Mississauga Bus Rapid Transit (BRT) Project *CEAA* Screening Report

MAIN REPORT (Book 1)

January 2009

TABLE OF CONTENTS – BOOK 1

LIST OF FIGURES

LIST OF TABLES

DESIGN PLATES & APPENDICES – BOOK 2 (UNDER SEPARATE COVER)

GLOSSARY

AAQC	**Ambient Air Quality Criterion**
ANSIs	**Areas of Natural or Scientific Interest - Life or Earth Science**
asl	**above sea level**
bgs	**below ground surface**
BRT	**Bus Rapid Transit**
BRT West	**The segment of the Mississauga BRT between Winston Churchill Boulevard and Erin Mills Parkway to the north of Highway 403.**
BRT East	**The segment of the Mississauga BRT between Hurontario Street and Renforth Drive running alongside Eastgate Parkway and Eglinton Avenue**
CEAA	***Canadian Environmental Assessment Act***
CoCs	**Contaminants of Concern**
COSSARO	**Committee on the Status of Species at Risk in Ontario**
COSEWIC	**Committee on the Status of Endangered Species in Canada**
CVC	**Credit Valley Conservation Authority**
CWS	**Canada Wide Standard**
dB	**Decibel**
dBA	**Decibel (A Scale)**
DFO	**Department of Fisheries and Oceans Canada**
EA	**Environmental Assessment**
EC	**Environment Canada**
ELC	**Ecological Land Classification**
EO	**Element Occurrence**
ESA	**Environmental Site Assessment**
FA	**Federal Authority**
FRT	**Federal Environmental Assessment Review Team**
GO Transit	**Greater Toronto Transit Authority**
GTA	**Greater Toronto Area (i.e. Toronto, Halton, Peel, York, Durham Regions)**
HIP	**Habitat Implementation Plan**
HC	**Health Canada**
INFC	**Infrastructure Canada**
MNR	**Ministry of Natural Resources (Ontario)**
MTO	**Ministry of Transportation (Ontario)**
NEB	**National Energy Board**

NHIC	**Natural Heritage Information Centre**
NRVIS	**Natural Resources and Values Information System**
NWPA	***Navigable Waters Protection Act***
OPSS	**Ontario Provincial Standard Specification**
PIC	**Public Information Centre**
$PM_{2.5}$	**respirable (fine) particulate matter**
PM_{10}	**inhalable (coarse) particulate matter**
PSW	**Provincially Significant or Locally Significant Wetland**
RA	**Responsible Authority**
ROW	**right-of-way**
SAR	**Species at Risk**
SARA	***Species at Risk Act***
SMA	**Special Management Area**
TC	**Transport Canada**
TOV	**Total Organic Vapor**
TRCA	**Toronto and Region Conservation Authority**
US EPA	**United States Environmental Protection Agency**
VOCs	**Volatile Organic Compounds**
WWIS	**Water Well Information System**

EXECUTIVE SUMMARY

This report has been prepared in accordance with the requirements of the *Canadian Environmental Assessment Act* (*CEAA*) to review and document the potential environmental effects of the Mississauga Bus Rapid Transit (BRT) Project. The report was structured based on the information request included the Federal Scoping Document (November 2007) prepared by the Federal Environmental Assessment Review Team (FRT) (copy provided in **Appendix A**). The following provides an overview of the various sections of the report.

Introduction and Scope of the Project (Chapters 1 and 3)

Mississauga's Rapid Transit program is centred on a bus-only roadway (busway) running across the heart of the City. The Mississauga Bus Rapid Transit facility (also known as the Mississauga Transitway) is also the Mississauga segment of the Greater Toronto Transit Authority's (GO Transit's) Inter-Regional Bus Rapid Transit. This Bus Rapid Transit (BRT) facility was planned and approved under the Ontario *Environmental Assessment Act* in the early 1990s, and a Provincial EA Addendum for an updated plan was approved in 2005. The project is now getting underway, courtesy of funding from the federal, provincial, and municipal governments. The Preliminary Design of the facility is currently being undertaken and construction is scheduled to be completed by 2013.

This project, Phase 1, includes a two-lane bus-only roadway (busway) that will run parallel to parts of Highway 403, Eastgate Parkway, and Eglinton Avenue. The busway will have 3.75m lanes, 2.75m shoulders and will fit within an approximate right-of-way of 30m. The current project addresses Phase 1 of the busway which will include eleven stations. At these stations, Mississauga Transit and GO Transit buses will serve passengers transferring from local bus routes, people walking or cycling to and from nearby homes and workplaces, and commuters getting dropped off by car. Ultimately two additional stations will be provided (not part of this project).

This project includes two main sections which are sometimes referred to as BRT West and BRT East. BRT West runs between Winston Churchill Boulevard and Erin Mills Parkway to the north of Highway 403. BRT East runs between Hurontario Street and Renforth Drive running alongside Eastgate Parkway and Eglinton Avenue. The bus bypass which connects BRT West and BRT East is already operational, making use of the bus bypass shoulder along Highway 403 and running along Centre View Drive, and is <u>not</u> part of the scope of this project (Phase 1).

There will be bus routes that stop at each station and others that operate express to selected major stations. The busway will also accommodate buses that pick up passengers in the community and travel to a station to drive directly on to the busway and into the City Centre.

The busway will be grade separated from all crossing roads, allowing buses to operate at up to 80 km/h on their own roadway, with no other traffic, no signals, and no stop signs. Bus passengers will enjoy a smooth, fast, reliable trip through a landscaped corridor. High quality stations will welcome users with elevators, protected walkways, an open, secure environment, clear and up-to-date travel information, and attractive architecture. Wherever possible, the stations will be connected to adjacent office buildings and communities. Parking areas will be well-lit and pathways leading to stations will be convenient and inviting.

Federal Environmental Assessment Process (Chapter 2)

The FRT is comprised of Federal Agencies that have an approval authority for a component of the project (Responsible Authorities) and those that provide expert advice to assist in the Responsible Authorities review. Additional details on the FRT are included in **Chapter 2** of this report.

The Responsible Authorities have a legal responsibility to review this project in accordance with the requirements of the *CEAA* to determine whether the project is likely to cause any significant adverse environmental effects. This *CEAA* Screening Report is intended to assist the Responsible Authorities in making their determination.

The environmental effects assessment process was designed to meet the information requirements outlined in the *CEAA* Scoping Document (**Appendix A**) prepared by the FRT in November 2007. The potential environmental effects outlined in this *CEAA* Screening Report are based on the Preliminary Design of the project.

Description of the Existing Environmental (Chapter 4)

The Mississauga BRT facility stretches across central Mississauga, through a variety of land uses. Most of the BRT facility is located in the Parkway Belt West, a broad swath of public lands stretching across the western half of the Greater Toronto Area. With the exception of two creek valleys, the landscape has been modified by earthworks for utilities and infrastructure. A detailed description of the existing biophysical and socio-economic environment is provided in **Chapter 4** of this report.

Potential Environmental Effects, Mitigation and Significance (Chapter 5)

Chapter 5 of this report outlines potential effects, mitigation measures and the commitments to future work and consultation to be completed as design proceeds to ensure that the mitigation commitments outlined in this document are realized during the design, construction and operation/maintenance stages. It is also recognized that additional details will be provided at the time specific permits and approvals are sought.

The environmental effects assessment process was designed to meet the information requirements outlined in the *CEAA* Scoping Document (**Appendix A**) prepared by the FRT received in November 2007. The potential environmental effects outlined in this *CEAA* Screening Report are based on the Preliminary Design of the project.

The environmental effects assessment examined potential environmental effects during the construction phase as well as during operations and maintenance (**Section 5.1**). In addition, potential environmental effects associated with accidents and malfunctions (**Section 5.2**), effects of the environment on the project (**Section 5.3**), decommissioning (**Section 5.4**) and cumulative effects (**Section 5.5**) were examined. **Section 5.6** provides a summary of the significance of the potential environmental effects of the Mississauga BRT project both prior to and following the application of mitigation.

As noted previously, the mitigation measures documented in this report have been developed with due consideration for the full range of potential adverse effects of the project. The identified mitigation measures will be carried forward through the Detail Design, construction, operation and maintenance phases of the project, as applicable. Refinements and enhancements to the mitigation measures will be made as warranted throughout all phases of the project to ensure that this project does not result in any significant adverse environmental effects. As the project progresses, Transport Canada and Infrastructure Canada will be provided with information regarding any substantial changes to the identified mitigation measures and will be provided with an opportunity to review and comment on those revisions.

As discussed in **Chapter 5**, most of the potential adverse environmental effects of this project will occur during the construction phase. **Chapter 5** outlines the detailed commitments for mitigation that will be employed to further reduce potential adverse environmental effects. A summary of mitigation and commitments to future work is included in **Section 5.7**.

Consultation (Chapter 6)

The Mississauga BRT project has been the subject of an extensive consultation process, stretching back to the late 1980s with the development of the Mississauga Transportation Study which established the preferred corridor. An in-depth public and agency consultation process was included in the 1990 – 1993 Provincial Environmental Assessment process (documented in the Provincial EA Report). It included surveys, cable television presentations, opinion polls, newspaper advertising, individual meetings, open public meetings, and agency liaison.

The Provincial EA Addendum process in 2003 – 2004 also had a full public and agency consultation process, covering the whole project but with a focus on aspects of the project that had changed since the 1993 plan.

At the current Preliminary Design stage, the City of Mississauga and GO Transit followed up on those earlier studies with a new public information program. This is to be carried out during the design, construction, and operation stages of the project. The program employs a number of means of informing the public of study developments and opportunities for interested members of the public to provide their input on the project, **Chapter 6** provides details regarding consultation with the general public (**Section 6.1**), external departments and agencies (**Section 6.2**), First Nations (**Section 6.3**) and property owners and developers (**Section 6.4**).

4.0 DESCRIPTION OF EXISTING ENVIRONMENT

This chapter has been organized based on the factor areas identified in the *CEAA* Scoping Document (**Appendix A**) prepared by the FRT. The one exception is Surface Water Quality and Quantity. Since this factor area is so closely linked to water features it is documented in both the Fish and Fish Habitat, and Vegetation and Wetlands sections (**Sections 4.1.1** and **4.1.2**). A separate section has been included to address navigability (**Section 4.2.6**).

