



Municipal Class Environmental Assessment Environmental Study Report

Mississauga Road (Regional Road 1) from Financial Drive to Queen
Street West (Regional Road 6)
City of Brampton
Project #TP115085

Prepared for:

The Regional Municipality of Peel

10 Peel Centre Drive, Suite B, Brampton, ON L6T 4B9

January 10, 2019

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West (Regional Road 6)
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Prepared for:

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January 10, 2019

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Executive Summary

Environmental Study Report

A Class Environmental Assessment process is a mechanism by which the planning and approval of municipal servicing is provided in an efficient, timely, economical and environmentally responsible manner. It represents a consistent, streamlined and easily understood process for planning and implementing municipal infrastructure projects. Under the Provincial Environmental Assessment (EA) Act, projects are classified as approved, subject to screening, subject to a Class Environmental Assessment (Class EA), or subject to a full Environmental Assessment. This project is classified as being subject to the Class EA process. It is being conducted according to the requirements outlined in the Municipal Engineers Association document titled *Municipal Class Environmental Assessment (October 2000, as amended in 2007, 2011 & 2015)* (Municipal Class EA).

Consistent with the Municipal Class EA, the study approach has been designed to meet the following objectives:

- i. Protection of the environment, including natural, social/cultural and economic components of the environment;
- ii. Participation of a broad range of stakeholders in the study process to allow for sharing of ideas, education, testing of creative solutions and developing alternatives, and
- iii. Documentation of the study process in compliance with all phases of the Municipal Class EA process.

The Class EA process classifies projects according to their level of complexity and potential environmental impacts. These are termed "Schedules" and are summarized below:

Schedule A and A+ projects involve minor modifications to existing facilities. Environmental effects of these projects are generally small; therefore, the projects are considered pre-approved.

Schedule B includes improvements and minor expansion to existing facilities. There is a potential for some adverse environmental impacts and, therefore, the proponent is required to proceed through a screening process, including consultation with those affected. Schedule B projects are required to proceed through Phases 1, 2 and 5 of the Municipal Class EA process.

Schedule C includes the construction of new facilities and major expansion of existing facilities. These projects proceed through the environmental assessment planning process outlined in the Municipal Class EA document. These projects are required to fulfill the requirements of all five phases of the Municipal Class EA process.

This project is being completed under the requirements of a Schedule C Class EA.

The following Class EA planning phases apply:

- **Phase 1** - Identify the problem (deficiency) or opportunity – completed as part of the Region of Peel's Long Range Transportation Plan (LRTP).
- **Phase 2** - Identify and evaluate alternative solutions to address the problem or opportunity by taking into consideration the existing environment, and establish the preferred solution taking into account public and review agency input – completed as part of the Region of Peel's Long Range Transportation Plan (LRTP).
- **Phase 3** - Identify Alternative Design Concepts for the preferred solution implementation by taking into consideration the existing environment and establish the preferred design concept by taking into account public and review agency input, anticipated environmental effects and methods of minimizing negative effects and maximizing positive effects.
- **Phase 4** - Document the Environmental Assessment process that includes the design and consultation process in an Environmental Study Report for public review.

- **Phase 5** - Complete contract drawings and documents and proceed to construction and operation; monitor construction for adherence to environmental provisions and commitments. Where special conditions dictate, also monitor the operation of the completed facility.

Background to the Study

Mississauga Road is a major north-south arterial corridor that extends from Caledon in the north, through the City of Brampton, and to the City of Mississauga in the south. The section of Mississauga Road being studied is from approximately 300 m north of Financial Drive to 300 m north of Queen Street West. This section of Mississauga Road is currently four lanes, two in each direction, with turning lanes at various intersections and accesses. The Region of Peel's Long Range Transportation Plan identified the need for capacity improvements along this section of Mississauga Road. The Long Range Transportation Plan suggests widening of this section to six (6) lanes.

There are a number of recent studies and other documents which were reviewed by the Study Team for their significance to the Mississauga Road Class EA study area. These include:

- Region of Peel Long Range Transportation Plan;
- Region of Peel Active Transportation Plan (2012);
- City of Brampton Transportation and Transit Master Plan;
- Region of Peel Official Plan, 2016 Office Consolidation;
- Mississauga Road Class Environmental Assessment, Bovaird Drive West to Mayfield Road, (2013) – Region of Peel;
- Bovaird Drive West Class Environmental Assessment, Lake Louise Drive/Worthington Avenue to 1.45 km west of Heritage Road (2013) – Region of Peel;
- Mississauga Road Class Environmental Assessment, Queen Street West to Bovaird Drive West, (2006) – Region of Peel;
- Mississauga Road Class Environmental Assessment, Highway 407 to Queen Street (2002) – Region of Peel;
- Mississauga Road Widening Class Environmental Assessment Addendum, Highway 407 to Queen Street (2011);
- Heritage Road (Steeles Avenue to Rivermont Road) – City of Brampton (2017);
- Bram West Parkway (Heritage Road to Financial Drive) and Financial Drive (Heritage Road to Winston Churchill Boulevard) – City of Brampton (2016); and
- GTA West – The Ministry of Transportation

Generally, these studies project significant increases in population and traffic in Brampton and indicate that the Mississauga Road corridor in its current state will be inadequate to support projected development and increased traffic.

Existing and Future Conditions

As part of the study, a review of existing and future conditions was completed. The objective of the review was to confirm the need and justification for improvement and expansion of the roadway, as well as to identify environmental constraints and sensitivities. Investigations have been completed for the following:

- land use
- roadway geometric design
- traffic volume/congestion
- utilities
- geotechnical/pavement
- hydrogeology/well water
- stormwater drainage
- natural environment
- archaeology
- cultural/built heritage
- pedestrian/cyclist access
- traffic noise
- air quality
- structures

Problem/Opportunity Definition

The purpose of this study is to address existing and future opportunities and constraints along the Mississauga Road corridor, through a comprehensive, environmentally sound planning process, and while facilitating dialogue between stakeholders with diverse interests. Based on a review of existing and future conditions, as well as preliminary consultation with stakeholders, it has been determined that improvements are needed along the Mississauga Road corridor. The specific problems and opportunities to be addressed are as follows:

- existing and future traffic congestion;
- accommodation of transit;
- accommodation of future development;
- roadway geometrics;
- pavement conditions;
- pedestrian and cyclist facilities;
- intersection operations;
- traffic, pedestrian and cyclist safety;
- drainage deficiencies and opportunities for stormwater management, and
- accommodation of future municipal services and utilities within the ultimate right-of-way.

Development and Evaluation of Alternative Planning Solutions

The following planning alternatives have been considered in addressing the problems and opportunities discussed above:

- Alternative 1:** **Do Nothing:** Maintain Mississauga Road in its present configuration with no improvements other than regular maintenance.
- Alternative 2:** **Improve other Roads:** Add capacity to adjacent parallel roads to accommodate traffic.
- Alternative 3:** **Transit Infrastructure Improvements:** Improve transit infrastructure to support Brampton Bus Rapid Transit Service and address capacity requirements.
- Alternative 4:** **Active Transportation (AT) Infrastructure Improvements:** Improve AT infrastructure to support Region of Peel's Active Transportation Plan.
- Alternative 5:** **Travel Demand Management (TDM):** Encourage and support change in travel behavior to reduce peak travel demand by:
- Promoting car-pooling and possible HOV lanes
 - Promoting flexible work hours, increase active transportation trips (biking/walking)
- Alternative 6:** **Widen Mississauga Road with Intersection Improvements:** Add through lanes including intersection improvements, to increase traffic capacity of the corridor.
- Alternative 7:** **Combination:** Combination of:
- Improve transit services
 - Improve AT
 - Travel Demand Management
 - Widen Mississauga Road

Following a comprehensive evaluation, Alternative 7 was carried forward as the preferred planning solution.

Summary of Consultation Activities

Consistent with the Municipal Class EA, the study approach has been designed to meet the following objectives:

- i. Protection of the environment, including natural, social/cultural and economic components of the environment.
- ii. Participation of a broad range of stakeholders in the study process to allow for sharing of ideas, education, testing of creative solutions and developing alternatives.
- iii. Documentation of the study process in compliance with all phases of the Municipal Class EA process.

This project is being completed under the requirements of a Schedule 'C' Municipal Class EA. The following Schedule 'C' trigger applies to this project:

- Reconstruction or widening where the reconstructed road will not be for the same purpose, use or capacity or at the same location as the facility being reconstructed and the estimated cost is greater than \$2.2 million.

The Municipal Class EA requires notification of, and consultation with, relevant stakeholders. The Project Team has ensured that stakeholders were notified early in the planning process, and throughout the study. The following is a summary of consultation completed for the various phases of the Class EA:

Phase 1 Consultation

A Notice of Study Commencement was submitted to relevant property owners, agencies, stakeholders, and organizations by mail on October 27, 2015. The notice detailed the study area, summarizing the objectives of the study and requesting comments. In addition, the Notice of Study Commencement was published in the local newspaper, *Brampton Guardian*, on October 28, 2015 and October 29, 2015. An agency kickoff meeting was held on the January 21, 2016 and an additional meeting with the Ministry of Natural Resources and Forestry (MNRF) and Credit Valley Conservation (CVC) was held on March 4, 2016.

Phase 2 Consultation

A Technical Advisory Committee (TAC) meeting was held on November 8, 2016 with representatives from the Region of Peel, the City of Brampton, Brampton Transit, Ministry of Natural Resources and Forestry (MNRF), Credit Valley Conservation (CVC), and Hydro One Brampton. A Notice of Public Information Center (PIC) was submitted to relevant property owners, agencies, stakeholders, and organizations by mail on January 26, 2017. In addition, the Notice of PIC was published in the local newspaper, *Brampton Guardian*, on January 26th and February 2, 2017. A second meeting with the Ministry of Natural Resources and Forestry (MNRF) and Credit Valley Conservation (CVC) was held on January 10, 2017.

Based on input provided by stakeholders including representatives of the new developments, technical agencies, and public participants, as well as based on a formal assessment by the study team, the preferred planning alternative is Alternative 7, a combination of alternatives 3-6, as follows:

- Alternative 3. Transit Infrastructure Improvements
- Alternative 4. Active Transportation Improvements
- Alternative 5. Travel Demand Management
- Alternative 6. Widen Mississauga Road including additional through lanes and intersection improvements

A combination of Alternative 3 - 6 will address the problem statement developed for the Mississauga Road corridor, while minimizing environmental impacts and supporting the Region's 2015-2035 Strategic Plan and Term of Council Priorities.

Phase 3 Consultation

A Technical Advisory Committee (TAC) meeting #2 was held on October 25, 2017. Members of TAC included the Region of Peel, City of Brampton, Brampton Transit, Ministry of Natural Resources and Forestry, Credit Valley Conservation (CVC), and Hydro One Brampton. A Notice of Public Information Center (PIC) # 2 was submitted to relevant property owners, agencies, stakeholders, and organizations by mail on November 2, 2017. In addition, the Notice of PIC # 2 was published in the local newspaper, *Brampton Guardian*, on November 2nd and November 9th, 2017, and a tweet was sent out on the Region of Peel's Twitter account on November 15, 2017. Additional meetings with the Ministry of Natural Resources and Forestry (MNRF) and Credit Valley Conservation (CVC) were held to discuss storm water drainage.

Description of the Preferred Design

The preliminary design is documented in detail in Section 6 of this report. The following is a brief summary of some key aspects of the preferred alternative:

- Key elements of the proposed cross-section of Mississauga Road include the following:
 - ◆ Concrete curb and gutter;
 - ◆ Six (6) – 3.40m through lanes (3.50m adjacent to curb);
 - ◆ Minimum 2.0m raised median island at all intersections;
 - ◆ 3.0m flush median island (outside floodplain area);
 - ◆ 1.0m boulevard (splash strip and grass boulevard);
 - ◆ 2.50m multi-use path along both sides of the roadway (excluding the west side from Embleton Road to Queen Street);
 - ◆ 3.40m left and right turn lanes as required at all intersections;
 - ◆ Right turn channelization at Mississauga Road and Queen Street West, and
 - ◆ Illumination on both sides.
- A new retaining wall / reinforced earth slope on the east side of Mississauga Road, directly across from the Terrace on the Green access;
- Full replacement of the existing Credit River Bridge with a new three-span bridge (45m midspan + 2x30m outside spans);
- Protection of important community resources such as the Huttonville Maples and McMurchy Woolen Mill; and
- New noise barriers for six reverse frontage or side exposure locations.

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1.0 Introduction and Background

1.1 Introduction

The Regional Municipality of Peel (Region of Peel) has completed a Schedule C Municipal Class Environmental Assessment (Class EA) for planned transportation improvements to accommodate future travel demand on Mississauga Road 300 m north of Financial Drive to 300 m north of Queen Street West (**ref. Figure 1.1. Key Plan**). Wood Environment & Infrastructure Solutions (Wood E&IS), formerly Amec Foster Wheeler was retained by the Region of Peel to complete the study.

1.2 Environmental Study Report

The Environmental Study Report (ESR) will document the rationale for the project, the background to the study, existing and future conditions within the study area, the planning, design and consultation process leading to the preferred alternative, anticipated positive and negative impacts, and proposed mitigation measures.

1.3 Purpose of the Project

In order to best address deficiencies (short term and long-term issues related to future growth, operational, geometric and capacity issues) along Mississauga Road, a number of road improvement alternatives were examined as part of the study, including widening of the roadway, cross-section improvements, intersection improvements, accommodation of pedestrians and cyclists and enhancement of traffic control. In addition, the impact of such improvements on the social and natural environments were examined.

A major objective of the study was to undertake consultation with a wide range of stakeholders in order to identify and resolve or mitigate issues of concern, while meeting the requirements of the Municipal Class EA process to permit the Region of Peel to proceed to detail design, and ultimately, construction. A number of factors influenced the need to undertake a Municipal Class EA Study for this corridor. The study addresses the following specific deficiencies and concerns:

- Accommodating existing and future traffic demands;
- Accommodating future transportation network improvements;
- Accommodating transit system expansion along the corridor;
- Aesthetics and streetscaping through the corridor;
- Addressing drainage deficiencies and opportunities for stormwater management, and
- Accommodating pedestrian and cyclist movements through the corridor.

The need and justification for roadway improvements are discussed in later sections of this report.

1.4 Project Background

Mississauga Road is a major north-south arterial road that extends from Caledon in the north, through the City of Brampton, and to the City of Mississauga in the south. The current configuration of Mississauga Road through the study area provides one (1) to three (3) travel lanes in each direction, with turning lanes at many intersections. The Region of Peel's Long Range Transportation Plan identified the need for capacity improvements along this section of Mississauga Road. The Region's Long Range Transportation Plan suggests widening this section of Mississauga Road between Queen Street West and Financial Drive to six (6) lanes by 2021.

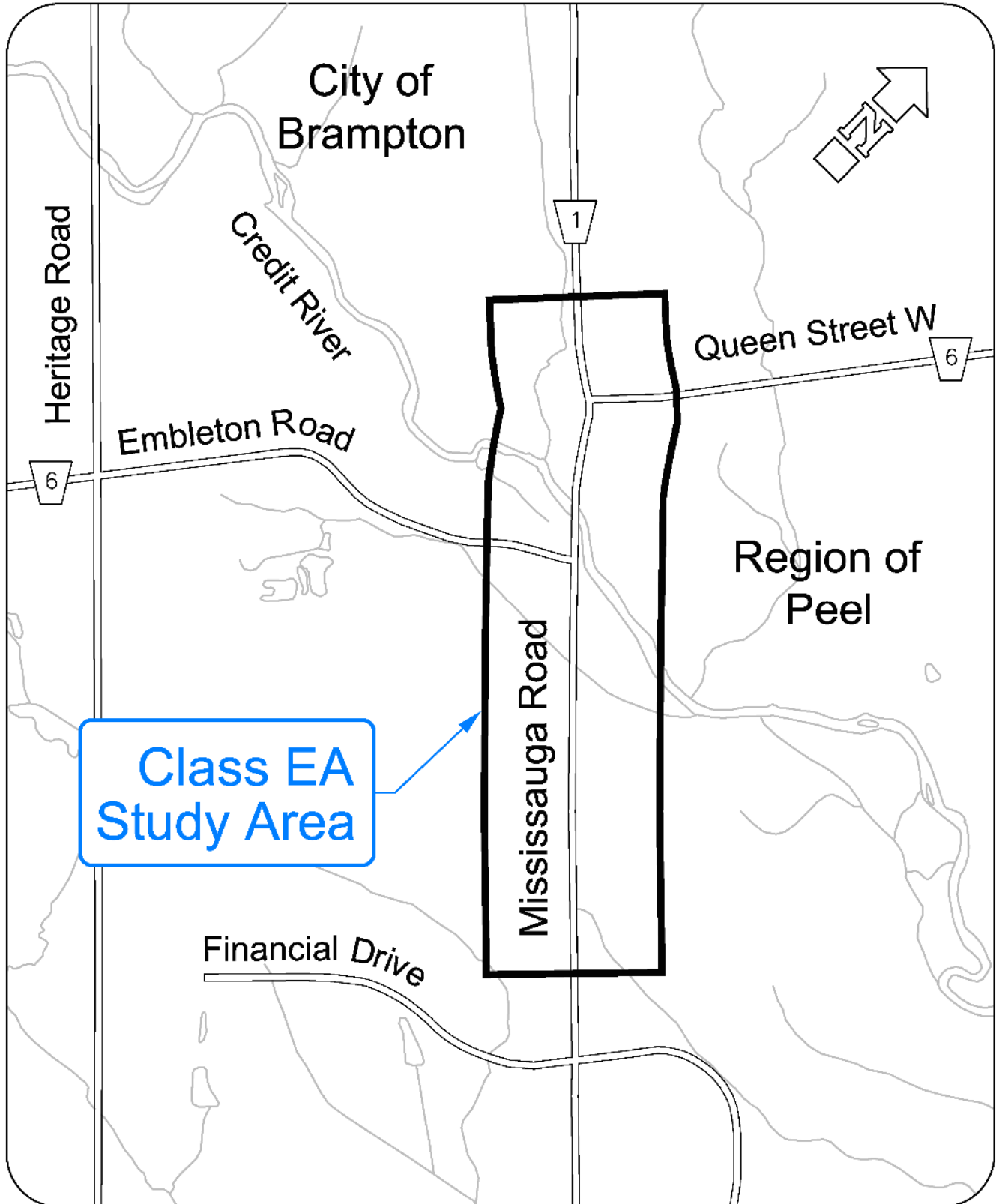


Figure 1.1. Key Plan

1.5 Previous Studies and Adjacent Projects

There are a number of studies that were reviewed by the Project Team because of their significance to the Mississauga Road corridor.

Mississauga Road (Bovaird Drive West to Mayfield Road) – Region of Peel

The Region of Peel completed a Municipal Class EA in 2013 for improvements to Mississauga Road between Bovaird Drive West and Mayfield Road. The study recommended:

- Widening of Mississauga Road from 2 to 6 lanes from Bovaird Drive West to Sandalwood Parkway West, and from 2 to 4 lanes from Sandalwood Parkway West to Mayfield Road;
- A rail overpass and a 42m clear span bridge over Huttonville Creek; and
- Intersection improvements, transit facilities, sidewalk and multi-use trail.

Bovaird Drive West (Lake Louise Drive/Worthington Avenue to 1.45 km west of Heritage Road) – Region of Peel

The Region of Peel completed a Schedule 'C' Municipal Class EA in 2013 for improvements to Bovaird Drive West from Lake Louise Drive/Worthington Avenue to 1.45 km west of Heritage Road. The study recommended:

- Widening of Bovaird Drive West from 2 to 6 lanes east of the North-South Transportation Corridor (was part of the GTA West Transportation Corridor and assumed to cross Bovaird Drive West of Heritage Road), and from 2 to 4 lanes west of the North-South Transportation Corridor, with full urbanization; and
- Multi-use trail on the north side of Bovaird Drive West and sidewalk on the south side, as well as intersection improvements and transit facilities.

Mississauga Road (Queen Street West to Bovaird Drive West) – Region of Peel

The Region of Peel is completing an addendum to the 2006 Schedule C Municipal Class EA for improvements to Mississauga Road between Queen Street West and Bovaird Drive West to address the short and long term transportation needs related to planned growth and review opportunities to better facilitate the movement of vehicles, transit, goods movement, walking and cycling.

Mississauga Road Class EA Highway 407 to Queen Street (2002) – Region of Peel

The Region of Peel completed a Schedule 'C' Class EA for Mississauga Road from Highway 407 northerly for approximately 4.5 km to Queen Street in the City of Brampton. The study recommended the following improvements in the study area:

- Widening of Mississauga Road to a 7-lane cross section from Highway 407 to Steeles Avenue, a 5 lane cross section from Steeles Avenue to just beyond the crest of the Credit River Valley and maintaining the 4 lane cross section from Embleton Road to Queen Street.
- Intersection improvements at Embleton Road.
- Allowance for traffic signals at Hallstone Road and the Lionhead Golf Course.

The Region of Peel completed an Addendum to the Mississauga Road Class EA from Highway 407 to Queen Street in 2011 as the Region identified the need for further improvements to Mississauga Road from Steeles Avenue northerly to Financial Drive. The EA addendum confirmed the need for 6 lanes along this section of Mississauga Road.

Heritage Road (Steeles Avenue to Rivermont Road) – City of Brampton (2017)

The City of Brampton has assessed the need for improvements along the Heritage Road corridor from Steeles Avenue to future Rivermont Road (formerly Riverview Heights Road), approximately 460 m north of Embleton Road. The study has considered a combination of measures to address operational deficiencies and the need for additional north-south capacity, including:

- Widening of Heritage Road from 2 to 4 through lanes;
- Intersection improvements (auxiliary lanes, property access relocation, signalization, and/or roundabouts at intersections);
- Improvements at specific locations to improve transit service; and
- Traffic Demand Management (TDM) measures, such as carpool areas, shuttle buses, and flexible work hours, to support Bus Rapid Transit on Steeles Avenue.

Bram West Parkway (Heritage Road to Financial Drive) and Financial Drive (Heritage Road to Winston Churchill Boulevard) – City of Brampton (2016)

The City of Brampton has completed a Municipal Class EA for a new north-south arterial road, Bram West Parkway, from Heritage Road to Financial Drive and for the extension of Financial Drive from Heritage Road to Winston Churchill Boulevard. The study has recommended the following improvements:

- New Bram West Parkway with 6 lanes from north of Steeles Avenue to Heritage Road, and a partial interchange with Highway 407 at the south, providing access to and from the east. The new road is being planned to have a 55m right-of-way, 70 km/h posted speed, and signalized intersections at Heritage Road, Steeles Avenue and Financial Drive;
- Financial Drive extension with 4 through lanes and a continuous two-way centre left-turn lane from Heritage Road to Winston Churchill Boulevard. The road is being planned to have a 30 m right-of-way, 50 km/h posted speed, and signalized intersections at Heritage Road and Winston Churchill Boulevard;
- Future ZÜM bus services on both Bram West Parkway and Financial Drive; and
- Sidewalk along the west side of Bram West Parkway and south side of Financial Drive, and multi-use trails along the east side of Bram West Parkway and north side of Financial Drive.

