

Final Early Works Report

Bradford Bypass County Road 4 Early Works

Ontario Ministry of Transportation

60636190

March 2022

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Revision History

Rev #	Revision Date	Revised By:	Revision Description
1	January 13, 2022	AECOM	Draft Early Works Report
2	March 21, 2022	AECOM	Final Early Works Report

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Executive Summary

The Ontario Ministry of Transportation (MTO) has retained AECOM Canada Ltd. (AECOM) to undertake a Preliminary Design project-specific assessment of environmental impacts for the proposed Highway 400 – Highway 404 Link (Bradford Bypass). In accordance with the provisions of the Ontario Regulation 697/21, the Ministry intends to move ahead with Early Works. Early Works, as set out in the regulation is focused on a grade separated bridge crossing for the future Bradford Bypass at County Road 4 (Yonge Street).

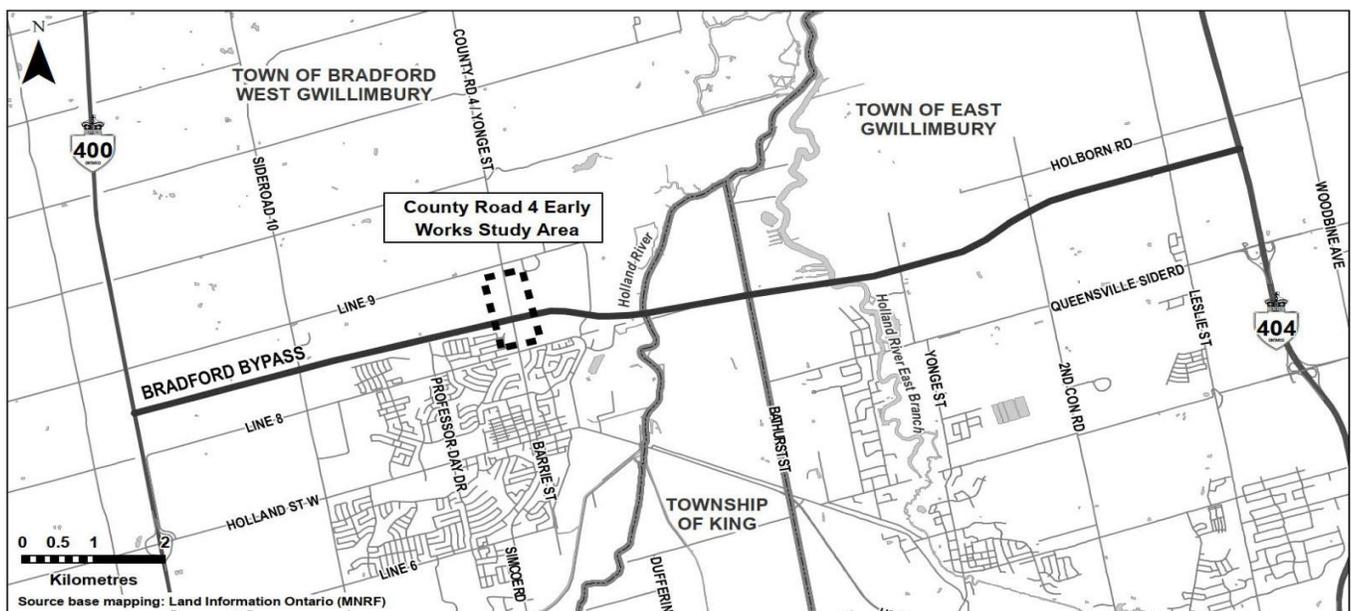
To promote efficiencies between the Bradford Bypass and the County of Simcoe’s widening of County Road 4 (2012 approved Municipal Class Environmental Assessment), the Ministry’s Early Works project will incorporate the widening of this section of County Road 4 including a 3.0 m wide multi-use path.

The Early Works Study Area covers County Road 4 from south of 9th Line to 8th Line, in the Town of Bradford West Gwillimbury, County of Simcoe (see **Key Plan**). This Study will advance as an Early Works Contract Package for the Bradford Bypass. The new bridge will be designed to include the widening of County Road 4 approved by the County of Simcoe, further outlined in Section 1.2.1. The area of impact associated with the County Road 4 Early Works is herein referred to as the Limits of Work.

The County Road 4 Early Works will be delivered through one advance Design-Build contract scheduled to be awarded in the Spring of 2022. This Early Works Report (this Report) details the design as per the Reference Concept issued along with the Design-Build Request For Proposals (RFP). The Reference Concept design has been advanced to approximately a 30% detail design level of completion. Upon award of the Design-Build Contract, the Design-Build Team will be required to complete the detail design according to design standards, as well as the environmental protection, mitigation, and monitoring measures prescribed in this Early Works Report.

A detailed project description can be found in Section 3.4 of this Report.

Key Plan: County Road 4 Early Works Study Area



Ontario Regulation 697/21

The County Road 4 Early Works assessment was undertaken in accordance with Ontario Regulation 697/21: Bradford Bypass. Ontario Regulation 697/21 provides the opportunity for the Ministry of Transportation to prepare an Early Works Report for the design and project-specific assessment of environmental impacts for the following:

- The design, construction and operation of a bridge and associated roadway construction that accommodates a future interchange on County Road 4, between 8th Line and 9th Line within the technically preferred route, that is part of the Bradford Bypass.
- Any applicable activities that are required to support the completion of the bridge and roadway and that are to be carried out within the Study Area.

Draft Early Works Report

The Draft Early Works Report was prepared to satisfy the requirements of Section 5 of Ontario Regulation 697/21 and summarizes the local environmental conditions within the Early Works Study Area characterized through a combination of a desktop review and field studies by practitioners using industry standard techniques and provincial standards, protocols and guidelines, where appropriate. A detailed description of local environmental conditions for the Bradford Bypass will be documented in a future Environmental Conditions Report which will be prepared under separate cover and in accordance with Section 16 of the Ontario Regulation 697/21.

The Report provided an assessment and evaluation of impacts that the Early Works might have on the environment. Based on the potential impacts, a description of mitigation measures and monitoring activities is outlined. A list of any municipal, provincial, federal or other permits and approvals that may be required for the Early Works was also provided.

A description of consultations carried out with Indigenous communities and interested persons was provided in Section 4, along with commitments to further consultation throughout the completion of design and into construction.

The Draft County Road 4 Early Works Report was available for review on the project website (www.BradfordBypass.ca/early-works/) from January 13, 2022 until February 12, 2022.

Interested persons were encouraged to visit the project website (www.BradfordBypass.ca/early-works/) or contact the Project Team by phone or email as listed below.

Website: www.BradfordBypass.ca/early-works/

Email: ProjectTeam@BradfordBypass.ca

Toll-Free Number: 1-877-247-6036

Comments were collected to assist the Ministry of Transportation in meeting the requirements of Ontario Regulation 697/21. This material will be maintained on file for use during the Study and may be included in project documentation. Information collected will be used in accordance with the *Freedom of Information and Protection of Privacy Act, R.S.O. 1990, c. F.31*. With the exception of personal information, all comments will become part of the public record. Anyone with accessibility requirements in order to participate in this project was encouraged to contact the Project Team as listed above.

Consultation

Consultation for this project was initiated under the Ministry of Transportation Class EA for Provincial Transportation Facilities, Group 'A' project and is continuing under Ontario Regulation 697/21 to meet the requirements of the new regulation. Further details on the consultation process are summarized in Section 4 of this Report.

Issues Resolution

In accordance with Section 11(4) of the Ontario Regulation 697/21, the Ministry of Transportation established an issues resolution process for the County Road 4 Early Works. Any concerns raised by Indigenous communities and interested persons during the public review period of the Draft Early Works Report is documented in Section 8 of this Report, as required by Section 12(1)(b) of Ontario Regulation 697/21.

Final Early Works Report

Input/feedback received during the public review period of the Draft Early Works Report has been incorporated into the Final Early Works Report and the report has been published on the project website.

After publishing the Final County Road 4 Early Works Report, the Ministry of Transportation will provide a Statement of Completion of the Early Works Assessment Process to the Director of the Ministry of Environment, Conservation and Parks Environmental Assessment Branch, after which the Statement of Completion will be published on the project website. The Statement of Completion of the Early Works Assessment Process will indicate the intention to proceed with the Early Works in accordance with the Final Early Works Report.

If after providing a Statement of Completion of the Early Works Assessment Process, changes are required to the Early Works that are inconsistent with the Final Early Works Report, an addendum will be prepared to the applicable report in accordance with Section 29(1) of the Ontario Regulation 697/21.

Contents of the Early Works Report

This Report has been prepared in accordance with Section 5(2) and Section 12 (1)(b) of the Ontario Regulation 697/21 and contains the information outlined below.

Regulation Section	Requirement	Report Section
Section 5(2)(1)	A description of the early works, including a description of the alternatives that were considered or a description of why alternatives were not considered.	Sections 1 and 3
Section 5(2)(2)	The rationale for proceeding with the early works and a summary of background information relating to them.	Section 1
Section 5(2)(3)	A map showing the area of study for the early works described under paragraph 1, along with a rationale for the proponent’s selection of the boundaries for the area of study.	Section 1
Section 5(2)(4)	An update to the description of the local environmental conditions within the area of study for the early works.	Section 5
Section 5(2)(5)	A description of all studies undertaken in relation to the early works, including the studies required by sections 6 to 9, which must set out, <ul style="list-style-type: none"> i. a summary of all data collected or reviewed, and ii. a summary of all results and conclusions. 	Sections 5 and 6

Regulation Section	Requirement	Report Section
Section 5(2)(6)	The proponent’s assessment and evaluation of the impacts that the preferred method of carrying out the early works and other methods might have on the environment, and the proponent’s criteria for assessment and evaluation of those impacts.	Section 6
Section 5(2)(7)	A description of any measures proposed by the proponent for mitigating any negative impacts that the preferred method of carrying out the early works might have on the environment.	Section 6
Section 5(2)(8)	A description of the means the proponent proposes to use to monitor and verify the effectiveness of the mitigation measures proposed under paragraph 7, including a plan to make the results of the monitoring and verification available on the Project website.	Section 6
Section 5(2)(9)	A description of any municipal, provincial, federal or other approvals or permits that may be required for the early works.	Section 7
Section 5(2)(10)	A consultation record, including, <ul style="list-style-type: none"> i. a description of the consultations carried out with Indigenous communities, in accordance with the early works Indigenous Consultation Plan prepared under section 4, and with other interested persons, ii. a list of the Indigenous communities and interested persons who participated in the consultations, iii. summaries of the comments submitted by Indigenous communities and interested persons, iv. a summary of discussions that the proponent had with Indigenous communities, and copies of all written comments submitted by Indigenous communities, v. a description of what the proponent did to respond to concerns expressed by Indigenous communities and interested persons, and vi. any commitments made by the proponent to Indigenous communities and interested persons in respect of the early works. 	Section 4 and Appendix B
Section 12 (1)(b)	Update the draft early works report, including by adding,	Section 8 and Appendix B

Regulation Section	Requirement	Report Section
	i. a description of the issues resolution process employed by the proponent in respect of any concerns raised by Indigenous communities and interested persons, ii. a description of the concerns raised by Indigenous communities and interested persons in the issues resolution process and of the outcome of the process, including what, if anything, the proponent did or will do in respect of the concerns raised, and iii. a description of any changes to the early works as a result of addressing concerns raised through consultation under this section;	

The Recommended Plan

The County Road 4 Early Works includes construction of a new bridge over the Bradford Bypass. The bridge’s cross section will provide sufficient width for four through lanes, two speed change lanes, and a multi-use path on the east side. At the completion of construction of the Early Works project appropriate delimitation will be in place to prevent vehicles from driving on the part of the deck intended for the speed change lanes of a potential future interchange at this location.

The roadway will be constructed with curb and gutter on the east and west edges of the travelled lanes and will achieve the 80 km/h design speed that was mutually agreed to by the Ministry of Transportation, the Town of Bradford West Gwillimbury, and the County of Simcoe. The posted speeds upon completion of the Early Works contract will be 70 km/h northbound, and 60 km/h southbound between the limits of north of 8th Line and south of 9th Line. The multi-use path will transition to paved sidewalk at the 8th Line intersection to match the existing condition, and will transition to fully paved shoulder south of the 9th Line intersection. It is anticipated that the multi-use path will be extended further north through other County of Simcoe widening contracts.

An interim multi-use path alignment was provided that minimizes rework once the future interchange is constructed.

A new horizontal alignment is proposed for County Road 4 and includes reverse curves on either side of the proposed structure, shifting the roadway east of its existing location. The horizontal alignment was optimized to minimize construction and schedule impacts to and from utilities, properties, and archaeology.

The existing road profile of County Road 4 includes steep grades over the Bradford Bypass. To meet Ministry requirements for a future County Road 4 Interchange, road reconstruction is required to provide a maximum of 3% grade through the future ramp terminal intersections, and to provide the required clearances over the Bradford Bypass lanes. As a result of road profile modifications, entrances and driveways within the Limits of Work shall also be modified to meet design requirements.

Construction Staging

To accommodate traffic safety and efficient construction, construction staging is required to facilitate the proposed works. As outlined in Section 3.3.2, construction staging will proceed with a temporary detour road adjacent to the new bridge during construction of the new bridge.

The following traffic parameters shall be met:

- A minimum of two lanes of traffic (one lane in each direction) are to be maintained between 8th Line and 9th Line throughout construction.
- At the intersection of County Road 4 and 8th Line, the Southbound through and right-turn lanes are to be combined during construction reducing the total available lanes from 6 to 5-lanes during various stages to tie-in the works in the south limits.
- At the intersection of County Road 4 and 8th Line, a Southbound left-turn lane will be removed during night-time lane closures for construction reducing the total available lanes from 5 to 4-lanes during various stages to tie-in the works in the south limits.

It is anticipated that construction staging will include the following:

- Construction of a two-lane temporary detour to the west of the existing County Road 4 alignment;
- Shifting of traffic to the temporary detour during construction of the County Road 4 bridge, maintaining two lanes of traffic; and
- Upon completion of the County Road 4 bridge, shifting traffic back onto County Road 4.

Local Environmental Conditions

Section 5.0 describes the existing natural, technical, socio-economic and cultural aspects of the existing environment in the context of the County Road 4 Early Works. Information on the following environmental components is provided in the sections below:

- Natural Environment
 - Terrestrial ecosystems
 - Fish and fish habitat
 - Groundwater and hydrogeology
 - Surface water and Hydrology
 - Fluvial geomorphology
- Social and Economic Environment
 - Land use and property
 - Designated agricultural land
 - Noise
 - Air quality
 - Climate change
 - Landscaping
 - Waste and excess materials management
 - Snow drift
 - Human health
- Cultural Environment
 - Built heritage and cultural heritage landscapes
 - Archaeology

The assessments above have been prepared based on the Reference Concept Design which was developed to approximately a 30% Detail Design level of completion. Upon award of the Design-Build Contract, the Design-Build Team will be required to complete the detail design according to design standards, update the impact assessments, as well carry forward and implement the environmental

protection, mitigation and monitoring measures prescribed in this Early Works Report and environmental reports prepared for this Project. The winning Design-Build Team will be required to consult with regulatory agencies to obtain permits, approvals or authorizations as required.

Environmental Issues and Commitments

In accordance with Sections 5(7) and 5(8) of Ontario Regulation 697/21, Section 6.0 describes the potential impacts, mitigation measures, and monitoring activities to verify the effectiveness of mitigation measures associated with the County Road 4 Early Works for the studies listed above.

The assessments above have been prepared based on the Reference Concept Design which was developed to approximately a 30% detail design level of completion. Upon award of the Design-Build Contract, the Design-Build Team will be required to complete the Detail Design according to design standards, update the impact assessments, as well carry forward and implement the environmental protection, mitigation and monitoring measures prescribed in this Early Works Report and environmental reports prepared for this Project. The winning Design-Build Team will be required to consult with regulatory agencies to obtain permits, approvals or authorizations as required.

Permits and Approvals

Section 7.0 provides a description of the federal, provincial, conservation authority and/or municipal permits that may be required for the County Road 4 Early Works. Permit and approval requirements will be confirmed as Early Works detailed design progresses.

Record of Issues and Resolutions

In accordance with Section 11(4) of Ontario Regulation 697/21, the Ministry of Transportation established an issues resolution process to attempt to resolve any concerns raised by interested persons and Indigenous communities, in a way that does not cause unreasonable delay to the implementation of the Early Works. The issues resolution process included a review of comments received during the public review period, engagement of subject matter experts as required, and then preparation and final review of responses. Issues were considered on a case by case basis to determine if changes were required to the Project or if clarification on the Project or process was required. Further consultation with individual stakeholders took place, as required.

Section 8, Table 8-1 provides a record of issues and resolutions in the form of feedback received and Project Team actions. Correspondence received during the review of the Draft Early Works Report along with Project Team responses has been added to the Consultation Record available in Appendix B.

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- Appendix A: County Road 4 Early Works Recommended Plan
- Appendix B: Consultation Record
- Appendix C: Aquatic Effects Assessment Summary Table (Template D4)

1 Introduction

1.1 Project Description

The Ontario Ministry of Transportation (MTO) has retained AECOM Canada Ltd. (AECOM) to undertake a Preliminary Design project-specific assessment of environmental impacts for the proposed Highway 400 – Highway 404 Link (Bradford Bypass). In accordance with the provisions of the Ontario Regulation 697/21, the Ministry intends to move ahead with early works. Early works, as set out in the regulation is focused on a grade separated bridge crossing for the future Bradford Bypass at County Road 4 (Yonge Street).

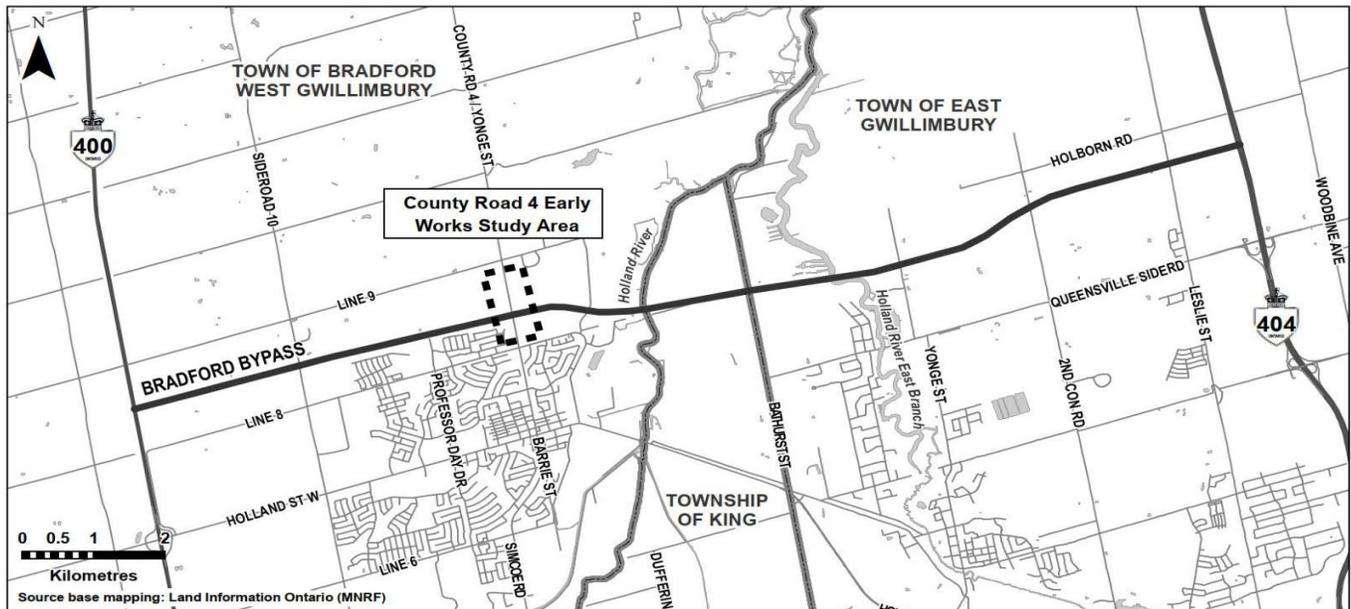
To promote efficiencies between the Bradford Bypass and the County of Simcoe’s widening of County Road 4 (2012 approved Municipal Class Environmental Assessment), the Ministry’s Early Works project will incorporate the widening of this section of County Road 4 including a 3.0 m wide multi-use path.

The Study Area covers County Road 4 for 1.3 km from south of 9th Line to 8th Line in the Town of Bradford West Gwillimbury and the County of Simcoe (see **Figure 1-1**). This Study will advance as an Early Works Contract Package for the Bradford Bypass. The new bridge will be designed to include the widening of County Road 4 approved by the County, further outlined in Section 1.2.1. The area of impact associated with the County Road 4 Early Works is herein referred to as the Limits of Work.

The County Road 4 Early Works will be delivered through one advance Design-Build contract scheduled to be awarded in the Spring of 2022. This Early Works Report (this Report) details the design to a Final Design-Build Ready Reference Concept. Upon award of the Design-Build contract, the Design-Build Team will be required to complete the detailed design according to design standards, update the impact assessments, as well as carry forward and implement the environmental protection, mitigation, and monitoring measures prescribed in this Early Works Report and environmental reports prepared for this Project. The winning Design-Build Team will be required to consult with regulatory agencies to obtain permits, approvals or authorizations as required.

A detailed Project Description can be found in Section 3.4 of this Report.

Figure 1-1: County Road 4 Early Works Study Area



1.2 County Road 4 Early Works

1.2.1 Background

1.2.1.1 County of Simcoe Municipal Class Environmental Assessment (2012)

The County prepared an Environmental Study Report (2012) for the widening of County Road 4 from north of 8th Line to north of County Road 89 that was approved under the Municipal Class Environmental Assessment process. The approved plan provides a four-lane rural road cross section, including a flush 1.0m paved median. The approved plan includes any necessary upgrades to existing drainage systems, addition of turning lanes at various side road intersections, replacement of culverts, addition of illumination at sideroad intersections, roadside safety upgrades, correction of vertical alignment deficiencies, and inclusion of a multi-use path on the east side of County Road 4 (County of Simcoe, 2012). The County has since started site preparation works for the widening of County Road 4 from the southern limit, from 8th Line to 11th Line.

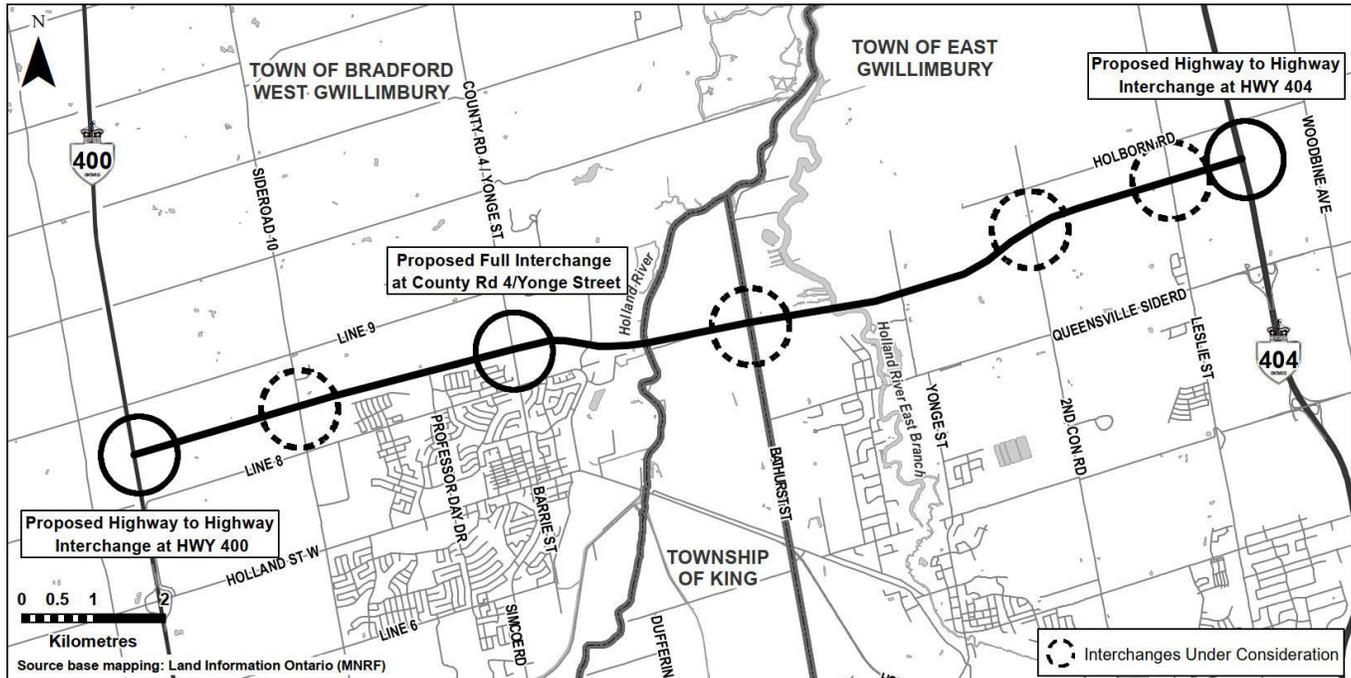
1.2.1.2 Highway 400 – Highway 404 Link (Bradford Bypass)

The Highway 400 – Highway 404 Link (Bradford Bypass) is a new proposed 16.2 km controlled access freeway connecting Highway 400 and Highway 404 in the County of Simcoe and Regional Municipality of York. The proposed highway will extend from Highway 400 between 8th Line and 9th Line in Bradford West Gwillimbury, cross a small portion of King Township, and connect to Highway 404 between Queensville Sideroad and Holborn Road in East Gwillimbury. There are proposed full and partial interchanges as well as grade separated crossings at intersecting municipal roads and watercourses, including the Holland River and Holland River East Branch. The Project will also include the Preliminary Design for the replacement of the 9th Line Structure on Highway 400.

Figure 1-2 shows the Bradford Bypass Study area as well as the locations of the proposed interchanges.

In September 2020, the Ministry of Transportation initiated the Preliminary Design and Class Environmental Assessment Study for the Bradford Bypass for the 2002 Environmental Assessment approved Recommended Plan and alignment and began discussions with municipalities to coordinate projects in the Study Area. As the Bradford Bypass will require a bridge to carry County Road 4 over the new highway, the Ministry is working with County to complete the widening of County Road 4 within the Bradford Bypass study limits.

Figure 1-2: Bradford Bypass Study Area



1.2.1.3 Early Works

The Ministry of Transportation is planning to build a grade separated bridge crossing for the Bradford Bypass on County Road 4 (Yonge Street) between the 8th Line and 9th Line (herein referred to as the Early Works). To ensure design coordination and accommodation of the future Bradford Bypass without requiring any future reconstruction, this bridge will include the widening of County Road 4 and construction of a 3.0 m wide multi-use path on behalf of the County.

On October 7, 2021, Ministry of the Environment, Conservation and Parks (MECP) announced that Ontario Regulation 697/21 came into force. The new regulation exempts the Bradford Bypass and Early Works components under the *Environmental Assessment Act* and therefore this Preliminary Design and assessment is now proceeding in accordance with Ontario Regulation 697/21. The decision notice on the Environmental Registry of Ontario (<https://ero.ontario.ca/notice/019-1883>) provides further information on Ontario Regulation 697/21. Ontario Regulation 697/21 prescribes project-specific requirements for environmental impacts, including consultation requirements. The Early Works construction must be in compliance with all applicable federal and provincial regulatory requirements and legislation, refer to Section 7 for the list of permits and approvals.

In accordance with the provisions of the Ontario Regulation 697/21, the Ministry intends to move ahead with the Early Works. Further details on the study process are provided in Section 2.

1.2.2 Rationale for Proceeding with the Early Works and the Study Area

The Bradford Bypass has been identified in the *Growth Plan for the Greater Golden Horseshoe* as a future transportation corridor, representing a key link between Highway 400 in southeastern part of the County with Highway 404 in the Regional Municipality of York. Future population and employment growth in this area will result in a significant increase in travel demand for both people and goods movement in the northern portion of the Greater Toronto Area (GTA) and Greater Golden Horseshoe (GGH).

As the County is proceeding with the widening of County Road 4 and the Bradford Bypass crosses County Road 4, proceeding with the County Road 4 Early Works will provide cost efficiencies between the Ministry and the County, minimize disruptions to the travelling public and provide infrastructure needed to meet travel demands in the shorter term.

The Study Area boundary includes 1.3 km along County Road 4 between 8th Line and 9th Line and a 120 m buffer. The Study Area was determined based on the following:

- The widening limits for County Road 4 from the County's Environmental Study Report (County of Simcoe, 2012);
- The 2002 Approved Environmental Assessment alignment from the Bradford Bypass;
- Additional property required to meet current design standards and accommodate construction staging; and
- A 120 m buffer from the proposed right-of-way per guidance from the Environmental Reference for Highway Design (Ministry of Transportation, 2013).

2 Study Process

2.1 Ontario Regulation 697/21: Bradford Bypass

The Bradford Bypass is being assessed in accordance with Ontario Regulation 697/21. Ontario Regulation 697/21 provides a defined framework for the proponent to follow to conduct assessment and decision-making surrounding the potential environmental impacts of the Bradford Bypass.

Ontario Regulation 697/21 provides the opportunity for the Ministry of Transportation to prepare an Early Works Report for the assessment of a bridge at County Road 4 and the potential to proceed in advance of the rest of the Bradford Bypass. The Ministry of Transportation is required to complete all regulatory requirements set forth in Ontario Regulation 697/21, such as carrying out consultation, conducting environmental studies and obtaining permits and approvals for the project. The introduction of Ontario Regulation 697/21 does not change the purpose or requirement for completing environmental studies for the Project from the Environmental Assessment process.

This Report has been prepared in accordance with Section 5(2) and Section 12 (1)(b) of the Ontario Regulation 697/21 and contains the information outlined in Table 2-1.

Table 2-1: Report Contents in Accordance with Ontario Regulation 697/21: Bradford Bypass

Regulation Section	Requirement	Report Section
Section 5(2)(1)	A description of the early works, including a description of the alternatives that were considered or a description of why alternatives were not considered.	Sections 1 and 3
Section 5(2)(2)	The rationale for proceeding with the early works and a summary of background information relating to them.	Section 1
Section 5(2)(3)	A map showing the area of study for the early works described under paragraph 1, along with a rationale for the proponent's selection of the boundaries for the area of study.	Section 1
Section 5(2)(4)	An update to the description of the local environmental conditions within the area of study for the early works.	Section 5
Section 5(2)(5)	A description of all studies undertaken in relation to the early works, including the studies required by sections 6 to 9, which must set out, <ul style="list-style-type: none"> i. a summary of all data collected or reviewed, and ii. a summary of all results and conclusions. 	Sections 5 and 6
Section 5(2)(6)	The proponent's assessment and evaluation of the impacts that the preferred method of carrying out the early works and other methods might have on the environment, and	Section 6

Regulation Section	Requirement	Report Section
	the proponent’s criteria for assessment and evaluation of those impacts.	
Section 5(2)(7)	A description of any measures proposed by the proponent for mitigating any negative impacts that the preferred method of carrying out the early works might have on the environment.	Section 6
Section 5(2)(8)	A description of the means the proponent proposes to use to monitor and verify the effectiveness of the mitigation measures proposed under paragraph 7, including a plan to make the results of the monitoring and verification available on the Project website.	Section 6
Section 5(2)(9)	A description of any municipal, provincial, federal or other approvals or permits that may be required for the early works.	Section 7
Section 5(2)(10)	<p>A consultation record, including,</p> <ul style="list-style-type: none"> i. a description of the consultations carried out with Indigenous communities, in accordance with the early works Indigenous Consultation Plan prepared under section 4, and with other interested persons, ii. a list of the Indigenous communities and interested persons who participated in the consultations, iii. summaries of the comments submitted by Indigenous communities and interested persons, iv. a summary of discussions that the proponent had with Indigenous communities, and copies of all written comments submitted by Indigenous communities, v. a description of what the proponent did to respond to concerns expressed by Indigenous communities and interested persons, and vi. any commitments made by the proponent to Indigenous communities and interested persons in respect of the early works. 	Section 4 and Appendix B
Section 12 (1)(b)	<p>Update the draft early works report, including by adding,</p> <ul style="list-style-type: none"> i. a description of the issues resolution process employed by the proponent in respect of any concerns raised by Indigenous communities and interested persons, 	Section 8 and Appendix B

Regulation Section	Requirement	Report Section
	ii. a description of the concerns raised by Indigenous communities and interested persons in the issues resolution process and of the outcome of the process, including what, if anything, the proponent did or will do in respect of the concerns raised, and iii. a description of any changes to the early works as a result of addressing concerns raised through consultation under this section;	

Section 14 of Ontario Regulation 697/21 outlines that the Early Works assessment process may only be carried out until the Notice of Publication of Draft Environmental Impact Assessment Report for the overall Bradford Bypass has been distributed in accordance with Section 25(3) of the regulation. After the Notice of Publication of Draft Environmental Impact Assessment Report for the overall Bradford Bypass has been distributed, the Early Works assessment process shall cease immediately if it is underway. Should changes be required to the Early Works that are inconsistent with the Final Early Works Report or the Final Environmental Impact Assessment Report for the Bradford Bypass, then an addendum will be required in accordance with Ontario Regulation 697/21, Section 29.

2.1.1 Early Works Report

2.1.1.1 Draft Early Works Report

The Draft County Road 4 Early Works Report was prepared to satisfy the requirements of Section 5 of Ontario Regulation 697/21 for the proposed works at County Road 4 (Section 3). This Early Works Report summarizes the local environmental conditions within the Early Works Study Area. The local environmental conditions were characterized through a combination of a desktop review and field studies by practitioners using industry standard techniques and provincial standards, protocols and guidelines, where appropriate.

The Report provided an assessment and evaluation of impacts that Early Works might have on the environment. Based on the potential impacts, a description of mitigation measures and monitoring activities is outlined. A list of any municipal, provincial, federal or other permits and approvals that may be required for the Early Works was also provided.

A description of consultations carried out with Indigenous communities and interested persons was provided in Section 4, along with commitments to further consultation throughout the completion of design and into construction.

The Draft County Road 4 Early Works Report was available on the project website (www.BradfordBypass.ca/early-works/) from January 13, 2022 until February 12, 2022. Interested persons were encouraged to visit the Project Website (www.BradfordBypass.ca/early-works/) or contact the Project Team by phone or email as listed below.

Website: www.BradfordBypass.ca/early-works/
Email: ProjectTeam@BradfordBypass.ca
Toll-Free Number: 1-877-247-6036

Anyone with accessibility requirements in order to participate in this Project was encouraged to contact the Project Team as listed above.

Comments were collected to assist the Ministry of Transportation in meeting the requirements of Ontario Regulation 697/21. This material will be maintained on file for use during the Study and may be included in project documentation. Information collected will be used in accordance with the *Freedom of Information and Protection of Privacy Act, R.S.O. 1990, c. F.31*. With the exception of personal information, all comments will become part of the public record.

2.1.1.2 Consultation and Issues Resolution Process

Consultation was carried out for this project initially under the Ministry of Transportation *Class Environmental Assessment for Provincial Transportation Facilities*, Group 'A' project. As the Ontario Regulation 697/21 is now in force, the consultation process has been updated to meet the requirements of the new regulation. Further details on the consultation process are summarized in Section 4 of this Report.

In accordance with Section 11(4) of the Ontario Regulation 697/21, the Ministry of Transportation established an issues resolution process for the County Road 4 Early Works. Any concerns raised by Indigenous communities and interested persons during the public review period of the Draft County Road 4 Early Works Report will be documented in Section 8 of this Report, as required by Section 12(1)(b) of Ontario Regulation 697/21.

2.1.1.3 Final Early Works Report

Comments received during the public review period of the Draft Early Works Report were incorporated into Section 8 this Report and the Final County Road 4 Early Works Report has been published on the project website.

After the Final County Road 4 Early Works Report is published, the Ministry of Transportation will provide a Statement of Completion of the Early Works Assessment process to the Director of the Ministry of Environment, Conservation and Parks Environmental Assessment Branch, after which the Statement of Completion will be published on the project website. The Statement of Completion of the Early Works Assessment Process will indicate that the intention to proceed with the Early Works in accordance with the Final Early Works Report.

If after providing a Statement of Completion of the Early Works Assessment Process, changes are required to the Early Works that are inconsistent with the Final Early Works Report, an addendum will be prepared to the applicable report in accordance with Section 29(1) of the Ontario Regulation 697/21.

2.2 Regulatory Context

2.2.1 Ontario Environmental Assessment Act

On October 7, 2021, Ontario Regulation 697/21 came into effect and exempts the Bradford Bypass from the requirements of the Environmental Assessment Act, subject to conditions, to promote environmental protection and provide for continued consultation with government agencies, Indigenous communities and members of the public. The regulation sets a streamlined assessment process going forward and for continued environmental protection and consultations for the Bradford Bypass Project and associated Early Works. Further details on the regulation are outlined in Section 2.1.

2.2.2 Federal Impact Assessment Act

In June 2019, the Government of Canada released the Impact Assessment Act (IAA), providing an outline for the federal assessment of impacts of major projects and projects on federal lands within Canada. The *Impact Assessment Act* provides a five-phase process to assessing projects subject to the Impact Assessment Act:

- Planning
- Impact Statement
- Impact Assessment
- Decision-Making
- Post Decision.

Projects that meet the definition of designated projects under the Physical Activities Regulations (SOR/2019-285) of the *Impact Assessment Act* are subject to the *Impact Assessment Act*.

The Ministry of Transportation reviewed the Physical Activities Regulations (SOR/2019-285) under the *Impact Assessment Act* in order to reconfirm the applicability and requirements pertaining to the Bradford Bypass. The Ministry of Transportation considered the applicability of the Bradford Bypass as a 'Designated Project' pursuant to the *Impact Assessment Act*, whereas Section 51 of the Physical Activities Regulations applies to "The construction, operation, decommissioning and abandonment of a new all-season public highway that requires a total of 75 km or more of new right of way." The Bradford Bypass may include up to 35.0 km of road works, which takes into consideration the new Highway 400 to Highway 404 link mainline / designated right-of-way (ROW) (16.2 km), plus consideration for associated infrastructure works to connect with existing segments along Highway 400 and Highway 404, municipal roads (10th Sideroad, County Road 4, Artesian Industrial Parkway, Bathurst Street, Yonge Street, 2nd Concession, and Leslie Street), and a segment associated with the Metrolinx rail line. The associated segments on existing infrastructure account for approximately 13.2 km (without staging) to 18.8 km (with staging).

In consideration for the length of the Project, Section 51 of the Physical Activities Regulations does not apply to the Bradford Bypass, which involves less than 75 km or more of new Right of Way.

The following were also considered in the determination of the Bradford Bypass being subject to the criteria of a Designated Project per the Impact Assessment Act:

- The Recommended Plan does not impact or impede on federal lands;
- The Recommended Plan is not located within a Wildlife Area as defined in the Wildlife Area Regulations;
- The Recommended Plan is not located within a Marine Conservation Area;
- The Recommended Plan is not located in a migratory bird sanctuary, as defined in the Migratory Bird Sanctuary Regulations; and
- The Recommended Plan is not located on land administered by Parks Canada.

Per review of the applicability of Section 51 of the Physical Activities Regulations and other considerations, the Bradford Bypass does not meet the criteria for a defined 'Designated Project' per the Physical Activities Regulations under the *Impact Assessment Act* and, therefore is not subject to Federal Impact Assessment requirements per the *Impact Assessment Act*. The Ministry acknowledges that under subsection 9(1) of *Impact Assessment Act*, the federal Minister of the Environment may, by order, designate a physical activity that is not prescribed in the Physical Activities Regulations.

It should also be noted that the Bradford Bypass' potential impacts within federal jurisdiction are limited and will be managed through the project-specific assessment of environmental impact process and federal permits and approvals. The management and consideration of federal jurisdiction and approvals was initiated during the route planning study as part of the 2002 Approved Environmental Assessment

alignment. A comprehensive consultation and engagement program with local community members, Indigenous communities, the municipalities, and stakeholders has been underway since initiation of the preliminary design study in 2020 and will continue through project implementation. The Ministry of Transportation is actively addressing concerns from Indigenous communities and interested parties and will continue to do so throughout the Project lifecycle.

2.2.2.1 Impact Assessment Agency of Canada Designation Request and Minister's Decision

In February 2021, the Minister of Environment and Climate Change received a request to designate the Bradford Bypass under subsection 9(1) of the *Impact Assessment Act*. Under subsection 9(1) of the *Impact Assessment Act*, the Minister may, by order, designate a physical activity that is not prescribed in the *Physical Activities Regulations*. The Minister may do this if, in the Minister's opinion, the physical activity may cause adverse effects within federal jurisdiction or adverse direct or incidental effects (resulting from federal decisions), or public concerns related to those effects that warrant the designation. The Ministry of Transportation reviewed the Project in line with the request and responded to the request in March 2021 (the responses are available on the project website). In May 2021, the Minister of the Environment and Climate Change determined that the Bradford Bypass proposed by the Ministry of Transportation does not warrant designation under the *Impact Assessment Act* and issued the following statement (Government of Canada, 2021):

The Minister of Environment and Climate Change has considered the potential for the Project to cause adverse effects within federal jurisdiction, adverse direct or incidental effects, public concern related to these effects, as well as adverse impacts on the Aboriginal and treaty rights of the Indigenous peoples of Canada. The Minister also considered the analysis of the Impact Assessment Agency of Canada.

The Minister has reached the decision that the designation of the Project is unwarranted for the following reasons:

- *the regulatory review processes that apply to the Project and related consultations with Indigenous peoples provide a framework to address the potential adverse aforementioned effects and public concerns raised in relation to those effects. These include:*
 - *provincial approvals and permits pursuant to the Environmental Assessment Act, Endangered Species Act, Environmental Protection Act, Ontario Heritage Act, Ontario Water Resources Act, and Safe Drinking Water Act.*
- *the Project must comply with relevant provisions of federal legislation, including the Canadian Navigable Waters Act, the Fisheries Act and the Explosives Act.*

2.2.3 Planning Policies

The Province of Ontario, the County of Simcoe and the Town of Bradford West Gwillimbury have plans and policies which are relevant to the development of the County Road 4 Early Works. These plans and policies serve as important elements of the planning framework and provide insight into key provincial and municipal objectives, while encouraging strategic transportation development.

The following sections provide an overview of the planning policies relevant to the County Road 4 Early Works.

2.2.3.1 Provincial Planning

This section provides an overview of provincial policy documents that guide land use, growth, infrastructure planning, trade, tourism and recreation, and environmental protection. The following provincial plans are considered to be applicable to the project.

2.2.3.1.1 A Place to Grow: Growth Plan for the Greater Golden Horseshoe

A Place to Grow: Growth Plan for the Greater Golden Horseshoe, 2020 (Growth Plan) is a long-term plan for Ontario designed to promote economic growth, increase housing supply, create jobs, and build communities that make life easier, healthier, and more affordable for people of all ages. As one of the most dynamic and fast-growing regions in North America, the Greater Golden Horseshoe is a designation for many people and businesses relocating from other parts of Canada and around the world. To accommodate such growth, the plan provides a framework to guide and prioritize infrastructure planning and investments in the Greater Golden Horseshoe, including transportation system planning for moving people and moving goods, to support and accommodate forecasted growth to 2051 and beyond (Province of Ontario, 2020b).

The infrastructure framework in the Growth Plan requires that municipalities undertake an integrated approach to land use planning, infrastructure investments, and environmental protection to achieve the outcomes of the Growth Plan.

The Growth Plan supports the planned corridors which are required to meet projected needs, and are identified through the Growth Plan, preferred alignment(s) determined through the Provincial *Environmental Assessment Act*, processes; or identified through planning studies where the Ministry of Transportation is actively pursuing the identification of a corridor. The Growth Plan policy dictates that in planning for the development of planned corridors and supporting facilities, the Province, other public agencies and municipalities will consider increased opportunities for moving people and goods by rail; separation of modes within corridors; and provide opportunities for inter-modal linkages. The Growth Plan calls for the long-term protection of planned corridors and the co-location of infrastructure in these corridors, where appropriate (Province of Ontario, 2020b).

The 2002 Approved Environmental Assessment for the Bradford Bypass is identified on the Growth Plan Schedule 2 – A Place to Grow Concept as ‘Highway Extension’ that crosses the lands designated as Greenfield Area and Greenbelt Area. The Growth Plan defines the ‘Designated Greenfield Area’ as lands within settlement areas but outside of delineated built-up areas that have been designated in an official plan for development and are required to accommodate forecasted growth to the horizon of the Growth Plan.

2.2.3.1.2 Provincial Policy Statement

The Provincial Policy Statement, 2020 is issued under Section 3 of the *Planning Act* and provides policy direction on matters related to land use planning and development. The Provincial Policy Statement is premised upon the efficient use of land and infrastructure, the protection of environmental resources, and ensuring sufficient land is available for the development of future employment and residential uses. Of relevance to the Study Area are policies that relate to transportation systems and infrastructure, long-term economic prosperity, and the protection of natural, cultural, and built heritage. In particular, the Provincial Policy Statement promotes:

- Healthy and active communities by facilitating active transportation and community connectivity (Provincial Policy Statement, 2020, Section 1.5.1);
- The planning for and protection of transportation infrastructure and transit to meet current and projected needs (Provincial Policy Statement, 2020, Section 1.6.8.1);
- Providing safe, energy efficient, integrated, and reliable multimodal transportation systems which facilitate the movement of people and appropriately address projected needs (Provincial Policy Statement, 2020, Section 1.6.7);
- Maintaining or restoring the diversity and connectivity of natural features in an area, and the long-term ecological function and biodiversity of natural heritage systems (Provincial Policy Statement, 2020, Section 2.1.2);

- Restricting development and site alteration in, or adjacent to, significant wetlands, woodlands, valley lands, wildlife habitat, and Areas of Natural and Scientific Interest, unless it has been demonstrated that there will be no negative impacts on the natural features or their ecological functions (Provincial Policy Statement, 2020, Sections 2.1.4 and 2.1.5);
- Restricting development and site alteration in habitat of endangered or threatened species except in accordance with Provincial and Federal requirements (Provincial Policy Statement, 2020, Section 2.1.7); and
- Restricting development and site alteration in or near sensitive surface or groundwater features such that their features and related hydrological functions will be protected, improved, or restored (Provincial Policy Statement, 2020, Section 2.2.2).

The County Road 4 Early Works is consistent with the objectives of the Provincial Policy Statement as it supports the expansion and optimization of a multi-modal transportation system that provides connectivity to existing local and regional transportation infrastructure and supports long-term economic prosperity. The County Road 4 Early Works will also support areas that are planned for residential and employment growth.

2.2.3.1.3 Greenbelt Plan 2017

The Greenbelt Plan, 2017, identifies where urbanization should not occur in order to provide permanent protection to the agricultural land base and the ecological and hydrological features, areas, and functions occurring within the Greater Golden Horseshoe landscape (Province of Ontario, 2017). The Greenbelt Plan was introduced in 2005 under the Greenbelt Act, 2005, and includes lands within, and builds upon the ecological protections provided by, the Niagara Escarpment Plan and the Oak Ridges Moraine Conservation Plan. The Greenbelt Plan, together with the Growth Plan, builds on the Provincial Policy Statement to establish a land use planning framework for the Greater Golden Horseshoe that supports a thriving economy, a clean healthy environment, and social equity (Province of Ontario, 2017).

The County Road 4 Early Works are not located within the Greenbelt Plan boundary as it is located on lands designated as Settlement Area.

2.2.3.2 Municipal Planning

2.2.3.2.1 County of Simcoe Official Plan 2008 (Office Consolidation 2016)

The Official Plan for the County, 2016, is prepared under the *Planning Act*. The final consolidated text for the Official Plan was approved for the County by the Ontario Municipal Board in December 2016. This Official Plan provides a policy context for land use planning taking into consideration the economic, social, and environmental impacts of land use and development decisions within the County.

The County is expecting continued population growth to the year 2031. Population within the County is projected to increase by 53%, from 272,000 (County of Simcoe, 2016) to 416,000 in 2031.

It is the County's policy that land use planning and development decisions within the County shall be integrated with transportation considerations. The County, along with local municipalities, plan for and infrastructure corridors and right-of-way to meet current and projected needs. Where development in 'Planned Corridors' could preclude or negatively affect the use of the corridor for the purposes for which it was identified, the development shall not be permitted. The County will encourage and support the planning, corridor and connectivity protection and the early construction of Provincial Planned Corridors, as a goods movement and transit corridor. The Bradford Bypass has been identified as 'Potential Provincial Corridor' in Schedule 5.5.2 of the Official Plan - Future County Transportation System.

The Bradford Bypass traverses the lands designated as Settlements Area, Agricultural Lands, Greenlands, Highway 400 Employment lands and the Protected Countryside in the Greenbelt Plan. The Official Plan states that where feasible and subject to local municipal policies and By-Laws, infrastructure may be located in any designation of the Official Plan, subject to the requirements of the Greenbelt Plan where applicable, and applicable provincial and federal policy and legislation. Lot creation for infrastructure in the Agricultural designation is discouraged and should only be permitted where the use cannot be accommodated through an easement or right-of-way.

2.2.3.2.2 County of Simcoe Transportation Master Plan, 2014

The County has emerged as a key growth area in the outer ring municipalities surrounding the Greater Toronto and Hamilton Area (GTHA). Not only is the demand for growth a major challenge facing the County's transportation system, but the recreational communities within and just to the north and west of the County dramatically increase the travel demands on the weekends and particularly during the summer months (County of Simcoe, 2014).

Since the completion of the County's Transportation Master Plan, the County and its local municipalities continue to experience growth in employment and tourism, as well as seasonal and year-round residents. The Transportation Master Plan provided a fundamental framework for the County's planned transportation corridors and systems.

According to the Transportation Master Plan, increasing the supply of transportation infrastructure and services and construction of new transportation facilities will be a strategy direction to address the transportation challenges facing the County. The Transportation Master Plan also refers to the information gathered from the public survey which indicated that 86% of the respondents supported the idea of working with the provincial government to complete new highways, including the Bradford Bypass. Additionally, staff from 18 Simcoe Area municipalities identified the implications of a deferred Bradford Bypass and the impact on County roads as one of the specific areas of 'Road Network Concerns'. In support of implementation, phasing and monitoring of the key Transportation Master Plan strategies, Transportation Master Plan recommended that the County should engage in discussions with the Ministry of Transportation to move forward in the construction of the Bradford Bypass. Protection of lands for this facility should persist and implementation of a facility in this corridor should continue to be a high priority for the County and the Province as it has been identified as a near-term need to accommodate growth and to facilitate goods movement and future transit movements.

The Transportation Master Plan was updated in 2014 to proceed toward an integrated transportation network with additional focus on transit services and nodes, active transportation amenities, as well as a review of County road design standards, cross sections and right-of-way widths. It is been assumed in the updated Transportation Master Plan that the Bradford Bypass will be undertaken.

2021 Update

The County initiated a Transportation Master Plan Update in February 2021, which is currently in Phase 2 of a four-stage study process (County of Simcoe, 2021). According to the County's website (<https://www.simcoe.ca/dpt/pln/tmp>), the Transportation Master Plan update will:

- Develop a forward-looking plan for the County and expand the multi-modality of the transportation system including driving, transit, cycling, walking and movement of commercial vehicles;
- Identify appropriate infrastructure to support and manage growth and address the needs and priorities of both rural and urban communities;
- Develop complementary transportation solutions informed by supporting provincial and local policies including the Official Plan update; and

- Provide recommendations on managing a multi-modal transportation system, improving safety, and supporting the development of healthy communities.

The intention of the update is to describe the action of the County and its partners to achieve the network envisioned to 2031 (short-term), 2041 (medium-term), and 2051 (long-term and horizon (2065)) (County of Simcoe, 2021).

On October 5, 2021 the County's released Phase I of the Transportation Master Plan update. As the County continues to experience population growth and urbanization, this update provides an opportunity to realign transportation policy and investment directions to best meet the varied transportation needs, by considering all modes of travel (County of Simcoe, 2021). The strategic direction for the Transportation Master Plan update consists of three components: the transportation Vision Statement, Goals, and Guiding Principles. The Vision Statement is as follows:

"A safe, efficient and accessible multi-modal transportation system that responds to the County's vast geography, provides the connectivity needed for its growing and changing populations and businesses, and supports community and environmental health."

The Goals follow from and break down the Vision into a set of specific desired outcomes. Specific goals that County Road 4 addresses includes: providing efficient and safe travel between County communities and to adjacent municipalities via the County road network, and supporting the local economy by enabling efficient movement of goods and commercial vehicles.

The Guiding Principles overarch the value statement and act as building blocks for the development of the Transportation Master Plan update. Guiding principles that the construction of County Road 4 addresses include:

- Establishing an efficient and integrated multi-modal transportation network;
- Supporting safe and reliable movement of people and goods; and
- Integrative transportation and land use planning.

This is because County Road 4 is part of the Bradford Bypass, future infrastructure expansion project that will have significant impacts on local roads in Bradford West Gwillimbury, and provide placemaking opportunities as a result of reduced traffic (County of Simcoe, 2021). The Bradford Bypass is expected to accommodate the additional travel demand in the County, and may relieve congestion on some County Roads (County of Simcoe, 2021).

