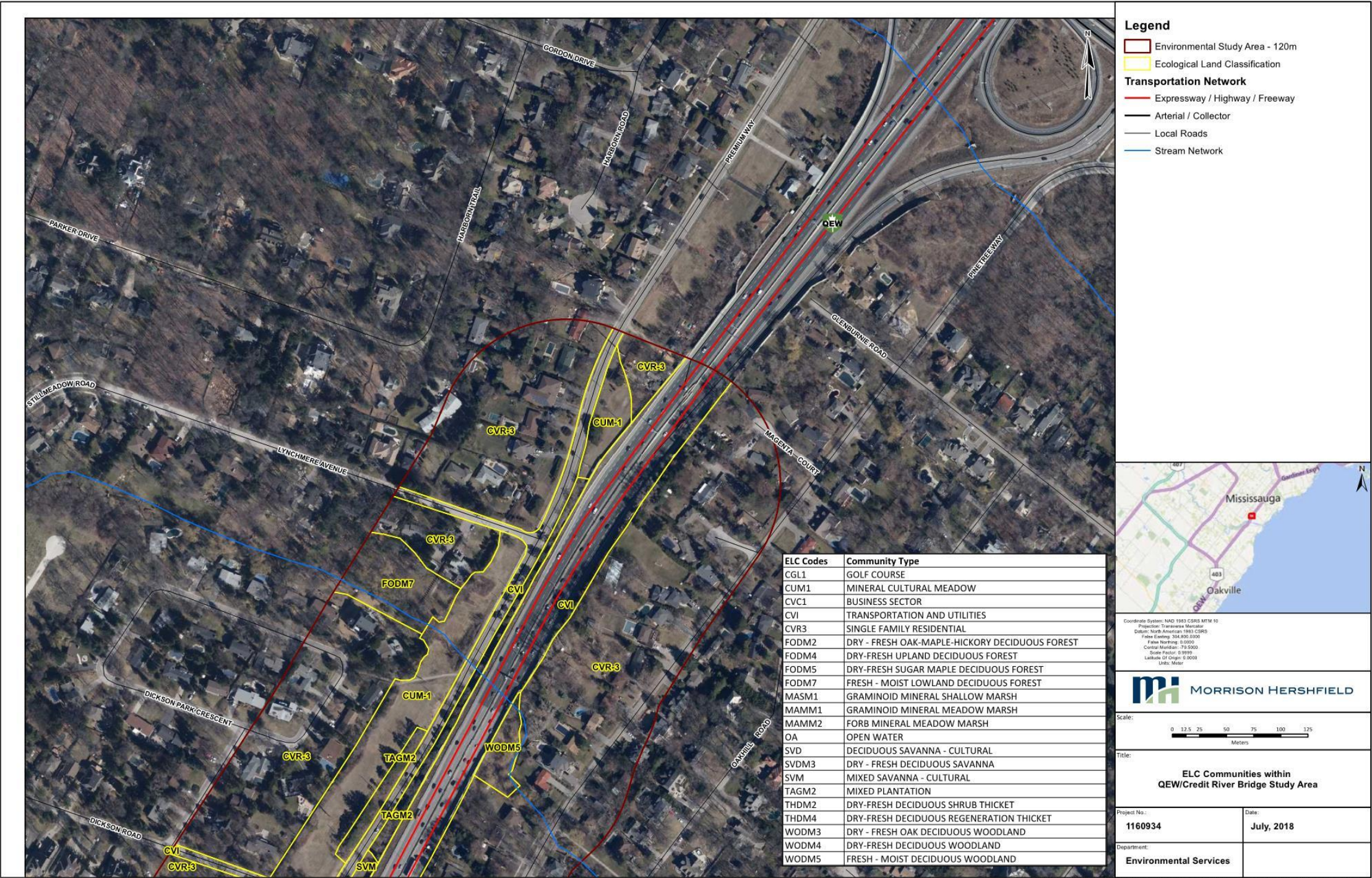
Figure 5-6: ELC Communities 4<sup>6</sup>



<sup>6</sup> Terrestrial Ecosystems Existing Conditions and Impact Assessment Report Queen Elizabeth Way (QEW) from West of Mississauga Road to West of Hurontario Street Agreement No. 2015-E-0033



Figure 5-7: ELC Communities 5<sup>7</sup>



<sup>7</sup> Terrestrial Ecosystems Existing Conditions and Impact Assessment Report Queen Elizabeth Way (QEW) from West of Mississauga Road to West of Hurontario Street Agreement No. 2015-E-0033



#### 5.2.1.4 Herpetofauna

During field investigations, species of herpetofauna observed within the overall project area included Green Frog (*Lithobates clamitans*), Northern Leopard Frog (*Lithobates pipiens*), Snapping Turtle (*Chelydra serpentina*), and American Toad (*Anaxyrus americanus*). All observations were within, or adjacent to wetland communities.

Snapping Turtle is listed on the Species at Risk in Ontario List as a species of Special Concern. During MH's field investigations, one (1) adult Snapping Turtle was observed west of the bridge along the north bank of the Credit River, within the Open Water (OA) community adjacent to the MAMM1 community. During archaeological field investigations, one (1) Snapping Turtle nest was identified in the northern half of the Deciduous Savanna – Cultural (SVD) community (**Figure 5-5**), west of the bridge and north of the Credit River.

The Ontario Reptile and Amphibian Atlas (ORAA) contained records of several SAR herpetofauna within a 10 x 10 km square that encompasses the project area, including recent records of Snapping Turtle, Northern Map Turtle (*Graptemys geographica*), and Jefferson Salamander (*Ambystoma jeffersonianum*), and historical records of Eastern Ribbonsnake (*Thamnophis sauritus*), Blanding's Turtle (*Emydoidea blandingii*), and Eastern Musk Turtle (*Sternotherus odoratus*). The NHIC contained records of Snapping Turtle within a 1 x 1 km square encompassing the project area. The NHIC also provided historical records of one (1) rare herpetofaunal species surrounding the project area: Eastern Milksnake (*Lampropeltis triangulum*). This species is not likely to be present due to its preference for large, open grasslands and meadows, which do not occur within the project area. The MNRF did not provide any additional records of herpetofaunal SAR surrounding the project area. See **Section 5.2.1.8** for a discussion of Species at Risk.

#### 5.2.1.5 Birds

The following bird species were observed within the project area during field investigations: American Robin (*Turdus migratorius*), House Finch (*Haemorhous mexicanus*), Warbling Vireo (*Vireo gilvus*), Hairy Woodpecker (*Picoides villosus*), Red-tailed Hawk (*Buteo jamaicensis*), European Starling (*Sturnus vulgaris*), House Sparrow (*Passer domesticus*), Least Flycatcher (*Empidonax minimus*), Red-winged Blackbird (*Agelaius phoeniceus*), American Goldfinch (*Spinus tristis*), Northern Cardinal (*Cardinalis cardinalis*), Blue Jay (*Cyanocitta cristata*), Barn Swallow (*Hirundo rustica*), Cliff Swallow (*Petrochelidon pyrrhonota*), Great Blue Heron (*Ardea herodias*), Cedar Waxwing (*Bombycilla cedrorum*), Song Sparrow (*Melospiza melodia*), Belted Kingfisher (*Megaceryle alcyon*), Gray Catbird (*Dumetella carolinensis*), Eastern Kingbird (*Tyrannus tyrannus*), and Rock Pigeon (*Columba livia*). One (1) of the observed species, Barn Swallow, is a SAR, however no Barn Swallow nests were observed on the QEW/Credit River Bridge or within culverts in the project limits therefore no impacts to this species are anticipated.

Species recorded nesting on the underside of the QEW/Credit River Bridge in 2017, include Rock Pigeon, European Starling, and Cliff Swallow. According to the Ontario Breeding Bird Atlas (OBBA) (2001-2005), 102 species were recorded within a 10 x 10 km square that encompasses the project area, including nine (9) SAR: Bank Swallow (*Riparia riparia*), Barn Swallow, Bobolink (*Dolichonyx oryzivorus*), Chimney Swift (*Chaetura pelagica*), Common Nighthawk (*Chordeiles minor*), Eastern Meadowlark (*Sturnella magna*), Eastern Wood-Pewee (*Contopus virens*), Peregrine Falcon (*Falco peregrinus*), and Wood Thrush (*Hylocichla mustelina*). A list of all bird species recorded within the OBBA atlas square is provided in the above noted existing conditions report. The NHIC contained historical records of Henslow's Sparrow (*Ammodramus henslowii*) within a 1 x 1 km square encompassing the project area. The MNRF Aurora District Office did not provide any additional records of SAR birds surrounding the project area. See **Section 5.2.1.8** for a discussion of Species at Risk.

#### 5.2.1.6 Insects

Red Admiral (*Vanessa atalanta*), Mourning Cloak (*Nymphalis antiopa*), and Monarch (*Danaus plexippus*) were recorded within the project area during field investigations completed by MH. One (1) of the observed species, Monarch, is a SAR.

The Ontario Butterfly Atlas (OBA) provided recent records of Monarch, and historical records of Mottled Duskywing (*Erynnis martialis*) within a 10 x 10 km square encompassing the project area. The NHIC and the MNRF did not provide any records of additional SAR insects surrounding the project area. See **Section 5.2.1.8** for a discussion of Species at Risk.