GTA West – The Ministry of Transportation

The Ministry of Transportation (MTO) commenced the Greater Toronto Area (GTA) West Transportation Corridor Planning and Environmental Assessment Study (March 4, 2008) to identify the preferred solution for providing better linkages between Urban Growth Centres in the west part of the GTHA, including Downtown Guelph, Downtown Milton, Brampton City Centre and Vaughan Corporate Centre. The proposed corridor was to include a six (6) lane freeway (400-series highway) along the north-south section near the Region of Peel and Region of Halton municipal boundary (once known as the Halton/Peel Freeway) and a four (4) lane facility for the east-west segment, with interchanges at major arterial roads. In December 2015, MTO suspended its work on the GTW West EA. The study was cancelled in February 2018.

2.0 Class Environmental Assessment Approach

2.1 Class Environmental Assessment Process

The Class Environmental Assessment process is a mechanism by which planning and approval of municipal servicing is provided in an efficient, timely, economical and environmentally responsible manner. It represents a consistent, streamlined and easily understood process for planning and implementing municipal infrastructure projects. Under the Provincial Environmental Assessment (EA) Act, projects are classified as approved, subject to screening, subject to a Class Environmental Assessment (Class EA), or subject to a full Environmental Assessment. This project is classified as being subject to the Class EA process. It is being conducted according to the requirements outlined in the Municipal Engineers Association document titled *Municipal Class Environmental Assessment (October 2000, as amended in 2007, 2011 & 2015)* (Municipal Class EA).

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- iii. Documentation of the study process in compliance with all phases of the Municipal Class EA process.

The Class EA process classifies projects according to their level of complexity and potential environmental impacts. These are termed “Schedules” and are summarized below:

Schedule A and A+ projects involve minor modifications to existing facilities. Environmental effects of these projects are generally small; therefore, the projects are considered pre-approved.

Schedule B includes improvements and minor expansion to existing facilities. There is a potential for some adverse environmental impacts and, therefore, the proponent is required to proceed through a screening process, including consultation with those affected. Schedule B projects are required to proceed through Phases 1, 2 and 5 of the Municipal Class EA process.

Schedule C includes the construction of new facilities and major expansion of existing facilities. These projects proceed through the environmental assessment planning process outlined in the Municipal Class EA document. These projects are required to fulfill the requirements of all five phases of the Municipal Class EA process.

This project is being completed under the requirements of a Schedule C Class EA. The following Schedule C trigger applies to this project:

- Reconstruction or widening where the reconstructed road or other linear paved facilities (e.g. HOV lanes) will not be for the same purpose, use, capacity or at the same location as the facility being reconstructed (e.g. additional lanes, continuous centre turn lane) where the estimated cost is greater than \$2.4 million.

The following Class EA planning phases apply:

- **Phase 1** - Identify the problem (deficiency) or opportunity – completed as part of the Region of Peel’s Long Range Transportation Plan (LRTP).

- **Phase 2** - Identify and evaluate alternative solutions to address the problem or opportunity by taking into consideration the existing environment, and establish the preferred solution taking into account public and review agency input – completed as part of the Region of Peel’s Long Range Transportation Plan (LRTP).
- **Phase 3** - Identify Alternative Design Concepts for the preferred solution implementation by taking into consideration the existing environment and establish the preferred design concept by taking into account public and review agency input, anticipated environmental effects and methods of minimizing negative effects and maximizing positive effects.
- **Phase 4** – Document the Environmental Assessment process that includes the design and consultation process in an Environmental Study Report for public review.
- **Phase 5** - Complete contract drawings and documents and proceed to construction and operation; monitor construction for adherence to environmental provisions and commitments. Where special conditions dictate, also monitor the operation of the completed facility.

The Phases of the Municipal Class EA process that will be followed in this project are illustrated in **Figure 1.2**.

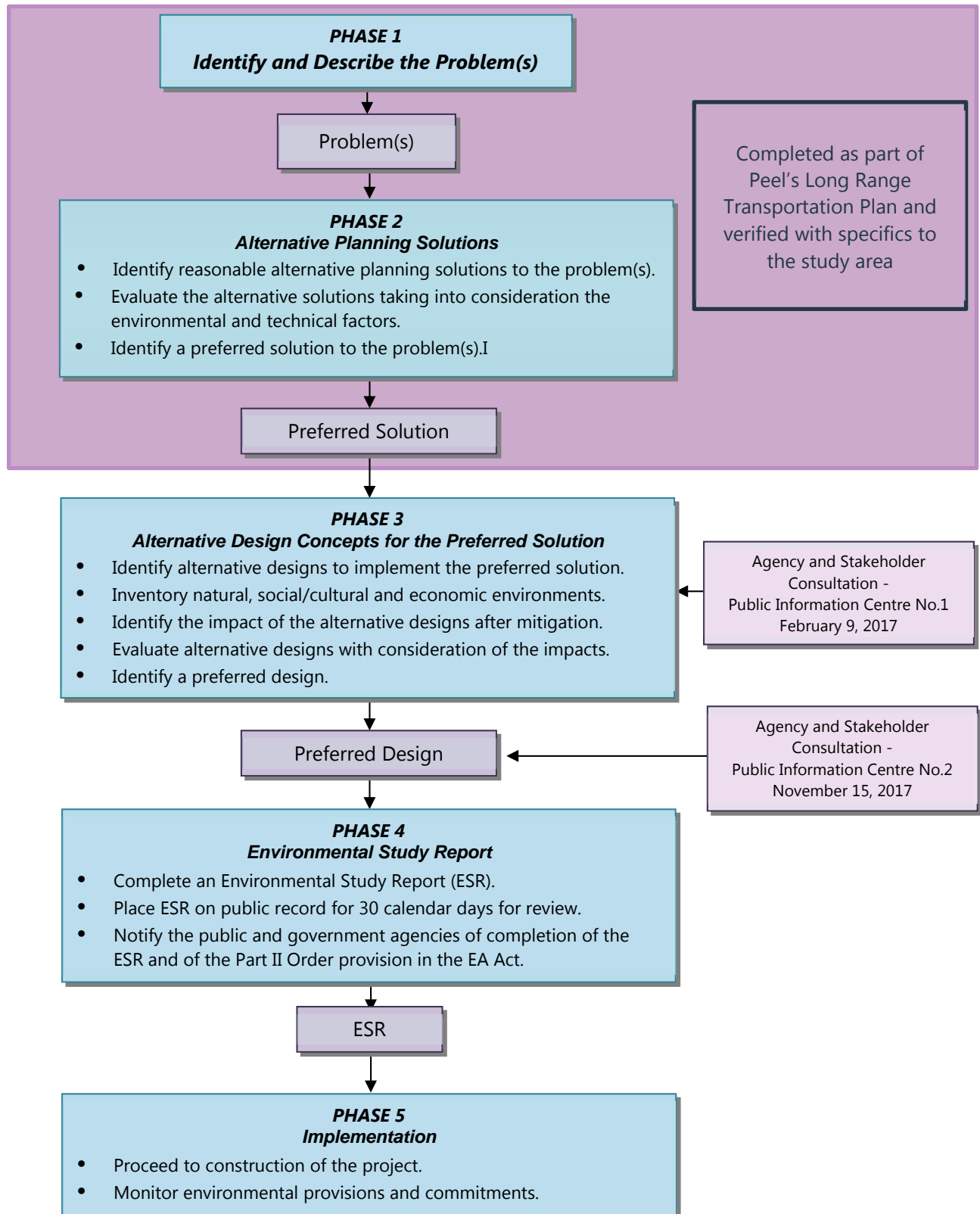


Figure 1.2. General Municipal Class Environmental Assessment Process

2.1.1 Study Relationship to the Long Range Transportation Plan (LRTP)

The scope of Plans such as the LRTP is broad and includes analysis of the transportation system in order to outline a framework for future works and development. They do not typically address site-specific issues; however, they do satisfy the requirements of Phases 1 and 2 of the Municipal Class EA process including problem identification and alternative planning solutions. For this study, the work completed in preparing the Region’s LRTP study has satisfied the first two phases of the Municipal Class EA process for the Mississauga Road study. Phase 1 and Phase 2 were revisited as part of this Class EA to verify the findings within the LRTP and to collect more data specific to the study area including environmental constraints.

2.2 Schedule

The study was initiated in September 2015. Project milestones to date are as follows:

Table 2.1. CONSULTATION SCHEDULE

	Date
Notice of Commencement published in newspaper and mailed to review agencies and affected public	October 27, 2015
Agency Kick-Off meeting	January 21, 2016
TAC Meeting No.1	November 8, 2016
Notice of Public Information Centre No.1 published in newspaper and mailed to review agencies and affected public.	January 26, 2017 February 2, 2017
Public Information Centre No.1	February 9, 2017
TAC Meeting No. 2	October 25, 2017
Notice of Public Information Centre No.2 published in newspaper and mailed to review agencies and affected public.	November 2, 2017 November 9, 2017
Region of Peel broadcast – “Join us tonight for the 2 nd Public Info Centre on Mississauga Road – Financial Drive to Queen Street E. EA”	November 15, 2017
Public Information Centre No. 2	November 15, 2017
Notice of Completion published in newspaper and mailed to review agencies and affected public.	January 10, 2019 January 17, 2019
Documentation of preferred design and filing of Environmental Study Report (ESR)	January 10, 2019

2.3 Project Organization

The Project Team consisted of staff from the following organizations:

Proponent:	Region of Peel Sally Rook, Manager, Infrastructure Programming & Studies Gino Dela Cruz, Project Manager, Infrastructure Programming & Studies Sargon Sifo, Design Engineer, Infrastructure Programming & Studies Asha Saddi, Technical Analyst, Infrastructure Programming & Studies
Prime Consultant:	Wood Environment & Infrastructure Solutions David Sinke, Project Manager Neal Smith, Senior Technologist Jason Stahl, Project Engineer Heather Dearlove, Environmental Planner Mary Kelly, Public Consultation Specialist Nicolas Theodor, Structural Engineer Steve Chipps, Water Resources Engineer Daryl Rideout, Fisheries Biologist Jeff Balsdon, Terrestrial Ecologist Shaun Austin, Senior Archaeologist Linda Axford, Built and Cultural Heritage Specialist Shami Malla, Geotechnical Project Engineer Hoda Seddik, Pavement Engineer Mohammed Salim, Acoustical Specialist Jeff Carson, Environmental Site Assessment
Sub Consultants:	Paradigm Transportation Solutions Ltd.: Gene Chartier – Traffic Analysis James McWilliams – Landscape Architect Matrix Solutions: Ahmed Siddiqui – Fluvial Geomorphology

2.4 Stakeholder and Agency Consultation

An extensive Public Consultation program was implemented for this project to ensure that stakeholders and agency staff were consulted early on, and throughout the Class EA process.

In October 2015, Wood prepared a Public Consultation Plan proposing communication and consultation activities with stakeholders, including the general public, interested persons, Aboriginal Communities and government agencies, throughout the Class EA process. The Consultation Plan was accepted by the Region of Peel and is directing Public Consultation activities throughout the Class EA process.

2.4.1 Phase 1 Consultation

A Notice of Study Commencement was submitted to relevant property owners, agencies, stakeholders, and organizations by mail on October 27, 2015. The notice detailed the study area, summarizing the objectives of the study and requesting comments. In addition, the Notice of Study Commencement was published in the local newspaper, Brampton Guardian, on October 29, 2015 and November 5, 2015.

Correspondence was received from several stakeholders and agencies (**ref. Appendix A – Notice of Commencement**). Copies of the newspaper advertisement, letters to stakeholders and agencies, copies of all comments received, and written responses are contained in **Appendix A – Notice of Commencement**.

2.4.2 Phase 2 and 3 Consultation

Consultation with agencies and the public in Phases 2 and 3 of the Class EA process included meetings with stakeholders and agencies and two Public Information Centres (**ref. Appendix L – Public Information Centre No. 1 and Appendix M – Public Information Centre No. 2**). Stakeholders were notified of the opportunities for consultation by letter and/or newspaper advertisement in the Brampton Guardian. In addition, for Public Information Centre No. 2, the Region of Peel Tweeted – “Join us tonight for the 2nd Public Info Centre on Mississauga Road – Financial Drive to Queen Street E. EA”. Results of the consultation with various stakeholders are discussed in this ESR.

2.4.3 Indigenous Consultation

Indigenous consultation is a key component of the Municipal Class EA process. The Province has delegated the procedural aspects of the Duty to Consult to the Region of Peel (letter dated December 16, 2015) (**ref. Appendix B – Indigenous Consultation**).

2.4.3.1 Identification of Indigenous Groups

Initial consultation was completed with the Ministry of Aboriginal Affairs (MAA) (letter dated February 22, 2016) requesting the Ministry's assistance in identifying Indigenous Groups that may have a potential interest in the Project. No response was received from the MAA and dialogue was held with the Ministry of the Environment, Conservation, and Parks (MECP) about next steps for identifying Indigenous Groups that may have an interest in this Project. Following discussion with the MECP it was determined that the MECP would provide direction on which Indigenous Groups should be contacted. Wood provided a request to MECP (dated March 10, 2016) to confirm the Indigenous Groups that should be contacted for this Project. This request included copies of the letters, Project Information Sheet and Notice of Commencement that were sent to the following Indigenous Groups:

- Mississaugas of the New Credit First Nation;
- Six Nations of the Grand River;
- Haudenosaunee Development Institute, and
- Métis Nation of Ontario.

A response was provided from the MECP (dated March 15, 2016) confirming that the identified Indigenous Groups should be engaged about this Project. The following is a summary of the Indigenous Consultation completed to date.

2.4.3.2 Mississaugas of the New Credit First Nation (MNCFN)

Introductory Letter and Information Package – February 26, 2016: The purpose of this letter was to introduce the project and determine if MNCFN has an interest in the Study.

Follow-up Phone Call – March 15 and 21, 2016: Follow-up phone calls were made to determine the level of interest in this project. An introductory meeting was scheduled.

Letter from MNCFN – April 19, 2016: The Region of Peel (Region) received a letter from the MNCFN that identified that they do not have a high level of concern regarding the Project. MNCFN did request to be kept informed through the sharing of environmental and archaeological reports and be notified if there are any changes to the Project. In the letter, the MNCFN requested that Field Liaison Representatives (FLRs) be on location whenever any fieldwork for environmental and/or archaeological assessment is undertaken.

Introductory Meeting – April 13, 2015: An initial introductory meeting was held April 13, 2016 with representatives from the MNCFN, the Region and Wood. During the meeting the MNCFN identified that they have an interest in the Project and would like to participate. The MNCFN requested the following information:

- Existing environmental and archaeological reports –MNCFN requested copies of any existing studies associated with the Study Areas for their review. The Region provided a link, via email, to the 2006 EA documents on April 14, 2016.
- Contact details for developers in the Study Areas –MNCFN requested contact details for area developers as they have not been engaged by these developers. On April 19, 2016, the Region provided a contact with the Region’s Development Services who can assist in providing the details to MNCFN.
- Field and archaeological monitor participation – MNCFN requires participation of their monitors (FLRs) during fieldwork. An agreement between the Region and MNCFN would be developed to support this participation. As part of this, the Region would fund the participation. The Region requested a copy of the agreement and budget so that they can begin the necessary internal processes. MNCFN issued a draft agreement on April 15, 2016. The Region requested a schedule and list of field studies to be completed so that the MNCFN can prepare a budget and schedule participation.

2.4.3.3 Six Nations of the Grand River (SNGR)

Introductory Letter and Information Package – February 26, 2016: The purpose of this letter was to introduce the Project and determine if SNGR has an interest in the Study.

Follow-up Phone Call – March 15, 2016: A follow-up phone call was made to determine the level of interest in this Project. SNGR identified that they had not received the information. Wood resent the information and confirmed receipt. No response has been provided to date.

2.4.3.4 Haudenosaunee Development Institute (HDI)

Introductory Letter and Information Package – February 26, 2016: The purpose of this letter was to introduce the Project and determine if HDI has an interest in the Study.

Follow-up Phone Calls – March 15 and 16, 2016: Follow-up phone calls were made to determine the level of interest in this project. HDI identified that they would like to meet and that they will require archaeological and environmental field monitors to be present during the field investigations. Several attempts to meet were unsuccessful.

Follow-up consultation – March 30, 2016 to January 2019: Continued correspondence to HDI was issued throughout the study. A letter and Notice of Completion was mailed to HDI in January 2019.

2.4.3.5 Metis Nation of Ontario (MNO)

Introductory Letter and Information Package – February 26, 2016: The purpose of this letter was to introduce the Project and determine if MNO has an interest in the Study.

Follow-up Phone Call – March 15, 2016: A follow-up phone call was made to determine the level of interest in this Project. The MNO had not seen the information package yet but identified that they would not have an interest in the Project but would like to be kept informed about the Study.

2.4.4 Filing of the ESR

All parties having expressed an interest in the project will be notified by letter, regarding the completion of the project and filing of the ESR. In addition, a Notice of Study Completion will be placed in the local newspaper, the *Brampton Guardian* in accordance with the requirements of the Class EA.

Copies of the ESR will be made available at the following locations:

The Region of Peel
Clerk's Division
10 Peel Centre Dr., 5th Floor, Suite A
Brampton, ON

City of Brampton
Clerk's Office – City Hall
2 Wellington Street West
Brampton, ON

Hours:
Mon-Fri: 8:30 a.m. to 4:30 p.m.

Hours:
Mon-Fri: 8:30 a.m. to 4:30 p.m.

A review period of not less than thirty (30) calendar days will be provided, during which comments will be received from stakeholders and agencies. Should stakeholders raise issues that cannot be resolved through discussion with the Region of Peel and consultant staff, the stakeholder may request the Minister of the Environment, Conservation and Parks to require the Region of Peel to complete an individual EA in accordance with Part II of the Environmental Assessment Act, R.S.O. 1990. This is known as a Part II Order Request. However, it is anticipated that all concerns will be resolved through discussion between the Region of Peel and the concerned party.

Written comments should be provided to Asha Saddi, Technical Analyst, Infrastructure Programming and Studies at the Region of Peel, within the 30-day calendar review period. If your concern can not be addressed, you may request that the Minister of the Environment, Conservation and Parks make an Order for the project to comply with Part II of the *Environmental Assessment Act*, which addresses individual environmental assessments. The Minister must receive the request, at the address provided below, by 4:30pm on February 11, 2019.

The Honorable Rod Phillips, Minister of the Environment, Conservation and Parks

77 Wellesley Street West, 11th Floor, Ferguson Block
Toronto, Ontario M7A 2T5

3.0 Existing & Future Conditions

Existing conditions along Mississauga Road are documented on Drawing 1 – Existing Conditions (ref. rear pocket).

3.1 Study Area

The Mississauga Road study area is located within the City of Brampton and extends from just north of Financial Drive to just north of Queen Street (ref. Figure 1.1: Key Plan).

3.2 Land Use and Development Plans

3.2.1 Provincial Land Use Planning Initiatives

The following planning documents were reviewed to determine their applicability to the study area:

- Oak Ridges Moraine Conservation Plan;
- Niagara Escarpment Plan;
- Lake Simcoe Protection Plan;
- The Greenbelt Plan, and
- Parkway Belt West Plan Area.

Based on the review completed, none of the policies identified above have a direct relation to the study area.

The following policies were reviewed to ensure the development proposed is in line with the policies contained within them:

Provincial Policy Statement (2014): The Provincial Policy Statement (2014) provides for appropriate development while protecting resources of provincial interest, public health and safety, and the quality of the natural and built environment. The Provincial Policy Statement supports improved land use planning and management, which contributes to a more effective and efficient land use planning system.

The following policies within the Provincial Policy Statement support potential improvements to the Mississauga Road corridor:

1.1.1 Healthy, livable and safe communities are sustained by:

g) ensuring that necessary infrastructure, electricity generation facilities, transmission and distribution systems, and public service facilities are, or will be available to meet current and projected needs.

1.6 Infrastructure and Public Service Facilities:

1.6.1 Infrastructure, electricity generation facilities and transmission and distribution systems, and public service facilities shall be provided in a coordinated, efficient and cost-effective manner that considers impacts from climate change while accommodating projected needs.

Growth Plan for the Greater Golden Horseshoe: The Growth Plan for the Greater Golden Horseshoe – Places to Grow, was adopted in June 2006 and updated in 2017 under the provisions of the Places to Grow Act, 2005. The plan provides the framework for implementing the provincial government's vision for building strong, prosperous communities by better managing growth to the year 2041 in the burgeoning Greater Toronto and Hamilton Area (GTHA). Since implementation, the plan has been amended to provide population and employment forecasts to the year 2041.

The Growth Plan contains specific policies and directives regarding transportation infrastructure, land use planning, urban form, housing, natural heritage and resource protection to be considered by municipalities in their planning activities. Of particular interest, the Growth Plan provides direction on where growth can occur, the form of future development, and future population and employment forecasts. The City of Brampton and the Region of Peel are within the area designated for potential growth.

3.2.2 Existing Land Use

The land use adjacent to Mississauga Road, within the study area is a combination of residential, commercial, and initial stages of new development (largely residential development). The following is a breakdown of the major land uses along the corridor:

- Single family residential dwellings located along both sides of Mississauga Road;
- A residential community commonly known as Huttonville is located on the west side of Mississauga Road south of the Credit River crossing;
- Numerous heritage designated properties (built heritage structures and cultural heritage landscapes);
- Significant environmental features including the Credit River, a provincially significant wetland, and the Huttonville Environmentally Sensitive Area;
- Commercial development including the Terrace on the Green, and Lionhead Golf and Country Club;
- Vacant land, and
- Land currently being used for agricultural production.

3.2.3 Existing Land Use Designation

Region of Peel

The Region of Peel designates the land surrounding the Credit River as part of the Core Areas of the Greenlands System (October 2014) (ref. Figure 1.3).

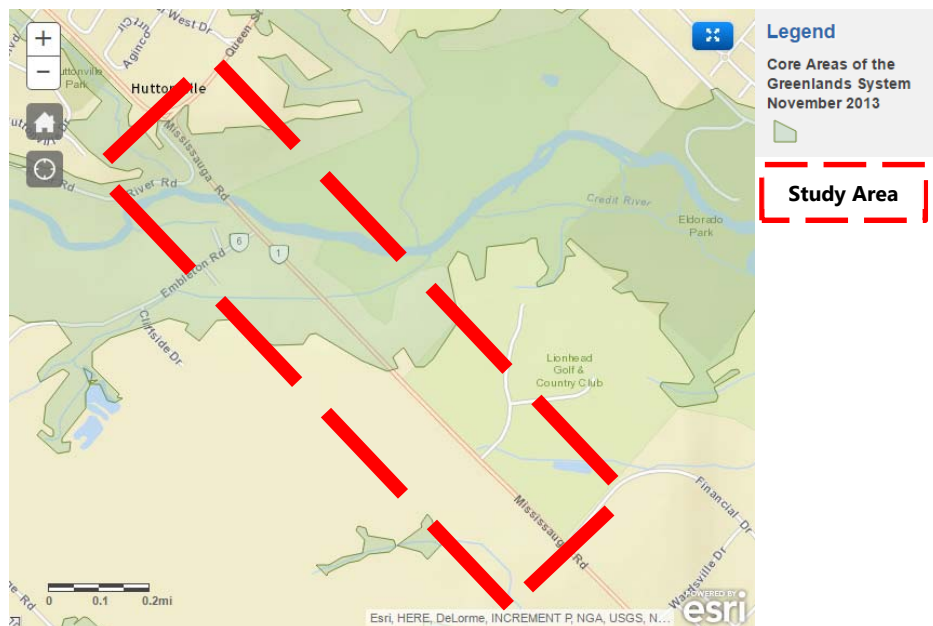


Figure 3.3. Part of Region of Peel Official Plan Schedule A Core Areas of the Greenlands System in Peel Region (October 2014)

The Greenlands System in Peel, which consists of Core Areas, Natural Areas and Corridors, and Potential Natural Areas and Corridors, is intended to support and express the Region’s vision for the protection of the natural environment. The Core Areas contain ecological features, forms and/or functions that provide favorable conditions for uninterrupted natural systems and maximum biodiversity. These areas are protected by the Official Plan and are functionally supported, connected and/or buffered by the Natural Areas and Corridors and Potential Natural Areas and Corridors to form the Greenlands System in Peel. The objective and policies set out in Section 2.3.1 of the Region’s Official Plan (October 2014) address the identification, protection and maintenance of the Greenlands System and restoration and rehabilitation that may enhance the Greenlands System and the natural environment in the Region of Peel.