4.1 DESCRIPTION OF THE BIOPHYSICAL ENVIRONMENT

The BRT West and the BRT East between Hurontario Street and Fieldgate Drive are within the Parkway Belt West Plan (PBWP) area. This is an area designated as a multi-purpose utility corridor, urban separator and linked open space system including hydroelectric towers and lines, pipelines and utilities. With the exception of two creek valleys (Little Etobicoke Creek and Etobicoke Creek), the landscape has been modified by earthworks for these utilities and infrastructure. Ecosystem components continue to be affected by infrastructure operation and maintenance including earthworks, vegetation maintenance (e.g., herbicide application, clearing and pruning), drainage works, stormwater runoff and 'contaminant drift' from the roadway (e.g., hydrocarbons, metals and salt spray).

The following sections describe the character and associated sensitivities of the existing ecosystem components within the BRT West and BRT East project limits. Where needed to provide context, some areas outside of the project limits are also described. Supporting information (such as species lists and field photographs) is provided in **Appendix B**. Natural environment features are depicted in **Figures 4.1-1** to **4.1-9**.

2008/11/21

MississaugaBRT_MapBook5000_West_Nov_VegRemoval.mxd

Legend

- Intermittent Watercourse (OBM)
- Permanent Watercourse (OBM)
- Waterbody (OBM)
- Wetland (OBM)
- Ecoplans ELC Communities

FOD5-3: Sugar Maple - Hickory Deciduous Forest
CUM1-1: Cultural Meadow/Old Field (Predominant vegetation community unless otherwise marked.)
CUW: Cultural Woodland
MAM2-2: Reed Canary Grass - Mineral Meadow Marsh
MAS2-1: Cattail Mineral Shallow Marsh

W4 MAM2-2
W3 MAM2-2
W1 CUW
W2 MAM2-2
W8 MAM2-2
W7 MAM2-2
W9 MAM2-2
HIGHWAY 403
W5 CUW
W6 FOD5-3
WINSTON CHURCHILL BOULEVARD

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MississaugaBRT_MapBook5000_West_Nov_VegRemoval.mxd

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CUW: Cultural Woodland
MAM2-2: Reed Canary Grass - Mineral Meadow Marsh
MAS2-1: Cattail Mineral Shallow Marsh

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Legend

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FOD5: Sugar Maple Deciduous Forest
FOD5-5: Sugar Maple - Hickory Deciduous Forest
FOD7: Lowland Deciduous Forest
CUM1-1: Cultural Meadow/Old Field (Predominant vegetation community unless otherwise marked.)
CUW: Cultural Woodland
MAM2-2: Reed Canary Grass - Mineral Meadow Marsh
MAS2-1(b): Cattail Mineral Shallow Marsh
MAM2: Phragmites Mineral Meadow Warsh
MAM2-b: Purple Loosestrife Mineral Meadow Marsh

Cooksville Creek

HURONTARIO STREET

E1 CUW

E2 CUW

E3 CUW

E4 CUW

E5 FOD5-5

CENTRE VIEW DRIVE

RATHBURN ROAD WEST

RATHBURN ROAD EAST

DUKE OF YORK BOULEVARD

CITY CENTRE DRIVE

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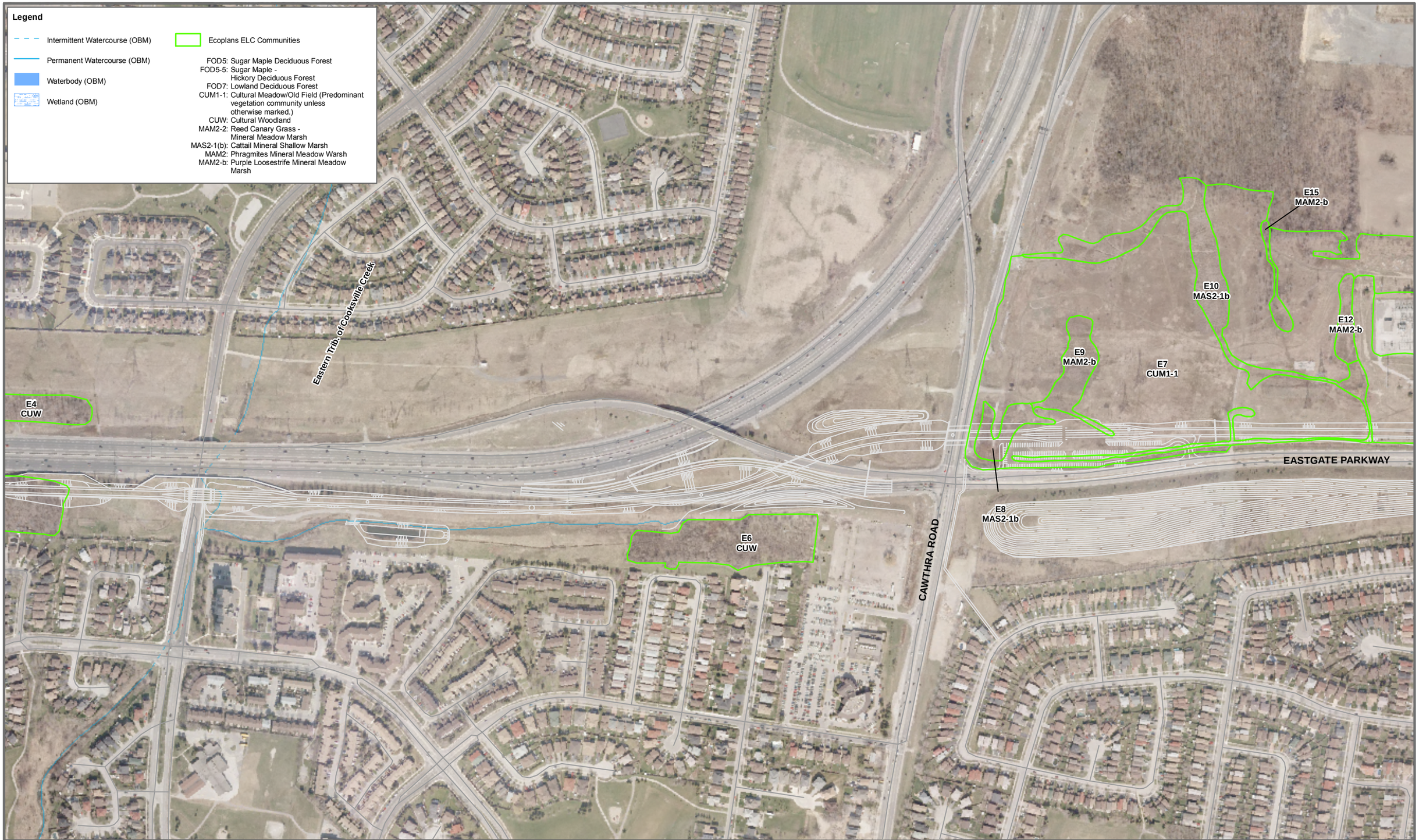

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MAM2-b: Purple Loosestrife Mineral Meadow Marsh

E15 MAM2-b
E11 CUM1-1
E10 MAS2-1b
E12 MAM2-b
E14 MAS2-1b
E7 CUM1-1
E13 CUM1-1
Little Etobicoke Creek
E16 MAS2-1
E18 MAS2-1
E19 MAS2-1b
E20 MAS2-1b
E21 MAM2-2
E17 MAM2-2
E24 MAS2-1b
E25 MAS2-1b
DIXIE ROAD
EASTGATE PARKWAY
TOMKEN ROAD
EASTGATE PARKWAY
E31 MAM2-2

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DIXIE

EASTGATE PARKWAY

E35 CUW

E41 FOD7

E42 CUM1-1

E40 FOD5

E43 FOD5

21 12-2

E24 MAS2-1b

E25 MAS2-1b

E26 MAM2-2

E27 MAM2-2

E30 MAM2-b

E29 MAM2-b

E22 CUM1-1

EASTGATE PARKWAY

E28 MAM2-b

E23 CUM1-1

E31 MAM2-2

E32 MAM2-b

E33 MAM2-b

E34 MAM2-2

REVISIONS		DRAWN:	MISSISSAUGA BRT - EAST SECTION	FIGURE
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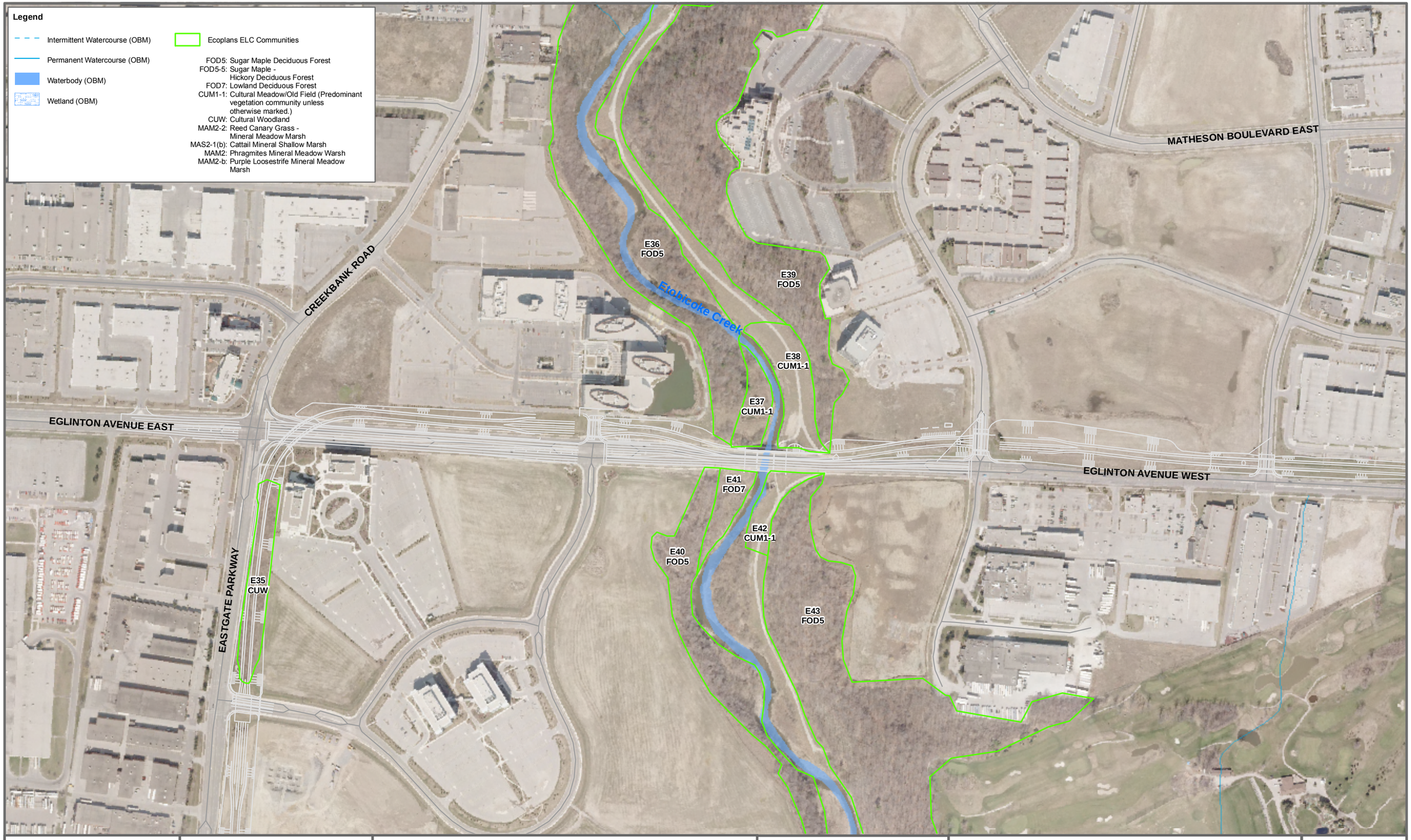