#### 5.2.1.7 Mammals

Evidence of Eastern Cottontail (*Sylvilagus floridanus*), Virginia Opossum (*Didelphis virginiana*), White-tailed Deer (*Odocoileus virginianus*), Muskrat (*Ondatra zibethicus*), Coyote (*Canis latrans*), and Raccoon (*Procyon lotor*) were observed within the project area during field investigations. Additional species that are potentially present within the general area include: Beaver (*Castor Canadensis*), Groundhog (*Marmota monax*), Skunk (*Mephitis mephitis*), American Mink (*Neovison vison*), Red Fox (*Vulpes vulpes*), Eastern Chipmunk (*Tamias striatus*), Gray Squirrel (*Sciurus carolinensis*), and a variety of small rodents and weasels (*Mustelidae* sp.) that are difficult to detect.

Several SAR bat species are known to have ranges that extend into this region, including Little Brown Myotis (*Myotis lucifuga*), Eastern Small-footed Myotis (*Myotis leibii*), Northern Myotis (*Myotis septentrionalis*), and Tri-colored Bat (*Perimyotis subflavus*). Potential habitat for SAR bats was identified within forested communities within the project area, therefore surveys were conducted within forested communities in 2017, to determine if maternity roost habitat for bats was present, and whether SAR bats could potentially be impacted by the project. See **Section 5.2.1.8** for a discussion of Species at Risk.

#### 5.2.1.8 Species at Risk

Species listed under the Endangered Species Act, 2007 (ESA) or the Species at Risk Act (SARA) are discussed in this section. SAR listed as Special Concern are considered Species of Conservation Concern, and are also discussed in the following paragraphs.

The OBBA listed nine (9) SAR birds as potentially present within the project area including: Barn Swallow, Bank Swallow, Bobolink, Chimney Swift, Common Nighthawk, Eastern Meadowlark, Eastern Wood-pewee, Peregrine Falcon, and Wood Thrush.

The ORAA contained recent and historical records of six (6) herpetofaunal SAR surrounding the project area: Snapping Turtle, Northern Map Turtle, Jefferson Salamander, Eastern Ribbonsnake, Blanding's Turtle, and Eastern Musk Turtle (*Sternotherus odoratus*).

The OBA provided observation records of Monarch Butterfly and Mottled Duskywing in the vicinity of the project area. The NHIC contained records of Henslow's Sparrow and Snapping Turtle surrounding the project area.

The MNRF did not provide any additional records of terrestrial SAR.

Based on the previously completed field investigations coupled with background information from the OBBA, ORAA, OBA, and NHIC, the project area provides potential and/or confirmed habitat for Barn Swallow, Butternut, Common Nighthawk, Eastern Ribbonsnake, Eastern Small-footed Myotis, Eastern Wood-pewee, Little Brown Myotis, Monarch, Northern Myotis, Northern Map Turtle, Snapping Turtle, Tri-colored Bat, and Wood Thrush.

All potential SAR and their habitat preferences are discussed in **Table 5-2** below, along with a summary of their provincial and federal designations.

Based on the previously completed field investigations coupled with background information from the MNRF, OBBA, ORAA, OBA, and NHIC, the overall study area was found to provide habitat for thirteen SAR. Five (5) of these species were observed during field investigations completed for the project in 2017: Little Brown Myotis, Barn Swallow, Snapping Turtle, Monarch, and Butternut. An additional eight (8) SAR were determined to have potential to occur within the overall study area.

Table 5-2: Summary of the SAR and SAR Habitat within the Overall Study Area

Species		Designations		Protection		Habitat within Project Area
Common Name	Scientific Name	Federal (SARA)	Provincial (ESA)	Federal Legislation	Provincial Legislation	
Bank Swallow	<i>Riparia</i>	THR	THR	MBCA, SARA	ESA	No
Barn Swallow	<i>Hirundo rustica</i>	THR	THR	MBCA, SARA	ESA	Yes; confirmed over OA
Blanding's Turtle	<i>Emydoidea blandingii</i>	THR	THR	SARA	FWCA, ESA	No
Bobolink	<i>Dolichonyx oryzivorus</i>	THR	THR	MBCA, SARA	ESA	No
Butternut	<i>Juglans cinerea</i>	END	END	SARA	ESA	Yes; confirmed within FODM5
Chimney Swift	<i>Chaetura pelagica</i>	THR	THR	MBCA, SARA	ESA	No
Common Nighthawk	<i>Chordeiles minor</i>	THR	SC	SARA, MBCA	-	Yes; potential within SVD and SVDM3
Eastern Meadowlark	<i>Sturnella magna</i>	THR	THR	MBCA, SARA	ESA	No
Eastern Musk Turtle	<i>Sternotherus odoratus</i>	THR	SC	SARA	FWCA	No
Eastern Ribbonsnake	<i>Thamnophis sauritus</i>	SC	SC	-	-	Yes; potential throughout project area
Eastern Small-footed Myotis	<i>Myotis leibii</i>	END	END	SARA	FWCA, ESA	Yes; potential within FODM2, FODM4, FODM5, and FODM7
Eastern Wood-pewee	<i>Contopus virens</i>	SC	SC	MBCA	-	Yes; potential within SVD, SVM, SVDM3, WODM3, WODM4, WODM5, FODM2, FODM4, FODM5, and FODM7



Species		Designations		Protection		Habitat within Project Area
Common Name	Scientific Name	Federal (SARA)	Provincial (ESA)	Federal Legislation	Provincial Legislation	
Henslow's Sparrow	<i>Ammodramus henslowii</i>	END	END	SARA, MBCA	ESA	No
Jefferson Salamander	<i>Ambystoma jeffersonianum</i>	END	END	SARA	FWCA, ESA	No
Little Brown Myotis	<i>Myotis lucifugas</i>	END	END	SARA	FWCA, ESA	Yes; potential within FODM2, FODM4, FODM5, and FODM7
Monarch Butterfly	<i>Danaus plexippus</i>	SC	SC	-	FWCA	Yes; confirmed within CUM-1 and WODM4
Mottled Duskywing	<i>Erynnis martialis</i>	Not Listed	END	-	ESA	No
Northern Myotis	<i>Myotis septentrionalis</i>	END	END	SARA	FWCA, ESA	Yes; potential within FODM2, FODM4, FODM5, and FODM7
Northern Map Turtle	<i>Graptemys geographica</i>	SC	SC	-	FWCA	Yes; potential within OA, MASM1, MAMM1, and MAMM2
Peregrine Falcon	<i>Falco peregrinus</i>	SC	SC	-	FWCA	No
Snapping Turtle	<i>Chelydra serpentina</i>	SC	SC	-	FWCA	Yes; confirmed within OA and SVD, and potential within MASM1, MAMM1, and MAMM2
Tri-colored Bat	<i>Perimyotis subflavus</i>	END	END	SARA	FWCA, ESA	Yes; potential within FODM2, FODM4, FODM5, and FODM7
Wood Thrush	<i>Hylocichla mustelina</i>	THR	SC	MBCA, SARA	-	Yes; potential within FODM2, FODM4, FODM5, and FODM7

\*ESA: Endangered Species Act; SARA: Species at Risk Act; FWCA: Fish and Wildlife Conservation Act; MBCA: Migratory Birds Convention Act; SC: Special Concern; THR: Threatened; END: Endangered

#### 5.2.1.9 Significant Habitats

Background research and field investigations were coupled with agency consultation in order to determine the habitat function and the significance of wetlands, woodlands and other vegetated areas and wildlife habitats and movements. The below sections outline the significant habitats within the project area.

##### Designated Natural Areas

Designated Natural Areas are defined by resource agencies, municipalities, the government and/or public, through legislation, policies, or approved management plans, to have special or unique value. Such areas may have a variety of ecological, recreational, and/or aesthetic features and functions that are highly valued.

Portions of the Credit River Coastal Marsh: Life Sciences Area of Natural and Scientific Interest (ANSI) are contained within the project limits. This area is part of a species movement corridor along the Credit River, supports high biodiversity, and is particularly rich in provincially and regionally rare species. This ANSI is not classified as a provincially significant ANSI, but is considered to have regional significance. Refer to **Figure 5-2** for the location of the ANSI within and surrounding the project area.

The valley lands adjacent to the Credit River are contained within the Urban River Valley Greenbelt Designation. Refer to **Figure 5-2** for the location of all designated areas within and surrounding the project area.

Environmentally Sensitive Areas (ESA) within and adjacent to the project area include the Stavebank Oak Woods ESA, located north of the QEW along the Credit River, and the Credit River - QEW - CNR ESA, located south of the QEW along the Credit River (Region of Peel, 2012). Mapping illustrating the location of these features is provided in **Appendix G**.

The City of Mississauga Natural Areas Survey (NAS) identifies two (2) designated areas that fall within the limit of the project area. Site CRR8 is located along the Credit River, extending from north of the QEW to the Queensway, while Site CRR9, which is also located along the Credit River, extends from south of the QEW to the Canadian National Railway Bridge (City of Mississauga, 2017). Mapping illustrating the location of these features is provided in **Appendix G**.

##### Significant Wetlands

Provincially Significant Wetlands are identified by the MNRF using evaluation procedures established by the Province, to determine the significance of the wetland.

Portions of the Credit River Marshes Wetland Complex PSW are located within the project limits. These wetland areas were classified as MASM1, MAMM1, and MAMM2 communities during field investigations. Refer to **Figure 5-2** for the locations of this PSW within and surrounding the project area.

##### Significant Woodlands

Significant Woodlands are areas which are ecologically important in terms of features such as species composition, age of trees and stand history; functionally important due to its contribution to the broader landscape because of its location, size or due to the amount of forest cover in the planning area; or economically important due to site quality, species composition, or past management history.