City of Brampton

The City of Brampton is responsible for the land use designation along the Mississauga Road Corridor.

Figure 3.4. illustrates the designated land use along the corridor which includes residential, village residential, business corridor, and open space designations.

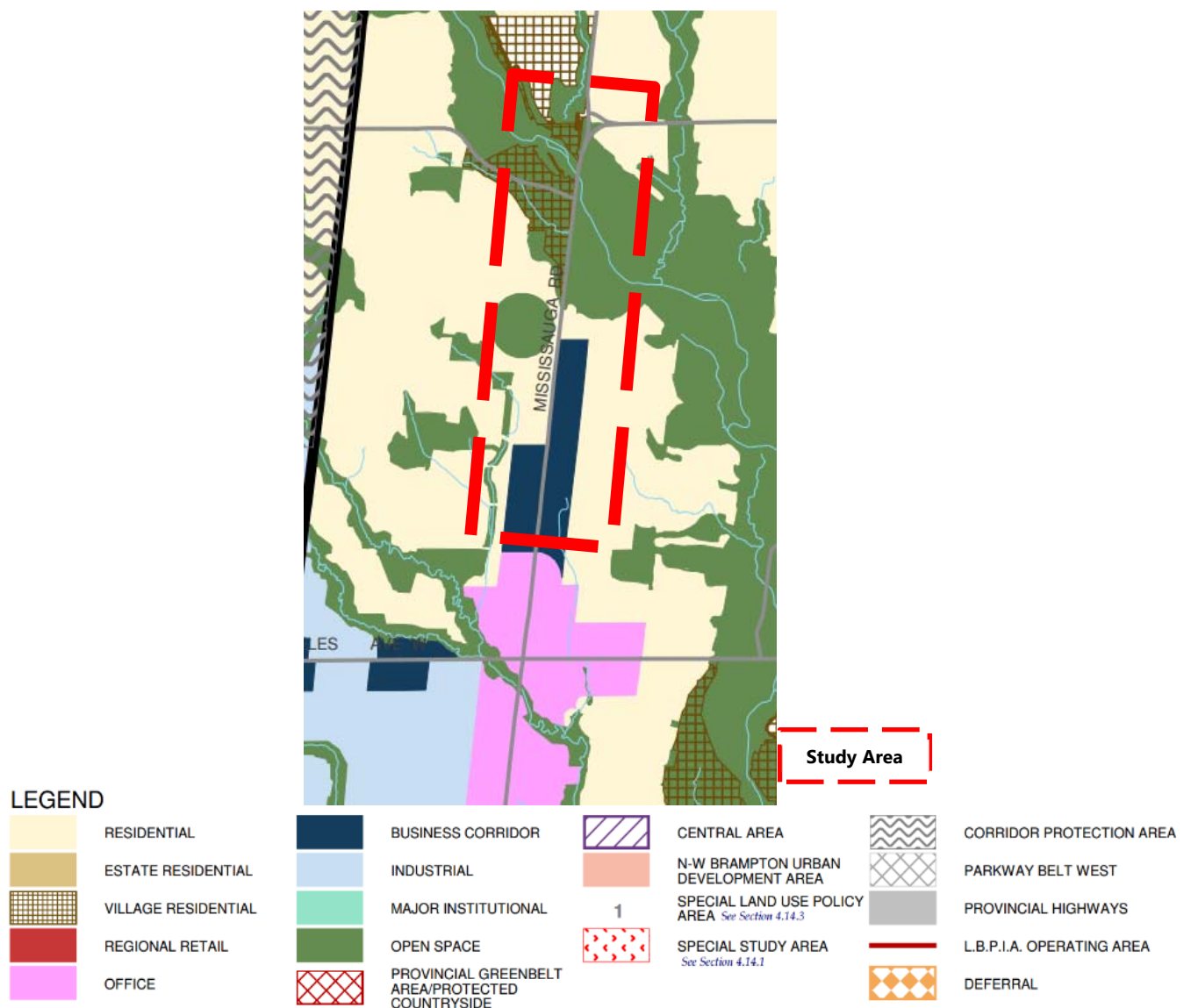


Figure 3.4. Part of the City of Brampton Schedule D – Natural Heritage Features and Area

3.2.4 Proposed Development

The following proposed development has been identified along the study area:

- Future commercial development at 8532 Mississauga Road (located directly across from the Lionhead Golf and Country Club);
- Future residential development at 8500 Mississauga Road, and
- Future extension of Financial Drive west of Mississauga Road.

3.3 Transportation

Paradigm Transportation Solutions Ltd., as sub-consultant to Wood, completed a Traffic Study to investigate existing and future traffic conditions in the study corridor. The study assessed the need for improvements to accommodate traffic in a safe and efficient manner (**ref. Appendix C – Traffic and Transportation Report**).

3.3.1 Adjacent Projects and Planning Documents

The following studies and initiatives were reviewed by Paradigm to determine the potential impact to this study:

- Provincial Growth Plan for the Greater Golden Horseshoe
- Metrolinx “The Big Move” – Regional Transportation Plan for the GTHA;
- GTA West Transportation Corridor Planning and Environmental Assessment Study;
- Halton-Peel Boundary Area Transportation Study;
- Region of Peel and City of Brampton Official Plans;
- Region of Peel Long Range Transportation Plan;
- Region of Peel Road Characterization Study;
- Region of Peel Strategic Goods Movement Network Study;
- Region of Peel Active Transportation Plan
- City of Brampton Transportation Master Plan, and
- Land Development Applications for properties adjacent to the corridor (including FourX, Bluegrass, Mount Pleasant, Riverview Heights, and Heritage Heights).

3.3.2 Existing Roadway Network

The main connecting roadways within the Study Area include (ref. Figure 1.1):

- **Mississauga Road** is a north-south Regional Arterial Road that extends from Caledon in the north, through the City of Brampton, and to the City of Mississauga in the south. Within the Study Area, Mississauga Road has various speed limits (ranging from 60 to 80 km/h), features urban and rural cross sections, and provides one (1) to three (3) travel lanes per direction, with auxiliary lanes at many intersections.
- **Queen Street West** is a two to four lane, east-west Regional Arterial Road that runs east from Mississauga Road to downtown Brampton. Within the Study Area, Queen Street West has a four-lane urban cross-section with a posted speed limit of 60 km/h. Queen Street West extends westerly from Mississauga Road as River Road, a local road providing access to the residential area situated west of the signalized intersection.

- **Embleton Road** is a two lane Regional Arterial Road that runs west from Mississauga Road to the Peel-Halton border and continues as 5th Sideroad within Halton Region. Within the Study Area, Embleton Road has a two-lane rural cross section and a posted speed limit of 50 km/h. At its signalized intersection with Mississauga Road, Embleton Road has a shared left-right turn lane and is constrained by a narrow road allowance.
- **The Lionhead Golf Club Road** intersects with Mississauga Road south of Embleton Road at a signalized intersection. The west leg of the intersection currently serves as a construction access road to new residential lands and will provide a local road connection to this area in the future.

There is also a significant driveway that intersects with Mississauga Road within the Study Area:

- **The Terrace on the Green Restaurant driveway** intersects with Mississauga Road north of Lionhead Golf Course and Country Club signalized intersection. The driveway is on the westside of Mississauga Road and on the steep southbound grade. The proposed design does not impact the driveway. The existing northbound left turn will be maintained.

3.3.3 Existing Traffic Conditions

The following is a summary of the analysis of existing traffic conditions along the Mississauga Road Corridor.

- Midblock traffic volumes are approaching or already exceed capacity at locations along Mississauga Road within the Study Area. Specific observations include:
 - ◆ During the AM peak hour, the highest peak period ratios occur between Queen Street West and Embleton Road, and Embleton Road and Lionhead Golf and Country Club driveway. The findings suggest that this section of Mississauga Road is over capacity during the morning peak.
 - ◆ In the PM peak hour, the segment of Mississauga Road between Queen Street West and Lionhead Golf and Country Club driveway is also over capacity.
- All intersections within the Study Area operate with an overall acceptable level of service during the AM and PM peak hours. Specific observations include:
 - ◆ Mississauga Road at Queen Street West/River Road – During the AM peak hour, the westbound left turn operates poorly and the southbound through operates with LOS E. These two movements effectively exceed capacity. In the PM peak hour, the westbound left turn movement operates poorly.
 - ◆ Mississauga Road at Embleton Road – During the AM peak hour, the eastbound shared left-right turn movement operates poorly. The southbound shared through-right turn movement is approaching capacity but operates sufficiently. In the PM peak hour, the eastbound shared left-right turn movement has reached capacity and operates poorly.
 - ◆ Mississauga Road at Lionhead Golf and Country Club Driveway – During the AM and PM peak hours, the eastbound and westbound movements experience significant delay, likely caused by the length of green time allocated to serve northbound and southbound traffic demand.
- Several individual intersection movements are approaching or exceeding their capacities. Optimizing the traffic signal phase timings would improve operations during the AM and PM peak hours. However, the southbound through movement at the Mississauga Road and Queen Street West/River Road intersection would still be approaching capacity.

3.3.4 Traffic Operations

Intersection level of service is a recognized method of quantifying the efficiency of traffic flow at intersections. It is based on the delay experienced by individual vehicles executing the various movements. The delay is related to the number of vehicles desiring to make a particular movement, compared to the estimated capacity for that movement.

For the Mississauga Road study area, the following is noted:

- **Mississauga Road at Queen Street West/River Road** – During the AM peak hour, the westbound left turn operates with LOS E and a v/c ratio of 0.99, and the southbound through operates with LOS E and a v/c ratio of 1.07. These two movements effectively exceed capacity. In the PM peak hour, the westbound left turn movement operates at capacity with LOS F and a v/c ratio of 0.97.
- **Mississauga Road at Embleton Road** – During the AM peak hour, the eastbound shared left-right turn movement operates with LOS E and a v/c ratio of 0.84. The southbound shared through-right turn movement is approaching capacity with a v/c ratio of 0.96, but operates with LOS B. In the PM peak hour, the eastbound shared left-right turn movement has reached capacity with a v/c ratio of 1.0 and operates at LOS F.
- **Mississauga Road at Lionhead Golf and Country Club Driveway** – During the AM and PM peak hours, the eastbound and westbound movements experience significant delay, likely caused by the length of green time allocated to serve northbound and southbound traffic demand.

3.3.5 Future Traffic Conditions

The following summarizes the results of the traffic analysis for future conditions (2031).

- Midblock traffic volumes are expected to exceed capacity at all locations along Mississauga Road within the Study Area by the year 2031. Even with six (6) lanes, Mississauga Road will be over capacity during the 2031 AM and PM peak hours.
- The intersection operations analysis reflects the forecasted northbound and southbound midblock capacity issues, with several intersections within the study area expected to operate with poor levels of service by the year 2031. Specific observations include:
 - ◆ Mississauga Road at Queen Street West/River Road – The westbound left turn movement is expected to operate over capacity with a V/C greater than 1.0 and a LOS of F during the AM and PM peak hours. The southbound left turn movement is expected to operate poorly during the PM peak hour.
 - ◆ Mississauga Road at Embleton Road – During the AM peak hour, the eastbound shared left-right turn movement is expected to operate near capacity with a V/C greater than 0.92 and a LOS of E. The southbound through-right movement is expected to operate over capacity with a V/C greater than 1.0 and a LOS of F. During the PM peak hour, the eastbound shared left-right turn movement and the northbound through movement is expected to operate poorly with a V/C greater than 1.0 and a LOS of E and LOS F, respectively.
 - ◆ Mississauga Road at Lionhead Golf and Country Club Driveway – During the AM and PM peak hours, the eastbound and westbound movements are expected to continue to experience delay caused by northbound and southbound traffic demand.
 - ◆ The operational effects of widening Mississauga Road to six (6) lanes but retaining the current four-lane cross-section over the Credit River structure, were assessed through microsimulation analysis using VISSIM. The analyses indicated that traffic operational performance of Mississauga Road and the network as whole would be significantly deteriorated if the current cross-section over the structure is retained.

3.3.6 Existing Transit and Active Transportation Network

Transit: The City of Brampton (Brampton Transit) currently operates one bus route that extends through the study area, Route 60 Mississauga Road. A westward expansion of Brampton Transit's Züm Bus Rapid Transit service along Queen Street West was completed 2016. Within the Study Area, new Züm transit stops were provided on Mississauga Road at Queen Street West in advance of the 6-lane widening.

Active Transportation Infrastructure: Within the Study Area active transportation infrastructure varies depending on location due to the differences in the road cross-section along Mississauga Road. Pedestrian infrastructure is provided along Mississauga Road in the form of either a sidewalk or multi-use trail on at least one side of the road. South of Queen Street West, on the west side, there is sidewalk that provides access to River Road via stairs. The sidewalk ends at the stairs and there is no active transportation facility from that point to Embleton Road.

There are currently no on-street bike lanes on Mississauga Road within the Study Area.

3.3.7 Geotechnical Investigation

Wood conducted a geotechnical investigation that included a pavement investigation and a preliminary foundation investigation at the Credit River Bridge. (**ref. Appendix N – Geotechnical Investigation and Pavement Design Report**).

3.3.8 Existing Pavement Conditions

A preliminary pavement investigation was completed by Wood in (**ref. Appendix N – Geotechnical Investigation and Pavement Design Report**). The condition of the existing asphaltic concrete surface from north of Financial Drive to North of Queen Street West ranged from "Good to Fairly Good".

3.3.9 Credit River Structure

The existing structure over the Credit River is a three-span concrete structure, consisting of concrete deck slabs over girders supported by two piers and abutments. The structure is approximately 18.3m wide and 76.9m long and carries four (4) lanes of traffic.

3.4 Natural Environment

3.4.1 Terrestrial Resources

Wood completed a Terrestrial Habitat Existing Conditions report which documented significant terrestrial and aquatic resources. (**ref. Appendix D - Terrestrial and Aquatic Reports**). Through a secondary source information review, two field investigations conducted by Wood and correspondence with the Ministry of Natural Resources and Forestry (MNR), terrestrial resource information was gathered for the study area.

The MNR reported that 15 terrestrial or semi-terrestrial Species at Risk (SAR) as well as five natural heritage features exist within the vicinity of the study area. A total of five of these SAR were assessed as having a high probability of occurrence within the study area, based on habitat preference and existing conditions within the study area. These included the Chimney Swift, Barn Swallow, Little Brown Myotis, Eastern Milksnake and Monarch Butterfly.

The study area land was classified as primarily residential and commercial (78.4%), while also containing some cultural vegetative habitats, classified as cultural due to their anthropogenic origins. The remaining 21.6% of the land in the study area is classified as natural / semi-natural and is most strongly associated with the watercourses in the area, though these areas do contain many non-native species due to their proximity to other cultural habitats.

3.4.2 Aquatic Resources

The Mississauga Road study area contains two watercourse crossings and two cross drainage ditches. The crossings within the study limits include the main branch of the Credit River and a culvert at an unnamed tributary to the Credit River.

Wood conducted an aquatic field survey in which information regarding flows and associated habitat availability as well as potential impediments to upstream fish movements was collected (**ref. Appendix D - Terrestrial and Aquatic Reports**). Fish sampling was judged as unnecessary due to the sufficient amounts of existing data regarding the Credit River and due to the lack of water necessary for fish sampling in the unnamed tributary. Although secondary source information indicated the existence of Redside Dace (a provincially endangered species) within the study area, the likelihood of Redside Dace within the study area was deemed low due to the large size of the Credit River and its lack of overhanging streamside vegetation.

The Credit River remains a natural channel with residential areas beyond the riparian zone on the west side of Mississauga Road and remnant wood lots and golf greens at the top of its banks on the east side of Mississauga Road. The Credit River is a permanent, coolwater, and a high sensitivity watercourse supporting a resident warmwater and coolwater fish community.

The Credit River has been identified by Aurora District MNRF as having 'High' sensitivity, undoubtedly due to its coolwater thermal regime and utilization by migratory coldwater species. Reproduction of these migratory species is suspected to occur within the tributaries in the upper reaches of the Credit River watershed; however, the Credit River can also provide important refuge habitat for the young of these migratory species.

The unnamed tributary to the Credit River originates approximately 1 km west of Mississauga Road and south of Embleton Road in the agricultural field across the road from Huttonville Public School. This tributary is directly associated with the Churchville-Norval Wetland Complex and it connects with two ponds as it travels east to Mississauga Road. The tributary passes through an irregular shaped corrugated steel pipe culvert under Mississauga Road. On the east side of Mississauga Road, the tributary flows underground approximately 180 m before draining into an open wetland and ultimately discharging into the Credit River. This tributary did not have sufficient flow to provide direct fish habitat at the time of Wood's field inspection, however, the CVC has records of Pumpkinseed (*Lepomis gibbosus*), Brown Bullhead (*Ameiurus nebulosus*) collected in 2004. The CVC has classified the unnamed tributary as a warmwater thermal regime with an in-water timing window for construction extending from July 1 to March 31.

3.4.3 Existing Stormwater Management

The existing roadway drainage is split between two (2) watersheds: The Credit River and the Levi Creek as described below. The existing Mississauga Road encompasses a series of storm sewers conveying minor system flows, and a series of urban and semi-urban R.O.W.s conveying major system flows. The minor system includes storm events up to the 10-year storm event, and the major system includes storm events greater than the 10 year, up to the 100 year storm event.

Credit River: Approximately 5.33 ha of minor system drainage and 12.93 ha of major system drainage from the Mississauga Road R.O.W. is conveyed directly to the Credit River.

Levi Creek: Approximately 0.20 ha of minor and major system drainage from the Mississauga Road R.O.W. is conveyed directly to the Levi Creek approximately 1.5 km to the south of the study area.

3.4.4 Fluvial Geomorphic Assessment

Matrix Solutions, a sub-consultant to Wood E&IS, completed a Fluvial Geomorphic Assessment for the Class EA (**ref. Appendix F – Fluvial Geomorphic Assessment**). The scope of work included consideration of fluvial geomorphology within the study area, with particular focus on the stream Meander Belt Assessment in order to determine trends, channel reaches, meander belt width, meander amplitude, erosion and scouring characteristics and identify potential setbacks, buffers or mitigation measures for work taking place around these features. The Meander Belt Assessment will also be used to provide input into the sizing of replacement culvert structures and ensuring watercourse structures are sized at minimum, based on the local erosion within the watercourse.

Prior to undertaking the fluvial geomorphological assessment, a background review was undertaken to highlight other studies and previous work of relevance to fluvial geomorphology within the study area. In September 2016, field reconnaissance was completed for reach crossings within the study area which included: Rapid Geomorphic Assessments (RGAs), documenting channel stability; Rapid Stream Assessment Technique (RSAT), documenting channel dimensions and degree of watercourse health, and Stream Crossing Assessment Forms, which record information regarding the condition of crossing structures and the watercourse upstream and downstream of the crossing. A detailed historical assessment was completed, using available mappings, aerial photos from 1974 and 1989, and digital ortho-imagery from 2016, to quantify changes in channel location and migration tendencies.

A final meander belt width of approximately 168 m was estimated for the study reach. A preliminary belt width of 140 m was measured representing the width of the controlling meander bends which define the meander belt boundary. This width also takes into consideration historical planform alignments of the river.

The Credit River crossing of Mississauga Road is located along a generally straight section of the river; with a slight south easterly curve. The current bridge structure is constructed with two piers spaced approximately 16 m apart. The slight curve in the reach has caused scour along the length of the right abutment (looking downstream). There is no flow through either side of the piers, but stagnant water is present. The Credit River ranges from approximately 23 to 27 m wide at bankfull near the bridge crossing. To compensate for the flow constricted through the 16 m space between the piers, the flow over-widens on the downstream, eastern edge of the bridge. At the downstream end of the crossing, the river meanders south-easterly to run almost parallel to Mississauga Road for 150 m. The initial portion of the meander puts the right bank of the Credit River less than 10 m from Mississauga Road.

3.4.5 Hydrogeological Investigation

Wood provided a Hydrogeological Assessment Report (**ref. Appendix G – Hydrogeological Report**) that outlines a preliminary assessment of the local area and the impacts of the proposed construction on the surrounding private well and septic system users and the local environment. The report serves to summarize the investigation completed at the site, in-situ hydraulic conductivity testing and groundwater level measurements.

Based on information made available to Wood and the information acquired through site visits, subsurface soils were found to consist of fine-grained, relatively cohesive till or till-like soils in the vicinity of the Credit River, though there were coarser native soils noted along much of the rest of Mississauga Road. During field investigations in June, September and October 2017, groundwater levels were noted to range between 1.8m below grade surface (bgs) and 5.4m bgs. Hydraulic conductivity values of 1.6×10^{-8} m/s (in weathered shale) and 1.7×10^{-9} m/s (tight clay silt / silty clay soils) were found through tests completed in monitoring wells installed near the Credit River and can be used in assessing dewatering requirements near the Credit River for similar soils or rock.

3.4.6 Air Quality Assessment

Wood completed an Air Quality Assessment for the study area (**ref. Appendix H – Air Quality Assessment Report**). The study was completed to:

- Provide estimates of the air emissions resulting from vehicular traffic;
- Predict the resulting air quality effects on ambient air, with consideration of existing background air quality; and
- Provide a qualitative discussion of the significance of potential effects and a quantitative comparison of the future air quality effects to the current scenario.

The conclusions reached in this report are summarized in Section 6.2.3.

3.5 Socio-Economic Environment

3.5.1 Utilities

As part of the study, utility companies were contacted to confirm their plant locations within the study corridor. The following summarizes existing plant locations:

- Bell Canada
 - ◆ From Lionhead Golf Course Road to 250m north of Lionhead Golf Course Road, existing conduit runs along both sides of Mississauga Road approximately 2m off property line;
 - ◆ From 250m north of Lionhead Golf Course Road to Queen Street, existing conduit runs along the west side of Mississauga Road, with a large branch at the bend with River Road and a crossing under the Credit River.
- Enbridge Gas (local and distribution)
 - ◆ No plant was identified by Enbridge Gas within the project area.
- Rogers Cable
 - ◆ Rogers has an existing aerial coaxial and fiber tv plant along the west side of Mississauga Road (on Alectra Hydro poles), and
 - ◆ A number of underground crossings to service existing residences occur throughout the study area.
- Alectra Hydro (formerly Brampton Hydro)
 - ◆ For the length of the study area, hydro has a running line along the west side of Mississauga Road, and
 - ◆ A number of local service connection cross Mississauga Road aerially throughout the study area.
 - ◆ Streetlighting on east side on Mississauga Road is on streetlight poles and on the west side the majority of the streetlighting is on hydro poles.