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			SCALE: 1:5,000	FIGURE 4.1-8

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MAM2-b: Purple Loosestrife Mineral Meadow Marsh

RENFORTH DRIVE
CARLINGVIEW DRIVE
INTERNATIONAL BOULEVARD
MATHESON BOULEVARD EAST
HIGHWAY 401 EXPRESSWAY EAST
EGLINTON AVENUE WEST
HIGHWAY 427 SOUTH
HIGHWAY 427 NORTH
Renforth Creek

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Designated Natural Areas and Policy Areas

Provincial and Regional

Based on information from Ministry of Municipal Affairs and Housing (2002 and 2005), the project limits are outside of Provincial Land Use and Environmental Plans areas (Oak Ridges Moraine, Niagara Escarpment and Greenbelt). Based on a review of MNR Natural Resources and Values Information System (NRVIS) information, an Natural Heritage Information Centre (NHIC) database query, and information received from the Credit Valley Conservation (CVC), and Toronto and Region Conservation (TRCA) and the City of Mississauga, there are no designated natural features within or adjacent to the project limits including ANSIs (Areas of Natural or Scientific Interest - Life or Earth Science), evaluated wetlands (Provincially Significant or Locally Significant Wetlands - PSW) or other federally or provincially designated areas.

City of Mississauga Natural Areas

A Natural Areas Survey for the City of Mississauga was undertaken during 1995 and 1996 (Geomatics 1996). The *Natural Areas Survey* identified and designated natural features as Natural Areas (NA) Special Management Areas (SMAs), Linkage Areas (Linkages) and Residential Woodlands. In order to keep the Natural Areas database current, each year, natural areas in different quadrants of the City are reviewed. With the completion of the 2001 work, all Wards in the City were updated once since the initial study in 1996. The start of the second round of updates commenced in 2002. Using the most recent maps and fact sheets (City of Mississauga 2006), several of the features within the project limits have local designations identified through these studies. These are described in **Section 4.1.2**.

Regulated Limits

Under the *Conservation Authorities Act* (1990), CVC and TRCA have developed regulations that apply to areas such as river or stream valleys, hazardous lands and wetlands:

- O. Reg. 166/06 Toronto and Region Conservation Authority: Regulation of Development, Interference with Wetlands and Alterations to Shorelines and Watercourses (Consolidation Period: from May 14, 2008 to July 22, 2008).
- O. Reg. 160/06 Credit Valley Conservation Authority: Regulation of Development, Interference with Wetlands and Alterations to Shorelines and Watercourses (Consolidation Period; from May 4, 2006 to July 22, 2008).

Within the project limits, TRCA has mapped several regulated areas as shown on **Figures 4.1-4** to **4.1-8** as Generic Regulation Limits. No such mapping was available for CVC areas. The designations, as they apply to specific features, are noted in the relevant sections of the report.

4.1.1 Fish and Fish Habitat

There are no watercourse crossings in the BRT WEST section.

Within the BRT EAST Section, the BRT alignment crosses portions of Cooksville Creek, Little Etobicoke Creek and Etobicoke Creek sub-watersheds. The BRT alignment crosses, from east to west and the Eastern Tributary of Cooksville Creek (both of which are enclosed at their crossings), Little Etobicoke Creek and Etobicoke Creek (**Figures 4.1-3** to **4.1-9**).

As shown in the previous Provincial Environmental Assessment documentation (City of Mississauga 1994 and 2004), the 'original' flow paths of Elmcrest and Renforth Creeks cross Eglinton Avenue and the project limits. However, as discussed below, the portions of these watercourses upstream/north of the road have been enclosed, and all of the overland flow from the upstream portions of their drainage areas has been diverted to the west through the storm sewer system to Etobicoke Creek.

The following sections describe fish (where relevant) and fish/aquatic habitat in Cooksville Creek and its tributary, Little Etobicoke Creek and Etobicoke Creek. Potential sensitivities are also highlighted. Fish species of conservation concern are discussed in **Section 4.1.4**. Additional details are included in **Appendix B**.

Approach

Aquatic field surveys were conducted on October 11 and 12, 2007. Additional general information was collected during site visits with TRCA on November 19, 2007 and June 18, 2008. Fluvial geomorphic information was collected on June 18, 2008. The field information collected was used to update background information provided by the agencies (TRCA, CVC and MNR) as listed in **Appendix B**. Specific fish community inventories (e.g., electrofishing) were not conducted by Ecoplans Limited (Ecoplans) staff given the availability of fish community sampling information and related input from TRCA, CVC and MNR.

Aquatic habitat conditions were assessed at each of the following: Cooksville Creek, Eastern Tributary of Cooksville Creek (upstream open section), Little Etobicoke Creek, Etobicoke Creek, Renforth Creek (downstream section) and Elmcrest Creek (downstream section). Habitat conditions were assessed upstream, through and downstream of the BRT alignment. Detailed assessment was conducted through the reaches just upstream and just downstream of the alignment, to encompass areas that might be directly affected, and a review of conditions further up and downstream.

Existing Conditions

Cooksville Creek

The BRT alignment crosses Cooksville Creek north of Rathburn Road East immediately east of Hurontario Street where it is currently enclosed (**Figure 4.1-3**). The open reaches of Cooksville Creek upstream of the 'crossing', west of Hurontario Street and up and downstream of Highway 403, are not affected by the alignment.

Upstream of Highway 403, the open section of creek channel appears to have been previously modified / straightened. It is confined in a narrow corridor between the single and multi-family residential blocks north of the highway, draining through the open Parkway Belt/hydroelectric corridor and is then enclosed for approximately 150 m under the highway and west ends of the ramps. It then flows as an open but modified channel section between the ramp and Hurontario Street, and is then enclosed for another approximately 230 m downstream of Hurontario Street and Rathburn Road East. The busway alignment crosses this double box cell culvert immediately east of Hurontario Street. In that location a twin cell box culvert carries Cooksville Creek under Hurontario Street and Rathburn Road. That culvert is 2.7 m high and approximately 230 m long. The channel flows along the base of a retaining wall along Rathburn Road East. Grade control structures at and downstream of the Hurontario Street crossing act as permanent barriers to upstream fish movement.

The CVC considers the open portions of this watercourse within the project limits to have the potential to support a warmwater fishery (City of Mississauga 1994); however, no fish were collected at the sampling station near Rathburn Road (upstream of the grade control structures) in July of 1995. Although flow is permanent, there may be insufficient refuge habitat available in the short open reach to support fish, and the man made grade control structures downstream of the project limits and the long enclosed reaches preclude re-colonization from downstream reaches. Therefore, these reaches do not appear to support direct fish use within the BRT project limits. However, these reaches contribute to downstream habitat through conveyance of flow and some limited inputs of allochthonous materials (e.g., nutrients and detritus).

Eastern Tributary of Cooksville Creek

The BRT alignment crosses this watercourse on the south side of the existing Highway 403 culvert structure, over a section of the channel that is currently enclosed. The only remaining section of open channel (approximately 75 m length) along this tributary in the vicinity of the project limits is located just upstream of the highway. The open channel section is channelized.

The CVC considers this watercourse, within the project limits, to have the potential to support a warmwater fishery (City of Mississauga 1994). However, no fish were observed in the open channel section during Ecoplans' field investigations. Although flow appears to be permanent,

likely supported by storm sewer outfalls, there appears to be insufficient refuge habitat available to support fish seasonally and the long sections of enclosed channel (e.g., greater than 1 km) preclude re-colonization. Therefore, this reach does not appear to directly support fish use, although it continues to convey flow and limited allochthonous input downstream.

Little Etobicoke Creek

The BRT alignment crosses Little Etobicoke Creek on the north side of Eastgate Parkway. The existing crossing at Eastgate Parkway is a 3 cell culvert with all cells set at the same elevation. Little Etobicoke Creek is considered by the TRCA to support a degraded warmwater fish community with common and prevalent habitat, affected by urbanization and stormwater issues (debris, water quality, etc.) (City of Mississauga 1994). Through the project limits and vicinity, it appears that the Little Etobicoke Creek channel was straightened and modified historically. Much of the channel banks are armoured with riprap (which is now overgrown with vegetation) or gabions (downstream).

A concrete Jersey barrier was installed subsequently to divert low flow into the easternmost cell. There is also a low concrete weir structure extending across the channel between the upstream wingwalls that creates a barrier to movement under at least low flow conditions. As well, a gabion weir structure and several steep man-made features downstream of the alignment area act as seasonal barriers to the upstream movement of fish.

The morphology of the channel is predominantly flats, with some riffles. Substrates are dominated by cobble, which may have been placed during the historical channel works, and/or sloughs off the banks. The woody riparian corridor is narrow upstream, widening downstream.

Historical (1949) fish sampling records at the closest sampling station located approximately 1.25 km downstream of the project limits near Burnamthorpe Road East recorded the presence of three species of tolerant warmwater bait/forage fish (Common Shiner [*Luxilus cornutus*], Creek Chub [*Semotilus atromaculatus*], Brook Stickleback [*Culaea inconstans*]), as well as Redside Dace (*Clinostomus elongates)* (NHIC 2008). The Redside Dace record is considered 'historical', and this species is considered to be extirpated from this creek, as discussed further in **Section 4.1.4**.