There are no Significant Woodlands identified within the project area, aside from the three (3) woodlands that have been further classified as ESAs as described above.

## 5.2.2 POTENTIAL IMPACTS AND MITIGATION MEASURES

The proposed works described in this DCR 1 will result in the permanent loss of vegetation and habitat adjacent to the existing highway and bridge. Temporary (short-term) impacts are also anticipated. Temporary impacts associated with the activities can be minimized through the implementation of mitigation and avoidance measures. The following section provides details on the anticipated impacts to the terrestrial features and functions as well as recommended mitigation measures to avoid and minimize impacts.

### 5.2.2.1 Soils

Temporary impacts to soils that may result from the proposed work include:

- Erosion of soils, soil exposure and loss of vegetation as a result of run-off.
- Degradation of soil quality.
- Soil compaction.

These potential impacts can be managed and prevented through the implementation of proper construction practices and mitigation measures. In addition to implementing measures as per Ontario Provincial Standard Specification (OPSS) 805: Construction Specification for Temporary Erosion and Sediment Control Measures, the following is recommended:

- Minimize vegetation removal, where possible, and limit removal to within the footprint of the proposed activities.
- Maintain vegetation of embankments for as long as possible prior to disturbance.
- Seed and cover exposed soils as soon as possible.

### 5.2.2.2 Wetlands and Vegetation

The overall study area contains a total of twenty-two Ecological Land Classification (ELC) communities. Not all ELC communities are predominately represented by vegetation. The QEW, Mississauga Road, and all other roadways within the overall study area were classified as transportation (CVI); single family residential (CVR) communities include low- or high-density residential areas, such as single-family homes, rural properties, apartment buildings, and trailer parks; and business sector (CVC1) areas can include business sectors, commercial areas, industrial areas, and educational or health care institutions. As such, these three communities (CVI, CVR3 and CVC1) are not discussed as part of the assessment of impacts to vegetation within the overall study area.

The Credit River was classified as an open water (OA) community. The Fish and Fish Habitat Impact Assessment Report (MH, 2019) provides an assessment of impact and recommended mitigation measures for the Credit River and other watercourses within the overall study area. As such, the open water (OA) community is discussed in other parts of this report.

Construction activities that have the potential to impact vegetation include:

- Vegetation management.
- Disturbance to vegetated areas as a result of equipment, access and/or storage of materials.

Potential impacts may include:

- Entry of fill, sediment runoff and/or debris from active work areas into adjacent vegetation communities and drainage ditches.

- Damage to rooting zones in areas immediately adjacent to natural areas.
- Spread of invasive plant species.

The Advanced Works described in this DCR 1 will only impact a limited area around the Credit River bridge, it is anticipated to be up to 1.023 ha. This area of impact has been determined based on the limits of site design plus a 5 m buffer to accommodate work (access, etc.).

**Table 5-3** provides a summary of the Advanced Works area of impact within each ELC community.

Table 5-3: ELC Community Impact Areas

ELC Code	Community	Area of Impact (ha)
MASM1	Graminoid Mineral Shallow Marsh	0.053
MAMM1	Graminoid Mineral Meadow Marsh	0.041
MAMM2	Forb Mineral Meadow Marsh	0.261
OA	Open Water	n/a
CUM1	Mineral Cultural Meadow	0.011
THDM2	Dry – Fresh Deciduous Shrub Thicket	0
THDM4	Dry – Fresh Deciduous Regeneration Thicket	0
TAGM2	Mixed Plantation	0
SVD	Deciduous Savanna – Cultural	0.656
SVM	Mixed Savanna – Cultural	0
SVDM3	Dry – Fresh Deciduous Savanna	0
WODM3	Dry – Fresh Oak Deciduous Woodland	0
WODM4	Dry – Fresh Deciduous Woodland	0.001
WODM5	Fresh – Moist Deciduous Woodland	0
FODM2	Dry – Fresh Oak-Maple-Hickory Deciduous Forest	0
FODM4	Dry – Fresh Upland Deciduous Forest	0
FODM5	Dry – Fresh Sugar Maple Deciduous Forest	0
FODM7	Fresh – Moist Lowland Deciduous Forest	0
CGL1	Golf Course	0
CVI	Transportation and Utilities	n/a
CVR3	Single Family Residential	n/a
CVC1	Business Sector	n/a
	<b>TOTAL</b>	<b>1.023</b>

In order to avoid and/or minimize impacts to vegetation, mitigation measures include:

- Minimize vegetation removal to the extent possible and shall be limited to the activity disturbance footprint.

- In order to protect the features and functions of retained vegetation areas, clearly delineate limits of work areas.
- In order to protect deciduous forest communities that will be retained, install tree protection along the limits of work areas as per OPSS 801 – Construction Specification for the Protection of Trees.
- Seed areas of herbaceous vegetation disturbed during the proposed activities with an appropriate seed mix per OPSS 804 – Construction Specification for Seed and Cover.
- Seed and cover exposed soils as soon as possible.
- Limit stockpiling of materials to clearly identified locations within the project footprint.
- Install sediment and erosion control measures (e.g., silt fencing, straw bales, etc.) at the limits of the work to minimize direct impacts to wetland areas. No access, work, or storage shall be permitted within wetland areas outside of the limits of disturbance. Refueling shall not occur within 30 m of wetland areas.
- Clearly delineate forest communities (FODM4, FODM5, FODM2) that exist within and adjacent to the work area in the field and no access beyond the limits of work shall be permitted as they are potential habitat for SAR bats.

#### 5.2.2.3 Invasive Plant Control

This project area contains areas with the invasive plant species Common Reed, also commonly known as Phragmites. Three (3) small patches of Phragmites were found to occur within the proposed Advanced Works limits of disturbance (**Table 5-4**).

Table 5-4: Summary of Phragmites Within Advanced Works Project Limits

Location	Description	Approximate Patch Size (m <sup>2</sup> )
611963 E 4823149 N	Phragmites patch south of the access road that leads from east of Mississauga Road to the QEW/Credit Bridge along the north side of the QEW	20
612216 E 4823490 N	Phragmites patch on the west bank of the Credit River, immediately upstream of the existing QEW/Credit River Bridge	20
612251 E 4823481 N	Phragmites patch on the west bank of the Credit River, immediately downstream of the existing QEW/Credit River Bridge	10

The removal and disposal of Phragmites that will be disturbed during the proposed activities will be carried out by Project Co and documented in subsequent DCRs.

#### 5.2.2.4 Wildlife and Wildlife Habitat

The overall study area provides habitat for a number of wildlife species including birds, amphibians and reptiles, insects and mammals. The permanent loss of habitat to common wildlife species is not anticipated to result in any long-term impacts to the species due to the availability of habitat in the surrounding area. This section provides a discussion of the potential short-term impacts to wildlife and wildlife habitat within the overall study area that may result from the proposed work. Potential impacts to SAR found to be present in the overall study area are discussed below.

Activities that have the potential to impact wildlife and wildlife habitat include:



- Noise during construction.
- Loss of wildlife habitat due to vegetation removal.
- Loss of wildlife habitat due to rehabilitation and/or replacement of man-made structures that provide habitat.

Vegetation clearing during the breeding bird season of April 1 to August 31 could result in the disturbance/displacement of breeding birds and/or destruction of their active nests. In order to avoid the destruction of migratory birds, their eggs and their nests, vegetation removal has been conducted outside of the breeding bird window of April 1 to August 31.

If vegetation removal during the breeding bird window (April 1 – August 31) cannot be avoided within areas of simple habitat, an avian specialist must conduct nest surveys to confirm the absence of nesting birds within the area to be cleared and/or grubbed. If any nests are found, they must be protected during the nesting season with a species-appropriate buffer (determined by the avian specialist).

#### 5.2.2.5 Species at Risk

Based on field investigations coupled with background information the overall project area was found to provide habitat for thirteen SAR (refer to **Table 5-2**). Five (5) of these species were observed during field investigations completed for the project in 2017: Little Brown Myotis, Barn Swallow, Snapping Turtle, Monarch, and Butternut. The following provides an assessment of impacts to SAR within the overall study area.

The Contractor will be required to provide awareness training to contractor staff that addresses the potential for SAR to occur on site. Training will provide information that should allow contractor staff to recognize the SAR and respond appropriately.

Any observations of Endangered or Threatened species must be reported to the MNRF using the Rare Species Reporting form available at [http://nhic.mnr.gov.on.ca/species/species\\_report.cfm](http://nhic.mnr.gov.on.ca/species/species_report.cfm)

#### Little Brown Myotis

Little Brown Myotis was confirmed within the overall study area during 2017 acoustic monitoring surveys. A total of six (6) potential bat maternity roost trees were identified within the cavity tree survey areas, all of which were ranked as low quality. Suitable bat maternity roosting trees identified within the cavity tree survey areas are located outside of the limits of disturbance and, as such, the proposed project will not require the removal of suitable bat maternity roosting trees.

The total area of potential bat habitat within the overall study area where impacts are anticipated is 0.061 hectares. The proposed project will result in mainly linear impacts along the edges of the potential bat habitat areas. It is anticipated that the level of tolerance to these edge impacts is high and will result in minimal impacts to overall bat habitat in the vicinity of the project. Given the amount of forest present that will remain, the area will continue to provide potential maternity roost habitat for SAR bats. The Advanced Works described in this DCR 1 are not expected to have any impacts on potential bat habitat identified within the overall study area.

Due to the lack of cavity trees within the limits of disturbance as well as the availability of bat maternity habitat in the adjacent treed areas, impacts to potential SAR bat maternity roosting in these areas are not anticipated as a result of the proposed project.