- Region of Peel Watermain
 - ◆ An existing 600mm dia. Concrete Pressure Pipe (CPP) watermain runs along the west side of Mississauga Road for the length of the study area.
 - ◆ An existing 300mm dia. PVC watermain parallels the existing 600mm dia. CPP watermain from Queen Street to 300m south of Embleton Road.
 - ◆ A number of above ground appurtenances (ie. hydrants, valve chambers, and drain chambers) occur throughout the study area.

3.5.2 Archaeology

Stage 1

A Stage 1 archaeological assessment was conducted across a study area of 11.52 hectares (**ref. Appendix I – Stage 1 and Stage 2 Archaeological Assessment**). Through information collected from the Ministry of Tourism, Culture and Sport (MTCS) as well as a desktop review of the study area’s physical setting, it was determined that those portions of the study area that remained undisturbed had archaeological potential for four reasons: the close proximity of a natural water course, a clear pattern of pre-contact Aboriginal and historic Euro-Canadian land use in the vicinity, the close proximity of early transportation routes and the close proximity of the historic Huttonville Cemetery. It was then concluded that approximately 87% of the study area (9.99 hectares) required no further archaeological assessment, while the remaining 13% (or 1.53 hectares) of the study area was deemed to possess some archaeological potential, therefore warranting a Stage 2 archaeological assessment.

Stage 2

A Stage 2 archaeological assessment for the proposed widening of Mississauga Road (Regional Road 1) between Financial Drive and Queen Street West (Regional Road 6) in the City of Brampton, Ontario was completed as identified in the Stage 1 report (**ref. Appendix I – Stage 1 and Stage 2 Archaeological Assessment**).

The Stage 2 test pit survey was conducted prior to any land development. At the request of the Region of Peel and prior to commencing Stage 2 field activities, Wood provided information sharing letters to three Indigenous groups. Appendix E of this report contains the Indigenous Engagement Documentation. All aspects of the Stage 2 assessment were conducted in accordance with the MTCS Standards and Guidelines for Consultant Archaeologists (2011).

In the course of the Stage 2 assessment no cultural artifacts were encountered in any of the test pits advanced. No archaeological materials were recovered, and no new archaeological sites were identified.

In light of these results, the following recommendations are made, subject to the conditions below and the advice on compliance with legislation contained in Section 6.0:

1. The assessed portions of the study area, as noted on Figures 7a-e in Appendix A of the Stage 2 Archaeological Report, do not require further archaeological assessment.
2. The unassessed portions of the study area, as noted on Figures 7b and 7e in Appendix A of the Stage 2 Archaeological Report, require Stage 2 archaeological assessment by means of test pit survey in accordance with Section 2.1.2 of the MTCS *Standards and Guidelines for Consultant Archaeologist (2011)* prior to any form of land alteration.

3.5.3 Built Heritage and Cultural Landscape Assessment

A Built Heritage and Cultural Landscape Assessment was conducted by Wood in May 2016 (**ref. Appendix J - Built Heritage and Cultural Landscape Assessment**). All aspects of the Built Heritage/Cultural Heritage Landscape Assessment were conducted in accordance with *Ontario Regulation 9/06* made under the *Ontario Heritage Act*, as amended in 2005, and the guidelines presented in the Ontario Ministry of Tourism, Culture and Sport's *Ontario Heritage Tool Kit*. The character of the Mississauga Road study area is a mixture of residential and agricultural development with urban and rural land uses. It contains both open fields and mid-century homes and is being prepared for new housing subdivisions. The exceptions are mostly clustered around the village of Huttonville and include a mill and power house, a church, a store and various residences. These heritage resources are designated or listed with the City of Brampton.

Table 3.1 lists the heritage resources (built heritage and cultural landscapes) within or near the study area. The final design should respect built heritage and cultural landscapes within the study area.

Table 3.1. HERITAGE RESOURCES WITHIN OR NEAR THE STUDY AREA

Address	Name	Recognition	Notes
2 & 3 – 2100 Embleton Road	McMurphy Woolen Mill	Designated	Near road and Credit River.
1 – 2100 Embleton Road	McMurphy Powerhouse	Designated	Behind Mill, outside the study area.
2051 Embleton Road	Huttonville United Church	Designated	Outside the study area
2014 Embleton Road	Residence	Listed "B"	Apparently abandoned house near northwest corner of Mississauga Road and Embleton Road.
2015 Embleton Road	Residence	Listed "B"	First house on southeast corner of Embleton Road set well back from Mississauga Road.
2045 Embleton Road	Huttonville Store	Listed "B"	Outside the study area
8837 Mississauga Road	Residence	Listed "B"	House is behind rows of conifers that line the road.
8935 Mississauga Road	Hutton Home	Listed "B"	House set back from road with mixed planting in front, along road.
18 River Road	Residence	Listed "B"	House on north side of River Road facing Mississauga Road.
River Road	River Road	Listed "B"	The entire road is a Cultural Heritage Landscape. It is on the north side of the Credit River.

4.0 Development and Evaluation of Alternative Planning Solutions

4.1 Problem and Opportunity Statement

The purpose of this study is to address existing and future opportunities and constraints along the Mississauga Road corridor, through a comprehensive, environmentally sound planning process, and while facilitating dialogue between stakeholders with diverse interests. Based on a review of existing and future conditions, as well as preliminary consultation with stakeholders, it was determined that improvements are needed along the Mississauga Road corridor. The specific problems and opportunities to be addressed are as follows:

- existing and future traffic congestion;
- accommodation of transit;
- accommodation of future development;
- roadway geometrics;
- pavement conditions;
- pedestrian and cyclist facilities;
- intersection operations;
- traffic, pedestrian and cyclist safety;
- drainage deficiencies and opportunities for stormwater management, and
- accommodation of future municipal services and utilities within the ultimate right-of-way.

4.2 Evaluation Criteria

As part of the initial phases of this study the following preliminary evaluation criteria was developed to reflect the concerns of various stakeholders, as communicated through preliminary consultation. **Table 4.1** provides a description of the anticipated evaluation criteria that will be used in subsequent phases of the study:

Table 4.1. EVALUATION CRITERIA FOR PLANNING ALTERNATIVES

Component	Evaluation Criteria	Description
Natural Environment	Wetlands and Vegetation	Potential adverse effects on terrestrial species and habitats
	Wildlife Habitat	Potential adverse effects on existing wildlife due to disturbance or loss of habitat
	Species at Risk	Potential effects on Species at Risk identified within the study area
	Groundwater	Potential adverse effect on groundwater and wells including groundwater discharge and recharge
	Fisheries and Water Quality	Potential to minimize impact on aquatic features
	Flooding, Erosion and Water Quality	Potential impact on flood potential, flood elevations, downstream erosion risk and water quality
Social Environment including Cultural, and Economic	Land Use	Presence, number and characteristics of residences, community facilities, public parks, institutions or businesses within or adjacent to the study corridor
	Noise	Impact on noise levels at noise sensitive receivers during or after construction
	Archaeology and Cultural Heritage Resources	Potential adverse effects on archaeological and built heritage resources
	Agricultural	Potential adverse effects on agricultural lands and operations
	Access Considerations	Ability to maintain/maximize access following construction

Component	Evaluation Criteria	Description
	Utilities	Ability to minimize effects on existing and proposed utilities
	Construction Disruptions	Ability to minimize construction constraints and complexity
Health	Active Modes of Transportation	Ability to contribute to the Active Transportation (AT) network through the corridor including the provision of continuous facilities, AT type and design, and access to destinations along the corridor
	Accessibility	Ability to maintain or enhance accessibility of the roadway for all road users including pedestrians
	Air Quality	Ability to reduce emission associated with transportation within the study area
Transportation	Safety	Ability to improve vehicular and active transportation safety
	Travel Delay/ Traffic Capacity	Potential to address existing and future capacity and operational needs
	Transit	Potential to address transit needs for future planned transit initiatives
Costs	Capital Cost	Capital cost of the proposed improvements
Technical	Constructability	The degree of ability to construct the improvements in a simple and cost-effective manner
	Adherence to Applicable Design Standards	Degree to which the proposed improvements meet applicable standards and codes
Transportation Plans & Policies	Compatibility with Regional and City Transportation Plans and Policies	Compatibility with Regional and Municipal Official Plans and Policies

4.3 Identification of Planning Alternatives

The following planning alternatives have been identified for consideration in addressing the problems and opportunities discussed above:

- Alternative 1: Do Nothing:** Maintain Mississauga Road in its present configuration with no improvements other than regular maintenance.
- Alternative 2: Improve other Roads:** Add capacity to adjacent parallel roads to accommodate traffic.
- Alternative 3: Transit Infrastructure Improvements:** Improve transit infrastructure to support Brampton Bus Rapid Transit Service and address capacity requirements.
- Alternative 4: Active Transportation (AT) Infrastructure Improvements:** Improve AT infrastructure to support Region of Peel's Active Transportation Plan.
- Alternative 5: Travel Demand Management (TDM):** Encourage and support change in travel behavior to reduce peak travel demand by:
- Promoting car-pooling and possible HOV lanes
 - Promoting flexible work hours, increase active transportation trips (biking/walking)

Alternative 6: Widen Mississauga Road with Intersection Improvements: Addition of through traffic lanes including intersection improvements, to increase traffic capacity of the corridor.

Alternative 7: Combination: Combination of:

- Improve transit services
- Improve AT
- Travel Demand Management
- Widen Mississauga Road

Alternatives 1 and 2 were eliminated as part of the Region's Long Range Transportation Plan process and not carried forward for further consideration.

4.4 Preliminary Assessment of Planning Alternatives

The assessment of the planning alternatives can be found in **Table 4.2**.

Table 4.2. ASSESSMENT OF ALTERNATIVE PLANNING SOLUTIONS

Component	Evaluation Criteria	Alternative 1: Do Nothing: Maintain Mississauga Road in its present configuration with no improvements other than to continue regular maintenance	Alternative 3: Transit Infrastructure Improvements: Improve transit infrastructure to support Brampton Transit (Zum and/or standard services) and address capacity requirements	Alternative 4: Active Transportation (AT) Infrastructure Improvements: Improve AT infrastructure to support Region of Peel's Active Transportation Plan.	Alternative 5: Travel Demand Management (TDM): Encourage and support change in travel behavior to reduce peak travel demand	Alternative 6: Widen Mississauga Road with Intersection Improvements: Addition of through-traffic lanes including intersection improvements, to increase traffic capacity of the corridor	Alternative 7: Combination of 4, 5, and 6: • Improve transit services • Travel Demand Management • Widen Mississauga Road
Natural Environment	Wetlands and Vegetation	No impacts	Minor impacts dependent on the scope of the transit improvements implemented	Minor impacts dependent on the scope of the AT improvements implemented	No impacts	Potential for impacts dependent on the design of the widening but can be mitigated with established practices and guidelines	Potential for impacts dependent on the design of the widening and other improvements but can be mitigated with established practices and guidelines
	Wildlife Habitat	No impacts	Minor impacts dependent on the scope of the transit improvements implemented	Minor impacts dependent on the scope of the AT improvements implemented	No impacts	Potential for impacts dependent on the design of the widening but can be mitigated with established practices and guidelines	Potential for impacts dependent on the design of the widening and other improvements but can be mitigated with established practices and guidelines
	Species at Risk	No impacts	Minor impacts dependent on the scope of the transit improvements implemented	Minor impacts dependent on the scope of the AT improvements implemented	No impacts	Potential for impacts dependent on the design of the widening but can be mitigated with established practices and guidelines	Potential for impacts dependent on the design of the widening and other improvements but can be mitigated with established practices and guidelines
	Groundwater	No impacts	Minor impacts dependent on the scope of the transit improvements implemented	Minor impacts dependent on the scope of the AT improvements implemented	No impacts	Potential for minor impacts dependent on the design of the widening but can be mitigated with established practices and guidelines	Potential for minor impacts dependent on the design of the widening and other improvements but can be mitigated with established practices and guidelines
	Fisheries and Water Quality	No impacts	Minor impacts dependent on the scope of the transit improvements implemented	Minor impacts dependent on the scope of the AT improvements implemented	No impacts	Potential for minor impacts dependent on the design of the widening but can be mitigated with established practices and guidelines	Potential for minor impacts dependent on the design of the widening and other improvements but can be mitigated with established practices and guidelines
	Flooding, Erosion and Water Quality	No impacts	Minor impacts dependent on the scope of the transit improvements implemented	Minor impacts dependent on the scope of the AT improvements implemented	No impacts	Potential for minor impacts dependent on the design of the widening but can be mitigated with established practices and guidelines	Potential for minor impacts dependent on the design of the widening and other improvements but can be mitigated with established practices and guidelines
	Summary	Most Preferred		Neutral	Neutral	Most Preferred	Not Preferred
Social Environment including, Cultural, and Economic	Land Use	With increase in traffic volumes and no expansion of existing facilities, congestion would create a	Minor impacts dependent on the scope of the transit improvements implemented	Minor impacts dependent on the scope of the AT improvements implemented	No impacts	Minor impacts to land use along corridor dependent on property acquisition required for the design of the widening	Minor impacts to land use along corridor dependent on property acquisition required for the design of the widening

Component	Evaluation Criteria	Alternative 1: Do Nothing: Maintain Mississauga Road in its present configuration with no improvements other than to continue regular maintenance	Alternative 3: Transit Infrastructure Improvements: Improve transit infrastructure to support Brampton Transit (Zum and/or standard services) and address capacity requirements	Alternative 4: Active Transportation (AT) Infrastructure Improvements: Improve AT infrastructure to support Region of Peel's Active Transportation Plan.	Alternative 5: Travel Demand Management (TDM): Encourage and support change in travel behavior to reduce peak travel demand	Alternative 6: Widen Mississauga Road with Intersection Improvements: Addition of through-traffic lanes including intersection improvements, to increase traffic capacity of the corridor	Alternative 7: Combination of 4, 5, and 6: • Improve transit services • Travel Demand Management • Widen Mississauga Road
		negative impact on the existing land use					
	Noise	With increase in traffic volumes and no expansion of existing facilities, congestion, and in turn noise, will increase	A reduction in predicted traffic volumes would be achieved, however, background traffic would still increase, and in turn noise, will increase	Potential for minor impacts dependent on the scope of the AT improvements implemented	A reduction in predicted traffic volumes would be achieved, however, background traffic would still increase, and in turn noise, will increase	Potential increase in noise due to increased traffic volumes. Opportunity to include additional noise mitigation if required	Potential increase in noise due to increased traffic volumes. Opportunity to include additional noise mitigation if required
	Archaeology and Cultural Heritage Resources	No impacts	Potential impacts to archaeological and built heritage resources along the corridor	Potential for minor impacts dependent on the scope of the AT improvements implemented	No impacts	Potential impacts to archaeological and built heritage resources along the corridor	Potential impacts to archaeological and built heritage resources along the corridor
	Agricultural	No impacts	No impacts	No impacts	No impacts	No impacts	No impacts
	Access Considerations	No opportunity to improve access along the corridor	No opportunity to improve access along the corridor	No opportunity to improve access along the corridor	No opportunity to improve access along the corridor	Opportunity to improve access to the corridor and other local roadways	Opportunity to improve access to the corridor and other local roadways
	Utilities	Utility relocation would not be required	Utility relocation dependent on the scope of the transit improvements implemented	Utility relocation dependent on the scope of the AT improvements implemented	Utility relocation would not be required	Utility relocation would be required along the corridor	Utility relocation would be required along the corridor
	Construction Disruptions	No Impact	Minor impact	Minor impact	No impacts	Potential for disruption to traffic and residents as a result of construction	Potential for disruption to traffic and residents as a result of construction
	Summary	Not Preferred	Preferred	Preferred	Preferred	Neutral	Neutral
Health	Active Modes of Transportation	No opportunity to improve Active Transportation facilities	Minor improvements to Active Transportation facilities	Significant opportunity to improve AT facilities	No opportunity to improve Active Transportation facilities	Opportunity to improve Active Transportation facilities as part of widening	Significant opportunity to improve Active Transportation facilities as part of widening and other improvements
	Accessibility (AODA)	No opportunity to improve accessibility (AODA) along corridor	No opportunity to improve accessibility (AODA) along corridor	Opportunity to improve accessibility (AODA) along corridor	No opportunity to improve accessibility (AODA) along corridor	Opportunity to improve accessibility (AODA) along corridor	Significant opportunity to improve accessibility (AODA) along corridor
	Air Quality	With increase in traffic volumes and no expansion of existing facilities, congestion will increase and in turn air quality will decrease	Marginal improvement to future air quality condition due to reduction in predicted traffic volume	With increase in traffic volumes and no expansion of existing facilities, congestion will increase and in turn air quality will decrease	Marginal improvement to future air quality condition due to reduction in predicted traffic volume	Improvement to future air quality condition due to reduction in congestion	Improvement to future air quality condition due to reduction in congestion
	Summary	Least Preferred	Neutral	Neutral	Not Preferred	Preferred	Most Preferred
Transportation	Safety	Increase in traffic volumes with no expansion of the	Increase in traffic volumes with no expansion of the	Increase in traffic volumes with no expansion of the	Increase in traffic volumes and pedestrian / cyclist	Opportunity to improve safety due to reduction in	Opportunity to improve safety due to reduction in

Component	Evaluation Criteria	Alternative 1: Do Nothing: Maintain Mississauga Road in its present configuration with no improvements other than to continue regular maintenance	Alternative 3: Transit Infrastructure Improvements: Improve transit infrastructure to support Brampton Transit (Zum and/or standard services) and address capacity requirements	Alternative 4: Active Transportation (AT) Infrastructure Improvements: Improve AT infrastructure to support Region of Peel's Active Transportation Plan.	Alternative 5: Travel Demand Management (TDM): Encourage and support change in travel behavior to reduce peak travel demand	Alternative 6: Widen Mississauga Road with Intersection Improvements: Addition of through-traffic lanes including intersection improvements, to increase traffic capacity of the corridor	Alternative 7: Combination of 4, 5, and 6: • Improve transit services • Travel Demand Management • Widen Mississauga Road
		corridor will increase the potential for collisions	corridor will increase the potential for collisions	corridor will increase the potential for collisions	movement with no expansion of the corridor will increase the potential for collisions	congestion and other improvements	congestion and other improvements
	Travel Delay/ Traffic Capacity	With increase in traffic volumes and no expansion of existing facilities, the road will be unable to meet future traffic demands, causing longer delays	Potential to limit increase in traffic congestion by promoting alternative modes of travel	Potential to limit increase in traffic congestion by promoting alternative modes of travel	Potential to limit increase in traffic congestion by promoting alternative modes of travel	Improves corridor capacity and reduces delay and queuing	Improves corridor capacity and reduces delay and queuing
	Transit	No potential to improve transit services along the corridor	Potential to improve transit services along the corridor	No potential to improve transit services along the corridor	No potential to improve transit services along the corridor	Potential to improve transit services along the corridor with changes to the road cross section.	Greatly improves transit services along the corridor with changes to the road cross section with widening
	Summary	Least Preferred	Not Preferred	Not Preferred	Least Preferred	Preferred	Most Preferred
Costs	Capital Cost	No capital costs	Moderate capital expenditure would be required	Moderate capital expenditure would be required	Minimal capital cost increase would be required to advance program initiatives	High capital costs associated with improvements to corridor	High capital costs associated with improvements to corridor
	Summary	Most Preferred	Preferred	Preferred	Most Preferred	Least Preferred	Least Preferred
Technical	Constructability	No constructability issues	Some constructability concerns given the restricted right-of-way	Some constructability concerns given the restricted right-of-way	No constructability issues	Many constructability issues would need to be resolved.	Many constructability issues would need to be resolved.
	Adherence to Applicable Design Standards	No ability to upgrade the corridor to adhere to applicable design standards and current practices	No ability to upgrade the corridor to adhere to applicable design standards and current practices	No ability to upgrade the corridor to adhere to applicable design standards and current practices	No ability to upgrade the corridor to adhere to applicable design standards and current practices	Ability to upgrade the corridor to adhere to applicable design standards and current practices	Ability to upgrade the corridor to adhere to applicable design standards and current practices
	Summary	Neutral	Not Preferred	Not Preferred	Neutral	Neutral	Neutral
Transportation Plans & Policies	Compatibility with Regional and City Transportation Plans and Policies	Does not comply with the City's and Region's planning documents	Complies with some aspects of the City's and Region's planning documents by supporting alternative modes of travel	Complies with some aspects of the City's and Region's planning documents by supporting alternative modes of travel	Complies with some aspects of the City's and Region's planning documents by supporting alternative modes of travel	Complies with City's and Region's planning documents	Complies with City's and Region's planning documents
	Summary	Least Preferred	Not Preferred	Not Preferred	Not Preferred	Most Preferred	Most Preferred
Recommendations		Eliminated from Further Consideration	Eliminated from Further Consideration	Eliminated from Further Consideration	Eliminated from Further Consideration	Eliminated from Further Consideration	Recommended as the Preferred Planning Solution

Least Preferred Not Preferred Neutral Preferred Most Preferred

4.5 Public Consultation (Phase 2)

4.5.1 Agency and Stakeholder Meetings

Agency Kick-off Meeting/Workshop – January 21, 2016

A meeting was held with agency representatives including the City of Brampton, Brampton Transit, Credit Valley Conservation Authority, and Region of Peel. The purpose of the meeting was to receive feedback from agency representatives on the opportunity and constraints along the Mississauga Road corridor and to solicit comment on the evaluation criteria (**ref. Appendix K – Meeting Minutes**).

Meeting with Ministry of Natural Resources and Forestry (MNRF) and the Credit Valley Conservation Authority (CVC) – March 4, 2016

A meeting was held with representatives from the MNRF and CVC to discuss the activities associated with the project and to receive feedback on the main issues/constraints as well as opportunities within the study. The MNRF and CVC provided information on constraints along the Mississauga Road corridor (**ref. Appendix K – Meeting Minutes**).

Meeting with Ministry of Natural Resources and Forestry (MNRF) and the Credit Valley Conservation Authority (CVC) – October 11, 2016

A meeting was held with representatives from the MNRF and CVC to provide them with an update on the study. A considerable focus was around the constraints and opportunities at the crossing of the Credit River were noted (**ref. Appendix K – Meeting Minutes**).

Technical Agency Committee Meeting No.1 – November 8, 2016

A meeting was held with agency representatives including the City of Brampton, Brampton Transit, Credit Valley Conservation Authority, and Region of Peel. The purpose of the meeting was to review the technical studies that have been completed, the initial assessment of planning alternatives, and a review of the existing constraint mapping (**ref. Appendix K – Meeting Minutes**).

Meeting with Ministry of Natural Resources and Forestry (MNRF), the Credit Valley Conservation Authority (CVC) and the Region of Peel: Background Drainage and Stormwater Management Information Discussion – January 10, 2017

A meeting was held with representatives from the MNRF, CVC and Region to discuss the background information relevant to stormwater management (SWM), including design reports and drawings completed by various consultants, as well as existing and proposed infrastructure within the Mississauga Road right-of-way (R.O.W.) (**ref. Appendix K – Meeting Minutes**).