2.2.3.2.3 Town of Bradford West Gwillimbury Official Plan, 2021

The Town of Bradford West Gwillimbury is strategically located along Highway 400 within the County, between the Town of Newmarket and City of Barrie. New growth is transforming the form and layout of Bradford West Gwillimbury. According to the 2016 Census, the Town of Bradford West Gwillimbury's population and employment numbers were approximately 36,700 persons and 10,000 jobs respectively. Growth projections as contained in the *Greater Golden Horseshoe 2019* and the County Official Plan 2008 (Bradford West Gwillimbury, 2016) state that the Town of Bradford West Gwillimbury's population will reach 50,500 people and 18,000 jobs by the year 2031.

The Bradford West Gwillimbury's Official Plan was adopted by Town Council on March 2, 2021 (Bradford West Gwillimbury, 2021) and is focused on sustainability and establishes policies that have a positive effect on the social, economic, cultural and natural environment of the Bradford West Gwillimbury. The submission of the Environmental Assessment document for the Bradford Bypass has been of particular importance and it is Bradford West Gwillimbury's Policy to ensure that development in the vicinity of the highway will be compatible with the functioning of the highway and its access points

Section 3.11.3 of the Bradford West Gwillimbury Official Plan recognizes the Bradford Bypass corridor and indicates that lands within the Bradford Bypass shall only be permitted to be used for their legal existing purposes. Any expansion of use or building shall require a development application and Ministry of Transportation permit in accordance with the *Public Transportation and Highways Improvement Act* to ensure there is no adverse impact on the future corridor. Development proposals adjacent to the Bradford Bypass shall, as part of reviewing the application, consult with the Ministry of Transportation to ensure all appropriate requirements are met (Bradford West Gwillimbury, 2021).

3 Early Works Description

3.1 Project Location

The Study Area covers County Road 4 from south of 9th Line to 8th Line, in the Town of Bradford West Gwillimbury, County of Simcoe, see Figure 1-1.

3.2 Existing Conditions

3.2.1 Existing Road Network

County Road 4 within the Study Area between 8th Line and 9th Line is a two-lane rural arterial undivided roadway, with both fully and partially paved shoulders, a mix of rural and urban cross section elements, and two posted speeds of 50 km/h and 80 km/h. County Road 4 intersects with 8th Line with a signalized intersection and with 9th Line with a stop-controlled intersection. The County has initiated the widening works in accordance with the County’s Municipal Class Environmental Assessment from 8th Line to 11th Line. The County Road 4 and 9th Line intersection (outside and north of the Study Area) is proposed to be signalized in the County’s widening. There are no existing bridges along the proposed route.

3.2.2 Traffic

The latest traffic volumes from Spring 2019 were provided by the County and used in conjunction with the overall Bradford Bypass model to calculate the 2041 volumes. A 2017 count was used for the commercial vehicle percentage. A summary of the projected traffic volumes is included in Table 3-1

Table 3-1: Summary of Protected Traffic Volumes for County Road 4

	2019 (Latest Available Year)	2041 (Design Year) Only Widening	2041 (Design Year) With the Bradford Bypass
Average Annual Daily Traffic (AADT)	18,763	25,200	29,800
Summer Average Daily Traffic (SADT)	17,483	23,481	27,767
Design Hour Volume (DHV)	1,989	2,671	3,159
AM Peak Hour Volume	1,261	2,190	2,974
PM Peak Hour Volume	1,596	2,082	2,079
% Commercial vehicles	4% (2017)	6%	6%

3.2.3 Cycling Facilities and Recreational Trails

There are no provincial parks or recreational trails within the Study Area.

The County's 2012 Municipal Class Environmental Assessment for County Road 4 included the addition of a multi-use path along the east side of County Road 4. In 2014, the County's Transportation Master Plan identified County Road 4 as a proposed active transportation corridor which would link to other future corridors to the north at Line 11 and to the south at 8th Line (County of Simcoe, 2014).

3.3 Rationale, Description, and Assessment to the Undertaking

3.3.1 County Road 4 Structure Alternatives

The Project Team assessed various structure alternatives for the construction of the new County Road 4 bridge over the Bradford Bypass. The new structure will be designed to span the future six general purpose lanes, two ramp speed change lands, and two High Occupancy Vehicle lanes of the Bradford Bypass. A standard clear zone will be provided between the edge of the outside travelled lane and the abutment wall at each end of the bridge in accordance with The Ministry of Transportation's Roadside Design Manual (Ontario Ministry of Transportation, 2020).

Considering the skew angle and the thickness of the abutment wall, the total span length (measured along County Road 4 between the centreline of the bearings) is estimated to be approximately 80 m (for the preferred bridge) which includes provisions for the required standard horizontal clear zone of not less than 7 m on the Bradford Bypass in the ultimate configuration.

The following three structure types were evaluated for the new structure:

- Alternative 1: Two-Span Pre-stressed NU 2000 Girders (Figure 3-1)
- Alternative 2: Two-Span Steel Box Girders (Figure 3-2)
- Alternative 3: Two-Span Post-tensioned Voided Slab (Figure 3-3)

Based on the requirements for the ultimate condition, the total length of the new structure is 80 m, measured between centrelines of the abutment bearings. The preferred County Road 4 bridge over the Bradford Bypass accommodates a 6-lane cross section and a total width of 31.845 m (at the pier).

3.3.1.1 Alternative 1 – Two-Span NU 2000 Girders

This structure consists of a two span (43.0 m; 39.0 m; total 82.0 m) bridge with NU 2000 girders and the total depth of superstructure estimated at 2.39 m on a skew of 4°21'41". The cross section consists of thirteen (13) NU 2000 girders spaced at 2.475 m and composite with a 225 mm reinforced concrete deck and 90 mm asphalt and waterproofing. The cantilevers are variable to accommodate the variation in speed change lanes and the northeast and southwest corners of the bridge (see Figure 3-1). The pier columns shall be designed following the Ministry of Transportation's Aesthetic Guidelines for Bridges. The pier columns shall be proportioned to stand out and create a crossing that is distinguishable and can be associated with the Bradford Bypass. It shall be noticeably different in form than most typical underpass bridges.

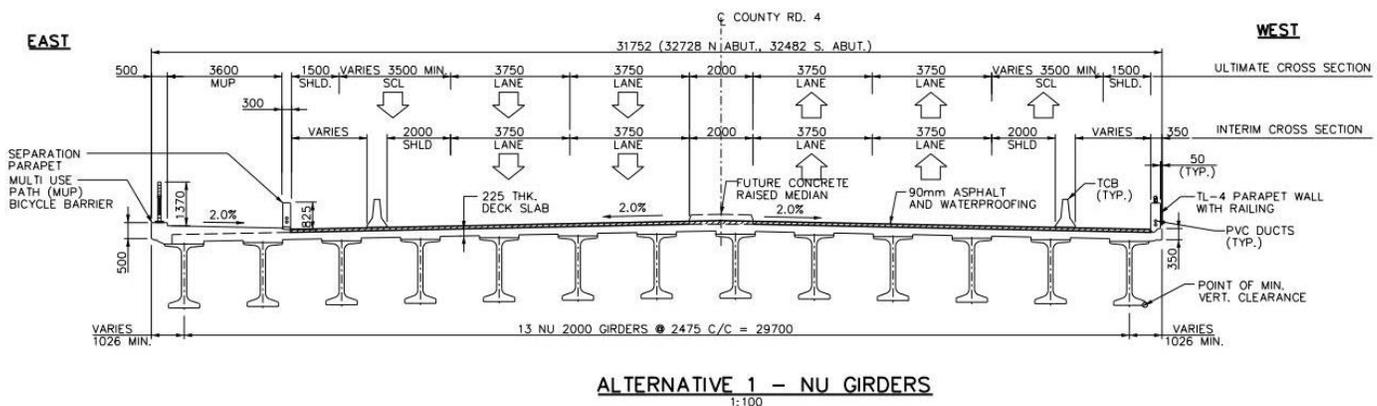
The foundation investigation indicates that spread footings are feasible for the sub-structure at the pier. This alternative is compatible with an integral abutment articulation resulting in increased durability and reduced maintenance. There will be sleeper slabs with expansion joints at the ends of the approach slabs. The foundation at the abutments will consist of a single row of steel piles.

The concrete deck on concrete girder structure is the least aesthetically pleasing out of all the alternatives. The deeper cross sections, combined with the use of concrete in the parapet walls, the deck, and the girders gives the appearance of a bulkier structure. The numerous elements (the thirteen

rows of girders) and the pier cap break up the flow of the lines in the structure, hindering the aesthetic appeal. This has been mitigated through the use of a parapet wall with a combination of traffic/bicycle railing at the west and open railing at the east side, as opposed to a deeper solid barrier.

Preliminary analysis indicates that this is a functional design and provides a durable structure. Precast concrete girders of required lengths are readily available and can be fabricated and delivered on site via Highway 400. The construction can be further sped up with the use of partial depth precast deck panels, which will eliminate a need for extensive falsework. This type of structure can easily be widened in the future by adding another row of girders and extending the foundations, abutments, and pier. It is estimated that the heavier superstructure will result in more expensive foundations as more piles at integral abutments and larger pier foundation will be required compared to the Alternative 2, Steel Box Girder.

Figure 3-1: County Road 4 Structure Alternative 1



3.3.1.2 Alternative 2 – Two-Span Steel Box Girders

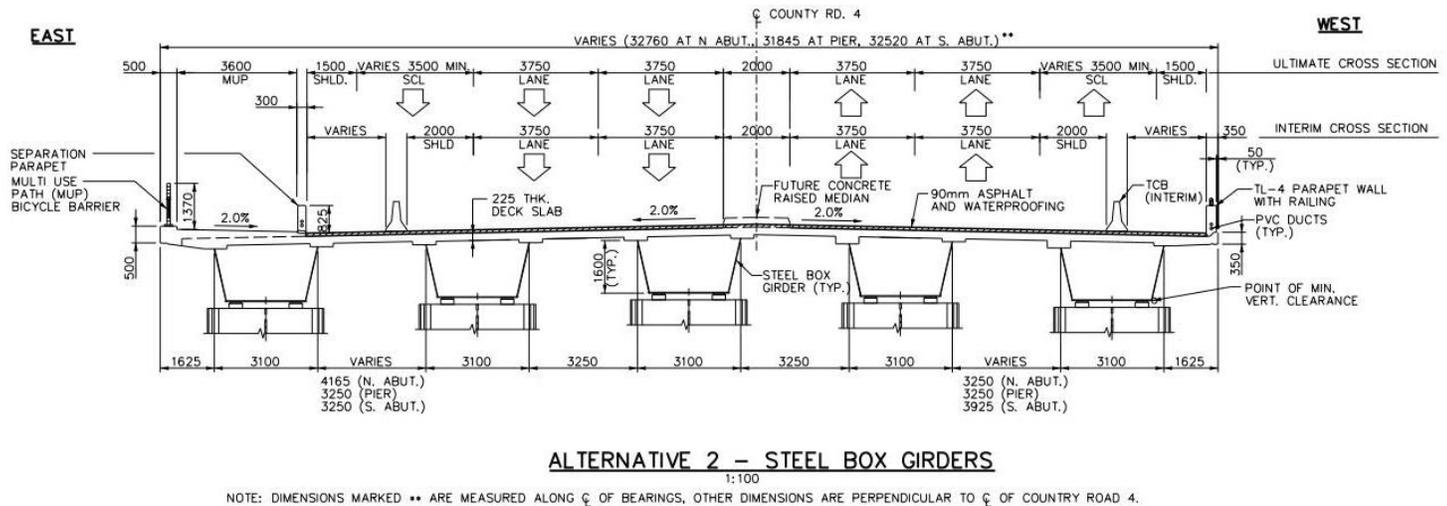
This alternative consists of a steel box girder bridge with two spans (42.0 m; 38.0 m; total 80.0 m) on a skew of 4°21'41". The depth of girders is estimated at 1.6 m. Shallower superstructure facilitates one meter reduction of each span compared with Alternative 1. The cross section consists of five (5) 3100 mm wide steel box girders, nominal 3250 mm spacing between box girders and 1625 mm wide cantilevers. The box girders support a 225 mm reinforced concrete deck and 90 mm asphalt and waterproofing system (see Figure 3-2). To maintain the desirable constant cantilevers along the length of the bridge, spacing of the steel box girders will be variable at the northeast and southwest corners of the bridge. The outside boxes will be curved at the northeast and southwest quadrants to maintain the constant cantilevers while following the curvature of the deck outline. Alternatively, steel box girders can be straight and concrete deck designed with larger cantilevers at the northeast and southwest corners of the bridge. The constant cantilevers were assumed on preliminary drawings.

The substructure will consist of five individual pier shafts supporting each of the girders. The foundation investigation indicates that spread footings are feasible for the sub-structure at the pier. This alternative is compatible with an integral abutment articulation resulting in increased durability and reduced maintenance. There will be sleeper slabs with expansion joints at the ends of the approach slabs. The abutments will be supported by a single row of steel piles. Steel box girder bridges are more aesthetically pleasing than concrete girder structures. The contrast in colour between the steel in the girders and the concrete in the deck and parapet walls enhance the apparent slenderness of the bridge. The absence of exterior bracings and a pier cap provides clean lines of view across the spans. Providing a curvature to the outside boxes to match the deck outline and constant cantilevers is aesthetically more pleasing compared with variable cantilevers for NU girders. Similar to the Alternative 1, using parapet wall with

combination of traffic/bicycle railing at west and open railing at east side, opposed to a deeper solid barrier, creates visual appearance of openness / lightness to the structure.

Preliminary analysis indicates that this is a functional design and the construction cost for this alternative is approximately equal with the NU girders bridge. Similar to Alternative 1, the construction can be accelerated with use of partial depth precast deck panels inside and between box girders. Steel box girders are highly durable but require periodic fatigue inspections and inspections of the interior of the boxes, leading to a slightly higher long-term maintenance and inspection cost compared with NU girders.

Figure 3-2: County Road 4 Structure Alternative 2



3.3.1.3 Alternative 3 – Two-Span Post-Tensioned Voided Slab

This alternative consists of two cast-in-place post-tensioned trapezoidal voided slab structures with two equal spans (38.0 m; 38.0 m; total 76.0 m) on a skew of 4°21'41". The two slabs are connected with closure strip constructed after two decks are cast and post-tensioned. The depth of the deck is 1.60 m, and it will be protected with a 90 mm thick asphalt and waterproofing system.

As an alternative to the above noted option, a single post tensioned structure can be considered. The single deck will result in more concrete cross-sectional area and consequently higher construction cost. For the purposes of this estimate the first concept with two decks and closure strip is considered.

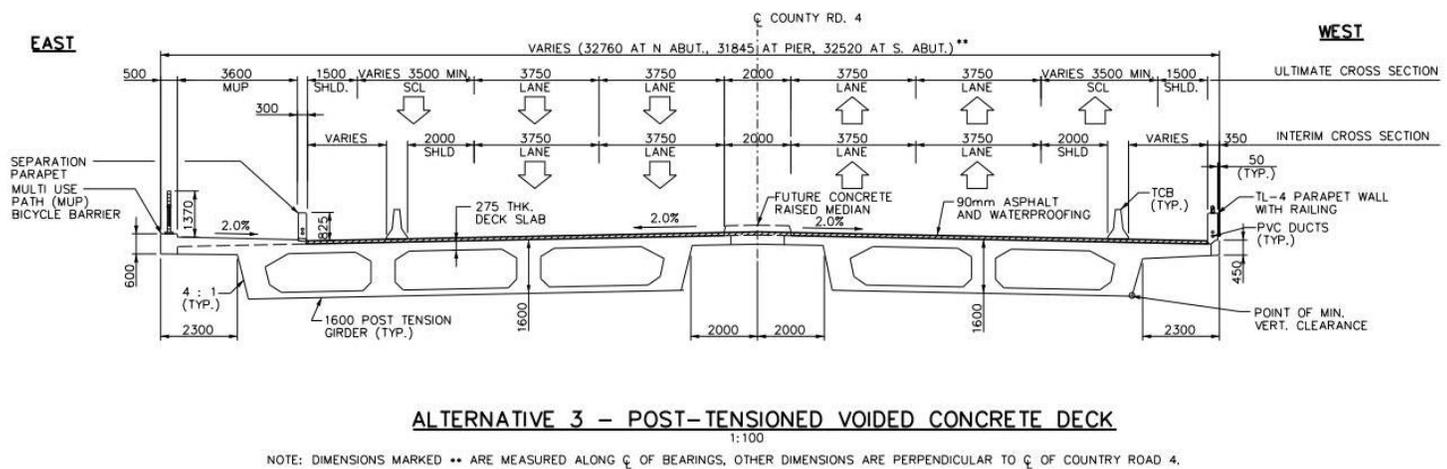
The substructure for this alternative will consist of three 1.8 m diameter reinforced concrete columns (two for the east deck and one for the west deck) casted integral with the deck and supported on spread footings (see Figure 3-3). The abutments will be semi-integral in order to eliminate the expansion joints at the abutments and to improve the durability of the structure. There will be sleeper slabs with expansion joints at the ends of the approach slabs. The foundation at the abutments will consist of either steel H-piles or spread footings. For the cost estimated purpose steel piles were assumed. Casting of semi-integral deck extensions will be delayed at least 3 months after the post-tensioning operation is completed in order to provide time for initial creep and shrinkage in the deck concrete to occur. Bearings at abutments will also be reset after 3 months.

There are examples of innovative design that facilitate post-tensioned concrete decks with an integral abutment articulation. However, this concept will require a more rigorous analysis and a more complex

design with detailed foundation recommendations. As a result, post-tensioned concrete deck with integral abutments was not considered at the preliminary design stage but can be further explored during detail design.

A post-tensioned structure has a more aesthetically pleasing appearance due to the shallower depth of the superstructure as well as the continuity of horizontal lines created by relatively large overhangs. Single pier columns allow for a more open view through the crossing, enhancing the aesthetic appeal. Post-tensioned deck is also more durable than reinforced concrete deck on girders. Construction of a post-tensioned structure requires extensive falsework and formwork and longer duration of construction for placement of reinforcing, casting concrete deck, post-tensioning and delays in construction mentioned above to provide time for initial creep and shrinkage in the deck to occur prior to completing the bridge.

Figure 3-3: County Road 4 Structure Alternative 3



3.3.1.4 Recommended County Road 4 Structure Alternative

The following criteria were considered in evaluating the three alternatives: construction duration, standardized fabrication, constructability, architectural appearance, structural integrity, durability, grade raise, maintenance cost and capital cost. Based on these criteria, Alternative 2 (Steel Box Girders) is the recommended alternative for the new structure at this site.

Out of the three alternatives, the slab-on-girder superstructures are preferred over the post-tensioned deck with regards to duration of construction and constructability. They are the simplest to construct and use well-known construction methods and materials. The post-tensioned deck alternative scores the lowest in the category as construction is labour intensive due to the placement of the formwork, falsework and reinforcement as well as the post-tensioning operation. This alternative also requires longer curing times and a waiting period between stressing and casting of the semi-integral deck extensions. The slab-on-girder alternatives also score higher when it comes to standardized fabrication. The concrete girder alternative has a slight advantage since the shape of the girder is standard, while the steel box girders are more customizable and are fabricated by welding steel plates.

Alternative 3 (post-tensioned voided slab) received the highest score out of all alternatives when it comes to aesthetic appearance. This type of structure is the most aesthetically pleasing, having the highest span-to-depth ratio and using only a single pier column thereby reducing the amount of vertical lines. The steel box girder alternative scores higher than the precast girder alternative in this category because it has a higher span-to-depth ratio, and benefits from contrasting materials to reduce its apparent depth.

All alternatives will provide durable structures. The girder alternatives use integral abutments and the post tensioned slab alternative uses an integral abutment articulation, which will enhance the durability through the elimination of the expansion joints at the abutments. There will be sleeper slabs with expansion joints at the ends of the approach slabs. However, Alternative 3 received a slightly higher score for durability and maintenance cost than the girder alternatives because post-tensioned concrete decks are durable and have lower long-term maintenance and inspection costs. Steel box girders require periodic inspections of the interior of the boxes as well as fatigue inspections.

The NU girder alternative features the deepest superstructure and requires the highest-grade raise, therefore received the lowest score of all alternatives. Steel box girders and post-tensioned concrete deck alternatives received higher scores in a profile and grade raise category.

Both the NU 2000 Girders (Alternative 1) and Post-Tensioned Concrete Slab (Alternative 3) alternatives are respectively 9% and 20% more costly than the Steel Box Girder Alternative 2. It shall be noted that recent experience suggests that fewer manufacturers are producing NU girders, which resulted in a drop of supply and an increase in price. The increase in price of NU girders have eliminated cost advantage that precast girders had over steel girders in the past, leading to preliminary cost estimates for the steel box girder alternative being more competitive.

Alternative 2 scored the highest, followed by Alternatives 1 and 3. Alternatives 1 and 2 can be constructed using well-known conventional construction methods and feature the most desirable integral abutments and aesthetically pleasing open concept. Cast-in-place concrete Alternative 3 received high scores on durability and low long-term maintenance; however, it is more costly and labor intensive requiring the longest time to construct. The preliminary cost estimates indicate Alternative 2 being 9% less expensive than Alternative 1 and 20% less costly than Alternative 3. Feasibility of obtaining precast NU girders and/or steel box girders on schedule required for construction could be one of the factors that will impact selection of the preferred alternative. As steel box girders scored significantly higher than precast NU girders on aesthetics, Alternative 2, steel box girders, will be presented as the recommended bridge type in the Design Build Request for Proposals.

The County Road 4 bridge will be constructed as part of an Early Works contract package, ahead of the construction of the Bradford Bypass. As a result, components of the bridge, mainly pier shafts, will be protected with plastic sheets to prevent staining of concrete and backfilled to protect from ponding of water below the bridge. At the time of construction of the Bradford Bypass, excavation of the temporary grade under the County Road 4 Bridge will take place and slope paving in front of abutments will be constructed.

It should be noted that although Alternative 2 is presented as the recommended bridge type, the Design Build Contractor may find efficiencies in selecting any of the three structural types and are not restricted to proceeding with Alternative 2.

If changes are required to the Early Works that are inconsistent with the Final Early Works Report after the Statement of Completion of the Early Works Assessment Process is issued, the Design Build Contractor shall comply with the addendum process in accordance with Ontario Regulation 697/21, Section 29.

3.3.2 County Road 4 Staging Alternatives

After the recommended structure design alternatives were selected, construction staging alternatives were evaluated to evaluate the best method of constructing the structure. The following alternatives were considered:

- **Alternative 1:** Close County Road 4 with a detour through Artesian Industrial Parkway and 10th Side Road.
 - This would result in a single construction stage, minimize property impacts, and require relocation of utilities. Additional utility relocations would take place in the Bradford Bypass contract.
- **Alternative 2:** Widen County Road 4 and construct the structure within the existing right-of-way.
 - This would result in construction taking place in two phases, each being half of the road widening and half of the bridge works at a time. This alternative would use a temporary road protection system to maintain two lanes of traffic, minimize property impacts, and require relocation of utilities. Additional utility relocations would take place in the Bradford Bypass contract.
- **Alternative 3:** Construction of a temporary detour road around the new bridge during construction of the new bridge.
 - This would result in constructing the bridge in one stage and construction of half the widening at a time. This would require a temporary road protection system to maintain two lanes of traffic, impacts to the 8th Line intersection at the tie-in of the temporary detour road, which would require additional property, and would require relocation of utilities before the works commence.

3.3.2.1 Recommended County Road 4 Staging Alternative

As the Bradford Bypass Study Area has a history of loose soil conditions, it was determined that Alternative 2 would not be feasible with the geotechnical information known at the time. Additionally, as County Road 4 has significant traffic flows, if the roadway was closed during construction (Alternative 1), the traffic impact to the detour roads would be significant. As such, Alternative 3 was the only alternative carried forward. Two lanes of traffic will be maintained with Alternative 3, with the temporary detour road reducing disruption from construction ingress/egress/works and providing more space for the contractor to complete the works. Further details on construction staging are provided in Section 3.4.1.10.

3.4 Detailed Description of the Recommended Plan

The County Road 4 Early Works will be delivered through one advance Design-Build contract scheduled to be awarded in the Spring of 2022. This Early Works Report details the design to a Design-Build Ready Reference Concept level of completion. Upon award of the Design-Build contract, the Design-Build Team will be required to finish the detail design and meet the design standards and specifications, and the environmental protection, mitigation and monitoring measures prescribed in this Early Works Report.

3.4.1 Major Features of the Recommended Plan

The County Road 4 Early Works includes construction of new bridge over the Bradford Bypass. The bridge's cross section will provide sufficient width for four through lanes, two speed change lanes, a multi-use path, and a traffic barrier between the multi-use path and traffic lanes. At the completion of construction of the Early Works project temporary concrete barrier will be installed to prevent vehicles from driving on the part of the deck intended for the speed change lanes of a potential future interchange at this location. The roadway will be constructed with a curb and gutter on the east and west edges of the

travelled lanes and achieve an 80 km/h design speed as agreed by the Ministry of Transportation, the Town of Bradford West Gwillimbury, and the County. The posted speed after the Early Works contract will be 70 km/h northbound, and 60 km/h southbound between the limits of north of 8th Line and south of 9th Line. The multi-use path will transition to the existing paved sidewalk at the 8th Line intersection, and to the existing fully paved shoulder south of the 9th Line intersection.

An interim multi-use path alignment will be included that minimizes rework for the future interchange multi-use path.

A new horizontal alignment is proposed for County Road 4 and includes reverse curves on either side of the proposed structure, shifting the roadway slightly east of its existing location. The horizontal alignment was optimized to minimize construction and schedule impacts to and from utilities, properties, and archaeology.

The existing road profile of County Road 4 includes steep grades over the future Bradford Bypass. To meet Ministry requirements for a future County Road 4 Interchange, road reconstruction is required to provide a maximum of 3% grade through the future ramp terminal intersections, and to provide the required clearances over the future Bradford Bypass. As a result of road profile modifications, entrances and driveways within the Limits of Work shall also be modified to meet design requirements.

The Design-Build Team shall provide the following:

- A four-lane (3.75 m lane width) 80 km/h design speed County Road 4. On County Road 4 bridge, there shall be 2 speed change lanes for the future interchange.
- Maximum 3% grades through existing and future intersections.
- Temporary concrete barrier shall be installed for the Early Works to provide the maximum required bridge shoulders.
- 5100 mm vertical clearance from County Road 4 structure to Bradford Bypass mainline.
- 7000 mm horizontal clearance from the future speed change lanes under County Road 4 structure.
- A 3.0 m wide multi-use path on the east side of County Road 4. On the County Road 4 bridge, the 3.0 m multi-use path shall have a traffic barrier between the pathway and traffic and shall have 0.3 m lateral clearances to each barrier (3.6 m total width).
- Provisional grading for the north-west ramp, south-east ramp, north-east loop ramp, and south-west loop ramps up to the entrance ramp bullnoses (on County Road 4).
- Maintain required vertical and horizontal clearance/cover at all utility crossings. Coordinate work near utility infrastructure with utility companies.
- Design and construct private driveway/entrance modifications and realignments due to the change in County Road 4 profile and widening.

Major features of the Recommended Plan are presented in Appendix A of this Report.

3.4.1.1 Bradford Bypass and County Road 4 Interchange

The Bradford Bypass and County Road 4 Interchange is currently under review as part of the overall Bradford Bypass. The classification and design speed for the County Road 4 is proposed to be the same as the condition to be constructed as part of the Early Works (80 km/h). The Bradford Bypass and County Road 4 interchange will include a full ramp interchange design that allows motorists to enter and exit to and from the Bradford Bypass. The 2002 Environmental Assessment Approved plan included a Parclo A4 interchange for County Road 4.

The Design-Build Team shall provide the following provisions for the future interchange:

- 2.0 m continuous divisional raised islands on the bridge to the ramp terminal intersections, and at the ramp terminal intersections (15 m minimum length).

- Electrical (1-75mm and 1-50mm) and ATMS embedded ducts (1-75mm and 1-50mm) on both sides of the bridge structure.
- Concrete encased traffic signal conduits for the north and south future ramp terminal intersections.

3.4.1.2 Ditching

Existing ditch drainage patterns will be impacted by the Early Works, and ditches will require re-grading and re-alignment to provide positive drainage. County Road 4 will change from a rural to urban cross section with curb and gutter.

3.4.1.3 Drainage

Modifications and improvements to the existing drainage system to accommodate the Early Works will include culvert replacements, and temporary culverts and temporary culvert extensions for the construction staging and temporary detour. Existing drainage systems will be cleaned out as required. The Design-Build Team shall ensure positive drainage during permanent and temporary conditions.

3.4.1.4 Structural Design

The project includes the construction of one new structure, as outlined in Table 3-2.

Table 3-2: Structures as part of County Road 4 Early Works

Structure Site No.	Structure Name	Work Required
30X-0866/B0	Highway 400-Highway 401 Link (Bradford Bypass) County Road 4 Underpass	New Construction

The County Road 4 Underpass (Site No. 30X-0866/B0) will be a new structure on County Road 4 and over the Bradford Bypass. The proposed County Road 4 will be in a north-south orientation on a tangent horizontal alignment and consistent grade vertical profile. The new structure is proposed to intersect the centreline of the Bradford Bypass.

The bridge structure will be built to the span length and width outlined in Section 3.3.1 during the County Road 4 Design-Build Contract. There will be two lane configurations for the proposed work: interim and ultimate. The ultimate configuration includes four general purpose lanes, two speed change lanes, and a multi-use path. For the interim condition, the speed change lanes will not be in use. As the speed change lanes may act as wide shoulders and encourage speeding, temporary concrete barrier will be placed to provide normal shoulders adjacent to the through lanes. The ultimate configuration also includes a divisional median that will not be constructed in the interim condition (a flushed paved median will be provided in the interim). The multi-use path will be separated on the bridge structure from traffic with a traffic barrier.

3.4.1.5 Electrical

Illumination

County Road 4 is currently not illuminated with street lighting except at the southern end of the project limits where County Road 4 intersects with 8th Line. Illumination requirements were reviewed for the interim widening and ultimate interchange. The existing municipal illumination poles on the north approach to 8th Line intersection will be impacted by County Road 4 reconstruction, grading, and the new multi-use path. These existing direct buried concrete poles complete with 65-watt LEDs and elliptical bracket arms shall be removed, salvaged, and relocated to locations that are not in conflict with the widened roadway and multi-use path. Pole bases will be provided on County Road 4 bridge that satisfy

the spacing requirements for future County Road 4 illumination. Temporary illumination will be installed along the County Road 4 detour roadway during construction traffic staging.

Traffic Signals

Temporary aerial traffic signal spans will be installed at 8th Line intersection as required to allow traffic lanes to shift. The north leg traffic signal poles will be removed temporarily, and provisional duct crossings and manholes for future traffic signals at the north and south ramp terminals will be provided.

3.4.1.6 Drainage and Watercourses

The existing drainage system will be cleaned out as required, and temporary stormwater management measures will be provided during all stages of construction. The interim drainage system will accommodate the interim widening and will consider the future interchange. Meanwhile, culvert extensions will be provided as required.

3.4.1.7 Property

Property requests have been prepared for the property required for the County Road 4 Early Works and property acquisition is underway.

3.4.1.8 Entrances

There are various residential, farm/field, and commercial entrances to associated properties within the project limits along County Road 4. Access to these entrances or properties shall be maintained throughout construction activity. Reconstruction of County Road 4 will result in a change in the roadway elevation adjacent to these entrances, and modifications, relocations, and reconstruction to the entrances are required.

The Design-Build Team shall be responsible for coordinating construction activities, and entrance/driveway access during construction with the property owners.

3.4.1.9 Utilities

The following utility companies have facilities located within the Early Works Project limits:

- Hydro One Distribution
- Bell
- Rogers (including Zayo)

Utilities south of the widening limits at the 8th Line intersection include:

- County stormwater, watermain, and sanitary;
- Enbridge; and
- Alectra.

Hydro One Distribution, Bell, and Rogers will require relocations to accommodate the proposed widening works along County Road 4. Ongoing relocation discussions are being held with these utilities to be completed after the Design-Build contract is awarded. Relocation is dependent on the Ministry of Transportation's property acquisitions and clearance.

3.4.1.10 Construction Staging

To accommodate traffic safety and efficient construction, construction staging is required to facilitate the proposed works. As outlined in Section 3.3.2, it will be presented in the Design Build Request for

Proposals that construction staging will proceed with a temporary detour road adjacent to the new bridge during construction of the new bridge; however, the Design Build Contractor may find efficiencies in other methods of construction staging and are not restricted to proceeding with this recommendation.

The following traffic parameters shall be met:

- A minimum of two lanes north of 8th Line to south of 9th Line (one lane in each direction) are to be maintained throughout construction.
- At 8th Line intersection, the Southbound through and right-turn lanes are to be combined during construction reducing the total available lanes from 6 to 5-lanes during various stages to tie-in the works in the south limits.
- At 8th Line intersection during night-time lane closures for construction, a Southbound left-turn lane will be removed reducing the total available lanes from 5 to 4-lanes during various stages to tie-in the works in the south limits.

The overall staging sequencing of this project includes the following over three seasons:

Year 1 (after Property and Utility Clearances)

- **Pre-Stage:** All existing lanes of traffic will be maintained during peak periods. Work will be conducted during off-peak periods under traffic control. Strengthen the existing west shoulder of County Road 4 to accommodate a temporary traffic lane shift in Stage 1 (Figure 3-4).
- **Stage Number 1:** Traffic lanes shifted west temporarily onto the existing Southbound lane and strengthened shoulder. Construct temporary roadway widening on the east side of County Road 4 to accommodate the shifted traffic for Stage 2. Construct a temporary two-lane detour road on the west side of County Road 4. Temporary extend one non-structural culvert at STA 10+144 on the east side (Figure 3-5).
- **Stage Number 2:** Traffic lanes shifted east temporarily onto the existing Northbound lane and temporary widened shoulder on the east side. Install a roadway protection system separating the Stage 2 and 3 work areas. Construct County Road 4 southbound to finished grade. Complete the temporary two-lane detour road on the west side of County Road 4. Temporarily extend two non-structural culverts at STA 10+144 and STA 10+310 on the west side. Install 2 new non-structural culverts adjacent to existing culverts at STA 10+144 and STA 10+310 on the west side. Install a temporary non-structural culvert under the detour roadway (Figure 3-6).

Figure 3-7 **Figure 3-4: County Road 4 Staging - Pre-Stage 1**

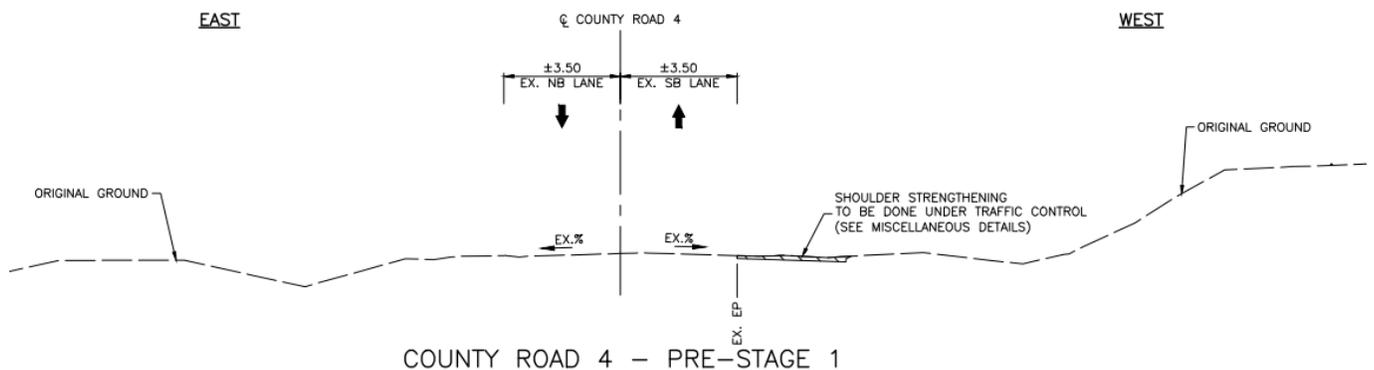


Figure 3-5: County Road 4 Staging - Stage 1

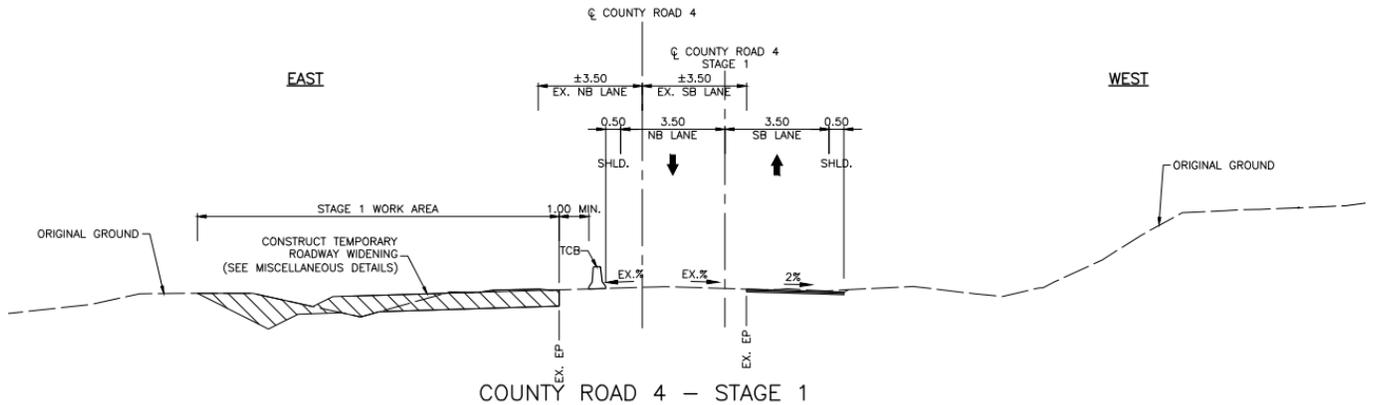


Figure 3-6: County Road 4 Staging - Stage 2

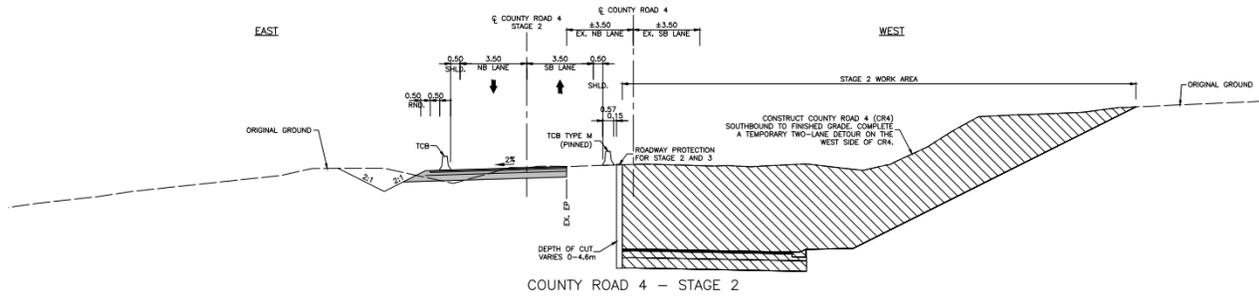
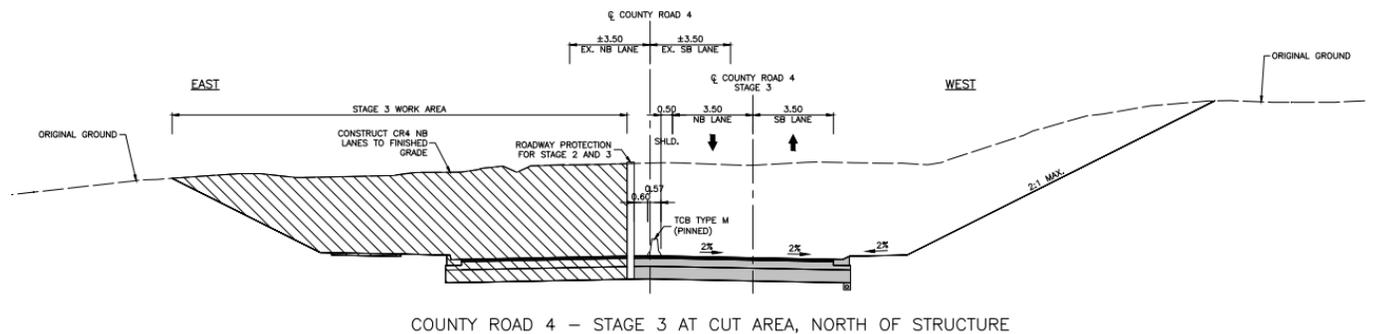


Figure 3-7: County Road 4 Staging - Stage 3



Year 2

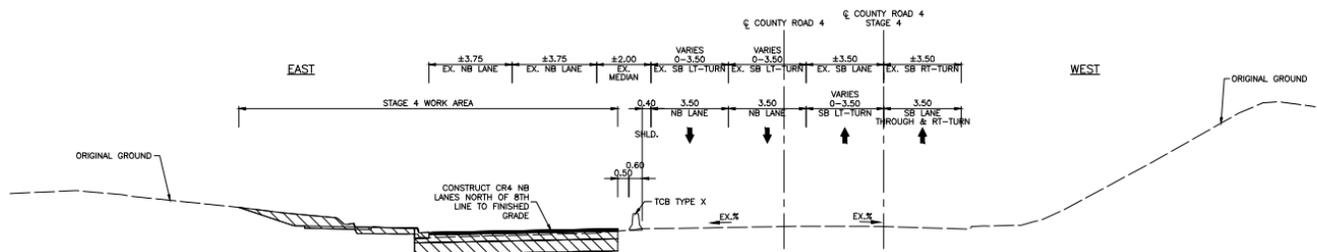
- Continue Stage Number 2 works (Figure 3-6)
- Stage Number 3:** Traffic lanes shifted onto the new constructed southbound lanes, and temporary two-lane detour road on the west side of County Road 4. Construct County Road 4 Underpass

structure. Construct County Road 4 Northbound to finished grade. Install one new non-structural culvert adjacent to existing culvert at STA 10+144 on the east side. Remove temporary non-structural culvert adjacent to STA 10+144 on the east side when the new non-structural culvert is operational (Figure 3-7).

Year 3

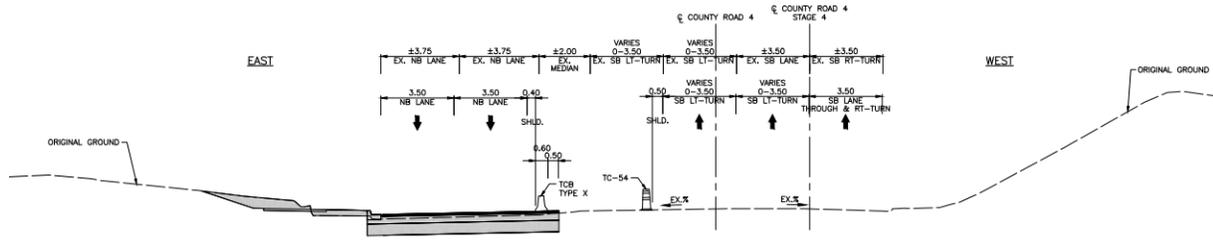
- Continue Stage Number 3 works (Figure 3-7).
- **Stage Number 4:** Traffic lanes at 8th Line intersection are reduced from 6 to 5 lanes during the daytime through combining the Southbound through and right-turn (Figure 3-9), and 4 lanes during the night-time through additionally removing the Southbound left-turn (Figure 3-8). The existing north and south islands at the 8th Line intersection will be removed to allow for Northbound traffic to be shifted west towards the Southbound lanes. At 8th Line intersection tie-in, no daytime works will be required. During night works, construct County Road 4 Northbound to finished grade. Install one new non-structural culvert adjacent to STA 10+310 on the east side (Figure 3-8).
- **Stage Number 5:** During the daytime, 5 traffic lanes are provided at 8th Line intersection (Figure 3-11), and during the nighttime 4 lanes are provided (Figure 3-10). Northbound traffic is shifted to the east side, and Southbound traffic is shifted to the west side. At 8th Line intersection tie-in, no daytime works will be required. During night works, construct County Road 4 Southbound east portion to finished grade (Figure 3-10).
- **Stage Number 6:** During the daytime, 5 traffic lanes are provided at 8th Line intersection, and during the nighttime 4 lanes are provided. Southbound traffic is shifted to the east side. At 8th Line intersection tie-in, no daytime works are required. During night works, construct County Road 4 Southbound west portion to finished grade (Figure 3-12).
- **Stage Number 7:** Traffic is shifted onto the new County Road 4 roadway and bridge. Remove the temporary detour roadway and temporary culverts and temporary culvert extensions (when new culverts are operational). Complete grading, landscaping, and other remaining works. Open four lanes on County Road 4 (Figure 3-13).

Figure 3-8: County Road 4 Staging - Stage 4 (nighttime closure)



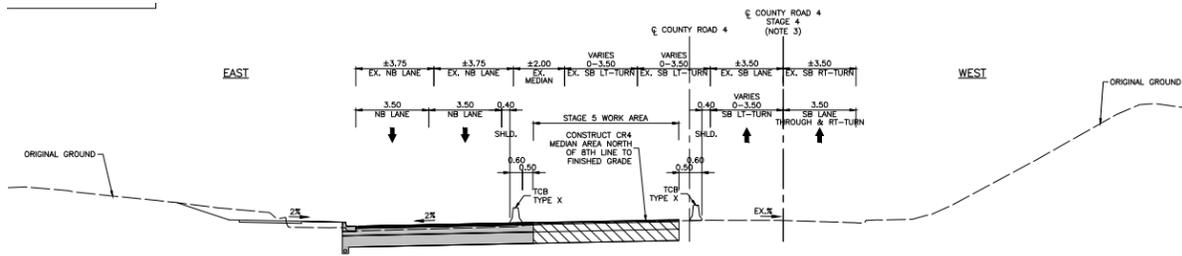
COUNTY ROAD 4 – STAGE 4 AT 8TH LINE INTERSECTION DURING NIGHTTIME CLOSURE

Figure 3-9: County Road 4 Staging - Stage 4 (daytime)



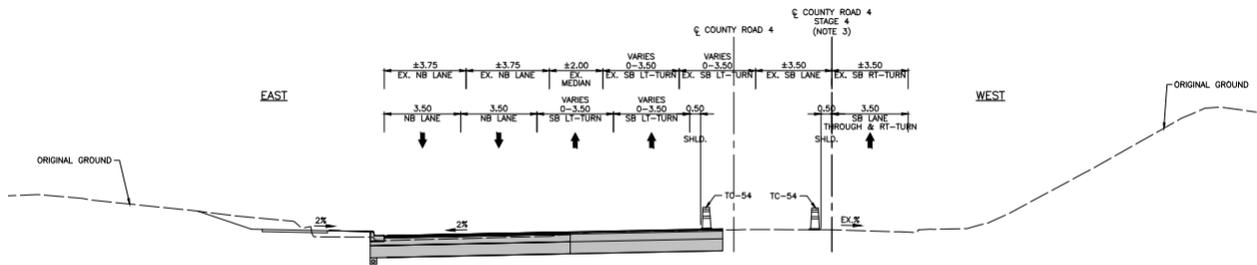
COUNTY ROAD 4 – STAGE 4 AT 8TH LINE INTERSECTION DURING DAYTIME

Figure 3-10: County Road 4 Staging - Stage 5 (nighttime closure)



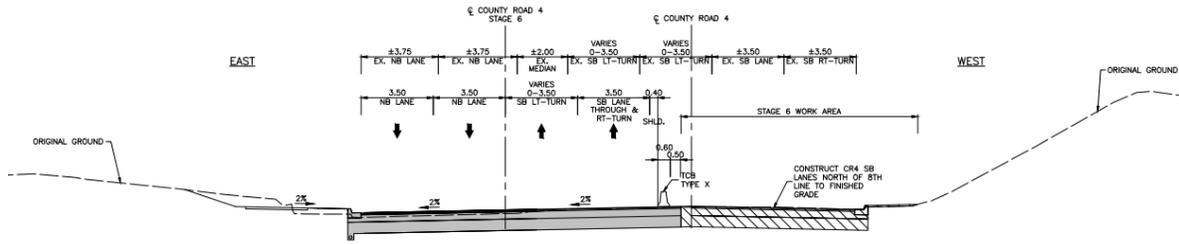
COUNTY ROAD 4 – STAGE 5 AT 8TH LINE INTERSECTION DURING NIGHTTIME CLOSURE

Figure 3-11: County Road 4 Staging - Stage 5 (Daytime)



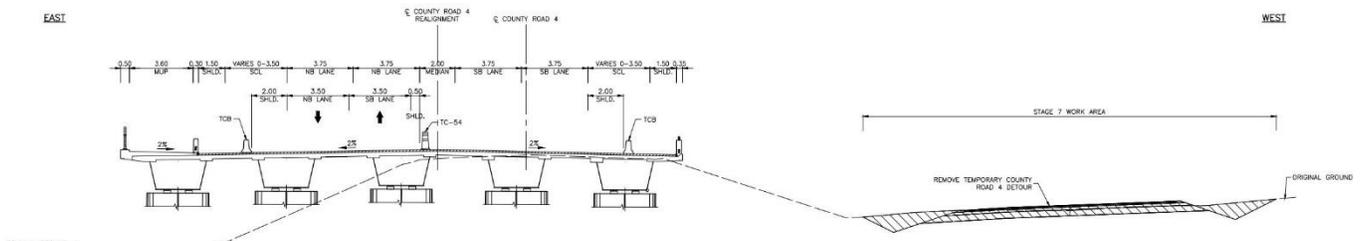
COUNTY ROAD 4 – STAGE 5 AT 8TH LINE INTERSECTION DURING DAYTIME

Figure 3-12: County Road 4 Staging - Stage 6 (nighttime closure)



COUNTY ROAD 4 – STAGE 6 AT 8TH LINE INTERSECTION DURING NIGHTTIME CLOSURE

Figure 3-13: County Road 4 Staging - Stage 7



COUNTY ROAD 4 – STAGE 7

4 Consultation Process

In accordance with Section 5 (10), Section 11 and Section 12(1)(a) of Ontario Regulation 697/21, this section summarizes the consultation plan and consultation efforts undertaken to date for Early Works. A record of consultation is provided in Appendix B of this Report.

4.1 Consultation Overview

Consultation is an integral part of the study process. It provides opportunity for two-way communication between the Project Team and interested stakeholders. Consultation activities provide a forum to identify potentially significant environmental issues early in the decision-making process and gives them appropriate consideration. As part of the overall Bradford Bypass, extensive stakeholder consultation was undertaken to assist in the planning and impact assessment for this project. Individuals and organizations consulted include:

- External Agencies (including Provincial Ministries and Agencies, Federal Departments, and the local Conservation Authorities);
- Municipalities;
- Indigenous communities; and
- Members of the public (including affected land and business owners, community/ interest groups and the general public).

To facilitate a comprehensive consultation program for this Study, the Project Team implemented the following communication and consultation activities to reach all stakeholders and provide them the opportunity to submit comments and feedback for consideration by the Project Team:

- Project Website (www.bradfordbypass.ca);
- Project Telephone Line (1-877-247-6036);
- Project Contact List;
- Emails via the Project Team email address (ProjectTeam@bradfordbypass.ca);
- Mailings/notifications (via physical mail or email);
- Newspaper advertisements;
- Distributions of brochure notifications (copy of the Ontario Government Notice) through Canada Post Neighbourhood Mail to residences and businesses within 500 m of the entire Bradford Bypass Study Area (approximately 13,500 notices at the time of Study Commencement in September 2020);
- Public Information Centre (held virtually as a result of government restrictions);
- Outreach regarding engagement and consultation with Indigenous communities, further outlined in Section 4.6;
- Meetings and correspondence with municipalities; and,
- Correspondence with technical stakeholders, local community groups and property owners.

As a result of the public health measures linked to COVID-19 that restricted large in-person gatherings, the Project Team has held consultation events (e.g. meetings with technical stakeholders, Public Information Centre) virtually by leveraging various platforms (i.e. Microsoft Teams/Skype/the Project Website). Virtual consultation events have proven to be as engaging and effective as in-person consultation events. These events often include extended opportunities to view materials online, comment periods to provide feedback to the Project Team and opportunities to request one-on-one meetings with the Project Team. They provide flexibility for those wishing to attend who may have conflicts or restrictions that limit their ability to attend an event in person (e.g. childcare needs, work

requirements, transportation). Within the virtual platform there is an opportunity address accessibility needs as they arise.

4.1.1 Engagement with Elected Officials

Elected Officials were engaged throughout the Project to-date. Elected officials engaged included Members of Parliament, Members of Provincial Parliament, and municipal Mayors and Councillors within the Study Area.

4.1.2 Engagement with Technical Stakeholders

Technical stakeholders engaged throughout the Project to-date, including federal, provincial and municipal agencies, conservation authorities and other technical stakeholders (e.g. utility companies) are listed below.