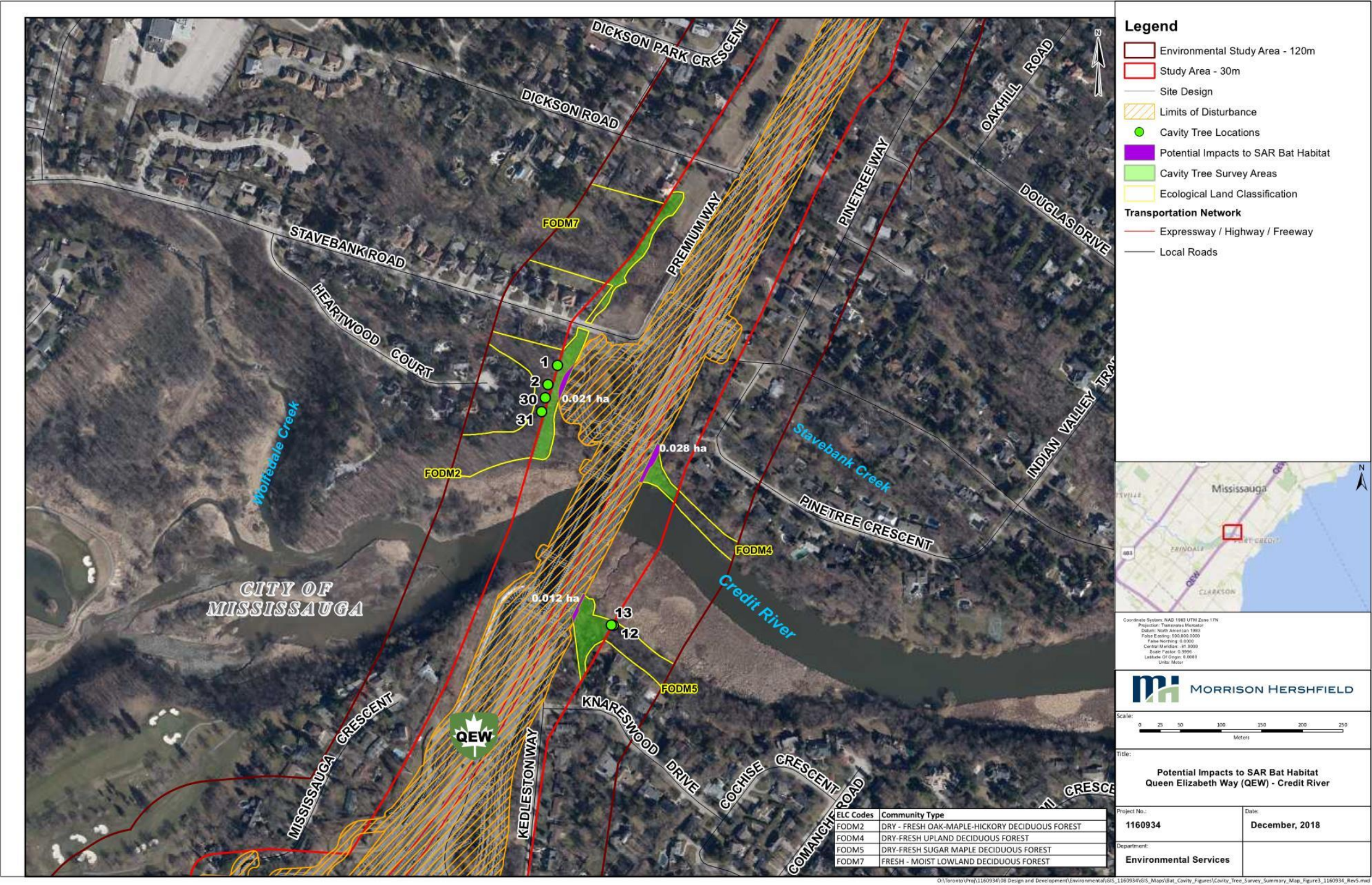
The Contractor shall implement the following mitigation measures with respect to bats and bat habitat:

- No vegetation removals between April 1 and September 30 to protect critical life processes related to rearing young bats.
- Those communities that provide bat habitat shall be identified as Sensitive Bat Habitat on Contract documents. These areas shall be protected as per OPSS-801: Construction Specification for the Protection of Trees and shall be clearly delineated in the field. These areas shall be considered no-go zones, where storage, staging and access are not permitted at any time.
- Implement standard practices to minimize construction noise and vibration. Construction activities shall be in compliance with the municipal bylaws when possible.
- Any lighting associated with the construction phase shall be the minimum necessary to ensure security and safety, and should be directed away from natural areas when possible.

Provided the mitigation measures are adhered to, this project will not adversely impact SAR bats or their habitat. MNRF has agreed with the results of the assessment on impacts to SAR bats and issued a Letter of Advice confirming this on January 3, 2019. **Figure 5-8** illustrates the potential impacts to SAR bat habitat.



Figure 5-8: Impacts to SAR Bat Habitats<sup>8</sup>



<sup>8</sup> Terrestrial Ecosystems Existing Conditions and Impact Assessment Report Queen Elizabeth Way (QEW) from West of Mississauga Road to West of Hurontario Street Agreement No. 2015-E-0033



### Barn Swallow

Six (6) Barn Swallows were observed flying and foraging around the QEW/Credit River Bridge during field investigations. While the bridge does provide potential nesting habitat for this species, no Barn Swallow nests were observed on the bridge or elsewhere within the overall study area during field investigations completed by MH in 2017, or in previous years (Ecoplans/MMM, 2012; WSP/MMM, 2017). Impacts to this species are not anticipated to result from the proposed Advanced Works project.

### Snapping Turtle

During MH's field investigations, one (1) adult Snapping Turtle was observed north of the bridge along the east bank of the Credit River within the OA community. During archaeological field investigations, one (1) Snapping Turtle nest was identified in the northern half of the SVD community, north of the bridge and east of the Credit River. In order to avoid impacts to this species, the following measures are recommended:

- Awareness training for the Contractor that addresses the potential for Snapping Turtles to occur on site. Training should provide information that will allow the Contractor to recognize the species and respond appropriately.
- Snapping Turtles encountered outside of the work area should be left to move on their own.
- Maintenance of erosion and control measures prescribed for the project will work to prevent turtles from entering the work area.
- Move Snapping Turtles encountered within the work area to a location outside of the work area that is within close proximity and provides similar habitat to where the individual was found.
- If a nesting activity is observed or a nest is found, contact the MNRF immediately and flag and protect a five (5) m buffer around the site until further direction is received from MNRF.

### Monarch

Monarch, listed as Special Concern in Ontario, was recorded within the overall study area during field investigations completed by MH.

Eight (8) Monarchs were observed within the CUM-1 and WODM4 communities during field investigations, and these communities contain Common Milkweed which provides potential breeding habitat for this species.

Common Milkweed is considered to be widespread in Ontario. Loss of Common Milkweed plants as a result of the proposed work is not anticipated.

### Butternut

As part of MH's 2017 field investigations, one (1) Butternut was confirmed within the overall project area east of the QEW on the south bank of the Credit River. In order to avoid impacts to the Butternut, the limits of disturbance to accommodate rehabilitation of the existing bridge have been minimized to the extent possible.

It is anticipated that there will be no impact to the Butternut tree or the function of the habitat supporting the tree as a result of the proposed project. Discussions with MNRF confirmed this assessment of the impacts.

### Bank Swallows

Bank Swallow is listed as a Threatened species in Ontario. Neither Bank Swallows nor their habitat were observed within the overall study area during the field investigations; however, there is the potential for this species to



arrive on site following commencement of the proposed works, as they are attracted to nesting in loose soils such as those resulting from embankments and slopes, or those found in stockpiles of soils. If work within stockpiles or slopes is required during the breeding bird season, a slope reduction plan should be used to deter nesting by Bank Swallows, and can be achieved by:

- Sloping off stockpiles (using a bulldozer excavator, etc.).
- Contouring slope faces.
- Piling materials on the face (exclusion).

Note that any slopes or parts of slopes that are not rendered unsuitable can be occupied as quickly as overnight. For work sites that are operational daily, slopes should be left at 70 degrees or less at the end of each day. Slope reduction measures should continue throughout the breeding bird season (April 1 – August 31) of any year.

Specifications have been included in the contract so the Contractor implements the above recommendations.

### **Other Species at Risk**

Other SAR that were not confirmed during field investigations but have the potential to occur within the overall study area include Common Nighthawk, Eastern Wood-Pewee, Wood Thrush, Northern Map Turtle, Eastern Ribbonsnake, Eastern Small-footed Myotis, Northern Myotis and Tri-colored Bat. It is anticipated that implementation of mitigation measures meant to address other wildlife and SAR will work to minimize or avoid the impact to other SAR that may occur within the overall study area. No adverse impacts to these SAR are anticipated as result of the proposed project.

#### **5.2.2.6 Designated Natural Areas**

The overall study area overlaps with a number of Designated Natural Areas including:

- Credit River Coastal Marsh ANSI.
- Urban River Valley Greenbelt.
- Stavebank Oak Woods ESA.
- Credit River - QEW - CNR ESA.
- City of Mississauga Natural Areas Survey Site CRR8.
- City of Mississauga Natural Areas Survey Site CRR9.

Impacts to these Designated Natural Areas can be avoided and/or minimized through the implementation of appropriate mitigation measures identified in the sections above.