4.5.2 Public Information Centre No. 1

A Public Information Centre (PIC) was held on Thursday February 9, 2017 from 6:00 pm – 8:00 pm at the Lionhead Golf and Conference Centre. Notification of the PIC was sent to stakeholders, local residents and agencies by mail on January 23, 2017. Notices were placed in the *Brampton Guardian* on January 26, 2017 and February 2, 2017. The PIC was hosted by representatives from the Region of Peel along with the consulting team from Wood Environment & Infrastructure Solutions. The PIC followed an open house drop-in format including display boards and maps detailing the progress of the project. Representatives from the Region's Long Range Transportation Plan update team were also available at the PIC to discuss this Region of Peel initiative. The PIC had 19 attendees signing the registry (**ref. Appendix L – Public Information Centre No. 1**).

For PIC No.1 Comment Forms were supplied to provide the opportunity for input/comments by members of the public and the agencies. They were encouraged to provide feedback on the project by submitting their comments on site, via mail, fax, website or email. All comments were requested to be returned by February 24, 2017. There were 10 comments submitted for PIC No.1.

Table 4.3 is a summary of comments received for PIC No. 1.

Table 4.3. SUMMARY OF PUBLIC INFORMATION CENTRE CONSULTATION

Comment / Question Received from Stakeholders	Response / Commitments
Not in favor of widening to 6 lanes because of noise, impact to trees, damage to Eco systems, make crossing unsafe, increased speeds and reduced safety for cyclist	No Response, comment noted
Speed is a concern, speed needs to be reduced	No Response, comment noted
Was unable to attend PIC and would like to meet	Meeting was set up to meet
Please add to the mailing list, did not receive notice	Added to mailing list
Need signal progression for Mississauga Road	That system is not available in the area, will review
Left turns are a problem on Mississauga Road	The concern was forwarded to Region's Traffic group
Would like to see more information regarding Credit River Bridge, will it be 6 lanes?	This will be provided at PIC No. 2
Will cycling facilities be provided for Huttonville School?	That is outside to limits of this project. Region's Active Transportation group was forwarded this for review
Would prefer the Region focus on BramWest Pkwy	No Response, comment noted
Traffic Report was to focus on Mississauga Road	No Response, comment noted
Would like to see clarity on drawings for PIC No. 2	No Response, comment noted
Request for noise wall	Noise study is being completed and will make a recommendation for noise barriers where required
Are cycling facilities being planned for Mississauga Road	As part of the EA study we will be determining what facilities are required for pedestrians and cyclists

4.6 Preferred Planning Solution

The preliminary recommended alternative solution, developed in consultation with agencies, is Alternative 7: A combination of alternatives 3-6, as follows:

- Alternative 3. Transit Infrastructure Improvements
- Alternative 4. Active Transportation Improvements
- Alternative 5. Travel Demand Management
- Alternative 6. Widen Mississauga Road including additional through-lanes and intersection improvements

A combination of Alternative 3 - 6 will address the problem statement developed for the Mississauga Road corridor, while minimizing environmental impacts and supporting the Region's 2015-2035 Strategic Plan and Term of Council Priorities.

5.0 Alternative Design Concept and Assessment

Based on the preferred planning alternative as described above, a series of alternative design concepts have been considered, and are discussed below.

5.1 Horizontal Alignment Alternatives

The following horizontal alternatives were considered:

- Alternative 1:** Widen Mississauga Road to the west
- Alternative 2:** Widen Mississauga Road around the centerline of the road
- Alternative 3:** Widen Mississauga Road to the east
- Alternative 4:** Widen using a hybrid design (combination of alternatives 1 through 3).

After considering environmental and technical factors, **Alternative 4:** Widen using a hybrid design (combination of alternatives 1 through 3) was selected as it allows for a context sensitive road design at highly constrained and environmentally sensitive areas. With this hybrid approach, the roadway will be widened uniformly from the existing centerline of the roadway between Queen Street West and the Credit River crossing. Between the Credit River crossing and Embleton Road, the alignment of Mississauga Road will be shifted to the east in order to maintain the existing edge of pavement adjacent to the McMurchy Woolen Mill, an important heritage resource. From Embleton Road to the Terrace on the Green entrance, the alignment will follow the existing centerline. Moving southward, the alignment will transition to the west of Mississauga Road until approximately 150m north of the Lionhead Golf Club driveway, as it reduces the impact on the greatest number of properties and limits the impact to the Huttonville Maples.

5.2 Design Alternatives for the Credit River Bridge

The existing Mississauga Road crossing of the Credit River currently supports a 4-lane roadway. To accommodate the proposed widening to 6 lanes, a detailed discussion and review process was completed to determine the best approach to facilitate the widening or replacement of the existing structure. The following summarizes some key issues with the existing structure:

- 1) The structure was built in 1968, and a full deck replacement and minor girder rehabilitation were completed in 2006;
- 2) Assuming a 50-year lifespan with 10+/- years added due to the deck replacement/rehab, the service life of the structure will be completed in 2028;
- 3) The existing structure conveys the 100-year storm event, with the Regional Storm overtopping the structure by 1-2m;
- 4) The structure is not at the low point of the Credit River valley, but is still contained within the Credit River floodplain;
- 5) Based on a sensitivity analysis completed by Wood Environment & Infrastructure Solutions, widening of the existing structure will cause water elevations to increase upstream during the Regional Storm, and
- 6) The existing structure has two piers within the low flow portion of the Credit River. Based on the fluvial geomorphologic review completed, the piers as currently configured restrict flow of the river, causing channel widening downstream of the structure and bed scour.

Given the above, various alternatives were assessed for the Credit River Bridge.

Do Nothing Alternative: Maintain the existing structure with no modifications

Alternative 1: Widen existing structure 6.0m east and 3.0m west

Alternative 2: Widen existing structure 3.0m east and 3.0m west, and construct a separate pedestrian crossing outside the limits of the extended structure

Alternative 3: Remove existing structure and replace with a new three span bridge structure with a total span of 103 m (45m mid-span + 2 x 29m outside span)

The alternative assessment determined that Alternative 3 was preferred, as it addresses all the issues identified above, while allowing the Region of Peel to accommodate 6 lanes for Mississauga Road.

Table 5.1. ASSESSMENT OF ALTERNATIVES FOR THE CREDIT RIVER CROSSING

Category	Criteria	Do Nothing Alternative: Maintain Existing Bridge with Existing Road Width	Alternative 1: Widen existing structure 6.0m East and 3.0m West	Alternative 2: Widen existing structure 3.0m West and 3.0m East, and construct a separate pedestrian crossing outside the limits of the extended structure	Alternative 3: Remove existing structure and replace with a new three span bridge structure with a total span of 103m (45m midspan + 2x29m outside span)
NATURAL ENVIRONMENT	Wetlands and Vegetation	Surrounding land use includes cultural land uses and developed lands. No additional loss of natural areas, terrestrial areas, or wetland areas. The Churchville-Norval Wetland Complex is located south of the crossing. The wetland is not affected by this alternative.	Disturbance would occur to channel banks. Vegetation removal would be required on the west and east sides to accommodate bridge extension. Opportunity to improve riparian vegetation. The Churchville-Norval Wetland Complex is located south of the crossing. The wetland is not affected by this alternative.	Disturbance would occur to channel banks. Vegetation removal would be required on the west and east sides to accommodate bridge extension and pedestrian crossing. Opportunity to improve riparian vegetation. The Churchville-Norval Wetland Complex is located south of the crossing. The wetland is not affected by this alternative.	Disturbance would occur to channel banks. Vegetation removal would be required on the west and east sides to accommodate bridge replacement. Opportunity to improve riparian vegetation. The Churchville-Norval Wetland Complex is located south of the crossing. The wetland is not affected by this alternative.
	Wildlife Habitat	Barn swallow and Chimney Swift were observed, with a number of nests in place under the bridge. Other bird species reported but not observed included Eastern Meadowlark and Bobolink. Endangered bat species reported in the area but not observed included Eastern Small-footed Myotis, Little Brown Myotis, and Northern Myotis. No impacts to wildlife or wildlife habitat.	Limited habitat would be lost. Opportunity to improvement of wildlife wetland and riparian habitat. Barn Swallow and Chimney Swift nests would be disturbed temporarily. Compensation habitat would be required.	Limited habitat would be lost. Opportunity to improvement of wildlife wetland and riparian habitat. Barn Swallow and Chimney Swift nests would be disturbed temporarily. Compensation habitat would be required.	Limited habitat would be lost. Opportunity to improvement of wildlife wetland and riparian habitat. Barn Swallow and Chimney Swift nests would be disturbed temporarily. Compensation habitat would be required.
	Surface Water	No impacts to the surface water with this alternative. The bridge conveys the 100 year storm event. The bridge would continue to be overtopped by the Regional Storm.	Water surface elevations would increase upstream of the crossing during the Regional Storm, causing increased flooding to homes within the floodplain. Increased runoff due to road widening. Therefore quality, erosion, and flow impacts would require mitigation. Extended structure would continue to convey the 100 year storm event, with overtopping during the Regional Storm.	Water surface elevations would increase upstream of the crossing during the Regional Storm, causing increased flooding to homes within the floodplain. Increased runoff due to road widening. Therefore quality, erosion, and flow impacts would require mitigation. Extended structure would continue to convey the 100 year storm event, with overtopping during the Regional Storm.	Water surface elevations would decrease upstream of the crossing during the Regional Storm, causing decrease flooding to homes within the floodplain. Increased runoff due to road widening. Therefore quality, erosion, and flow impacts would require mitigation. Extended structure would be able to convey the Regional Storm.
	Fluvial Geomorphology	The current bridge is restricting flow, which is causing channel widening on the downstream end. In addition, bed scouring is occurring around the bridge. No opportunity for improvement to the watercourse to address the deficiencies observed.	The extended structure would continue to restrict flow, causing channel widening and bed scour. Further encroachment of Mississauga Road into the Credit River valley. No opportunity for improvement to the watercourse to address the deficiencies observed.	The extended structure and new pedestrian crossing would continue to restrict flow, causing channel widening and bed scour. Further encroachment of Mississauga Road into the Credit River valley. No opportunity for improvement to the watercourse to address the deficiencies observed.	The wider structure would be able to span the low flow channel, which would eliminate the flow restriction. Further encroachment of Mississauga Road into the Credit River valley. Improvements to the watercourse would be achieved, addressing the deficiencies observed.
	Fisheries	Within the vicinity of the bridge, habitat is available for a number of fish species, including American Brook Lamprey, American Eel, Atlantic Salmon, Salmonidae family including Rainbow Trout, Brown Trout and Coho Salmon. No impacts on fish or fish habitat.	Channel banks and vegetation will be disturbed to facilitate the structure extension. Fish and fish habitat would be temporarily disturbed.	Channel banks and vegetation will be disturbed to facilitate the structure extension and pedestrian crossing. Fish and fish habitat would be temporarily disturbed.	Channel banks and vegetation will be disturbed to facilitate the structure replacement. Fish and fish habitat would be temporarily disturbed.

Category	Criteria	Do Nothing Alternative: Maintain Existing Bridge with Existing Road Width	Alternative 1: Widen existing structure 6.0m East and 3.0m West	Alternative 2: Widen existing structure 3.0m West and 3.0m East, and construct a separate pedestrian crossing outside the limits of the extended structure	Alternative 3: Remove existing structure and replace with a new three span bridge structure with a total span of 103m (45m midspan + 2x29m outside span)
SOCIAL, CULTURAL & ECONOMIC ENVIRONMENT	Land Use	Reduced opportunity for growth of the surrounding community. No impact to the existing property.	Road widening would improve goods movement through the study area. Widening would allow for adjacent lands to be developed (outside protected natural areas).	Road widening would improve goods movement through the study area. Widening would allow for adjacent lands to be developed (outside protected natural areas).	Road widening would improve goods movement through the study area. Widening would allow for adjacent lands to be developed (outside protected natural areas).
	Noise	With increase in traffic volumes and no expansion of existing facilities, congestion will increase. This will further increase the noise levels through the area.	Widening reduces buffer to residences adjacent to Mississauga Road, resulting in increased traffic noise levels at the outdoor living areas.	Widening reduces buffer to residences adjacent to Mississauga Road, resulting in increased traffic noise levels at the outdoor living areas.	Widening reduces buffer to residences adjacent to Mississauga Road, resulting in increased traffic noise levels at the outdoor living areas.
	Archaeology and Cultural Heritage Resources	No impact to archaeology and cultural heritage resources.	Potential for impact to archaeological resources. Impacts to the McMurchy Mill, a designated heritage site, would need to be mitigated.	Potential for impact to archaeological resources. Impacts to the McMurchy Mill, a designated heritage site, would need to be mitigated.	Potential for impact to archaeological resources. New bridge would be positioned to eliminate any impacts to the McMurchy Mill.
	Access Considerations	No impact to existing entrances.	Reconfiguration of the access on the northeast quadrant of the structure (maintenance access for the golf course) would be required.	Reconfiguration of the access on the northeast quadrant of the structure (maintenance access for the golf course) would be required.	Reconfiguration of the access on the northeast quadrant of the structure (maintenance access for the golf course) would be required.
	Utilities	No impact on existing utilities, however, opportunity missed to expand facilities for potential development in the community.	Relocation of utilities as required for widening.	Relocation of utilities as required for widening.	Relocation of utilities as required for widening.
	Construction Disruptions	No impact to community from construction.	Disruptions to traffic patterns and dust would occur but can be mitigated during construction.	Disruptions to traffic patterns and dust would occur but can be mitigated during construction.	Disruptions to traffic patterns and dust would occur but can be mitigated during construction.
	Safety	Increase in traffic volumes with no expansion of the corridor will increase the potential for collisions.	Safety related factors of proposed configuration meets necessary roadway design criteria.	Safety related factors of proposed configuration meets necessary roadway design criteria.	Safety related factors of proposed configuration meets necessary roadway design criteria.
	Travel Delay/ Traffic Capacity	Future capacity issues will not be addressed, causing an increase in congestion and traffic delays.	Existing and future capacity issues will be addressed with the proposed widening.	Existing and future capacity issues will be addressed with the proposed widening.	Existing and future capacity issues will be addressed with the proposed widening.
TRANSPORTATION	Transit	No potential to address future transit needs.	Future transit needs will be addressed with the proposed widening.	Future transit needs will be addressed with the proposed widening.	Future transit needs will be addressed with the proposed widening.
	Active Modes of Transportation	No potential to address requirements for active modes of transportation.	The need for facilities to allow for pedestrian and cycling requirements will be addressed.	The need for facilities to allow for pedestrian and cycling requirements will be addressed.	The need for facilities to allow for pedestrian and cycling requirements will be addressed.
	Incremental Capital Cost	No incremental cost for this option.	9.0m Structure Extension = \$ 3.6 M	6.0m Structure Extension and separate pedestrian crossing = \$ 4.75 M	Full Structure Replacement = \$ 11.5 M
	Compatibility with Regional and City Transportation Plans and Policies	Not compatible with Region's Official Plans, Long Range Transportation Plan, Transportation and Transit Plan.	The proposed widening meets the Region's Official Plans, Long Range Transportation Plan, Transportation and Transit Plan.	The proposed widening meets the Region's Official Plans, Long Range Transportation Plan, Transportation and Transit Plan.	The proposed widening meets the Region's Official Plans, Long Range Transportation Plan, Transportation and Transit Plan.

5.3 Stormwater Management Alternative Assessment

Stormwater management will be provided for the road improvements. Under existing road and drainage conditions, the roadside swale system and storm sewer is recognized to provide stormwater quality treatment. Based on the increase in pavement for the ultimate Mississauga Road right-of-way, and the removal of the existing ditch system for the proposed urbanized roadway, stormwater controls are required.

5.3.1 General Stormwater Management Opportunities

Stormwater Management practices (SWMPs) for the management of roadway runoff generally fall into two categories: those that address water quantity and those that manage quality of surface runoff. Water quantity management issues relate to properly sizing watercourse crossings, as well as the conveyance of roadway runoff along the roadway corridor for minor and major storm events. In addition, water quantity management strategies can include the need for facilities to address downstream flood and erosion potential resulting from the expansion of the roadway right-of-way. Typically, the flood and erosion protection standards are defined in the watershed or subwatershed planning study, which are dependent on the hydrologic function and watercourse sensitivity of the receiving stream system. For the Credit River, flood control is not required, and erosion control is required by means of infiltrating the runoff volume from a 5 mm storm event. For the Levi Creek, flood control is required for all storm events up to the Regional Storm, and erosion control is required by means of infiltrating the runoff volume from a 5 mm storm event. Although flood control is required for Levi Creek, the changes proposed to the section of Mississauga Road draining to Levi Creek are insignificant, such that quantity controls are not warranted.

In terms of water quality, the SWMPs relate to the treatment of new pavement, and where possible, the treatment of existing pavement; however, current legislation solely relates to the former. Typically, the treatment level is related to the standards defined in the watershed or subwatershed planning study, which are dependent on the quality and sensitivity of the receiving stream system (i.e. Level 1, Level 2, etc.). For the Credit River and Levi Creek, the standard is Level 1 as required by CVC, therefore requiring enhanced water quality control.

Various Low-Impact Development Best Management Practices or Stormwater Management practices are available to address the quality of runoff from roadways. Due to the linear nature of roadway corridors, however, the full spectrum of stormwater management practices is typically not appropriate.

5.3.2 Alternative Stormwater Management Practice

Stormwater management will be provided for the road improvements to satisfy the applicable criteria. Based on the increase in pavement for the ultimate Mississauga Road right-of-way, stormwater controls are required, in accordance with the applicable Region of Peel, the Credit Valley Conservation Authority, the MTO, the MNRF and the MECP criteria.

5.3.3 Alternative Stormwater Management Practices

For watercourse crossings of roadway corridors, typical management opportunities include:

- i. Controlling or reducing upstream flows to the capacity of existing crossings.
- ii. Increasing the capacity of the existing crossing to the appropriate runoff standard.
- iii. Developing optimized diversions between sub-catchments to facilitate and/or reduce hydraulic crossings.

The decision process to select a management opportunity largely relates to environmental impacts, economics, timing and future required gradients. Given that the roadway is planned for reconstruction, the need or warrant for upgrading hydraulic capacity of crossings needs to be coordinated with the structural assessment of the respective crossings.

Quality Management

There are numerous stormwater management practices, which can be used to treat contaminated stormwater runoff from roadway surfaces. These include the following:

- i. Wet ponds/wetlands/hybrids (generally linear facilities)
- ii. Enhanced grass swales
- iii. Filter Strips
- iv. Bioretention Systems
- v. Oil and grit separators
- vi. Off-site stormwater management facilities
- vii. Cash-in-lieu of on-site treatment

The respective characteristics, advantages and disadvantages of the foregoing have been well documented in previous municipal and provincial literature and hence this information has not been repeated within this document. Some brief advantages and disadvantages, though, are discussed in the following section.

5.3.4 General Assessment

The advantages and disadvantages of the various Best Management Practices associated with both quantity and quality control measures are as follows:

Quantity and Erosion Control

Controlling runoff in stormwater management facilities upstream of crossings requires land and future management/maintenance by municipal forces. The advantages relate to maintaining existing sizing of drainage infrastructure or smaller infrastructure across the roadway, as well as downstream.

Disadvantages include the cost of land, infrastructure and maintenance. Increasing the size of drainage infrastructure, while somewhat costlier to the roadway authority, reduces the need for future maintenance and eliminates the need for the dedication of stand-alone land for surface controls. Inter-subcatchment diversions can be effective on a minor scale in optimizing and/or reducing the number of crossings and are typically followed to address both major and minor runoff conditions.

Quality Control

Wet ponds, Wetlands, Hybrids

These systems generally require the dedication of land that most often is not available in linear corridors for roadway projects. Most often when applied to roadway runoff, these SWMP's are located adjacent to creek crossings. For Mississauga Road, this particular opportunity is considered extremely limited. These systems typically provide an excellent level of treatment and as end-of-pipe systems are more visible, hence less prone to failure.

Enhanced Grassed Swales

Grassed swales designed with a trapezoidal geometry and flat longitudinal profiles with largely unmaintained turf can provide excellent filtration and treatment for storm runoff from roadways. It is generally conceded that treatment levels are at a minimum, Normal (formerly Level 2) treatment, and when combined with other practices can provide Enhanced treatment. Their application in linear corridors

is also particularly appropriate and can be further enhanced through the introduction of check dams to provide additional on-line storage. The application in urbanized roadway cross-sections (i.e. curb and gutter) often requires alternative grading and roadway configurations which can compromise the function of the roadway itself and are therefore typically not preferred. Notwithstanding, gutter outlets along outside lanes have functioned effectively in the past where the right-of-way can accommodate the design.

Filter Strips

Filter strips typically are designed for small drainage areas less than 2 ha and are applied as part of a treatment train. Filter strips require flat areas with slopes ranging from 1 to 5% and are usually in the range of 10 to 20 m in length in the direction of flow. Flow leaving filter strips should be a maximum of 0.10 m depth, based on a 10 mm storm event.

Bioretention Systems

Bioretention systems are used in the treatment train process to provide water quality control and infiltration. Bioretention systems should be situated within flat areas with slopes ranging from 1 to 5%. Bioretention systems require 5 to 10% of the contributing drainage area and as such cannot typically service large drainage areas. Where groundwater contamination could be an issue, bioretention systems should be lined to prevent infiltration.

Infiltrative Trenches

Infiltrative trenches are similar to bioretention systems, however are typically located below the ground surface. By installing the trenches below ground surface, the trenches are not required to follow the slope of the roadway and can be implemented in steeper roadway sections. Infiltrative trenches can be implemented beneath other roadway features such as multi-use paths, which saves on the dedication of land, and preserves the function of the roadway. Where groundwater levels are located near the ground surface, the feasibility of their application significantly reduces.

Oil and Grit Separators

These systems tend to serve limited drainage areas and provide levels of treatment (less than Enhanced, formerly Level 1). They are typically encouraged as part of a "treatment train" approach. Disadvantages include the need for frequent maintenance, as well as relatively high capital costs and the ability to serve small drainage areas.

Off-Site Stormwater Management Facilities

While facilities can often not be constructed within roadway right-of-way lands, roadway runoff can be directed towards subdivisions, which would have their runoff managed by future stormwater management facilities. A stormwater management facility is located within the Riverview Heights development located directly south of the Mississauga Road right-of-way, however this stormwater management facility was not designed to accept drainage from the Mississauga Road right-of-way.

Cash-in-Lieu of On-Site Treatment

Often, due to the sensitivity of downstream systems (i.e. low habitat potential) and the difficulty of providing affordable and effective stormwater management on-site, roadway authorities have proposed the contribution of cash-in-lieu of on-site stormwater management, to be directed towards other environmental enhancement projects. These can either be identified in subwatershed planning studies or addressed on a site-specific basis. The priority of application usually relates first to improving watershed conditions in the directly affected watershed. This approach is supported by both Provincial and Municipal policy.

5.4 Potential Posted Speed Reduction

The section of Mississauga Road from 1190 metres south of Embleton Road to 400 metres north of Queen Street West is proposed to be widened to six lanes and urbanized. At present, the posted speed on Mississauga Road is 60 km/hr. The speed was increased from 50 km/hr to 60km/hr in May of 2015.