Federal Agencies

- Fisheries and Oceans Canada (DFO)
- Indigenous and Northern Affairs Canada
- Transport Canada
- Canadian Environmental Assessment Agency
- Environment and Climate Change Canada
- Canadian Transportation Agency

Provincial Agencies

- Ministry of Indigenous Affairs
- Ministry of the Environment, Conservation and Parks (MECP)
- Ministry of Municipal Affairs and Housing (MMAH)
- Ontario Ministry of Agriculture, Food and Rural Affairs (OMAFRA)
- Ministry of Heritage, Sport, Tourism and Culture Industries (MHSTCI)
- Ministry of Health and Long-Term Care
- Ministry of Northern Development, Mines, Natural Resources and Forestry (MNDMNR, formerly Ministry of Energy, Northern Development and Mines, and Ministry of Natural Resources and Forestry)
- Ministry of Energy
- Ministry of the Solicitor General
- Infrastructure Ontario
- Metrolinx
- Ministry of Economic Development, Job Creation and Trade
- Ontario Provincial Police
- Ontario Federation of Agriculture

Municipal Agencies

- Town of East Gwillimbury
- County of Simcoe
- Township of King
- Town of Bradford West Gwillimbury
- York Region
- Central York Fire Services
- York Regional Police

- South Simcoe Police Services
- Queensville Fire
- King Fire and Emergency Services
- Bradford West Gwillimbury Fire and Emergency Services
- East Gwillimbury Fire Services
- York Catholic District School Board
- York Region District School Board
- Simcoe County District School Board
- Conseil scolaire catholique MonAvenir
- Conseil scolaire Viamonde
- Student Transportation Services of York Region
- York Region Transit
- Bradford West Gwillimbury Public Library
- King Chamber of Commerce
- East Gwillimbury Chamber of Commerce
- Bradford Board of Trade
- The Corporation of the County of Simcoe
- Holland Marsh Drainage System Joint Municipal Services Board

Conservation Authorities

- Lake Simcoe Region Conservation Authority (LSRCA)
- Nottawasaga Valley Conservation Authority (NVCA)

Other Technical Stakeholders

- Ontario Trucking Association
- Oak Ridges Moraine Foundation
- Canadian National Rail
- Canadian Pacific Rail
- The Friends of the Greenbelt Foundation
- York Simcoe Naturalists

4.1.3 Engagement with Municipal Stakeholders

Staff from the following municipalities were engaged throughout the study process:

- County of Simcoe
- Bradford West Gwillimbury
- East Gwillimbury
- York Region
- King Township

In addition to the municipalities above, the Town of Newmarket also received a copy of the Notice of Publication of Draft Early Works Report (Section 4.2.5) in accordance with Ontario Regulation 697/21.

4.1.4 Engagement with Members of the Public

A contact list was developed at the outset of the Bradford Bypass, which included a list of property owners within the Study Area. As additional members of the public expressed interest in the study through receiving public notices (e.g. Canada Post Neighbourhood Mail, newspapers, links to the project

website in news correspondence, word of mouth, etc.) their contact information was also added to the project contact list.

The contact list included all property owners within the Study Area and any individuals that expressed interest in the County Road 4 Early Works.

4.2 Notices and Letters

4.2.1 Notice of Study Commencement

A Notice of Study Commencement was published for the overall Bradford Bypass in the Bradford West Gwillimbury Topic and East Gwillimbury Express on September 24, 2020. Letters were distributed to the project contact list by mail and email on September 23, 2020. The notice was distributed as a brochure through Canada Post Neighbourhood Mail to residences and businesses within the entire Bradford Bypass Study Area (approximately 13,500 notices at the time of Study Commencement in September 2020). The notice provided a link to the project website and an email and toll-free telephone number to contact the Project Team for further information.

A copy of the Notice of Study Commencement is included in the record of consultation in Appendix B of this Report.

4.2.2 Permission to Enter (PTE)

As part of the preparatory works in advance of the preliminary design study, permission to enter (PTE) was sought for properties where field investigations were required during the study. Properties were identified and contact information for the property owners was gathered through a combination of data collected from property ownership and land registry databases by the Ministry of Transportation. Through the property fabric information and available contact details, the identified property owners were contacted to seek permission to enter the property to undertake project specific site investigations. The following contact methods were utilized as required to solicit permission to enter from property owners, in order of precedence:

- Emails were sent to property owners using email addresses identified by the Ministry of Transportation;
- Physical letters and Permission to Enter forms were sent to property owners using mailing addresses identified by Ministry of Transportation;
- Phone calls were made using telephone numbers identified by Ministry of Transportation;
- Internet searches (e.g. Google, Canada Post, Canada411.com) were undertaken to find missing contact information (mailing addresses, email addresses, telephone numbers) and above listed contact methods were utilized with the new information.
- Municipalities were consulted to obtain revised/updated contact information (e.g. mailing addresses, email addresses, telephone numbers) and above listed contact methods were utilized with the new information; and
- Hand-delivered letters/permission to enter forms were distributed by Project Team members in accordance with government restrictions and relevant health and safety plans to properties with physical structures who had not responses to previous contact attempts.

A copy of the Permission to Enter request is included in the record of consultation in Appendix B of this Report.

4.2.3 Notice of Public Information Centre

A Notice of Public Information Centre #1 was published for the overall Bradford Bypass in the Bradford West Gwillimbury Topic and East Gwillimbury Express on April 15, 2021. Letters were distributed to the project contact list by mail and email on April 13, 2021. The notice was distributed as a brochure through Canada Post Neighbourhood Mail to residences and businesses within the entire Bradford Bypass Study Area (approximately 12,459 notices at the time of the Public Information Centre in April 2021). The notice provided a link to the project website and an email and toll-free telephone number to contact the Project Team for further information.

Further detail on the Public Information Centre is provided in Section 4.3. A copy of the Notice of Public Information Centre #1 is included in the record of consultation Appendix B of this Report.

4.2.4 Project Update Letters

The Minister of Transportation provided a letter to the municipalities in the Study Area on October 27, 2021 with information on the implementation of Ontario Regulation 697/21. The letters provided an overview of the regulation including that the Early Works assessment process. The letters were sent to the municipalities which have expressed interest in the Bradford Bypass, including the Town of Bradford West Gwillimbury and the County of Simcoe that are within the Study Area.

A copy of the project update letters is included in the record of consultation in Appendix B of this Report.

4.2.5 Notice of Publication of Draft Early Works Report

A Notice of Publication of Draft Early Works Report was published on the Project Website on January 7, 2022. The notice included the following information:

- A description of the County Road 4 Early Works;
- Contact information of the Project Team, including the project team email, toll free telephone number and a link to the project website;
- A statement that the environmental impacts of the Early Works have been assessed in accordance with Ontario Regulation 697/21;
- A map of the Study Area; and
- Information on how to obtain a copy of the Draft Early Works Report, the review period to submit comments and how to submit comments.

In addition to the Notice of Publication of Draft Early Works Report being published on the website, letters were distributed to the project contact list by mail and email on January 7, 2022, and brochures of the notice were distributed to all residents within 500 m of the Study Area via Canada Post Neighbourhood Mailing (approximately 9,887 notices).

A copy of the Notice of Publication of Draft Early Works Report is included in the record of consultation in Appendix B of this Report.

4.2.6 Notice of Publication of Final Early Works Report

A Notice of Publication of the Final Early Works Report was published on the Project Website on March 21, 2022. The notice included the following information:

- A description of the County Road 4 Early Works;
- Contact information of the Project Team, including the project team email, toll free telephone number and a link to the project website;

- A statement that the environmental impacts of the Early Works have been assessed in accordance with Ontario Regulation 697/21;
- A map of the Study Area; and
- Information on how to obtain a copy of the Final Early Works Report.

In addition to the Notice of Publication of Final Early Works Report being published on the website on March 21, 2022, letters were distributed to the project contact list by mail and email, and brochures of the notice were distributed to all residents within 500 m of the Study Area via Canada Post Neighbourhood Mailing (approximately 9,887 notices).

A copy of the Notice of Publication of Final Early Works Report is included in the record of consultation in Appendix B of this Report.

4.3 Public Information Centre

A Public Information Center was held for the overall Bradford Bypass which included an overview of the County Road 4 interchange. The Public Information Centre was held virtually in two parts through the Project Website where the Preliminary Design Study was presented.

- **Public Information Centre Part 1:** The purpose of the first stage of the Public Information Centre was to showcase the Study, update and summarize existing conditions, illustrate the Preliminary Design refinements as compared to the 2002 approved Environmental Assessment study, outline the evaluation criteria, and solicit input, feedback and comments on the preliminary design refinements. The Public Information Centre materials were made available on the Project Website for a two-week stakeholder review period beginning April 22, 2021 and ending on May 6, 2021. A total of 1665 individuals visited the Virtual Public Information Centre #1 webpage from April 22, 2021- May 6, 2021, 65 comments were received, and 49 individuals completed the poll.
- **Public Information Centre Part 2:** The Project Team hosted a Public Information Centre Webinar presentation on May 18, 2021 where stakeholders were able to learn more about key topics raised during the Public Information Centre's stakeholder review period and receive additional project information. A total of 130 individuals registered for the Public Information Centre#1 webinar presentation through Zoom, 76 individuals attended the presentation held from 7:00 p.m. to 10:00 p.m. and 27 comments were received via the chat function through the Zoom platform.

4.4 Meetings and Presentations

The following meetings and presentations were held throughout the study:

- The Project Team hosted a virtual meeting with the Town of Bradford West Gwillimbury and the County on September 22, 2021 to provide a project overview, project schedule, existing conditions, the design, construction staging, potential impacts and approvals for County Road 4. Key discussion items such as changes in design speed, coordination of the widening of County Road 4 on behalf of the County of Simcoe, construction limits, realignments, and potential impacts were also discussed.
- On September 29, 2021, the Project Team hosted a virtual meeting with the Bradford West Gwillimbury Fire and Emergency Services, King Fire and Emergency Services, and South Simcoe Police Services. At the meeting the Project Team provided a project overview, and overview of the design and construction staging. Key discussion items such as construction staging and the implementation of the new detour route to ensure continued access to County

Road 4 and communication plans for advance notice to emergency services of any changes as the project progresses.

- On December 8, 2021, the Project Team hosted a virtual meeting with the Environment, Community and Agriculture Committee as part of the overall Bradford Bypass. The purpose of the Environment, Community and Agriculture Committee is to understand and address community concerns and gather input on how to best implement the Bradford Bypass in a context sensitive manner. The committee is comprised of representatives from local communities and stakeholder groups that have focused interest or lands within the Study Area. The meeting included a presentation and a breakout discussion. The presentation provided an update on the County Road 4 Early Works and the County Road 4 Early Works were discussed in further detail in the breakout portion of the meeting. A copy of the committee presentation and minutes are available on the project website and will be documented in the Draft Environmental Conditions Report and Draft Environmental Impact Assessment Report for the Bradford Bypass.

Copies of meeting materials and summaries are provided in the record of consultation in Appendix B of this Report.

4.5 Consultation Record

The Project Team maintained a record of consultation related to the County Road 4 Early Works through the finalization of the Early Works Report. The record of consultation includes the following:

- Notification materials distributed throughout the study;
- Contact List;
- Presentation materials;
- Project Website materials;
- Record of consultation and correspondence with external agencies (including provincial ministries and agencies, federal departments and local conservation authorities), municipalities, Indigenous communities and members of the public.

The Record of Consultation is available in Appendix B. All comments received from the public have been redacted to protect personal information in accordance with the *Freedom of Information and Protection of Privacy Act*, R.S.O. 1990, c. F.31.

Comments received to date regarding the County Road 4 Early Works include the following themes:

- Questions regarding the relationship to the Bradford Bypass;
- Questions regarding the future interchange and how it will be accommodated;
- Comments and concerns regarding increased traffic;
- Comments and concerns regarding potential noise impacts;
- Comments and concerns regarding impacts to cultural heritage, terrestrial ecosystems and fish and fish habitat;
- Comments regarding the Greenbelt Act and Lake Simcoe Protection Act;
- Requests for supporting documents;
- Questions about property impacts;
- Questions about the Duty to Consult;
- Questions about the Issues Resolution Process;
- Questions regarding the coordination between the Ministry of Transportation and the County;
- Questions regarding obtaining permits and approvals;
- Questions regarding climate change adaptation;
- Request for confirmation on culvert works;
- Questions on the Early Works Groundwater Protection and Well Monitoring Plan;
- Questions on the Early Works Stormwater Management Plan; and

- Questions on the Early Works Noise Report.

Documentation of the Issues Resolution Process and comments during the review of the Draft Early Works Report are further outlined in Section 8.

4.6 Indigenous Communities Engagement and Consultation

The Ontario Ministry of Transportation remains committed to fulfilling its duty to consult requirements and will engage with local Indigenous communities and consider interests in the preliminary design. The Ontario Ministry of Transportation prepared an Indigenous Consultation Plan in accordance with Ontario Regulation 697/21 and circulated the plan to Indigenous communities and the Ministry of Environmental, Conservation, and Parks. The Indigenous Consultation Plan was provided to Indigenous communities that have or may have existing Aboriginal or treaty rights, as recognized and affirmed in section 35 of the *Constitution Act, 1982*, that may be impacted by the Early Works, and Indigenous communities that may otherwise be interested in the Early Works.

The following speaks to the Ministry's understanding of obligations and commitments to satisfy the Duty to Consult.

Section 35(1) of the *Constitution Act, 1982* provides that, "The existing Aboriginal and treaty rights of the Aboriginal peoples of Canada are hereby recognized and affirmed." Over the years, the common law has developed as court decisions have determined how governments are to give meaning to the protection of Section 35 rights.

The Ministry of Transportation is committed to fulfilling its Duty to Consult requirements with Indigenous communities regarding Section 35 rights by the following:

- Meaningfully consulting with First Nations and Métis communities about adverse impacts of the Ministry of Transportation initiatives on their Aboriginal and treaty rights (fulfilling the duty to consult);
- Accommodating, where appropriate, the adverse impacts on Aboriginal and treaty rights; and
- Consideration of providing Indigenous communities with funding to facilitate participation in consultation processes.

Throughout this Study, engagement and consultation with Indigenous communities has included:

- Access to general information and consultation through the Project Website (www.bradfordbypass.ca);
- Access to general communication through Project Telephone Line (1-877-247-6036);
- Inclusion on the Project Contact List to receive regular project updates and to ensure that the correct individuals may be consulted by the Project Team;
- Receive email communications and contact the Project Team through a dedicated Project email address (ProjectTeam@bradfordbypass.ca);
- Receive project specific Mailings and notifications (via physical mail or email);
- Newspaper advertisements and where appropriate, notifications will be provided in Indigenous community newspapers;
- Indigenous community information sessions, and/or pre-screenings for Indigenous communities at the Public Information Centre held virtually as a result of government restrictions of group events; and
- Meetings and correspondence with Chiefs and Councils, or their delegates (see Section 4.6.1).

The Project Team has engaged or consulted with the following Indigenous communities. Initial outreach has commenced, per the list below. Consultation activities related to the Project are ongoing. The

Ministry of Transportation is sensitive to the potential need for extended timelines for the Indigenous consultation process due to the current pandemic:

- Alderville First Nation;
- Beausoleil First Nation;
- Chippewas of Georgina Island First Nation;
- Curve Lake First Nation;
- Chippewas of Rama First Nation;
- Hiawatha First Nation;
- Kawartha Nishnawbe First Nation;
- Mississaugas of Scugog Island First Nation;
- Huron Wendat Nation (regarding archaeological resources only); and
- Métis Nation of Ontario - Georgian Bay Métis Council.

4.6.1 Meetings with Indigenous Communities

The following meetings were held with Indigenous communities virtually throughout the study process:

- A meeting was held on July 15, 2021 with Curve Lake First Nations to provide a project update and discuss any questions or concerns expressed by the community.
- A meeting was held on September 23, 2021 with Williams Treaty First Nations to provide a project update and discuss any questions or concerns expressed by the communities. Representatives from Chippewas of Georgina Island First Nation, Kawartha Nishnawbe, Hiawatha First Nation, and Mississaugas of Scugog Island First Nation were in attendance.
- A meeting was held on October 26, 2021 with Huron Wendat Nation to provide a project update and discuss any questions or concerns expressed by the community. Attendees from Huron Wendat Nation expressed their expectation to continue to be involved in archaeological assessments throughout the Early Works and the Bradford Bypass studies.
- A meeting was held on December 7, 2021 with Mississaugas of Scugog Island First Nation to provide a project update and discuss any questions or concerns expressed by the community. Attendees expressed interest in being actively involved in the Project and to be kept apprised of all reports once available.

Meeting request letters were distributed to all communities on November 29, 2021 to discuss the County Road 4 Early Works. Information has been distributed to all communities and to date meetings have been held with a few communities based on level of interest expressed and availability. Information packages were sent to Indigenous communities that did not express a specific interest to attend a meeting to ensure the information sharing process is thorough and transparent.

Copies of presentations are included in the Consultation Record in Appendix B. Engagement and consultation with Indigenous communities will continue during and after the publication of the Early Works Report, as well as through consultation if any Indigenous communities express an interest for continued engagement and consultation.

4.6.2 Field Liaison during Archaeological Assessments

The Project Team is committed to working closely with Indigenous partners throughout the archaeological assessments throughout the Early Works and Bradford Bypass studies. Community Field Liaisons from communities listed in Section 4.6 that have previously expressed an interest in participating as Community Field Liaisons were invited to participate in the archaeological assessments throughout the study. Curve Lake First Nation and Huron Wendat Nation expressed interest in participating and have been involved in Stage 2 archaeological assessments within the Study Area and Stage 3 or 4 assessments if it is determined that the sites relate to Indigenous heritage on a site-by-site

basis. Chippewas of Georgina Island First Nation have requested to be kept apprised throughout the assessments and have been sent updates as the assessments progress. In future, any other Indigenous community listed in Section 4.6 that expresses an interest in participating or receiving updates will be included in the archaeological assessment process, either through participation or the sharing of information.

4.7 Issues Resolution

The Draft Early Works Report was made available to the public, technical stakeholders, elected officials, Indigenous communities and other interested persons for review from January 13, 2022 to February 12, 2022. During this time, Indigenous communities and interested persons had the opportunity to submit written comments to the Project Team. In accordance with Section 11(4) of Ontario Regulation 697/21, the Ministry of Transportation established an issues resolution process to attempt to resolve any concerns raised by interested persons and Indigenous communities, in a way that does not cause unreasonable delay to the implementation of the Early Works. The issues resolution process involved review of comments received during the public review period, engagement of subject matter experts as required, and then preparation and final review of responses. Issues were considered on a case by case basis to determine if changes were required to the Project or if clarification on the Project or process was required. Further consultation with individual stakeholders took place if required.

In accordance with Section 12(1)(b) of Ontario Regulation 697/21, Section 8 of the Final County Road 4 Early Works Report includes:

- A description of the issues resolution process employed by the proponent in respect of any concerns raised by Indigenous communities and interested persons;
- A description of the concerns raised by Indigenous communities and interested persons in the issues resolution process and the outcome of the process, including what, if anything, the proponent did or will do in respect of the concerns raised, and
- A description of any changes to the Early Works as a result of addressing concerns raised through consultation under this section.

Following the consultation program described in Section 4, the Final Early Works Report was published on the Project Website.

In accordance with Section 13 of Ontario Regulation 697/21, the Ontario Ministry of Transportation will issue a Statement of Completion of the Early Works Assessment process to the Director of the Ministry of Environment, Conservation and Parks Environmental Assessment Branch. The Statement of Completion of the Early Works Assessment Process will indicate that the Ministry of Transportation intends to proceed with the Early Works in accordance with the Final Early Works Report. A copy of the Statement of Completion will be published on the project website.

If after providing a Statement of Completion of the Early Works Assessment Process, changes are required to the Early Works that are inconsistent with the Final Early Works Report, an addendum will be prepared to the applicable report in accordance with Section 29 of the Ontario Regulation 697/21.

4.8 Commitment to Future Consultation

The Ministry of Transportation is committed to continuing stakeholder and public engagement and consultation beyond the regulatory requirements set out in Ontario Regulation 697/21. Specifically, the Ministry of Transportation will:

- Maintain the Project Website so interested parties can access updated Project information;

- Maintain the Project Distribution List to help ensure all interested parties receive Project updates;
and
- Continue discussions with members of the public, local stakeholders and Indigenous communities with respect to potential impacts and mitigation throughout County Road 4 Early Works design and construction, as appropriate.

5 Environmental Conditions

This section describes the existing natural, socio-economic and cultural aspects of the existing environment within the Study Area. The environmental studies were undertaken based on the Study Area to confirm existing conditions within the Study Area, identify potential impacts and recommend mitigation and monitoring measures as required.

Information on the following environmental components is provided in the sections below:

- Natural Environment
 - Terrestrial ecosystems
 - Fish and fish habitat
 - Groundwater and hydrogeology
 - Surface water and hydrology
 - Fluvial geomorphology
- Social and economic environment
 - Land use and property
 - Designated agricultural land
 - Noise
 - Air quality
 - Climate change
 - Landscaping
 - Waste and excess materials management
 - Snow drift
 - Human Health
- Cultural environment
 - Built heritage and cultural heritage landscapes
 - Archaeology

The assessments above have been prepared based on the Reference Concept Design which was developed to approximately a 30% detail design level of completion. Upon award of the Design-Build Contract, the Design-Build Team will be required to complete the detail design according to design standards, update the impact assessments, as well carry forward and implement the environmental protection, mitigation and monitoring measures prescribed in this Early Works Report and environmental reports prepared for this Project. The winning Design-Build Team will be required to consult with regulatory agencies to obtain permits, approvals or authorizations as required.

5.1 Natural Environment

5.1.1 Terrestrial Ecosystems

A Terrestrial Ecosystems Existing Conditions and Impact Assessment was completed as part of the County Road 4 Early Works. The assessment included background reviews, breeding bird surveys, vegetation communities and flora surveys, species at risk surveys and a significant wildlife habitat surveys.

Further information on potential impacts and mitigation measures for terrestrial ecosystems can be found in Section 6.1.1.

5.1.1.1 Vegetation Communities and Flora

Background

Background information was reviewed to identify records of rare vegetation communities, species at risk (SAR) and Species of Conservation Concern plants within the vicinity of the Study Area. No rare vegetation communities were identified within the vicinity of the Study Area during the background review process. Records of one plant species at risk, butternut (*Juglans cinerea*), was identified within the vicinity of the Study Area through a review of the Ministry of Natural Resources and Forestry make-a-map: Natural Heritage Information Centre records (2021). Additionally, 16 butternut were observed within the large naturalized property located directly west of County Road 4 during the 2020 Bradford Bypass field investigations. The closest butternut observed within the naturalized property was located approximately 300 m west of the County Road 4 Study Area. Butternut is listed as Endangered under the Endangered Species Act, 2007, the Species at Risk Act, 2002 and the Committee on the Status of Endangered Wildlife in Canada status list.

Methods

Natural areas within the Study Area were visited during the growing season to confirm vegetation community boundaries and classification. Vegetation community types were delineated using the Ecological Land Classification system for southern Ontario (Lee et al., 1998). Particular consideration was given to identifying provincially rare flora and the presence of Species at Risk plants. The vegetation community boundaries are presented in Figure 5-1 below.

The completed vascular plant list for each Ecological Land Classification code was analyzed for rare plant species that may be affected by the proposed works. Plants were considered rare if designated as Threatened, Endangered or Special Concern under the *Endangered Species Act*, or designated provincially as S1 (extremely rare in Ontario), S2 (very rare in Ontario), or S3 (rare to uncommon in Ontario).

Site visits for the County Road 4 and Bradford Bypass were conducted throughout the 2020 and 2021 growing season by qualified AECOM Ecologists.

Results

Vegetation communities observed within the Study Area consisted of primarily disturbed sites including cultural meadows and thickets which have had a high degree of past and current human influence. One natural forested community was observed east of County Road 4 in the central portion of the Study Area. An overview of the vegetation communities found within the Study Area is provided in Table 5-1. No significant vegetation communities or vegetation, i.e., provincially rare plants or SAR, were observed during field investigations. Additionally, there are no designated natural areas present within the Study Areas.

Figure 5-1: Ecological Land Classification

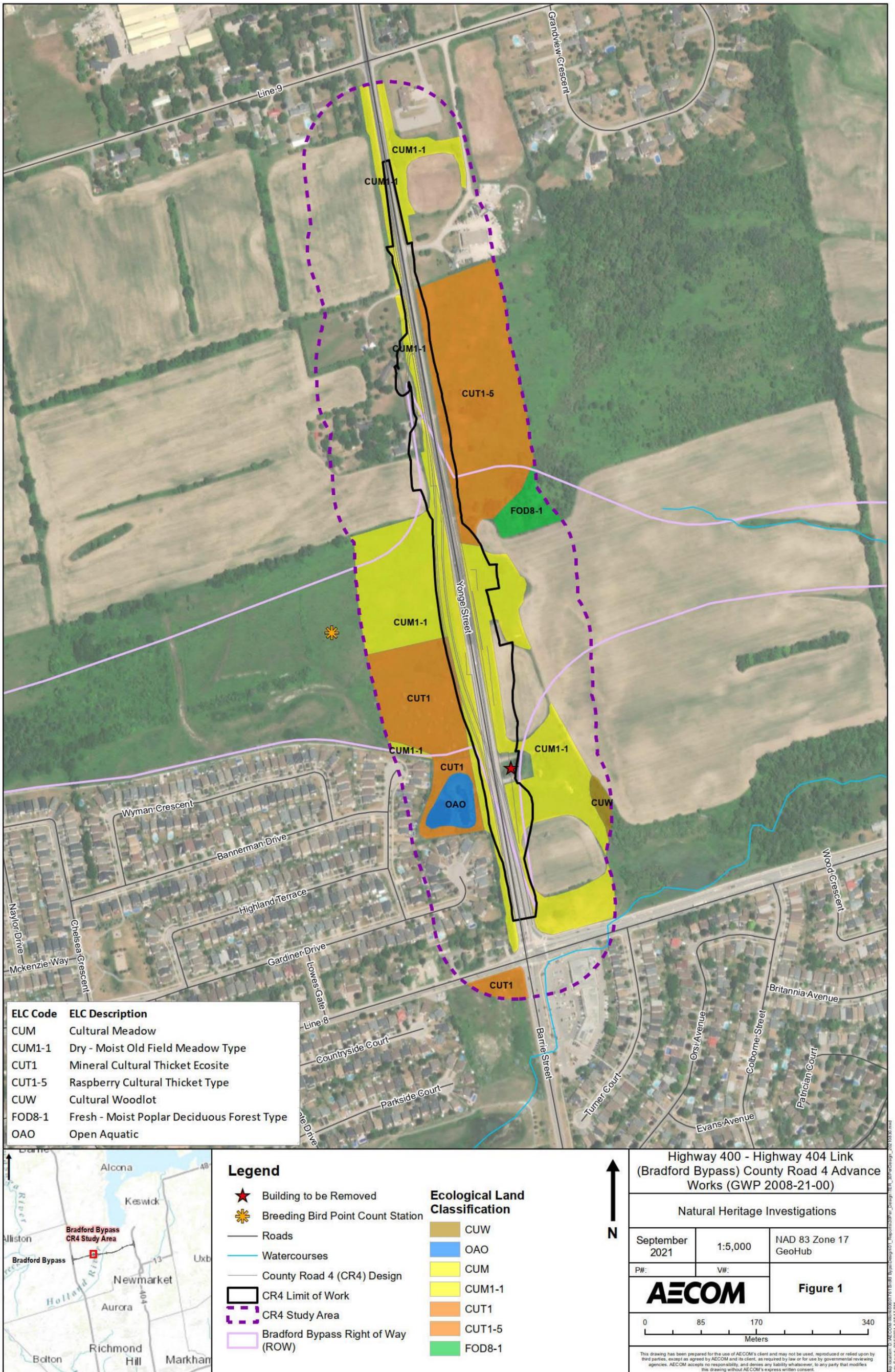


Table 5-1: Summary of Vegetation Communities within the Study Area

ELC Code	ELC Community	Location
CUM1-1	Dry – Moist Old Field Meadow Type	This cultural meadow community was located west of County Road 4 in the central portion of the Study Area. Ground cover was dominant at greater than 60% cover with the most frequent species being reed canary grass (<i>Phalaris arundinacea</i>), Kentucky bluegrass (<i>Poa pratensis</i>), Canada goldenrod (<i>Solidago canadensis</i>), tall goldenrod (<i>Solidago altissima</i>), tufted vetch (<i>Vicia cracca</i>), coltsfoot (<i>Tussilago farafara</i>), field sow-thistle (<i>Sonchus arvensis</i>) and common dandelion (<i>Taraxacum officinale</i>). The shrub layer was comprised of American ash (<i>Fraxinus americana</i>), bitternut hickory (<i>Carya cordiformis</i>), gray dogwood (<i>Cornus racemosa</i>) and common buckthorn (<i>Rhamnus cathartica</i>).
CUM1-1	Dry – Moist Old Field Meadow Type	This cultural meadow community was located adjacent to the east side of County Road 4 in the southwest section of the Study Area. Ground cover was dominant at greater than 60% cover with the most frequent species being smooth brome (<i>Bromus inermis</i>), Kentucky bluegrass (<i>Poa pratensis</i>), Canada goldenrod, and New England aster (<i>Symphotrichum novae-angliae</i>), broad-leaved cattail (<i>Typha latifolia</i>) and common reed (<i>Phragmites australis ssp. australis</i>). The shrub layer was comprised of heart-leaved willow (<i>Salix eriocephala</i>) and sandbar willow (<i>Salix interior</i>). The sparse tree layer consisted of balsam poplar (<i>Populus balsamifera</i>) and Russian olive (<i>Elaeagnus angustifolia</i>). A Mineral Shallow Marsh Ecosite (MAS2) and a Cattail Mineral Shallow Marsh Type (MAS2-1) inclusion was present within the community.
CUM1-1	Dry – Moist Old Field Meadow Type	This cultural meadow community was located east of County Road 4 in the northern portion of the Study Area. Ground cover was dominant at greater than 60% cover with the most frequent species smooth brome, Kentucky bluegrass, tall goldenrod, and bird's-foot trefoil (<i>Lotus corniculatus</i>). The shrub layer was comprised of staghorn sumac (<i>Rhus typhina</i>) and black locust (<i>Robina pseudoacacia</i>).
CUT1	Mineral Cultural Thicket Ecosite	This mineral cultural thicket was located west of County Road 4 in the central portion of the Study Area. Tall shrub layer species were dominant in this community with the most frequent species being red-osier dogwood (<i>Cornus sericea</i>), Russian olive and Manitoba maple (<i>Acer negundo</i>). The ground cover layer consisted of white sweetclover (<i>Melilotus albus</i>), Canada goldenrod, and riverbank grape (<i>Vitis riparia</i>).
CUT1	Mineral Cultural Thicket Ecosite	This mineral cultural thicket was located southwest of the County Road 4 and line 8 interchange. Low shrub layer species were dominant in this community with the most frequent species being willow species (<i>Salix sp.</i>), Russian olive, common buckthorn, and red osier dogwood. The ground cover layer consisted of smooth brome, Canada goldenrod, tall goldenrod and wild carrot (<i>Daucus carota</i>). Surveys were completed from the adjacent road ROW due to access constraints at the time of the field investigations.
CUT1-5	Raspberry Cultural Thicket Type	This mineral cultural thicket was located east of County Road 4 in the northeast section of the Study Area. Low shrub layer species were dominant in this community with the most frequent species being red raspberry (<i>Rubus idaeus</i>), staghorn sumac, and riverbank grape. The sparse canopy layer

ELC Code	ELC Community	Location
		consisted of eastern cottonwood (<i>Populus deltoides</i>), Scots pine (<i>Pinus sylvestris</i>), black locust, sugar maple (<i>Acer saccharum</i>) and trembling aspen (<i>Populus tremuloides</i>). The ground cover layer consisted of smooth brome, purple crown-vetch (<i>Securigera varia</i>) and thicket creeper (<i>Parthenocissus vitacea</i>). This community was complexed with a Mineral Cultural Thicket Ecosite (CUT1) and a Dry – Moist Old Field Meadow Type (CUM1-1) community. Surveys were completed from the adjacent road ROW due to access constraints at the time of the field investigations.
CUW	Cultural Woodland	This community could not be visited due to site access constraints and was delineated though the use of aerial photo interpretation.
FOD8-1	Fresh - Moist Poplar Deciduous Forest Type	This deciduous forest was located east of County Road 4 in the central portion of the Study Area. Forest canopy cover was dominant at greater than 60% cover. Dominant species included trembling aspen, green ash (<i>fraxinus pennsylvanica</i>), American elm (<i>Ulmus americana</i>) and eastern cottonwood. The shrub layer was comprised of trembling aspen, round-leaved dogwood (<i>Cornus rugosa</i>), alternative-leaved dogwood (<i>Cornus alternifolia</i>) and Tatarian honeysuckle (<i>Lonicera tatarica</i>). The sparse ground layer consisted of purple-stemmed aster (<i>Symphotrichum puniceum</i>), field horsetail (<i>Equisetum arvense</i>), broad-leaved enchanter’s nightshade (<i>Circaea canadensis</i>), herb-Robert (<i>Geranium robertianum</i>) and gray goldenrod (<i>Solidago nemoralis</i>). Surveys were completed from the adjacent road ROW due to access constraints at the time of the field investigations.
OAO	Open Aquatic	A stormwater management pond is located within the southern portion of the Study Area between Meadowview Drive and County Road 4.

5.1.1.2 Breeding Bird Surveys

Background

The Atlas of the Breeding Birds of Ontario (Cadman et al. 2007) provides breeding bird data within 10 km x 10 km squares across the province. The Study Area lies within square 17PJ18, which had observation data for 109 avian species.

Records of 14 avian Species at Risk and Species of Conservation Concern were identified within the vicinity of the Study Area through the background review.

Methods

Breeding bird surveys for the County Road 4 Early Works were completed in tandem with the Bradford Bypass breeding bird surveys. One breeding bird station was established within the cultural meadow community located west of County Road 4 (see Figure 5-1). A total of two point-count surveys were completed during the breeding bird period between May 24th and July 10th. The separate surveys are recommended as they typically provide data that more accurately reflects the number of species and birds utilizing the habitat at each station (Canadian Wildlife Services, 2009). An additional point count survey was completed in accordance with the *Bobolink Survey Methodology*, to determine the presence or absence of Species at Risk grassland birds. Surveys were completed between 5:00 am and 10:00 am under appropriate weather conditions (i.e. no precipitation, calm to light wind) (CWS, 2009). Each point-count consisted of two ten-minute surveys during which time, species and individual bird movement

within 100 m radius were recorded. Species heard outside of the 100 m radius or that were observed outside of their breeding habitat within the 100 m radius (i.e. Fly-overs) were recorded separately.

Breeding bird surveys were completed within the Study Area on June 7th, June 23rd and July 14th, 2021.

Results

A total of 12 species were identified within the Study Area. All bird species observed are listed as Apparently Secure to Secure or Common under Natural Heritage Information Centre (2021). Actively nesting migratory birds are protected under the *Migratory Birds Convention Act*. Nests of these species can only be removed if a permit is obtained from the Ministry of Natural Resources and Forestry.

5.1.1.3 Species at Risk

Species at Risk include any species designated as Threatened or Endangered on the Species at Risk in Ontario (SARO) List, which are afforded both individual and habitat protection under the *Endangered Species Act*. Whereas, species designated as Special Concern on the Species at Risk in Ontario List, listed federally under the *Species at Risk Act, 2002* as Endangered, Threatened or Special Concern and, any species with a Provincial S-Rank of S1, S2 or S3 that is not otherwise protected under the *Endangered Species Act* are considered Species of Conservation Concern. Species of Conservation Concern are documented herein, in the event that these species become up listed in the future (i.e., from Special Concern to Threatened or Endangered). In addition to Species at Risk and Species at Risk, migratory birds, their eggs and their active nests are protected under the *Migratory Birds Convention Act*.

Prior to field investigations, a Species at Risk screening exercise was completed to determine the presence and potential impacts to Species at Risk within the Study Area. A list of Species at Risk which have the potential to occur within the Study Area was compiled based on a review of background information. Habitat preferences of the listed terrestrial Species at Risk were then compared to onsite habitat characteristics to determine if the Study Area contained potential habitat for Species at Risk. The potential for species to occur was then determined through a probability of occurrence whereby the following rankings were applied:

- **Low Probability:** suitable habitat for the species is not likely present within the Study Area,
- **Moderate Probability:** potentially suitable Species at Risk habitat may be present within the Study Area,
- **High Probability:** preferred habitat conditions for Species at Risk are likely present within the Study Area, and
- **Confirmed:** species were observed within the Study Area during field investigations.

This assessment was initially completed using aerial photo interpretation and was then further refined after Ecological Land Classification community delineations were complete.

Results

The background information review resulted in a total of 12 Species at Risk and 10 Species of Conservation Concern which have been recorded within the vicinity of the Study Area. These Species at Risk are listed in Table 5-2 below. A habitat assessment, presented in Table 5-2 was completed for these species to determine if suitable habitat is present in the Study Area based on the vegetation communities delineated during the Ecological Landscape Classification surveys and through interpretation of aerial photography. Table 5-2 summarizes the probability for occurrence for each Species at Risk and their habitat.

Table 5-2: Probability of Occurrence for Species at Risk with Records for the Vicinity of the Study Area

Taxa	Common Name	Scientific Name	S-Rank ¹	Endangered Species Act Status ²	Last Year Observed	Source of Record	Probability of Occurrence within the Study Area	Habitat Assessment
Bird	Bald Eagle	<i>Haliaeetus leucocephalus</i>	S4	Special Concern	N/A	Ministry of the Environment, Conservation and Parks	Low	Suitable habitat is not present within the Study Area. Species was not observed during breeding bird surveys and nest sweeps.
	Bank Swallow	<i>Riparia</i>	S4B	Threatened	2001-2005	Natural Heritage Information Centre/Ontario Breeding Bird Atlas/Ministry of the Environment, Conservation and Parks	Low	Embankments within the study are covered in dense vegetation making them unsuitable for nesting. Species was not observed during breeding bird surveys and nest sweeps.
	Barn Swallow	<i>Hirundo rustica</i>	S4B	Threatened	2001-2005	Ontario Breeding Bird Atlas (BSC, 2006)	Low	Barn swallow nests were not observed within the Study Area. Species was not observed during breeding bird surveys and nest sweeps.
	Black Tern	<i>Chlidonias niger</i>	S3B, S4N	Special Concern	2001-2005	Ontario Breeding Bird Atlas (BSC, 2006)	Low	Suitable vegetation communities (open aquatic habitat) are small in size and unlikely to support black tern nesting. Species was not observed during breeding bird surveys and nest sweeps.
	Bobolink	<i>Dolichonyx oryzivorus</i>	S4B	Threatened	2001-2005	Ontario Breeding Bird Atlas (BSC, 2006) / Ministry of Environment, Conservation, and Parks	Low	Agricultural fields within the Study Area were planted with winter wheat. Species was not observed during breeding bird surveys and nest sweeps.
	Chimney Swift	<i>Chaetura pelagica</i>	S3B	Threatened	2001-2005	Ontario Breeding Bird Atlas (BSC, 2006)	Moderate	A potentially suitable chimney for nesting is present within the abandoned building located at 2835-2879 Yonge Street. The species was not observed during breeding bird surveys and nest sweeps. Targeted surveys were not completed at the abandoned building. The interior of the property was not investigated due to health and safety concerns resulting from the deteriorated condition of the house.
	Eastern Meadowlark	<i>Sturnella magna</i>	S4B, S3N	Threatened	2001-2005	Ontario Breeding Bird Atlas (BSC, 2006) / Ministry of Environment, Conservation, and Parks	Low	Species was not observed during breeding bird surveys and nest sweeps.
	Eastern Wood-Pewee	<i>Contopus virens</i>	S4B	Special Concern	2001-2005	Ontario Breeding Bird Atlas (BSC, 2006)	Moderate	The FOD8-1 (Fresh – Moist Poplar Deciduous Forest Type) community may provide suitable nesting habitat. Species was not observed during breeding bird surveys and nest sweeps.
	Grasshopper Sparrow	<i>Ammodramus savannarum</i>	S4B	Special Concern	2001-2005	Ontario Breeding Bird Atlas (BSC, 2006)	Low	Species was not observed during breeding bird surveys and nest sweeps.
Henslow's Sparrow	<i>Centronyx henslowii</i>	S1B	Threatened	N/A	Ministry of the Environment,	Low	Habitat of suitable area is not present within the Study Area. Species was not observed during breeding bird surveys and nest sweeps.	

Taxa	Common Name	Scientific Name	S-Rank ¹	Endangered Species Act Status ²	Last Year Observed	Source of Record	Probability of Occurrence within the Study Area	Habitat Assessment
						Conservation, and Parks		
	Least Bittern	<i>Ixobrychus exilis</i>	S4B	Threatened	N/A	Ministry of the Environment, Conservation, and Parks	Low	Suitable vegetation communities (open aquatic habitat) are small in size and unlikely to support least bittern nesting. Species was not observed during breeding bird surveys and nest sweeps.
	Peregrine Falcon	<i>Falco peregrinus</i>	S4	Special Concern	N/A	Ministry of the Environment, Conservation, and Parks	Low	Suitable habitat is not present within the Study Area. Species was not observed during breeding bird surveys and nest sweeps.
	Red-headed Woodpecker	<i>Melanerpes erythrocephalus</i>	S3	Special Concern	2001-2005	Ontario Breeding Bird Atlas (BSC, 2006)	Moderate	The Cultural Woodland community may provide suitable habitat. Species was not observed during breeding bird surveys and nest sweeps.
	Wood Thrush	<i>Hylocichla mustelina</i>	S4B	Special Concern	2001-2005	Ontario Breeding Bird Atlas (BSC, 2006)	Moderate	The FOD8-1 (Fresh – Moist Poplar Deciduous Forest Type) community may provide suitable nesting habitat. Species was not observed during breeding bird surveys and nest sweeps.
Mammals	Little Brown Myotis	<i>Myotis lucifugus</i>	S3	Endangered	N/A	Ministry of the Environment, Conservation, and Parks/ Bat Conservation International (BCI, 2021)	Moderate	The FOD8-1 (Fresh – Moist Poplar Deciduous Forest Type) community and abandoned building located at 2835-2879 Yonge Street community may provide suitable maternity roosting habitat. Targeted surveys for bat Species at Risk were not completed during field investigations. The interior of the property was not investigated due to health and safety concerns resulting from the deteriorated condition of the house. Additionally, acoustic monitoring was not completed within the FOD8-1 (Fresh – Moist Poplar Deciduous Forest Type) community as it was located outside of the Limits of Work.
	Eastern Small-footed Myotis	<i>Myotis leibii</i>	S2S3	Endangered	N/A	Ministry of the Environment, Conservation, and Parks/ Bat Conservation International (BCI, 2021)	Moderate	The FOD8-1 (Fresh – Moist Poplar Deciduous Forest Type) community and abandoned building located at 2835-2879 Yonge Street community may provide suitable maternity roosting habitat. Targeted surveys for bat Species at Risk were not completed during field investigations. The interior of the property was not investigated due to health and safety concerns resulting from the deteriorated condition of the house. Additionally, acoustic monitoring was not completed within the FOD8-1 (Fresh – Moist Poplar Deciduous Forest Type) community as it was located outside of the Limits of Work.
	Northern Long-eared Myotis	<i>Myotis septentrionalis</i>	S3	Endangered	N/A	Ministry of the Environment, Conservation, and Parks/ Bat Conservation International (BCI, 2021)	Moderate	The FOD8-1 (Fresh – Moist Poplar Deciduous Forest Type) community may provide suitable maternity roosting habitat. Targeted surveys for bat Species at Risk were not completed during field investigations. The interior of the property was not investigated due to health and safety concerns resulting from the deteriorated condition of the house. Additionally, acoustic monitoring was not completed within the FOD8-1 community as it was located outside of the Limits of Work.
	Tri-coloured Bat	<i>Perimyotis subflavus</i>	S3?	Endangered	N/A	Ministry of the Environment, Conservation, and Parks/ Bat	Moderate	The FOD8-1 (Fresh – Moist Poplar Deciduous Forest Type) community and abandoned building located at 2835-2879 Yonge Street community may provide suitable maternity roosting habitat. Targeted surveys for bat Species at Risk were

Taxa	Common Name	Scientific Name	S-Rank ¹	Endangered Species Act Status ²	Last Year Observed	Source of Record	Probability of Occurrence within the Study Area	Habitat Assessment
						Conservation International (BCI, 2021)		not completed during field investigations. The interior of the property was not investigated due to health and safety concerns resulting from the deteriorated condition of the house. Additionally, acoustic monitoring was not completed within the FOD8-1 (Fresh – Moist Poplar Deciduous Forest Type) community as it was located outside of the Limits of Work.
Reptile	Northern Map Turtle	<i>Emydoidea blandingii</i>	S3	Special Concern	1993	Ontario Reptile and Amphibian Atlas (Ontario Nature, 2019)	Low	Record considered historical (i.e., greater than 20 years old).
	Snapping Turtle	<i>Chelydra serpentina</i>	S4	Special Concern	2019	Ontario Reptile and Amphibian Atlas (Ontario Nature, 2019)	Low	The stormwater management pond found within the Study Area is an isolated feature that is unlikely to support snapping turtles. No other waterbodies are present in the Study Area. Species not observed during field investigations.
Insect	Monarch	<i>Danaus plexippus</i>	S4B, S2N	Special Concern		Ontario Butterfly Atlas (TEA, 2019)	Moderate	Common milkweed (<i>Asclepias syriaca</i>) was observed within the CUM1-1 (Dry- Moist Old Field Meadow Type), CUT1 (Mineral Cultural Thicket Ecosite) and CUT1-5 (Raspberry Cultural Thicket Type) communities. Species not observed during field investigations.
Plant	Butternut	<i>Juglans cinerea</i>	S2?	Endangered	N/A	Natural Heritage Information Centre/Ministry of the Environment, Conservation, and Parks	Low	Species not observed during Ecological Landscape Classification and vegetation surveys.

¹ **S-rank:** The natural heritage provincial ranking system (provincial S-rank) is used by the MNRF Natural Heritage Information Centre (NHIC) to set protection priorities for rare species and natural communities. The following status definitions were taken from NatureServe Explorer's (2015) National and Subnational Conservation Status Definitions available at <http://explorer.natureserve.org/nsranks.htm>:

SX - Presumed Extirpated—Species or community is believed to be extirpated from the province. Not located despite intensive searches of historical sites and other appropriate habitat, and virtually no likelihood that it will be rediscovered.

SH- Possibly Extirpated (Historical)—Species or community occurred historically in the province, and there is some possibility that it may be rediscovered. Its presence may not have been verified in the past 20-40 years. A species or community could become SH without such a 20-40 year delay if the only known occurrences in a province were destroyed or if it had been extensively and unsuccessfully looked for.

S1 - Critically Imperiled — Critically imperiled in the province because of extreme rarity (often 5 or fewer occurrences) or because of some factor(s) such as very steep declines making it especially vulnerable to extirpation from the province.

S2-Imperiled—Imperiled in the province because of rarity due to very restricted range, very few populations (often 20 or fewer), steep declines, or other factors making it very vulnerable to extirpation from the province.

S3 - Vulnerable — Vulnerable in the province due to a restricted range, relatively few populations (often 80 or fewer), recent and widespread declines, or other factors making it vulnerable to extirpation.

S4 - Apparently Secure—Uncommon but not rare; some cause for long-term concern due to declines or other factors.

S5 - Secure—Common, widespread, and abundant in the nation or state/province.

SNR - Unranked—Province conservation status not yet assessed.

SU - Unrankable — Currently unrankable due to lack of information or due to substantially conflicting information about status or trends.

SNA - Not Applicable — A conservation status rank is not applicable because the species is not a suitable target for conservation activities.

S#S# - Range Rank —A numeric range rank (e.g., S2S3) is used to indicate any range of uncertainty about the status of the species or community. Ranges cannot skip more than one rank (e.g., SU is used rather than S1S4).

Breeding Status Qualifiers

B - Breeding—Conservation status refers to the breeding population of the species in the province.

N - Nonbreeding—Conservation status refers to the non-breeding population of the species in the province.

M - Migrant—Migrant species occurring regularly on migration at particular staging areas or concentration spots where the species might warrant conservation attention. Conservation status refers to the aggregating transient population of the species in the province.

Note: A breeding status is only used for species that have distinct breeding and/or non-breeding populations in the province. A breeding-status S-rank can be coupled with its complementary non-breeding-status S-rank if the species also winters in the province, and/or a migrant-status S-rank if the species occurs regularly on migration at particular staging areas or concentration spots where the species might warrant conservation attention. The two (or rarely, three) status ranks are separated by a comma (e.g., "S2B,S3N" or "SHN,S4B,S1M").

Other Qualifiers

? -Inexact or Uncertain—Denotes inexact or uncertain numeric rank. (The ? qualifies the character immediately preceding it in the S-rank.)

²ESA Status: *The Endangered Species Act 2007 (ESA) protects species listed as Threatened and Endangered on the Species at Risk in Ontario (SARO) List on provincial and private land. The Minister lists species on the SARO list based on recommendations from the Committee on the Status of Species at Risk in Ontario (COSSARO), which evaluates the conservation status of species occurring in Ontario. The following are the categories of at risk:*

END (Endangered) – *A species facing imminent extinction or extirpation in Ontario.*

THR (Threatened) – *Any native species that, on the basis of the best available scientific evidence, is at risk of becoming endangered throughout all or a large portion of its Ontario range if the limiting factors are not reversed.*

SC (Special Concern) – *A species that may become Threatened or Endangered due to a combination of biological characteristics and identified threats.*

NAR (Not at Risk) – *A species that has been evaluated and found to be not at risk*

Upon completion of the Species at Risk habitat assessment, the following five (5) Species at Risk were determined to have a moderate probability of occurrence within the Study Area:

- Chimney Swift;
- Little Brown Myotis;
- Eastern Small-footed Myotis;
- Northern Myotis; and,
- Tri-colored Bat.

Potentially suitable habitat for mammal Species of Risk: little brown myotis (*Myotis lucifugus*), eastern small-footed myotis (*Myotis leibii*), northern myotis (*Myotis septentrionalis*) and tri-coloured bat (*Perimyotis subflavus*) may also be present within the forested vegetation communities outside of the Limits of Work.

At the time of field investigations, an abandoned house at 2835-2879 Yonge Street was noted to also be candidate Species at Risk bat habitat and chimney swift habitat (*Chaetura pelagica*); however, the house and outbuildings have since been demolished by the property owner under a building permit issued by the Town of Bradford West Gwillimbury.

5.1.1.4 Significant Wildlife Habitat

A Significant Wildlife Habitat (SWH) screening exercise was conducted using the Significant Wildlife Habitat Criteria Schedules for Ecoregion 6E (Ministry of Natural Resources and Forestry, 2015) to determine the presence of Candidate Significant Wildlife Habitat within the Study Area. The presence of candidate habitat for all five Significant Wildlife Habitat categories were determined by comparing existing conditions based on Ecological Landscape Classification site investigations to criteria listed within the 6E schedule. Similarly, a background review was conducted to determine the presence of Species of Conservation Concern within the Study Area and surrounding landscape. This assessment was completed to help inform the need for taxa-specific surveys completed during field investigations in 2021. The results of Ecological Landscape Classification and taxa surveys were utilized to confirm the presence / absence of Candidate Significant Wildlife Habitat within the Study Area. A total of two candidate Significant Wildlife Habitat types were identified within the Study Area. No confirmed Significant Wildlife Habitat was present.

Candidate Significant Wildlife within the Study Area include the following:

Bat Maternity Colonies – The abandoned house located at 2835-2879 Yonge Street and the FOD8-1 community (see Figure 5-1) may provide habitat for Bat Maternity Colonies. Targeted surveys for bats were not conducted at either location and the interior of the property was not investigated due to health and safety concerns resulting from the deteriorated condition of the house. Acoustic monitoring was not completed within the FOD8-1 (see Figure 5-1) community as it was located outside of the Limits of Work. As such, the Significant Wildlife Habitat type remains candidate.

Special Concern and Rare Wildlife Species Habitat – Potentially suitable habitat for Special Concern and Rare Wildlife (i.e., Species of Conservation Concern) was identified during the Significant Wildlife Habitat screening and could not be ruled out within the Study Area during field investigations. Special Concern and Rare Wildlife Species of Conservation Concern remains candidate for monarch (*Danaus plexippus*) as milkweed plants (*Asclepias* sp.) were observed within the Study Area. Additionally, candidate habitat for eastern wood-pewee (*Contopus virens*), red headed woodpecker (*Melanerpes erythrocephalus*) and wood thrush (*Hylocichla mustelina*) is present within the FOD8-1 and CUW communities (see Figure 5-1).

5.1.2 Fish and Fish Habitat

A Fish and Fish Habitat Existing Conditions and Impact Assessment was completed as part of the County Road 4 Early Works to document existing aquatic features within the Study Area, and identify anticipated impacts to fish and fish habitat and potential project permitting needs, future constraints and considerations that may be required to facilitate the Early Works.

Further information on potential impacts and mitigation measures for fish and fish habitat can be found in Section 6.1.2.