## **5.3 Land-Use and Landscaping**

### **5.3.1 EXISTING CONDITIONS**

The project area is located within the south-central portion of Mississauga predominated by single-family detached homes and green spaces. The QEW conveys traffic from the Gardiner Expressway/Highway 427 Interchange in Toronto through Mississauga, over the Credit River and continuing to the west. The project area includes a small plaza with a gas station and Tim Hortons, utilities infrastructure, the Mississauga Golf and Country Club and single-detached homes bordering the project area in most places.

The Mississauga Official Plan (2018) designates most of the lands within the project area as Residential Low Density I, with a small portion of Residential Low Density II at the western extent of the project area. Areas used for hydro infrastructure (including a substation and hydro corridor) are designated Utility, while the Credit River Corridor is designated as Greenlands with Natural Hazards.

The City of Mississauga's 2018 Cycling Master Plan and the Region of Peel's 2012 Active Transportation Plan identified several active transportation connections within the project area as part of the Mississauga Cycling Route Network. These connections include a north-south crossing of the QEW at Stavebank Road and an east-west crossing of the Credit River under the QEW.

### **5.3.2 CREDIT RIVER CORRIDOR**

The Credit River Corridor is a natural landscape formed by the flow of the Credit River from Georgetown to Lake Ontario. At the northwestern extent of the Project Area, the corridor is dominated by the Mississauga Golf and Country Club, which encompasses the width of the entire corridor. Downstream of the club the corridor returns to a naturalized state with virtually no development in the valley floor floodplain. Due to the lack of easy public access to the river within the vicinity of the Credit River Bridge, there are no hiking trails or other public land based recreational uses in this part of the corridor. Recreational uses within this section of the corridor are mostly limited to boating activities (i.e. canoe/kayaks), though a small number of property owners can access the river and floodplain from their properties.

### **5.3.3 POTENTIAL IMPACTS AND MITIGATION**

#### **5.3.3.1 Operational Noise**

During the Preliminary Design stage, a detailed noise impact assessment was undertaken. Many residents in close proximity to the Credit River Valley will see an improvement in sound levels due to the construction of a clear noise wall on the existing and future bridge. Noise levels will also be improved as a result of an overall reduction in the number of expansion joints on the existing bridge. The existing double joints will be changed to single joints and the abutment joints will be eliminated, making for new reduced total of five joints. All noise reduction works will be designed and constructed by Project Co and documented in future DCRs.

#### **5.3.3.2 Direct Property Impacts**

No property impacts are expected as a result of the Advanced Works.

#### **5.3.3.3 Visual Impacts**

Visual impacts due to the Advanced Works described in this DCR 1 will be temporary and overall project impacts will be addressed through the final design by Project Co.

#### **5.3.3.4 Landscaping**

During the Preliminary Design and Class Environmental Assessment completed in 2013, a conceptual Landscape Plan was created based on the principles of mitigating impacts to the natural environment, landscape enhancements and landscape plantings to increase natural environments and improve aesthetics.

As part of the overall project works, Project Co will develop and implement a landscape and design plan, including principles from the previous conceptual plan. This work will be documented in subsequent DCRs to be prepared by Project Co.

## 5.4 Construction Noise

Construction noise impacts are temporary in nature, and largely unavoidable. In addition, the timing of construction activities is such that they vary by activity and location within the site as the construction progresses and therefore noise levels from construction activities will also vary. Although for some periods and types of work, construction noise may be noticeable, with adequate controls, impacts can be minimized. As a result, it is not anticipated that receptors would be exposed to constant construction noise for the duration of the construction contract. During the detailed design process, a *Construction Noise Assessment for the Reconstruction of Queen Elizabeth Way (QEW) from West of Mississauga Road to West of Hurontario Street, City of Mississauga* by Novus Environmental in 2018, findings and recommendations are presented below.

Construction noise levels at a given receptor location will vary over time as different activities take place and as those activities change location within the construction footprint.

MTO has a standing agreement with the City of Mississauga that night and weekend work within the MTO right-of-way (ROW) are exempt from the Noise By-law.

Even though night work is not anticipated as part of the proposed works in DCR 1, should it be required MTO will undertake the following to satisfy conditions imposed by the City which includes:

- Notification of all local residents within a 500 m radius of the project of anticipated night/weekend work. The public notice may be made via a Canada Post mailing, direct door to door hand delivery or publication in a newspaper of general circulation. The notification will be delivered prior to the start of the construction contract.
- Furthermore, notification related to the anticipated night/weekend construction activities will be provided to the area Councillors.

Measures to mitigate construction noise include:

- Properly maintain all equipment to limit noise emissions. As such, all construction equipment must be operated with effective muffling devices that are in good working order.
- Any initial noise complaint will trigger verification that the general noise control measures agreed to, are in effect. Any noise complaints should be forwarded to the Contract Administrator, so they can be addressed.
- In the presence of persistent noise complaints, verify all construction equipment to comply with MECP NPC-115 guidelines.
- If noise level emissions for the construction equipment in use exceed the sound level criteria for construction equipment contained in the MECP NPC-115 guidelines, the contractor is required to comply with the sound level criteria where quieter alternative equipment is reasonably available.
- Vibration monitoring requirements will be included in the contract documents.

## 5.5 Air Quality

The most significant source of dust emissions from construction activities is typically from vehicle traffic on unpaved roads or open construction areas. Emissions from paved roads can also occur, typically due to material spillage, the transportation of uncovered material, or from dirty equipment. Additionally, paved roads surrounding a construction area can become dirty if left unattended, and vehicle traffic on these roads can cause the re-suspension of dust. During the detailed design process, a *Construction Air Quality Report for the Reconstruction of Queen Elizabeth Way (QEW) from West of Mississauga Road to West of Hurontario Street Region of Peel MTO Assignment #2015-E-0033* by Novus Environmental in 2018, findings and recommendations are presented below.

Mitigation and control measures to reduce dust emissions from paved surfaces include:

- Street sweeping as required, based on visual inspection. Roads should be kept clear of dust as much as possible.
- Swift removal of spilled materials.
- Use enclosed cargo holds on trucks and vehicles or cover open-bodied trucks.
- Minimize or limit the number of trucks accessing the site.
- Clean the wheels and empty cargo holds of vehicles prior to leaving the site.

Dust from unpaved roads and exposed construction sites can occur due to vehicle travel as well as wind erosion. The predominant mechanism of dust generation from unpaved roads is the re-suspension of surface particulate due to vehicle traffic.

Mitigation and control measures to minimize fugitive dust from unpaved areas include:

- Minimize vehicle traffic on-site.
- Set low speed limits for on-site traffic.
- Apply water or a dust suppressant on unpaved surfaces, including roads and lots.
- Limit total area of exposed sites at any given time throughout the construction period (i.e. staging of construction activities).

Dust generation occurs from wind erosion of storage piles. Mitigation and control measures to control fugitive dust from aggregate material and earth storage include:

- Minimize uncovered storage of materials on-site.
- Apply water or a dust suppressant to storage piles.
- Construct wind breaks surrounding storage piles.
- Strategic placement of storage piles to increase separation distance to nearby sensitive receptors such as schools, residences and parks.
- Consider predominant winds and avoid locating storage piles upwind of nearby sensitive receptors.

Loading, unloading, and transferring materials is a significant source of fugitive dust. Dust generation from these activities is increased during strong wind conditions.

Mitigation and control measures for unloading, loading, and transferring aggregate materials include:

- Minimize the amount of material being transferred on-site at any one time.
- Lower drop distances when unloading material onto piles or surfaces.
- Loading trucks and vehicles so that the dump load will not spill over the sides of the target vehicle. Loads should drop as close to the vehicle opening as possible.
- Apply a water spray or dust suppressant to the materials being transferred.

All diesel operated vehicles and machinery including generators, excavators, crushers, etc., will emit suspended particulate matter and odours as part of exhaust emissions. Higher amounts of particulate emissions can be expected during long idling times and when many vehicles or engines are operating at any one time.

- Mitigation and control measures to control particulate matter and odours from engine exhaust include:



- Minimize the number of vehicles and engines operating at any one time.
- Increase separation distances between sensitive receptors, such as schools, residences, and parks and all exhaust points.
- When possible, ensure that engine exhausts are oriented upwards.
- Limit idle times of vehicles and engines. Shut off engines when not in use.
- When possible, limit operations to times when winds are blowing away from sensitive receptors, and minimize use when winds would direct exhaust emissions towards sensitive receptors.

Mitigation and control measures to minimize fugitive dust from excavation operations include:

- Minimize the number of machines in operation concurrently.
- Use water or dust suppressants on the work surface.
- Decrease the travel distance between the work area and storage piles or trucks.
- Lower drop distances of the excavated earth and materials.

## 5.6 Archaeology

### 5.6.1 EXISTING CONDITIONS

The Credit River has been used for thousands of years by Indigenous People and subsequently European Settlers.

From 2010-2012, MTO undertook a Stage 1-3 Archaeological Assessment of the QEW between Hurontario Street and Mississauga Road. Artifacts and other cultural material were identified in the area around the Hogsback Site. The Hogsback Archaeological Site was first identified in the 1930s by the Royal Ontario Museum (ROM).

In addition to numerous finds from European Settlers, the archaeologists found a significant amount of 'pre-contact' indigenous artifacts dating back to the Middle Woodland Period (400 BC – AD 600).

As a result of these finds, MTO conducted an additional Stage 3 assessment and Stage 4 excavations of the site since 2016. The site was fully hand-excavated in order to identify and record all cultural features and determine appropriate mitigation. This excavation was completed in early autumn 2017.