The current characteristics of Mississauga Road in this section are:

- four (4) lane cross-section, constructed in 2010
- through lane widths are:
 - ◆ southbound lanes 3.5m
 - ◆ northbound lanes 3.4m
- steep southbound grade (8.3%) south of Queen Street
- steep northbound grade (10.1%) north of the Terrace on the Green restaurant entrance
- Mississauga Road is a goods movement truck route
- Mixed (sidewalk or multi-use trail) pedestrian and cycling infrastructure which abuts the back of curb
- A signal ahead warning sign is in place for southbound drivers

The lane widths north of Queen Street are approximately 3.65m to 3.75m. The lane widths south of Lionhead Golf Course entrance are approximately 3.85m to 3.90m.

Through the environmental assessment process, it was determined that Mississauga Road in this section needs to be widened to 6 lanes to accommodate future growth and traffic demand expected by year 2031. In addition, it is recommended that the crossing of the Credit River be fully replaced to accommodate the 6-lane widening. The width of the proposed structure includes a 2.0m wide painted median between northbound and southbound traffic, and a multi-use trail on the east side.

Wood has reviewed the following documents:

- Region of Peel Regional Road Characterization Study, May 2013
- TAC Geometric Design Guide for Canadian Roads, 2017

The Region's Road Characterization Study identifies segments of Regional Roads and associated typologies. The Road Character Map identifies Mississauga Road as a Suburban Connector north of Steeles Avenue to Bovaird Drive West. The Road Characterization Study also provides a table, which identifies certain characteristics and desired elements for each roadway type. The table identifies desired operating speeds for a Suburban Connector Road to be in the range of 50 to 70 km/h.

TAC provides guidelines on the selection of appropriate design and posted speeds. TAC states that it is important to provide a reasonable degree of uniformity for a given roadway classification.

The levels of service at the intersections will not change significantly with a reduction in the posted speed limit. With a reduced lower speed limit, the potential to improve left-turning and right turning traffic may result, as greater gaps will be created within the traffic stream given. The use of a lower speed limit along Mississauga Road may also result in increased pedestrian and cycling activities. (**ref. Appendix S – Traffic Speed Memo**).

At the time of writing this report, the Region was considering the speed reduction for this section of Mississauga Road.

5.5 Public Consultation (Phase 3)

5.5.1 Agency and Stakeholder Consultation

Meeting with Owners of Terrace on the Green – March 7, 2017

A meeting was held with representatives of Terrace on the Green, as they were unable to attend Public Information Centre No.1 and had concerns with access to their property (**ref. Appendix K – Meeting Minutes**).

Meeting with Ministry of Natural Resources and Forestry (MNRF) and the Credit Valley Conservation Authority (CVC) – July 11, 2017

A meeting was held with representatives from the MNRF and CVC to discuss the activities associated with the project and to receive feedback on the main issues/constraints as well as opportunities along both study locations. A focus was placed on a detailed review of the recommended design alternative (**ref. Appendix K – Meeting Minutes**).

Meeting with Ministry of Natural Resources and Forestry (MNRF) and the Credit Valley Conservation Authority (CVC) – September 13, 2017

A meeting was held with representatives from the MNRF and CVC to discuss the activities associated with the project and to receive feedback on the main issues/constraints as well as opportunities along both study locations. The meeting was held in advance of the TAC meeting to discuss key issues and opportunities. (**ref. Appendix K – Meeting Minutes**).

Technical Agency Committee Meeting No. 2 – October 25, 2017

The second Technical Agency Committee (TAC) meeting was held with representatives from the City of Brampton, the Region of Peel and Credit Valley Conservation. The purpose of the meeting was to review the material presented at TAC meeting #1, to provide an updated on the project status and to present the preliminary design. A summary of the results was completed (**ref. Appendix K – Meeting Minutes**).

5.5.2 Public Information Centre No. 2

The second Public Information Centre (PIC) was held on Wednesday, November 15, 2017 at the Lionhead Golf and Conference Centre. Notification of the PIC was sent to stakeholders including local residents, agencies and municipal staff, by mail and notices were placed in the *Brampton Guardian*. A copy of the PIC notice and all the comments received are provided in **Appendix N – Public Information Centre No. 2**. Table 5.2 is a summary of comments received through consultation to date.

Table 5.2. SUMMARY OF PUBLIC INFORMATION CENTRE CONSULTATION

Comment / Question Received from Stakeholders	Commitments
Request for a 10-foot buffer between the Huttonville Maples and the road/sidewalk	The space requirement between the walkway and trees will be a function of the detailed design. A certified arborist will determine the required distance as to not impact the health of the trees.
Request that all widening be done along the west side of Mississauga Road	Widening only to the west side is not feasible as there is a heritage property on the west side. The proposed widening of Mississauga Road was minimized as much as possible to reduce the impacts on both sides.
Request a full moves median turning lane along Mississauga Road for easier access to residences	Turning lanes will be added to the design.
Concerns regarding posted speed limits not being followed, especially as drivers travel downhill	The current posted speed is being reviewed. Attendee advised to call police for enforcement of speed limits.

Comment / Question Received from Stakeholders	Commitments
Request for a right turn lane to be added at Mississauga Road and Embleton Road	The design will be updated to include a right turn lane at Embleton Road.
Heritage property impacts (McMurchy Mill)	Design does not impact the McMurchy Mill property.
Request for hidden driveway sign	Comment forwarded to Region's Traffic Operations section.
Request synchronizing of the traffic lights on Mississauga Road.	Comment forwarded to Region's Traffic Signals section.
Reduce the width of the multi-use trail to add a turning lane.	We are currently reviewing the design to see if we can widen the median enough to allow space for a southbound turning vehicle.
Request for wall/noise barrier from south of Queen Street West to the bridge.	Committed to review as part of the speed review and noise study.
Please explain if any part of my property comes in this road expansion.	This design does not impact your property.
The speed must be reduced. There are many accidents and rear end collisions involving residents turning left.	The speed concern has been reviewed and a recommendation will be made to lower the posted speed to 50km/h. The recommended narrower lane widths will also support a reduced speed through the study limits.
The planned 2 metre buffer needs to be widened to accommodate residents making left turns.	The 2m buffer you mention between the northbound and southbound lanes adjacent your property is designed at 2.79m and tapers to 2m across the Credit River Bridge. We are currently reviewing the design and we are looking at providing additional space for a turning vehicle.
How does the proposed plan promote active transportation?	Active transportation is being addressed in the form of a multi-use trail on the east side of Mississauga Road (accommodating cyclists and pedestrians), including the Credit River Crossing.
How does the proposed plan integrate transit initiatives?	Brampton Transit has been involved in the project from the start and has provided us with their future requirements for this section of Mississauga Road. Brampton Transit operates Route 60 on Mississauga Road, providing stops at Queen Street, Embleton Road and Lionhead Golf Course (within the limits of the project).
How does the proposed plan address safety concerns, in particular, current discontinuous active transportation?	Road crossings are provided (at Queen Street and Embleton Road) to provide safe pedestrian connectivity. Detailed signing, roadway and intersection lighting and pavement markings will make the facility safer.
Remove the traffic signal at the intersection of Mississauga Road and Embleton Road	The traffic signals at Embleton Road are required to provide safe turning movements for both left and right turn vehicles and to provide safe crossing for pedestrians and cyclists.

6.0 Description of Preferred Alternative

6.1 Major Features of the Recommended Plan

6.1.1 Design Criteria

The proposed design criteria for the preliminary design of Mississauga Road, based on a design speed of 70 km/h, is shown in Table 6.1. The criteria are based on the TAC Geometric Design Guide for Canadian Roads (2017) and Region of Peel standards.

Table 6.1. DESIGN CRITERIA FOR MISSISSAUGA ROAD

	Present Conditions	Design Standards	Proposed
HIGHWAY CLASSIFICATION	UAU	UAU	UAU
NUMBER OF THROUGH LANES	4	6	6
POSTED SPEED (KPH)	60	60	60
DESIGN SPEED (KPH)	70	70	70
MIN STOPPING SIGHT DISTANCE (m)	>110	110	>110
MIN 'K' FACTOR	CREST – 18 SAG – 13	CREST – 16-23 SAG – 10-12	CREST – 17 SAG – 14
GRADES MAXIMUM	10%	5%	10%
SUPERELEVATION MAXIMUM	N/A	6%	6%
MIN RADIUS (m)	N/A	190	N/A
LANE WIDTH (m)	3.50	3.65 (inside) 3.75 (curb)	3.40 (inside) 3.50 (curb)
MEDIAN WIDTH (m)	0 (midblock) 3.50 (con't left)	Varies	0 (midblock) 2.0 (intersection)
RIGHT-OF-WAY (m)	Varies	45.0 (midblock) 50.5m (single left int.)	45.0 (midblock) 50.5m (single left int.)

6.1.2 Horizontal Alignment

As evaluated in Section 5, the following horizontal alignment is proposed:

- 1) Maintain the existing centerline between Queen Street and the Credit River crossing;
- 2) Realign Mississauga Road to the east from the Credit River crossing to Embleton Road;
- 3) Maintain the existing centerline from Embleton Road to Terrace on the Green entrance;
- 4) Realign Mississauga Road to the west from the Terrace on the Green entrance to Lionhead Golf Course Road, and
- 5) Maintain the existing alignment from Lionhead Golf Course Road to Financial Drive.

The proposed alignment is shown in detail on the preliminary design drawings (ref. Sheet 1-7: Plan and Profile)

6.1.3 Vertical Alignment

In general, the proposed vertical alignment follows the existing centerline elevation except for Sta. 10+175 to 10+500, where a 2m grade increase is proposed to accommodate the new structure for the Credit River crossing.

In addition, a grade increase of 0.5m is proposed from Sta. 10+540 to 10+780 to ensure Mississauga Road meets the following TAC Geometric Design Guide for Canadian Roads (TAC GDG):

- 1) To ensure adequate drainage, curbed roadway typically have a minimum longitudinal grade of 0.5% or 0.6%, depending on local policy. (ref TAC GDG, Ch. 3, p.56), and
- 2) The minimum gradients outlined are suitable for normal conditions of rainfall and drainage outlet spacing. Where less than the normal minimum gradient is utilized, the lengths of such grades should be limited to short distances, and their location and frequency become important considerations. (ref TAC GDG, Ch. 3, p.56).

The Region recently widened Mississauga Road to 4-lanes with minimum grades of 0.3%. In order to protect the investment made by the Region, the existing grade of 0.3% will be maintained for the section between Sta. 10+540 to 10+780.

The vertical alignment for Mississauga Road is shown in detail on the preliminary design drawings (ref. Sheets 1-7 Plan and Profile). The vertical alignment will be refined in detailed design based on the following criteria:

- Meet the design criteria for the vertical alignment specified above;
- Match the proposed road profile for the section of Mississauga Road north of Queen Street (as defined by the Mississauga Road Class EA Addendum (Bovaird Drive West to Queen Street));
- Match the existing centerline profile at key locations;
- Match existing boulevards, commercial properties, entrances, and sideroads as closely as possible, and
- Minimize property purchase requirements.

6.1.4 Typical Cross-Section

The typical cross sections proposed for Mississauga Road are illustrated in Figures 6.1. Key elements of the proposed cross sections include the following:

- Concrete curb and gutter;
- Six (6) – 3.40m through lanes (3.50m adjacent to curb);
- Minimum 2.0m raised median island at all intersections;
- 3.0m flush median island (outside floodplain area);
- 1.0m boulevard (splash strip and grass boulevard);
- 2.50m multi-use path along both sides of the roadway (except on the west side from Embleton Road to Queen Street);
- 3.40m left and right turn lanes as required at all intersections;
- Right turn channelization at Mississauga Road and Queen Street West, and
- Illumination on both sides.

There are many constraints within the study area which limit the ability for the design to meet the Region of Peel standards for a six-lane arterial roadway. A concerted effort was made to minimize the road footprint as much as possible. The following summarizes the results of this context sensitive design effort:

Road Element	Region Standard	Proposed for Mississauga Road
Lane Width (adjacent to curb)	3.65m	3.40m
Lane Width (inside lanes)	3.75m	3.50m
Median Width	5.50m	0 – 2.00m
Boulevard Width (splash strip + grass boulevard)	3.50m	1.00m
Multi-Use Path	3.00m	2.50m

6.1.5 Intersections and Sideroads

Intersection designs have been developed to provide an acceptable level of service at each intersection. Storage lengths were calculated based on 95th percentile queue lengths. Required turning lanes and corresponding storage lengths are shown on the preliminary design drawings (ref. Sheets 1-7 Plan and Profile).

Queen Street

Modification to the intersection is required to fulfill the requirements of the proposed design. For the north leg of the intersection, the southbound right turn lane will be converted to a shared through/right. The channelized right turns on the east side of the intersection are proposed to be modified to meet the Region’s standard for ‘Channel Design without Acceleride Bus Lane (Std. Dwg 6.2 # 5-2-16E). An additional northbound through lane is required for the south leg. The traffic signal will need to be modified to accommodate the proposed works.

Embleton Road

At Embleton Road, an additional through lane will be added to the north and south legs. Additionally, a short right turn lane is proposed for the west leg of the intersection, which is to be contained on the Region of Peel lands. Along the east side of the intersection, a retaining wall is proposed between Mississauga Road and the Credit River. The traffic signal will need to be modified to accommodate the proposed works.

Lionhead Golf Course Road

At Lionhead Golf Course Road, an additional through lane will be added to the north and south legs. In both directions along Mississauga Road, left turn lanes are proposed to facilitate turning movements. For the right turns, the traffic impact report completed for the Bram West Village of Riverview Heights identified the need for right turn lanes, which is reflected in the preferred alternative.

At the time of writing this report, the western leg of the intersection is under construction by the developers. As a result, the design of the intersection of Lionhead Golf Course Road and Mississauga Road should be re-evaluated as part of the detailed design process to ensure the proposed design matches the as-constructed configuration.

Financial Drive

The intersection of Financial Drive and Mississauga Road is currently configured to meet all criteria identified by this document. As such, no work is proposed at this location as part of this study.

6.1.6 Transit

As the surrounding areas continue to develop and expand, it is anticipated that demand for transit will increase. Through discussions with the City of Brampton and Brampton Transit, it was noted at Technical Agency Committee meetings 1 and 2 (ref. **Appendix K**) that the section of Mississauga Road from Queen Street West to Financial Drive would be serviced by a local service route, and Zum transit infrastructure will not be required. **Table 6.2** summarizes the proposed transit network:

Table 6.2. TRANSIT INFRASTRUCTURE

Intersecting Roadway	Proposed Transit Infrastructure
Queen Street – Northbound	Nearside bus pad and shelter
Queen Street – Southbound	Far-side bus bay, pad, and shelter
Embleton Road – Northbound	Nearside bus pad and shelter
Embleton Road – Southbound	Far-side bus bay, pad, and shelter
Lionhead Golf Course Road – Northbound	Far-side bus bay, pad, and shelter
Lionhead Golf Course Road – Southbound	Far-side bus bay, pad, and shelter

At the intersection of Mississauga Road with Embleton Road, a dedicated bus bay for buses to pull off outside the through lanes is not recommended as part of this study. This location is particularly close to the Credit River and there is insufficient space for a dedicated bus bay. Instead, a nearside bus pad (shelter only) is proposed.

6.1.7 Private Entrances

In general, existing private entrances will be reconstructed based on the following criteria:

- Asphalt aprons between the curb and sidewalk;
- Match original driveway material at the property line;
- Driveway grades in accordance with municipal standards, and
- Permission to enter required for re-grading of driveways beyond the limit of the right-of-way.

In addition, gaps in the raised median will be provided to allow for full vehicular movements only where it is deemed safe.

The Terrace on the Green existing access was reviewed, and the proposed design does not impact the existing driveway. The existing northbound left turn lane into Terrace on the Green will be reinstated.

6.1.8 Property Requirements

The Region of Peel’s Official Plan, Schedule F, designates a midblock right-of-way width of 45m for Mississauga Road. At intersections where a left turn lane is required, an additional 5.5m of right-of-way (50.5m total) is designated. Property requirements were identified based on Official Plan requirements and have been identified on the design plan drawings (ref. Sheets 1-7: Plan and Profile). Property requirements (including permission to enter requirements) will be confirmed during the detailed design phase.

6.1.9 Pedestrian Facilities

The recommended pedestrian and cycling facilities for Mississauga Road from Queen Street to north of Financial Drive are as follows:

- Relocate the existing sidewalk on the west side of Mississauga Road, south of Queen Street to the east side of River Road, removing the existing stairs.
- A 2.5m multi-use trail on the east side from Queen Street to south of Lionhead Golf Course entrance, including over the Credit River structure.
- A 2.5m multi-use trail on the west side from Embleton Road to Lionhead Golf Course Road.
- Provide cross ride pavement markings at Embleton Road and Lionhead Golf Course Entrance intersections.

The City of Brampton noted at TAC meeting #2 that their standard width for a multi-use trail is 3.0m. Due to the environmental constraints within the corridor and comments received from Credit Valley Conservation (CVC), a width of 2.5m is recommended for all multi-use trails within the study area.

6.1.10 Accessibility for Ontarians with Disabilities Act Measures

The Accessibility for Ontarians with Disabilities Act (AODA) requires that all barriers in the built environment (public spaces and buildings) be removed. The Integrated Accessibility Standards Regulation identifies the specific requirements that must be implemented for public spaces and the associated timelines. During the Detail Design phase, the Region will need to confirm that the design for Mississauga Road meets the minimum requirements under the AODA.

6.1.11 Pavement Design

The pavement design recommendations contained in this report were used for preliminary design and estimating purposes.

Rehabilitation

Given that Mississauga Road will be widened, and the existing pavement condition is rated as "Good" to "Fairly Good", it is recommended that the existing surface course be milled and resurfaced to a depth of 40 mm, commencing from the centerline of the roadway to the outside edge of pavement.

Widening of Mississauga Road

A wider roadway platform is required to accommodate the preferred design alternative. The minimum pavement structural design for widening Mississauga Road is presented below in **Table 6.3** and was designed in accordance with the 1993 AASHTO Guide for the Design of Pavement Structures. **Table 6.3** serves to compare the AASHTO based design with the Peel Region Roadway Design standards for the hot mix type, lift thickness and PGAC type making up the recommended asphalt thickness. The AASHTO design is used as the recommended design, however a granular thickness of 450mm will be used in order to comply with Region of Peel standards.

Table 6.3. PAVEMENT STRUCTURE ANALYSIS FOR WIDENING OF MISSISSAUGA ROAD

Material Description	AASHTO'93 for 20 Yrs ESALs ~ 15.0 X10 ⁶	Peel Region Roadway Design Standards
Hot Mix Asphalt Concrete	195 mm Traffic Category 'D'	Match existing or 150 mm
- HL 1 or SP12.5FC2	40 mm (PGAC 64-28)	HL1 - 50mm
- HL 8 (HS) /HDBC or SP19.0 mm	50 mm + 50 mm +55 mm (PGAC 64-28)	HL8HS /HDBC – 100 mm
Granular Base 'A'/Crusher Run Limestone	150 mm	150 mm
Granular Sub-base 'B' Type II/Crusher Run Limestone	350 mm	450 mm
Design Structure Number (DSN) mm	146 mm	-
Selected Structure Number (SSN) mm	152 mm (ok)	-
Total Pavement Thickness (mm)	695 mm	750 mm

6.1.12 Hydrogeology

A preliminary hydrogeology study has been completed for this project (**ref. Appendix G - Hydrogeological Report**). Once the design for the bridge footings has been completed, the dewatering inflow rates will require updating to determine whether an Environmental Activity and Sector Registry (EASR) registration or a Permit to Take Water (PTTW) would be required to support the construction. Measures may be required to isolate the river from the excavations in order to reduce or eliminate the potential for inflow from the river into the excavations which could result in significant dewatering effort.

6.1.13 Stormwater Drainage

A stormwater management report has been completed for this project (**ref. Appendix E – Stormwater Management Report**). To meet the standards of the Region of Peel, the Credit Valley Conservation Authority, the MTO, the MNRF and the MECP, the report recommends the following stormwater management strategies and hydraulic improvements:

- Based on the limited drainage area to Levi Creek within the study area limits, no stormwater management controls are considered to be required.
- To meet the water quality control, water balance, erosion infiltration, and the pending MECP infiltration criteria for the Credit River Outlets 1, 2, and 3, LID BMPs must be implemented within the ultimate R.O.W. A preliminary review of the site constraints has determined that infiltration trenches, located within the contributing area to Outlet 1 and Outlet 3 within the ultimate R.O.W. can accommodate the volume requirements of the criteria.
- Flow splitter devices must be implemented within the catchbasins and catchbasin manholes to divert the runoff volumes required to be infiltrated during a 27 mm storm event to the infiltration trenches.
- The existing Credit River Bridge is recommended to be replaced with a structure that reduces the Regional Storm overtopping south of the bridge at Road Sag 1 to 0.57 m +/- by increasing the flow area under the bridge. The bridge deck will be raised from an elevation of 185.00 m to 186.60 m.

6.1.14 Utilities

Utility companies were contacted at the commencement of the study and were invited to participate in the study. Based on a preliminary review, relocation or protection of various utilities will be required during the detailed design phase, as follows:

Bell Canada

- Relocation is anticipated for most of the corridor
- Some of the existing infrastructure can be protected, depending on the results of the utility conflict analysis completed by the detailed design team

Enbridge

- Relocation of Enbridge gas main is anticipated for the corridor. Further coordination is recommended for the detailed design team

Rogers

- Rogers has aerial cables attached to the existing hydro poles (which are owned by Alectra Hydro). Relocation of these cables will be a function of the hydro work. Further coordination is recommended for the detailed design team.

Alectra Hydro (formerly Hydro One Brampton)

- All existing hydro poles along Mississauga Road are in conflict with the proposed widening. Further coordination is required by the detailed design team to determine the specifics of the relocation works.

Region of Peel Watermain

- The existing 300mm dia. and 600mm diameter watermains are not anticipated to be significantly impacted. Further review is required by the detailed design team to determine the impacts (if any) to the existing watermain.
- The watermain appurtenances (such as hydrants and valve chambers) will need to be adjusted / relocated. Further review is required by the detailed design team.

A comprehensive utility investigation should be conducted in the detailed design phase, to locate and determine conflicts with the proposed works.

6.1.15 Agency Approvals

Agency approvals are required before construction can begin. Approval requirements are summarized below.

Agency	Approval Required
Ministry of the Environment	Approval of Sewage Works (ECA), Permit to Take Water/EASR (if required)
Department of Fisheries and Oceans	Request for Review
Credit Valley Conservation	Permit for Approval for culvert extension/replacement, work in regulated area, and storm outlets
Ministry of Natural Resources	Permit for Approval for Activities that may affect Species or Habitat protected under the Endangered Species Act (17C) Possible Fisheries Act Authorization

6.1.16 Traffic Signals and Illumination

The existing traffic signals at Queen Street West, Embleton Road and Lionhead Golf Course will be replaced or modified as part of construction. Full illumination will be provided along Mississauga Road within the limits of construction.

The Region of Peel is responsible to keep the existing street lighting operational at all times during construction and will notify the City of Brampton before making changes to the existing lighting system.