The Study Area is located within the Aurora Ontario Ministry of Northern Development, Mines, Natural Resources and Forestry District. As per Section 3.1.2 of the Environmental Reference for Highway Design, for the purposes of investigating the potential impacts of the proposed works on fish and fish habitat, the area of assessment is divided into two zones: the Zone of Detailed Assessment, which includes the area within the Ministry of Transportation right-of-way, from 0 m to 50 m downstream of the right-of-way, and from 0 m to 20 m upstream of the right-of-way and the Zone of General Assessment, which includes from 50 m to 200 m downstream of the right-of-way and from 20 m to 50 m upstream of the right-of-way (of which only a general description of the aquatic environment is documented). Table 5-3 summarizes the location of waterbodies assessed under the Ministry of Transportation/Fisheries and Oceans Canada/Ministry of Natural Resources and Forestry Fisheries Protocol for this Study.

Table 5-3: Fish and Fish Habitat - Location of Work

Waterbody	Municipality	Location of Stream (GPS Co-ordinates)	
		Easting	Northing
Unnamed Tributary	Township of Bradford West Gwillimbury	614531.11 m E	4887161.37 m N
Stormwater Management Pond (SWMP) – Countryside Estates Subdivision	Township of Bradford West Gwillimbury	614457.97 m E	4887158.81 m N

Fish Habitat, as defined by the *Fisheries Act*, are spawning grounds and nursery, rearing, food supply and migration areas on which fish depend directly or indirectly in order to carry out their life processes. Fish Habitats are those associated with aquatic features including, but not limited to, lakes, rivers, streams, roadside and agricultural drains, online ponds and some wetlands.

5.1.2.1 Methods

5.1.2.1.1 Background Review

AECOM documented aquatic conditions within 1 km of the Study Area as shown on Figure 5-2 via desktop review of available secondary sources.

For the purposes of this assessment, information request letters that were submitted for the larger Bradford Bypass were used because the Bradford Bypass Study Area contains the County Road 4 Study Area. Background information requests were submitted on December 4, 2019 to the Aurora District office

of the Ministry of Northern Development, Mines, Natural Resources and Forestry District, the Lake Simcoe Region Conservation Authority, and the Ministry of Environment, Conservation and Parks to obtain/confirm fisheries data within the Study Area. No correspondence with Fisheries and Oceans Canada at this stage of the project has been completed; however, Fisheries and Oceans Canada's online aquatic Species at Risk mapping has been reviewed.

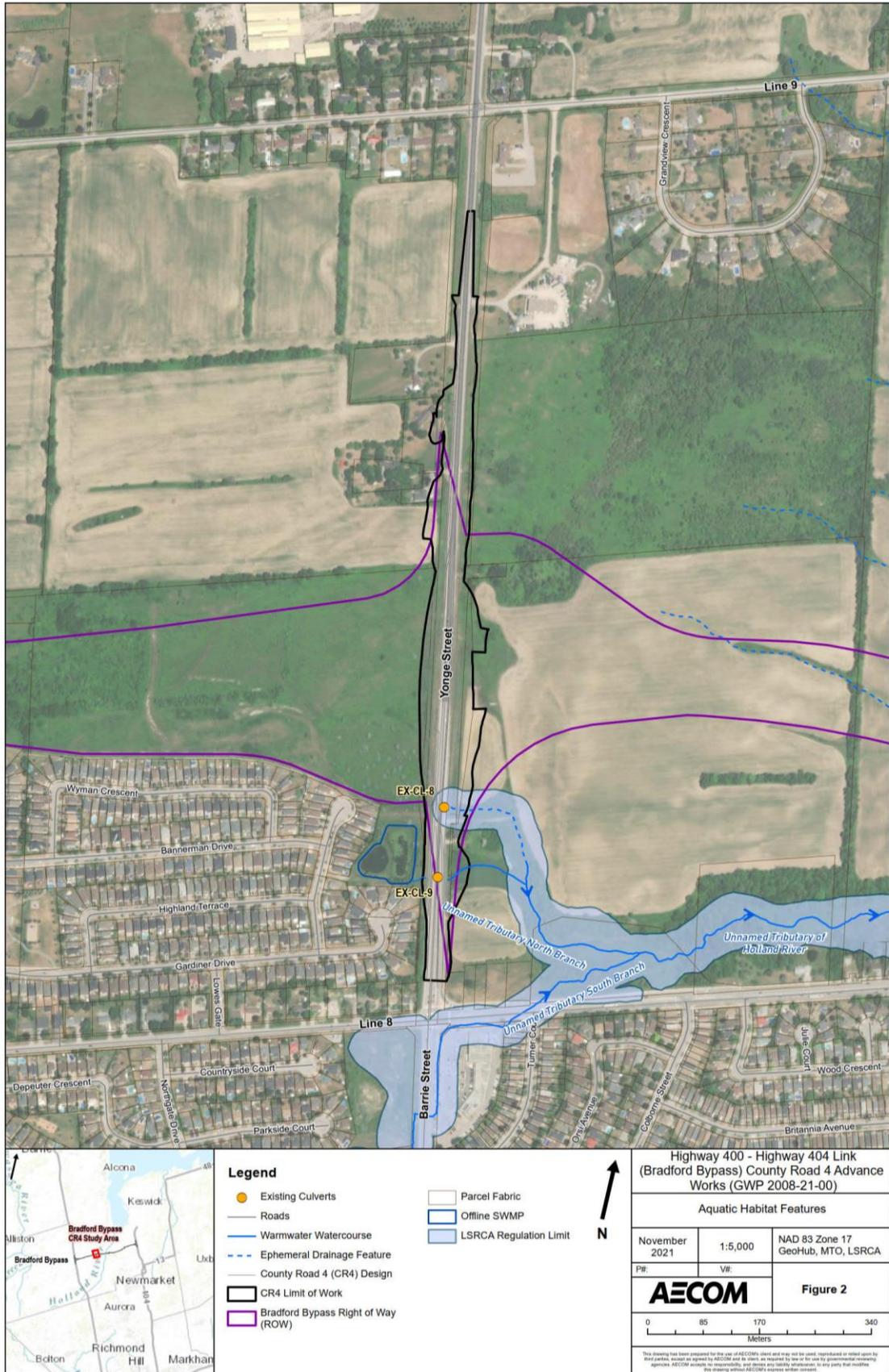
5.1.2.1.2 Field Investigations

AECOM ecologists completed a field investigation on September 30, 2021 to document existing aquatic habitat conditions within the Study Area. A detailed aquatic field investigation was completed at the County Road 4 crossing of the Unnamed Tributary North Branch and the adjacent Storm Water Management Pond, including a general investigation 50 m upstream and 200 m downstream. The aquatic assessment for this project was completed following methodologies outlined in the Ministry of Transportation Environmental Guide for Fish and Fish Habitat (2020) ("the Guide") and in conjunction with the Ministry of Transportation/Fisheries and Oceans Canada/Ministry of Natural Resources and Forestry Protocol for Protecting Fish and Fish Habitat on Provincial Transportation Undertakings, Version 4 (Pilot, 2020) ("the Protocol").

The aquatic habitat assessment included the characterization of habitat features that may influence fish community composition and determined the presence of any specialized habitat within assessed reaches such as spawning, feeding and migratory habitat. Representative photographs of the existing aquatic conditions were also gathered as part of the aquatic assessment.

Fish community surveys via electrofishing were not completed as there was anticipated to be sufficient available background information of the fish community structure in the Study Area. Both online databases/resources and agency correspondence were used to supplement the characterization of existing fish and fish habitat conditions and have been incorporated herein.

Figure 5-2: Aquatic Habitat Features



5.1.2.2 Results

5.1.2.2.1 Habitat

Subwatershed

The County Road 4 Study Area is contained within the West Holland River subwatershed, which flows in a northeast direction and drains into Cook's Bay (Lake Simcoe). The main tributaries of the West Branch of the Holland River include: Ansnorveldt Creek, Glenville Creek, East Kettleby Creek, 400 Creek, Pottageville Creek, South Schomberg River, North Schomberg River, Fraser Creek, Scanlon Creek, William Neeley Creek, Coulson's Creek and the Holland Marsh and its extensive canal and Municipal Drain system (Lake Simcoe Region Conservation Authority, 2010). The headwaters originate from discharge springs and seepages along the northern parts of the Oak Ridges Moraine (Lake Simcoe Region Conservation Authority, 2010); however, tributaries to the West Branch of the Holland River that do not originate on the Oak Ridges Moraine, like Fraser Creek, have different characteristics such as temperature regime and substrate, and thus fish community assemblages may differ to other Holland River Tributaries (Lake Simcoe Region Conservation Authority, 2010). This subwatershed has a large range of thermal regimes, from cold headwater communities to diverse, warm, large order systems (Lake Simcoe Region Conservation Authority, 2010). The watercourse assessed as part of the County Road 4 Study Area drains directly into the West Branch of the Holland River via an unnamed tributary further described below.

Within the Study Area, there is a Stormwater Management Pond on the west side of County Road 4, which is an offline feature. The inlet of the pond is a 1050 mm stormwater drain in the southwest corner of the pond that collects drainage from the subdivision to the west. A forebay is present which collects the initial drainage, which then flows into the larger detention bay to the east. The outlet of the pond consists of a hickenbottom/drop structure at the southeast corner of the detention bay. Flowing water was observed to be entering the outlet structure via the hickenbottom system at the time of the site visit. An overflow weir was present which would allow high flows to enter the outlet structure, although fish passage upstream would still not be possible given the vertical drop (2+m). The vegetation growth throughout the overflow channel indicates that the overflow feature is not commonly used. The pond itself was densely covered in aquatic vegetation consisting of floating pond lilies and cattails around the perimeter. An abundance of algae growth was also noted in the detention pond with water depths observed to be greater than 1 m. Overall, the vegetation and algae growth cover approximately 70% of the pond surface. There were minimal riparian trees which reduced the amount of riparian shading of the pond, and a large earth berm was present to the north.

At the pond outlet on the west side of County Road 4, water flows into a defined channel approximately 1.2 m wide and 25 cm deep. The substrate consisted of clay with gravel and silt overtop, and the water was clear with no obvious staining or colouration. Approximately 15 m downstream of the pond outlet, the water flows into a 1.5 x 1.5 m concrete box culvert underneath County Road 4 (EX-CL-9, see Figure 5-2). Dense vegetation growth was present around the culvert inlet consisting of grasses and cattails. Drainage ditches flow towards the watercourse from the north and south along the road, but both were dry during the field investigation. Shallow laminar flow was observed overtop of the culvert bottom, which may restrict fish passage upstream at this location and be a seasonal fish barrier, most notable during low flow conditions. No substrate was noted in the culvert at the inlet. Riparian lands consisted of grassed roadside ditches with no trees or large shrubs near the culvert inlet.

At the culvert outlet on the east side of County Road 4, the culvert outlet was embedded and filled with silt substrate. The depth in the culvert outlet was approximately 15 cm, and clear flow was again noted. Surrounding land uses consisted of actively farmed crop fields to the south and an abandoned farmhouse to the north. Immediately downstream of the culvert outlet, the watercourse and riparian lands consist of dense invasive phragmites (European Common Reed) which choke out the channel and heavily shade the watercourse. Due to the dense phragmites, no channel morphology or variation in fish habitat was noted. Flow did appear to be concentrated in a channel feature approximately 1.2 m wide through the dense phragmites. The phragmites patch was approximately 15-20 m wide on either side of the watercourse and extended approximately 125 m downstream to the east before it started to thin out in sections. No visible permanent fish barriers were noted downstream of the culvert. The dense phragmites may create a seasonal fish barrier during low flow conditions in the summer. Given the presence of flowing water in early Fall, and the lack of permanent fish barriers throughout the assessed reaches, it would be expected that fish would inhabit the Unnamed Tributary downstream of the Stormwater Management Pond. Based on available fish habitat community information downstream of the Study Area, a similar warmwater fish community would be anticipated in this area. No aquatic Species at Risk or significant/exceptional fish habitat features were noted. The Unnamed Tributary may only function as seasonal fish habitat during the summer months, but this could not be determined from a single season site investigation.

Approximately 100 m downstream (east) of the culvert outlet at EX-CL-9, an unnamed ephemeral drainage feature drains into the Unnamed Tributary from the north as shown on Figure 5-2. This drainage feature collects water from culvert EX-CL-8 and agricultural fields to the north and was dry during previous field investigations in the area, therefore is considered to be indirect fish habitat.

The nearest location from which data was received for was a watercourse outside the Study Area, approximately 1.3 km downstream to the east. Ministry of Northern Development, Mines, Natural Resources and Forestry District background information received indicates that flow travels east through the Holland March Provincially Significant Wetland ultimately draining into the Holland River. This is a tributary of the Holland River and is the same watercourse that the Unnamed Tributary in the Study Area flows into approximately 350 m downstream of the County Road 4 road crossing (EX-CL-9 – see Figure 5-2). The Unnamed Tributary is classified as warmwater watercourse.

Previous environmental studies completed in the area for the County's Municipal Class Environmental Assessment (2012) identified both the Unnamed Tributary and the watercourse 1.3 km downstream as permanent warmwater features. However, both were also classified as indirect fish habitat. Given these environmental assessments were completed in 2011, the natural heritage conditions may have changed. In addition, given they were previously classified as permanent features, it would be anticipated that fish could inhabit these features seasonally at a minimum.

Based on aerial review and recent field work in the area for the Bradford Bypass, a defined channel feature appeared to originate from a Stormwater Management Pond on the west side of County Road 4. The Stormwater Management Pond outlets into the Unnamed Tributary, which then crosses Country Road 4 200 m north of 8th Line through the EX-CL-9 culvert. At the culvert outlet on the east side of County Road 4, the watercourse continues to flow east where it collects ephemeral flows from an

agricultural drainage swale to the north. All these features can be seen on Figure 5-2 below. The Unnamed Tributary continues to flow in an easterly direction where it eventually outlets into the Holland River.

5.1.2.2.2 Fish Species

The watercourse approximately 1.3 km downstream of culvert EX-CL-9 (Figure 5-2) is direct fish habitat and is a confirmed spawning area for muskellunge species (Ministry of Natural Resources and Forestry, 2019).

No fish were observed in the stormwater management pond on the west side of County Road 4, but it is anticipated that small-bodied pollution tolerant warmwater fish would be present given the size of the pond, observed water depths, and abundant aquatic vegetation.

Although no fish were observed during field investigations, the Unnamed Tributary crossing at culvert EX-CL-9 is considered direct, warmwater fish habitat.

Further details on fish habitat can be found in Table 5-4.

Table 5-4: Existing Fish and Fish Habitat Conditions Summary Table

Waterbody ID	Work Location (UTM Coordinates)	Flow	Thermal Regime	Fish Habitat	Habitat Information	Substrate Type	Channel Morphology	Vegetation	Constraints and Opportunities	Significant Fish Habitat
The watercourse approximately 1.3 km downstream of culvert EX-CL-9, Holland River Tributary	615762.66 m E, 4887454.45 m N	Permanent (AECOM, 2021)	Land Information Ontario (2019) and Ministry of Northern Development, Mines, Natural Resources and Forestry (2019): Warmwater	Direct	<p>Upstream Habitat: Watercourse has a moderate flow that drains east through an industrial area, then continues under a railway crossing heading south/ southeast until its confluence with West Branch of the Holland River. Valley land surrounding channel is dense thicket/forest on the upstream reaches then open wet meadow/wetland towards the downstream reach. Watercourse has a natural morphology and is deeply incised through a primarily clay substrate. Channel is completely shaded by thicket and woody debris overhanging the channel.</p> <p>Downstream Habitat: Watercourse enters a wetland feature with multiple channels and backwater locations. No defined bankfull or channel banks. with riparian grass hummocks and deep (>1 m) water observed. Dense riparian grasses and cattails.</p>	<p>Upstream: Clay/gravel/silt/cobble</p> <p>Downstream: muck</p>	<p>Upstream: Flat/run/ pool</p> <p>Downstream: Flat/ Pool</p>	<p>Upstream: upstream is dominated by an agricultural thicket/deciduous swamp community that transitions into a shallow cattail marsh community close to the rail crossing and downstream.</p> <p>Downstream: Overhanging cattails and grasses shaded parts of the channel; grass hummocks provide additional shading.</p>	N/A	Mapped Northern Pike spawning habitat
Unnamed Tributary North Branch - EX-CL-9 (County Road 4)	614527.83 m E, 4887130.24 m N	Permanent (AECOM, 2021)	Ministry of Northern Development, Mines, Natural Resources and Forestry (2019): Warmwater	Direct	<p>Upstream: a defined channel feature appeared to originate from a Stormwater Management Pond on the west side of County Road 4. The Stormwater Management Pond outlets into the Unnamed Tributary, which then crosses County Road 4 200 m north of 8th Line. At the culvert outlet on the east side of County Road 4, the watercourse continues to flow east where it collects ephemeral flows from an agricultural drainage swale to the north. The Stormwater Management Pond on the west side of County Road 4 is an offline feature. At the pond outlet on the west side of County Road 4, water flows into a defined channel approximately 1.2 m wide and 25 cm deep.</p> <p>Downstream: watercourse and riparian lands consist of dense invasive phragmites (European Common Reed) that choke out the channel and heavily shade the watercourse. Due to the dense phragmites, no channel morphology or variation</p>	<p>Upstream: clay with gravel and silt overtop</p> <p>Downstream: detritus and silt</p>	<p>Upstream: run/riffle</p> <p>Downstream: run</p>	<p>Upstream: grasses and cattails.</p> <p>Downstream: invasive phragmites (European Common Reed)</p>	Remove invasive phragmites.	None.

Waterbody ID	Work Location (UTM Coordinates)	Flow	Thermal Regime	Fish Habitat	Habitat Information	Substrate Type	Channel Morphology	Vegetation	Constraints and Opportunities	Significant Fish Habitat
					<p>in fish habitat was noted. Flow did appear to be concentrated in a channel feature approximately 1.2 m wide through the dense phragmites. The dense phragmites may create a seasonal fish barrier during low flow conditions in the summer.</p>					

5.1.2.2.3 Aquatic Species at Risk

Based on the results of the desktop screening and correspondence with the Lake Simcoe Region Conservation Authority and Ministry of Northern Development, Mines, and Forestry, no provincial aquatic Species at Risk or aquatic Species at Risk habitats were identified within the Study Area. No correspondence with Fisheries and Oceans Canada has been completed at this stage of the project; however, Fisheries and Oceans Canada online aquatic Species at Risk mapping has been reviewed and no aquatic Species at Risk have been identified in the Study Area.

5.1.3 Groundwater and Hydrogeology

5.1.3.1 Hydrogeological Investigation Report

A Hydrogeological Investigation Report was prepared for the Early Works to characterize the local physical and groundwater setting, quantify potential dewatering requirements for construction, assess possible impacts to local water wells and groundwater dependant environmental features, and recommend appropriate monitoring and/or mitigation measures, as required.

The Hydrogeological Investigation Study Area considered a 500m buffer around the right-of-way to assess physical, geological, and hydrogeological settings within the study area. The Study Area falls within the Clay Till Plains. The region is relatively drumlinized plains that were over-ridden by a glacial event following their initial deposition (Chapman and Putnam, 1984).

The ground surface within the Study Area is generally undulating with a downward gradient from the surrounding areas (east and west) to the Holland River and ultimately towards Lake Simcoe. The ground elevations within the Study Area ranged from approximately 251 m above mean sea level (mASL) (close to Holland River) to greater than 298 mASL (north end of the Study Area).

5.1.3.1.1 Local Subsurface Conditions

Soil stratigraphy within the Study Area has been interpreted based on the results of a Project-specific subsurface (geotechnical) investigation program completed by Golder Associates Ltd. (Golder) that included the advancement of eighteen (18) boreholes within the Study Area. The Study Area included surficial material that ranged from sand to clayey silt till.

5.1.3.1.2 Hydrogeological Conditions

The Study Area falls under the jurisdiction of the Lake Simcoe Region Conservation Authority (LSRCA) (County of Simcoe, 2012). A total of four groundwater monitoring wells that were constructed by Golder within the Study Area as part of the geotechnical investigation between August and November 2021 were used for this investigation. Additional groundwater monitoring wells were installed within the active roadway and were not sampled. The four groundwater monitoring wells chosen for this investigation best reflect the areas of excavation.

Groundwater Levels

Groundwater level monitoring within the four groundwater monitoring wells was conducted by AECOM between October 12th and November 26th. Observed static groundwater level elevations were ranged between approximately 249.20 mASL and 260.11 mASL. It is expected that the groundwater levels within the Study Area will be subject to seasonal fluctuations including response to the spring freshet and localized precipitation events.

Hydraulic Conductivity Estimate

Single Well Response Testing was conducted at all four groundwater monitoring wells within the Study Area between October 12th and November 23rd, 2021. Collected data was analyzed to provide an estimate of the hydraulic conductivity (K) of the stratum surrounding each respective monitoring well screen.

Prior to completing single well response testing the depth to water was measured within each monitoring well and used to determine the static water level for each well. The static water level represents the initial water levels for the single well response testing. The single well response testing method involves causing a rapid change in hydraulic head within a well and measuring the water level response back to a static water level condition. The single well response testing method may include one or a combination of rising head or falling head tests, depending on the position of the static groundwater level within the monitoring well being tested. Prior to start of each test, a datalogger was installed within the target well and configured to obtain readings on a regular (i.e., 0.5 to 1-second) interval. Information collected by the datalogger was confirmed through the collection of manual groundwater level measurements using an electronic water level indicator.

Falling head tests were carried out using a solid slug, which was introduced into the well to a depth completely below the static water level causing the water level to initially rise and subsequently fall back to static, and rising head tests were carried out by completely removing the solid slug from the water column causing the water level to initially drop and subsequently rise back to static. Immediately following the introduction of the slug into the well, manual groundwater levels and elapsed time were measured as the water level returned back to its original static elevation. These measurements were supplemented with data collected by the installed datalogger. Each single well response test was concluded when the water level returned to its static elevation.

Some of collected data was performed using the Kansas Geological Survey model (Hyder et. al. 1994) in AQTESOLV Professional V4.5 to estimate the K of the aquifer material. The Kansas Geological Survey model is highly recommended by many professionals working in the field of aquifer testing and data interpretation methods (Butler et. al., 2000).

Analysis of the most collected data is typically performed using the hydrostatic time-lag method of Hvorslev (1951) that is applicable to both unconfined or confined aquifer systems and monitoring wells with submerged screens. Hvorslev's method is described by the following general equation:

$$K = \frac{r_c^2}{2L_e} \ln \left[\frac{L_e}{2r_w} + \sqrt{1 + \left(\frac{L_e}{2r_w} \right)^2} \right] \left[\frac{\ln \left(\frac{h_1}{h_2} \right)}{(t_2 - t_1)} \right]$$

Where: K = hydraulic conductivity of the tested material (m/s)
r_c = effective casing radius (m)
r_w = equivalent well radius (m)
L_e = length of screen interval (m)
h_t = hydraulic head at time t (m)
t = time (s)

Using the Hvorslev method, the collected data are plotted as Normalized Head versus Elapsed Time on a semi-logarithmic scale. Values are then taken from the plot and input to the equation above to estimate the hydraulic conductivity (K) of the soil and/or rock formation(s) contacted along the well screen/sand pack length.

The single well response testing results are summarized in Table 5-5 below.

Table 5-5: Summary of Single Well Response Testing Results

Monitoring Well ID	Test Date	Analytical Method ^{1, 2}	Top of Test Interval (mBGS) ³	Bottom of Test Interval (mBGS) ³	Type of Slug Test	Hydraulic Conductivity (m/s) ⁴	Geologic Formation
CR4-03	October 14, 2021	Kansas Geological Survey Model	6.89	9.94	Falling Head	2.08 x 10 ⁻⁶	SILTY SAND (SM) and CLAYEY SILT-SILT (CL-ML) TO SILT
		Kansas Geological Survey Model			Rising Head	1.82 x 10 ⁻⁶	
CR4-11	October 14, 2021	Kansas Geological Survey Model	6.11	9.16	Falling Head	4.25 X 10 ⁻⁷	CLAYEY SILT (CL) with trace sand, trace gravel to CLAYEY SAND (SC) with some gravel (TILL)
		Kansas Geological Survey Model			Rising Head	4.88 X 10 ⁻⁷	
CV1-01	November 23, 2021	Hvorslev	7.67	10.72	Rising Head	5.91 X 10 ⁻⁸	CLAYEY SILT-SILT (CL-ML), trace sand to sandy, trace gravel (TILL)
CV1-04	October 12, 2021	Hvorslev	6.25	9.30	Rising Head	8.78 X 10 ⁻⁹	CLAYEY SILT (CL) to CLAYEY SILT-SILT (CL-ML), some sand to sandy, trace gravel (TILL)

Notes: 1 – KGS = Kansas Geological Survey (1994)
2 – Hvorslev (1951)
3 – mBGS = metres Below Ground Surface
4 – m/s = metre per second

5.1.3.1.3 Existing Groundwater Users

Potable water in the rural areas is dependent on private well water, while potable water in urban areas is municipally serviced with water obtained from a combination of well water and surface water sources. Overall, a total of 86 records were identified within the Study Area by primary well use and are summarized in Table 5-6.

Table 5-6: Summary of Ministry of the Environment, Conservation and Parks Water Well Record Information

Primary Water Use	Number of Well Records	Well Depth (m)	Primary Well Type
Domestic	68	5 - 108	Overburden
Industrial	2	16 – 133	Overburden
Livestock	1	13	Overburden
Monitoring and Test Hole	6	0 - 69	Overburden
Not Used / Unknown	9	0 - 137	Overburden

A review of the Ministry of the Environment, Conservation and Parks Permit to Take Water database identified no active Permits to Take Water and a review of the Environmental Activity and Sector Registries database found no records within the Study Area.

5.1.3.1.4 Groundwater Quality

Groundwater samples were collected from four (4) groundwater monitoring wells between October 13th to November 24rd, 2021.

The collected groundwater samples were submitted to AGAT Laboratories for geochemical analysis. Results of the analyses were compared to the Town of Bradford West Gwillimbury’s Sewer Use Bylaw 2013-68 limits for both Sanitary and Storm Sewers discharges. The analysis results were also compared to Provincial Water Quality Objectives criteria limits. As required under the Sewer Use By-Law and Provincial Water Quality Objectives criteria, the samples were not filtered and are therefore representative of raw groundwater quality prior to any treatment processes.

The analytical results received from AGAT Laboratories indicate that the tested groundwater samples were generally below most of the criteria limits for the applicable standards, with the exception of those parameters summarized in Table 5-7 and Table 5-8.

The concentration of Un-ionized Ammonia was calculated by the laboratory for each groundwater sample based on measured pH and temperature when the samples were received, rather than the field-measured parameters of pH and temperature at the time of sample collection. As a result, the laboratory calculated and reported Un-ionized Ammonia values do not accurately reflect the actual concentration within each sampled well.

Ammonia is highly soluble in water and its speciation is affected by a wide variety of environmental parameters including pH, temperature, and ionic strength. In aqueous solutions, an equilibrium exists between Un-ionized (NH₃) and Ionized (NH₄⁺) Ammonia species (Canadian Council of Ministers of the Environment, 2010). The equilibrium constant for this reaction is a function of temperature and solution pH (Florida Department of Environmental Protection, 2001). Thus, if the equilibrium constant is known for a particular temperature and the pH of the solution is also known, the fraction of Un-ionized Ammonia

can be calculated. The Un-ionized Ammonia concentration can be calculated if the Total Ammonia concentration is also known from laboratory analysis (Florida Department of Environmental Protection, 2001).

Field measurements of pH and temperature together with the laboratory-derived concentration of Total Ammonia (mg/L) were utilized to calculate the Un-ionized Ammonia concentration for selected sampled monitoring wells. The calculation process followed the procedure and equations provided in Emerson et.al.,1975. The calculated concentration of Un-ionized Ammonia for selected sampled well was compared to the Provincial Water Quality Objectives criteria of 0.02 mg/L. Results indicate that none of the monitoring wells were found to contain a concentration of Un-ionized Ammonia in excess of the Provincial Water Quality Objectives criteria.

Table 5-7: Summary of Parameters Exceeding the Town of Bradford West Gwillimbury Storm and Sanitary Sewer By Law

Parameter →	Phenols	Total Chromium	Total Copper	Total Manganese	Total Nickel	Total Phosphorus	Total Titanium	Total Suspended Solids	
Unit →	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	
Reported Detection Limit (RDL) →	0.001							10	
Storm Sewer Limits →	0.008	0.08	0.05	0.15	0.08	0.40	-	15	
Sanitary Sewer Limits →	1	2	3	5	2	10	5	350	
Sampled Monitoring Wells	CV1-01	-	0.51	0.31	7.44	0.37	9.74	8.34	62
	CV1-04	0.010	<0.020	<0.015	0.055	<0.015	0.07	0.05	62
	CR4-04	0.010	-	-	-	-	-	-	54

Notes: mg/L = milligrams per Litre

Bolded/Shaded = indicates parameter does not meet the Town of Bradford West Gwillimbury Sanitary Sewer Discharge (Bylaw 2013-68)

Bolded = indicates parameter does not meet the Town of Bradford West Gwillimbury Storm Sewer Discharge (Bylaw 2013-68)

Table 5-8: Summary of Parameters Exceeding Provincial Water Quality Objectives Guidelines

Parameter →	pH	Total Cobalt	Total Copper	Total Nickel	Total Vanadium	Total Iron	
Unit →	pH Units	mg/L	mg/L	mg/L	mg/L	mg/L	
Reported Detection Limit (RDL) →	NA					0.01	
Provincial Water Quality Objectives Guideline →	6.5 – 8.5	0.0009	0.005	0.025	0.006	0.3	
Sampled Monitoring Wells	CR4-11	8.04	<0.0005	0.002	<0.003	<0.002	0.411
	CV1-01	8.56	0.149	0.31	0.37	0.64	378

Notes: mg/L = milligrams per Litre

Bolded = indicates parameter does not meet the Provincial Water Quality Objectives Guidelines

As shown in Table 5-7 phenols, total chromium, total copper, total manganese, total nickel, total phosphorus, total titanium and total suspended solids exceed the Town's Storm Sewer By-Law limits.

As shown in Table 5-8 pH, total cobalt, total copper, total nickel, total vanadium and total iron exceeded the Provincial Water Quality Objectives guidelines limits.

Given these exceedances, the use of water treatment prior to the discharge to the Town's storm sewer system should be included as part of the dewatering plan.

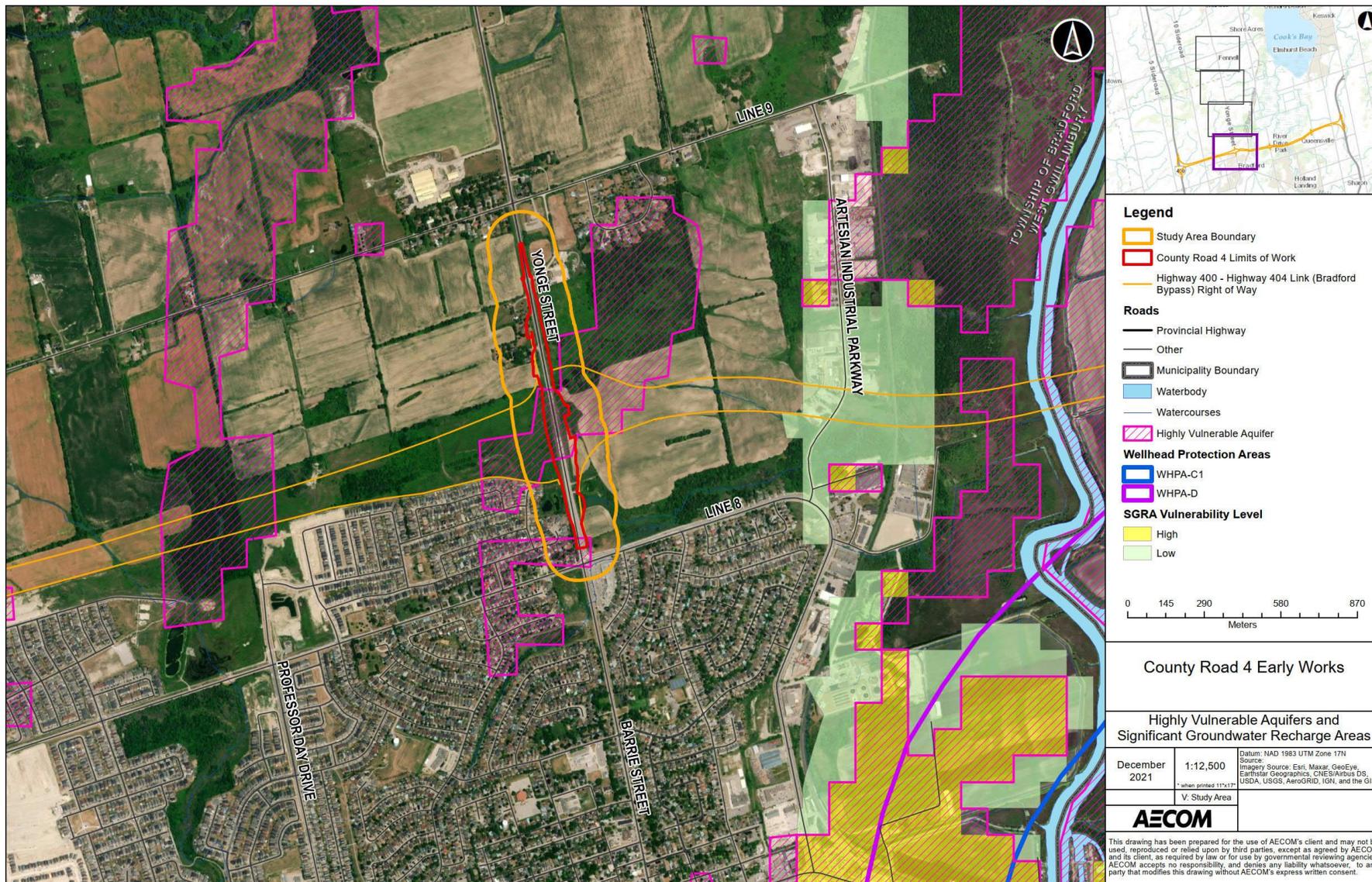
5.1.3.1.5 Wellhead Protection Areas, Highly Vulnerable and Significant Groundwater Recharge Areas

Areas that are vulnerable to contamination have been delineated for active municipal wells and are known as Wellhead Protection Areas. A Wellhead Protection Area is the area or capture zone surrounding the wellhead where land use activities have the greatest potential to affect the quality of groundwater within the aquifer from which the well derives its source. The Study Area lies just outside Wellhead Protection Areas.

A highly vulnerable aquifer has a relatively fast path for water to travel from the ground's surface down to the aquifer. Generally, the faster the water is able to flow through the ground to an aquifer, the more vulnerable the area is to contamination. These aquifers typically occur in areas of coarse or sandy soils with a high groundwater table. All highly vulnerable aquifers have a vulnerability score of 6 out of 10. Highly vulnerable aquifers are present throughout the Study Area (Figure 5-3), consideration will have to be made during dewatering to ensure these areas are maintained.

Surface water received from precipitation will percolate or infiltrate into the ground until it reaches the water table. This occurs in surficial sediments that are permeable and allow for easy movement of water through its pore spaces. Areas such as these are known as recharge areas. Significant Groundwater Recharge Areas are characterized by high permeable soils at surface, such as sand and/or gravel, which allows water to readily pass from the ground surface to an aquifer. These areas are considered significant when they aid in maintaining the water level in an aquifer that provides water for potable means or supplies groundwater to a cold-water ecosystem. There are no Significant Groundwater Recharge Areas present in the Study Area (Figure 5-3).

Figure 5-3: Highly Vulnerable Aquifers and Significant Groundwater Recharge Areas



5.1.3.1.6 Water Taking Assessment

According to available design details, and proposed construction elements (which are deepest below grade and affect dewatering requirements) the dewatering requirements were based on the following:

- Construction drawings for each proposed structure and services;
- An assumption that the water table at the proposed structure's construction footprint will be lowered to the target elevation;
- Dewatering target depths will extend to 1 m below the base of the excavation to ensure dry working conditions;
- An assumption that the required excavation will extend 1 m beyond the structure plan footprint in all directions;
- The highest reported water level elevation was considered in the assessment; and,
- The highest hydraulic conductivity between all four monitoring wells was conservatively used.

A summary of the assumptions utilized to calculate dewatering rates are shown below in Table 5-9.

Table 5-9: Assumptions for Construction Dewatering Rate Estimates

Construction Type	Stations	Excavation Dimensions (m)	Ground Surface Elevation (mASL) ₁	Proposed Lowest Excavation Elevation (mASL) ₂	Aquifer Bottom Elevation (mASL)	Highest Groundwater Elevation (mASL) _{3, 4}	Dewatering Target Elevation (mASL)	Hydraulic Conductivity (m/s)
BBP/CR4 Underpass Structure - Future BBP Westbound (WB)	9+950 to 10+000	50 X 17	261.1	249.0	246.8	260.1	248.0	2.08 x 10 ⁻⁶
BBP/CR4 Underpass Structure - Future BBP Eastbound (EB)	10+000 to 10+050	50 X 17	259.5	249.0	246.8	253.5	248.0	4.88 x 10 ⁻⁷
New Ditch Right (RT) and Left (LT)	9+900 to 9+950	50 X 3.5	261.3	260.0	256.0	260.11	259.0	2.08 x 10 ⁻⁶
New Ditch RT and LT	9+950 to 10+000	50 X 3.5	258.1	257.6	253.6	258.00	256.6	2.08 x 10 ⁻⁶
New Ditch RT and LT	10+000 to 10+050	50 X 3.5	256.0	254.7	250.7	256.00	253.7	2.08 x 10 ⁻⁶
New Ditch RT and LT	10+050 to 10+100	50 X 3.5	253.7	252.3	248.3	253.54	251.3	4.88 x 10 ⁻⁷
New Ditch RT and LT	10+100 to 10+150	50 X 3.5	251.1	250.9	246.9	250.19	249.9	8.78 x 10 ⁻⁹
New Ditch RT	10+150 to 10+200	50 X 3.5	251.8	250.9	246.9	250.19	249.9	8.78 x 10 ⁻⁹
New Ditch RT	10+200 to 10+250	50 X 3.5	253.2	250.5	246.5	250.19	249.5	8.78 x 10 ⁻⁹
New Ditch RT	10+250 to 10+300	50 X 3.5	251.6	249.1	245.1	250.19	248.1	8.78 x 10 ⁻⁹
New Ditch RT	10+300 to 10+350	50 X 3.5	250.1	249.0	245.0	250.19	248.0	8.78 x 10 ⁻⁹

Notes: 1 – mASL = metres above mean sea level

2 – Lowest Elevation of Bottom of Excavation in the Area

3 – Groundwater Level Elevation based on information from near-by well(s)

4 - **256.0** = Estimated Groundwater Level Elevation based on Information from Near-by Well(s) and Lowest Ground Surface Elevation in the Excavation Area.

5.1.3.2 Door to Door Water Well Survey

A Door To Door Water Well Survey was completed as part of the County Road 4 Early Works and involved a review of available project documentation and design information relating to the proposed construction activities and methods, as well as a desktop review of existing published information within a radial distance of approximately 500 m of the right-of-way as a precursor to field assessment activities, including:

- Aerial photographs;
- Available Ontario Ministry of Environment, Conservation, and Parks Water Well Record and Permit To Take Water databases (including Environmental Bill of Rights registry);
- Available mapping (e.g., topographic, base mapping, geological) and reports (e.g., watershed plans, aquifer vulnerability mapping, site-specific investigations);
- Subsurface or other hydrogeological information that AECOM and/or the Ministry may have on file which pertains to the Study Area; and
- Geotechnical data / reports carried out as part of the current project, if available.

Upon completion of the preliminary desktop review, AECOM staff mailed to all known and listed properties in the Ministry of the Environment, Conservation and Parks database a letter explaining the water well survey from that was attached to the letter. The homeowners were given one month upon receipt of the letter and form to complete and send back. The water well survey form allowed the homeowners to confirm groundwater use and to provide basic well information, including the location, type, depth, condition, use, yield and water quality of any identified wells. A stamped envelope was left at each residence in a conspicuous location (i.e., in mailbox or front door) for completion by the property owner and return mailing to AECOM.

The purpose of the initial desktop review and field reconnaissance was to identify, on a preliminary basis to the extent possible, the following:

- General groundwater usage including aquifers, well types and locations;
- Location and use of large volume wells, if present; and
- Wells with known quality and/or quantity problems.

For each identified well source where access permission was obtained from the Property Owner, a baseline well survey / assessment was carried out to document pre-construction conditions (quality and quantity). The scope of each baseline (pre-construction) well survey was developed based on requirements outlined in the following reference documents:

- a) Ministry of Transportation, April 2004. Guidelines for Drinking Water Sampling and Testing in Ministry of Transportation Activities.
- b) Ministry of the Environment, Conservation and Parks, December 2009. Water Supply Wells – Requirements & Best Management Practices. Chapter 10 – Yield Test.

The baseline survey for each identified well (where accessible) included the following elements, at a minimum. Variations to the generalized methodology below were made in the field, as required, based on site-specific conditions encountered at each property and/or requests made by individual property owners:

1. Interview with the current property owner and/or tenant.
2. Documentation of well construction details (including well type, diameter, casing material, total depth, stick-up, general condition, co-ordinate location, etc.) in written form and through the collection of digital photographs.

3. Measurement of the static groundwater level within the well.
4. Collection of a representative raw (untreated) water sample for analysis of general water quality (ph; total hardness; total alkalinity; calcium, magnesium, sodium; potassium; iron, manganese; chloride; sulphate; nitrate [NO₃-N]; nitrite [NO₂-N], ammonia / ammonium [NH₃-N]; electrical conductivity; total dissolved solids [TDS]; total suspended solids [TSS]; tannin and lignins) and microbiological (*E. coli*, faecal coliforms, total coliforms) parameters.

Private wells were not opened, and measurement of groundwater levels and completion of well yield tests were not completed as part of this program. Groundwater samples were obtained from untreated taps to obtain a representative sample. Groundwater quality samples were submitted under chain of custody documentation to a CALA-accredited environmental analytical laboratory for general inorganic and microbiological testing. Any exceedances of the applicable drinking water standards were reported to the well owner, the Ministry of Transportation, and to the local public health unit, where appropriate.

As detailed in the Ministry of Transportation Guidance Document (April 2004), the following standard forms were referenced by AECOM in the completion of this assignment:

- Form 1: Field Survey Documentation Form
- Form 2: Standard Checklist for Collection and Handling of Drinking Water Samples
- Form 3: Letter to Licensed Laboratory
- Form 4: Analytical Results Comparison Table
- Form 5: Notification Letter – No exceedance of Regulated Parameters
- Form 6: Notification Letter – Exceedance of Ministry of Transportation Mandatory Parameters
- Form 7: Notification Letter – Exceedance of Other Regulated Parameters
- Form 8: Communication Record
- Form 9: Checklist for Well Water Quantity Testing

Results of the Door to Door Water Well Survey are summarized below. The documentation provided includes well owner notification in accordance with the procedures outlined within the Ministry of Transportation Guideline Document (April 2004). All reporting completed for this assignment has been completed by an experienced hydrogeologist licenced by the Professional Geoscientists of Ontario.

Upon completion of the initial background information review a total of 44 properties that were identified within a radial distance of approximately 500 m of the right-of-way. Following mailing of the survey letter, a response was received from a total of four property owners, or 9% of the identified properties. The properties were scheduled for participation within the pre-construction Private Well Monitoring Program between October 6th and October 14th, 2021.

The results of the Door to Door Water Well Survey is summarized below:

- Water quality sampling results from two of the properties determined that the drinking water sample obtained had exceedances above the Ontario Drinking Water Standards for health-related parameters. Owners were contacted by phone to resample the well water and informed to contact the Local Public Health Units to discuss the results further.
- Other parameters that were exceeded for the Ontario Drinking Water Standards fell into the aesthetic objectives which may impair the taste, odour, and colour of water which may interfere with good water quality or are operational guidelines that must be controlled to make water treatment systems effective.
- Drilled wells were in excellent condition; however, dug wells had historical lid issues or debris/objects blocking assessment of the well lid.

- All properties except for one have water softeners and/or some form of water treatment (chlorination, reverse osmosis or ultraviolet lights).

A copy of the lab results, including the completed AECOM field investigation and any exceedances were hand delivered to all respective properties in an envelope.

Further information on potential impacts and mitigation measures for groundwater and hydrogeology can be found in Section 6.1.3.

5.1.4 Surface Water and Hydrology

A Drainage and Hydrology assessment was prepared for the Early Works to assess surface water and hydrology conditions within the Study Area, identify potential impacts associated with the Early Works and recommend mitigation measures.

The Study Area is located within the jurisdiction of Lake Simcoe Region Conservation Authority. The topography generally slopes to the east towards the Holland River, which conveys flow north to Cook's Bay (Lake Simcoe). The Study Area itself is quite steep across County Road 4, with most of the roadway at a 3% slope with one section sloped at 6%.

The existing drainage system includes roadside ditches, two culverts (Figure 5-2), as well as catchbasins located along the edge of pavement and localized ditch inlets that collect water from catchbasins and roadside ditches.

Culvert EX-CL-8 (Figure 5-2) conveys flows across County Road 4 from a drainage area of 26.90 ha. Culvert EX-CL-9 (Figure 5-2) conveys flows across County Road 4 from a drainage area of 19.1 ha. This area includes the drainage area (18.6 ha) to the existing stormwater management pond located upstream of the culvert. Flows from these two culverts are conveyed easterly to a tributary of the West Branch of Holland River which ultimately discharge to Lake Simcoe.

Conveyance of runoff in the road area just north of 8th Line, is achieved by a storm sewer system where runoff is collected by catchbasins located along the urban section of the road. Runoff collected by the storm sewer system discharges to a 2000 x 2000 mm corrugated steel pipe that crosses 8th Line and that discharges to the tributary of the West Branch of Holland River.

Further information on potential impacts and mitigation measures for surface water and hydrology can be found in Section 6.1.4.

5.1.5 Fluvial Geomorphology

A Fluvial Geomorphology Assessment is being completed as part of the overall Bradford Bypass and is not applicable to the County Road 4 Early Works. The assessment is expected to be prepared in mid-2022. Once available, the results will be provided in the Draft Environmental Conditions Report and Draft Environmental Impact Assessment Report, which will be published on the Project Website.

5.2 Social and Economic Environment

5.2.1 Land Use and Property

5.2.1.1 Land Use

The Bradford West Gwillimbury Official Plan clearly identifies the preliminary design route for the Bradford Bypass and designate those lands as a transportation corridor (Highway 400-404 Link). Lands north of County Road 4 and Bradford Bypass Interchange are designated as Industrial/Commercial. Prior to those lands being developed the Bradford West Gwillimbury Official Plan requires a Secondary Plan, or more detailed planning process to be undertaken. The permitted uses in this area include industrial uses and light industrial uses subject to the following policies:

- a) *Uses permitted within the Industrial/Commercial designation include manufacturing, warehousing, fabricating, repairing, processing, and assembly; office uses; hotel and convention facilities; and public and institutional uses.*
- b) *Residential uses are prohibited.*
- c) *Office uses are permitted accessory to a primary use permitted in subsections (a) or (b) above.*
- d) *Retail uses are not permitted, except for products produced or assembled on site. Such uses shall be accessory to, and located within the same building as the primary industrial use.*
- e) *Outside storage may be permitted as a principal or accessory use, provided that appropriate screening is provided from lands in non-employment land use designations or public streets and all applicable safety requirements are upheld.*
- f) *Service commercial uses, recreational uses, entertainment uses, and building supply outlets, are only permitted accessory to and located on the same lot as a primary use permitted by subsection (a).*

A very small portion of the lands adjacent to County Road 4 north of the Industrial/Commercial Area are designated Industrial. The uses permitted in this designation mirror those uses identified for the Industrial/Commercial areas as noted above. However, entertainment uses and building supply outlets are not permitted in this designation.

Lands in the south-east quadrant of the Study Area are designated Medium Density Residential and Residential in the 2021 Official Plan. The following policies guide the future development of these areas for residential purposes:

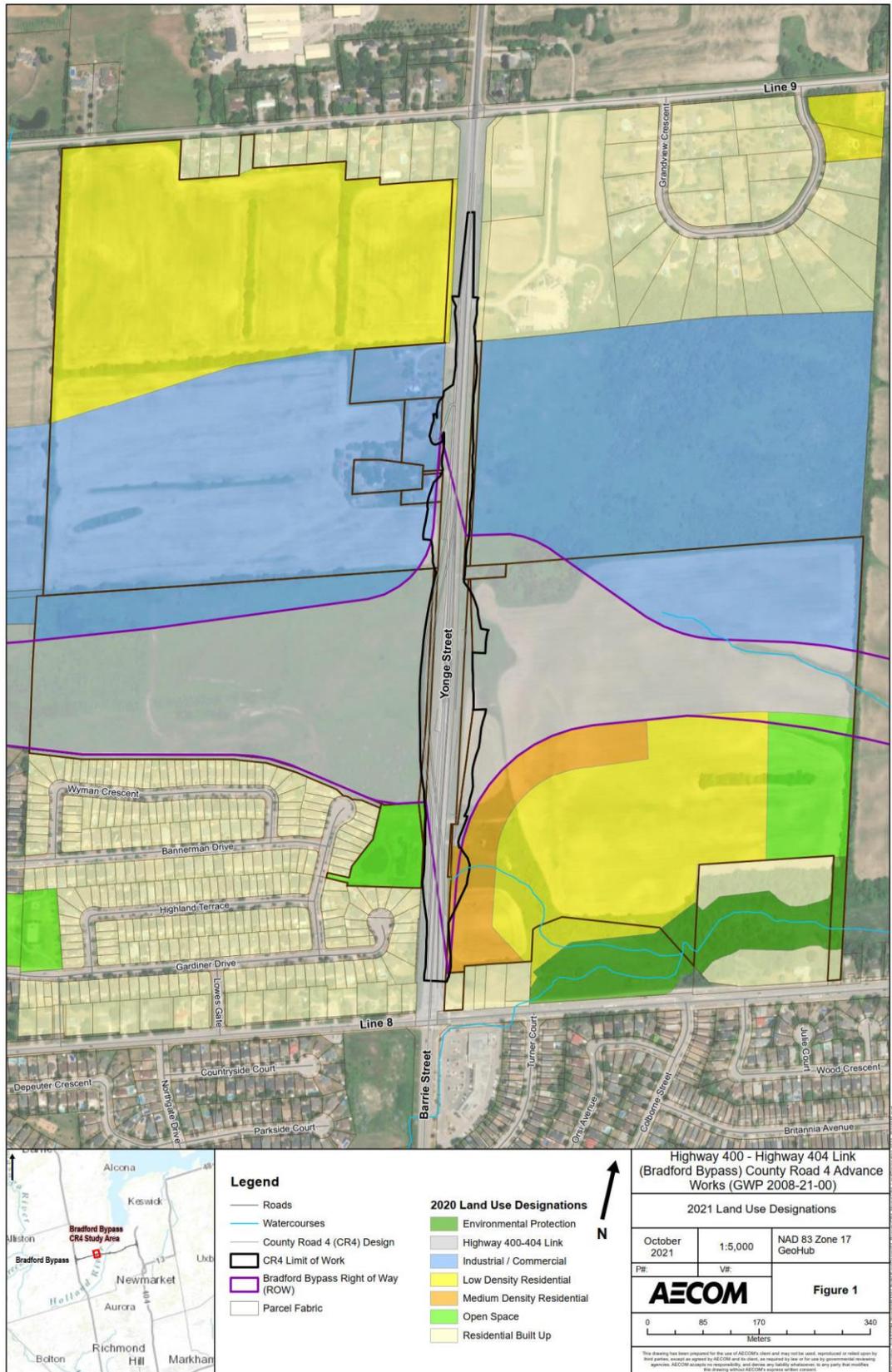
- Low Density Residential
 - a) *Permitted uses shall include single detached, semi-detached and duplex dwellings.*
 - b) *The density of development shall not exceed 24 units per net developable hectare.*
- Medium Density Residential
 - a) *Permitted uses include single detached, semi-detached, triplex, fourplex, street fronting or cluster townhouses and small scale and low profile apartment units. A maximum of eight units shall be permitted in each townhouse block.*
 - b) *The density shall range from 25 to 40 units per net developable hectare.*

In addition to Residential Uses the Official Plan permits:

Other uses which support the residential area function may be permitted in each of the residential designations. Such uses include home occupations, accessory uses, childcare facilities, group homes, accessory apartments, garden suites, community facilities, recreational uses and public and private open space, and will be regulated through the Zoning By-law.

Refer to Figure 5-4 for the Land Use Designations of the Bradford West Gwillimbury Official Plan, 2021.

Figure 5-4: Bradford West Gwillimbury, 2021 Official Plan Land Use Designations



5.2.1.2 Zoning

Official Plans describe what development and uses are permitted in the future. Zoning By-laws establish what uses can exist in the present. Zoning By-laws are written under the regulations established under Section 34 of the Planning Act. Key language in the Planning Act and carried forward into most Zoning By-laws includes:

Zoning by-laws

34 (1) Zoning by-laws may be passed by the councils of local municipalities:

Restricting use of land

- 1. For prohibiting the use of land, for or except for such purposes as may be set out in the by-law within the municipality or within any defined area or areas or abutting on any defined highway or part of a highway.*

To be certain of the uses permitted the Zoning By-law was reviewed. The Bradford West Gwillimbury Zoning By-law, By-law 2010-50, came into effect on June 8, 2010. The Zoning By-law is based on the 2002 Bradford West Gwillimbury Official Plan and reflects the policies that recognize the 2002 Approved Environmental Assessment for the Bradford Bypass.