Etobicoke Creek

Etobicoke Creek meanders through a well-defined deep valley with a broad floodplain and steep slopes that rise more than 20 m. Through the vicinity of the project limits, the BRT alignment crosses Etobicoke Creek on the north side of Eglinton Avenue, the channel flows close to the west side of the valley, with some contact directly with the valley wall approximately 200 m downstream of the crossing. The valley now supports only about 5.5% of its original natural

vegetative cover, with over 66% of the watershed now urbanized; approximately 1/3 of the watercourse is no longer considered in its natural state (TRCA 2006).

Through the project limits, the east bank has been historically disturbed for the development of the walkway system that extends along the valley floor. The banks and over-bank area through the structure are completely armoured with poured concrete. Some of this concrete is failing, particularly on the west bank where a corrugated steel pipe is now exposed. The Eglinton Avenue East bridge piers have been constructed into the concrete armouring that extends through and slightly up and downstream of the bridge. This concrete armouring encroaches into bankfull area; flows are confined by the concrete 'banks' through the crossing.

Downstream of the bridge, there is a large (10 m wide) concrete box storm sewer outfall, through the concrete armouring on the east bank. Large concrete blocks have been placed in the outfall to dissipate flow; however the outflow has scoured a deep pool feature. The gabion wingwalls that are tied into the banks on either side of the outfall show signs of failure (i.e., being undermined). The scour pool, which is more than 150 cm deep, provides good refuge cover off-line to the main thalweg flow.

The channel exhibits a broad shallow profile, and moderate gradient. The morphology is comprised of flats, with riffles; the only pool within the subject reaches is at the storm sewer outfall. Substrates include cobble/rubble, with sand and some gravel and boulders, and exposed bedrock through the existing bridge section. Instream cover is limited to scattered boulders and overhanging vegetation along the edges.

Woody riparian vegetation is limited to the valley slopes, with common old field herbs and grasses dominating the valley floor and riverbanks. The east side of the floodplain is manicured. Both banks exhibit erosion and some slumping upstream of the north bridge piers.

The TRCA (2006a) indicated that Etobicoke Creek supports a warmwater fish community, and formerly high quality habitat that has been degraded by stormwater discharge, loss of natural cover and other urban influences. Several common tolerant bait/forage and panfish species have been recorded in sampling data at various stations between 1949 and 2004 (**Appendix B**).

Elmcrest and Renforth Creeks

Elmcrest and Renforth Creeks are tributaries of Etobicoke Creek. However, as noted, they no longer exhibit connected flow through the project limits. The portions of these watercourses upstream/north of the road have been enclosed, and all of the overland flow from the upstream portions of their drainage areas has been diverted through the storm sewer system to the west to Etobicoke Creek.

There is no surface evidence at all of Elmcrest Creek north of Eglinton Road. Downstream of the road (and BRT alignment), a defined remnant channel section persists. Localized evidence of Renforth Creek in the form of a low vegetated draw swale persists upstream of Eglinton Road, however it no longer conveys flow. Downstream of the road, there is a small cattail pocket, with no evidence of a flow path through it, as well as a series of constructed ditches and swales through the hydroelectric corridor and behind a parking lot, which ultimately outfall to the storm sewer system to the west.

Given the enclosure and since the diversion of the upstream portions of the drainage areas that are crossed by the BRT alignment completely severs any downstream connectivity, Elmcrest and Renforth Creeks are not discussed further in this section. Mitigation measures associated with storm water flowing into Etobicoke Creek are discussed in **Section 5.1.1.7**.

4.1.2 Vegetation and Wetlands

The existing characteristics and sensitivities of the vegetation, associated habitat and wildlife along the project limits are described below. The vegetation units are mapped on the natural environmental features map presented in **Figures 4.1-1** to **4.1-9**. The mapping identifies 'designations' of those features, where relevant. It also highlights the major designated natural areas that are found outside the project limits.

Approach

The vegetation inventory focused on compiling and reviewing existing information within the project limits, augmented with field surveys focused in specific locations to refine the site specific data base and address any data gaps, and support the impact assessment process. The City's Natural Areas Survey (City of Mississauga 2006) provides an existing information base for most of the natural areas in the vicinity of the project.

Initial field surveys were conducted on October 11th, 2007 with additional surveys carried out on January 29th, and June 18th and 26th, 2008. The scope of the field work and terrestrial resources analyses included:

- Classifying or verifying previous classifications for vegetation communities, using the Ecological Land Classification (ELC) System for Southern Ontario (Lee et al. 1998);
- Evaluating the sensitivity and significance of vegetation communities, using the "Natural Heritage Resources of Ontario: Vegetation Communities of Southern Ontario" (Bakowsky 1996; NHIC 2008)
- Evaluating significance and sensitivity of flora and fauna recorded during field surveys, using Newmaster et al. (1998) and the NHIC website (2008) for provincial and national significance
- Preparing a vascular plant species list; and
- Taking representative site photographs, a selection of which is included in **Appendix B**.

Existing Conditions

As outlined previously, the BRT project limits traverse an urbanized landscape dominated by residential and commercial land uses. The project limits are located immediately adjacent to the existing road/highway network and much of the project is within the parkway belt infrastructure corridor. As a result, the terrestrial features are culturally influenced or anthropogenic in origin and character, and heavily influenced by the existing land uses.

The vegetation within the study corridor is dominated by cultural meadow (CUM 1-1), with scattered pockets of culturally-influenced meadow marsh/shallow marsh, successional growth/treed patches and occasional remnant forest patches. The cultural meadow communities are dominated by species such as Brome Grass (*Bromus inermis ssp. inermis*), Canada Goldenrod (*Solidago canadensis*), New England Aster (*Aster novae-angliae*), Canada Thistle (*Cirsium arvense*), Teasel (*Dipsacus fullonum ssp.sylvestris*), Queen Anne's Lace (*Daucus carota*) and Red Raspberry (*Rubus idaeus ssp. melanolasius*). This early-successional community is of low quality and low sensitivity, comprised of common species that are tolerant of disturbed conditions.

The cultural influence on flora and vegetation communities is reflected in the high proportion and wide distribution of non-native, disturbance-tolerant and invasive plant species.

Within the cultural meadow dominated landscape are numerous small pockets of wetland vegetation; the larger of these features are discussed below. These wetlands have formed in local topographic depressions (usually created through previous earth works in the utility corridor) that are poorly drained. Drainage ditches also contain pockets / strips of wetland vegetation. Given that the surficial geology of the project limits consists of silt and clay associated with Halton Till deposits, it is unlikely that significant hydraulic connectivity with the underlying groundwater system exists. As such, these wetland pockets are likely sustained by precipitation and surface water runoff.

The wet pockets are dominated by a variety of common, disturbance tolerant wetland vegetation species that colonize wet areas quickly, such as Common Cattail and Reed Canary Grass. Giant Reed, an aggressive invasive species is abundant, and Purple Loosestrife also occurs commonly.

Specific characteristics of vegetation and habitat features along the BRT West and BRT East project limits are described below.

BRT West

The vegetation along the BRT West project limits is dominated by cultural meadow. Scattered landscape plantings and successional growth include patches of Manitoba Maple (*Acer negundo*), Sugar Maple (*A. saccharum*), Trembling Aspen (*Populus tremuloides*), White Spruce (*Picea glauca*), Austrian Pine (*Pinus nigra*), Eastern White Cedar (*Thuja occidentalis*), Norway Spruce (*Picea abies*) and occasional Red Cedar (*Juniperus sp.*). These species are tolerant of disturbance and the vegetation communities are of low quality and diversity. Specific vegetation communities that occur north of Highway 403, in the vicinity of the BRT, are described below. There are 14 vegetation units within BRT West representing a total area of 2.98 ha. These features are shown on **Figures 4.1-1** and **4.1-2**. The full list of species observed for each vegetation community type can be found in **Appendix B**. Species of Conservation Concern are discussed in **Section 4.1.4**.

- There are two small Cultural Woodland patches located north of Highway 403, west and east of the Winston Churchill Boulevard interchange. Unit W1 (0.2 ha) is located west of Winston Churchill Boulevard and Unit W5 (0.03 ha) is located east of Winston Churchill Boulevard. These patches contain maple, Red and White Oak, White Pine, White Ash and Trembling Aspen in the canopy with groundcover dominated by old field and invasive species.
- A third Cultural Woodland patch (Unit W11) is located just west of Glen Erin Drive. This 0.09 ha patch is comprised of tolerant early successional woody species (Trembling Aspen, White Ash, Sugar Maple, Austrian Pine, and Red Osier Dogwood). Ground cover is dominated by old field species such as Canadian Goldenrod, Tufted Vetch, Red Clover and grass species. This vegetation community is cultural in character and of low quality and sensitivity.
- Seven small isolated pockets of mineral meadow marsh and mineral shallow marsh vegetation occur along the north side of Hwy 403, east and west of Winston Churchill Boulevard (Units W2, W3, W4, W7, W8, W9 and W10). These wetland pockets range in size from 0.02 to 0.05 ha with the exception of W4 which is 0.2 ha. All are considered to be of low quality and sensitivity, almost exclusively dominated by either Reed Canary Grass or Narrow-leaved Cattail with some Phragmites, and Purple Loosestrife. All of these species are aggressive and tend to out-compete other wetland plants to form homogeneous mats, and the latter species is also non-native. As described above, these wetland pockets are cultural in origin, having formed in shallow depressions along the infrastructure corridor where water collects seasonally / following storm events on the till-based soils.
- Additional landscape plantings and successional growth of White Spruce, Austrian Pine, Norway Spruce, Manitoba Maple and Eastern White Cedar are present within the various interchange loops. These species are common and tolerant of disturbance and several are non-native, likely planted for their tolerance to the surrounding conditions. The vegetation patches are of low ecological quality and sensitivity.

BRT East

Similar to the BRT West project limits, the vegetation along the BRT East project limits is dominated by cultural meadow, an early-successional community of low quality and low sensitivity, comprised of common species that are tolerant of cultural influence and disturbance. A relatively high component of the species is 'invasive' and non-native. Specific vegetation communities that occur in the vicinity of the BRT are described below. There are 43 vegetation units within BRT East representing a total area of 83.18 ha. These features are shown on **Figures 4.1-3** to **4.1-9**. The full list of species observed for each vegetation community type can be found in **Appendix B**. Species of Conservation Concern are discussed in **Section 4.1.4**.