6.1.17 Structural Design

Credit River Structure

As noted in Section 5, the existing crossing of Mississauga Road and the Credit River is recommended to be fully replaced with a new three span structure. The approximate spans for this crossing are as follows: 49.0m midspan, and two 29.0m end spans (total span = 107.0m). A preliminary general arrangement drawing of the proposed structure is shown in Figure 6.2, and an artistic representation of the new structure is shown in Figure 6.3.

The new Credit River structure will be subject to review and approval by the MNRF under the Endangered Species Act and by Credit Valley Conservation (CVC), and by the Department of Fisheries and Oceans (DFO). Conversation with MNRF and CVC should begin early in the detailed design process to ensure timeframes for construction of this new structure are met.

Additionally, a retaining wall is proposed between Mississauga Road and the Credit River to minimize fill requirements within the Credit River floodplain. The limits of the retaining wall are shown on the design plan drawings (ref. Sheet 1-7: Plan and Profile). This retaining wall will need to be integrated with the abutment for the new Credit River structure and designed to ensure long term stability during Regional Storm events. Additional consultation and approvals will be required by both CVC and MNRF regarding this retaining wall during the detailed design phase.

Public Access

As part of the consultation process, MNRF noted that the proposed works are required to maintain and protect public access to the Credit River in order for the Region to fulfill its obligations defined in the *Public Lands Act, R.S.O. 1990 c. P.43*. Full access for canoeing, fishing, and the general public use to the Credit River were specifically noted by MNRF as being required at the crossing with Mississauga Road.

Under this Act, proponents are required by law to get a 'work permit for certain activities on Crown land and shore lands before any work can take place' (ref. <https://www.ontario.ca/page/crown-land-work-permits>). For the proposed Mississauga Road works, the following triggers require that the Region pursue a permit under the Act:

- the placement of fill on shore lands (infilling lake or river bed, or building an erosion control structure) for any other purpose;
- construct or place a structure or combination of structures that are in physical contact with more than 15 square meters of shore lands (e.g. docks with large cribs), and
- construct a water crossing, such as a bridge, culvert or causeway, except when constructed under the authority of the Crown Forest Sustainability Act.

As part of the preliminary design, an access point was identified immediately north of 8837 Mississauga Road on the east side of Mississauga Road. During detailed design, the Region should consult with the MNRF to confirm details of the application process, the specifics of the access point, and any requirements to be fulfilled to satisfy the statutes of the Public Lands Act.

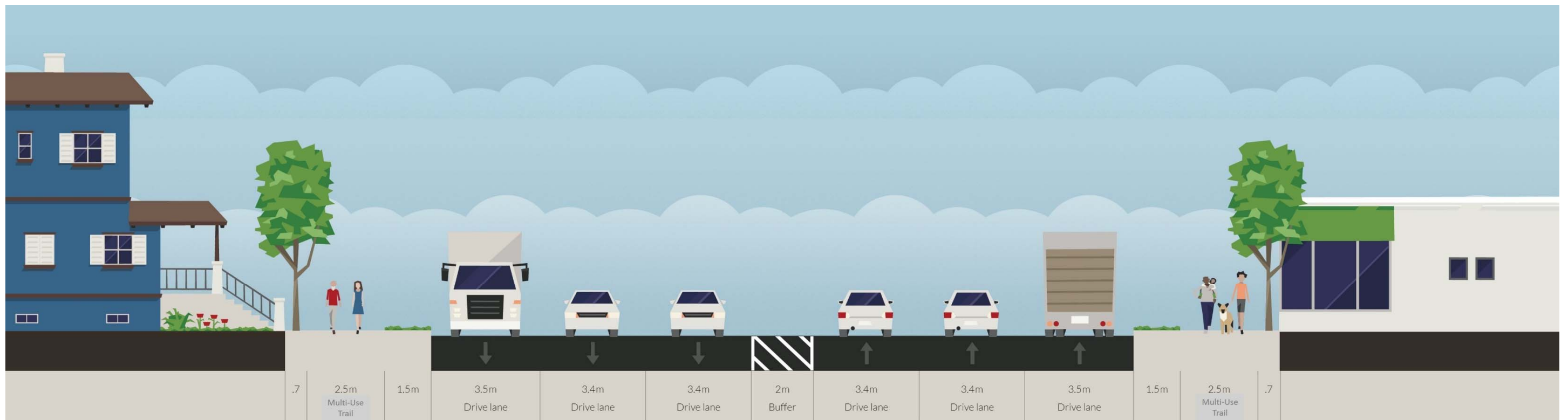


Figure 6.1. Typical Cross Section

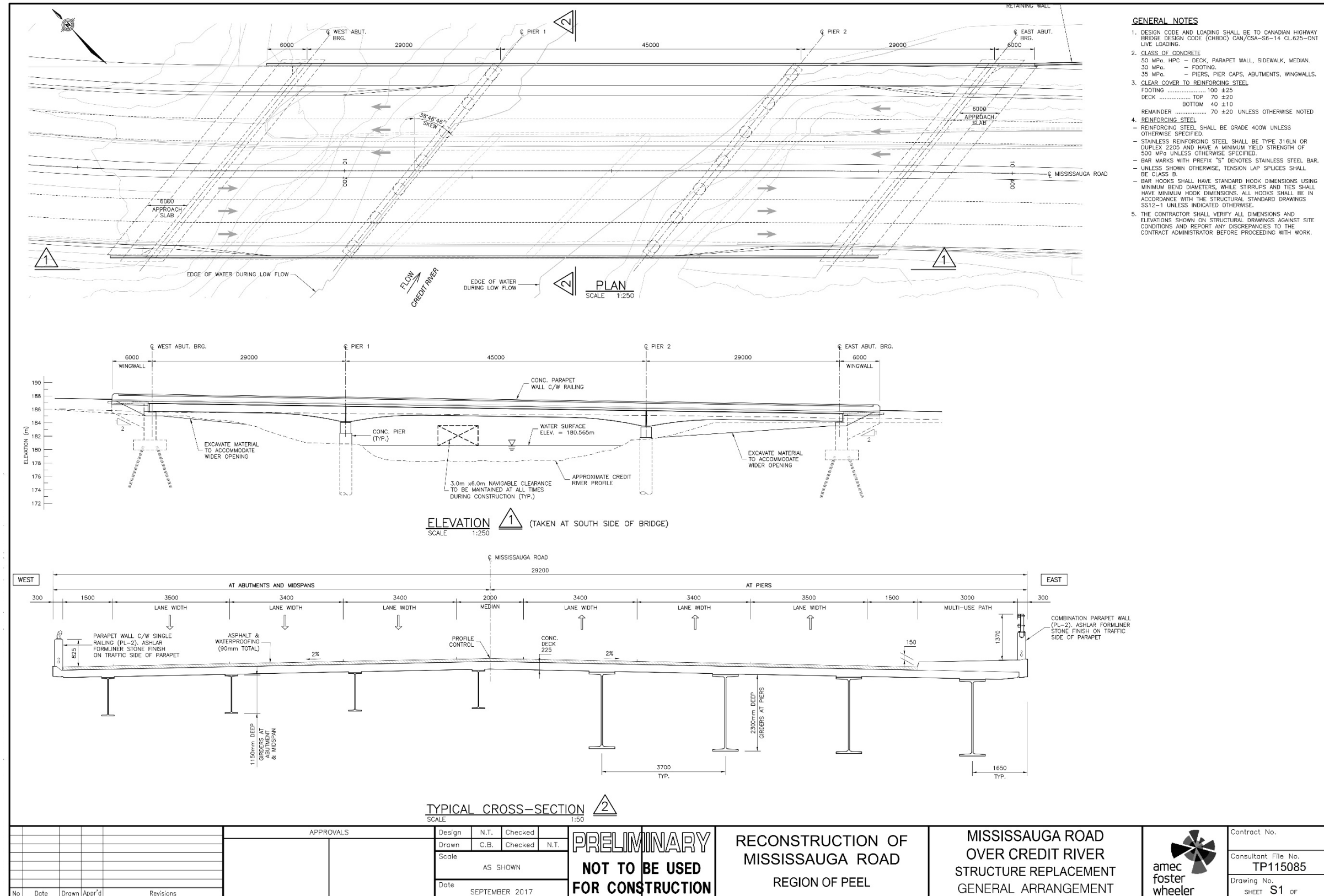


Figure 6.2. General Arrangement Drawing for Credit River Structure



Figure 6.3. Artistic Representation for Credit River Structure

Other Structural Works

An additional soil retaining system, such as mechanically stabilized earth fill (MSE) or retained soil system (RSS) is required immediately across from the Terrace on the Green entrance. The approximate limits of this system are identified on the design plan drawings (ref. Sheet 1-7: Plan and Profile).

6.1.18 Construction Staging and Phasing

Construction of the Credit River structure will require staging. The new structure will be constructed in three stages, with the portion of the new structure outside the limits of the existing structure to be constructed first. For the second phase, two lanes of traffic will be shifted onto the new structure. This will facilitate removal of a portion of the existing structure, and the corresponding portion of the new structure will be constructed. Once the second stage is complete, four lanes (two in each direction) will be shifted to the new structure, and any of the remaining structure will be removed. For the final stage, with all of the existing structure removed, any remaining elements of the new structure will be completed.

At some locations, widening of Mississauga Road can be completed with traffic on the existing portion of the roadway. Traffic would then shift to the new platform, allowing rehabilitation for the existing road platform. For those locations where a grade change is proposed between existing and proposed, more significant staging will be required, with temporary shoring required for the approaches to the proposed Credit River structure. More specifics for the construction staging and phasing will be determined as part of the detailed design phase.

6.1.19 Preliminary Cost Estimate

The preliminary cost estimate for the project is provided in **Appendix R - Preliminary Cost Estimate**.

6.2 Environmental Issues and Commitments

6.2.1 Land Use

The proposed reconstruction and widening of Mississauga Road will result in the roadway and associated traffic being brought closer to existing residential and rural land uses. The following impacts to property have been documented within the project limits, and will be reviewed during the detail design process:

- Property purchase along both sides of Mississauga Road: Purchase will be completed in accordance with Region policy;
- Driveway reconstruction/grading (both asphalt and gravel): Driveways will be reconstructed to match existing materials;
- Impact to landscape features (fencing, gates and retaining walls): Landscape features will be modified and/or reconstructed as indicated on the preliminary design drawings;
- Impact to or removal of trees and residential landscape plantings at various properties along Mississauga Road: A tree preservation plan and landscape planting plan will be prepared in detail design, and
- Coordination with development plans.

6.2.2 Noise Assessment

Wood completed two (2) Road Traffic Noise Impact Studies in support of the Class EA for the proposed improvements along Mississauga Road. (ref. Appendix O - Noise Study)

Noise Assessment Report – May 2017

The Noise Assessment Report completed in May 2017 concluded that the noise impacts along Mississauga Road are predicted to be less than 5 dB when comparing the Future “build” 2031 and Future “no-build” 2031 scenarios. The focus of this assessment was to predict the noise levels at properties that back onto or side onto Mississauga Road between Adamsville Road and Financial Drive.

Thirteen representative receptors were selected to predict the future noise levels as a result of the proposed Mississauga Road widening. These locations are expected to be the most affected by the noise associated with the roadway improvements.

The predicted Future “build” levels are predicted to be above the 60 dBA criterion, when rounded to the nearest whole decibel, at nine locations (R01 and R03 to R10). Locations R08 and R10 are frontage lots and therefore the Peel Region and City of Brampton Noise Attenuation Policies do not apply. However, locations R01, R03 to R07 and R09 are either reverse frontage or side exposure lots. Therefore, a barrier investigation is warranted for these locations.

The results of a noise barrier investigation which compares the results of the Future “build” 2031 without barriers scenario to the Future “build” 2031 Barrier Investigation scenario. In order to be warranted the barrier must achieve a minimum 5 dB reduction at a targeted receptor but not necessarily at all targeted receptors.

Table 6.4 indicates Barriers 2 to 5 achieve an average reduction of 5 dB or greater. Barriers 2 through 5 are feasible and recommended for implementation. All recommended noise barriers are 4.0 metres in height above existing grade.

Table 6.4. RECOMMENDED NOISE BARRIER LOCATIONS – 60km/h POSTED SPEED

Barrier Segment	Properties	Barrier Height (m) Above Grade	Receptor Location	Future “build” Daytime (16-hr) L_{eq} (dBA) Without Barriers	Future “build” Daytime (16-hr) L_{eq} (dBA) Barrier Investigation	Barrier Reduction (dB)	Barrier Reduction ≥ 5 dB
Barrier 2	1957 Queen Street West	4	R03	62.8	55.9	8	Yes
	8951 Mississauga Road		R04	66.5	62.2	4	No
Barrier 3	22 River Road	4	R05	65.6	57.9	8	Yes
	21 River Road		R06	60.6	57.4	3	No

Barrier Segment	Properties	Barrier Height (m) Above Grade	Receptor Location	Future "build" Daytime (16-hr) L_{eq} (dBA) Without Barriers	Future "build" Daytime (16-hr) L_{eq} (dBA) Barrier Investigation	Barrier Reduction (dB)	Barrier Reduction ≥ 5 dB
Barrier 4	2014 Embleton Road	4	R07	68.6	63.8	5	Yes
Barrier 5	2015 Embleton Road	4	R09	65.3	60.1	5	Yes

Noise Assessment Report – April 2018

A supplemental noise assessment was completed to determine if a speed reduction to 50km/h would change the recommendations made in the May 2017 study. The results of the supplemental assessment concluded that a speed reduction would not change the recommendations for noise barrier contained in the previous report submitted in May 2017.

The noise barriers proposed in **Table 6.5** would provide significant attenuation and are therefore recommended for implementation. All recommended noise barriers are 4.0 metres in height above existing grade.

Table 6.5. RECOMMENDED NOISE BARRIER LOCATIONS – 50km/h POSTED SPEED

Barrier Segment	Properties	Barrier Height (m) Above Grade	Receptor Location	Future "build" Daytime (16-hr) L_{eq} (dBA) Without Barriers	Future "build" Daytime (16-hr) L_{eq} (dBA) Barrier Investigation	Barrier Reduction (dB)	Barrier Reduction ≥ 5 dB
Barrier 2	1957 Queen Street West	4	R03	62.8	55.9	7	Yes
	8951 Mississauga Road		R04	66.5	62.2	4	No
Barrier 3	22 River Road	4	R05	65.6	58.0	8	Yes
	21 River Road		R06	60.6	57.5	3	No

Barrier Segment	Properties	Barrier Height (m) Above Grade	Receptor Location	Future "build" Daytime (16-hr) L_{eq} (dBA) Without Barriers	Future "build" Daytime (16-hr) L_{eq} (dBA) Barrier Investigation	Barrier Reduction (dB)	Barrier Reduction ≥ 5 dB
Barrier 4	2014 Embleton Road	4	R07	68.6	63.8	5	Yes
Barrier 5	2015 Embleton Road	4	R09	65.3	60.1	5	Yes

Construction noise impacts are temporary and largely unavoidable. However, the contract documents should identify the contractor’s responsibilities with respect to controlling noise, as well as recording, investigating and if possible addressing complaints. The contract documents should also explicitly state that compliance with all applicable law is an expectation of the contract including adherence to the Brampton Noise By-Law 93-84.

6.2.3 Air Quality Assessment

An Air Quality Assessment report (**ref. Appendix H – Air Quality Assessment Report**) was completed. The findings of the air quality study were as follows:

- In the case of Mississauga Road, it was noted that passenger vehicles comprise the majority of the traffic, with the average fleet profile consisting of 91% passenger cars and 9% heavy duty diesel vehicles;
- The potential effect associated with air emissions is an increase in the airborne concentrations of the key pollutants NO_x, PM_{2.5}, PM₁₀, CO, SO₂, and VOCs (Benzene, 1-3 Butadiene, Formaldehyde, Acetaldehyde, and Acrolein) in the vicinity of the project;
- The incremental (project) effects for NO_x, PM_{2.5}, PM₁₀, CO, SO₂, and VOCs (Benzene, 1-3 Butadiene, Formaldehyde, Acetaldehyde, and Acrolein) are predicted to be below the respective ambient air quality criteria;
- The highest effects are located proximate to intersections, most significantly Mississauga Road and Queen St West;
- The air quality computer model considers the gradual fleet replacement as the higher polluting vehicles are removed from service;
- The predicted effects for NO_x were highest for the existing conditions, as the NO_x emissions reductions achieved as older vehicles are removed from service were significant and offset the increased traffic volumes for 2031. The emission factors for the other target pollutants (PM_{2.5}, PM₁₀, CO, SO₂) also decreased over time and offset the increase of traffic volume. This resulted in lower impacts on air quality in 2031 scenario of all contaminants except SO₂. SO₂ emissions demonstrate marginal increase in ambient concentrations but still being in compliance with ambient criteria limits;

- The cumulative effects of the roadway PM_{2.5}, CO, SO₂, Benzene, and 1-3 Butadiene emissions within the study area and the background concentrations were below the respective ambient air quality criteria for all averaging times under each scenario; and
- The only cumulative effect of the NO_x emissions within the study area and the background concentrations were found to be slightly higher than the respective ambient air quality criteria for the 1-hour averaging times.

Based upon these findings, the future traffic volume along Mississauga Road is not expected to have a negative effect on local air quality.

6.2.4 Stage 1 and Stage 2 Archaeological Assessment

A Stage 1 Archaeological Assessment was completed for the study area (**ref. Appendix I – Stage 1 and Stage 2 Archaeological Assessment**). It was found that approximately 97.5% of the study area (or 7.5 ha) has nonexistent or negligible archaeological potential due to excessive slope and recent development in the area. For these reasons, these areas do not require a Stage 2 Archaeological Assessment.

The remaining 2.5% of the study area (or 0.2 ha) consists of relatively level land. This small area was found to have archaeological potential and to warrant a Stage 2 assessment for several reasons including the presence of 32 registered archaeological sites within 1 km, the close proximity of an early history transportation route (Mississauga Road), and the close proximity of the Credit River and its tributaries.

Through the Stage 2 Archaeological Assessment, the 0.2 ha area was proven, through test pitting, to be thoroughly disturbed with no intact soils. Those 0.2 ha of remaining lands identified as having archaeological potential were systematically shovel tested at 5m intervals. No culturally significant materials were encountered, and no new archaeological sites were identified during this testing. As such, the overall Mississauga Road study area does not require any further archaeological assessment.

6.2.5 Built and Cultural Heritage

A Built Heritage/Cultural Heritage Landscape Assessment was completed for the study area **ref. Appendix J – Built Heritage and Cultural Landscape Assessment**). The property inspections were conducted from within the current ROW as permission to access lands outside of the ROW was not granted at the time of the assessment.

Based on the results of the Built Heritage and Cultural Heritage Landscape Assessment of the study area and after consultation with the City of Brampton, the following recommendations are made with regard to potential project effects on heritage resources:

The Designated resource at 2 & 3 – 2100 Embleton Road (the McMurchy Woolen Mill), and the six Grade B-Listed properties at 2014 and 2015 Embleton Road, 8837 and 8935 Mississauga Road, 18 River Road and River Road itself each contains buildings and landscapes with cultural heritage value. To address this, the proposed widening of Mississauga Road ensures that the heritage character of the buildings and landscapes on these properties is not unduly obscured or impacted.

Should the Region of Peel decide that avoidance of the properties at 2100 Embleton Road and 2014 Embleton Road, along with 8837 and 8935 Mississauga Road and River Road (where it runs parallel to Mississauga Road) cannot be accommodated, impacted resources should be subjected to Heritage Impact Assessments in order to elucidate their heritage character fully and to make specific mitigation recommendations based on the final detailed design.

6.2.6 Natural Environment

An Aquatic and Terrestrial Impact Assessment Memo (**ref. Appendix D – Terrestrial and Aquatics Reports**) for the Widening of Mississauga Road from Financial Drive to Queen Street West) was completed to document any impacts associated with the proposed design, and to recommend any necessary mitigation measures to minimize said impacts.

To minimize the footprint of the roadway widening, retaining walls will be installed along the Provincially Significant Wetlands (PSW) to avoid roadway slopes. Retaining walls can be constructed from the road surface to avoid the use of heavy equipment in the PSW during construction. CVC has requested that the wetland boundaries be staked during detail design such that the areas of impact can be quantified and minimized. A tree protection plan will be developed during detail design to define tree hoarding to minimize impacts to the wetland.

Vegetation Impacts

A total of 6,763 m² of natural and semi-natural habitats are expected to be impacted by the proposed works. The areas of impact are located immediately adjacent to the existing road and are currently influenced by roadway disturbance. The impact areas are concentrated in the central section of the roadway study area and located primarily east of the Credit River. Impact to natural woody vegetation will occur in several areas as well as impacts to planted trees in many other parts of the study area. A complete tree inventory, tree preservation plan, and landscaping plan will need to be completed during the detailed design stage. There are several significant features that exist within and immediately adjacent to the study area including significant woodlands, PSW and significant valleylands. As such, the goal of restoration should be to replicate and enhance these features. Tree replacement ratios can be further discussed with CVC at the detailed design stage, however, the following preliminary restoration recommendations are provided below:

1. CVC requires that only common, native species be used in all restoration and stabilization works that occur within regulated and/or natural areas. CVC recommends the use of only common, native plants in restoration works outside of regulated or natural areas. The proponent should review the updated *CVC Plant Selection Guideline version 2.0* (CVC 2018) for recommendations on approved plant species, approved seed mixes and approved cover crops.
2. If soils within natural or regulated areas are impacted, please refer to the *CVC Healthy Soils Guideline* (CVC 2017) for soil management recommendations.

Wildlife Impacts

All species observed in the study area are common, except for the Species at Risk discussed below, and the impacted lands do not provide any specialized habitat. Despite being urban tolerant and common in the area, the species observed may still be impacted by vegetation clearing.

Widening of the roadway and the associated increase in traffic volumes may increase the risk of wildlife road mortality. Conversely, due to the expansion of the Credit River Bridge, more animals will be able to cross underneath the bridge which will improve passage for small animals including reptiles and amphibians.

As there are significant natural features on both sides of Mississauga Road south of the Credit River, it is plausible that wildlife currently crosses the road regularly to travel between these areas.

The unnamed tributary crossing south of the Credit River provides a direct connection between the PSW features that exists on both sides of Mississauga Road. The completed *Aquatic and Terrestrial Impact Assessment* (**ref. Appendix D – Terrestrial and Aquatics Reports**) indicates that replacement of the unnamed tributary culvert should maintain or enhance passage for herptiles.

To prevent the loss of biodiversity and protect the integrity of the landscape, CVC recommends the addition of a wildlife crossing structure (including appropriate fencing) at or near the unnamed tributary crossing to facilitate wildlife movement from wetland to wetland (i.e. amphibian and reptile passage), or incorporation of passage into the existing structure. It is unlikely that all animals (i.e. amphibians and reptiles) will travel as far as the Credit River Bridge structure to pass. Several residential parcels with fencing exist between the PSW and the Credit River bridge, creating a barrier to wildlife movement. CVC recommends a designated eco-passage be installed in this area. Further consultation with CVC and MNRF regarding optimal location and design of the structure will be required at the detailed design stage. The *CVC Fish Wildlife Crossing Guideline* (CVC 2017) for fish and wildlife crossing design should be for designing the crossing. Material type (steel not preferred), ambient light and moisture conditions, water depth, openness ratio, clear lines of sight and cover at entrance/exits are important design considerations for the passage of reptiles and amphibians.