There are only two zones that apply to lands within the Study Area, Future Development and Agriculture, Exemption 18:

- Most of the lands are zoned Future Development. This zone permits only existing uses and permits minor expansions to those uses. The Zoning essentially 'freezes' the land use, recognizing that a significant portion of the lands would be used for the transportation corridor.
- A portion of the lands west of County Road 4 are zoned Agriculture, Exception 18. This is a site-specific zone that permits the lands to be farmed but does not permit any buildings or structures, again, essentially 'freezing' the current land uses.

5.2.2 Designated Agricultural Land

A screening of the study area for the County Road 4 Early Works was completed to identify designated agricultural land use within the Study Area, identify potential impacts and recommend mitigation measures.

A review of the Agricultural Systems Portal (Ontario Ministry of Agriculture, Food and Rural Affairs (OMAFRA)) was completed to determine the location with respect to the Agricultural Land Base mapping. The Agricultural Land Base is part of the Agricultural System and includes mapping that has been completed by Ontario Ministry of Agriculture, Food and Rural Affairs as part of an initiative to identify prime agricultural areas, specialty crop areas, and candidate areas.

The Agricultural Systems Portal illustrates that the Study Area is not located within a Provincially defined agricultural area (e.g. prime agricultural area, candidate area, or a specialty crop area). North of 9th Line is considered prime agricultural area; however, that area is not part of the County Road 4 Early Works.

A further review was completed on the land use designations from the County Official Plan it was determined that the Study Area is designated as Settlement area and is not designated as agricultural.

A review of the Town of Bradford West Gwillimbury's Official Plan considers the Study Area part of the urban area of the Town of Bradford, and therefore, non-agricultural lands.

Based on the reviews, it was determined that the lands within the Study Area are not located on any Provincially, County or Township designated agricultural lands.

Further details on the potential impacts and mitigation measures are provided in Section 6.2.2.

5.2.3 Noise

Ontario Regulation 697/21, Section 9, requires the proponent prepare an Early Works noise report in accordance with the noise protocols. The following sections outline the Noise assessment studies that have been undertaken for the Early Works or by the County as part of their Municipal Class Environmental Assessment widening project (County of Simcoe 2012), County Road 4 Noise Impact Assessment.

5.2.3.1 Construction Noise

A Construction Noise Assessment for the construction of the County Road 4 Early works bridge structure was completed to assess potential noise impacts associated with construction. The assessment was prepared in accordance with the Ministry of Transportation Noise Guide. Relevant guidelines from the Ministry of the Environment, Conservation and Parks and local municipal noise control bylaws are also considered in this assessment. The scope of this assessment was limited to construction noise. Long term traffic noise is addressed below in Section 5.2.3.2.

The Ministry of Transportation Guide requirements for construction noise are documented in Section 8.4 of the Ministry of Transportation Guide which states:

- Noise Sensitive Areas (NSAs) must be identified during the project planning stage;
- Potential noise impacts of construction equipment on Noise Sensitive Areas must be identified. These might include impacts resulting from hours or type of operation or proximity of equipment;
- Potential mitigation of noise impacts from construction equipment must be identified. These might include measures such as timing constraints, setbacks of certain operations from Noise Sensitive Areas, or quieter equipment;
- The technical and economic feasibility of various alternatives must be evaluated in order to select the appropriate construction noise control measures;
- Municipal noise control bylaws must be reviewed for requirements that may cause hardship to the project. This can be a particular problem when the need for night construction work is identified; and
- In certain situations, a contract may require work that is in contravention of a municipal noise control bylaw. In these cases, as of April 2019, the Ministry of Transportation no longer applies for noise by-law exemptions.

Noise Sensitive Areas in the context of an assessment as per the Ministry of Transportation Guide typically include the following land uses, provided that an outdoor living area is associated with them:

- Private homes such as single family residences (owned or rental)
- Townhouses (owned or rental)
- Multiple unit buildings, such as apartments
- Hospitals, nursing/retirement homes, etc.

Where a new freeway/highway corridor or route is planned, the following land uses would qualify as Noise Sensitive Areas in addition to the land uses noted above:

- Educational facilities and day care centres, where there are Outdoor Living Areas¹ for students

¹ The Outdoor Living Area can be situated on any side of a noise sensitive area which accommodates outdoor living activities, and is generally taken to be the backyard.

- Campgrounds that provide overnight accommodation
- Hotels / motels where there are Outdoor Living Areas (i.e. swimming pool area, etc.) for visitors

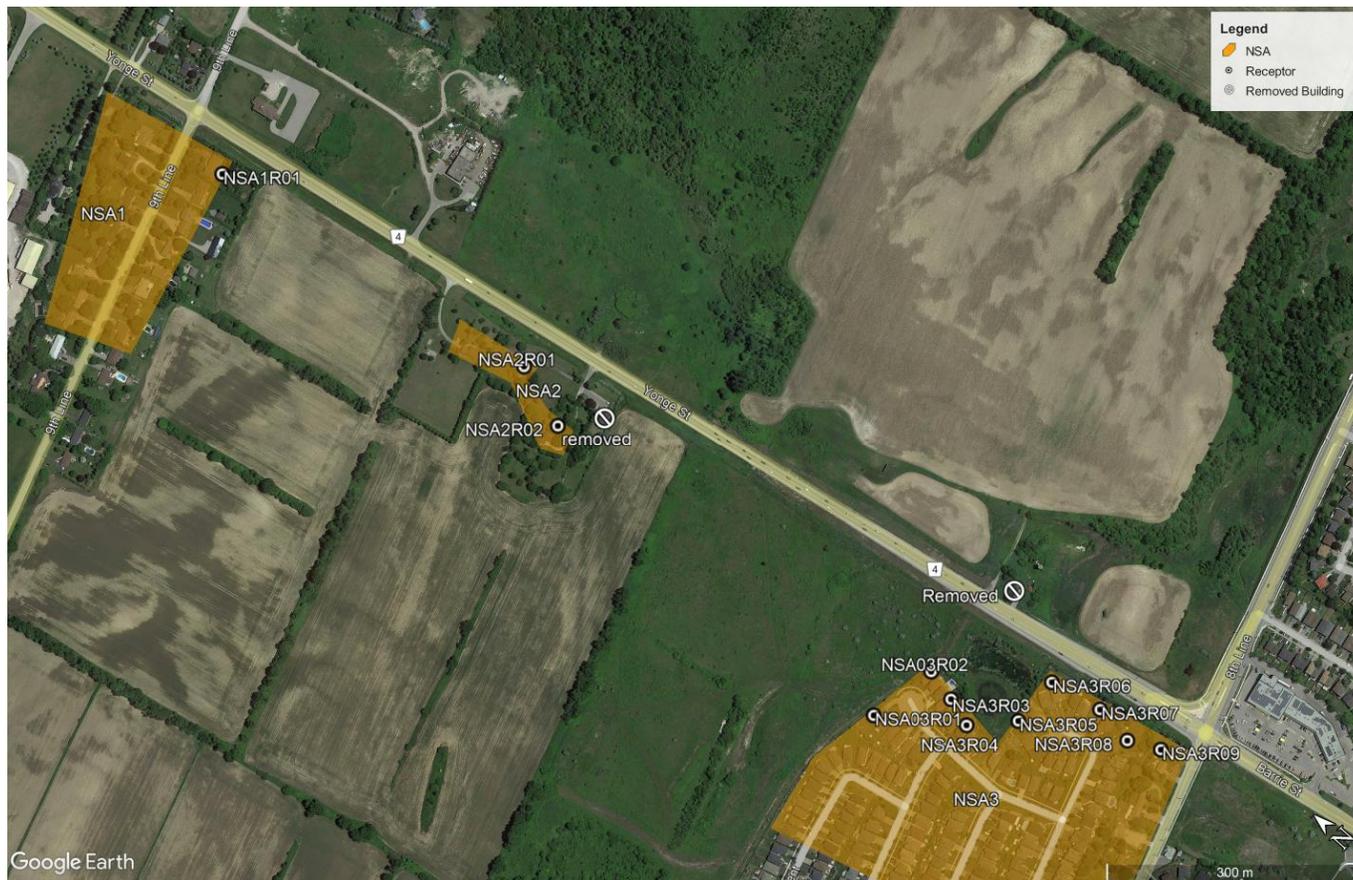
The purpose of the assessment was to document the construction noise assessment completed to evaluate the potential noise impacts of the construction works on the nearby Noise Sensitive Areas. The area surrounding the Project is comprised of a mixture of commercial and residential usages. The nearest Noise Sensitive Areas within 500 metres of the construction areas were identified for construction noise analysis.

Noise predictions were conducted at representative receptors which were selected to be representative of the locations with the worst-case construction noise exposure for each Noise Sensitive Area. Locations further removed from the construction site will have lower noise exposures from Project-related construction activities. A summary and description of the identified Noise Sensitive Areas are provided in Table 5-10, with Noise Sensitive Areas and representative receptor locations presented on Figure 5-5.

Table 5-10: Noise Sensitive Areas Summary

Noise Sensitive Area	Representative Receptors	Approximate Number of Front Row Receivers	Description
NSA1	Detached Dwellings	2	Detached dwellings west side of Yonge Street (County Road 4) at 9 th Line
NSA2	Detached Dwellings	3	Detached dwellings west side of Yonge Street (County Road 4) 830 metres north of 8th Line
NSA3	Detached Dwellings	9	Detached dwellings west side of Yonge Street (County Road 4) north of 8th Line

Figure 5-5: Noise Sensitive Areas



Further details on the potential impacts and recommended mitigation measures for construction noise can be found in Section 6.2.3.1.

5.2.3.2 Traffic Noise

A Traffic Noise Analysis for the temporary detour of County Road 4 for the construction of the Early Works and the change in road geometry to accommodate the construction of the County Road 4 Bridge was completed. The assessment of the temporary detour required the prediction of noise for the year 2024 (assume to be the last year the detour will be in place), and the year 2041 for the assessment of the overpass. The assessment was completed in accordance with the Ministry of Transportation Environmental Guide, with the exception of the detour assessment as it was assessed for the last year of operations, instead of the standard 10-year post construction time period.

The location of assessment is an outdoor location associated with the representative receptor. The Ministry of Transportation Guide requires that the most exposed side of a dwelling unit be assessed as part of an initial screening. Where the future noise level with the proposed improvements at the most exposed side result in a greater than 5 dBA increase over the future noise level without the proposed improvements; or the projected noise level is equal to or is greater than 65 dBA, the future noise level must be predicted in the Outdoor Living Area to determine the significance of the noise impact. Where the future noise level with the proposed improvements in the Outdoor Living Area result in a greater than 5 dBA increase over the future noise level without the proposed improvements; or the projected noise level is equal to or is greater than 65 dBA, the following must occur:

- noise control measures must be investigated within the right-of-way;

- if a minimum attenuation of 5 dBA can be achieved in the outdoor living area averaged over first row receivers, the selected measures within the right-of-way are to be implemented.

The Outdoor Living Area can be situated on any side of a noise sensitive area which accommodates outdoor living activities, and is generally taken to be the backyard. For this assessment, the location has been taken as 3 metres from the façade with a height of 1.5 metres above ground level.

Where increases in noise levels are predicted, the mitigation efforts to be applied for the predicted change in noise level above the ambient and the projected noise level with the proposed improvements are shown in Table 5-11.

Table 5-11: Criteria for When Noise Mitigation is Required

Change in Noise Level Above Future Ambient ² /Projected Noise Levels with Proposed Improvements	Mitigation Effort Required
<p style="text-align: center;">< 5 dB Change AND <65 dBA Overall</p>	<ul style="list-style-type: none"> ■ None
<p style="text-align: center;">≥ 5 dB Change OR ≥ 65 dBA Overall</p>	<ul style="list-style-type: none"> ■ Investigate noise control measures on right of way ■ Introduce noise control measures within right of way and mitigate to ambient if technically, economically, and administratively feasible. ■ Noise control measures, where introduced, should achieve a minimum of 5 dBA attenuation, over first row receivers.

The determination of whether or not mitigation is provided must be based on the review of technical, economical and administrative feasibility:

- **Technical Feasibility:** Review the constructability of the noise mitigation (i.e. design of wall, roadside safety, shadow effect, topography, achieve a 5 dBA reduction, ability to provide a continuous barrier;
- **Economic Feasibility:** Carry out a cost/benefit assessment of the noise mitigation (i.e., determine cost per benefited receiver);
- **Administrative Feasibility:** Determine the ability to locate the noise mitigation on lands within public ownership (i.e., provincial or municipal right-of-way)

In general, the areas adjacent to the project consist mainly of agricultural usages and lands zoned for future development, with scattered residences. However, there is a concentration of residences near 8th Line. The lands zoned for future development do not yet have committed land uses and are not considered further in this analysis.

As the County Road 4 is not considered a freeway, the assessment of the noise levels was based on the daytime 16-hour equivalent sound level ($L_{eq, 16hr}$) as required by the Ministry of Transportation Guide. The road surface was assumed to be constructed from typical asphalt and was modeled as the average surface type in Traffic Noise Model Version 2.5.

To assess the noise impact, the predicted “No Project” noise levels were compared to those of the predicted “With Project” noise levels. As the detour will only be in operation for the construction period,

² Noise impact

the last year of the detour usage of 2024 was used as the year of assessment. For long term road noise impacts, the horizon year of 2041 was used as the basis of assessment.

As required in the Ministry of Transportation’s Noise Guide, noise levels on the most exposed side of a noise sensitive land use were calculated to determine if a noise mitigation investigation would be required. If a noise investigation was required, the noise levels were assessed at the Outdoor Living Area location, which is the point of assessment for noise mitigation as noted in the Ministry of Transportation’s Noise Guide.

Assessed locations are presented in Table 5-12 with locations provided in Figure 5-5.

Table 5-12: Assessed Representative Noise Sensitive Locations

Noise Sensitive Area	Representative Receptor	Receptors Represented	Description
NSA1	NSA1R01	1	Detached dwelling southwest corner of 9 th Line and County Road 4
NSA2	NSA2R01	2	Detached dwelling west side of County Road 4 approximately 450 metres south of 9 th Line
	NSA2R02	1	Detached dwelling west side of County Road 4 approximately 550 metres south of 9 th Line
NSA3	NSA3R01	1	Detached dwelling north end of Meadowview Dr (west side)
	NSA3R02	3	Detached dwelling north end of Meadowview Dr (east side)
	NSA3R03	3	Detached dwelling east side of Meadowview Dr near Bannerman Dr
	NSA3R04	3	Detached dwelling east side of Meadowview Dr near Bannerman Dr
	NSA3R05	3	Detached dwelling north end of Gardiner Dr
	NSA3R06	3	Detached dwelling north end of Gardiner Dr
	NSA3R07	2	Detached dwelling east side of Gardiner Dr

Noise Sensitive Area	Representative Receptor	Receptors Represented	Description
	NSA3R08	1	Detached dwelling east side of Gardiner Dr
	NSA3R09	1	Detached dwelling northwest corner of 8 th Line and County Road 4

Further details on the potential impacts and recommended mitigation measures for construction noise can be found in Section 6.2.3.2.

5.2.3.3 Simcoe County – County Road 4 Noise Impact Assessment

A Noise Impact Assessment Report was prepared as part of the County’s Environmental Assessment for the widening of County Road 4 (County of Simcoe, 2012). The assessment used protocols outlined by the Ministry of Transportation and the Ministry of the Environment agreement as the basis for the noise analysis. In evaluating potential noise impacts, the requirement is to compare the sound levels with and without the County’s widening project at a point 10 years after project completion. At the time of the preparation of the Environmental Study Report, the County’s widening project was expected to be constructed by 2014. The protocol stipulated that noise control measures be considered when the increment in sound levels between the proposed future condition and the future do-nothing condition (based on a 10-year traffic forecast after completion of the project in the year 2024) is 5 dB or greater at the affected noise sensitive receivers. Increases in the sound level of less than 5 dB are considered low, and impacts of less than 3 dB are considered insignificant.

5.2.3.4 Bradford Bypass Noise Impact Assessment

A separate, overarching noise impact assessment will be completed for the Bradford Bypass to assess potential noise impacts related to the preferred Preliminary Design alternative. The study will capture approved residential developments during the review of noise sensitive areas and the evaluation of alternatives. It will be carried out in accordance with the Ministry of Transportation *Environmental Guide for Noise*, involving noise modelling to determine the need for mitigation investigation and both asphalt and concrete pavement types will be considered in the assessment. The results of the Noise Study will be documented in a stand alone technical report and presented to the public in accordance with Ontario Regulation 697/21.

5.2.4 Air Quality

As the purpose of the County Road 4 Early Works assessment is to address the construction of the grade separated bridge crossing for the future Bradford Bypass at County Road 4 and that the widening was assessed by the County’s Municipal Class Environmental Assessment, an Air Quality Assessment for the Early Works is not required. An Air Quality Assessment is being completed as part of the overall Bradford Bypass. The assessment is expected to be prepared in mid-2022. Once available, the results will be provided in the Draft Environmental Conditions Report and Draft Environmental Impact Assessment Report, which will be published on the Project Website.

5.2.5 Climate Change

In 2017 the Ministry of Environment, Conservation and Parks (MECP) released a new guide “Considering Climate Change in the Environmental Assessment Process” (Climate Change guide) released under the *Environmental Assessment Act*, R.S.O. 1990, chapter E.18. This guidance demonstrates both quantitatively and qualitatively how proponents should address climate change impacts and mitigation considerations for new projects undergoing the environmental assessment process. In a letter dated September 28, 2020, the MECP requested this guidance be employed for the Highway 400 – Highway 404 Link (Bradford Bypass) No. 2019-E-0048, and therefore is also being considered as part of the County Road 4 Early Works GWP 2008-21-00.

The directions implemented within the MECP’s Climate Change guide were developed to support the climate-focused policies of the Provincial Policy Statement (section 3 of the Planning Act). The Provincial Policy Statement was updated in 2020 to align with other changes to land use planning changes to the *Planning Act* through *More Homes, More Choice Act, 2019*, and *A Place to Grow: Growth Plan for the Greater Golden Horseshoe*. A partial listing of applicable policies in the 2020 Provincial Policy Statement include (Ontario Government, 2021):

- Policy 1.1.3.2 – Land use patterns within settlement areas shall be based on densities and a mix of land uses which:
 - Minimize negative impacts to air quality and climate change, and promote energy efficiency
- Policy 1.6.6.7 – Planning for stormwater management by minimizing erosion and changes in water balance, and prepare for the impacts of a changing climate through effective management of stormwater, including the use of green infrastructure
- Policy 1.8 - Planning authorities shall support energy conservation and efficiency, improved air quality, reduced greenhouse gas emissions, and preparing for the impacts of a changing climate through land use and development patterns.
- Policy 3.1.3 Planning authorities shall prepare for the impacts of a changing climate that may increase the risk associated with natural hazards.

As part of the assessment of climate change, the Ministry of the Environment, Conservation and Parks expects proponents to evaluate and assess the following key items during the assessment of alternatives and alternative methods of implementing the project undergoing environmental assessment:

- the project’s expected production of greenhouse gas emissions and impacts on carbon sinks (climate change mitigation), and
- the resilience or vulnerability of the undertaking to changing climatic conditions (climate change adaptation).

This assessment focused on both these key areas of assessment for the Project and described possible mitigation options available for reducing the Project’s effects on climate change (Climate Change Mitigation), and the effects of climate change on the Project (Climate Change Adaption).

The list of project components and elements that were considered as part of the assessment are outlined in Table 5-13 below.

Table 5-13: List of Project Components and Elements considered as part of the Climate Change Assessment

Components	Elements
Construction site	<ul style="list-style-type: none"> • Shoulder strengthening and temporary roadway widening

Components	Elements
	<ul style="list-style-type: none"> • A temporary detour road • Temporary aerial traffic signal spans, traffic island removals, and lane shifts • Reprofiling and realigning County Road 4 • Pavement markings, signage, traffic safety and control devices, barriers, and attenuators • Driveway and entrance access modifications, realignment, and reconstruction
Plant and equipment	<ul style="list-style-type: none"> • Fencing • Drainage and watercourse • Lighting
Materials	<ul style="list-style-type: none"> • Illumination poles • Duct crossings and manholes for future lighting • Electrical embedded ducts for the County Road 4 structure • Aerial traffic signal spans
People	<ul style="list-style-type: none"> • Construction/operation Workers • Users of the bypass
Operation of the overpass infrastructure	<ul style="list-style-type: none"> • Bypass structure • Pavement • Road users
Surrounding natural environment	<ul style="list-style-type: none"> • The Unnamed Tributary north of 8th Line and the Holland River • The surrounding terrestrial ecosystems • Agricultural lands • Residential subdivision
Indigenous communities	<ul style="list-style-type: none"> • Indigenous communities that have or may have existing aboriginal or treaty rights, as recognized and affirmed in section 35 of the <i>Constitution Act, 1982</i>, that may be impacted by the Early Works, and Indigenous communities that may otherwise be interested in the Early Works

5.2.5.1 Greenhouse Gas Background

Greenhouse gases emitted from vehicular traffic, construction, and other sources of carbon emission and sinks identified within this report are limited to carbon dioxide (CO₂), methane (CH₄), and nitrous oxide (N₂O). These may be emitted from sources such as tailpipe exhausts, diesel vehicular combustion, on-site generator combustion, decomposition of natural materials within existing naturalized areas, created upstream through material sourcing (e.g. concrete and steel production), and removed from the atmosphere as part of natural biosynthesis of vegetation within the project study area. The balance of creation and absorption of greenhouse gases from a project’s construction, operation, and maintenance phases contributes to the overall climate change impact a project may have on the surrounding environment and regional climate.

Individual greenhouse gases have differing abilities to absorb heat in the atmosphere. These varying heat absorption properties are quantified by an individual global warming potential factor for each contaminant which converts the mass of a greenhouse gas to the representative equivalent mass of CO₂ (CO₂eq). The Global Warming Potentials are calculated based on the amount of heat trapping potential that would result from the emission of 1 kg of a given greenhouse gas to the emission of 1 kg of CO₂. Global Warming Potentials for various greenhouse gas compounds are defined by Environment Canada in their most recently published article in the Canadian Gazette Part I, Volume 155 (February 13, 2021; Canadian Department of the Environment 1999). These Global Warming Potential values are identified in Table 5-14 below.

Table 5-14: Greenhouse Gas 100-year Global Warming Potential

Greenhouse Gas	100-year Global Warming Potential
Carbon dioxide (CO₂)	1
Methane (CH₄)	25
Nitrous Oxide (N₂O)	298

5.2.5.2 Climate Change Mitigation

In assessing potential impacts the Project may have on the local area and impacts on climate change, the following key questions must be considered within the planning and design stages.

1. How might the project/alternatives generate greenhouse gas emissions or affect carbon storage or the removal of carbon dioxide from the atmosphere?
2. To what extent have the project/alternatives already taken into account impacts on climate change in project planning?
3. Are there alternative methods to implement the project that would reduce any adverse contributions to a changing climate?
4. How might the project/alternatives give rise to climate change impacts, positive or negative, on Indigenous people and/or communities?
5. What commitments can be made to reduce the impacts on climate change from the project over time, i.e. when the project is implemented?

The potential climate change impacts and mitigation measures identified in this assessment are outlined in Section 6.2.5.1.

5.2.5.3 Climate Change Adaptation

The Climate Change Resilience Assessment is performed in the context of a preliminary screening to provide input and direction for the design, construction and operations and maintenance of the Project. A Climate Change Resilience Assessment typically involves adopting a risk management approach to a) anticipate climate change related risks that may have an impact on the assets or activities under study, and b) identify potential design features or actions to help prevent, withstand, respond to, recover from and adapt to these risks.

The Climate Change Resilience Assessment was undertaken following the five key steps described the ISO 31000 Risk Management Standard (i.e., establishing the context, risk identification, risk analysis, risk evaluation, risk treatment and adaptation measures), as well as the Ministry of Environment, Conservation and Parks guidance for considering climate change in the environmental assessment process.

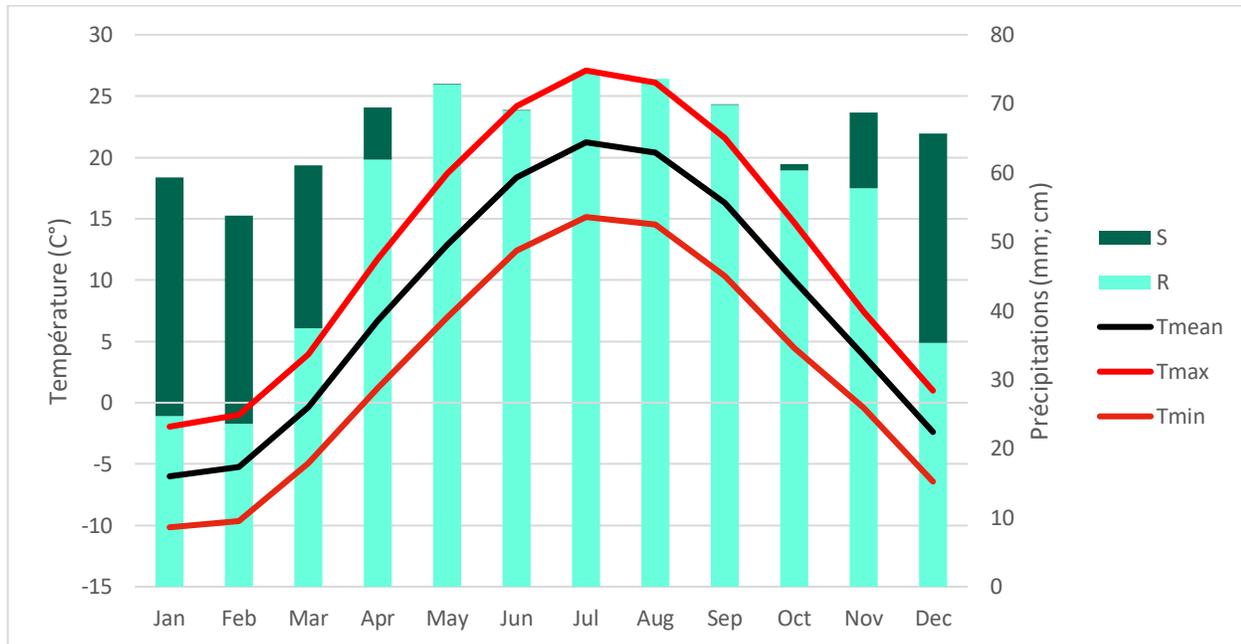
The scope and boundaries of the assessment encompass time periods and areas during and within which the Project components are likely to interact with or be influenced by climate risks. The scope of the assessment for this Project considers climate change impacts on the construction (design) as well as future operation and maintenance phases of the Project.

This project will be staged in approximately three to four years for the construction phase, and it will be operational for approximately 75 years (the life span of the infrastructure). Therefore, the assessment is carried out using the projections for time periods 2021-2040, 2041-2060, 2061-2080, and 2081-2100.

Climate Data Analysis

Climate data was analyzed based on temperature and precipitation data measured at the Toronto Pearson International Airport's weather station from 1981 to 2010 from the Canadian Centre for Climate Services. Figure 5-6 below presents climate norms over the 1981-2010 period for temperature (mean, minimum and maximum) and for overall precipitation and snow and rain separately.

Figure 5-6: Climate Normal from the Weather Station at Toronto Pearson International Airport (1981 - 2010)



S = Snow, R = Rain, Tmean= Mean temperature; Tmax= maximum temperature, Tmin= Minimum temperature

Climate Projections

Climate projections are based on assumptions regarding the evolution of greenhouse gas emissions. These are referred to as Representative Concentration Pathways (RCP). For this assessment, the high carbon future (RCP 8.5) scenario as it represents the worst-case scenario was selected, which would bring the highest climate change impacts on the Project. The high carbon future scenario is a very high greenhouse gas emission scenario that is consistent with no policy changes and substantial international efforts to reduce emission. Climate change projections were also retrieved from the Canadian Centre for Climate Services.

Identification of Climate Indicators

A climate indicator represents a certain climate condition or a type of event (e.g., number of hot days with + 30°C), defined by a threshold above which the evaluated infrastructure would trigger a reaction resulting in a loss of productivity, damage to the infrastructure or more intensive maintenance plan. The likelihood or probability associated with an indicator is calculated from data recorded at a weather station and applies to a historical dataset or climate prediction.

The analysis of climate data from the Toronto airport weather station highlights eleven (11) climate variables with a high probability of occurrence in the future. These indicators were selected based on the following criteria:

- Climate indicators identified in past extreme weather events: past extreme weather events were researched and provided insights on which climate indicators are relevant to the future infrastructure.
- Historical and future annual and seasonal variation for both temperature and precipitation were reviewed and provided insights on future trends
- Relevant climate indicators showing significant increases in probability during the project’s timeframe
- Relevance of climate indicators to local reality
- Potential interactions of a certain climate condition with the Project component

Considering climate normal and projected changes for the 2081-2100 timeframe, the calculated probabilities of occurrence for each climate indicator were then converted into a score as shown in Table 5-15 and Table 5-16.

Table 5-15: Climate Indicators Probability Scoring (Climate Data from the Weather Station at Toronto Pearson International Airport)

	Code	Climate Indicators	Definition	1981-2010	2081-2100
Temperature	T1	Hot temperature	Days with Tmax ≥ 30°C	5	5
	T3	Heat wave	Instances of 3 days with Tmin ≥ 20°C and Tmax ≥ 33°C	4	5
	T5	Diurnal variation	Days with Tmax-Tmin ≥ 20°C	4	5
Precipitation	P2	Heavy rainfall	Days with P ≥ 25mm	5	5
	P5	Winter rain on snow	Instances of P ≥ 25mm within Jan-Feb-Mar	2	3
	P9	Drought	Instance of P < 0.2mm for 10 days	5	5
Wind	W1	Heavy wind	Days with W ≥ 65km/h	5	5
	PW1	Blowing rain	Instances of (P ≥ 5mm) and (W ≥ 65km/h)	5	5
	PW2	Blowing snow	Instances of ((S ≥ 5cm) or (SD ≥ 5cm)) and (W ≥ 65km/h)	5	5
Other	H1	Relative humidity	Days with Hmd ≥ 90%	3	3
	H5	Fog	Days with fog	4	4

Table 5-16: Climate Indicators Likelihood Scoring Description

Description	Frequency		Scoring
Very high	Once every year or more	More than 70% (100%)	5

Description	Frequency		Scoring
High	Once every 2 years	40%-70% (50%)	4
Moderate	Once every 5 years	20%-40% (20%)	3
Low	Once every 10 years	4%-20% (10%)	2
Very low	Once every 30 years	4% or less (4%)	1

The probability of occurrence of hot temperatures, heat waves, diurnal variation, heavy rainfall, drought, heavy wind, blowing rain and blowing snow to happen once every year or more in the 2081-2100 timeframe is higher than 70%.

Future Projections

The Project is located within the Town of Bradford West Gwillimbury, which is characterized as having a warm-summer humid continental climate. The climate is cold and temperate, and rainfall is significant, with precipitation occurring even during the driest month.

The modelled climate conditions for the time periods of 2021-2040, 2041-2060, 2061-2080, and 2081-2100 were used over the construction phase and life of the proposed overpass

- The construction phase will have a maximum duration of approximately three (3) years. Thus, the anticipated climate conditions in the 2021-2040 projection time period are considered.
- The proposed County Road 4 Underpass Structure will have a minimum design life of 75 years. Thus, anticipated climate conditions in the 2081-2100 projection time period are considered.

Precipitation

The predicted effects of climate change will cause wetter winter and almost drier summer although natural variation, including extreme events such as storms and heat waves Table 5-17, will continue to punctuate these trends. The projected changes of total precipitation (snow + rain) for the periods 2021-2041, 2041-2060, 2061-2080 and, 2081-2100 relative to the 1986-2005 average are summarized in Table 5-17.

Table 5-17: Projected Seasonal Change in Total Precipitation (%) for the Town of Bradford West Gwillimbury, ON using RCP 8.5 Emission Scenario

Season	Time period, Total Precipitation Change (%)			
	2021-2040	2041-2060	2061-2080	2081-2100
Winter	+9.4%	+11.2%	+16.7%	+21.0%
Summer	+2.0%	+0.2%	+0.3%	-0.7%
Spring	+5.9%	+10.9%	+17.9%	+19.7%
Autumn	+5.3%	+5.3%	+1.7%	+5.3%

Source: Canadian Centre for Climate Services (website consulted on November 25, 2021)

The Canadian Centre for Climate Services predicts that there will be an increase in precipitations for all the season for all the time periods except a decrease of 0.7% in the summer in the 2081-2100 period.

Thus, the frequency of heavy rainfall (Days with P ≥ 25mm) is expected to continue and even increase during the winter period in the Town of Bradford West Gwillimbury.

Snow Depth

With regards to future changes, rising winter temperatures are likely to reduce the amount of precipitation that falls as snow in winter. The Canadian Centre for Climate Services projections indicate the Town of Bradford West Gwillimbury will experience a substantial reduction in snow depth as low as -83.2% for the period 2081-2100 (Table 5-18). The projected change is relative to the 1986-2005 average.

Table 5-18: Projected Seasonal Change in Snow Depth (%) for the Town of Bradford West Gwillimbury, ON using RCP 8.5 Emission Scenario

Season	Time period, change in Snow Depth (%)			
	2021-2040	2041-2060	2061-2080	2081-2100
Winter	-34.5%	-57.3%	-70.5%	-82.3%
Summer	-100.0%	-100.0%	-100.0%	-100.0%
Spring	-97.4%	-97.4%	-94.6%	-97.4%
Autumn	-73.5%	-91.2%	-95.1%	-99.4%

Source: Canadian Centre for Climate Services (website consulted on November 25, 2021)

Temperature

In general, it is anticipated that climate change will cause hotter summers and warmer winters in the Town of Bradford West Gwillimbury (Table 5-19)

Table 5-19: Projected Change in Seasonal Mean Temperature(°C) for the Town of Bradford West Gwillimbury, ON using RCP 8.5 Emission Scenario

Season	Time period , Mean Temperature change °C			
	2021-2040	2041-2060	2061-2080	2081-2100
Winter	+6.2 °C	+6.2 °C	+5.0 °C	+6.2 °C
Summer	+1.5 °C	+2.9 °C	+4.3 °C	+5.6 °C
Spring	+4.9%	+4.9%	+3.6%	+4.9%
Autumn	+5.4%	+5.4%	+4.1%	+5.4%

Source: Canadian Centre for Climate Services (website consulted on November 25, 2021)

There will be an increase in summer mean temperature relative to the 1986-2005 average by approximately 1.5 °C in the 2021-2040 period up to a rise of +5.6 °C for the time horizon 2081-2100 under RCP 8.5. The temperature rise will be greater during the winter period, with increases of up to 6.2°C (Table 5-17) in comparison to the 1986-2005 average.

Wind

For all seasons, the projected averages of wind speed for all the time periods are smaller than the 1986-2005 averages (Table 5-20).

Table 5-20: Projected Change in Seasonal Surface Wind Speed for the Town of Bradford West Gwillimbury, ON using RCP 8.5 Emission Scenario

Season	Time period , Surface wind speed change (%)			
	2021-2040	2041-2060	2061-2080	2081-2100
Winter	-0.3%	-0.3%	-0.5%	-0.6%
Summer	-1.2%	-2.7%	-4.9%	-6.8%
Spring	-0.7%	-0.6%	+0.2%	-1.1%
Autumn	-6.2%	-6.2%	-4.0%	-6.2%

Estimate of Likelihood of Climatic Events to Occur

Based on the climate norms and projected changes for the different timeframe, the likelihood rating assigned for the climate indicators varies from low (L), moderate (M) and high (H) (see Table 5-21).

Table 5-21: Estimate of Likelihood of Occurrence of Climate Events

Climate Event		Construction phase (2021-2040)	Operation phase (2081-2100)
Precipitation	Heavy rainfall	High (H)	High (H)
	Winter rain on snow		
	Drought	Low (L)	Low (L)
Temperature	Hot temperature and Heat wave	Moderate (M)	Moderate (M)
	Diurnal variation		
Wind	Heavy wind	Moderate (M)	Moderate (M)
	Blowing rain		
	Blowing snow		
Other	Relative humidity	Low (L)	Low (L)
	Fog		

Further details on potential impacts and proposed adaptation measures are outlined in Section 6.2.5.2 for the construction of the County Road 4 Early Works. Further proposed adaptation measures will be considered as part of the overall Bradford Bypass.

5.2.6 Landscaping

As outlined in Section 5.1.1, vegetation communities observed within the County Road 4 Study Area consist primarily of disturbed sites including cultural meadow and thickets which have a high degree of past or human influence. An overview of vegetation communities and existing vegetation is provided in Table 5-1.

Further information on recommended landscaping commitments and mitigation measures can be found in Section 6.2.6.

5.2.7 Waste and Excess Materials Management

A Waste and Excess Materials Management Plan was prepared as part of the County Road 4 Early Works which included collecting environmental soil samples and laboratory testing to support excess materials management in accordance with Ontario Regulation 406/19. The soil sampling program was conducted as part of the Geotechnical and Hydrogeological investigations from June to October 2021. A total of 22 samples were collected from boreholes which were chosen based on risk of contamination being identified as high or medium.

Soil samples were screened for combustible organic vapours. Soil vapours readings ranged from 0 to less than 50 parts per million in all soil samples across the site. In addition, field staff looked for potential visual indicators of soil contamination including staining or soil odours during the collection of samples; however, none were observed in the samples. Therefore, representative samples were submitted for laboratory analysis for Polycyclic Aromatic Hydrocarbons, Petroleum Hydrocarbons in Fractions F1 to F4, Polychlorinated Biphenyls, Volatile Organic Compounds, selected inorganic parameters and metals, and mandatory testing of Synthetic Precipitation Leaching (SPLP) to support the requirements under Ontario Regulation 406/19.

The soil chemical analysis results were evaluated with respect to the Ministry of Transportation requirements for soil management as follows:

- Ontario Regulation 406/19, Appendix 1, TABLE 2.1: Full Depth Excess Soil Quality Standards in a Potable Ground Water Condition for Industrial/ Commercial/ Community Property Use uses with coarse type of soil condition (Table 2.1 standards).
- Ontario Regulation 406/19, Appendix 2, TABLE 2.1: Leachate Screening Levels for Full Depth Excess Soil in a Potable Ground Water Condition for Industrial/ Commercial/ Community Property Use uses with coarse type of soil condition.

Based on results of analysis, the concentration of several Polycyclic Aromatic Hydrocarbons exceeded the applicable Ministry of Environment, Conservation and Parks Table 2.1 standards in shallow soil samples collected from HF-04-SS-2, CR4-04, and CR4-07 from the depth interval 0.7-2.0 m bgs. In addition, Sodium Adsorption Ratio exceeded Ministry of the Environment, Conservation and Parks Table 2.1 standards in shallow soil samples collected from HF-02 from depth interval 0.7-1.5 m bgs.

No other contaminants analyzed exceeded the Ministry of Environment, Conservation and Parks Table 2.1 standards from the soil samples collected from the eight drilled boreholes at the investigated Site. The concentrations of Polycyclic Aromatic Hydrocarbons, Volatile Organic Compounds, Polychlorinated Biphenyls, and Selected Inorganic Parameters and Metals (except Sodium Adsorption Ratio) were non-detect and/or below applicable criteria in soil samples collected from all boreholes. Also, all Synthetic Precipitate Leaching Procedure Metals soil sample's analytical results were below the Table 2.1 screening level criteria.

Further information on recommended waste and excess materials management commitments and mitigation measures can be found in Section 6.2.7.

5.2.8 Snow Drift

A Snow Drift Assessment is being completed as part of the overall Bradford Bypass. The assessment is expected to be prepared in mid-2022. Once available, the results will be provided in the Draft Environmental Conditions Report and Draft Environmental Impact Assessment Report, which will be published on the Project Website.

5.2.9 Human Health

A Human Health Screening is being completed as part of the overall Bradford Bypass. The assessment is expected to be prepared in mid-2022. Once available, the results will be provided in the Draft Environmental Conditions Report and Draft Environmental Impact Assessment Report, which will be published on the Project Website.

5.3 Cultural Environment

Cultural Environment includes built heritage and cultural heritage landscapes as well as archaeological resources. The Ministry has undertaken a heritage evaluation and extensive archaeological assessments within the Study Area.

5.3.1 Built Heritage and Cultural Heritage Landscapes

As part of the preparatory work for the Bradford Bypass, AECOM completed a Cultural Heritage Resource Assessment Report for Built Heritage Resources and Cultural Heritage (AECOM 2020a). The objective of the Cultural Heritage Resource Assessment Report was to document known cultural heritage resources within the study area for the Bradford Bypass. Since the completion of the Cultural Heritage Resource Assessment Report in 2020, refinements to the project have been made through the development and assessment of alternatives. The introduction of Ontario Regulation 697/21 in October 2021 does not change the purpose or requirement of environmental studies completed for the Project, including the Cultural Heritage Resource Evaluation Report, Cultural Heritage Evaluation Reports or any further cultural heritage reporting.

For the purposes of the County Road 4 Early Works, the Limits of Work were used to determine if there were any potential built heritage resources or cultural heritage landscapes that may require further assessment. The property at 2835-2879 Yonge Street was the only property identified within the Limits of Work as a property of potential cultural heritage significance. As such, only 2835-2879 Yonge Street is subject to a Cultural Heritage Evaluation. The Cultural Heritage Evaluation Report for this subject property was prepared for to determine if the property demonstrates cultural heritage value or interest, and to determine next steps.

The Town of Bradford West Gwillimbury, the County of Simcoe and the Simcoe County Archives were contacted with inquiries regarding background of the property. Based on archival research, the field review, and heritage evaluation conducted for the Cultural Heritage Evaluation Report, the property at 2835-2879 Yonge Street does not meet the criteria of Ontario Regulation 9/06 or Ontario Regulation 10/06 of the *Ontario Heritage Act*. The house on the subject property appears to be in a state of disrepair and the decorative elements have been removed or lost due to neglect or decay. The orchards shown on historical mapping are no longer present on the property and although the lands adjacent to the property

are still used for agricultural purposes, the house on the subject property is no longer associated with farming activities.

As 2835-2879 Yonge Street does not meet the criteria for Ontario Regulation 9/06 or Ontario Regulation 10/06, a Statement of Cultural Heritage Value or Interest and list of heritage attributes have not been prepared for the subject property. A copy of the Cultural Heritage Evaluation Report will be provided to the Town of Bradford West Gwillimbury and the Simcoe County Archives.

The house and outbuildings at 2835-2879 Yonge Street have since been demolished by the property owner under a building permit issued by the Town of Bradford West Gwillimbury.

Copies of the Cultural Heritage Resource Assessment Report for Built Heritage Resources and Cultural Heritage (AECOM 2020a) and the Cultural Heritage Evaluation Report for 2835-2879 Yonge Street (AECOM 2021) referenced above are available upon request.

Further details on potential impacts and recommended mitigation measures to Built Heritage and Cultural Heritage Landscapes can be found in Section 6.3.1.

5.3.2 Archaeology

In 2020, AECOM conducted a Stage 1 archaeological assessment for the proposed Bradford Bypass in the Town of Bradford-West Gwillimbury, Lots 6 and 7 and Concessions 9, Lots 5-19, Concession 8, Lots 6, 7, 14-18 Concession 7, Township of West Gwillimbury, County of Simcoe, Lot 22-26 Concession 2 Old Survey and Town of East Gwillimbury, Lots 117-121 Concession 1 West of Yonge Street, Lot 117-120 Concession 1 East of Yonge Street (EOY), Lot 23-26 Concession 2 EOY, Lot 22-27 Concession 3 EOY, Township of King, Regional Municipality of York (AECOM 2020b). The study area consisted of the proposed right-of-way plus a 500-meter (m) wide buffer zone on both sides. The right-of-way began at Highway 400, between the 8th and 9th Lines in the Town of Bradford-West Gwillimbury. It continued eastward to the north of the community of Bradford, crossing the east and west branches of the Holland River and connected with Highway 404 between Holborn Road and Queensville Sideroad East in the Town of East Gwillimbury. Proposed interchanges were located at Simcoe County Road 4 and Bathurst Street. Overall, the length of the study area was 17.8 km, with an average width of 1.1 km, widening to 1.6 – 2.7 km at interchanges. The Stage 1 concluded that there were many parts of the study area which contained archaeological potential and were recommended for Stage 2 assessment.

A Stage 2 archaeological assessment report was prepared and entered into the Ontario Public Register of Archaeological Reports on November 5, 2021 as part of the County of Simcoe's Environmental Assessment study. The Stage 2 study area was larger than the current footprint of the County Road 4 Early Works as it covered the County of Simcoe's study area for the full extent of widening County Road 4 from Line 8 to County Road 89. Within that study area ten archaeological sites were identified. Of these, one site, the William Robinson Jr site (BaGv-83), is within the County Road 4 Early Works study area. Another archaeological site, the Wheatfield site (BaGv-113), was identified as part of an archaeological assessment for another portion of the Bradford Bypass. The site falls just outside of the Early Works study area, but its 50m buffer area falls within the study area. In summary, the following two sites have potential to be impacted by the project:

- The William Robinson Jr site (BaGv-83), formerly called the H2 site
- The Wheatfield site (BaGv-113), the study area is within the monitoring area
- identified for this site

As a part of AECOM's agreement with the Ministry of Transportation Ontario, and in accordance with the draft technical bulletin entitled *Engaging Aboriginal Communities in Archaeology* (MHSTCI 2011b) the Indigenous communities with the closest cultural affiliation, or with interest in the project, were contracted to act as monitors during the Stage 2 archaeological assessment. Huron-Wendat from Quebec and Curve Lake First Nation expressed interest in participating as monitors in the assessments, and Chippewas of Georgina Island requested to be kept apprised of field work updates. Further details regarding the Aboriginal Engagement for the Stage 2 archaeological assessment are provided in the *Statement of Aboriginal Engagement: Stage 2 Archaeological assessment* under a separate cover.

The William Robinson Jr Site (BaGv-83)

The William Robinson Jr Site (BaGv-83) was found in 2014 during the Stage 2 AA for the County Road 4 Widening for the County of Simcoe's Environmental Assessment (URS 2014). As part of this study, the portion of the William Robinson Jr site (BaGv-83) within the proposed widening footprint was subject to a Stage 3 AA (AECOM 2021). The Stage 3 AA determined that only a small portion of the site was intact with the remainder being disturbed by residential / septic construction to the west and the grading for County Road 4 to the east. The Stage 3 assessment took place on July 30, 2021. A total of five test units were excavated across the study area (approximately 25m x 3m wide) and produced 155 Euro-Canadian artifacts. The modest assemblage of artifacts collected from the William Robinson Jr site (BaGv-83) showed signs of debris representative of a mid to late 19th century domestic occupation based on the ceramic tableware, kitchenware, structural and personal items recovered. Additionally, a single pre-contact Indigenous ceramic sherd was found. This assemblage recovered during the Stage 2 and 3 assessments indicates the portion of the William Robinson Jr site within the current alignment must be subject to Stage 4 mitigation.

The Stage 4 AA was conducted between October 13, 2021 and October 19, 2021. No artifacts were recovered from the trenching of the William Robinson Jr Site (BaGv-83). One feature, a post, was found. The post was approximately 27cm in length, 26cm in width and 73cm in depth. After being recorded, the post was excavated. No artifacts were found in the post feature and AECOM recommended that the portion of the William Robinson Jr Site (BaGv-83) that has been subject to Stage 4 AA is cleared of further archaeological work upon receiving concurrence from the Ministry of Heritage, Sport, Tourism and Culture Industries.

The Wheatfield Site (BaGv-113)

the Wheatfield site (BaGv-113) was found during assessment for another part of the Bradford Bypass in 2021 and its 50m monitoring zone overlaps with the present study area. The site was subject to Stage 3 assessment as part of the County Road 4 Early Works on October 12 and 13, 2021. A total of 11 test units were completed, resulting in the recovery of one additional Pre-Contact ceramic sherd.

Further details on potential impacts and recommended mitigation measures for archaeology can be found in Section 6.3.2.

6 Environmental Issues and Commitments

In accordance with Sections 5(7) and 5(8) of Ontario Regulation 697/21, this section identifies the key environmental issues, potential impacts, and outlines the recommended mitigation measures to be implemented during design refinement and construction. Where appropriate, monitoring commitments have been identified and will form commitments during construction, to verify the effectiveness of mitigation measures developed and implemented for the Early Works. These issues, concerns, mitigation measures and commitments are summarized in Table 6-14 in Section 6.6. Information on the components outlined in Section 5 are provided in the sections below.

The assessments above have been prepared based on the Reference Concept Design which was developed to approximately a 30% detail design level of completion. Upon award of the Design-Build Contract, the Design-Build Team will be required to complete the detail design according to design standards, update the impact assessments, as well carry forward and implement the environmental protection, mitigation and monitoring measures prescribed in this Early Works Report and environmental reports prepared for this Project. The winning Design-Build Team will be required to consult with regulatory agencies to obtain permits, approvals or authorizations as required.

6.1 Natural Environment

6.1.1 Terrestrial Ecosystems

As outlined in Section 5.1.1, a Terrestrial Ecosystems Existing Conditions and Impact Assessment was undertaken for the County Road 4 Early Works. The potential effects of the project on the terrestrial environment were identified and, where available, reasonable mitigation measures were developed to address the potential adverse effects. An overview of these potential environmental effects and recommended mitigation measures is provided below, and a summary of effects and commitments is provided in Table 6-14.

6.1.1.1 Potential Impacts

Vegetation

Vegetation removal is largely expected to be limited to the cultural vegetation communities located adjacent to County Road 4. During the existing conditions survey, the vegetation surrounding the Project Location was noted to contain common plant species for the area as well as several non-native and invasive species. No rare plants, Species at Risk plants or significant terrestrial features were found. Therefore, considering these factors, limited potential effects to vegetation communities are anticipated. Table 6-1 summarizes the anticipated area of impact within each vegetation community found within the Study Area, based on the current 30% design.

During construction, fill and sediment runoff from the active construction area may enter vegetation communities. Additionally, oil, gasoline, grease and other materials from construction equipment, material storage and handling may enter adjacent vegetation communities.

Table 6-1: Anticipated Size of Vegetation Removals

Ecological Land Classification Code	Ecological Land Classification Description	Area (ha) within the Limits of Work
CUM1-1	Dry – Moist Old Field Meadow Type	2.43

Ecological Land Classification Code	Ecological Land Classification Description	Area (ha) within the Limits of Work
CUT1	Mineral Cultural Thicket Ecosite	0.07
CUT1-5	Raspberry Cultural Thicket Type	0.35
Total		2.85

Species at Risk

As vegetation removal will be limited to the Limits of Work, destruction of mammal Species at Risk and / or their habitat is not expected within the forested communities found within the Study Area. At the time of field investigations, an abandoned house at 2835-2879 Yonge Street was noted to also be candidate Species at Risk bat habitat and chimney swift habitat; however, the house and outbuildings have since been demolished by the property owner under a building permit issued by the Town of Bradford West Gwillimbury.

Significant Wildlife Habitat

Three bird Species of Conservation Concern, eastern wood-pewee, red-headed woodpecker and wood thrush may be present within the Study Area. Forested communities in which the candidate habitat for the bird Species of Conservation Concern is present is located outside of the Limits of Work and impacts to habitat are not anticipated.

One insect Species of Conservation Concern, monarch, may be present within the Limits of Work and Study Area. Candidate Bat Maternity Colonies Significant Wildlife Habitat is present within the forested communities found within the Study Area. At the time of field investigations, an abandoned house at 2835-2879 Yonge Street was noted to also be candidate Bat Maternity Colonies Significant Wildlife Habitat; however, the house and outbuildings have since been demolished by the property owner under a building permit issued by the Town of Bradford West Gwillimbury. The mitigation measures recommended below may minimize potential impacts to these species.

6.1.1.2 Commitments and Recommended Mitigation Measures

Vegetation removals within the Study Area should occur outside of the bird nesting period of April 1st to August 31st to avoid disturbance to breeding migratory birds including species at risk and/or damage/destruction of their nests.

Limiting vegetation removal to outside of the monarch nesting period will help to protect monarch while they are present as eggs or larvae on milkweed plants (May 25th to August 15th). It is recommended that milkweed be included in the species mix for the revegetation of temporary disturbed areas within the Limits of Work.

6.1.1.3 Environmental Provisions

The following Ministry of Transportation Provisions should be utilized, at a minimum:

- Ontario Provincial Standard Specification -180: General Specification for the Management of Excess Materials;
- Ontario Provincial Standard Specification-182: General Specification for Environmental Protection for Construction in Waterbodies and on Waterbody Banks;
- Ontario Provincial Standard Specification-201: Construction Specification for Clearing, Close Cut Clearing, Grubbing and Removal of Surface and Piled Boulders;

- Ontario Provincial Standard Specification-801: Construction Specification for the Protection of Trees;
- Ontario Provincial Standard Specification-803: Construction Specification for Vegetative Cover;
- Ontario Provincial Standard Specification-804: Construction Specification for Temporary Erosion Control;
- Ontario Provincial Standard Specification .MUNI 804: Construction Specification for Seed and Cover;
- Ontario Provincial Standard Specification-805: Construction Specification for Temporary Sediment Control;
- Special Provision 199S56 Control of Emissions During Structural Work;
- Operation Constraint (Environmental) – General Environmental Protection;
- Operational Constraint (Environmental) Special Provision ENVR0007: Protection of Species at Risk; and
- Non-Standard Special Provision Operational Constraints (Environmental) - Migratory Bird Protection.