In 2019, MTO conducted additional Stage 1 and 2 archaeological assessments for the QEW Credit River Improvement project on lands with the potential to be impacted during construction. The Stage 1 assessment determined that the overall study area retained archaeological potential. The Stage 2 test pit survey did not identify any archaeological material.

In 2019, MTO carried out a marine archaeological assessment in portions of the Credit River. The overall study area was subject to forward looking sonar survey, and the near shore in-water track (where depths were not excessive) was subject to in-water test pitting methodology, conducted in five metre intervals, approximately one metre parallel to the shoreline. No archaeological materials, features, or sites were located during the Stage 2 assessment.

Given the significance of the site, MTO employed archaeological site monitors from the First Nation communities who have a cultural connection to this site.

As part of the Advanced Works described in this DCR 1, MTO will install cofferdams in order to carry out additional Marine Archaeology in the Credit River, once the in-water areas are isolated (**Appendix A**).

### 5.6.2 POTENTIAL IMPACTS AND MITIGATION

As noted in **Section 5.7.1** archaeological assessments of the area have been completed to clear the area of archaeological material. However, the potential still exists that during construction archaeological material could be found. In the event that archaeological material is discovered during construction, the following mitigation measures will apply:

- In the event that human remains are encountered during construction, the Contractor shall contact the Ontario Provincial Police, the Ministry of Transportation Archaeologist at 416-235-5489, the Ministry of Tourism, Culture and Sport at 416-314-7146; and the Registrar of the Ministry of Government Services Cemeteries Regulations Unit at 416-326-8404.
- In the event that potential archaeological resources are discovered during construction, they may be a new archaeological site and therefore subject to Section 48 (1) of the Ontario Heritage Act. The proponent or person discovering the archaeological resources must cease alteration of the site immediately and engage a licensed consultant archaeologist to carry out archaeological fieldwork, in compliance with Section 48 (1) of the Ontario Heritage Act. The Contractor shall also contact the Ministry of Transportation Archaeologist at 416-235-5489 and the Ministry of Tourism, Culture and Sport at 416-314-7132.

Additionally, snow fence will be installed to prevent any entry and disturbance of lands outside of the project limits. As noted above, in **Section 5.6.1**, MTO will carry out additional Marine Archaeology works as part of the Advanced works described in this DCR 1. Where the river bottom is to be impacted, sediments in those specific areas will be screened for archaeological/cultural materials by the archaeologist.

## 5.7 Built Heritage

Preservation of cultural heritage resources within the overall study area was reviewed and documented as part of the previously completed detailed design works.

### 5.7.1 EXISTING CONDITIONS

Within the overall study area, the Credit River Corridor is identified in the City of Mississauga Cultural Landscape Inventory as a natural landscape (L-NA-2) and included in the City's Heritage Register. The Mineola Neighbourhood which is bound to the north by the QEW, to the east by Cawthra Road, to the south by the GO rail corridor and to the west by the Credit River, is identified in the City of Mississauga Cultural Landscape Inventory as a residential landscape (L-RES-6) and is included in the City's Heritage Register. The building located at 1564 Mississauga Road, is individually listed (Inventory #253) for architectural reasons, and is listed for its location within the Mississauga Road Scenic Route Cultural Landscape (F-TC-4) and is included on the City's Heritage Register.

Specific to the Advanced Works project limits, the QEW Credit River Bridge, MTO Site No. 24-203, has been included in the Ontario Heritage Bridge List and has been recognized as a Provincial Heritage Property of Provincial Significance (PHPPS) as set out under the MTCS Standards and Guidelines for the Conservation of Provincial Heritage Properties (2010). Furthermore, it is identified in the City of Mississauga's Cultural Landscape Inventory as a Special Landscape Feature (F-SLF-2), and is included in the City's Heritage Register. The QEW is commemorated by the Canadian Society for Civil Engineering as a National Historic Civil Engineering Site.

### 5.7.2 POTENTIAL IMPACTS AND MITIGATION

#### Existing QEW Credit River Bridge

The following measures are recommended to mitigate impacts of the Advanced Works described under this DCR 1 and have been implemented through the design process:

- Soil will not be piled up against the heritage bridge and materials, equipment and vehicles will be stored elsewhere on the site.
- It is recommended that fencing or other means of shielding be used to establish protection measures when work is being completed near the existing structure.
- Embankments will be protected to the extent possible and minimal intervention undertake if erosion control is recommended.

The design on the new Twin Bridge over the Credit River, and the rehabilitation of the existing Credit River Bridge will be prepared by Project Co and documented in subsequent DCRs.

#### 5.7.2.1 Credit River Corridor Cultural Heritage Landscape

Indirect impacts will be related to air, noise and dust during construction and are deemed temporary. These conditions will be managed.

### 5.8 Groundwater and Soil Contamination

An investigation of groundwater and contamination was previously completed as part of the detailed design works, the *Soil and Groundwater Investigation, QEW from West of Mississauga Road to West of Hurontario Street, Mississauga, Ontario GWP# 2013-13-00* was completed by Morrison Hershfield in 2019, and findings are presented below.

#### 5.8.1 EXISTING CONDITIONS

The site history and records review indicated that the overall study area was developed prior to the 1930s. The surrounding area was used primarily for agricultural purposes until circa 1960 and has since been developed as low density residential land use with some commercial properties.

Based on the findings of this Phase I Environmental Site Assessment (ESA), areas of potential environmental concern were identified.

There are several areas within the project limits that have contaminated material that may be above acceptable limits for reuse. These materials will be managed in accordance with the mitigation identified in the section below.

#### 5.8.2 POTENTIAL IMPACTS AND MITIGATION

##### 5.8.2.1 Monitoring and Management of Potentially Impacted Soil and Groundwater

Examples of general provisions which have been included in the contract to monitor for the presence of impacted soils/groundwater and to ensure proper management if encountered include:

- Requirements to manage soil in accordance with applicable regulations and guidelines, including "Management of Excess Soil – A Guide for Best Management Practices", Ontario Ministry of the Environment, 2014.
- Requirements for Qualified Persons (as defined by Ontario Regulation 153/04) to be onsite during work within areas identified as being potentially subject to soil impacts.
- Sampling and analysis of soil and groundwater prior to ultimate reuse and/or disposal.

- Requirements to manage all wastes, including any contaminated soil and/or groundwater in accordance with applicable regulations and Ontario Provincial Standard Specification 180.
- Disposal of any contaminated earth at an MECP-approved waste facility.
- Discharging all dewatering in compliance with requirements stipulated in the Permit to Take Water (PTTW) and all supporting documentation. The detailed requirements will be determined through the PTTW process.

#### **5.8.2.2 Removal of TNPI Pipelines near the Credit River**

Project Co will be responsible for removing any decommissioned Trans-Northern Pipeline Inc.'s (TNPI) decommissioned pipeline that could be impacted by the construction of new piers for the Twin Bridge over the Credit River. Soil from these locations should be sampled and if necessary managed as contaminated non-hazardous soil in accordance with the recommendations provided in the P3 contract.

If any signs of soil/gravel contamination are noted, Project Co will advise TNPI's onsite inspector immediately and cease work until contaminated areas have been located and their extents determined and staked. Under TNPI supervision, stained or odorous soils will be segregated and contained so as not to contaminate other lands or watercourses. The TNPI Inspector will arrange for appropriate testing of soils, and for handling practices as appropriate. Contaminated materials shall be removed in accordance with TNPI's Environmental Practices Manual and transported to an authorized disposal site.

### **5.9 Traffic Management During Construction**

As part of the Advanced Works described in this DCR 1, Advanced Notification/Warning/Detour Route TC-64 signs will be installed to provide notification to the travelling public of any temporary lane reductions.

### **5.10 Summary of Environmental Effects, Proposed Mitigations and Commitments to Future Work**

A summary of the potential impacts and mitigation measures of the Advanced Works are provided in **Table 5-5** below.



Table 5-5: Summary of Potential Impacts and Mitigation Measures of the Advanced Works