Species at Risk and Provincially Rare Species

Based on background information derived from secondary sources and field investigations, project works have the potential to impact several species at risk (SAR). Species observed during field investigations include Barn Swallow and Chimney Swift. Other potentially impacted species include Bank Swallow and four species of bats (tri-colored Bat, Little Brown Myotis, Northern Myotis and Eastern Small-footed Myotis).

A Barn Swallow nest was observed on the Mississauga Road Bridge over the Credit River, and a Barn Swallow was observed several times throughout the study area. Chimney Swift was observed during the breeding bird surveys, including several individuals noted circling McMurchy Mill, which has a chimney and is a likely roosting or nesting chimney for the species. All four species of bat were not observed but have the potential to occur within the deciduous forest habitats within the study area. Approximately 1,840m² of deciduous forest will be disturbed with the anticipated construction works.

Aquatic

There are two drainage features within the study area that provide fish habitat, the first being the span bridge across the Credit River, the second being a CSP culvert used to convey an intermittent unnamed tributary of the Credit River. The proposed bridge and culvert works were assessed to determine project risk of impacts to fish and fish habitat. Overall the proposed works planned for Mississauga Road will result in a temporary increased risk of sedimentation and deposition of deleterious materials to the watercourse as well as an increased risk of siltation and surface water turbidity. Additionally, limited temporary and/or permanent removal of riparian vegetation will be required, which may result in a temporary increase in erosion and sedimentation risk, instability in channel banks and increased water temperatures. The potential of the above-noted effects is low if appropriate mitigation measures are applied.

Mitigation

Birds

To minimize nesting birds from delaying construction during the breeding bird period, exclusion netting (or other deterrents) should be installed under the Credit River Bridge to prevent birds from utilizing the bridge before demolition is scheduled.

Barn Swallow is provincially-designated as Threatened and is therefore protected under the provincial species at risk legislation, which prohibits destroying critical or essential habitat for Threatened and Endangered SAR. In order to avoid adverse effects to Barn Swallow and their habitat, mitigation measures should be applied, including adhering to breeding bird season restrictions. Creation of an artificial nest structure nearby will be required to compensate for the loss of Barn Swallow nesting habitat on the bridge over the Credit River. Replacement nests are required to be installed prior to the beginning of the breeding bird season (April 1 to August 31).

The Migratory Birds Convention Act (MBCA 1994) makes it unlawful to pursue, hunt, take, capture, kill or sell birds listed therein ("migratory birds"). Compliance with the MBCA regulations and guidelines for vegetation clearing or demolition, as recommended by Environment Canada, will be considered during the project's construction phase. In order to minimize the potential risk of any nesting migratory birds, clearing of vegetation and any proposed work activities in migratory bird habitat must be undertaken outside of the active breeding season (mid-May to August 1 for Southern Ontario). In the event that clearing (or other work) is required during the nesting season, a nest survey must be conducted by a qualified avian biologist within 2 days prior to commencement of the works to identify and locate active nests of species covered by the MBCA.

Bats

If bat species at risk are detected within the study area during detailed design, further mitigation measures such as bat boxes may be necessary. Any vegetation clearing should take place outside the active period for bats (April 1 to September 30), or at least the maternity period (June 1 to July 31).

Fish

It is recommended that "in-the-dry" and in-water works occur between July 1 and September 30 to protect both warm and coolwater species. Furthermore, fish rescue will be required in order to move fish from the work areas to areas upstream prior to beginning the dewatering process that is required to complete construction "in-the-dry".

Erosion and Sediment Control (ESC)

Prior to the commencement of construction, standard ESC measures should be designed and implemented and should meet or exceed Ontario Provincial Standards and Specifications (OPSS). The control measures shall be implemented prior to work and be maintained through all phases of the project until vegetation is re-established, and all disturbed ground is permanently stabilized.

6.2.7 Landscaping Features

A streetscaping / aesthetics study was conducted by McWilliam and Associates and the associated report and drawings completed (**ref. Appendix P – Landscaping**). In summary, the report found that the undertaking will have some impacts on existing trees along this section of Mississauga Road. The impacts will include the removal of numerous mature and immature street trees along the edges of existing wooded areas and to the vegetation located along the banks of the Credit River.

It is noted that none of the trees inventories along this section of the Mississauga Road corridor are identified as significant specimen trees or rare species. Although the proposed undertaking will require the removal of some existing trees, the reconstruction will provide an opportunity to improve the overall aesthetics of this major thoroughfare, with a comprehensive streetscaping / tree planting plan. The Huttonville Maples, as they are referenced by the community, were considered a constraint and are to be protected.

For detailed design, a vegetation assessment and street tree planting and planting / streetscape design plans should be prepared in accordance with the guidelines outlined in the report.

6.3 Monitoring

The anticipated construction date for widening Mississauga Road is 2023. During construction, the Region of Peel will review the implementation of mitigation measures and key design features, to confirm that they are consistent with the contract and with commitments made. All Region of Peel construction projects are subject to daily on-site inspection. Additionally, the Credit River crossing is to be monitored post-construction for wildlife passage. Further remediation may be required if steps taken to direct wildlife towards the crossing are not successful.

7.0 Summary of Environmental Effects, Proposed Mitigation, Commitments to Further Work

Table 7.0. SUMMARY ENVIRONMENTAL EFFECTS, PROPOSED MITIGATION, COMMENTS TO FURTHER WORK

ID	Details	Expressed By	ID	Details
1	Air Quality	Region	1.1	The contractor will be required to limit and control dust during construction
2	Surface Water Quality	MECP CVC Region	2.1	Mitigation measures for erosion and sedimentation from construction operations will be included in the contract and implemented. An erosion and sedimentation control plan will be submitted to the CVC during detail design. Work will be controlled to prevent the entry of any deleterious materials to watercourses and located downstream of the study area. Refueling of all vehicles and equipment will be conducted away from the watercourse to prevent any material from entering the watercourse. Any material (excavated soil, sediment, and backfill material) that is removed during construction will be placed above the high-water mark and contained in a manner to ensure sediment will not enter the watercourse.
			2.2	All spills that could potentially cause damage to the environment will be reported to the Spills Action Centre of the Ministry of the Environment, Conservation, and Parks. A detailed protocol will be developed during detailed design to be implemented during construction if an incidence should occur.
			2.3	Stormwater management (quality control) will be implemented as per recommendations in this report. All recommendations are required to be confirmed in a stormwater management report completed during detailed design.
3	Fisheries/Watercourse	CVC MNRF DFO	3.1	A Fisheries Act authorization and Endangered Species Act 17C permit may be required for the Credit River crossing
			3.2	A new retaining wall between Mississauga Road and Credit River is recommended on the east side immediately south of the crossing with the Credit River. The design of the wall is to account for the erosion potential of the base of the wall if the river meanders closer to Mississauga Road.
			3.3	The proposed design encroaches onto the Churchville-Norval Wetland Complex. An investigation in consultation with CVC will be completed during detailed design to determine the exact limits of the wetland complexes, and the associated impact limits and mitigation plan.
4	Property Impacts	Residents Region City	4.1	All impacts to private property will be mitigated where appropriate as documented within this report.
5	Landscaping and Vegetation		5.1	Removal of vegetation and disturbance of soils will be minimized.
			5.2	A Landscape/Streetscaping Planting Plan and Tree Preservation Plan will be prepared during detail design.
			5.3	All tree and shrub plantings within the corridor are to be salt-tolerant, non-invasive, low maintenance, disease/pest resistant and drought resistant.
			5.4	The planting of new trees along the corridor is to be coordinated with existing and proposed utility corridors and light standards.
			5.5	Proposed boulevard trees are to be planted within the Region's right-of-way. Compensation planting on private property, if required, will be coordinated with the land owner.
			5.6	Construction impacts at stream crossing areas are to be mitigated with the planting of riparian vegetation. This vegetation should be native, non-invasive, riparian vegetation, as approved by CVC.
			5.7	Trees to be planted near overhead utilities to be selected to conform to mature height limitations (Hydro approved species).
			5.8	New street trees to be installed as per the Region of Peel 'Regional Streetscape Policy'.
6	Traffic and Access	Residents Region	6.1	A construction staging plan will be prepared at the detail design stage.
			6.2	Access to existing residential and business entrances will be maintained during construction.
			6.3	All entrances will be reconstructed with similar material as existing conditions.
7	Pedestrians/Cyclists	Residents	7.1	A multi-use path on the east side will be constructed for the length of the study area. A multi-use path will also be provided on the west side from Embleton Road to Financial Drive.
8	Utilities	Utility Companies	8.1	Conflicts with utilities will be reviewed during the detail design phase. Relocation or protection of utilities will be required.
9	Noise	Region	9.1	Traffic noise mitigation will be provided as per the recommendations of this report.

ID	Details	Expressed By	ID	Details
		Residents	9.2	Construction noise control measures to be implemented in accordance with Region bylaws. General noise control measures to be referred to, or placed into the contract documents.
10	Property Requirements	Region	10.1	Property purchase requirements to be minimized where possible. Compensation for property purchase will be in accordance with the Regional policy.
11	Archaeology	MTCS	11.1	A Stage 1 and 2 Archaeological Assessment was completed for this project, and no further study is required.
			11.3	If any archaeological artifacts are located during construction, work in the area will cease and the Ministry of Culture will be contacted. The Ministry of Culture and the Registrar of the Cemeteries Regulation Unit will be contacted in the event that human remains are encountered during construction.
12	Wildlife	CVC MNRF	12.1	Removal of trees is limited to outside the nesting period of April 1 to August 15, or completion of a nesting survey by a qualified avian ecologist will be required, to identify and temporarily protect active nests.
			12.2	Locally rare/uncommon species were identified. Opportunities to relocate or to avoid are required.
			12.3	Barn Swallows and Chimney Swifts were observed in the study area. Protection of habitat is required.
			12.4	The Credit River crossing is to be monitored post-construction for wildlife passage. Further remediation may be required if steps taken to direct wildlife towards the crossing are not successful.



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**APPENDIX A
NOTICE OF STUDY COMMENCEMENT**

The logo for the company 'wood.' is located in the top right corner. It consists of the word 'wood.' in a dark blue, lowercase, sans-serif font. The period at the end of the word is a solid dot.

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The title 'APPENDIX B' and 'INDIGENOUS CONSULTATION' is centered on the page. It is written in a bold, black, uppercase, sans-serif font. The text is positioned between two large, light gray, curved shapes that resemble stylized arches or segments of a circle, one above and one below the text.

APPENDIX B
INDIGENOUS CONSULTATION



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APPENDIX C
TRANSPORTATION AND TRAFFIC ANALYSIS REPORT



The logo for the company 'wood.' is located in the top right corner. It consists of the word 'wood.' in a dark blue, lowercase, sans-serif font. The background of the page features large, light gray curved shapes that sweep across the left and bottom edges.

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**APPENDIX D
TERRESTRIAL AND AQUATIC EXISTING
CONDITIONS REPORTS**



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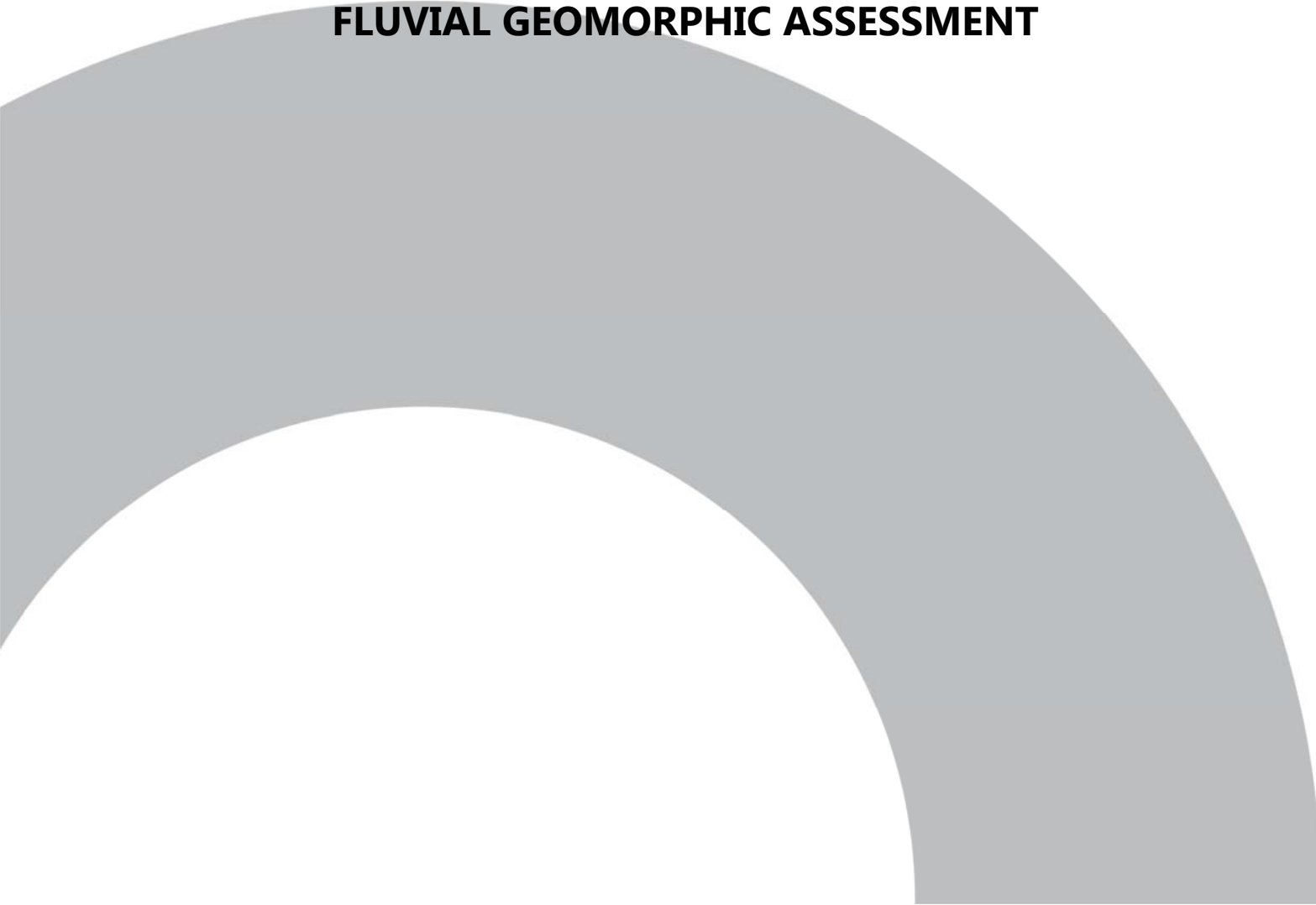
**APPENDIX E
STORMWATER**





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**APPENDIX F
FLUVIAL GEOMORPHIC ASSESSMENT**





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**APPENDIX G
HYDROGEOLOGY REPORT**





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**APPENDIX H
AIR QUALITY ASSESSMENT REPORT**





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**APPENDIX I
STAGE 1 AND STAGE 2 ARCHAEOLOGICAL
ASSESSMENT**





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**APPENDIX J
BUILT HERITAGE AND CULTURAL LANDSCAPE
ASSESSMENT**





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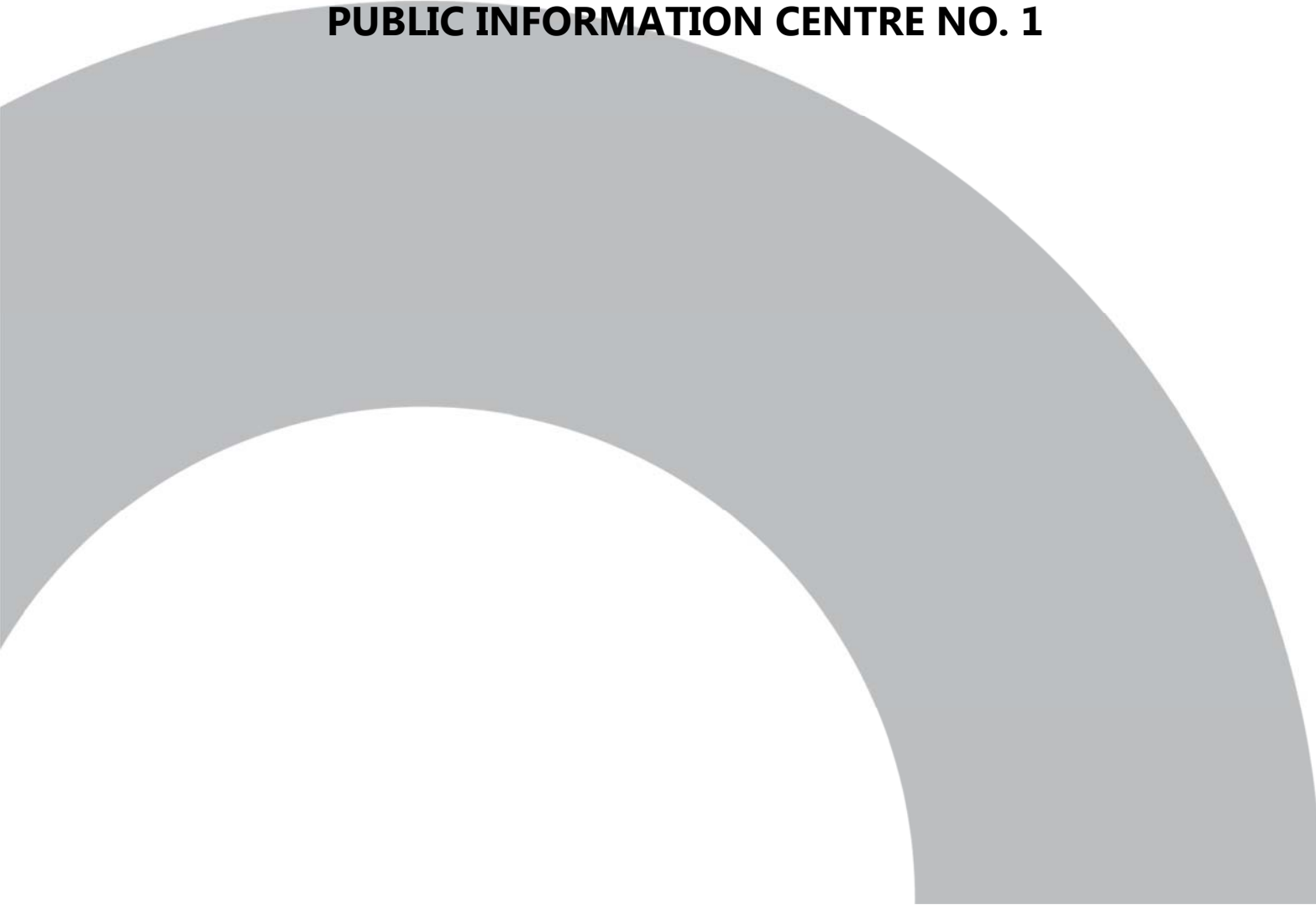
**APPENDIX K
AGENCY MEETING MINUTES**





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**APPENDIX L
PUBLIC INFORMATION CENTRE NO. 1**





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**APPENDIX M
PUBLIC INFORMATION CENTRE NO. 2**





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**APPENDIX N
GEOTECHNICAL REPORT**





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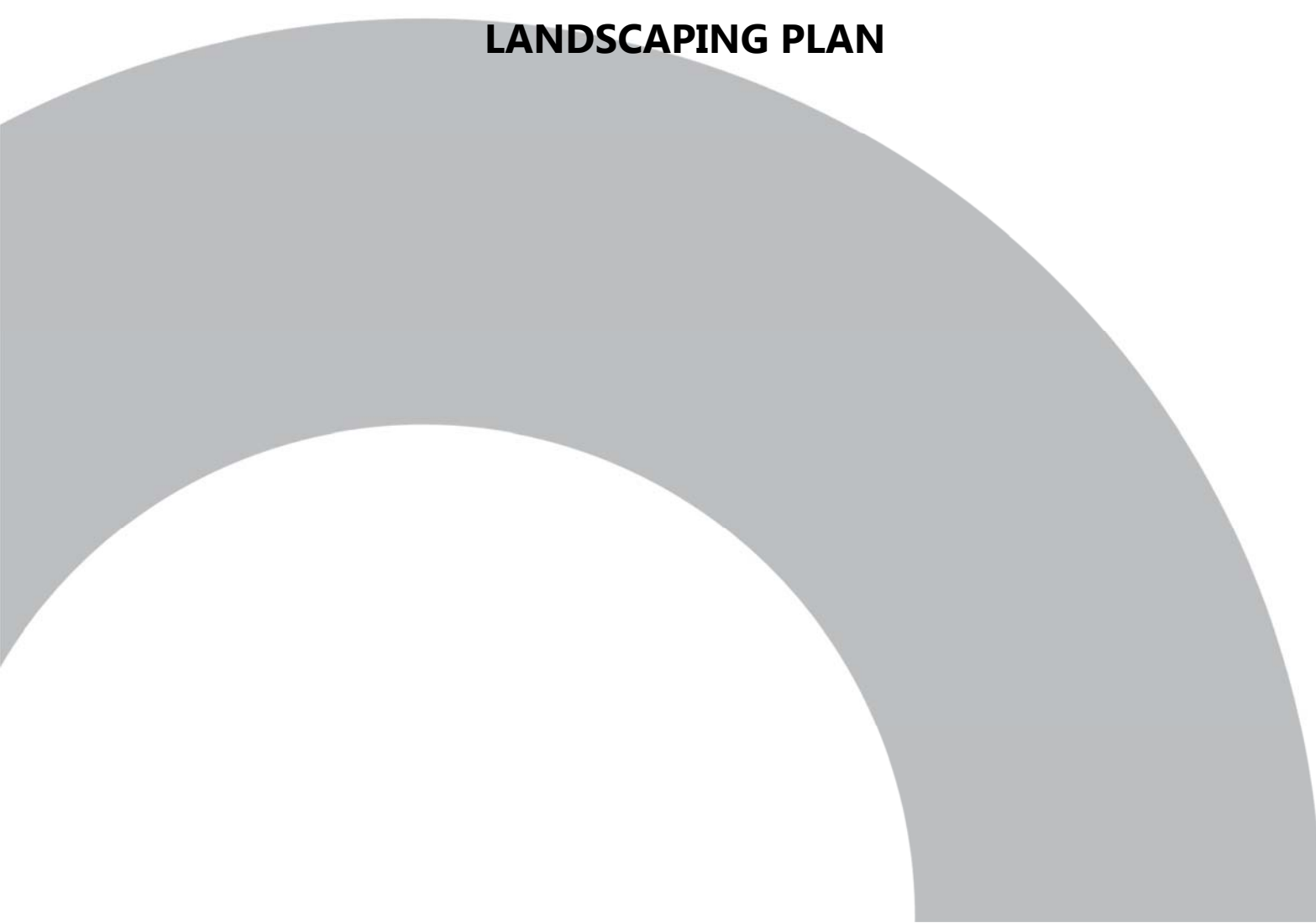
**APPENDIX O
NOISE REPORT**





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**APPENDIX P
LANDSCAPING PLAN**





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**APPENDIX Q
NOTICE OF COMPLETION**





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**APPENDIX R
PRELIMINARY COST ESTIMATE**





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**APPENDIX S
TRAFFIC SPEED MEMO**