6.1.1.4 Anticipated Permits and Approvals

Potentially suitable habitat for mammal Species at Risk: little brown myotis (*Myotis lucifugus*), eastern small-footed myotis (*Myotis leibii*), northern myotis (*Myotis septentrionalis*) and tri-coloured bat (*Perimyotis subflavus*) may be present within the forested vegetation communities outside of the Limits of Work. As vegetation removal will be limited to the Limits of Work, destruction of mammal Species at Risk and / or their habitat is not expected within the forested communities found within the Study Area.

6.1.2 Fish and Habitat

6.1.2.1 Potential Impacts

The following is a summary of the proposed works at the Stormwater Management Pond and the Unnamed Tributary at culvert EX-CL-9:

Stormwater Management Pond west of County Road 4:

- No in-water work is proposed. The wetted portion of the pond should remain untouched throughout the construction process.
- Grading and fill will be placed in proximity to the east side of the pond but should be approximately 10-15 m from the pond edge.
- It is understood that the existing function of the pond will remain the same post-construction.

Based on the proposed works at the 30% detail design stage described above, no significant impacts to the Stormwater Management Pond are anticipated. Standard erosion and sediment control measures should be effective at isolating the pond from the work area to avoid any unintentional impacts to the pond (such as sediment laden site runoff entering the pond).

Unnamed Tributary

- To accommodate the road widening and traffic staging along County Road 4, culvert extensions will be required at both the inlet and outlet of the existing 33.45 m culvert structure - EX-CL-9. At this time, approximately a 5 m extension at the culvert inlet and a 25 m extension at the culvert outlet are proposed to allow for additional fill and grading in the area along the road.
- Relocation of the existing ditches on the west side of County Road 4 to accommodate the fill/grading and culvert extension. No existing defined ditches were observed on the outlet (east)

side of County Road 4. Ditches may be proposed on the east side if required during subsequent design stages.

- A new 67.2 m culvert will be installed immediately north of the existing culvert to convey flows underneath County Road 4. The existing culvert will then be plugged and abandoned once the new culvert is online.
- The need for scour protection in the channel at the inlet and outlet is still being assessed and should be reviewed further during subsequent design stages. At this time, it was only confirmed with the engineering team that no scour protection stone is needed at the culvert inlet due to the slow flow velocities calculated for this area. It is recommended that the installation of river stone at the channel tie-in locations be considered to both naturalize and stabilize the channel in these areas.

The Unnamed Tributary will have approximately 30 m of the watercourse altered if the proposed culvert extensions are installed. Given the average channel width of 1.2 m, this will result in the permanent alteration of 36 m² of direct warmwater fish habitat. If a culvert replacement is completed, a larger area of direct warmwater fish habitat will be altered within the existing culvert footprint. Removal of the invasive phragmites will also need to be completed to accommodate this work, and the addition of stone substrate at the inlet and outlet should reduce scouring and erosion post-construction.

A culvert extension is proposed at EX-CL-8. However, during the field investigations it was determined that this is an offline drainage feature and indirect fish habitat and has not been considered further in this assessment.

Preliminary Impact Assessment

As a result of the proposed works, there will be a permanent loss of approximately 80.64 m² of direct warmwater fish habitat when the existing culvert (EX-CL-9) is abandoned and the channel is infilled upstream and downstream of the culvert (67.20 linear meters of channel x 1.2 meters channel width). The new culvert will convey flows underneath County Road 4 immediately north of the existing culvert. The existing culvert will be plugged and abandoned once the new culvert is online. The proposed culvert will create 120.96 m² of habitat (proposed culvert dimensions: 67.2 m x 1.8 m).

Ministry of Transportation Routine Works

Project activities were assessed against the list of MTO Routine Works in Table 2 of the *Ministry of Transportation / Fisheries and Oceans Canada / Ministry of Natural Resources and Forestry Protocol for Protecting Fish and Fish Habitat on Provincial Transportation Undertakings – Version 4, 2020*. Routine works are those within the Ministry of Transportation right-of-way, which includes the shoulders and paved area that do not occur within the waterbody and can be mitigated to prevent sediment / debris from entering an aquatic feature. Proposed works associated with drainage (where no in-water work is proposed within fish habitat), electrical, signage, and pavement resurfacing are all covered by Ministry of Transportation Routine Works. Activities such as culvert replacement with extensions, grading within 30 m of a water, riparian vegetation removal, ditch tie-ins, etc., have all been carried forward to Step 3.

Ministry of Transportation Best Management Practices

Project activities for all the culvert replacements and extensions in fish habitat were assessed against the Ministry of Transportation Best Management Practices Manual for Fisheries (Ministry of Transportation, 2020) to determine which activities can be addressed by Best Management Practices as per Step 3 in the Protocol. Application of Best Management Practices requires adherence to the Operational Constraints and Protection Measures identified in each Best Management Practice. Certain conditions and provisions are outlined in each Best Management Practice (e.g. work must be completed within the allowable in-water work timing window, etc.) which must be met in order to remain in compliance.

Applicable notification procedures are required for use of Best Management Practices. Table 6-2 summarizes the activities carried forward from Step 2 and the applicable Best Management Practices.

Table 6-2: Summary of Construction Activity and Associated Best Management Practice

Activity	Associated Best Management Practice.
Vegetation removal within the road right-of-way. to accommodate the culvert replacement and extension	Maintenance of Riparian Vegetation in Existing Right-of-Way Best Management Practice.
Culvert extensions, removal, and replacements that are not like-for-like	None

There is no applicable Best Management Practice for the proposed culvert replacements and extensions, and the Best Management Practice for the Maintenance of Riparian Vegetation does not cover the complete clearing of riparian vegetation (which will be required during culvert extension work. Therefore, these proposed works will need to be carried forward for a full impact assessment. Once the detail design has reached 60% to 90%, the impact assessment for these proposed works will need to be reevaluated and updated.

Fisheries Assessment Protocol

Step 4 of the Protocol is a Fisheries Assessment Process that applies to project activities that may impact fish habitat and that do not qualify as Ministry of Transportation Routine Works (Step 1) nor meet the conditions of the Ministry of Transportation Best Management Practices Manual for Fisheries (Step 3).

The proposed culvert replacement (and related activities) associated with the work that did not meet the Ministry of Transportation Routine Works or Fisheries Best Management Practice requirements have been assessed to determine the potential impacts to the fish and fish habitat. This is accomplished through the use of pathways, stressors, and residual effects flow charts and have been developed for both in-water and land-based construction activities. Potential impacts to fish habitat have been identified using the Pathway of Effects diagrams provided in the Guide. The Pathway of Effects diagrams are used to display how activities may impact the aquatic environment and determine the mitigation and protection measures required to minimize or avoid these impacts.

The following summarizes the potential negative effects on fish and fish habitat which may result from activities associated with the proposed work that is applicable to all works described above unless specifically noted.

- Land-based Activities
 - Use of industrial equipment may result in alterations to contaminant concentrations from fuel or fluid leaks. An increase in sediment may result from increased erosion potential where industrial equipment has exposed and loosened soils. Cleaning or maintenance of structures may result in changes to contaminant and sediment concentrations if wash water is allowed to enter a waterbody.

- Vegetation clearing may result in alterations to sediment concentrations and habitat structure and cover as a result of increased erosion potential and sediment deposition. Changes in food supply and nutrient concentrations may result from the loss of external inputs with a reduction in riparian vegetation. The use of herbicides may result in changes in contaminant concentrations.
- Grading may result in alterations to sediment concentrations and habitat structure and cover as a result of increased erosion potential and sediment deposition.
- In-water Activities
 - Placement of material or structures in water can result in changes in channel or shoreline morphology, aquatic macrophytes, and substrate composition. This can lead to changes in sediment concentration, habitat structure and cover, food supply, nutrient concentrations and may result in direct or indirect fish mortality.
 - Removal of aquatic vegetation may result in changes in dissolved oxygen concentrations, food supply, nutrient concentrations, habitat structure and cover, sediment concentrations or contaminant concentrations as a result of the release of sediment, nutrient inputs, habitat and light penetration.
 - Use of industrial equipment below the high-water mark could result in fish mortality, as well as alterations to sediment concentrations from the release of sediment or an increase in contaminant concentrations from fluid leaks from equipment.
 - The installation of in-water work isolations measures may result in the incidental entrainment and potential mortality of fish and limit access for fish to habitats.
 - Any dewatering and pumping of isolated in-water work areas could displace or kill fish, change access to and composition of habitat features. Alterations to flows could increase erosion and scour potential and result in alterations to temperatures and concentrations of sediment, food, contaminants or nutrients. Water extraction using pumps could result in fish mortality by entrainment in pumps and machinery.
 - Improper management of wastewater can result in a change in water temperature, change in migration access to habitat, change of dissolved oxygen concentration, change in nutrient concentrations, change in contaminant concentrations and introduction of pathogens, disease vectors and exotics.
 - Alterations to flows could increase erosion and scour potential and result in alterations to temperatures and concentrations of sediment, food, contaminants or nutrients.
 - Changes to fish passage could result in changes in water chemistry/temperature and flow alternation, which may lead to incidental entrainment, impingement or mortality of resident species and changes to habitat access.
 - Structure removals could result in changes to channel morphology or shoreline morphology and habitat structure or cover.

6.1.2.2 Commitments and Recommended Mitigation Measures

The following outlines potential opportunities, constraints, and mitigation measures that should be assessed and considered during future design phases. The following is intended to provide guidance for future design plans and agency consultation, and further assessment will be required once the design plans are finalized:

Operational Constraints

- Access to waterbodies and banks should be limited to protect riparian vegetation and to minimize bank disturbance; and,

- In-water work below the high water mark and work on watercourse banks shall be carried out during the appropriate in-water timing window: Given the warmwater characterization of the Unnamed Tributary North Branch, a warmwater fisheries timing window is anticipated for any in-water work. Warmwater in-water timing windows for similar watercourses throughout the Bradford Bypass project permit in-water work from July 15 – March 15 of any given year; however, this should be confirmed with Ministry of Northern Development, Mines, Natural Resources and Forestry during the detail design stage.

Management Practices and Controls

- An Erosion and Sediment Control Plan should be designed and implemented to contain/isolate exposed soils, stockpiled materials, and unstable areas in the work zone and to prevent the release of sediment to all waterbodies and ensure the work site is stabilized prior to removal of erosion and sediment control measures following construction (as per Ontario Provincial Standard Specification 805). Site-specific erosion and sediment control plans should be developed for the Unnamed Tributary North Branch and Stormwater Management Pond where work is proposed within 30 m of a watercourse/waterbody. While the Stormwater Management Pond is not protected under the Federal *Fisheries Act* as described earlier, the contractor is still required to avoid causing harm or the death of fish within the pond.
- An in-water work area isolation plan should be designed and implemented to maintain clean flow around the work area at the Unnamed Tributary North Branch crossing (EX-CL-9) where in-water work is proposed. The design should:
 - Use only clean materials free of particle matter for temporary cofferdams;
 - Manage flow withdrawal and discharge to prevent erosion and the release of sediment to a waterbody;
 - Ensure work zones are stabilized against high flows at the end of each workday.
- Design and install culvert extensions or replacement at the Unnamed Tributary North Branch crossing to prevent the creation of barriers to fish movement and maintain bankfull channel functions and habitat functions to the extent possible (design constraint). Where permanent in-water structures are placed in fish habitat, naturalize these areas by placing river stone below the 2-year high water mark (as per Ontario Provincial Standard Specifications 825 and 1005). Design and install in-stream cover to replace or reinstate fish cover removed, altered or disturbed during construction. The low flow channel should be designed according to requirements outlined in MTO Standard WC-12 of the Highway Drainage Design Standards (February 2008) for works to not limit fish passage.
- As per Ontario Provincial Standard Specification 182, any fish isolated in the work area should be transferred (using appropriate capture, handling and release techniques to prevent harm and minimize stress) downstream or away from the construction area. Fish screens shall be used to avoid entrainment of fish in pumps or hoses.
- Dewatering operations should be managed to prevent erosion or the release of sediment-laden water to a waterbody (as per Ontario Provincial Standard Specification 805);
- A Spills Management Plan should be prepared and shall include materials, instructions, education and emergency numbers. The plan shall be kept onsite at all times, communicated to work crews and be properly implemented in the event of accidental spills (operational constraint – Spill Prevention and Response Contingency Plan as per Ontario Provincial Standard Specification 182);
- Operate, store and maintain equipment and associated materials in a manner and at a distance that prevents the entry of any deleterious substance from entering a waterbody (as per Ontario Provincial Standard Specification 182). Any part of equipment entering the waterbody or operating from the bank shall be cleaned, free of fluid leaks and in good working condition; and,

- Isolated in-water work areas must be cleared of fish prior to commencement of work. Fish must be released unharmed downstream. Intakes of pumps and hoses for dewatering of in-water work areas shall be screened to avoid impingement and/or entrainment of fish (as per Ontario Provincial Standard Specification 182).

Rehabilitation

- Re-stabilize any portion of the bed of a waterbody disturbed during construction to pre-construction conditions. This shall include substrates as per Ontario Provincial Standard Specification 182 and Ontario Provincial Standard Specification 1005. Based on the 30% detail design drawings, riprap is shown at the culvert inlet and outlet. It is recommended that riprap be replaced with suitably sized river stone to naturalize the area and provide scour protection. During the detail design stage, it is also recommended that the Design Team consider the installation of river stone at the channel tie-in locations to both naturalize and stabilize the channel upstream and downstream of the proposed culvert.
- Re-stabilize the banks of a waterbody that have been disturbed during construction to pre-construction conditions or better (as per Ontario Provincial Standard Specification 182 and Ontario Provincial Standard Specification 804). This shall include riparian vegetation or stone material, temporary measures and the avoidance of hard engineering; Given the presence of dense invasive phragmites at the culvert outlet, a suitable native species should be planted in the area,
- Re-stabilize and re-vegetate soils exposed or disturbed during construction, including new or cleaned-out ditches (as per Ontario Provincial Standard Specification 182).

Table 6-3 provides the modified Pathways of Effects Table and includes potential stressors, mitigation measures and residual effects associated with the Project. The table also indicates if a Harmful Alternation, Disruption and Destruction of Fish Habitat designation applicable to each potential stressor.

Table 6-3: Modified Pathway of Effects Table (Template D3)

Pathway of Effect(s)	Stressor (Potential Impact)	Mitigation Measures	Residual Effects	Harmful Alternation, Disruption and Destruction of Fish Habitat (Yes/No)
<p>B2 – Use of Industrial Equipment</p>	<ul style="list-style-type: none"> ■ Use of mobile industrial equipment may promote changes to bank stability/exposed soils, re-suspension and entrainment of sediment and oil/grease/fuel leaks that can result in: <ul style="list-style-type: none"> – potential for mortality of fish/egg/ova from equipment; – change in sediment concentration; and – change in contaminant concentration. 	<ul style="list-style-type: none"> ■ O-1 – Access <ul style="list-style-type: none"> ○ Prohibit or limit access to banks or areas adjacent to waterbodies, to the extent required to protect the structural integrity of banks or shorelines ■ O-3 – Timing of In-water works <ul style="list-style-type: none"> ○ Implement timing restrictions for in-water work to protect sensitive life stages/processes of migratory and resident fish ○ additional timing considerations: <ul style="list-style-type: none"> ▪ minimize duration of in-water work ▪ conduct in-stream work during periods of low flow to allow work in water to be isolated from flows ▪ schedule work to avoid wet, windy and rainy periods that may increase erosion and sedimentation and allow for proper re-stabilization and re-vegetation as appropriate prior to winter. ■ M-2 – Dewatering Discharge <ul style="list-style-type: none"> ○ manage and treat dewatering (or other) discharge water to prevent erosion and/or release of sediment-laden or contaminated water to the waterbody. ○ Considerations: <ul style="list-style-type: none"> ▪ Use of appropriately designed and sited temporary settling basin, filter bag, etc. such as sediment is filtered out prior to the water entering a waterbody ▪ Use of energy dissipation measures to prevent bank or bed erosion. ■ M-3 – Equipment <ul style="list-style-type: none"> ○ Whenever possible, operate machinery on land above the high-water level, on ice, or from floating barge in a manner that minimizes disturbance to the banks and bed of the waterbody ○ Operate, store and maintain (e.g. refuel, lubricate) all equipment, vehicles and associated materials in a manner that prevents the entry of any deleterious substance from entering the water ○ Any part of equipment entering the water or operating on the bank shall be free of fluid leaks, invasive species and noxious weeds and externally cleaned/degreased to prevent any deleterious substance from entering the water ■ M-4 – Erosion and Sediment Controls <ul style="list-style-type: none"> ○ Design and implement erosion and sediment controls to contain/isolate the construction zone, manage site drainage/runoff and prevent erosion of exposed soils and migration of sediment to adjacent waterbody during all phases of the project. ○ Erosion and sediment control measures should be maintained until all disturbed ground has been permanently stabilized, suspended sediment has resettled to the bed of the waterbody or settling basin and runoff water is clear. The plan should, where applicable, include: <ul style="list-style-type: none"> ▪ Installation of effective erosion and sediment control measures before starting work to prevent sediment from entering the waterbody ▪ Regular inspection and maintenance of erosion and sediment control measures and structures during construction. ▪ Repairs to erosion and sediment control measures and structures if damage occurs. ▪ Removal of non-biodegradable erosion and sediment control materials once site is stabilized. ■ M-9 – Spills <ul style="list-style-type: none"> ○ Ensure Spill Management Plan (including spill kit materials, instructions regarding their use, education of contract personnel, emergency contact numbers) on-site at all times for immediate implementation in event of accidental spill. ■ M-10 - Temporary Flow <ul style="list-style-type: none"> ○ design and implement isolation/containment plan to isolate temporary in-water work zones to maintain clean flow downstream/around the work zone at all times. The design should: 	<ul style="list-style-type: none"> ■ No residual effects. Machinery will be limited to existing right-of-way and will not intrude into natural areas. 	<ul style="list-style-type: none"> ■ No

Pathway of Effect(s)	Stressor (Potential Impact)	Mitigation Measures	Residual Effects	Harmful Alternation, Disruption and Destruction of Fish Habitat (Yes/No)
		<ul style="list-style-type: none"> ▪ use only clean materials free of particulate matter for temporary coffer dams ▪ situate or otherwise manage flow withdrawal and discharge (e.g. see dewatering discharge) to prevent erosion and sediment release to the waterbody ▪ ensure the work zone is stabilized against the impacts of high flow events during the work period ▪ remove fish from the isolated in-water work zones if necessary ○ See: Management – Fish Screens and Management – Fish Transfer for managing fish. ▪ R-1 – Waterbody Bank <ul style="list-style-type: none"> ○ Minimize the removal of natural woody debris, rocks or other materials from below the banks or the shoreline of the waterbody ○ Stabilize and reinforce banks of waterbody to pre-disturbance condition (or better) using properly designed and installed stabilization measures: <ul style="list-style-type: none"> ▪ Avoid hard engineering (sheet pile or other vertical walls) ▪ May include vegetation (e.g. tree and shrub plantings, bioengineering), rock/stone material (e.g. rip-rap, boulders). ▪ If rock reinforcement/armouring is required, ensure that appropriately-sized material is used and is installed at a similar slope to the existing, maintains a uniform bank/shoreline and maintains a natural bank/shoreline alignment such that it does not interfere with fish passage or alter the bankful channel profile. ▪ May incorporate temporary measures (e.g. biodegradable materials, 'nurse'-crop vegetation) to provide interim stabilization until vegetation is fully established ▪ R-3 – Exposed Soils/ Surfaces <ul style="list-style-type: none"> ○ Stabilize and re-vegetate (or use other materials appropriate to site conditions) all areas of disturbed/exposed soil that drain to a waterbody using: <ul style="list-style-type: none"> ▪ Targeted planting of appropriate vegetation ▪ Rolled erosion control blankets, topsoil, seed, mulch etc. ▪ Installation of appropriately designed structural materials and vegetation of feasible on steep slopes to maintain slope stability for the long term. Direct drainage away from slopes unless structure provided to take drainage into valley without erosion and risk of sedimentation. 		
<p>L1 – Vegetation Clearing</p>	<p>▪ Alteration of riparian vegetation, changes in shading, and changes to bank stability/exposed soils and the addition or removal of in-stream organic structure can result in:</p> <ul style="list-style-type: none"> – changes in habitat structure and cover; – change in water temperature; – changes in sediment concentration; – changes in food supply; and – changes in nutrient concentrations. 	<ul style="list-style-type: none"> ▪ M-11 – Vegetation <ul style="list-style-type: none"> ○ Use existing trails, roads or cut lines wherever possible to avoid disturbance to the riparian vegetation and prevent soil compaction ○ Clearing of riparian vegetation should be kept to a minimum and if removal is necessary use proper clearing techniques and protect retained vegetation. When practical, prune or top the vegetation instead of grubbing/uprooting ○ Selective or phased vegetation removal or species management to maintain or reduce shade may be desirable for the management of certain species and/or to provide specialized riparian communities or habitat, such as for warmwater species at risk or coldwater species. ○ Salvage and re-instate of seedbank materials or root mats may be appropriate for certain vegetation communities such as wetlands and/or to expedite re-establishment of vegetation cover. ▪ M-1 – Chemicals <ul style="list-style-type: none"> ○ Use only specified amounts and types of fertilizer in areas draining to waterbodies ○ Avoid use of chemical dust suppressants, pesticides and herbicides in areas near or draining waterbodies ○ Ensure that building material used in a watercourse has been handled and treated in a manner to prevent the release or leaching of substances into the water that may be deleterious to fish ▪ M-4 – Erosion and Sediment Controls <ul style="list-style-type: none"> ○ Design and implement erosion and sediment controls to contain/isolate the construction zone, manage site drainage/runoff and prevent erosion of exposed soils and migration of sediment to adjacent waterbody during all phases of the project. ○ Erosion and sediment control measures should be maintained until all disturbed ground has been permanently stabilized, suspended sediment has resettled to the bed of the 	<p>▪ Positive residual effect. While there will be the loss of 33.75 linear meters of riparian vegetation on either side of the channel, the majority of the riparian vegetation consists of dense invasive phragmites which does not provide any fish habitat function. Riparian vegetation will also be restored following construction which should provide a net benefit to fish habitat.</p>	<p>▪ No</p>

Pathway of Effect(s)	Stressor (Potential Impact)	Mitigation Measures	Residual Effects	Harmful Alternation, Disruption and Destruction of Fish Habitat (Yes/No)
		<p>waterbody or settling basin and runoff water is clear. The plan should, where applicable, include:</p> <ul style="list-style-type: none"> ▪ Installation of effective erosion and sediment control measures before starting work to prevent sediment from entering the waterbody ▪ Regular inspection and maintenance of erosion and sediment control measures and structures during construction. ▪ Repairs to erosion and sediment control measures and structures if damage occurs. ▪ Removal of non-biodegradable erosion and sediment control materials once site is stabilized. <ul style="list-style-type: none"> ▪ R-1 – Waterbody Bank <ul style="list-style-type: none"> ○ Minimize the removal of natural woody debris, rocks or other materials from below the banks or the shoreline of the waterbody ○ Stabilize and reinforce banks of waterbody to pre-disturbance condition (or better) using properly designed and installed stabilization measures: <ul style="list-style-type: none"> ▪ Avoid hard engineering (sheet pile or other vertical walls) ▪ May include vegetation (e.g. tree and shrub plantings, bioengineering), rock/stone material (e.g. rip-rap, boulders). ▪ If rock reinforcement/armouring is required, ensure that appropriately-sized material is used and is installed at a similar slope to the existing, maintains a uniform bank/shoreline and maintains a natural bank/shoreline alignment such that it does not interfere with fish passage or alter the bankful channel profile. ▪ May incorporate temporary measures (e.g. biodegradable materials, 'nurse'-crop vegetation) to provide interim stabilization until vegetation is fully established ▪ R-3 – Exposed Soils/ Surfaces <ul style="list-style-type: none"> ○ Stabilize and re-vegetate (or use other materials appropriate to site conditions) all areas of disturbed/exposed soil that drain to a waterbody using: <ul style="list-style-type: none"> ▪ Targeted planting of appropriate vegetation ▪ Rolled erosion control blankets, topsoil, seed, mulch etc. ▪ Installation of appropriately designed structural materials and vegetation of feasible on steep slopes to maintain slope stability for the long term. Direct drainage away from slopes unless structure provided to take drainage into valley without erosion and risk of sedimentation. ▪ R-4 – In-stream cover <ul style="list-style-type: none"> ▪ Minimize the removal of natural woody debris, rocks or other materials from below the high-water level ▪ Add/re-establish appropriate in-stream structure and cover for habitat, in such a way as to not destabilize the channel through negative impacts to hydraulics. Where possible, match structure/substrate type with previous or adjacent types removed, altered or disturbed during construction ▪ This may include salvage and re-instatement of existing in-stream structure such as large woody debris, boulders or in-stream aquatic vegetation. ▪ R-5 – Riparian Vegetation Plantings <ul style="list-style-type: none"> ○ Design and implement vegetation rehabilitation plan following construction to replant riparian vegetation to pre-construction or better condition (e.g. trees for shade to cool water and provide overhead cover). Considerations: <ul style="list-style-type: none"> ▪ Design and install riparian plantings to avoid or minimize encroachment into and/or alteration of bank and bed profile. ▪ Usually includes re-instatement of native soils or replacement with topsoil/suitable planting medium. ▪ May include local seed bank or root mass/mat salvage, vegetation transplant or bioengineering (e.g. live stakes, cuttings) techniques. ▪ Use native species compatible with site conditions. ▪ Integrate provisional fish cover where feasible. 		

Pathway of Effect(s)	Stressor (Potential Impact)	Mitigation Measures	Residual Effects	Harmful Alternation, Disruption and Destruction of Fish Habitat (Yes/No)
		<ul style="list-style-type: none"> ▪ Integrate appropriate techniques for interim stabilization measures such as biodegradable blanket, tackifier to maintain soil stability until vegetation becomes established. ▪ M-4 – Erosion and Sediment Controls <ul style="list-style-type: none"> ○ Design and implement erosion and sediment controls to contain/isolate the construction zone, manage site drainage/runoff and prevent erosion of exposed soils and migration of sediment to adjacent waterbody during all phases of the project. ○ Erosion and sediment control measures should be maintained until all disturbed ground has been permanently stabilized, suspended sediment has resettled to the bed of the waterbody or settling basin and runoff water is clear. The plan should, where applicable, include: <ul style="list-style-type: none"> ▪ Installation of effective erosion and sediment control measures before starting work to prevent sediment from entering the waterbody ▪ Regular inspection and maintenance of erosion and sediment control measures and structures during construction. ▪ Repairs to erosion and sediment control measures and structures if damage occurs. ▪ Removal of non-biodegradable erosion and sediment control materials once site is stabilized. 		
<p>L2 – Grading</p>	<ul style="list-style-type: none"> ▪ Alteration to bank stability/ exposed soils and slope that can change landscape patterns, increase erosion potential and sediment deposition that can result in: <ul style="list-style-type: none"> – change in habitat cover and structure; – change in slope and land drainage patterns; and – change in sediment concentrations. 	<ul style="list-style-type: none"> ▪ D-2 – Drainage System <ul style="list-style-type: none"> ○ Design drainage system to avoid diversion of or otherwise minimize changes in drainage to or from a waterbody (do not divert across waterbody boundaries). ▪ M-4 – Erosion and Sediment Controls <ul style="list-style-type: none"> ○ Design and implement erosion and sediment controls to contain/isolate the construction zone, manage site drainage/runoff and prevent erosion of exposed soils and migration of sediment to adjacent waterbody during all phases of the project. ○ Erosion and sediment control measures should be maintained until all disturbed ground has been permanently stabilized, suspended sediment has resettled to the bed of the waterbody or settling basin and runoff water is clear. The plan should, where applicable, include: <ul style="list-style-type: none"> ▪ Installation of effective erosion and sediment control measures before starting work to prevent sediment from entering the waterbody ▪ Regular inspection and maintenance of erosion and sediment control measures and structures during construction. ▪ Repairs to erosion and sediment control measures and structures if damage occurs. ▪ Removal of non-biodegradable erosion and sediment control materials once site is stabilized. ▪ R-1 – Waterbody Bank <ul style="list-style-type: none"> ○ Minimize the removal of natural woody debris, rocks or other materials from below the banks or the shoreline of the waterbody ○ Stabilize and reinforce banks of waterbody to pre-disturbance condition (or better) using properly designed and installed stabilization measures: <ul style="list-style-type: none"> ▪ Avoid hard engineering (sheet pile or other vertical walls) ▪ May include vegetation (e.g. tree and shrub plantings, bioengineering), rock/stone material (e.g. rip-rap, boulders). ▪ If rock reinforcement/armouring is required, ensure that appropriately-sized material is used and is installed at a similar slope to the existing, maintains a uniform bank/shoreline and maintains a natural bank/shoreline alignment such that it does not interfere with fish passage or alter the bankful channel profile. ▪ May incorporate temporary measures (e.g. biodegradable materials, ‘nurse’-crop vegetation) to provide interim stabilization until vegetation is fully established ▪ R-3 – Exposed Soils/ Surfaces <ul style="list-style-type: none"> ○ Stabilize and re-vegetate (or use other materials appropriate to site conditions) all areas of disturbed/exposed soil that drain to a waterbody using: <ul style="list-style-type: none"> ▪ Targeted planting of appropriate vegetation 	<ul style="list-style-type: none"> ▪ No residual effects. The Design Build Contractor shall determine during the detail design stage if scour protection is needed in the channel. At this time, scour protection was confirmed to not be needed at the culvert inlet due to low flow velocities. If scour protection is needed in the channel, natural river stone should be used below the 2-year high water mark. 	<ul style="list-style-type: none"> ▪ No

Pathway of Effect(s)	Stressor (Potential Impact)	Mitigation Measures	Residual Effects	Harmful Alteration, Disruption and Destruction of Fish Habitat (Yes/No)
		<ul style="list-style-type: none"> ▪ Rolled erosion control blankets, topsoil, seed, mulch etc. ▪ Installation of appropriately designed structural materials and vegetation of feasible on steep slopes to maintain slope stability for the long term. Direct drainage away from slopes unless structure provided to take drainage into valley without erosion and risk of sedimentation. ▪ R-4 – In-stream cover <ul style="list-style-type: none"> ○ Minimize the removal of natural woody debris, rocks or other materials from below the high-water level ○ Add/re-establish appropriate in-stream structure and cover for habitat, in such a way as to not destabilize the channel through negative impacts to hydraulics. Where possible, match structure/substrate type with previous or adjacent types removed, altered or disturbed during construction ○ This may include salvage and re-instatement of existing in-stream structure such as large woody debris, boulders or in-stream aquatic vegetation ▪ O-1 – Access <ul style="list-style-type: none"> ○ Prohibit or limit access to banks or areas adjacent to waterbodies, to the extent required to protect the structural integrity of banks or shorelines 		
<p>L3- Excavation</p>	<ul style="list-style-type: none"> ▪ Creation of pond, pit or trench that can affect bank stability and exposed soils, changes to slope or drainage, lead to the removal of topsoil and increase frequency of dewatering of a pit or trench, or the improper management of spoil/material stockpiles that can result in: <ul style="list-style-type: none"> – change in water temperatures; – change in sediment concentrations; and – change in base flow. 	<ul style="list-style-type: none"> ▪ D-2 – Drainage System <ul style="list-style-type: none"> ○ Design drainage system to avoid diversion of or otherwise minimize changes in drainage to or from a waterbody (do not divert across waterbody boundaries). ▪ D-4 – Site Selection <ul style="list-style-type: none"> ○ Design and plan activities and works in waterbody such that loss or disturbance to aquatic habitat is minimized and sensitive spawning habitats are avoided ○ Design and construct approaches to the waterbody such that they are perpendicular to the watercourse to minimize loss or disturbance to riparian vegetation and select narrow, straight channel sections to minimize requirements for piers and/or abutment fills. ▪ M-2 – Dewatering Discharge <ul style="list-style-type: none"> ○ manage and treat dewatering (or other) discharge water to prevent erosion and/or release of sediment-laden or contaminated water to the waterbody. ○ Considerations: <ul style="list-style-type: none"> ▪ Use of appropriately designed and sited temporary settling basin, filter bag, etc. such as sediment is filtered out prior to the water entering a waterbody ▪ Use of energy dissipation measures to prevent bank or bed erosion. ▪ M-4 – Erosion and Sediment Controls <ul style="list-style-type: none"> ○ Design and implement erosion and sediment controls to contain/isolate the construction zone, manage site drainage/runoff and prevent erosion of exposed soils and migration of sediment to adjacent waterbody during all phases of the project. ○ Erosion and sediment control measures should be maintained until all disturbed ground has been permanently stabilized, suspended sediment has resettled to the bed of the waterbody or settling basin and runoff water is clear. The plan should, where applicable, include: <ul style="list-style-type: none"> ▪ Installation of effective erosion and sediment control measures before starting work to prevent sediment from entering the waterbody ▪ Regular inspection and maintenance of erosion and sediment control measures and structures during construction. ▪ Repairs to erosion and sediment control measures and structures if damage occurs. ▪ Removal of non-biodegradable erosion and sediment control materials once site is stabilized. ▪ M-5 – Excess Materials ▪ Temporarily store, handle and dispose of all materials used or generated (e.g. organics, soils, uprooted or cut aquatic plants, woody debris, dredging spoils, commercial logging waste, temporary stockpiles, construction waste and materials such as concrete, sheet pile, wood forms etc.) during site preparation, construction and clean-up in a manner that prevents their entry to the waterbody, including temporarily storing and stockpiling materials a safe distance from the waterbody and stabilizing/ containing them. 	<ul style="list-style-type: none"> ▪ No residual effects. Anticipated impacts from excavation works near the creek should be mitigated using standard ESC measures and BMPs for working in and near water. All in-water work shall be completed in the dry in isolation of flowing water, and ESC measures shall be installed to isolate the channel from the work area. 	<ul style="list-style-type: none"> ▪ No

Pathway of Effect(s)	Stressor (Potential Impact)	Mitigation Measures	Residual Effects	Harmful Alteration, Disruption and Destruction of Fish Habitat (Yes/No)
		<ul style="list-style-type: none"> ■ R-1 – Waterbody Bank <ul style="list-style-type: none"> ○ Minimize the removal of natural woody debris, rocks or other materials from below the banks or the shoreline of the waterbody ○ Stabilize and reinforce banks of waterbody to pre-disturbance condition (or better) using properly designed and installed stabilization measures: <ul style="list-style-type: none"> ■ Avoid hard engineering (sheet pile or other vertical walls) ■ May include vegetation (e.g. tree and shrub plantings, bioengineering), rock/stone material (e.g. rip-rap, boulders). ■ If rock reinforcement/armouring is required, ensure that appropriately-sized material is used and is installed at a similar slope to the existing, maintains a uniform bank/shoreline and maintains a natural bank/shoreline alignment such that it does not interfere with fish passage or alter the bankful channel profile. ■ May incorporate temporary measures (e.g. biodegradable materials, 'nurse'-crop vegetation) to provide interim stabilization until vegetation is fully established ■ R-3 – Exposed Soils/ Surfaces <ul style="list-style-type: none"> ○ Stabilize and re-vegetate (or use other materials appropriate to site conditions) all areas of disturbed/exposed soil that drain to a waterbody using: <ul style="list-style-type: none"> ■ Targeted planting of appropriate vegetation ■ Rolled erosion control blankets, topsoil, seed, mulch etc. ■ Installation of appropriately designed structural materials and vegetation of feasible on steep slopes to maintain slope stability for the long term. Direct drainage away from slopes unless structure provided to take drainage into valley without erosion and risk of sedimentation. 		
<p>L4 Riparian Planting</p>	<ul style="list-style-type: none"> ■ Change in sediment concentrations ■ Change in contaminant concentrations ■ Change in water temperature ■ Change in habitat structure and cover ■ Change in food supply 	<ul style="list-style-type: none"> ■ M-1 – Chemicals <ul style="list-style-type: none"> ○ Use only specified amounts and types of fertilizer in areas draining to waterbodies ○ Avoid use of chemical dust suppressants, pesticides and herbicides in areas near or draining to waterbodies ○ Ensure that building material used in a watercourse has been handled and treated in a manner to prevent the release or leaching of substances into the water that may be deleterious to fish. ■ M-4 – Erosion and Sediment Controls <ul style="list-style-type: none"> ○ Design and implement erosion and sediment controls to contain/isolate the construction zone, manage site drainage/runoff and prevent erosion of exposed soils and migration of sediment to adjacent waterbody during all phases of the project. ○ Erosion and sediment control measures should be maintained until all disturbed ground has been permanently stabilized, suspended sediment has resettled to the bed of the waterbody or settling basin and runoff water is clear. The plan should, where applicable, include: <ul style="list-style-type: none"> ■ Installation of effective erosion and sediment control measures before starting work to prevent sediment from entering the waterbody ■ Regular inspection and maintenance of erosion and sediment control measures and structures during construction. ■ Repairs to erosion and sediment control measures and structures if damage occurs. ■ Removal of non-biodegradable erosion and sediment control materials once site is stabilized. ■ R-1 – Waterbody Bank <ul style="list-style-type: none"> ○ Minimize the removal of natural woody debris, rocks or other materials from below the banks or the shoreline of the waterbody ○ Stabilize and reinforce banks of waterbody to pre-disturbance condition (or better) using properly designed and installed stabilization measures: <ul style="list-style-type: none"> ■ Avoid hard engineering (sheet pile or other vertical walls) ■ May include vegetation (e.g. tree and shrub plantings, bioengineering), rock/stone material (e.g. rip-rap, boulders). ■ If rock reinforcement/armouring is required, ensure that appropriately-sized material is used and is installed at a similar slope to the existing, maintains a 	<ul style="list-style-type: none"> ■ No residual effects. Riparian vegetation will be restored as discussed above following construction. 	<ul style="list-style-type: none"> ■ No

Pathway of Effect(s)	Stressor (Potential Impact)	Mitigation Measures	Residual Effects	Harmful Alternation, Disruption and Destruction of Fish Habitat (Yes/No)
		<p>uniform bank/shoreline and maintains a natural bank/shoreline alignment such that it does not interfere with fish passage or alter the bankful channel profile.</p> <ul style="list-style-type: none"> ▪ May incorporate temporary measures (e.g. biodegradable materials, 'nurse'-crop vegetation) to provide interim stabilization until vegetation is fully established ▪ R-3 – Exposed Soils/ Surfaces <ul style="list-style-type: none"> ○ Stabilize and re-vegetate (or use other materials appropriate to site conditions) all areas of disturbed/exposed soil that drain to a waterbody using: <ul style="list-style-type: none"> ▪ Targeted planting of appropriate vegetation ▪ Rolled erosion control blankets, topsoil, seed, mulch etc. ▪ Installation of appropriately designed structural materials and vegetation of feasible on steep slopes to maintain slope stability for the long term. Direct drainage away from slopes unless structure provided to take drainage into valley without erosion and risk of sedimentation. ▪ R-5 – Riparian Vegetation Plantings <ul style="list-style-type: none"> ○ Design and implement vegetation rehabilitation plan following construction to re-plant riparian vegetation to pre-construction or better condition (e.g. trees for shade to cool water and provide overhead cover) ○ Considerations: <ul style="list-style-type: none"> ▪ Design and install riparian plantings to avoid or minimize encroachment into and/or alteration of bank/bed profiles ▪ Usually includes re-instatement of native soils or replacement with topsoil/suitable planting medium ▪ May include local seed bank or root mass/mat salvage, vegetation transplant or bioengineering (e.g. live stakes, cuttings) techniques ▪ Use native species compatible with site conditions ▪ Integrate provision of fish cover where feasible ▪ Integrate appropriate techniques for interim stabilization measures such as biodegradable blanket, tackifier to maintain soil stability until vegetation becomes established 		
<p>W1 – Placement of material or structures in water</p>	<p>▪ Changes in channel or shoreline morphology, hydraulics, aquatic macrophytes, and substrate composition can result in:</p> <ul style="list-style-type: none"> – change in sediment concentrations; – change in habitat structure and cover; – change in food supply; and – change in nutrient concentration. 	<ul style="list-style-type: none"> ▪ D-1 – Bridge, Culvert or other in-water structures <ul style="list-style-type: none"> ○ Reduce or eliminate constriction of flow through structure design. Design and site piers, abutments and other structures to avoid or otherwise minimize encroachment into waterbody and avoid sensitive habitats. Design structure to avoid or minimize effects on existing or natural flow regimes. Avoid building structures on meander bends, braided streams, alluvial fans, active floodplains or any other area that is inherently unstable and may result in erosion and scouring of the waterbody bed or the built structures ○ Additional considerations for bridges and culverts: <ul style="list-style-type: none"> ▪ Design deck drainage to avoid direct discharge into the waterbody ▪ Design and construct approaches to the waterbody such that they are perpendicular to the watercourse to minimize loss or disturbance to riparian vegetation ▪ Consider access requirements in sitting structures (e.g. need to access floodplain of deep pristine valley for construction). ▪ Design and install culverts to prevent creation of barriers to fish movement, and maintain bankfull channel functions and habitat functions to the extent possible, including proper sizing, embedment, re-instatement of low flow channel and properly designed and sized substrates to stay in-place under full range of flow conditions, compatible with existing native substrate, maintaining channel slope, etc. ▪ M-10 - Temporary Flow <ul style="list-style-type: none"> ○ design and implement isolation/containment plan to isolate temporary in-water work zones to maintain clean flow downstream/around the work zone at all times. The design should: <ul style="list-style-type: none"> ▪ use only clean materials free of particulate matter for temporary coffer dams ▪ situate or otherwise manage flow withdrawal and discharge (e.g. see dewatering discharge) to prevent erosion and sediment release to the waterbody 	<ul style="list-style-type: none"> ▪ Negative residual effect. Permanent loss of approximately 80.64 m² of fish habitat as a result of the existing culvert being abandoned and the channel being infilled upstream and downstream of the culvert (67.20 linear meters of channel x 1.2 meters channel width). The existing 33.45 m culvert will be temporarily extended during construction and then abandoned, with the new culvert conveying flows underneath County Road 4 immediately north of the existing culvert. The existing culvert will be plugged and abandoned. The extent of the channel infilling upstream and downstream of the existing culvert is not known at this time and will need to be determined during detail design. ▪ The proposed culvert will create 120.96 m² of habitat (proposed culvert dimensions: 67.2 m x 1.8 m) 	<ul style="list-style-type: none"> ▪ Yes, permanent loss of approximately 80.64 m² of fish habitat.

Pathway of Effect(s)	Stressor (Potential Impact)	Mitigation Measures	Residual Effects	Harmful Alternation, Disruption and Destruction of Fish Habitat (Yes/No)
		<ul style="list-style-type: none"> ▪ ensure the work zone is stabilized against the impacts of high flow events during the work period ▪ remove fish from the isolated in-water work zones if necessary ○ See: Management – Fish Screens and Management – Fish Transfer for managing fish. ▪ R-1 – Waterbody Bank <ul style="list-style-type: none"> ○ Minimize the removal of natural woody debris, rocks or other materials from below the banks or the shoreline of the waterbody ○ Stabilize and reinforce banks of waterbody to pre-disturbance condition (or better) using properly designed and installed stabilization measures: <ul style="list-style-type: none"> ▪ Avoid hard engineering (sheet pile or other vertical walls) ▪ May include vegetation (e.g. tree and shrub plantings, bioengineering), rock/stone material (e.g. rip-rap, boulders). ▪ If rock reinforcement/armouring is required, ensure that appropriately-sized material is used and is installed at a similar slope to the existing, maintains a uniform bank/shoreline and maintains a natural bank/shoreline alignment such that it does not interfere with fish passage or alter the bankful channel profile. ▪ May incorporate temporary measures (e.g. biodegradable materials, ‘nurse’-crop vegetation) to provide interim stabilization until vegetation is fully established ▪ R-2 – Waterbody Bed and Substrate <ul style="list-style-type: none"> ○ Restore and re-stabilize any portion of the waterbody bed disturbed during construction to pre-construction (or better) condition, including: <ul style="list-style-type: none"> ▪ Restoration of the original contour and gradient ▪ Morphological elements, e.g. pools and riffles ▪ Substrates, which may include salvage and re-instatement of native materials ▪ R-4 – In-stream cover <ul style="list-style-type: none"> ○ Minimize the removal of natural woody debris, rocks or other materials from below the high-water level ○ Add/re-establish appropriate in-stream structure and cover for habitat, in such a way as to not destabilize the channel through negative impacts to hydraulics. Where possible, match structure/substrate type with previous or adjacent types removed, altered or disturbed during construction ○ This may include salvage and re-instatement of existing in-stream structure such as large woody debris, boulders or in-stream aquatic vegetation 		
<p>W3 – Organic Debris Management</p>	<ul style="list-style-type: none"> ▪ Change in contaminant concentrations ▪ Change in sediment concentrations ▪ Change in habitat structure and cover ▪ Change in nutrient concentrations ▪ Change in food supply 	<ul style="list-style-type: none"> ▪ R-1 – Waterbody Bank <ul style="list-style-type: none"> ○ Minimize the removal of natural woody debris, rocks or other materials from below the banks or the shoreline of the waterbody ○ Stabilize and reinforce banks of waterbody to pre-disturbance condition (or better) using properly designed and installed stabilization measures: <ul style="list-style-type: none"> ▪ Avoid hard engineering (sheet pile or other vertical walls) ▪ May include vegetation (e.g. tree and shrub plantings, bioengineering), rock/stone material (e.g. rip-rap, boulders). ▪ If rock reinforcement/armouring is required, ensure that appropriately-sized material is used and is installed at a similar slope to the existing, maintains a uniform bank/shoreline and maintains a natural bank/shoreline alignment such that it does not interfere with fish passage or alter the bankful channel profile. ▪ May incorporate temporary measures (e.g. biodegradable materials, ‘nurse’-crop vegetation) to provide interim stabilization until vegetation is fully established ▪ R-2 – Waterbody Bed and Substrate <ul style="list-style-type: none"> ○ Restore and re-stabilize any portion of the waterbody bed disturbed during construction to pre-construction (or better) condition, including: <ul style="list-style-type: none"> ▪ Restoration of the original contour and gradient ▪ Morphological elements, e.g. pools and riffles ▪ Substrates, which may include salvage and re-instatement of native materials ▪ R-3 – Exposed Soils/ Surfaces 	<ul style="list-style-type: none"> ▪ No residual effects. 	<ul style="list-style-type: none"> ▪ No

Pathway of Effect(s)	Stressor (Potential Impact)	Mitigation Measures	Residual Effects	Harmful Alternation, Disruption and Destruction of Fish Habitat (Yes/No)
		<ul style="list-style-type: none"> ○ Stabilize and re-vegetate (or use other materials appropriate to site conditions) all areas of disturbed/exposed soil that drain to a waterbody using: <ul style="list-style-type: none"> ▪ Targeted planting of appropriate vegetation ▪ Rolled erosion control blankets, topsoil, seed, mulch etc. ▪ Installation of appropriately designed structural materials and vegetation of feasible on steep slopes to maintain slope stability for the long term. Direct drainage away from slopes unless structure provided to take drainage into valley without erosion and risk of sedimentation. ▪ R-4 – In-stream cover <ul style="list-style-type: none"> ○ Minimize the removal of natural woody debris, rocks or other materials from below the high-water level ○ Add/re-establish appropriate in-stream structure and cover for habitat, in such a way as to not destabilize the channel through negative impacts to hydraulics. Where possible, match structure/substrate type with previous or adjacent types removed, altered or disturbed during construction ○ This may include salvage and re-instatement of existing in-stream structure such as large woody debris, boulders or in-stream aquatic vegetation 		
W4 – Addition or Removal of Aquatic Vegetation	<ul style="list-style-type: none"> ▪ Change in water temperature ▪ Change in dissolved oxygen ▪ Change in food supply ▪ Change in nutrient concentrations ▪ Change in habitat structure and cover ▪ Change in contaminant concentrations ▪ Change in sediment concentrations 	<ul style="list-style-type: none"> ▪ M-3 – Equipment <ul style="list-style-type: none"> ○ Whenever possible, operate machinery on land above the high-water level, on ice, or from floating barge in a manner that minimizes disturbance to the banks and bed of the waterbody ○ Operate, store and maintain (e.g. refuel, lubricate) all equipment, vehicles and associated materials in a manner that prevents the entry of any deleterious substance from entering the water ○ Any part of equipment entering the water or operating on the bank shall be free of fluid leaks, invasive species and noxious weeds and externally cleaned/degreased to prevent any deleterious substance from entering the water ▪ M-4 – Erosion and Sediment Controls <ul style="list-style-type: none"> ○ Design and implement erosion and sediment controls to contain/isolate the construction zone, manage site drainage/runoff and prevent erosion of exposed soils and migration of sediment to adjacent waterbody during all phases of the project. ○ Erosion and sediment control measures should be maintained until all disturbed ground has been permanently stabilized, suspended sediment has resettled to the bed of the waterbody or settling basin and runoff water is clear. The plan should, where applicable, include: <ul style="list-style-type: none"> ▪ Installation of effective erosion and sediment control measures before starting work to prevent sediment from entering the waterbody ▪ Regular inspection and maintenance of erosion and sediment control measures and structures during construction. ▪ Repairs to erosion and sediment control measures and structures if damage occurs. ▪ Removal of non-biodegradable erosion and sediment control materials once site is stabilized. ▪ M-8 – In-water Turbidity Curtains or Other Appropriate Measures <ul style="list-style-type: none"> ○ Use properly sized, anchored and maintained in-water silt boom, turbidity curtains or other effective measures to contain suspended sediments. ▪ R-3 – Exposed Soils/ Surfaces <ul style="list-style-type: none"> ○ Stabilize and re-vegetate (or use other materials appropriate to site conditions) all areas of disturbed/exposed soil that drain to a waterbody using: <ul style="list-style-type: none"> ▪ Targeted planting of appropriate vegetation ▪ Rolled erosion control blankets, topsoil, seed, mulch etc. ▪ Installation of appropriately designed structural materials and vegetation of feasible on steep slopes to maintain slope stability for the long term. Direct drainage away from slopes unless structure provided to take drainage into valley without erosion and risk of sedimentation. ▪ R-4 – In-stream cover 	<ul style="list-style-type: none"> ▪ No residual effects. No aquatic vegetation was noted in the right-of-way during field investigations aside from invasive phragmites. 	<ul style="list-style-type: none"> ▪ No

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		<ul style="list-style-type: none"> ○ Minimize the removal of natural woody debris, rocks or other materials from below the high-water level ○ Add/re-establish appropriate in-stream structure and cover for habitat, in such a way as to not destabilize the channel through negative impacts to hydraulics. Where possible, match structure/substrate type with previous or adjacent types removed, altered or disturbed during construction ○ This may include salvage and re-instatement of existing in-stream structure such as large woody debris, boulders or in-stream aquatic vegetation 		
W5 – Change in Timing, Duration and Frequency of Flow	<ul style="list-style-type: none"> ■ Displacement or stranding of fish ■ Change in migration/ access to habitats ■ Change in sediment concentrations ■ Change in habitat structure and cover ■ Change in food supply ■ Change in water temperature ■ Change in contaminant concentrations ■ Change in nutrient concentrations 	<ul style="list-style-type: none"> ■ D-1 – Bridge, Culvert or other in-water structures <ul style="list-style-type: none"> ○ Reduce or eliminate constriction of flow through structure design. Design and site piers, abutments and other structures to avoid or otherwise minimize encroachment into waterbody and avoid sensitive habitats. Design structure to avoid or minimize effects on existing or natural flow regimes. Avoid building structures on meander bends, braided streams, alluvial fans, active floodplains or any other area that is inherently unstable and may result in erosion and scouring of the waterbody bed or the built structures ○ Additional considerations for bridges and culverts: <ul style="list-style-type: none"> ■ Design deck drainage to avoid direct discharge into the waterbody ■ Design and construct approaches to the waterbody such that they are perpendicular to the watercourse to minimize loss or disturbance to riparian vegetation ■ Consider access requirements in sitting structures (e.g. need to access floodplain of deep pristine valley for construction). ■ Design and install culverts to prevent creation of barriers to fish movement, and maintain bankfull channel functions and habitat functions to the extent possible, including proper sizing, embedment, re-instatement of low flow channel and properly designed and sized substrates to stay in-place under full range of flow conditions, compatible with existing native substrate, maintaining channel slope, etc. ■ D-2 – Drainage System <ul style="list-style-type: none"> ○ Design drainage system to avoid diversion of or otherwise minimize changes in drainage to or from a waterbody (do not across watershed boundaries). ■ D-5 – Stormwater Management Measures <ul style="list-style-type: none"> ○ Design stormwater management measures to manage runoff to waterbody considering discharge (e.g. velocities to avoid erosion) as well as quality (e.g. formal stormwater management ponds, enhanced ditches, and filtration). ■ O-3 – Timing of In-water works <ul style="list-style-type: none"> ○ Implement timing restrictions for in-water work to protect sensitive life stages/processes of migratory and resident fish ○ additional timing considerations: <ul style="list-style-type: none"> ■ minimize duration of in-water work ■ conduct in-stream work during periods of low flow to allow work in water to be isolated from flows ■ schedule work to avoid wet, windy and rainy periods that may increase erosion and sedimentation and allow for proper re-stabilization and re-vegetation as appropriate prior to winter. ■ M-7 – Fish Transfer <ul style="list-style-type: none"> ○ Avoid impacts to fishes by excluding, moving, or frightening fishes downstream or away from the work area. Retain a qualified environmental professional to ensure applicable permits for relocating fish are obtained ○ Capture any fish trapped within an isolated/enclosed area at the work site and safely relocate them to an appropriate location in the same waters using appropriate capture, handling and release techniques to prevent harm and minimize stress. Fish may need to be relocated again, should flooding occur on the site. ■ M-10 - Temporary Flow <ul style="list-style-type: none"> ○ design and implement isolation/containment plan to isolate temporary in-water work zones to maintain clean flow downstream/around the work zone at all times. The design should: 	<ul style="list-style-type: none"> ■ No residual effects. During construction, all works should occur in the dry and maintain flows around the work area at all times. Following construction, the existing concrete box culvert will be abandoned and replaced with another concrete box culvert immediately north of the existing culvert. The new culvert should convey flows, food, and nutrients similar to that of the existing culvert. 	<ul style="list-style-type: none"> ■ No