Issue/Concerns and Potential Effects	Mitigation/Protection/Monitoring
Fish and Fish Habitats	
Potential impacts to fish and fish habitat within the Credit River	<ul style="list-style-type: none"><li>Any required in-water works will only be permitted between July 1st to August 15<sup>th</sup> (extended to August 31 for 2020) and December 15th to January 31st within the Credit River</li><li>When possible, schedule work to avoid wet and rainy periods that may increase erosion and sedimentation</li><li>Contain all in-water works using site isolation as per Ontario Provincial Standard Specification (OPSS) 182 – General Specification for Environmental Protection for Construction in Waterbodies and on Watercourse Banks, designed and installed according to relevant Contract Specifications to delineate temporary in-water work zones to allow work in the dry and maintain clean flow downstream/around the work zone at all times. Maintain the natural flow regime for any diversion works.</li><li>Retain a qualified environmental professional to perform fish salvage within isolated, enclosed or dewatered areas at the work site and safely relocate them according to a License to Collect Fish for Scientific Purposes (as per OPSS 182). Fish may need to be relocated again, should flooding occur on the site.</li><li>Minimize duration of in-water work and conduct instream work during periods of low flow when possible to further reduce the risk to fish and their habitat and to allow work in water to be contained.</li><li>When temporary flow control must be undertaken for the work it will be per <i>Ontario Provincial Standard Specification (OPSS) 517 – Construction Specification for Dewatering</i>. The Contractor will make reasonable efforts to avoid changing flow and water levels.</li><li>All exposed soils or disturbed areas that drain into a waterbody will be treated with seed and cover according to OPSS 804 – Construction Specification for Seed and Cover, as soon as possible after exposure or upon completion of the work in or around the waterbody or on the waterbody bank.</li><li>The Contractor will monitor construction activities in and around watercourses and ensure all related mitigation measures are properly installed, maintained and are functioning effectively. Cofferdams will be monitored, inspected and evaluated and altered/maintained as necessary.</li><li>Maintain an appropriate depth and flow (i.e. base flow and seasonal flow of water) for the protection of fish and fish habitat.</li></ul>
Dewatering operations for in-water works may impact fish and aquatic wildlife	<ul style="list-style-type: none"><li>When using a pump, control the intake to prevent entry of fish and other aquatic wildlife (screen any water intakes or outlet pipes to prevent entrainment or impingement of fish in accordance with the DFO code of practice).</li><li>Dewatering operations will be directed to a sediment control device or natural attenuation area prior to discharge to watercourses, if a natural attenuation area is used, a minimum 30 m setback will be maintained from the receiving watercourse.</li><li>Dewater gradually to reduce the potential for stranding fish.</li></ul>
The disturbance and release of sediments may have direct negative effects on aquatic wildlife	<ul style="list-style-type: none"><li>Use effective erosion control measures including topsoil and seed, silt fence barriers, and erosion control blankets as per OPSS 804 and SP: Erosion and Sedimentation Control-General.</li><li>Design and implement erosion and sediment controls to contain/isolate the construction zone, manage site drainage/runoff and prevent erosion of exposed soils and migration of sediment into waterbodies at all stages of the project using details outlined in OPSS 805 – Construction Specification for Temporary Erosion and Sediment Control Measures. Erosion and sediment control measures will be maintained until all disturbed ground has been permanently stabilized, suspended sediment has resettled to the bed of the waterbody or settling basin and runoff water is clear.</li><li>Minimize vegetation removal where possible and proper clearing and utilize grubbing techniques. All retained vegetation will be delineated and protected. Removal of vegetation shall be in accordance with OPSS 182 and clearing shall be completed in accordance with the specifications outlined in OPSS 201 – Construction Specification for Clearing, Close Cut Clearing, Grubbing and Removal of Surface and Piled Boulders.</li><li>Implement site isolation/containment measures (i.e. cofferdams) to isolate areas where in-water work is required. Site isolation will be implemented as per OPSS 182 and designed according to relevant Contract Specifications.</li><li>Implement measures for containing and stabilizing waste material (e.g., dredging spoils, construction waste and materials, commercial logging waste, uprooted or cut aquatic plants, accumulated debris) above the HWM of nearby waterbodies to prevent re-entry.</li><li>Store and stabilize all stockpiled materials, including but not limited to excavated overburden and topsoil, excess materials, construction debris and containers in a manner that prevents them from entering any waterbody.</li><li>Inspect and maintain erosion and sediment control measures and structures during the course of construction.</li><li>Repair erosion and sediment control measures and structures if damage occurs.</li></ul>

	<ul style="list-style-type: none"><li>Remove non-biodegradable erosion and sediment control materials once site is stabilized.</li></ul>
Clearing of riparian vegetation may reduce bank stabilization	<ul style="list-style-type: none"><li>Minimize the removal of natural woody debris, rocks, sand or other materials from the banks, the shoreline or the bed of the waterbody below the normal high water mark. If material is removed from the waterbody, set it aside and return it to the original location once construction activities are completed.</li><li>Stabilize shoreline or banks disturbed by any activity associated with the project as soon as possible to prevent erosion and/or sedimentation through re-vegetation with native species (seed) suitable for the site.</li><li>If replacement rock reinforcement/armouring is required to stabilize eroding or exposed areas, ensure that appropriately-sized, clean rock is used; and that rock is installed at a similar slope to maintain a uniform bank/shoreline and natural stream/shoreline alignment.</li></ul>
The use of machinery may result in the addition of deleterious materials (sediment, fuel, oil, etc.), invasive species, and noxious weeds into the Credit River	<ul style="list-style-type: none"><li>Whenever possible, limit heavy machinery access to areas within the existing ROW and along the banks of the Credit River. The watercourse will not be crossed (i.e. forded) or treated as machinery staging at any time.</li><li>Whenever possible, operate machinery on land above the HWM in a manner that minimizes disturbance to the banks and bed of the waterbody.</li><li>Wash, refuel and service machinery and store fuel and other materials for the machinery a minimum of 30 m from any surface water features to prevent any deleterious substances from entering the water.</li><li>Have spill kits onsite and drip pans under all non-mobile machinery.</li><li>Contractors shall follow the Clean Equipment Protocol for Industry (Halloran, Anderson, Hayley and Tassie, Danielle, 2013).</li></ul>
Accidental spills may introduce deleterious substances into the Credit River	<ul style="list-style-type: none"><li>Materials such as paint, primers, rust solvents, degreasers, grout, poured concrete or other chemicals do not enter the watercourse.</li><li>Demolition debris such as concrete, asphalt, rebar, etc. do not enter the watercourse.</li><li>Building material used in a watercourse has been handled and treated in a manner to prevent the release or leaching of substances into the water that may be deleterious to fish.</li><li>Clean-up measures are suitably applied so as not to result in further alteration of the bed and/or banks of the watercourse.</li><li>Clean-up and disposal of deleterious substances is appropriately performed.</li></ul>
Terrestrial Ecosystems	
Loss of vegetation due to construction activities	<ul style="list-style-type: none"><li>Minimize vegetation removal to the extent possible and shall be limited to the construction disturbance footprint.</li><li>In order to protect the features and functions of retained vegetation areas, clearly delineate limits of construction work areas.</li><li>In order to protect deciduous forest communities that will be retained, install tree protection along the limits of construction areas as per OPSS –801: Construction Specification for the Protection of Trees.</li><li>Retained trees and shrubs shall be pruned if damaged by construction activities and replaced if killed by construction activities.</li><li>Replace trees and shrubs removed as part of the proposed project with native species where possible.</li><li>Seed areas of herbaceous vegetation disturbed during construction with an appropriate seed mix per the Landscape Plan and OPSS 804 – Construction Specification for Seed and Cover.</li><li>Seed and cover exposed soils as soon as possible.</li><li>Limit stockpiling of materials to clearly identified locations within the project footprint.</li><li>Install sediment and erosion control measures (e.g., silt fencing, straw bales, etc.) at the limits of construction to minimize direct impacts to wetland areas. No access, work, or storage shall be permitted within wetland areas outside of the limits of disturbance. Refuelling shall not occur within 30 m of wetland areas.</li><li>Clearly delineate forest communities (FODM4, FODM5, FODM2) that exist within and adjacent to the work area in the field and no access beyond the limits of work shall be permitted as they are potential habitat for SAR bats.</li></ul>
Construction activities may impact wildlife and wildlife habitats	<ul style="list-style-type: none"><li>Vegetation removal shall be conducted outside of the breeding bird window of April 1 to August 31.</li><li>If clearing and grubbing during the breeding bird window (April 1 – August 31) cannot be avoided within areas of simple habitat, an avian specialist must conduct nest surveys to confirm the absence of nesting birds within the area to be cleared and/or grubbed. If any nests are found, they must be protected during the nesting season with a species-appropriate buffer (determined by the avian specialist).</li></ul>
Construction activities may impact the five species at risk (SAR) identified, Little Brown	<ul style="list-style-type: none"><li>Vegetation removals will not occur between April 1 and September 30 to protect critical life processes related to rearing young bats.</li></ul>

Myotis, Barn Swallow, Snapping Turtle, Monarch, and Butternut	<ul style="list-style-type: none"><li>Those communities that provide bat habitat shall be identified as Sensitive Bat Habitat on Contract documents. These areas shall be protected as per OPSS-801: Construction Specification for the Protection of Trees and shall be clearly delineated in the field. These areas shall be considered no-go zones, where storage, staging and access are not permitted at any time.</li><li>Standard practices to minimize construction noise and vibration shall be implemented. Construction activities shall be in compliance with the municipal bylaws when possible.</li><li>Any lighting associated with the construction phase shall be the minimum necessary to ensure security and safety, and should be directed away from natural areas when possible.</li><li>Awareness training for the Contractor that addresses the potential for Snapping Turtles to occur on site. Training should provide information that will allow the Contractor to recognize the species and respond appropriately.</li><li>Leave snapping turtles encountered outside of the work area to move on their own.</li><li>Maintain erosion and control measures prescribed for the project to prevent snapping turtles from entering the work area.</li><li>Move snapping turtles encountered within the work area to a location outside of the work area that is within close proximity and provides similar habitat to where the individual was found.</li><li>If snapping turtle nesting activity is observed or a nest is found, contact the MNRF immediately and flag and protect a five (5) m buffer around the site until further direction is received from MNRF.</li><li>For work sites that are operational daily, slopes should be left at 70 degrees or less at the end of each day. Slope reduction measures should continue throughout the breeding bird season (April 1 – August 31) of any year.</li></ul>
Land-use and Landscaping	
No impacts to nearby residents and properties are expected as a result of the Advanced Works. Landscaping and restoration are expected to be completed as part of the overall project.	<ul style="list-style-type: none"><li>none</li></ul>
Construction Noise	
Noise from construction activities may affect nearby residents	<ul style="list-style-type: none"><li>All equipment should be properly maintained to limit noise emissions. As such, all construction equipment must be operated with effective muffling devices that are in good working order.</li><li>The contract documents should contain a provision that any initial noise complaint will trigger verification that the general noise control measures agreed to, are in effect. Any noise complaints should be forwarded to the Contract Administrator, so they can be addressed.</li><li>In the presence of persistent noise complaints, all construction equipment should be verified to comply with MECP NPC-115 guidelines.</li><li>If noise level emissions for the construction equipment in use exceed the sound level criteria for construction equipment contained in the MECP NPC-115 guidelines, the contractor is required to comply with the sound level criteria where quieter alternative equipment is reasonably available.</li><li>.</li></ul>
Air Quality	
Dust and particulate emissions from construction activities and travel along access routes will have a detrimental impact on air quality	<ul style="list-style-type: none"><li>Street sweeping as required, based on visual inspection. Roads should be kept clear of dust as much as possible.</li><li>Swift removal of spilled materials.</li><li>Use enclosed cargo holds on trucks and vehicles or cover open-bodied trucks.</li><li>Minimize or limit the number of trucks accessing the site.</li><li>Clean the wheels and empty cargo holds of vehicles prior to leaving the site.</li><li>Minimize vehicle traffic on-site.</li><li>Set low speed limits for on-site traffic.</li><li>Apply water or a dust suppressant on unpaved surfaces, including roads and lots.</li><li>Limit total area of exposed sites at any given time throughout the construction period (i.e. staging of construction activities).</li><li>Minimize uncovered storage of materials on-site.</li></ul>