City of Mississauga Natural Area Remnant Wooded Area - RW1

RW1 is a 3 ha linear dry-fresh sugar maple-white ash deciduous forest (FOD 5-5) located on a low berm adjacent to and south of Highway 403 between Hurontario Street and Central Parkway East (Unit E5) (**Figure 4.1-3**). This wooded area is dominated by Sugar Maple (*Acer saccharum ssp. saccharum*), Bitternut Hickory (*Juglans cinerea*), Shagbark Hickory (*Carya ovata var ovata*) and White Ash (*Fraxinus americana*), in association with, American Elm (*Ulmus americana*), Basswood (*Tilia americana*), and the occasional Red Oak (*Quercus rubra*). It is in fair condition but disturbed due to residential encroachment, dumping, compost, garbage, trails, and invasive plant species (Garlic Mustard and Buckthorn).

RW1 provides some local wildlife habitat and woody cover for common wildlife species, including common migratory bird nesting and foraging. However these functions are limited by the isolation of this small feature in the surrounding urban landscape and its proximity of Highway 403 (noise, bird song cannot be heard, etc.), and the understory disturbance due to active dumping by local residents and recreational uses (e.g. mountain bikes).

As discussed in **Section 4.1.4**, three regionally and municipally uncommon/rare species were recorded in RW1; Sharp-lobed Hepatica (uncommon within the City), Squirrel-corn (rare within the City, uncommon within the Region) and Bellwort (uncommon within the City). These species were not re-located during Ecoplans 2008 field surveys and therefore, construction and operation / maintenance effects to these species are not anticipated; however, additional surveys will occur during Detail Design once the grading footprint is finalized. The survey results will be provided to Transport Canada and Infrastructure Canada who will determine whether or there is a warrant for review by any Federal Authorities. It is noteworthy that none of these species are listed under the *Species at Risk Act*.

City of Mississauga Natural Area NE4 and Associated Special Management Area

NE4 is a sub-mature to mature deciduous wooded area located approximately 300 m north of Eastgate Parkway and outside the project limits. This contains a variety of vegetation communities and provides habitat to a variety of forest flora and fauna species.

NE4SMA is located immediately to the south of Natural Area NE4, along the north side of Eastgate immediately east of Cawthra Road. NE4SMA is predominantly cultural meadow (CUM 1-1) (e.g., Brome Grass, Canada Goldenrod, New England Aster, Canada Thistle, Teasel, Queen Anne's Lace and Red Raspberry), with numerous (approximately nine) small patches of wetland vegetation occupying the low-lying areas in the undulating / hummocky surface topography and adding to the overall diversity of the habitat mosaic. Digger Crayfish, a species of interest to TRCA (Pers. Comm. S. Lingertat November 30, 2007a) has been identified throughout this unit. This species is discussed further in **Section 4.1.3**.

Of the several wet pockets located throughout NE4SMA, one of the largest and least disturbed is Unit E10, a Cattail Mineral Shallow Marsh (MAS 2-1), dominated by Narrow-leaved Cattail and located in the northern half of the natural area. This area is within TRCA's Generic Regulation Limits. Other smaller meadow/shallow marsh pockets include the following:

- Unit E8 - a Cattail Mineral Shallow Marsh (MAS2-1b) dominated by Narrow-leaved Cattail (*Typha angustifolia*) located in a roadside ditch;
- A roadside portion of Unit 10 - a Cattail Shallow Meadow Marsh dominated by Narrow-leaved Cattail (MAS2-1b) that follows the roadside ditchline before extending further up into NE4SMA;
- Units E12 and E15 - Mineral Meadow Marsh communities dominated by Purple Loosestrife (*Lythrum salicaria*); (MAM2-b) located in the central eastern section of NE4SMA; and
- Unit E9 - a Mineral Meadow Marsh dominated by Purple Loosestrife (MAM2-b) located in the south western section of NE4SMA and within the TRCA Generic Regulation Limits.

Overall vegetation quality and sensitivity are low. Communities and species are common. The area is heavily disturbed as a result of active dumping, occasional pipeline maintenance activities and on-going recreational use, including ATVs and dirt bikes, which have created an extensive trail system. The NE4SMA area is not designated as a Natural Area, but is recognized as a buffer zone, with potential for restoration, in relation to Natural Area NE4. The area exhibits good opportunities for enhancement based on its size and association with NE4. The NE4SMA is also identified by TRCA as a Habitat Implementation Plan (HIP) area (Pers. Comm. S. Smith, December 11, 2007d). The HIP is a targeted strategy that is the mechanism by which the concepts of the TRCA Terrestrial Natural Heritage Program, Fisheries Management Plan, and Watershed Management Strategy can be implemented.

Two Wetlands South side of Eastgate Parkway

There are two wetland pockets located on the east and west sides of Tomken Road, south the Eastgate Parkway. The first is a very small (0.04 ha) Reed Canary Grass Mineral Meadow Marsh (MAM2-2) unit west of Tomken Road. The second is a slightly larger (0.13 ha) Mineral Meadow Marsh dominated by Purple Loosestrife east of Tomken Road. Both of the features are small seasonally wet depressions along the south side of an existing earthen berm.

Dominated by common, disturbance tolerant and invasive wetland species, these wet pockets are of low sensitivity due to past construction disturbances (berm and residential creation), recreational practices (fire pits, and bike trails), dumping, and proximity to major thoroughfares such as Eastgate Parkway and Tomken Road.

Little Etobicoke Creek Valley

The Little Etobicoke Creek valley has multiple designations within the City of Mississauga. The valley slopes of Little Etobicoke Creek are designated Valley Effect Zone (protected to preserve natural environment of watercourse) and the valley is designated in the City of Mississauga's OP as Natural Heritage System. The north portion of the valley (~100 m north of BRT alignment) is identified as Natural Area NE3 and the south portion of the valley (south of Eastgate Parkway) is identified as RW6 in the Mississauga Natural Areas Study.

Within the project limits, riparian vegetation consists of Heart-leaved Willow (*Salix eriocephala*) and other willow species, Staghorn Sumac (*Rhus typhina*), Red Osier Dogwood (*Cornus stolonifera*), wild grape, golden rod species, sedges, rushes.

Two lower lying pockets, one just west of the Little Etobicoke Creek valley (Unit E16), and one just to the east of the creek (Unit E18), support small wetland communities (unlabeled on Natural Area Survey):

- Unit E16, on the west, contains a mix of Mineral Meadow Marsh (MAM2) dominated by Phragmites. This area of hydroelectric corridor is actively mown (located south of an arena), and the Phragmites meadow marsh is mown up to the edges). A Narrow-leaved Cattail Shallow Meadow Marsh (MAS2-1b) within the roadside ditch also forms part of this unit. The marsh extends along the drainage ditch between Tomken Road and Dixie Road.
- Unit E18, on the east, contains a small (0.4 ha) Cattail Mineral Shallow Marsh (MAS2-1) dominated almost entirely by Narrow-leaved Cattail. Digger Crayfish, a species of interest to TRCA (Pers. Comm. S. Lingertat November 30, 2007a) has been identified along the north edge of this unit. This species is discussed further in **Section 4.1.4**. A similar, very small wetland pocket is located further east (Unit 19).

Closer to Dixie Road, Units E20 and E21 contain 0.34 ha and 0.7 ha pockets of Cattail Mineral Meadow Marsh and Reed Canary Grass Mineral Meadow Marsh respectively. Portions of these have been previously (recently) removed/bisected by a new access road within the hydroelectric corridor. A culvert has also been installed. All of these works are within the TRCA Generic Regulation Limits.

The vegetation and habitat system is dominated by tolerant and common species and communities, as such, the sensitivity of this system is low. However the location in and adjacent to the Little Etobicoke Valley, with natural areas further to north and south, provide opportunities for enhancement.

Wetland Pockets on the North Side of Eastgate Parkway

Units E24 and E25, located east of Dixie Road, north Eastgate Parkway, contain small (each 0.2 ha) pockets of Narrow-leaved Cattail dominated Cattail Mineral Shallow Marsh (MAS2-1b).

A series of very small wetland pockets are situated under the hydroelectric corridor and between two pipelines on the east side of Dixie Road (Units E26, E27, E28, E29 and E30). The pockets range in size from 0.01 to 0.04 ha with the exception of Unit E30 which is just under 0.2 ha. All are dominated by Narrow-leaved Cattail. Surrounding vegetation consists of cultural meadow communities dominated by old field species.

Units E33 (0.08 ha) and E34 (0.04 ha) occur adjacent to the bend at Eastgate Parkway. Both of the features are small wet or seasonally wet depressions on the south side of an existing earthen berm. Typical of the landscape features generally, these wetlands are of low sensitivity and are culturally influenced due to their location and past disturbances with the development of the hydroelectric lines and towers, pipelines and access road.

Eastgate / Eglinton Vegetated Strip (CUW1-A3)

Unit E35 is a 0.9 ha narrow vegetated strip adjacent to the west side of Eastgate Parkway, south of the intersection with Eglinton, Avenue. This City-owned area has been under the care of the adjacent property owner (TD Bank) and includes a ‘naturalization’ project area with a combination of landscape tree and shrub plantings and successional old field growth that has been allowed to develop (not mown). The ‘naturalization’ project area has been dedicated to the City for the Mississauga for the Mississauga BRT. This area is surrounded by manicured lawn. Tree species include a variety of common, tolerant species such as Manitoba Maple, Sugar Maple, Trembling Aspen, White Spruce, Austrian Pine, White Cedar and Norway Spruce (CUW1-A3).

This vegetated strip is of low sensitivity dominated by a variety of common, tolerant species. Any function as wildlife habitat is limited by its small size, linear nature and isolation.

Etobicoke Creek Valley

The Etobicoke valley is the largest and most prominent natural feature along the project limits. The valley consists of a mosaic of vegetation communities with deciduous forest communities dominating the slopes and more culturally influenced woodland and meadow communities scattered along the tableland and floodplain. A pathway system runs through the floodplain along the east river edge. Forest communities typically contain Sugar Maple, White Ash, Beech, White Birch with occasional White Pine. Lowland willow deciduous forest dominated by crack willow occurs along the banks of Etobicoke Creek. For a full list of plant species see **Appendix B**.

The Etobicoke River Valley provides an important natural corridor within the urban landscape. As noted above:

- The valley slopes and tributaries are designated Valley Effect Zone (protected to preserve natural environment of watercourse);
- Etobicoke Creek and its tributaries are designated by the City of Toronto as Natural Heritage Systems (City of Mississauga 2006; City of Toronto 2007); and
- The valley is designated as "Natural Area – ET04" (City of Mississauga 2006) as shown on **Figure 4.1-7**).

The area adjacent to ET04 south of Eglinton Avenue and east of Etobicoke Creek, which at present is dominated by cultural meadow, has also been identified as a Candidate Terrestrial Restoration Site of High Potential (TRCA 2006b).