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		<ul style="list-style-type: none"> ▪ use only clean materials free of particulate matter for temporary coffer dams ▪ situate or otherwise manage flow withdrawal and discharge (e.g. see dewatering discharge) to prevent erosion and sediment release to the waterbody ▪ ensure the work zone is stabilized against the impacts of high flow events during the work period ▪ remove fish from the isolated in-water work zones if necessary ○ See: Management – Fish Screens and Management – Fish Transfer for managing fish. ▪ M-12 – Water Flow <ul style="list-style-type: none"> ○ Flow management (e.g. minimum flows, seasonal flow augmentation, flushing flows) for specific aquatic habitat management goals or to mitigate other effects of flow management (e.g. fish passage, fish stranding). ▪ R-1 – Waterbody Bank <ul style="list-style-type: none"> ○ Minimize the removal of natural woody debris, rocks or other materials from below the banks or the shoreline of the waterbody ○ Stabilize and reinforce banks of waterbody to pre-disturbance condition (or better) using properly designed and installed stabilization measures: <ul style="list-style-type: none"> ▪ Avoid hard engineering (sheet pile or other vertical walls) ▪ May include vegetation (e.g. tree and shrub plantings, bioengineering), rock/stone material (e.g. rip-rap, boulders). ▪ If rock reinforcement/armouring is required, ensure that appropriately-sized material is used and is installed at a similar slope to the existing, maintains a uniform bank/shoreline and maintains a natural bank/shoreline alignment such that it does not interfere with fish passage or alter the bankful channel profile. ▪ May incorporate temporary measures (e.g. biodegradable materials, 'nurse'-crop vegetation) to provide interim stabilization until vegetation is fully established ▪ R-2 – Waterbody Bed and Substrate <ul style="list-style-type: none"> ○ Restore and re-stabilize any portion of the waterbody bed disturbed during construction to pre-construction (or better) condition, including: <ul style="list-style-type: none"> ▪ Restoration of the original contour and gradient ▪ Morphological elements, e.g. pools and riffles ▪ Substrates, which may include salvage and re-instatement of native materials ▪ R-4 – In-stream cover <ul style="list-style-type: none"> ○ Minimize the removal of natural woody debris, rocks or other materials from below the high-water level ○ Add/re-establish appropriate in-stream structure and cover for habitat, in such a way as to not destabilize the channel through negative impacts to hydraulics. Where possible, match structure/substrate type with previous or adjacent types removed, altered or disturbed during construction ○ This may include salvage and re-instatement of existing in-stream structure such as large woody debris, boulders or in-stream aquatic vegetation. ▪ R-5 – Riparian Vegetation Plantings <ul style="list-style-type: none"> ○ Design and implement vegetation rehabilitation plan following construction to re-plant riparian vegetation to pre-construction or better condition (e.g. trees for shade to cool water and provide overhead cover). Given the presence of invasive Phragmites on the east side of County Road 4, the vegetation rehabilitation plan should focus on re-establishing fast-growing native species to minimize the extent of Phragmites in the right-of-way. ○ Considerations: <ul style="list-style-type: none"> ▪ Design and install riparian plantings to avoid or minimize encroachment into and/or alteration of bank and bed profile ▪ Usually includes re-instatement of native soils or replacement with topsoil/suitable planting medium ▪ May include local seed bank or root mass/mat salvage, vegetation transplant or bioengineering (e.g. live stakes, cuttings) techniques ▪ Use native species compatible with site conditions ▪ Integrate provision of fish cover where feasible 		

Pathway of Effect(s)	Stressor (Potential Impact)	Mitigation Measures	Residual Effects	Harmful Alternation, Disruption and Destruction of Fish Habitat (Yes/No)
		<ul style="list-style-type: none"> ▪ Integrate appropriate techniques for interim stabilization measures such as biodegradable blanket, tackifier to maintain soil stability until vegetation becomes established. 		
<p>W6 – fish passage issues</p>	<ul style="list-style-type: none"> ▪ Incidental entertainment, impingement or mortality ▪ Change in access to habitats 	<ul style="list-style-type: none"> ▪ D-1 – Bridge, Culvert or other in-water structures <ul style="list-style-type: none"> ○ Reduce or eliminate constriction of flow through structure design. Design and site piers, abutments and other structures to avoid or otherwise minimize encroachment into waterbody and avoid sensitive habitats. Design structure to avoid or minimize effects on existing or natural flow regimes. Avoid building structures on meander bends, braided streams, alluvial fans, active floodplains or any other area that is inherently unstable and may result in erosion and scouring of the waterbody bed or the built structures ○ Additional considerations for bridges and culverts: <ul style="list-style-type: none"> ▪ Design deck drainage to avoid direct discharge into the waterbody ▪ Design and construct approaches to the waterbody such that they are perpendicular to the watercourse to minimize loss or disturbance to riparian vegetation ▪ Consider access requirements in sitting structures (e.g. need to access floodplain of deep pristine valley for construction). ▪ Design and install culverts to prevent creation of barriers to fish movement, and maintain bankfull channel functions and habitat functions to the extent possible, including proper sizing, embedment, re-instatement of low flow channel and properly designed and sized substrates to stay in-place under full range of flow conditions, compatible with existing native substrate, maintaining channel slope, etc. ▪ D-2 – Drainage System <ul style="list-style-type: none"> ○ Design drainage system to avoid diversion of or otherwise minimize changes in drainage to or from a waterbody (do not across watershed boundaries). ▪ D-3 – Fish Passage <ul style="list-style-type: none"> ○ Design to maintain fish passage and minimize risk for fish passing upstream or downstream of an obstruction (e.g. downstream migration diversion methods, upstream migration via fish ladders, bypass channels). ▪ D-5 – Stormwater Management Measures <ul style="list-style-type: none"> ○ Design stormwater management measures to manage runoff to waterbody considering discharge (e.g. velocities to avoid erosion) as well as quality (e.g. formal stormwater management ponds, enhanced ditches, and filtration). ▪ O-3 – Timing of In-water works <ul style="list-style-type: none"> ○ Implement timing restrictions for in-water work to protect sensitive life stages/processes of migratory and resident fish ○ additional timing considerations: <ul style="list-style-type: none"> ▪ minimize duration of in-water work ▪ conduct in-stream work during periods of low flow to allow work in water to be isolated from flows ▪ schedule work to avoid wet, windy and rainy periods that may increase erosion and sedimentation and allow for proper re-stabilization and re-vegetation as appropriate prior to winter. ▪ M-6 - Fish Screens <ul style="list-style-type: none"> ○ Use fish screens to avoid entrainment and impingement of fish at water intakes. ○ Refer to Fisheries and Oceans Canada fish protection measures for design, installation and operation of fish screens https://www.dfo-mpo.gc.ca/pnw-ppe/codes/screen-ecran-eng.html ▪ M-10 - Temporary Flow <ul style="list-style-type: none"> ○ design and implement isolation/containment plan to isolate temporary in-water work zones to maintain clean flow downstream/around the work zone at all times. The design should: <ul style="list-style-type: none"> ▪ use only clean materials free of particulate matter for temporary coffer dams ▪ situate or otherwise manage flow withdrawal and discharge (e.g. see dewatering discharge) to prevent erosion and sediment release to the waterbody 	<ul style="list-style-type: none"> ▪ No residual effects. The existing culvert is likely not passable for fish travelling upstream due to the shallow laminar flows observed during the field investigation. The new culvert should be embedded to provide adequate water depths for fish passage. It should also be noted that there is only a small section (less than 10 liner meters) of fish habitat upstream of the culvert before a permanent fish passage barrier is present (i.e., the stormwater management pond outlet). It is also recommended that river stone be added to the channel tie-in locations to ensure a smooth transition from the new culvert to the existing channel. 	<ul style="list-style-type: none"> ▪ No

Pathway of Effect(s)	Stressor (Potential Impact)	Mitigation Measures	Residual Effects	Harmful Alternation, Disruption and Destruction of Fish Habitat (Yes/No)
		<ul style="list-style-type: none"> ▪ ensure the work zone is stabilized against the impacts of high flow events during the work period ▪ remove fish from the isolated in-water work zones if necessary ○ See: Management – Fish Screens and Management – Fish Transfer for managing fish. ▪ M-12 – Water Flow ○ Flow management (e.g. minimum flows, seasonal flow augmentation, flushing flows) for specific aquatic habitat management goals or to mitigate other effects of flow management (e.g. fish passage, fish stranding). 		
W7 – Structure Removal	<ul style="list-style-type: none"> ▪ Change in food supply ▪ Change in habitat structure and cover ▪ Change in containment concentrations ▪ Change in sediment concentrations 	<ul style="list-style-type: none"> ▪ O-1 – Access ○ Prohibit or limit access to banks or areas adjacent to waterbodies, to the extent required to protect the structural integrity of banks or shorelines ▪ O-3 – Timing of In-water works ○ Implement timing restrictions for in-water work to protect sensitive life stages/processes of migratory and resident fish ○ additional timing considerations: <ul style="list-style-type: none"> ▪ minimize duration of in-water work ▪ conduct in-stream work during periods of low flow to allow work in water to be isolated from flows ▪ schedule work to avoid wet, windy and rainy periods that may increase erosion and sedimentation and allow for proper re-stabilization and re-vegetation as appropriate prior to winter. ▪ M-2 – Dewatering Discharge ○ manage and treat dewatering (or other) discharge water to prevent erosion and/or release of sediment-laden or contaminated water to the waterbody. ○ Considerations: <ul style="list-style-type: none"> ▪ Use of appropriately designed and sited temporary settling basin, filter bag, etc. such as sediment is filtered out prior to the water entering a waterbody ▪ Use of energy dissipation measures to prevent bank or bed erosion. ▪ M-4 – Erosion and Sediment Controls ○ Design and implement erosion and sediment controls to contain/isolate the construction zone, manage site drainage/runoff and prevent erosion of exposed soils and migration of sediment to adjacent waterbody during all phases of the project. ○ Erosion and sediment control measures should be maintained until all disturbed ground has been permanently stabilized, suspended sediment has resettled to the bed of the waterbody or settling basin and runoff water is clear. The plan should, where applicable, include: <ul style="list-style-type: none"> ▪ Installation of effective erosion and sediment control measures before starting work to prevent sediment from entering the waterbody ▪ Regular inspection and maintenance of erosion and sediment control measures and structures during construction. ▪ Repairs to erosion and sediment control measures and structures if damage occurs. ▪ Removal of non-biodegradable erosion and sediment control materials once site is stabilized. ▪ M-10 - Temporary Flow ○ design and implement isolation/containment plan to isolate temporary in-water work zones to maintain clean flow downstream/around the work zone at all times. The design should: <ul style="list-style-type: none"> ▪ use only clean materials free of particulate matter for temporary coffer dams ▪ situate or otherwise manage flow withdrawal and discharge (e.g. see dewatering discharge) to prevent erosion and sediment release to the waterbody ▪ ensure the work zone is stabilized against the impacts of high flow events during the work period ▪ remove fish from the isolated in-water work zones if necessary ○ See: Management – Fish Screens and Management – Fish Transfer for managing fish. 	<ul style="list-style-type: none"> ▪ No residual effects. No natural habitat structures are present in the right-of-way (i.e., woody debris, boulders, bank undercuts, etc.). The existing concrete box culvert will be abandoned and replaced with another concrete box culvert immediately north of the existing culvert. The new culvert should convey flows, food, and nutrients similar to that of the existing culvert. 	<ul style="list-style-type: none"> ▪ No

Pathway of Effect(s)	Stressor (Potential Impact)	Mitigation Measures	Residual Effects	Harmful Alternation, Disruption and Destruction of Fish Habitat (Yes/No)
		<ul style="list-style-type: none"> ■ M-13 – Work Site Containment <ul style="list-style-type: none"> ○ Design and implement containment plan to isolate all work occurring above water and keep all deleterious substances (e.g. dust particulates, air-borne contaminants, paint, grout, poured concrete etc.) from entering the waterbody. ○ The design should include: <ul style="list-style-type: none"> ■ ■ R-1 – Waterbody Bank <ul style="list-style-type: none"> ○ Minimize the removal of natural woody debris, rocks or other materials from below the banks or the shoreline of the waterbody ○ Stabilize and reinforce banks of waterbody to pre-disturbance condition (or better) using properly designed and installed stabilization measures: <ul style="list-style-type: none"> ■ Avoid hard engineering (sheet pile or other vertical walls) ■ May include vegetation (e.g. tree and shrub plantings, bioengineering), rock/stone material (e.g. rip-rap, boulders). ■ If rock reinforcement/armouring is required, ensure that appropriately-sized material is used and is installed at a similar slope to the existing, maintains a uniform bank/shoreline and maintains a natural bank/shoreline alignment such that it does not interfere with fish passage or alter the bankful channel profile. ■ May incorporate temporary measures (e.g. biodegradable materials, ‘nurse’-crop vegetation) to provide interim stabilization until vegetation is fully established ■ R-2 – Waterbody Bed and Substrate <ul style="list-style-type: none"> ○ Restore and re-stabilize any portion of the waterbody bed disturbed during construction to pre-construction (or better) condition, including: <ul style="list-style-type: none"> ■ Restoration of the original contour and gradient ■ Morphological elements, e.g. pools and riffles ■ Substrates, which may include salvage and re-instatement of native materials ■ R-5 – Riparian Vegetation Plantings <ul style="list-style-type: none"> ○ Design and implement vegetation rehabilitation plan following construction to re-plant riparian vegetation to pre-construction or better condition (e.g. trees for shade to cool water and provide overhead cover). ○ Considerations: <ul style="list-style-type: none"> ■ Design and install riparian plantings to avoid or minimize encroachment into and/or alteration of bank and bed profile ■ Usually includes re-instatement of native soils or replacement with topsoil/suitable planting medium ■ May include local seed bank or root mass/mat salvage, vegetation transplant or bioengineering (e.g. live stakes, cuttings) techniques ■ Use native species compatible with site conditions ■ Integrate provision of fish cover where feasible ■ Integrate appropriate techniques for interim stabilization measures such as biodegradable blanket, tackifier to maintain soil stability until vegetation becomes established. 		

6.1.2.3 Environmental Provisions

The following Ontario Provincial Standard Specifications and Ministry of Transportation Central Region Special Provisions are recommended for inclusion in the contract documents. Further assessment and review of applicable Ontario Provincial Standard Specifications should be completed during detail design:

- Environmental Protection During Work in Watercourses and on Watercourse Banks in accordance with Ontario Provincial Standard Specification 182;
- Temporary Erosion and Sediment Control Measures in accordance with Ontario Provincial Standard Specification 805;
- Environmental Incident Management Under Legislation Protecting the Environment and Natural Resources in accordance with Ontario Provincial Standard Specification 100;
- Management of Excess Materials in accordance with Ontario Provincial Standard Specification 180;
- Timing of in-water Work in accordance with Standard Special Provision 101F23;
- Construction Specification for Dewatering in accordance with Ontario Provincial Standard Specification 517; and,
- Material Specification for Aggregates – Streambed Material with Ontario Provincial Standard Specification PROV 1005.

6.1.2.4 Anticipated Permits and Approvals

Based on the known background information and proposed works at this time, submission to Fisheries and Oceans Canada under a Request for Review is anticipated for the culvert extension and replacement work due to the permanent loss of 80.64 m² of direct warmwater fish habitat when the existing culvert (EX-CL-9) is abandoned and the channel is infilled upstream and downstream of the culvert. The Federal *Fisheries Act* was amended on June 21, 2019 to restore protections to fish and fish habitat. Habitat protection provisions came into force on August 28, 2019 that prohibit the death of fish and the Harmful Alteration, Destruction, or Disruption of fish habitat. The 2019 amendments to the Fisheries Act no longer provide for a self-assessment process unless activities can follow the measures to protect fish and fish habitat as stipulated by Fisheries and Oceans Canada, or if works are occurring in a waterbody that is not protected under the Fisheries Act. There is currently no Ministry of Transportation Best Management Practice for culvert extensions, replacements, or relocations that result in the permanent loss of direct fish habitat. Therefore, the proposed culvert works that result in the permanent loss of fish habitat at the EX-CL-9 crossing should be reviewed by Fisheries and Oceans Canada through a Request for Review. The need for Fisheries and Oceans Canada submission will need to be further assessed during the detail design stage once the design plans are finalized. Once design plans are finalized, submission to Fisheries and Oceans Canada can be completed (if necessary). A summary of the impact assessment and rationale for Fisheries and Oceans Canada submission is provided in Appendix C.

6.1.3 Groundwater and Hydrogeology

As outlined in Section 5.1.3, a Hydrogeological Investigation Report and a Door-to-Door Water Well Survey was completed as part of the Early Works assessment.

6.1.3.1 Potential Impacts

Anticipated Dewatering Requirements

It is anticipated that temporary (short-term, non-recurring) construction dewatering will be required to remove water from the construction excavation(s). Excavation areas will collect water from four potential sources:

- Lateral groundwater seepage through excavation sidewalls;

- Groundwater seepage through the base of excavation;
- Overburden storage; and,
- Direct precipitation.

The estimated groundwater inflow is summarized in Table 6-4. To account for variability in aquifer thickness, storage affects, recharge events (i.e., precipitation) and variability in hydraulic conductivity, maximum flow is equivalent to three times the calculated steady-state flow (i.e., Q3 dewatering rate).

Table 6-4: Dewatering Estimate for Proposed Construction

Construction Type	Stations	Steady State Dewatering Rate 'Q' (L/d)	'Q3' Dewatering Rate (L/d)	Radius of Influence (Ro) (m)
BBP/CR4 Underpass Structure - Future BBP WB	9+950 to 10+000	131,632	394,896	39.1
BBP/CR4 Underpass Structure - Future BBP EB	10+000 to 10+050	23,135	69,404	15.2
New Ditch RT and LT	9+900 to 9+950	20,242	60,726	4.6
New Ditch RT and LT	9+950 to 10+000	22,913	68,738	5.3
New Ditch RT and LT	10+000 to 10+050	30,074	90,222	7.6
New Ditch RT and LT	10+050 to 10+100	11,265	33,795	4.5
New Ditch RT and LT	10+100 to 10+150	201	602	1.8
New Ditch RT	10+150 to 10+200	201	602	1.8
New Ditch RT	10+200 to 10+250	270	809	1.9
New Ditch RT	10+250 to 10+300	532	1,595	2.1
New Ditch RT	10+300 to 10+350	552	1,655	2.1
			Total: 723,044	

6.1.3.2 Commitments and Recommended Mitigation Measures

Dewatering Discharge

It is recommended that dewatering effluent be directed to the local Town sanitary or storm sewer. Any discharge of water would be subject to the terms and conditions of all required permits obtained by the Contractor based on the actual conditions encountered during construction. Sewer discharge requires by-law authorization from the Town. Due to the close proximity of the construction to agricultural drains, it is suggested that the discharge be directed away from the drains to reduce overland flow and promote infiltration.

If the groundwater pumped for dewatering purposes is to be directed to the natural environment, it is recommended that water quality testing for Provincial Water Quality Objectives be completed prior to dewatering. Given the geological material encountered, it is suggested that the dewatering contractor be prepared to potential deal with treatment for suspended solids prior discharge to the sanitary sewer.

The results of the baseline water quality sampling completed within the Study Area indicates that dewatering effluent may not fulfill the water quality requirements under the Town of Bradford West

Gwillimbury's Sewer Use Bylaw 2013-68 for Storm Sewer Discharge without pre-treatment for the exceeded parameters as listed in Table 5-7. It will be the responsibility of the dewatering contractor to ensure that any discharge to the local Region sewer system occurs in full compliance with the Town's Sewer Use By-Law (By-Law 2013-68). The Contractor shall ensure that all control measures implemented, and all materials collected or trapped by those measures are recovered and properly disposed of when they are no longer engaging in the activity or discharge to the sanitary sewer. Suggested treatment options for the dewatering discharge is sedimentation tanks and filtration.

The results described are representative of the condition at the sampled monitoring well at the time of sampling and do not necessarily reflect conditions that will be present at the time of construction. Confirmation of local groundwater levels and groundwater quality is recommended to be completed by the Contractor prior to the outset of project construction activities.

Prior to discharging any dewatering effluent, the Contractor will be required to ensure that all necessary discharge permits and/or agreements have been secured and that the water taking plan, discharge plan, erosion and sediment control plan, a water treatment process and sampling plan has been designed and implemented in accordance with the terms and conditions of such permits and the contract documents. Additional notification of homeowners and agencies may be required as per Ministry of Environment, Conservation and Parks protocols.

Ground Settlement

Potential ground settlement/subsidence related to existing pavements, sidewalks, buildings, and other structures / infrastructure within the possible dewatering radius of influence should be assessed by an experienced geotechnical engineer (P.Eng.) based on dewatering rate and magnitude of drawdown required to allow for construction of the planned construction elements within the Study Area.

It is recommended that these utilities be identified through a subsurface utility engineering survey by a qualified Professional Engineer. It is further recommended that all buried utilities, existing buildings/roads and other structures within the dewatering radius of influence that are planned to remain during and upon completion of construction be properly inspected / surveyed prior to the commencement of any construction activities (including construction dewatering operation) to establish a pre-construction baseline for the completion of post-construction condition survey or assessment.

The calculation of settlement is based solely on the dewatering process during construction and only a temporary condition was considered. No other loading conditions, such as construction loads, excavation, or loss of fines, are considered in the assessment. The settlement during the drawdown of groundwater table is due to the increase in the effective stress conditions. The dewatering system should be properly designed to prevent any ground loss during construction.

Contaminant Migration

The potential sources of contamination within the Study Area include potential spills and de-icing salt usage in winter seasons along County Road 4 and local roads/streets.

Groundwater dewatering is anticipated to create a groundwater flow towards the dewatering locations within the radius of influence, but is not anticipated to cause migration of potential contaminants off-site to the surrounding areas. Given the limited extent of the radius of influence (approximately 20 m from the dewatering locations), and relatively short duration of dewatering (several weeks for each dewatering location), any migration of groundwater impacts related to salt application and accidental spills, if present, is expected to be minor and contained within the right-of-way.

Given the historical nature of the area (agricultural uses), it is suggested that dewatering discharge be directed to the natural environment to promote infiltration, assuming water quality samples meet Provincial Water Quality Objectives.

Water Conservation

Implementation of long-term water conservation measures is not anticipated to be required for this proposed temporary dewatering water-taking for construction purposes.

Monitoring and Reporting

Based on the groundwater volumes that potentially need to be managed during Project construction and the geological material involved, it is recommended that groundwater exclusion measures, such as the use of sheet pile walls as one example, be considered by the Contractor to minimize the groundwater inflow to the work zone and/or limiting the length of excavation trench open at any given time.

A daily record of the timing, total volumes, and average rate of water-taking at each excavation location shall be maintained by the Contractor on a daily basis during completion of the Project. The flow meter(s) shall be calibrated prior to use and installed / operated in accordance with manufacturer specifications.

Monitoring wells have been installed as part of the project, to assess and refine dewatering calculations and assumptions. Should the location of any existing monitoring wells be in conflict with the location(s) of Project construction or damaged as a result of Project construction activities, it is recommended that an Ministry of the Environment, Conservation and Parks licenced water well contractor be retained by the Contractor to decommission those locations in accordance with Ontario Regulation 903 (Wells), as amended. It is further recommended that replacement well(s) be installed by a licenced environmental drilling contractor to replace any decommissioned monitoring wells and/or piezometers.

The monitoring wells monitored during this field program can be included in the monitoring plan. The proposed frequency of groundwater level measurement within the existing monitoring well network is as noted in Table 6-5.

Table 6-5: Groundwater Level Monitoring Program Details

	Dewatering Period	Measurement Frequency
Pre-Construction & During Construction	1 st Week	Daily
	2 nd Week to End of 1 st Month	Weekly
	End of 1 st Month to Program Completion	Bi-Weekly
Post-Construction	Monthly monitoring will be obtained for six months after construction has completed or until baseline conditions are obtained.	

The monitoring of surface water is not included as part of the monitoring program described herein. However, the monitoring of surface water should be considered prior to, during and post construction should any dewatering discharge to a local surface water feature be required for any reason, further outlined in Section 6.1.4.

Where the monitoring completed above identifies a significant amount of water level drawdown (i.e., in excess of 0.3 m at a monitored location more than 92 m [R_o] away from the dewatering area), immediate action should be taken by the Contractor to assess and potentially modify their dewatering approach / methodology, and/or rate / duration of pumping, so as to limit the dewatering R_o and alleviate the observed groundwater level impact.

Confirmatory Sampling Program

It is recommended that the Contractor pursue permission for sanitary sewer discharge from the Town of Bradford West Gwillimbury. The following sections have been prepared outlining proposed requirements for the discharge of dewatering effluent that should be modified, if required, based on the discharge permit obtained.

Water Quality and Treatment Standards

Dewatering effluent is proposed to meet the following Water Quality Standards prior to discharging into the municipal storm and/or sanitary sewer systems:

- Town of Bradford West Gwillimbury’s Sewer Use Bylaw (Bylaw 2013-68)

Adequate pre-treatment shall be provided by the Contractor at each dewatering location to achieve compliance with prior to any off-Site discharge occurring. Establishing treatment methodology (settling tank) is the responsibility of the Contractor and may be further informed by the raw (pumped) water quality and confirmatory sampling results obtained by the Contractor.

Proposed Confirmatory Sampling Program

Pre-assessment sampling of the water that is planned to be discharged is to be completed by the Contractor and submitted to an accredited environmental analytical laboratory for quality testing against applicable parameter concentration limits (e.g., Sewer Use By-laws). The intent of this sampling is to confirm both the background (raw) and Contractor’s treated water quality prior to the commencement of any dewatering discharge activities.

Regular sampling and testing of the discharge by the Contractor will be required during construction to verify that the effluent quality continues to comply with the Town’s sewer use by-law limits and permits, as applicable. The recommended frequency of confirmatory sample collection is summarized in Table 6-6.

Table 6-6: Confirmatory Sampling Frequency*

Dewatering Period	Sampling Frequency
1 st Week	Twice
2 nd Week to End of 1 st Month	Weekly
End of 1 st Month to Program Completion	Monthly

Notes: *To be modified as appropriate based on the discharge permit received.

A visual inspection must be completed by the Contractor along with the collection of in-field turbidity and temperature measurements (both untreated and treated effluent discharge streams) on a daily basis during periods of active discharge for the duration of the dewatering system(s) operation.

In the event that a sample is determined to be ‘unacceptable’ based on the applicable water quality standards, field turbidity and/or temperature monitoring activities, additional effluent samples must be obtained by the Contractor immediately upon receipt of the initial laboratory results for verification purposes.

Where the verification sampling is confirmed, immediate action should be taken by the Contractor to assess and potentially modify their dewatering approach / methodology, rate / duration of pumping, and/or provide additional / alternative pre-treatment prior resuming any further discharge. Prior to

resuming any effluent discharge, a confirmatory sample should be obtained by the Contractor confirming adherence with the applicable water quality standards.

Where the verification sampling is determined to be anomalous, the confirmatory sampling program is recommended to resume at the staged sampling frequency outlined in Table 6-6.

Analytical Testing Suite for Confirmatory Samples

The analytical testing package for confirmatory samples is proposed to comprise a suite of metals, inorganics, volatile organic carbons, and general water chemistry parameters (including Total Suspended Solids and turbidity), inclusive of the complete parameter list in the Town of Bradford West Gwillimbury's Sewer Use Bylaw 2013-68. Confirmatory Samples shall be submitted to a CALA-accredited environmental analytical laboratory for testing.

Private Well Monitoring Program

It is required that prior to any construction dewatering occurring that the four properties listed Door to Door Water Well Survey Report be contacted for monitoring and sampling of the residential well during and after construction to ensure that there is no effect on the water quality from the baseline assessed. The Door to Door Water Well Survey provides a baseline for the water wells prior to the proposed construction to determine existing water quality and quantity of each property. Additional mailing of letters to all properties within 500 m of the study limits is recommended to ensure all concerned homeowners are monitored during and after construction to capture and ensure potential well issues are addressed and monitored. If any water well complaints are received, the response will follow Ministry of Environment, Conservation and Parks guidance and follow Permit to Take Water protocols and conditions.

6.1.3.3 Anticipated Permits and Approvals

Where construction dewatering volumes between 50,000 and 400,000 L/day are expected, filing of the project on the Ministry of the Environment, Conservation and Park's Environmental Activity and Sector Registry system is required in accordance with Ontario Regulation 63/16 (as amended). Where expected construction dewatering volumes exceed 400,000 L/day, a Permit to Take Water (Category 3) will be required from the Ministry of the Environment, Conservation and Park in accordance with Section 34 of the *Ontario Water Resources Act* (RSO, 1990). Based on the dewatering estimates provided in Table 6-4, an Environmental Activity and Sector Registry is recommended to provide dry working conditions within in the excavations even as the total dewatering is anticipated to be a maximum for an excavation at 394,896 L per day. It is assumed that the construction will occur in stages and dewatering volumes will stay well within the limits of an Environmental Activity and Sector Registry.

Construction dewatering activities have the potential to affect groundwater quantity, resulting in decreases in baseflow to watercourses, groundwater discharge to wetlands, yield of private water wells and alteration of groundwater flow patterns. Where dewatering occurs, local groundwater table elevations will be temporarily lowered to facilitate construction under dry conditions. These effects are typically confined to the radius of influence (R_o) from dewatering activities and are temporary in nature.

6.1.4 Surface Water and Hydrology

6.1.4.1 Potential Impacts

As outlined in Section 5.1.4, a Drainage and Hydrology assessment was completed as part of the Early Works assessment.

The overall objective of the drainage and stormwater management plan is to minimize impacts in terms of water quantity and quality, on the existing drainage system and natural environment along and around County Road 4 due to the Early Works.

It must be noted that stormwater management measures do not exist under existing drainage conditions along the County Road 4 right-of-way. There is an existing stormwater management pond located upstream of the culvert EX-CL-9, that treats stormwater runoff from the adjacent residential subdivision.

The Ministry of Transportation *Highway Drainage Design Standards (HDDS, Feb. 2008)*, and the Ministry of the Environment, Conservation and Parks *Stormwater Management Planning and Design Manual (March 2003)* provided the design standards for the selection and design of the stormwater management measures required to mitigate the impacts of the Early Works.

The stormwater management strategy for this project is addressed at different construction stages related to the temporary and interim conditions of County Road 4 Early Works.

The steep slopes of County Road 4 and narrow right-of-way space limit the stormwater management measures feasible for the site. However, an effort has been made to provide measures that, despite Ministry of Environment, Conservation and Parks standards are not met, they will provide to the feasible extent treatment of runoff generated with the paved areas of the road.

6.1.4.2 Commitments and Recommended Mitigation Measures

The stormwater management strategy for construction (see Section 3.4.1.10 for details on construction stages) includes the following:

- Flat bottom grassed swales with flow check dams will be installed along roadside ditches where feasible.
- Flows at culvert EX-CL-9 will be treated by the existing stormwater management pond. Flows along roadside ditches draining to this culvert can be treated with flat bottom swales with flow check dams.
- Flows at culvert EX-CL-8 will not require treatment due to the natural area (forest) characteristics of its catchment area. However, flows along roadside ditches draining to this culvert can be treated with flat bottom swales with flow check dams.

Flat bottom grassed swales are designed to reduced flow velocities and to promote sedimentation. They are particularly applicable for roadway applications due to their linear nature. However, specific Design Criteria must be achieved. Proposed flowrates will be determined along the swales to ensure that velocity criteria are met.

Flat bottom swales are proposed along the east and west side ditches of County Road 4. The bottom widths will be sized based on the available land and grading constraints to maintain the swale within the roadway right-of-way. In addition, in areas where the swales are in the proximity of wetlands, the swale will be designed as shallow as possible to minimize adverse impacts to ground water levels in the wetlands.

In addition, permanent flow check dams are proposed along both east and west swales. The swales will be designed according to Ministry of the Environment, Conservation and Parks standards in combination with the flow check dams (weir), which will further slow down flow velocities, provide some measure of flood attenuation and to some extent quality control of runoff.

Operations and Maintenance

The *Ministry of the Environment's Stormwater Management Planning and Design Manual, March 2003*, provides guidelines for operation, maintenance and monitoring the performance of stormwater management facilities. Relevant information for the study area has been summarized in this section for the purpose of ensuring proper care of the site for optimal performance and longevity.

Regular maintenance and inspection of the proposed ditches and culverts constructed as part of the Early Works to ensure they are operating as designed.

For the flat bottom grass swales with flow check dams proposed for the study area, five main operation and maintenance activities should be completed, which are explained below.

- Inspection: As mentioned above, regular inspection is essential to assess the condition of the site, provide clean up and maintenance solutions and set goals for the upcoming year.
- Grass cutting: For flat bottom grass swales, longer grass is more beneficial for quality control; however, the aesthetics of the property is usually of some concern to the nearby residence. Grass-cutting is provided mainly to keep the property looking neat and tidy but should be limited if at all possible.
- Minor landscaping: to restore seasonal vegetation loss, maintain desired planting densities alongside slopes, remove undesirable plant species and improve aesthetics.
- Weed control: Weeds are referred to as unwanted vegetation species which could be invasive to adjacent areas if it is not controlled or have negative impacts on the stormwater management facility operation. Weed control may be required annually.
- Removal of accumulated sediment: Sediment removal for grassed swales is required when the aesthetic attributes of the swale indicate so. Discoloration of the soil or the buildup of a "crust" may indicate the need for sediment cleanout. The frequency of sediment removal depends on the drainage catchment area and level of imperviousness. The initial inspections should provide guidance on future removal schedules. The upstream side of flow check dams should be a focus of the inspections as this is likely where sediment buildup will occur. Ministry of the Environment, Conservation and Parks sediment disposal requirements should be consulted for information pertaining to the exact parameters and acceptable levels for different disposal options.
- Trash removal: Trash removal is an integral part of the stormwater management facility maintenance. Generally, a "spring cleanup" is needed to remove trash and debris from all surface stormwater management ponds. Trash removal is then performed as required based on observations during regular inspections.

All monitoring and maintenance activities will be recorded in a logbook kept by the proponent, also including but not limited to, the name of the designated inspector and a record of all activities related to inspection, monitoring and maintenance

For the grassed swales proposed for the study area, during the inspection it should be verified that the grading and vegetation are as designed, and that stormwater will be conveyed where and how it was intended.

The following principles are proposed as the basis of the monitoring framework.

- Monitoring must be directed at fulfilling one or more objective sets, be subject to analysis and lead to potential actions;
- Monitoring of receiving watercourses should be for identifying problems, establishing a background reference, and evaluating the effectiveness of controls;

- Technology performance monitoring should be to confirm that the stormwater management facility operates as designed, if not, determine if remedial design improvements are needed, or if it needs maintenance. This will assist in improving future designs.
- The strategy should recognize and incorporate existing monitoring programs.
- Reporting on results and taking appropriate follow-up action is a key component that fulfils due diligence expectations.

6.1.4.3 Anticipated Permits and Approvals

All Remedial Works will need to be approved by the Town of Bradford West Gwillimbury. Information may be requested by the Town to clarify why the works are required, to present design alternatives, and to demonstrate that the proposed works will be effective. As well, additional monitoring events and/or an increase in inspection frequency may be required to verify the effectiveness of the proposed maintenance and monitoring works.

6.1.5 Erosion and Sediment Control

6.1.5.1 Potential Impacts

Construction will require clearing of vegetation, topsoil stripping and earth grading that leaves exposed soils vulnerable to wind and water erosion. Stringent sediment and erosion control measures will need to be implemented to ensure that the receiving storm drainage system or watercourse is not negatively impacted by construction practices. Sediment release due to construction activities is not only detrimental to the health of the receiving system but will also result in costly future maintenance work of the existing downstream drainage infrastructure.

Prior to construction, the objectives of the Erosion and Sediment Control Plan is to protect the environmental features, water resources and receiving water bodies located within the study area; such as the tributary of the West Branch of Holland River where runoff from the County Road 4 drainage areas discharge into.

During construction, erosion and sedimentation control measures should be implemented to prevent the migration of soils from the site.

6.1.5.2 Commitments and Recommended Mitigation Measures

The following recommendations shall be considered when developing the detailed Erosion and Sedimentation Control Plan and drawings:

- Minimize erosion potential by implementing effective measures, procedural Best Management Practices and stormwater management Best Management Practices; and
- Apply sediment control measures (Best Management Practices) to prevent off-site sediment release in the event of sediment mobilization.

Vegetative

- All areas not subject to active construction 30 days after area grading should be top soiled and seeded as per Special Provision 572S01 October 2002 immediately after completion of such grading.
- Immediately following seed application, a straw erosion control blanket should be installed on any exposed slopes adjacent to sensitive features, as per OPSS 572.05.07, 572.05.08 and 572.07.04.05.

- Trapped sediments and controls are to be removed only after the soils of the construction area have been stabilized and adequately re-vegetated, unless sediments have accumulated to a depth of 1/3 the height of the sediment control device.

Structural

- As construction proceeds, diversion swales should be graded where needed along the right-of-way boundaries to intercept drainage from external areas and direct it away from exposed surfaces.
- Temporary sedimentation traps should be sized based on 125 cubic metres per hectare of drainage area.
- All culvert work should be conducted "in the dry".
- All dewatering for culvert installation should be directed to a sediment/dewatering trap.
- The locations of sediment/dewatering traps should be confirmed in the field by the on-site inspector and environmental inspector.
- Temporary silt fencing should be installed:
 - Around sensitive vegetative features; and
 - Approximately 2 m from the final toe-of-slope for the roadway embankment widening areas.
- Straw bale flow and rock checks dams should be provided in roadside ditches. Straw bales detain runoff and promote sedimentation, and to reduce channel flow velocities thereby reducing potential for channel erosion,
- Additional erosion control works may be required during the course of construction. These may consist of silt fences, swales, and/or diversion berms. The location and need for these works will need to be established in the field.
- Runoff from excavated areas or unvegetated soil will not be permitted to discharge off site or directly into active or temporary watercourses or any natural areas.
- The contractor should abide by the requirements set out in the Greater Golden Horseshoe Area Conservation Authorities Erosion and Sediment Guideline for Urban Construction (December 2006).

Other

- The Contractor shall remove accumulated sediment to the level of existing grade, in a manner that avoids sediment release to the downstream side of the sediment control device. The disposal location and method of disposal of removed sediment must be approved by the Ministry of Transportation's Environmental Monitor. All sediment control devices shall remain in place until after the surrounding ground has been permanently stabilized according to the Contract Drawings.
- Any stockpiled material must be deposited, stored, and contained in a manner to ensure sediment does not enter a water body and will be appropriately stored. Areas containing exposed soil or stockpiled material will be isolated using appropriated sediment control devices to prevent the entry of sediment into the watercourse.
- All activities, including maintenance procedures, will be controlled to prevent the entry of petroleum products, debris, rubble, concrete, or other deleterious substance into the water. Vehicular refueling and maintenance will be conducted a minimum of 30 m away from any aquatic areas to avoid potential impacts, in the event that an accidental spill occurs.

To ensure that the intent of the Erosion and Sedimentation Control Plan is maintained, and that erosion and sedimentation potential is minimized until the development area has been stabilized, the following requirements are proposed:

- No work will be permitted on site until all erosion and sediment control devices are properly installed;
- The construction of the erosion control works should be carefully supervised,
- Inspection of proposed measures should be completed after periods of excessive precipitation (i.e., rainfall depths exceed 15 millimetres),
- Bi-weekly inspection reports prepared by the engineer responsible for the project should be submitted to the contract administrator during construction until the development area has been stabilized,
- Control features that fail should be repaired and an evaluation should be completed to determine whether additional measures are required, and
- Removal of temporary erosion control devices upon completion of work:
 - Prior to removal of controls, the contractor, and the engineer responsible for the project should conduct a joint inspection of the development area.

6.1.5.3 Environmental Provisions

The following Ontario Standard Special Provisions and Ministry of Transportation Special Provisions are recommended for inclusion in the contract documents.

- Environmental Protection During Work in Watercourses and on Watercourse Banks in accordance with Ontario Standard Special Provision 182;
- Construction Specifications for Temporary Erosion Control (Ontario Standard Special Provision 804, April 2021);
- Temporary Erosion Control Measures in accordance with Ontario Standard Special Provision 804 and Temporary Sediment Control in accordance with Ontario Standard Special Provision 805;
- Environmental Incident Management Under Legislation Protecting the Environment and Natural Resources in accordance with Ontario Standard Special Provision 100;
- Management of Excess Materials in accordance with Ontario Standard Special Provision 180;
- General Environmental Protection in accordance with Ministry of Transportation Non-Standard Special Provision;
- Maintenance of Existing Drainage in accordance with Ministry of Transportation Non-Standard Special Provision;
- Spill Prevention and Response Contingency Plan in accordance with Ministry of Transportation Non-Standard Special Provision;
- Timing of in-water Work in accordance with SP101F23;
- Construction Specification for Dewatering in accordance with Ontario Standard Special Provision 517;
- Placement of Aggregates in Waterbodies in accordance with Ontario Standard Special Provision PROV 825; and
- Material Specification for Aggregates – Streambed Material with Ontario Standard Special Provision PROV 1005.

6.2 Social and Economic Environment

6.2.1 Land Use and Property

6.2.1.1 Potential Impacts

As outlined in Section 5.2.1, a Land Use and Property assessment was completed as part of the County Road 4 Early Works. There are 18 properties impacted by the County Road 4 Early Works. At this stage in the design, digital data is available that identifies the land impacted by the County Road 4 Early Works. From this data it is possible to overlay the impacted lands over the parcel fabric and determine how much of each parcel of land in proximity to the interchange is impacted. With this information the Project Team has also acquired digital data from the Town of Bradford West Gwillimbury that is used to analyze the Bradford West Gwillimbury Official Plan designation and the zoning designation is on the property. Table 6-7 provides a summary of the area impacted in hectares for each land use designation from the Town of Bradford West Gwillimbury 2021 Official Plan.

Table 6-7: Approximate Area Impacted by Land Use Designation

Land Use Designation Town of Bradford West Gwillimbury Official Plan, 2021	Approximate Area Impacted (hectares)
Industrial / Commercial	9.89 ha
Highway 400 – Highway 404 Link	26.0 ha
Open Space	2.97 ha
Residential Built Up	0.19 ha
Medium Density Residential	3.26 ha
Low Density Residential	10.05 ha
Environmental Protection	0.55 ha
Total Area Impacted (hectares)	52.91 ha

There are potential impacts to various residential, agricultural and commercial entrances of properties along County Road 4 as reconstruction of County Road 4 will result in a change in the roadway adjacent to these entrances

Impacts to agricultural lands may result in impacts to tile drains, outlets or fences.

6.2.1.2 Commitments and Recommended Mitigation Measures

Access to these entrances shall be maintained throughout construction. Reconstruction of County Road 4 will require modifications, relocations and reconstruction and/or property acquisition are required in consultation with property owners.

Tile drains, outlets and fences damaged during constructions will be repaired in consultation with property owners. New and temporary fences will be constructed to retain livestock. Field accesses will be constructed, and construction activities will be coordinated to minimize impacts on farming.

6.2.2 Designated Agricultural Lands

As outlined in Section **Error! Reference source not found.** the lands within the Study Area are not Provincially, County or Township designated agricultural lands, therefore no impacts are anticipated.

6.2.3 Noise

As outlined in Section 5.2.3, Ontario Regulation 697/21, Section 9, requires the proponent prepare an Early Works noise report in accordance with the noise protocols. The following sections outline the recommendations from the noise assessment studies that have been undertaken for the Early Works.

6.2.3.1 Construction Noise

6.2.3.1.1 Potential Impacts

Construction noise levels related to the Project were predicted as described in Section 5.2.3.1 and are presented in Table 6-8. Note that some construction activities will have a minimal effect on Noise Sensitive Areas located further away; as such, where construction activities were greater than 500 m away from a Noise Sensitive Area, the noise impact from that activity was not calculated. Potential acoustic shielding from objects, such as buildings or visual berms, was not accounted for as the acoustic shielding performance from these objects could not be estimated.

Table 6-8: Construction Noise Assessment Results

Noise Sensitive Area ID	Representative Receptor	Approximate Distance (m)	Predicted Construction Noise Levels at Receptors (dBA – Leq,8hr)				Above or Below Nighttime Basis of Assessment	Notes
			Removals	Bridge Construction	Potential Piling Type 1/2/3	Road Construction		
NSA1	NSA1R1	35/765	83	N/A ¹	N/A ¹	79	Above	1
NSA2	NSA2R1	13/330	91	61	68/67/57	88	Above	-
NSA3	NSA3R1	72/181	77	67	73/73/62	73	Above	-
NSA3	NSA3R2	23/296	86	62	69/68/58	83	Above	-

Note: First distance is to road works, second is to bridge works

(1) This location is further than 500 m from the bridge works. Noise level for bridge works area (bridge works and potential piling not calculated).

The results in the above table indicate that construction noise levels due to the Project can range, depending on location and proximity to construction, between 61 and 91 dBA, with all four of the assessed representative locations above the 70 dBA night time basis of assessment, indicating that noise disturbance will be likely when construction is closest to the residences.

As noted above, the assessment is based upon conservative assumptions, such as the construction equipment operating at the closest point of the construction areas to the Noise Sensitive Areas without any shielding effects. Actual achieved noise levels will likely be lower than the predicted noise levels.

The highest noise levels are due to select equipment (mounted impact hammer, pavement removal, jackhammer, and concrete saw) during the pavement removals and road construction. These activities are transient in nature and should not be in a single location for a long duration. Of the three potential piling methods, augured piles would be the least disruptive.

Efforts should be taken to control noise levels, to minimize the disturbance to the Noise Sensitive Areas surrounding the Project, and to decrease the potential for complaints.

Construction noise is temporary in nature and will cease at the end of the construction activities; it can be a cause of disturbance to the surrounding noise sensitive areas. Although Ontario does not have any applicable regulatory noise level limits for construction noise impacts on Noise Sensitive Areas, construction noise disturbance and potential for complaints can be reduced with the implementation of best practices and other noise control measures.

The Ministry of Transportation Noise Guide requires that construction noise be controlled and mitigated. The responsibility of this is typically split between the construction contractor and contract administrator.

6.2.3.1.2 Commitments, Recommended Mitigation Measures and Environmental Provisions

Construction contractor requirements are normally set out in Special Provision No 199F33 and Special Provision No. 199F31.

Special Provision No 199F33 is used to:

- Identify the extent of noise sensitive areas; and
- Stipulate constraints on construction noise with respect to Town of Bradford West Gwillimbury's noise control By-laws as follows:
 - Although the MTO does not require a noise by-law exemption, for works conducted from 7:00 p.m. to 7:00 a.m. (to 9:00 a.m. on Saturdays) and at all times on Sundays and holidays in residential areas
 - Submit a Notice of Works letter to the Town in advance of the works; which will allow the Town to notify area residents through the local councillor
- Equipment shall comply with the sound emission standards for construction equipment outlined in Ministry of Environment, Conservation and Parks publications NPC-115 and NPC-118 (contractor to confirm latest version by contacting the Ministry of the Environment, Conservation and Parks³), which are the following:
 - NPC-115: Construction Equipment
 - NPC-118: Motorized Conveyances
- Where feasible, equipment with broadband backup alarms instead of the tonal backup alarms/beepers shall be utilized.

³ Available from the Ontario Ministry of Environment, Conservation and Parks – Client Services and Information Branch or Environmental Assessment and Permissions Branch

- Equipment shall be maintained in an operating condition that prevents unnecessary noise, including but not limited to non-defective muffler systems, properly secured components, and the lubrication of moving parts.
- Idling of equipment shall be restricted to the minimum necessary to perform the specified work.
- Stationary equipment shall be located as far away from sensitive locations as feasible.

Special Provision No. 199F31, Environmental Exemptions and Permits, is used to set out notification requirements for operation of construction outside of noise By-law limits.

The contract administrator is required to:

- Setup a noise complaint process in accordance with of the Ministry of Transportation’s Environmental Guide for Noise.
- Investigate and address noise complaints in accordance with the Ministry of Transportation’s Environmental Guide for Noise.

Ensure that the construction contractor is in compliance with requirements of SP 199F31 and SP 199F33, and if not, require the necessary corrections to be implemented.

6.2.3.2 Operational Noise

6.2.3.2.1 Potential Impacts

Road geometry and traffic data were input into the noise model used, the United States Federal Highway Administration’s Traffic Noise Model Version 2.5, to predict the noise levels for the various scenarios required to assess both the 2024 temporary detour and the 2041 change in grade. Assessment results are in the below subsections.

Temporary Detour

Predicted noise levels and the assessment results for the temporary detour of County Road 4 are presented in Table 6-9 below.

Table 6-9: Noise Impact Assessment – Temporary Detour

Assessment Location	Predicted $L_{eq, 16}$ (dBA)		Change (dB)	Perceived Noise Impact	Below Criteria (Yes/No)	
	No Project	With Project			<5 dB Change	<65 dBA
NSA1R01	61	61	0	Minor	Yes	Yes
NSA2R01	60	59	-1	Negligible	Yes	Yes
NSA2R02	54	54	0	Minor	Yes	Yes
NSA3R01	49	48	-1	Negligible	Yes	Yes
NSA3R02	54	53	-1	Negligible	Yes	Yes
NSA3R03	45	45	0	Minor	Yes	Yes
NSA3R04	52	51	-1	Negligible	Yes	Yes
NSA3R05	50	48	-2	Negligible	Yes	Yes
NSA3R06	51	50	-1	Negligible	Yes	Yes

Assessment Location	Predicted $L_{eq, 16}$ (dBA)		Change (dB)	Perceived Noise Impact	Below Criteria (Yes/No)	
	No Project	With Project			<5 dB Change	<65 dBA
NSA3R07	58	59	1	Minor	Yes	Yes
NSA3R08	58	58	1	Minor	Yes	Yes
NSA3R09	52	52	0	Minor	Yes	Yes

Results in the above table show that the predicted noise levels due to the temporary detour of County Road 4 are less than 5 dB, and the ambient noise levels are less than 65 dBA, therefore, consideration of the further noise mitigation is not required.

Change in Grade

Predicted noise levels and the assessment results for the change in grade of County Road 4 (including the widening to 4 lanes) are presented in Table 6-10 below.

Table 6-10: Noise Impact Assessment – Change in Grade

Assessment Location	Predicted $L_{eq, 24}$ (dBA)		Change (dB)	Perceived Noise Impact	Below Criteria (Yes/No)	
	No Project	With Project			<5 dB Change	<65 dBA
NSA1R01	62	62	0	Minor	Yes	Yes
NSA2R01	60	60	0	Minor	Yes	Yes
NSA2R02	55	56	1	Minor	Yes	Yes
NSA3R01	49	50	1	Minor	Yes	Yes
NSA3R02	55	55	0	Minor	Yes	Yes
NSA3R03	45	46	1	Minor	Yes	Yes
NSA3R04	52	53	1	Minor	Yes	Yes
NSA3R05	51	52	1	Minor	Yes	Yes
NSA3R06	52	53	1	Minor	Yes	Yes
NSA3R07	59	61	2	Minor	Yes	Yes
NSA3R08	58	60	2	Minor	Yes	Yes
NSA3R09	53	54	<2	Minor	Yes	Yes

Results in the above table show that the predicted noise levels due to the widening and change in grade of County Road 4 will be below the noise level limits in the Ministry of Transportation Guide.

Noise mitigation consideration is given to receptors that experience an increase in noise levels compared to the “No-build” alternative or predicted noise levels are over a threshold. For noise mitigation to be warranted, it must meet Ministry of Transportation’s technical, economic and administrative feasibility criteria as defined in Ministry of Transportation’s *Environmental Guide for Noise*. Noise mitigation options during construction considers the type/ operation of equipment, hours of operation or proximity of equipment to Noise Sensitive Areas. The technical and economic feasibility of various alternatives of noise mitigation options such as timing constraints, setback distances, quieter alternatives are evaluated

prior to selection of a noise mitigation option. Further details are available in Ministry of Transportation's *Environmental Guide for Noise*.