	<ul style="list-style-type: none"><li>▪ Apply water or a dust suppressant to storage piles.</li><li>▪ Construct wind breaks surrounding storage piles.</li><li>▪ Strategic placement of storage piles to increase separation distance to nearby sensitive receptors such as schools, residences and parks.</li><li>▪ Consider predominant winds and avoid locating storage piles upwind of nearby sensitive receptors.</li><li>▪ Minimizing the amount of material being transferred on-site at any one time.</li><li>▪ Lower drop distances when unloading material onto piles or surfaces.</li><li>▪ Loading trucks and vehicles so that the dump load will not spill over the sides of the target vehicle. Loads should be dropped as close to the vehicle opening as possible.</li><li>▪ Apply a water spray or dust suppressant to the materials being transferred.</li></ul> <p>Mitigation and control measures to control particulate matter and odours from engine exhaust include:</p> <ul style="list-style-type: none"><li>▪ Minimize the number of vehicles and engines operating at any one time.</li><li>▪ Increase separation distances between sensitive receptors, such as schools, residences, and parks and all exhaust points.</li><li>▪ When possible, ensure that engine exhausts are oriented upwards.</li><li>▪ Limit idle times of vehicles and engines. Shut off engines when not in use.</li><li>▪ When possible, limit operations to times when winds are blowing away from sensitive receptors, and minimize use when winds would direct exhaust emissions towards sensitive receptors.</li><li>▪ Minimizing the number of machines in operation concurrently.</li><li>▪ Use water or dust suppressants on the work surface.</li><li>▪ Decrease the travel distance between the work area and storage piles or trucks.</li><li>▪ Lower drop distances of the excavated earth and materials.</li></ul>
Archaeology	
Excavation activities may result in discovery of archaeological materials	<ul style="list-style-type: none"><li>▪ In the event that human remains are encountered during construction, the Contractor shall contact the Ontario Provincial Police, the Ministry of Transportation Archaeologist at 416-235-5489, the Ministry of Tourism, Culture and Sport at 416-314-7146; and the Registrar of the Ministry of Government Services Cemeteries Regulations Unit at 416-326-8404.</li><li>▪ In the event that potential archaeological resources are discovered during construction, they may be a new archaeological site and therefore subject to Section 48 (1) of the Ontario Heritage Act. The proponent or person discovering the archaeological resources must cease alteration of the site immediately and engage a licensed consultant archaeologist to carry out archaeological fieldwork, in compliance with Section 48 (1) of the Ontario Heritage Act. The Contractor shall also contact the Ministry of Transportation Archaeologist at 416-235-5489 and the Ministry of Tourism, Culture and Sport at 416-314-7132.</li></ul>
Excavation activities may result in impacts to the river bottom.	<ul style="list-style-type: none"><li>▪ Screening of river bed sediments within the cofferdam limits will be carried out by the archaeologist as per the Stage 2 land-based protocol.</li></ul>
Built Heritage	
The existing QEW Credit River bridge has significant heritage attributes that may be impacted by construction activities	<ul style="list-style-type: none"><li>▪ Soil will not be piled up against the heritage bridge and materials, equipment and vehicles will be stored elsewhere on the site.</li><li>▪ It is recommended that fencing or other means of shielding be used to establish protection measures when work is being completed near the existing structure.</li><li>▪ Protect the embankments to the extent possible and undertake minimal intervention if erosion control is recommended.</li></ul>
Groundwater and Soil Contamination	
Soil and groundwater may be impacted by construction and need to be treated appropriately	<ul style="list-style-type: none"><li>▪ Requirements to manage soil in accordance with applicable regulations and guidelines, including “Management of Excess Soil – A Guide for Best Management Practices”, Ontario Ministry of the Environment, 2014.</li><li>▪ Requirements for Qualified Persons (as defined by Ontario Regulation 153/04) to be onsite during work within areas identified as being potentially subject to soil impacts.</li><li>▪ Sampling and analysis of soil and groundwater prior to ultimate reuse and/or disposal.</li><li>▪ Requirements to manage all wastes, including any contaminated soil and/or groundwater in accordance with applicable regulations and Ontario Provincial Standard Specification 180.</li></ul>

	<ul style="list-style-type: none"><li>▪ Disposal of any contaminated earth at an MECP-approved waste facility.</li><li>▪ Discharging all dewatering in compliance with requirements stipulated in the PTTW and all supporting documentation. The detailed requirements will be determined through the PTTW process.</li></ul>
Traffic Management During Construction	
Construction accesses and traffic may impact public roadways	<ul style="list-style-type: none"><li>▪ During construction, install Advanced Notification/Warning/Detour Route TC-64 signs to provide notification to the travelling public of temporary lane reductions.</li></ul>



## 6. Environmental Permits and Approvals

### 6.1 Noise By-law

Per **Section 5.4** a noise by-law exemption is not required for the Advanced Works described in this DCR 1. Given the complexity of this project, nighttime work is not anticipated to be required.

### 6.2 Endangered Species Act (ESA)

The project has the potential to impact habitat for species at risk (SAR) bats and American Eel. The project was designed to reduce impacts to habitat areas for these species to the extent possible however residual effects remain. Given the minor nature of these impacts, MNRF issued a Letter of Advice regarding SAR bat habitat and confirmed via email that proposed mitigation measures are appropriate regarding American Eel. The mitigation measures proposed are outlined in **Sections 5.1.2** and **5.2.2**.

### 6.3 Permit to Take Water

A Permit to Take Water (PTTW) will not be required as part of the Advanced Works described in this DCR 1.

### 6.4 Canadian Navigable Waters Act (CNWA)

The Advanced Works have the potential for minor impacts to the navigability of the Credit River and must follow requirements set out by the Navigation Protection Program (NPP) (part of the CNWA). In accordance with the NPP, MTO issued a public notification of work to the project mailing list, local marinas, and on the project website on June 4, 2020. The notice directs anyone interested in the potential impacts to navigation to the NPP's Common Project Search where further information on the project is available for a 30-day public review and comment period (June 4, 2020 to July 4, 2020).

### 6.5 Fisheries Act

A Request for Review was submitted to Fisheries and Oceans Canada (DFO) and they provided a Letter of Advice in February 2020, providing mitigation measures that must be incorporated in order to prevent serious harm to fish and fish habitat. Those mitigation measures are documented in **Section 5.1.2**.

## 7. Monitoring of Advanced Works

For the Advanced Works described in this DCR 1 a Contract Administrator is responsible for providing the Contract Administration Services and Deliverables as per the Construction Administration Legal Agreement. During construction, the Contract Administrator will ensure that the implementation of mitigation measures and key design features are consistent with the contract and external commitments in the Construction Administration and Inspection Task (CAIT) Manual. Environmental Monitoring by the Contract Administrator (CA) should be structured and scheduled to ensure compliance with any terms and conditions of legislative approvals and will include the following parameters:

- Inspection of mitigation measures and designs to confirm that they are built according to the approved designs and contract constraints and provisions. Where measures or designs are not in compliance with the contract specifications, deficiencies will be noted by the CA and recommendations for remediation will be provided by the CA.
- Inspection of the Advanced Works project limits by the Contract Administrator to identify areas where environmental impacts are evident and remedial measures are required. These impacts may or may not have been anticipated prior to construction and mitigation may or may not have been prescribed during design. Where environmental impacts are identified, the extent of the impacts and possible impacts will be noted and recommendations for remediation will be provided by the CA.
- CA to review drawings and correspondence during construction to verify changes in environmental mitigation designs are approved and constructed in compliance with the approved changes.
- Inspection of mitigation measures by the CA to assess the effectiveness of the measures and to identify deficiencies in the operation or expected results of the measures. Where deficiencies are identified, recommendations for remedial measures or modifications to the measures for future use will be provided by the CA.

In addition to the specific activities mentioned above, all permanent mitigation measures should be monitored by the CA with a concluding report of the monitoring prepared by the CA and submitted to the MTO so that deficiencies may be corrected or maintenance operations implemented. The CA will continually review the effectiveness of environmental mitigation measures to ensure the mitigation measures are adequate and provide the expected environmental protections. Should it be determined additional mitigation measures are required, the MTO should be contacted to provide additional input.