East of Etobicoke Creek

A small (~0.3 ha) pocket of Narrow-leaved Cattail Mineral Shallow Marsh (MAS 2-1) located along the south side of Eglinton Avenue West, just west of Renforth Drive. The marsh is dominated almost entirely by Narrow-leaved Cattail.

City of Mississauga Linkage Area

Linkage Areas are defined as areas which serve to link two or more of the components of the Natural Area Systems within the City, or to natural areas outside of the City boundaries. Within the project limits, this Linkage Area extends along the north side of Highway 403 and Eastgate Parkway, within the hydroelectric / utility corridor, from near Mississauga Road, continuing to the east of the point where Eastgate Parkway curves north, to 'connect' the Etobicoke and Little Etobicoke Creek valleys (**Figures 4.1-4** to **4.1-6**). Within the project limits, it includes portions of the following areas (also discussed above):

- City of Mississauga Natural Area (NE4) and associated Special Management Area (NE4SMA) and associated wetlands;

- Cultural meadow with scattered woody successional growth and associated wet pockets north of Eastgate Parkway; and
- Valley of Little Etobicoke Creek.

The Linkage Area remains dominated by cultural meadow vegetation, ubiquitous along the project limits, with the typical meadow marsh pockets and occasional successional woody growth (**Figures 4.1-3** to **4.1-6**). The exception is two watercourse valleys.

The numerous small seasonally wet, monoculture meadow and shallow marshes (ranging in size from 0.01 ha to 0.2 ha) are dominated common, disturbance tolerant wetland vegetation species. The ELC communities are classified as Narrow-leaved Cattail Shallow Marsh (MAS 2-1), Reed Canary Grass Meadow Marsh (MAM 2-2) or Mineral Meadow Marsh (MAM 2). The full list of species observed can be found in **Appendix B**. As noted, most appear to have formed in the minor topographic depressions created by the construction and maintenance of infrastructure and ditching that allow water to collect on the imperfectly to poorly drained clay soils. Several of the wet pockets are 'regulated' by TRCA (see below), including some of the roadside ditches along Eastgate Parkway (classified as Narrow-leaved Cattail Shallow Marsh [MAS 2-1]). These vegetation communities are of low sensitivity, comprised of common species that are tolerant of disturbed conditions and many are dominated by *Phragmites*.

Sensitivities and Management Implications

In general, the vegetation and wetlands occupying the majority of the study corridor is cultural in character, reflecting the influence of the utility and transportation corridors within the urban landscape. Vegetation species are predominantly common and tolerant. The level of disturbance is generally high, as reflected by the high proportion and wide distribution of non-native and invasive species. Furthermore, these wetland pockets are not designated as provincially or locally significant. The vegetation communities and species located along and immediately adjacent to the majority of the BRT alignment are therefore not considered sensitive.

4.1.3 Wildlife and Migratory Birds

Background and Approach

The wildlife and habitat assessment focused on compiling and reviewing existing information within the project limits, augmented with general observations. Specific wildlife surveys were not conducted; however all observations of wildlife and sign (e.g., calls, scat, burrows, nests) were recorded during the terrestrial and aquatic field work. As well, wildlife habitat was assessed generally based on the vegetation community characteristics. Potential wildlife movement areas were also assessed generally based on background information, air photo interpretation and field surveys. A number of wildlife inventories have also been conducted within the general project limits, specifically, those associated with the Natural Areas Survey

and Update (City of Mississauga, 2006) and TRCA's Draft Terrestrial Natural Heritage System Report (2004). This information is also integrated in the following discussions.

In addition to the data collected and summarized from background reports, the MNR was contacted to obtain Element Occurrence (EO) records of Species at Risk (SAR) and species of provincial conservation concern documented within the project limits. Ecoplans also considered potential habitat for species of conservation concern during their field surveys. A summary of the wildlife and wildlife habitat within the project limits is presented below.

Overview

As described in the vegetation section, the study corridor is located within a fully urbanized landscape, extending as a long narrow band parallel to existing infrastructure. This band is widest on the north. Terrestrial habitat is dominated by cultural meadow, with scattered woody patches and occasional small, isolated woodlands (e.g., RW1). The most prominent feature is the Etobicoke Creek valley, and secondarily, the habitat mosaic west of Cawthra Road (NE4 with NE4SMA) and the Little Etobicoke valley. Connectivity is fragmented by the existing road infrastructure and development, as discussed further below.

The wildlife species recorded by Ecoplans and the City of Mississauga (2006) within the study corridor include common, tolerant generalist species such as White-tailed Deer (*Odocoileus virginianus)*, Raccoon (*Procyon lotor)*, Striped Skunk (*Mephitis mephitis)*, Eastern Cottontail (*Sylvilagus floridanus*), vole species (*Microtus sp.*) and a variety of small passerines and hawks, tolerant of urban conditions. Additional species, such as Grey Squirrel (*Sciurus carolinensis*) and Groundhog (*Marmota monax*), are anticipated to use the habitat along the corridor. The observed species assemblage is consistent with the cultural habitat mosaic, proximity to commercial / industrial / residential development, cultural influence and high level of disturbance and fragmentation. The Etobicoke Creek valley and NE4 with NE4SMA mosaic are generally intact enough and of sufficient size to provide local habitat for a diversity of species.

Digger Crayfish (*Fallicambarus fodiens*) is found within NE4SMA and the wet pockets present on the east and west sides of Little Etobicoke Creek. This species prefers moist habitat and will dig down to reach the water table during drier seasons. This digging produces small "chimneys" of mud above ground, approximately 12-15 cm high which provide ample protection from terrestrial predators such as snakes (Barr 1994); garnering this species the additional common name of "Chimney Crayfish". There are nine species of crayfish (burrowing and non-burrowing) residing in Ontario (NHIC 2008). Digger Crayfish, the species found within the project limits, is a common burrowing species found in southern Ontario; the other three burrowing species are usually found farther north or within the Niagara Peninsula. Digger Crayfish is not considered 'rare' in Ontario, as they are commonly found throughout the province in a variety of culturally modified and natural habitats (NHIC 2008). However, TRCA ranks it as L-2, or of regional

concern and probably rare within its jurisdiction. Species of conservation concern are discussed in the **Section 4.1.4**.

A variety of migratory bird species are likely to utilize natural corridors such as Little Etobicoke and Etobicoke Creeks during the spring and fall migration periods, as well as the NE4 with NE4SMA mosaic and to a lesser extent RW1 and the open habitat areas as 'stopover' habitat. A variety of more tolerant species (e.g., Northern Cardinal [*Cardinalis cardinalis*], Black-capped Chickadee [*Poecile atricapillus*], Song Sparrow [*Melospiza* melodia], Yellow Warbler [*Dendroica petechia*] and American Goldfinch [*Carduelis tristis*]) will also use the main valley and NE4 with NE4SMA mosaic for nesting; the smaller features may be used by very tolerant species such as American Robin (*Turdus migratorius*), however their isolation and proximity to the highway adversely affects the quality of the habitat for nesting.

There are several migratory bird species that may utilize the bridge and large culvert structures along the project limits for nesting, including Cliff Swallow (*Petrochelidon pyrrhonota*), Barn Swallow (*Hirundo rustica*) and Eastern Phoebe (*Sayornis phoebe*). Four Cliff Swallow nests were noted on the Etobicoke Creek bridge during the field surveys; no nests were noted in the Little Etobicoke Creek culverts.

Wildlife Movement Opportunities

Wildlife movement opportunities were assessed using background information, field information, air photo interpretation and professional judgement. Wildlife habitat and wildlife movement opportunities are very limited within the urban, culturally modified landscape generally, given the very few remaining vegetation features of notable size, limited cover and adjacent urban development. Movement opportunities are further limited by the fragmentation by the numerous roads. The watercourse valleys, and primarily Etobicoke Creek valley, provide the only more or less continuous conduits with large enough structures to accommodate movement under the roads. The well-defined Etobicoke Creek valley and its more or less continuous woody vegetation provide a linkage down to Lake Ontario. There is confirmation that White-tailed Deer (City of Mississauga 2006) move through the area, indicating that other wildlife species also likely do so.

Within the east-west 'Linkage Area' designated by the City, potential land-based wildlife movement is hindered by the general lack of cover, and at present, fragmented regularly by the major road crossings (e.g., Hurontario Street, Highway 403, Cawthra Road, Tomken Road, Dixie Road and Eastgate Parkway) and their interchanges with Highway 403.

Wildlife Sensitivities and Management Implications

In general, the open character of the cultural meadow habitats is not sensitive to disturbance, given its anthropogenic origin. The urban landscape existing infrastructure disturbance and

roadway fragmentation limit the potential of the remnant habitat features generally. Nonetheless, these features provide local habitat opportunities in the otherwise developed landscape, accentuating the relative importance of the Etobicoke Creek valley, and secondarily the Little Etobicoke Creek valley, as both habitat and 'corridors'. The functions of the 'Linkage Area' are limited by the disturbance and major road and highway fragmentation; however, it is the only east-west linkage opportunity within the area and particularly between Little Etobicoke Creek and Etobicoke Creek valleys. Therefore, the City encourages any potential means of improving movement and habitat opportunities along this area.

4.1.4 Species of Conservation Concern and Species at Risk

The NHIC database (which uses the provincial S-rank system to designate 'rare' species [S1, S2, S3]), MNR Aurora District, CVC and TRCA, Department of Fisheries and Oceans Canada (DFO) Species at Risk (SAR) mapping, Environment Canada's SAR search tool (available at: http://www.sararegistry.gc.ca/species/speciesDetails_e.cfm?sid=793) and various monitoring and background reports were consulted for information on species of conservation concern within the project limits. The species list compiled from the above mentioned sources with their current status is provided in **Appendix B**.

Fish

The *Distribution of Fish Species at Risk* map (DFO 2007b) indicates that the reaches of Little Etobicoke Creek (within the project limits), as well as the remnant reaches of Renforth and Elmcrest Creeks (downstream of the project limits) have a "high potential" for Redside Dace and Atlantic Salmon. However, it was confirmed with DFO that the "potential" mapped for these creeks pertains only to Redside Dace (Andrea Doherty Pers. Comm. July 31, 2008).

Redside Dace is designated as Threatened by the Committee on the Status of Species at Risk in Ontario (COSSARO) and its federal status has recently been elevated to Endangered by the Committee on the Status of Endangered Species in Canada (COSEWIC).

Redside Dace was last recorded in Little Etobicoke Creek, at Burnamthorpe Road (downstream of the project limits) in 1949 (NHIC). Redside Dace was last recorded in Little Etobicoke Creek, at Burnamthorpe Road (downstream of the project limits) in 1949 (NHIC). The Redside Dace Recovery Strategy indicates that Redside Dace has likely been extirpated from the Etobicoke Creek Watershed. TRCA (Pers. Comm. Scott Smith, Tuesday July 29, 2008) confirms this point.

Flora

The working vascular plant species list is found in **Appendix B**. This list combines the findings of Ecoplans field surveys and the City of Mississauga Natural Areas Survey (2006). It should be noted that Ecoplans inventory focussed on features in the immediate vicinity of the alignment

and would not be considered exhaustive. However, the combined list provides a reasonably representative list for the purposes of a project of this nature.

Species of conservation concern will be associated primarily with the higher quality habitats and vegetation communities found within the remnant natural areas and valley stream corridors in the vicinity of the BRT East project limits (e.g., RW1, NE4, NE4SMA, Little Etobicoke and Etobicoke Creek [City of Mississauga 2006]). There are no intact 'natural areas' associated with BRT West. The presence of species of conservation concern is therefore considered limited relative to the BRT West section; the following discussion focuses on BRT East.

Although not within the project limits, Butternut was the only flora SAR recorded within the *Natural* Areas *Survey Update* (City of Mississauga 2006) in the vicinity of the BRT alignment. This tree species is designated by COSEWIC as *Endangered* in Canada and it is listed on Schedule 1 of the *SARA*. It is also designated by MNR as *Endangered*, but is not regulated in Ontario (i.e., the *Ontario Endangered Species Act* does not apply). This species also has a provincial rarity rank of S3.

The Endangered status is due to general Butternut decline from the disease *Butternut Canker*. Butternut canker is widespread, hyper-virulent and fatal (although infected trees can live for 20-40 years if otherwise healthy and able to "wall off" infected areas). Based on U.S. experience, a very small percentage of trees are resistant. Secondary fungal infections can develop in infected trees (black fungus at base of trees). The canker vectors are rain, wind and insects. The canker can be difficult to detect – some trees will show obvious signs / stress while others seem to be vigorous. One Butternut not infected by the canker was observed in ET04 in the Butternut Survey conducted in 2006.

Based on a query of the Environment Canada SAR search tool, American Ginseng (*Panax quinquefolius)* is also indicated as potentially being present in a broader area that encompasses the project limits. American Ginseng typically grows in mature, undisturbed deciduous forests, typically near the bottom of south-facing slopes where soils are well-drained and warm. Forest canopy is usually dominated by Sugar Maple, White Ash, Bitternut Hickory, and Basswood. These habitat conditions do not occur within the project limits; the most likely candidate habitat would be intact areas along the Etobicoke Creek valley. However, it is not known whether this species persists even there, as it has not been identified in recent surveys conducted (TRCA 2004).

The NHIC website (2008) shows an historical (1961) occurrence records of another vascular plant species, the Harbinger-of-spring (*Erigenia bulbosa*), that is ranked S3. This record is located in the vicinity of Etobicoke Creek but not within the project limits. This species is considered extirpated in the TRCA/Peel region (TRCA 2004; Varga *et al*. 1999).

A colony of Twinleaf is located on the eastern bank of Etobicoke Creek, well to the north of the project limits. The Twinleaf is considered rare in the TRCA region (L1) but is not considered a provincial or federal SAR. This colony is considered a Life Science Site by NHIC (2008).

Of the 95 species recorded in the general vicinity of the BRT EAST project limits by Ecoplans or during the City of Mississauga's *Natural Areas Survey Update* (2006), 42 are regionally recognized as "species of special concern" by Peel Region and/or TRCA. (As noted, the definitions of the various ranking systems are provided in **Appendix B**, along with the species lists). The following summary comments are relevant:

- Of these 42 species, TRCA (2003) ranks one as L1 (Twinleaf), three as L2 (Toadflax, White Oak, Clinton Wood Fern), 17 as L3, and 19 as L4 (see **Appendix B**). One is considered extirpated within the TRCA's jurisdiction (Harbinger-of-spring).
- Of the L2 to L4-ranked species, only White Oak was recorded along the project limits and its occurrence was associated with landscape plantings.
- Of the 42 species, Peel Region (Varga *et al*. 1999) has designated 15 as regionally rare: 13 as 'rare', one as 'uncommon', and one as 'extirpated' (some of these have overlapping L-ranks); and the City of Mississauga has identified 24 plant species as uncommon and 8 as rare (some of which overlap with the Regional list):
- The locations of the regionally and municipally rare species *within* the project limits are noted as follows:
    - RW1 – Sharp-lobed Hepatica (uncommon within the City), Squirrel-corn (rare within the City, uncommon within the Region) and Bellwort (uncommon within the City).
    - White Spruce – present throughout the project limits (BRT East and West), however they are most likely planted or seeded in from residential and landscape plantings.
- The locations of the Regionally rare species *in the immediate vicinity* of the project limits are noted as follows:
    - ET04 (Etobicoke Creek Valley) south of Eglinton Avenue (and south of BRT alignment)- Clinton Wood Fern, Twinleaf, Great Ragweed, River-bank Wild-rye, Rock Elm, Water Dock, White Bear Sedge, Carolina Spring Beauty, Squirrel Corn; and
    - NE4 (well outside of the project limits and is separated from the project limits by NE4SMA) - Bristly Sedge, Canada Moonseed, Toadflax, Cleavers.

The remainder of these species are located well outside of the project limits. Although it is possible that some may occur within the project limits, none was noted during the field surveys and most would be associated with the forest habitats or less disturbed habitats.

Wildlife

No SAR wildlife species were recorded during Ecoplans' field surveys, and potential is considered low along the project limits with the general exception of the Etobicoke Creek valley. The following summary points provide an overview of wildlife species and habitat significance associated with the general project limits:

- The only SAR recorded in the general vicinity is Eastern Milksnake (*Lampropeltis triangulum*), which was recorded historically (1966) along Etobicoke Creek approximately 2 km south of the project limits, as discussed further below. The Milksnake is designated provincially rare "S3", and "Special Concern" both by COSEWIC and COSSARO (NHIC 2008).
- No SAR designated by the COSEWIC or COSSARO, or provincially rare (S-rank: S1, S2, S3) species identified by NHIC were observed by Ecoplans or during the City's or TRCA's natural area inventories, or are recorded in the NHIC database in or within the immediate vicinity of the project limits.
- Based on the background information review and Ecoplans' field inventories, the vast majority of the wildlife recorded in the project limits and environs is classified as S5 (very common in Ontario), with a few S4 (common) and SE (non-native) species also noted.
- Two bird species (Cooper's Hawk [*Accipiter cooperii*] and Savannah Sparrow [*Passerculus sandwichensis*]) considered 'area sensitive' (MNR, 2000) have been recorded within the greater project limits. These species use the larger forested natural areas including the Etobicoke Creek valley corridor and expanses of field habitat.
- Twenty-three species are considered regionally or locally rare by TRCA or CVC (five as L3, 13 as L4, 15 of which have been recorded within the project limits. These species are associated with the higher quality and larger area habitat present within NE4SMA, and ET04. These species are considered to be common, widespread species that are often adaptable to disturbed, urban areas. The overall species list is provided in **Appendix B**.
- No specific amphibian surveys were conducted. However, wet pocket habitats associated with the hydroelectric corridor support potential breeding habitat for common amphibian species.

The Environment Canada SAR Search Tool was used to review the habitat ranges of species belonging to Schedule 1 of the *Species at Risk Act* that overlap the project limits. The search tool is used as a broad brush approach to identify potential habitat in the broader area. Environment Canada acknowledges that the "*distribution maps presented on the web site are based on limited available information and that they do not represent an exhaustive and comprehensive inventory of a species current distribution. The distribution maps displayed on this web site are intended to be used at the national / regional scale; use at the local scale is inappropriate*." Therefore, the Environment Canada Search Tool is used to generally augment Species at Risk information and ensure that potential habitat and habitat ranges are considered as well as species observations.

The species identified using the search tool are listed in **Table 4.1.4-1**. A summary of their general habitat requirements and the related *potential* of the habitats within the project limits to support these species is provided below. Of these 13 species identified through the use of the Environment Canada's Species at Risk search tool, Monarch is the species most likely to use habitat present within the project limits. Adjacent to the project limits, there is some potential for

Eastern Milksnake and Northern Map Turtle to use habitat in the Etobicoke Creek valley. While there may be potential for Eastern Ribbon Snake and Eastern Milksnake to use similar habitats to what is found along the project limits (small wetland pockets surrounded by meadow), the likelihood of their presence along the project limits is very low given the setting (major transportation facilities, local roads, urban development and other anthropogenic disturbances). Suitable habitat for the other species does not occur along the project limits.

Table 4.1.4-1 Environment Canada Species at Risk Search Tool Results of Species That Have Habitat Ranges Encompassing Portions of the Project Limits

Scientific Name	Common Name	GRANK[1]	SRANK[2]	COSEWIC[3]	MNR[4]
Ixobrychus exilis	Least Bittern	G5	S3B,SZN	THR*	THR
Falco peregrinus anatum	Peregrine Falcon	G4T3	S2S3B,SZN	SC	THR
Tyto alba	Barn Owl	G5	S1	END*	END
Dendroica cerulea	Cerulean Warbler	G4	S3B,SZN	SC*	SC
Icteria virens virens	Yellow-breasted Chat	G5	S2S3B,SZN	SC*	SC
Wilsonia citrine	Hooded Warbler	G5	S3B,SZN	THR*	THR
Danaus plexippus	Monarch	G4	S4	SC*	SC
Emydoidea blandingii	Blanding's Turtle	G4	S3	THR*	THR
Graptemys geographica	Northern Map Turtle	G5	S3	SC*	SC
Lampropeltis triangulum	Eastern Milksnake	G5	S3	SC*	SC
Thamnophis sauritus	Eastern Ribbonsnake	G5	S3	SC*	SC
Ambystoma jeffersonianum	Jefferson Salamander	G4	S2	THR*	THR
Urocyon cinereoargenteus	Grey Fox	G5	SZB?	NAR	NAR

Least Bittern

This species prefers to nest in freshwater marshes with dense aquatic vegetation, clumps of woody vegetation and open water. Most often they are found in marshes that exceed 5 hectares in size.

Suitable nesting habitat for this species is not found in the project limits

Readers interested in additional information regarding this species should visit:
http://www.sararegistry.gc.ca/species/speciesDetails_e.cfm?sid=51

Peregrine Falcon anatum subspecies

Nesting habitat for the Peregrine Falcon usually occurs on tall cliff areas that face a large open area for foraging. Open areas can consist of water, disturbed areas or young forests. The study site does not provide adequate habitat for this species. There is no cliff habitat or tall infrastructure within the vicinity of the project limits. No known habitat or potential habitat will be impacted. (*Forest Raptors and their Nests on Central Ontario.* Southcentral Sciences Section Field Guide FG-03 1998).

Barn Owl

Barn Owls preferred habitat includes low-elevation, open country, where their small rodent prey are more abundant. They are often associated with agricultural lands, especially pasture. Nests are located in buildings (barns etc), hollow trees and cavities in cliffs. Nests are most often found on man-made structures, especially those which are abandoned or unused. The preferred habitat for this species is not found in the project limits.

Readers interested in additional information regarding this species should visit:
http://www.sararegistry.gc.ca/species/speciesDetails_e.cfm?sid=611#habitat

Cerulean Warbler

The Cerulean Warbler is usually found in mature deciduous forests with an open understorey. In Ontario, this warbler also nests in older, second-growth deciduous forests. Little is known about the Cerulean Warbler's migratory habitat, but some individuals have been seen in lower elevation wet forests and in old-growth and second-growth forests. The forest cover, even along the Etobicoke Creek valley, is not mature or intact enough to provide suitable habitat for this species in species is observed in the Carolinian forests of far southern Ontario.

Readers interested in additional information regarding this species should visit:
http://www.sararegistry.gc.ca/species/speciesDetails_e.cfm?sid=46

Yellow-breasted Chat

The Yellow-breasted Chat's preferred habitat includes dense thickets around wooded edges, riparian areas, and overgrown shrubby clearings. The Ontario population is very dependent on successional habitats of thick shrubbery. These habitats are the result of vegetative growth in forest openings created by storms, fire, or abandoned fields. The availability of habitat in Ontario has been generally stable over the last decade. Although there is some thicket habitat available adjacent to NE4 and Etobicoke Creek, these patches do not provide the dense thicket cover and forest edge or clearing association typically used by this species. This species is most often found in far southern Ontario.

Readers interested in additional information regarding this species should visit:
http://www.sararegistry.gc.ca/species/speciesDetails_e.cfm?sid=61

Hooded Warbler

Hooded Warblers nest in mature hardwood forests with tall trees and a well-closed canopy. The species is considered area-sensitive, meaning that it requires large areas of forest. The bird occupies small clearings with low dense shrubby vegetation, generally from 1-5 years after it has been created (either naturally or by forestry practices). Prior to the 1800s, there was extensive habitat in Canada that would have been suitable for Hooded Warblers. Very little forest cover remains in the Carolinian area of Canada and much of the forest that does remain is highly fragmented. Presently, forest interior covers only about 2% of the land area in the Carolinian Forest region. The generally open and fragmented nature of the forest habitat even along the adjacent sections of the Etobicoke River valley does not provide adequate habitat for this species.

Readers interested in additional information regarding this species should visit:
http://www.sararegistry.gc.ca/species/speciesDetails_e.cfm?sid=37

Monarch Butterfly

Monarchs inhabit any areas where milkweed and wildflowers such as Goldenrod, asters, and Purple Loosestrife are found, including roadsides, abandoned farmland or open, meadow areas. The Monarch's Special Concern status is based on ongoing threats to wintering habitat outside of Canada rather than the rarity of is summer habitat and key host plant, Common Milkweed, which are still generally common throughout the province.

Potential Monarch is present throughout much of the cultural meadow habitat along the project limits; as previously noted, this meadow habitat is generally common and abundant within the project limits environs, and throughout much of the southern rural-agricultural Ontario.

Readers interested in additional information regarding this species should visit:
http://www.sararegistry.gc.ca/species/speciesDetails_e.cfm?sid=294

Blanding's Turtle

Blanding's Turtle inhabit areas of shallow water, usually in large marshes or shallow lakes. They are often found wandering on land, but not usually very far from water except when nesting. There are no open water marshes, ponds or lakes within the immediate vicinity of the project limits that would provide suitable habitat for this species.

Readers interested in additional information regarding this species should visit:
http://www.sararegistry.gc.ca/species/speciesDetails_e.cfm?sid=846

Northern Map Turtle

The Northern Map Turtle inhabits both lakes and rivers, showing a preference for slow moving currents, muddy bottoms, and abundant aquatic vegetation with suitable basking site that are exposed to the sun for much of the day. Although there is some potential for this species to occur within Etobicoke Creek, this species was not observed by Ecoplans within the project limits, nor has it been recorded by NHIC within the project limits.

Readers interested in additional information regarding this species should visit:
http://www.sararegistry.gc.ca/species/speciesDetails_e.cfm?sid=712

Eastern Milksnake

The Eastern Milksnake can be found in a wide variety of habitats, including prairies, meadows, pastures, hayfields and rock outcroppings, as well as deciduous forests, pine plantations, bog forests, pine forests and mixed pine-hardwoods. In most cases, this snake is found along open edge habitats associated with these forest habitats. This snake is often found in rural habitats such as around barns, sheds and houses (particularly old buildings and structures) and farm 'debris'.

Due to the diversity of habitat preferences, this species could be found within the project limits or vicinity. As noted, this species was recorded historically (1966) along the Etobicoke Creek valley approximately 2 km downstream of Eglinton Avenue, and given the extent of the general habitat modification and disturbance associated with the surrounding urban landscape, it is unknown if this species persists in the valley. It is unlikely that this species would use the managed and modified floodplain area in the immediate vicinity of the project limits (COSEWIC 2002).

Readers interested in additional information regarding this species should visit:
http://www.sararegistry.gc.ca/species/speciesDetails_e.cfm?sid=714

Eastern Ribbonsnake

This semi-aquatic snake is typically found near water including streams, ponds and wetlands. When associated with a wetland, the wetland is often close to forested areas. Within the study area wetland communities are restricted to small typically open and culturally derived pockets along small intermittent tributaries, east and west of Little Etobicoke Creek. NE4SMA includes wetland habitat with forest habitat found immediately to the north, however the larger wetland pockets adjacent to the forest are located well north of the alignment. Given the diversity of

habitats used by this species, it is possible that it could be found within the wetlands within and adjacent to the study area. However, as noted, most of these wetlands are small, cultural derived marsh pockets dominated by aggressive emergents and grasses. Therefore, the potential for this species to occur within the study area is limited generally. This species was not observed by Ecoplans within the study area, nor has it been recorded by NHIC within the study area.

Readers interested in additional information regarding this species should visit:
http://www.rom.on.ca/ontario/risk.php?doc_type=fact&id=295&lang=en

Jefferson Salamander

The Jefferson Salamander is found in a variety of woodland habitats including deciduous, coniferous or mixed forests as well as swamps. Breeding ponds are usually vernal pools found within these woodland areas, but this species will breed in acceptable marshes, swamps or even roadside ditches. Jefferson Salamander requires intact deciduous forest with undisturbed forest floor, and breeding ponds that are permanent and unpolluted. Within the project limits there is no intact expanse of suitable deciduous forest habitat and no vernal pools or other pond areas that might provide suitable breeding habitat.

Readers interested in additional information regarding this species should visit:
http://www.rom.on.ca/ontario/risk.php?doc_type=fact&id=154&lang=en

Grey Fox

Grey Foxes prefer deciduous forest and marsh habitats. Dens can be constructed in many types of substrate, but tend to be found in areas of dense bush with close proximity to a water source. Despite these habitat preferences the Grey Fox can often be found denning on the outskirts of cities. Within the project limits and vicinity, the only potential habitat for this species might be in the more intact forest areas along the Etobicoke Creek valley, or within the northern portion of the NE4/ NE4SMA mosaic. No dens were noted along the project limits during any of the field surveys.

Readers interested in additional information regarding this species should visit:
http://www.sararegistry.gc.ca/species/speciesDetails_e.cfm?sid=157

As previously mentioned, Monarch is the species most likely to use habitat present within the project limits. Adjacent to the project limits, there is some potential for Eastern Milksnake and Northern Map Turtle to use habitat in the Etobicoke Creek valley. While there may be potential for Eastern Ribbon Snake and Eastern Milksnake to use similar habitats to what is found along the project limits (small wetland pockets surrounded by meadow), the likelihood of their presence along the project limits is very low given the setting (major transportation facilities,

local roads, urban development and other anthropogenic disturbances). Suitable habitat for the other species (as listed above) does not occur along the project limits.

4.1.5 Air Quality

As described in **Section 4.2.7**, the Mississauga BRT corridor lies adjacent to many major roads, including Highway 403, and in close proximity to many busy arterial and local collector roads. As a result, the many nearby roadways, and especially Highway 403, present notable contributions to reduced local air quality.

Overall, the ambient air quality in the area is typical to the urban air quality found within the Greater Toronto Area. Please refer to **Section 5.1.1.4** for details regarding an air quality assessment completed by RWDI AIR Inc. including information regarding existing air quality conditions. In particular, please refer to **Table 5.1.1-3** which outlines the ambient air pollutant concentrations for the Years 2002-2006.

4.1.6 Physiography, Geology and Contamination

The following provides an overview of the physiography and geology within the study area and comments on what those local conditions mean to the potential for contaminant migration.

Physiography

According to Chapman and Putnam's *"The Physiography of Southern Ontario"* (1984), and the Ministry of Natural Resources Map 2226 *"Physiography of South Central Portion of Southern Ontario"* (1972), the study area is falls within the physiographic region known as the Peel Plain. The Peel Plain is a level-to-undulating tract of clay soils and covers an area of approximately 777 km^2. It is bounded to the north and south by the South Slope physiographic region. Many rivers and streams drain this region, and swamps and bogs are not common. Much of the Peel Plain has been modified by a veneer of clay and silt.

In general, contaminant migration will be greatest in areas of permeable soils such as sand and gravel.

Quaternary Geology

Typical deposits found within the study area include clay till, with some bedrock and organic deposits evident around the Credit River. Halton Till (Ontario-Erie Lobe) has been identified within the study area and consists of silt to clayey silt tills. Around the intersection of Winston Churchill Boulevard, Paleozoic shale bedrock is exposed at the surface. At the intersection of Cawthra Road and Eglinton Avenue West and further east are glaciolacustrine deposits of silt and clay with some sand. According to MOE (2001) the thickness of the overburden within the study area is generally less than 10 m.