As part of the Bradford Bypass, a noise impact assessment will be conducted on the refined alternative during Preliminary Design. The assessment will capture approved residential developments during the review of noise sensitive areas and the evaluation of alternatives. The assessment will be conducted in accordance with the Ministry of Transportation *Environmental Guide for Noise*. Noise modelling will be completed to determine the need for mitigation investigation and both asphalt and concrete pavement types will be considered in the assessment. The results of the assessment and mitigation recommendations will be documented in a Noise Report.

Highway projects are not typically associated with significant ground-borne vibrations therefore the Ministry of Transportation *Environmental Guide for Noise* does not include an assessment for operations-related ground-borne vibration. At this time, the Project Team has not received comments regarding vibration concerns directly related to County Road 4 by members of the public. Should vibration become a concern, Ministry of Transportation will address it on a case by case basis. Measures to minimize vibration impacts during construction will be considered during further stages of design and addressed as commitments during construction through Ontario Provincial Standard Specifications.

6.2.3.2.2 Commitments and Recommended Mitigation Measures

The results of the assessment indicate that the noise levels due to the temporary detour, and the long term impact due to the change in grade of County Road 4 in Bradford West Gwillimbury will have a minor to negligible perceived noise increase at most receptors. At all locations, the predicted noise levels and changes in noise levels are below the Ministry of Transportation's criteria for noise mitigation investigation.

6.2.4 Air Quality

6.2.4.1 Potential Impacts

Construction activities from the Project are expected to be typical of any highway construction project.

6.2.4.2 Commitments and Recommended Mitigation Measures

Prior to undertaking construction activities with potential to generate air quality impacts, the Design-Build Contractor shall work to ensure that sufficient best management practices for air quality are employed to reduce and or eliminate the potential for negative air quality impacts from construction. Additionally, best management practices may be employed in response to elevated emissions from construction as observed on site (e.g. visible dust levels, odours, etc.) or in response to complaints received during construction.

6.2.5 Climate Change

The following sections provide recommended guidance on best practices for climate change mitigation and adaptation for all phases of the Project.

6.2.5.1 Climate Change Mitigation

Net Greenhouse Gas Emissions

To promote efficiencies between the Bradford Bypass Project and the County of Simcoe's widening of County Road 4, the Ministry's Early Works project will incorporate the widening of this section of County

Road 4 including a 3.0 m wide multi-use path on behalf of the County of Simcoe. The benefit of the Early Works is that it reduces the requirement to perform construction activities twice at the same site, once for the widening of County Road 4, and a second time for the construction of the grade separated bridge crossing of the Bradford Bypass. This significantly reduces requirements for additional removal of natural features and associated carbon sinks/reservoirs and increased upstream cost from construction materials required for the second phase of construction. Combining the County of Simcoe's widening into the ministry's Early Works contract also allows the vegetation along the slopes of County Road 4 to begin to mature and contribute to the local carbon sink, rather than be completely removed a second time as would be the case if the widening were performed as a separate contract by the County of Simcoe. Completing this project will allow ease of construction on future Bradford Bypass interchange works, limiting required future construction to interchange ramps, intersection ramp terminals, lighting and traffic systems, ultimate drainage systems, and pavement markings, signage and traffic control devices.

The impacts of greenhouse gas emissions from the Project are contributed during three primary phases: construction, operation, and maintenance. Construction emissions may be categorized as both direct and indirect emissions which includes emissions from construction vehicle operation, land use change, and upstream material production for concrete, asphalt, steel, and other materials required for road construction. The upstream emissions of greenhouse gas are typically referred to as 'embodied carbon' within the buildings industry and can account for a vast majority of the emission on new construction projects as global production of concrete alone accounting for 26% of all industrial carbon dioxide emissions in 2019⁴.

Construction of new projects can impact the lands surrounding the construction site, reducing the percentage of local carbon sinks and reservoirs within the area. Carbon sinks are generally defined as areas which work to remove carbon from the atmosphere, typically including agricultural lands, forests, and large bodies of water. Carbon reservoirs perform a similar function, but also have the capacity to hold carbon within their systems which may be released later within the life cycle. These can include wetlands, vegetation and soils, reservoirs of fossil fuels, and permafrost land. The Project is anticipated to affect the local lands surrounding construction area through both expansion of road footprint for the final design and for construction of temporary bypass/detour roadways during the construction phases of the Project, both of which will impact existing agricultural land surrounding the roadway footprint. This would have a minor impact on the ability of the land within the study area to act as carbon sinks and/or reservoirs, which could slightly increase the Project's potential impact to climate change. The relative impact of this change of land use in relation to other key aspects of the Project's construction, such as embodied carbon and upstream greenhouse gas production in material production, would be considered insignificant and may be decreased through specific targeted mitigation within the final design. Based on the area of vegetated land use which would be impacted by construction and project development, and the low-biomass per square-foot ratio of the type of vegetation found within the staging zones (i.e. grasses vs. densely forested land), the loss of carbon sink potential is significantly outweighed by the volume of greenhouse gases associated with upstream creation of concrete, steel, asphalt, and other construction materials required for the road. Nevertheless, the impacts from loss of vegetated carbon sink land can be mitigated by swiftly re-instating greenspace with biomass dense vegetation (e.g. shrubs, etc.) as construction progresses where feasible, as an example.

The operation life cycle of new road or road alteration projects, such as the County Road 4 Early Works, are typically anticipated to have the greatest impact on greenhouse gas emissions from the anticipated adjustment to road traffic and traffic behaviour patterns within the study area resulting from the new

⁴ Joint statement: Canada's Cement Industry and the Government of Canada announce a partnership to establish Canada as a global leader in low-carbon cement and to achieve net-zero carbon concrete (<https://www.ic.gc.ca/eic/site/icgc.nsf/eng/07730.html>)

project implementation. A traffic analysis was performed on the Project, including a comparison to existing conditions assessed during 2019, the County Road 4 Early Works (without the construction of the Bradford Bypass) assessed at the 2041 project horizon, and the County Road 4 Early Works including the projected Bradford Bypass intersection. Table 3-1 shows the results of the three scenarios.

As shown in this comparison in Table 3-1, the traffic along County Road 4 is anticipated to increase in a future scenario. It is unclear from this analysis whether the traffic increase is a direct result of the Project, both from a road widening perspective without the Bradford Bypass and from a wholistic perspective including the addition of the proposed Bradford Bypass intersection. It is reasonable to assume that the projected population increase within the Greater Toronto Area (GTA) and surrounding areas would increase the traffic flow along the north-south routes to and from the County of Simcoe and lower regions and major traffic routes intersecting with the GTA. Regardless, the projected impacts of the Project with and without a Bradford Bypass inclusion show marked increase in daily traffic travel along the County Road 4 route within the study area, which may coincide with a similar increase in vehicular emissions from those operated by gasoline and diesel fuel. This would affect the direct emissions from the Project's operation within the year of 2041 and beyond. There is possible mitigation of the direct effects of the Project's increase in traffic through incorporation of higher percentages of electric and low-emission vehicles through programs like the Government of Canada's proposed Zero Emission Vehicle Infrastructure Program⁵.

Maintenance activities would have a temporary increase on greenhouse gas emissions resulting from the operation of construction vehicles operated by gasoline or diesel fuel. In addition, the downstream greenhouse gas impacts may be increased from material disposal or recycling programs.

Impacts on Climate during Assessment Process

There were no key features of the Project identified as having the potential to reduce greenhouse gas emissions within the community, barring any proposed mitigation measures which may be implemented in the final design. As the project involves widening and detour routing for the County Road 4 Early Works, the reduction of local agricultural land acting as carbon sinks/reservoirs is a necessary component of the construction phase. Steps may be taken to reduce disturbance to natural lands within construction by remaining efficient with use of space, and re-sodding exposed soil as soon as feasibly possible following construction completion. The construction is proposed in stages, which may be conducive to retaining as small of a local impact as possible and replacing vegetation in completed segments of road construction once a given construction stage has been completed.

Alternative Designs for the Project

This Project included an alternative assessment for three bridge options an NU Girder design, a Steel Box Girder design and a Cast-in-place Post-Tensioned Deck. While there would be an alteration in material requirements for each design which would affect upstream greenhouse gas emissions and embodied carbon within the bridge structures, this was not included as predominate decision factor in the selection of the preferred design. Rather, the design selection process was focused on structural requirements which best fit the overall geography and design requirements for the underpass structure.

Indigenous Community Impacts

Care must be taken not to inadvertently harm natural lands which act as a source of carbon sink and reservoir and may also act as a source of resource for communities.

⁵ Zero Emission Vehicle Infrastructure Program (<https://www.nrcan.gc.ca/energy-efficiency/transportation-alternative-fuels/zero-emission-vehicle-infrastructure-program/21876>)

There are several options and technologies available at this time which can serve to mitigate a project’s impact on greenhouse gas release (both direct and indirect), with projected increase in access to new technologies over time anticipated as both provincial and federal governments implement new focused actions related to climate change mitigation development. Primary suggested mitigation options for this Project include best practices and technologies which may be implemented to target climate change impacts during both construction and operation phases, as well as the decommissioning phase (e.g. future rehabilitation and maintenance) to a lesser extent.

Table 6-11 details both project impacts to greenhouse gas releases and climate change resulting from construction and operation, phases of the project and potential mitigation measures which may be employed to reduce project impacts.

Table 6-11: Greenhouse Gas Emissions and Climate Change Mitigation Options

Project Scenario	Anticipated GHG/Climate Change Impact	Examples of Possible Climate Change Mitigation Options
Construction: Reduction of natural or agricultural land acting as carbon sink and/or reservoir within the project Study Area	Corresponding % land use reduction in available carbon sink and reservoir capacity for removing carbon from the atmosphere.	<ul style="list-style-type: none"> ■ Limiting the requirement of naturalized land to only that which is required to construct the Project, including that which is required to appropriately stage construction ■ Re-naturalizing (e.g. re-sodding, vegetation and tree planting, etc.) of staging areas immediately following construction phase end.
Construction: Operation of gasoline or diesel fuel powered construction vehicles and equipment during construction activities	Emissions from diesel or gasoline powered vehicles and equipment cause an increase in greenhouse gas emissions during construction operations.	<ul style="list-style-type: none"> ■ Properly maintaining vehicles and other internal combustion engines used on site (pumps, generators, etc.) to ensure engines are operating as designed with optimal emissions ■ Minimizing on-site vehicle idling during construction activities and implementing a vehicle maximum idling policy while on site.
Construction: Paving techniques	Approach to paving on-site during construction has a direct impact on greenhouse gases released.	<ul style="list-style-type: none"> ■ Use of reclaimed materials in the roadway, aggregate for use in new hot mix asphalt and road base, subbase or shoulders
Construction: Structural work	Structural design and material component selection has an impact on both indirect	<ul style="list-style-type: none"> ■ Use of prefabricated Bridge Elements to improve the efficiency and duration

Project Scenario	Anticipated GHG/Climate Change Impact	Examples of Possible Climate Change Mitigation Options
	upstream greenhouse gas emissions and embodied carbon of structural materials for the project.	construction is an option open to the Contractor <ul style="list-style-type: none"> ■ Precast concrete pavement and rapid set concrete for concrete repairs to minimize congestion ■ Extended life-cycle materials (ASTM 1010 or Corrosion Resistant Steel) to minimize rehabilitation requirements
Construction: Traffic management	Approaches for traffic management on road construction projects has an impact on the indirect emissions from vehicles passing through the construction zone.	<ul style="list-style-type: none"> ■ Design-Build Reference Concept drawings includes a construction detour to reduce congestion
Construction: Earth management	Approaches to earth management on-site during construction has an impact on direct emissions from vehicles operating onsite, and embodied carbon of the project infrastructure during its lifespan.	<ul style="list-style-type: none"> ■ Where property availability allows, using excess materials on site through slope flattening is an option that can be considered by the Design Build Contractor in order to minimize the need to truck excess materials away from the site. ■ Minimizing double handling of materials and the associated trucks required for hauling is typically desired by contractors to reduce costs, this also has the benefit of reducing fuel requirements and emissions. ■ Retained soil system (RSS) walls or mechanically stabilized earth (MSE) rather than concrete retaining walls
Operations: Electrical systems design	Design of electrical systems for the project has the capacity to affect the indirect emissions of greenhouse gases related to energy production for the	<ul style="list-style-type: none"> ■ LED Traffic Signal Heads and LED Lighting at the intersection of County Road 4 and 8th Line, if specified by the Town of Bradford

Project Scenario	Anticipated GHG/Climate Change Impact	Examples of Possible Climate Change Mitigation Options
	ongoing operation of the project infrastructure during its lifespan.	West Gwillimbury which has jurisdiction over this intersection
Operations: Increased impact from gasoline and diesel fuelled passenger and commercial vehicles travelling within the Study Area	Increased vehicle kilometers travelled along the project corridor (projected through traffic modelling for the various project scenarios and/or alternatives) will increase greenhouse gas emissions from vehicle tailpipe exhaust tailpipes. Anticipated improvement to vehicle emission efficiencies (via new manufacturer standards, low-carbon fuels and electric vehicles) can effectively decrease emissions from travelling vehicles within the study area; however, these efficiencies may be offset by traffic increases if significant enough.	<ul style="list-style-type: none"> ■ The Town of Bradford West Gwillimbury had jurisdiction over the signalized intersection at County Road 4 and 8th Line; however, signal timing plans are typically designed to reduce overall vehicle delay either at an individual intersection or on a network wide basis, this in turn leads to reduced idling time.

6.2.5.2 Climate Change Adaptation

A project's risk to climate change is determined by:

- A typical severity of consequence on the assets. To estimate the level of consequences, three impact categories were identified based on what is considered most relevant when managing risks for the project. These are impacts on health and safety (include occupational illness and injury to staff or public inconvenience), infrastructure integrity (include damages or deterioration of essential component materials) and operational impacts (include operational inefficiencies and potential facility shut down)
- The probability or likelihood of relevant climate variables in the context of changing climate.

To assess and evaluate the risk of each interaction between the Project components and climate variables, severity levels were given by using relevant literature including low, moderate and high. The qualitative risk analysis was determined from the combination of severity and likelihood ratings. Adaptation measures are only suggested to interactions with moderate and high risks.

This assessment examines the impacts of adverse climate events within the Study Area of the Project and assess high-level risk mitigation. Therefore, in order to prevent any significant adverse environmental impacts during the construction of the Project and as possible solutions that should be discussed with engineers, the adaptation measures in the Table 6-12 below shall be adhered to wherever possible during construction.

Table 6-12: Climate Change Adaptation Risk Assessment and Proposed Adaptation Measures

Potential Impact	Risk	Proposed Adaptation Measures
<p>Construction: Heavy rainfall event would pose a risk to the construction site. Waterlogging and flash floods may occur on the construction site due to heavy rain. This can compromise any materials contained there.</p>	Moderate	<ul style="list-style-type: none"> Design the construction site drainage system to be able to withstand heavy rainfall
<p>Site and Equipment: Potential impacts to equipment and structures associated with changes in winds:</p> <ul style="list-style-type: none"> Storms and heavy winds could damage fences and lighting poles. Construction could be delayed by such climate events. Risk to the safety of site workers and the surrounding environment Loss of materials Increase in dust 	Moderate	<ul style="list-style-type: none"> If any height work will be undertaken, the schedule of activities should be adjusted, and the wind speed reviewed beforehand. Ensure all site fences and structures are properly secured Cover spoil and material heaps during periods of high winds Implement measures to control dust
<p>Surrounding Natural Environment: Potential impacts to the surrounding natural environment as a result of increased precipitation:</p> <ul style="list-style-type: none"> During construction, heavy rainfall may result in soil erosion on surrounding agricultural lands and nearby residential subdivision. Heavy rainfall can also result in accidental spills of hydraulic oil or fuel into the Unnamed Tributary north of 8th Line that can damage terrestrial and aquatic ecosystems 	Moderate	<ul style="list-style-type: none"> To prevent the risk of erosion and the potential for runoff from the construction site into the Unnamed Tributary north of 8th Line, install sediment barriers and redirect water to a vegetated area

6.2.6 Landscaping

6.2.6.1 Potential Impacts

In keeping with the Environmental Study Report for the Municipal Class Environmental Assessment for the Widening of County Road 4 by the County, landscaping works for the County Road 4 Early Works will require the reinstatement of vegetative coverage that is similar to pre-construction conditions for areas disturbed by construction.

Since a portion of the site restoration for Early Works fall within disturbed areas required for the construction of the Bradford Bypass, select areas of the Early Works landscape restoration are expected to be temporary. The ultimate landscaping design in the area of County Road 4 and the Bradford Bypass interchange will be captured as part of the preliminary landscape design and environmental commitment for the Bradford Bypass.

6.2.6.2 Commitments and Recommended Mitigation Measures

A combination of ground cover through seeding, livestakes for steep slopes and shrub plantings that range in size from small to large (in lieu of trees) would provide appropriate landscape rehabilitation effort, while anticipating the future development of the Bradford Bypass. For areas outside of the Bradford Bypass Right-of-Way, the use of deciduous and coniferous trees with varying install sizes (such as seedlings, whips, and caliper sizes).

Selection of species and planting densities for all landscape restoration shall aim to match the existing vegetative communities outlined in Table 5-1 of the Terrestrial Ecosystems Existing Conditions Memorandum, dated November 5, 2021, while applying the above noted recommendations. All landscape works shall follow applicable guidelines provided by and in consultation with the Lake Simcoe Region Conservation Authority, County, and the Township of Bradford West Gwillimbury.

6.2.7 Waste and Excess Materials Management

As outlined in Section 5.2.7, a Waste and Excess Materials Management Plan was prepared for the County Road 4 Early Works. The Plan outlines the following roles and responsibilities of key construction personnel with respect to the Plan.

Table 6-13: Conceptual Roles and Responsibilities for Waste and Excess Materials Management

Role	Definition	Responsibility
Qualified Person	The person holds a license, limited license or temporary license under the <i>Professional Engineers Act</i> , or the person holds a certificate of registration under the <i>Professional Geoscientists Act</i> , 2000 and is a practicing member, temporary member or limited member of the Association of Professional Geoscientists of Ontario per Section 5 of Ontario Regulation 153/04. The Qualified Professional will be assigned by the Contractor.	The Qualified Professional will be assigned by the Contractor and is responsible for: <ul style="list-style-type: none"> ■ Ensuring the soil management plan is followed. ■ Assessment of soil and its appropriate use with respect to all activities. ■ Regular communication with the Ministry of Transportation on the management and use of soil within the Project.
The Ministry of Transportation’s Environmental Monitor	The Environmental Monitor has the authority to direct the Construction Manager or Contractor to satisfy or meet the standards outlined in the Environmental Protection Plan ⁶ .	Independent of the Contractor and staff structure and is ultimately responsible to the Ministry of Transportation.
Contractor	Any person, who is not directly employed by the Ministry of Transportation, conducting work or other activities in relation to the Project on behalf of or at the request of Ministry of Transportation.	Is responsible for construction of the Project in accordance with detailed design plans and implementation of associated mitigation measures, as outlined in the Environmental Protection Plan and associated tender packages(s).
Project Leader	The Project Leader of Ministry of Transportation or the duly authorized agents.	Is ultimately responsible for making decisions relating to the planning and implementation of the Project.

6. The Environmental Protection Plan is an attachment provided in the overall Tender Package.

6.2.7.1 Potential Impacts

The following provides the relevant protocols and procedures for soil management. Given the results of the Soils Chemical Analysis, additional soil sampling programs may be required to investigate the extent of the soil impact based on the proposed locations of the excavation. It is anticipated that most of the excavated soils can be re-used on Project. This will need to be confirmed by the Contractor and a Qualified Professional.

If contaminated soils are encountered during construction, the Contractor must notify the Ministry of Transportation Environmental Monitor and the Project Leader. The suitability of re-using that soil must be determined before re-using it in accordance with Ontario Regulation 406/19.

If excavated soil is deemed unsuitable for backfill operations due to environmental conditions, the Contractor shall proceed to stockpile the material in the appropriate location assigned for unsuitable material on site. The Project Leader and the Ministry of Transportation's Environmental Monitor can direct the Contractor, whether the soil is required to leave the site or can remain on site with the additional approval of the Qualified Professional. No soil may be transported off-site without authorization from a designated Qualified Professional, the Project Leader and the Ministry of Transportation's Environmental Monitor during construction work.

Based on the age and materials used for buildings on properties and two culverts within the Project Area, there is potential for designated substances to be present. Should buildings be identified for demolition by MTO, a Designated Substance Survey (DSS) should be completed to ensure proper handling and disposal of materials.

6.2.7.2 Commitments and Recommended Mitigation Measures

Soil Excavation and Salvage

The major areas that require cut/fill include the grading for the road winding, as well as the areas designated County Road 4 Underpass. The estimated volume of excess material for the entire Project throughout each stage is estimated to be 21,000 m³. The estimated quantity of material that could be reused or placed within the Project Area is unknown at the time of this report.

For the purposes of the Waste and Excess Materials Management Plan topsoil includes those horizons in a soil profile containing organic material typically comprised of deposits of partially decomposed organic matter. Subsoil consists of the soils which occur below the topsoil.

Topsoil stripping will be based on, but not limited to, the following considerations and constraints.

- Topsoil will be stripped and stockpiled in accordance with the Grading Plan for all permanent and temporary construction areas after areas have been cleared of vegetation.
- Topsoil stripped during the site preparation program is not considered suitable for reuse in any application other than general landscaping on the site. The topsoil can be used for landscaping within diversion channel and swales, and the construction of landscaped berms.
- Any topsoil to be salvaged will be stripped during dry periods to the greatest extent practical. Topsoil will be stored in accordance with the sediment and erosion control measures described in the Environmental Protection Plan and contract specifications, until it is required for site reclamation.
- Topsoil piles shall be marked with appropriate signage to prevent accidental admixing. Topsoil shall not be imported to or exported from the site unless it satisfies the requirements of the *Aggregate Resources Act*.
- Topsoil from the natural areas will be separated from other topsoil stockpiles so that it may be used for restoration of the areas from which it was removed, to the extent possible.

- Replace topsoil as evenly as possible over areas of the construction area to be reclaimed where topsoil salvage was conducted. Postpone replacing topsoil during wet weather or high winds to prevent damaging soil structure or erosion of topsoil.
- Subsoil will be stored separately from topsoil with a minimum of 1 m separation of the piles
- Blade ratted topsoil flat prior to topsoil replacement.
- To prepare restoration areas for seeding, spread, loosen and fine grade topsoil. Topsoil shall be prepared for planting at a depth of 0.3 m unless otherwise specified.

Handling and Storage of On-Site Soil

It is the responsibility of the Contractor and the Ministry of Transportation to determine the best strategy for the movement of soil across the Project. Double handling of soil is to be minimized to the extent possible.

Soil shall not be placed in locations where there is direct drainage to that location. The drainage at the laydown located need to be managed appropriately to avoid localized flooding and/ or erosion of these storage areas.

Site Access and Movement

Site access and movement will be based on, but not limited to, the following considerations and constraints:

- The Contractor must keep within the designated construction limits and not travel from different areas of the Project using the public road network for movement of soil.
- The Contractor should limit the crossing of any watercourse to pre-determined locations to aid movement within the Project. Should other temporary crossings be required for any other fish-bearing watercourse, the Contractor shall develop a plan and submit to the Ministry of Transportation's Environmental Monitor for approval. Approval must be received before implementation. These temporary crossings of any watercourse will not be accessible once the realignment and restoration of the watercourse is complete. Work shall be undertaken in compliance with the *Fisheries Act* and any permits or approvals. The Contractor shall move the soil within Construction Limits. The off-site soil storage and movement is outlined further below.

Stockpiles

Stockpiles within the Project will either be re-used for engineered or for other purposes (e.g., topsoil/slope flattening). Some stockpiles may be required for a short period of time, but in some instances, it may be necessary to stockpile earth material for an extended period. Stockpile locations are to be limited to the Laydown Areas.

Stockpile locations within the Laydown Areas will be based on, but not limited to, the following considerations and constraints.

- Excavated earth that is not to be utilized immediately will be temporarily stockpiled in a manner that does not cause an adverse environmental effect or impair water quality.
- There will be minimal stockpiles of earth and granular material on-site in order to limit/ avoid double handling of material.
- A stockpiling location will generally be in proximity to where the material will be ultimately used.
- Earth will not be placed in locations where there is direct drainage to that location.
- Stockpiled materials near any watercourse will be stored and stabilized at least 30 m away from the watercourse.
- Soil must not be stored within 10 m of the construction limits unless any of the following apply:
 - 500 m³ or less will be stored
 - Soil storage will be less than 1 week

- There is a physical barrier between the excess soil and the Construction Limits.

Stockpile management will be based on, but not limited to, the following considerations and constraints.

- Implement measures, during construction, to avoid the introduction or spread of invasive vegetation with the Project Area, including from equipment brought on-site from other worksites and from imported fill. In doing so, take into account Ontario Invasive Plant Council's *Clean Equipment Protocol for Industry*.
- Stockpiles with invasive species may be tarped to facilitate the invasive species deterioration.
- Stockpiles shall be temporarily seeded to reduce erosion if left exposed or inactive for more than 30 days.
- Measures to prevent the mobilization of stockpiles will be employed using silt fences and other erosion control methods in accordance with the Erosion and Sediment Control Plans and approved by the Ministry of Transportation's Environmental Monitor.
- For stockpiles left on-site long-term (more than one month) and where erosion and sediment control measures are required to manage on-site runoff water, the Contractor shall maintain such measures to ensure their effectiveness. Silt fencing installed around soil stockpiles must maintain a minimum 1 m distance from the toe of the stockpile.
- Additional erosion and sediment control measures will be inspected on a weekly basis and after a major precipitation event. The Contractor is responsible to correct any identified deficiencies in a timely manner.
- The stockpiles should be monitored to ensure that stockpiles remain intact and that there are no environmental adverse effects, erosion issues, or other concerns.
- Soil stockpiles of any type must be stored with slopes 70 degrees or less from April 15 until July 15 (MNRF, 2017) to prevent Bank Swallows (*Riparia riparia*), a bird Species at Risk, from nesting in the stockpiles. If not permissible, the contractor shall implement exclusion techniques such as tarping of slopes.
- Soils shall be handled and stored during construction in a manner that protects soil quality for re-use.

On-Site Re-use of Soil

Decisions on re-using stockpiled soil to backfill the excavations or for grading within the Project Area will be determined in accordance with the project specifications and will be based strictly on the suitability of soil for use in backfilling construction excavations or as structural fill. The Contractor is responsible for the re-use of soil within the Project Area to the extent possible.

Handling and Storage of Excess Soils (Off-Site)

The Contractor shall re-use excess soil within the Project to the extent possible. Remaining excess soil shall be re-used or placed in the creation of berms at locations to be determined by the Qualified Professional, Project Leader and the Ministry of Transportation's Environmental Monitor. In some instances, on-site re-use of soil may not be possible. In these instances, with the consultation and approval of the Qualified Professional, Project Leader and Ministry of Transportation's Environmental Monitor the soil may be reused off-site.

Stockpiles of excess soil deemed unsuitable for use in any application after all construction excavations have been backfilled and grading completed within the Project and as approved by the Qualified Professional, Project Leader and the Ministry of Transportation's Environmental Monitor, must be transported to an off-site disposal facility or approved off-site reuse receiver in accordance with the applicable regulations, including Ontario Regulation 406/19. Transportation and reuse or disposal of excess soil should follow an Excess Soil Management Plan (developed by the Contractor and approved by the Ministry prior to transport of reuse or disposal of the soil. All documentation (bills of lading, waste

manifests, waste characterization, etc.) are to be maintained on-site, and copies shall be provided to the Ministry and the Qualified Professional. When required, off-site reuse or disposal details should be included in the Excess Soil Management Plan by the contractor outlining specific procedures and protocols for soil sampling and disposal. No soil removed from the site may be disposed of off-site or re-used at any location other than the Project Area and/or off-site location permitted to accept the soil. Approval by the Qualified Professional is required prior to the removal of any soil from the site. Preference will be given to re-using soil instead of disposing of soil at a landfill if the geotechnical quality of the soil is deemed appropriate for re-use. Large debris and solid waste material such as foundations, concrete, field stones, cobble stones, wood or metal shall be separated from the soil by mechanical means and salvaged for on-site/off-site re-use or disposed off-site separately as solid waste at a facility permitted to receive construction/ demolition debris.

Any excess soil should be sampled according to a Sampling and Analysis Plan that is prepared by the Qualified Professional based on Ontario Regulation 406/19 and at a minimum, soil samples must be analyzed for the following parameters: Petroleum Hydrocarbons in Fractions F1 to F4, and metals (including lead), salinity (if there are any intended agricultural receiving sites), inorganics, pH and grain size. Additional analysis may also be required for leachate if any substances with published Leachate Screening Levels in the Soil Rules are identified as contaminants of concern within the Project.

Assuming excess soil is stockpiled, appropriate bulk soil sample frequencies should comply with "Records of Site Condition - Part XV.1 of the Act, Ontario Regulation 153/04 as amended, Table 2 Minimum Stockpile Sampling Frequency". This is a requirement of Ontario Regulation 406/19.

All sampling and decontamination procedures, laboratory analytical methods, and protocols and procedures will be consistent with those established by the Ministry of the Environment, Conservation and Parks, as documented in "*Guidance on Sampling and Analytical Methods for Use at Contaminated Sites in Ontario, May 1996*" (MOE 1996 Guidance Manual). Representative samples should be collected in containers supplied by a Canadian Association for Laboratory Accreditation (CALA) - accredited laboratory.

Based on the results of the analytical testing of soils within the Project Area, excess materials should not be re-used off-site at a residential, commercial, or industrial property without further verification sampling or acceptance of that material according to the Excess Soil Management Plan for the receiver site that is completed by the Contractor and approved by the Ministry. It should be noted that the private receiver site may require additional testing to satisfy the Excess Soil Quality Standards published in the Soil Rules; which may require the collection and analysis of soil for select Synthetic Precipitation Leaching Procedure (SPLP) parameters to meet Ontario Regulation 406/19 before soil are exported and accepted. The Contractor will follow the proper screening and reuse or disposal requirements for excess soil if any is deemed to require off-site reuse or disposal. When soil suspected of being potentially contaminated are observed during construction, the contractor should inform the Qualified Professional. Additional testing should be conducted to further characterize the contamination based on the Qualified Professional's recommendation to determine suitability for re-use on-site or disposal off-site.

Off-site Receiving Sites for Beneficial Re-use

Should on-site re-use not be possible, the Contractor shall make all reasonable attempts to locate a suitable off-site beneficial re-use receiver. Only as a last resort shall disposal of excess soil at landfill will be undertaken. Re-use at off-site beneficial re-use receivers shall be communicated to the Ministry and the Contractor shall verify and document that the receiver is operating under appropriate by-laws, permits and regulations and that the quality of material being re-used is suitable for their operation. Copies of all agreements, hauling record, bills of lading, weigh bills, analytical results shall be forwarded

to the Ministry and/or Contract Administrator. A copy of the hauling record must be retained on behalf of the Ministry and confirmation of receipt of the excess soil at the destination site must be obtained by the hauler with a copy of the final record to be retained by all parties for two years.

Receiving sites identified for beneficial re-use of excess material will be screened in advance and will require approval by the Qualified Professional. As part of the screening process, the Qualified Professional will ensure that receiving site criteria, and legislative and regulatory requirements are withheld. If excess soil is to be transported off the right-of-way for beneficial re-use at a receiving site, each load should be accompanied by documentation from the Qualified Professional that summarized or provides (as a minimum):

- The sampling and segregating work done,
- The excess soil data pertaining to the suitability for the excess soil for re-use,
- The receiving site soil data pertaining to the suitability of the excess soil for re-use at the receiving site,
- A statement from the Qualified Professional that the soil should be used for beneficial re-use and is not likely to cause a negative effect on human health or the environment; and a statement from the QP confirming the land use of the receiving site matches the intended use/ suitability of the excess soil

Before the soil has been shipped and received at the receiving site, the Ministry requires written documentation from the owner of the receiving site confirming acceptance of the soil and the owner's understanding of the soil quality and quantity. The following must be kept on file for future reference as outlined in Ontario Provincial Standard Specification MUNI 100:

- A record of the exact location where the soil is deposited on the Receiving site;
- Landowner/ facility names and civic addresses;
- Date of disposition;
- Quantity (bill of lading);
- Soil sampling results; and,
- QPs confirmation of appropriateness of excess soil for Receiving Site.

Handling and Storage of Contaminated Soils

If potentially contaminated soil is encountered based on organic vapour monitor, odours, soil discolouration, buried containers or other materials contributing to a potential release, etc., the Contractor must inform the Ministry and the Qualified Professional. The following provides guidance with respect to contaminated soil management within the Project Area.

Soil Testing

A thorough understanding of the contaminants that may be encountered and appropriate means and measures for handling and managing excavated materials should be contemplated in advance of undertaking excavation activities of suspected contaminated soils. Contaminated soil is soil that exceeds the applicable Ministry of the Environment, Conservation and Parks Table 2 Site Condition Standard (MECP, 2011).

A procedure for soil testing, if soil that is observed to be potentially contaminated is encountered during excavation shall be developed by the Qualified Professional, in accordance with the project specification. If potentially contaminated soil is encountered during excavation, the contractor shall notify the Ministry and the Qualified Professional and the above noted procedure shall be implemented by the Contractor.

Temporary Soil Storage Site

The Contractor shall stockpile all suspected contaminated soil in a designated Temporary Soil Storage Site in such a manner as to protect existing surface, materials and structures from contamination, runoff surface water and, as result, erosion. Intermediate staging of contaminated soils elsewhere within the Project Area is strictly prohibited. If the designated Temporary Soil Storage Site cannot be used for any reason, the Contractor must consult with the Qualified Professional to determine an alternative, if possible. The Qualified Professional should notify the Ministry of any changes.

The Temporary Soil Storage Site should be designed by the Qualified Professional and constructed by the Contractor. Once designated, the surface soils (up to 1.5 m depth) of the Temporary Soil Storage Site will be sampled to establish a baseline of environmental conditions. Depending on the size of the Temporary Soil Storage Site, between three and eight samples will be collected and submitted for chemical analysis of PHCs in F1-F4, VOCs, PAHs, metals and inorganic parameters, including pH. Samples will be collected using either hand auger or by excavation of shallow test pits.

The design of the Temporary Soil Storage Site will include: a minimum of 10-mil (10 thousandth of an inch) nylon reinforced polyethylene sheeting serving as an impermeable/low permeable barrier to contain stockpiled potentially contaminated excess soils; a 0.5 to 1 m high berm of baled hay or clean fill with the 10-mil nylon reinforced polyethylene sheeting extended over the berm, reaching the exterior ground surface; and consider how the potentially contaminated soils will be transported and stockpiled without compromising the berms (controlling runoff/run-on) or causing potential cross contamination (e.g., migration of contaminants outside the Temporary Soil Storage Site). If more than one sheet of polyethylene is needed to line the ground beneath the Temporary Soil Storage Site, each section of sheeting must overlap by at least 1 m. As necessary, the Temporary Soil Storage Site will be designed with a sump pump to remove any accumulated water from the Temporary Soil Storage Site and temporary store it for proper discharge. In addition, should contaminated soil be encountered that the Qualified Professional or the Ministry consider a potential source of groundwater contamination, then these soils will either be:

- Placed in a separate cell in the Temporary Soil Storage Site, or;
- Placed directly into a lined roll-off and properly disposed of at a licensed landfill facility.

Following the use of the Temporary Soil Storage Site, confirmatory surface soil samples (up to 1.5 m depth) will be collected and submitted for chemical analysis of PHCs, VOCs, PAHs, pH, metals and inorganic parameters to verify the quality of soil in this area. These sample results will be compared to the baseline samples to verify the area was not contaminated through the use of the Temporary Soil Storage Site. If needed, shallow remedial excavations can be completed to return the Temporary Soil Storage Site area back to original condition.

Excavation and Management

If necessary, the excavation of contaminated soil, segregation and processing will be overseen by the Qualified Professional or a designate of the Qualified Professional, and any additional excavations/removal of impacted soil will require approvals from the Ministry, as well as a management plan and document for the additional work.

When excavation and/or trenching are required at a suspected contaminated location, appropriate management of the contaminated solid or semi-solid material (such as soil or sludge) is required. Concerns for excavation and management of impacted soil relate to the potential for transfer of contaminants during materials handling and transportation activities. Transfer of contaminants may occur due to:

- Excavation, storage, sizing etc. and the potential for dust and volatile emissions from the contaminated media;
- High potential for fugitive dust emissions due to movement of equipment at the site;
- Leaching contaminants from contaminated soil to surface and groundwater water can occur from unlined and uncovered stockpiles and excavated pits;
- Migration of contaminants to uncontaminated areas may occur during transportation;
- Improper handling and reuse or disposal of contaminated soil may allow contaminants to migrate into and pollute uncontaminated areas.

Excavation and trenching primarily involves equipment that is widely used in the construction or non-hazardous solid waste disposal industries, such as excavators, earth movers or backhoes, dump trucks, and containers of various shapes, sizes, and materials.

General guidance and best practice measures to prevent potential transfer of contaminants during excavation, material handling and transport of contaminated material include the following:

- Entry to the active work area should be limited to avoid unnecessary exposure and related transfer of contaminants.
- Traffic should be minimized on contaminated soil.
- Surface drainage and subsurface utility systems should be identified.
- Any runoff should be prevented from entering and mixing with on-site contaminated media by building earthen berms or adopting similar other measures on the TSSS and on the site, where needed.
- Provisions should generally be made to capture surface water runoff by diverting it to a controlled depression-area or lined pit on the Temporary Soil Storage Site and on-site, where needed.
- Fugitive dust emissions should be controlled during excavation both on the Temporary Soil Storage Site and on-site, where needed, by spraying water or other materials to keep the ground moist or covered. During wet weather or rainfall no water spraying would be needed. Materials for dust control must be approved by the Qualified Professional prior to use on the site.
- Appropriate personnel and equipment and decontamination procedures should be employed as required to keep the site-related contaminants within the Temporary Soil Storage Site and the Project.
- Covers and liners should be used at all times when contaminated materials are being stored at the Temporary Soil Storage Site. Covers should be used on trucks that are moving materials around and from the site.
- Any equipment that is involved in earthwork activities or that may have come into contact with waste or any potentially contaminated material must be decontaminated prior to being removed from the Site or Temporary Soil Storage Site.

General guidance and best practice measures for the storage of contaminated soil include the following:

- For contaminated suspected soil, soil must be stored in a manner that prevents potential contaminants from leaching into the groundwater.
- Potentially contaminated soil will be protected to prevent the infiltration of precipitation and/or generation of runoff.
- If determined necessary by a Qualified Professional, soil from the Project that require sampling needs to be kept segregated from soil that has already been sampled.

Reuse of Contaminated Soils

In the event that contaminated soil are encountered during construction, the suitability of reusing the soil should be determined before it's re-use. The contractor must consult with the Qualified Professional and the Ministry of Transportation's Environmental Monitor prior to re-using contaminated soil on-site. In general, contaminated soil may be re-used on-site for backfilling construction excavations/or as structural fill, as deemed appropriate by the Qualified Professional subject to approval from the Ministry the Project Leader and Ministry of Transportation's Environmental Monitor.

Contaminated soil must be stockpiled as close as possible to the location from where it was excavated or placed in a separate cell in the Temporary Soil Storage Site to ensure it is isolated from stockpiled clean material and is clearly identifiable. Contaminated soil may only be re-used in areas that will be advised by the Qualified Professional with approval from the Project Leader and Ministry of Transportation's Environmental Monitor according to the provincial and local authority standards. The contractor shall maintain a log to document the final disposition of contaminated soil re-used on-site, if any.

Contaminated soil will not be replaced beneath the groundwater table under any circumstance. In addition, if contaminated soil is encountered that the Qualified Professional, notify the Ministry immediately and then - consider a potential long-term source to groundwater contamination, then these contaminated soils may not be re-used in the Project Area in their current state. In the event contaminated soil is found below the water table, the contractor should contact the Ministry of Transportation first for potential remedial actions. This soil should be either:

- Placed in a separate cell in the Temporary Soil Storage Site; and
- Placed directly into a lined roll-off container.

In the event that off-site disposal is required, with prior approval from the Qualified Professional, Project Leader and the Ministry, the Contractor shall dispose of soil not suitable for re-use according to proper disposal requirements, taking into account Ontario's *Management of Excess Soil- A Guide for Best Management Practices* (MECP, 2014) and Ontario Regulation 406/19, including the *Soil Rules*.

Transportation of Soils

It is important that transportation of contaminated soil/excess soil is carefully considered prior to the commencement of the Project. Transportation of Dangerous Goods, General Waste Management, and other environmental regulations apply to the off-Site transportation and reuse or disposal of waste materials.

Contaminated soil not suitable for re-use within the Project Area shall be managed and reused or disposed of in accordance with all applicable laws, industry standards and best management practices, this may include but not limited to:

- The *Environmental Protection Act*;
- Ontario Regulation 406/19, as amended;
- Ontario Provincial Standard Specification PROV 180 General Specification for the Management of Excess Materials;
- Management of Excess Soil – A Guide for Best Management Practices (Ministry of Environment, Conservation and Parks [MECP], Updated: April 4, 2019, Published: April 5, 2016, as updated).

During all phases of the Project, the following measures must be implemented with respect to transportation and reuse or disposal requirements for soil management:

- The contractor will ensure that all shipments comply with applicable regulatory requirements, including Ontario Regulation 406/19, and all necessary documentation is provided to MTO in a timely manner.

- Only approved disposal facilities for contaminated soil (either non-hazardous or hazardous) will be permitted for use.
- Acceptance criteria must be met, including but not limited to provision of adequate soil quality data for bulk chemical analysis and Schedule 4 leachate criteria. The origin and volume of contaminated material being transferred to a reuse or disposal site and its final destination shall be tracked.
- The Contractor shall arrange for and pay for any additional testing required by the receiver site as a condition of acceptance of the material. The Contractor shall submit to the Ministry of Transportation a copy of the forms provided under Ontario Provincial Standard Specification PROV. 180, signed by the receiver site.
- Mitigation measures will be developed in consultation with the Qualified Professional and the Ministry of Transportation Environmental Monitor to mitigate the mobilization and transport of potential residual agricultural contaminants within the Project Area towards waterbodies during all phases of the Project, including measures to allow time for increased die-off of pathogenic organisms and volatilization of agricultural contaminants prior to soil disturbance and removal of nutrient compounds through plant harvesting.
- Prior to disposing of a subject waste (i.e., liquid industrial waste and hazardous waste, including hazardous soil), the contractor shall ensure that the subject waste be properly classified as per Ontario Regulation 347 and registered in the Ministry of the Environment, Conservation and Parks Hazardous Waste Information Network, and a valid waste subject waste generator registration number is obtained. The generator shall ensure that waste manifests are completed correctly for each subject waste transferred and all waste transfers are properly identified and tracked through the Hazardous Waste Information Network system.
- A waste tracking system governing all hazardous waste transfers in accordance with the federal *Transportation of Dangerous Goods Regulation* and provincial regulations should be implemented by the contractor.
- Soil/fill materials imported to the Project Area, including quantity, quality and the source of the imported materials, should also be tracked and documented during the construction activities in accordance with Ontario Regulation 406/19.
- For the purpose of any record-keeping mentioned in this document, it is recommended that records be retained for a minimum of 7 years after the completion of all excess soil management activities or the removal of all excess soil from a Temporary Soil Storage Site, as required by Ontario Regulation 406/19.

Waste and Excess Materials Identification and Classification

The asphalt levelling course on County Road 4 may contain asbestos and prior to construction, asphalt core samples should be collected and tested for asbestos. If asbestos containing materials are found, an asbestos abatement plan should be implemented according to MTO standard special provision 101 F21 'Occupational Health and Safety Compliance - List of Designated Substances', that is included in the MTO construction tender documents in accordance with the *Occupational Health and Safety Act* of the presence of designated substances.

Monitoring, Measurement, Analysis and Evaluation

Field monitoring for excavated materials is required during and post-construction. Construction monitoring for excavated materials during construction will be focused on the mitigation measures and management strategies described in the Soil Management Plan. Qualified Professionals will conduct daily visual inspections of active construction work zones to monitor stockpiles, potential excess soil or work in potentially contaminated areas.

The Contractor will be responsible for tracking and managing the quality and quantity of material excavated from or imported to the site using existing information and new information, as needed. Tracking will include quantifying and documenting locations for the beneficial on-site re-use of excavated materials. Management will include:

- Minimizing adverse effects to workers and sensitive receptors through Best Management Practices, worker health and safety provisions and ensuring that remedial/risk management options are considered during the construction planning process and appropriately incorporated into final designs.
- Minimizing soil disturbance and retaining vegetation, including wildlife trees, within and around the Project Area in accordance with the setbacks / buffers identified on applicable design drawings, and in other areas to the extent that it is technically feasible or unless required to meet engineering requirements for safe and facility operation. The construction vehicle traffic will be minimized on contaminated soils.
- Manage soil in such a way as to prevent any adverse effects associated with receiving, processing, storage and movement of soil with respect to noise, dust, mud, tracking, leaching, runoff, erosion, outdoor air quality and odour. Monitoring will be completed in accordance with the Contractor's Air Quality Best Management Practices Plan to reduce the potential generation of dust (specifically PM10) and other fugitive air emissions during construction, including daily visual observations and on-site dust monitoring to inform the implementation of mitigation measures.
- Handle and store soil during construction in a manner that protects soil quality for re-use. In the event that contaminated soil are encountered during construction, the Contractor, Qualified Professional, with approval from the Ministry, shall determine the suitability of reusing the soil before reusing it. The Contractor shall (with Project Leader and the Ministry of Transportation's Environmental Monitor's permission) dispose of any soil not suitable for re-use according to proper screening and disposal requirements, taking into account *Ontario's Management of Excess Soil- a Guide for Best Management Practices* (MECP, 2014) and Ontario Regulation 406/19, including the *Soil Rules*.
- Encouraging re-use of soil where appropriate, balancing cut and fill, minimizing grading, and minimizing the need to transport additional soil to the Project Area where possible.

6.2.7.3 Environmental Provisions

The following Ontario Provincial Standard Specifications and Ministry of Transportation Central Region Special Provisions are recommended for inclusion in the contract documents. Further assessment and review of applicable Ontario Provincial Standard Specifications should be completed during detail design:

- OPSS.PROV 180 General Specification for the Management of Excess Materials;
- The asphalt levelling course on County Road 4 may contain asbestos and prior to construction, asphalt core samples should be collected and tested for asbestos. If asbestos containing materials are found, an asbestos abatement plan should be implemented according to MTO standard special provision 101 F21 'Occupational Health and Safety Compliance - List of Designated Substances', that is included in the MTO construction tender documents in accordance with the *Occupational Health and Safety Act* of the presence of designated substances.

6.3 Cultural Environment

6.3.1 Built Heritage and Cultural Heritage Landscapes

6.3.1.1 Potential Impacts

As outlined in Section 5.3.1, the results of archival research, the field review, and the heritage evaluation of 2835-2879 Yonge Street indicate that the property does not meet the criteria of Ontario Regulations 9/06 and Ontario Regulation 10/06 and does not demonstrate cultural heritage value or interest. The house and outbuildings have since been demolished by the property owner under a building permit issued by the Town of Bradford West Gwillimbury.

6.3.1.2 Commitments and Recommended Mitigation Measures

If the boundaries of Limits of Work change, a review of potential built heritage and cultural heritage resources shall be undertaken to confirm potential impacts to built heritage or cultural heritage resources.

6.3.2 Archaeology

6.3.2.1 Potential Impacts

Areas of archaeological potential have been subject to Stage 2 Archaeological Assessments and as applicable subsequent Stage 3 and Stage 4 Archaeological Assessments:

- Stage 3 and Stage 4 Archaeological Assessments were completed on the William Robinson Jr Site (BaGv-83) within the Limits of Work and the portion of the William Robinson Jr Site (BaGv-83) that has been subject to Stage 4 assessment is cleared of further archaeological work. The Stage 4 Archaeological Assessment Report has been submitted to Ministry of Heritage, Sport, Tourism and Cultural Industries for review.
- A Stage 3 Archaeological Assessment was completed on the Wheatfield Site (BaGv-113) and the results of the assessment recommend a Stage 4 Archaeological Assessment be undertaken as outlined in Section 6.3.2.2.

The Stage 2 and Stage 3 Archaeological Assessment Reports are currently under review by Indigenous communities and the reports have been submitted to Ministry of Heritage, Sport, Tourism and Cultural Industries for review.

The Archaeological Assessment Reports are submitted to the Ministry of Heritage, Sport, Tourism and Cultural Industries as a condition of licensing in accordance with Part VI of the *Ontario Heritage Act*, R.S.O. 1990, c 0.18. The reports are reviewed to ensure that it complies with the standards and guidelines that are issued by the Ministry of Heritage, Sport, Tourism and Cultural Industries, and that the archaeological fieldwork and report recommendations ensure the conservation, protection and preservation of the cultural heritage of Ontario. When all matters relating to archaeological sites within the project area of a development proposal have been addressed to the satisfaction of the Ministry of Heritage, Sport, Tourism and Cultural Industries, a letter will be issued by the ministry stating that there are no further concerns with regard to alterations to archaeological sites by the proposed development. Once the Ministry of Transportation receives Ministry of Heritage, Sport, Tourism and Cultural Industries concurrence, the areas of included in the Stage 2 Archaeological Assessment Report are considered cleared of archaeological potential unless further Stage 3 or subsequent Stage 4 archaeological assessments were recommended. Upon completion of Heritage, Sport, Tourism and Cultural Industries

review and satisfaction, letters of concurrence will be issued for the Stage 3 and Stage 4 archaeological assessment reports as applicable.

6.3.2.2 Commitments and Recommended Mitigation Measures

Upon receiving concurrence of the Stage 2, Stage 3 and Stage 4 Archaeological Assessment Reports from the Ministry of Heritage, Sport, Tourism and Cultural Industries, the following measures shall be adhered to for lands within the Limits of Work that will be impacted by the County Road 4 Early Works:

- If the portion of the Wheatfield Site or its protective 10 m buffer (BaGv-113) within the study area cannot be avoided by future development, the following measures must be undertaken:
 - The site shall be subject to a Stage 4 assessment which should consist of hand excavation methodology as outlined in *Section 4.2 of the Standards and Guidelines for Consultant Archaeologists* (Ontario Government 2011). The excavation should consist of one metre by one metre square test units laid out in a grid and should be excavated by hand to a depth of five centimetres into the subsoil;
 - The Stage 4 excavation should be centered around the positive Stage 3 unit of 500N 300E, which was excavated otop of the location of the first body sherd. Excavation is to continue until counts drop below 10 and there are no diagnostic artifacts, in keeping with Table 4.1 in the *Standards and Guidelines for Consultant Archaeologists* (Ontario Government 2011);
 - The study area does not extend into the remaining parts of the property and lawn. Should development go beyond the present study area, additional Stage 2 assessment will be required. The Stage 2 assessment should consist of pedestrian survey in keeping with Section 2.1 of the *Standards and Guidelines for Consultant Archaeologists* (Ontario Government 2011).
- The study area does not extend into remaining parts of the property and lawn for the William Robinson Jr Site (BaGv-83). Should development go beyond the present study area, additional Stage 2 assessment will be required.
- All other areas are either disturbed, low lying and wet, steeply sloped or no archaeological resources were found. These areas are considered cleared of further archaeological work.

To maintain compliance with the Ministry of Heritage, Sport, Tourism and Culture Industries and the *Ontario Heritage Act* (1990), no ground disturbing activities are to occur until the proponent and approval authority receive a formal letter from the MHSTCI stating that the recommendations provided herein are compliant and that the report has been accepted into the Ministry of Heritage, Sport, Tourism and Culture Industries register of archaeological reports.

If the boundaries of Limits of Work change, a review of archaeological potential shall be undertaken to confirm potential impacts to archaeological resources and the potential need for further archaeological assessments and mitigation.

Should previously undocumented archaeological resources be discovered, they may be a new archaeological site and therefore subject to Section 48(1) of the *Ontario Heritage Act*. The proponent or person discovering the archaeological resources must cease alteration of the site immediately and engage a licensed consultant archaeologist to carry out archaeological fieldwork, in compliance with Section 48(1) of the *Ontario Heritage Act*.

Archaeological sites recommended for further archaeological fieldwork or protection remain subject to section 48 (1) of the *Ontario Heritage Act* and may not be altered, or have artifacts removed from them, except by a person holding an archaeological license.

The *Funeral, Burial and Cremation Services Act, 2002*, S.O. 2002, c.33 (when proclaimed in force in 2012) require that any person discovering human remains must notify the police or coroner and the Registrar of Burial Sites, War Graves, Abandoned Cemeteries, and Cemetery Closures.

6.4 Engineering and Transportation

6.4.1 Utilities

As outlined in 3.4.1.9, the Hydro One Distribution, Bell, Rogers, and Zayo have utilities located within the current Study Area and will be impacted by the County Road 4 Early Works.

The Design-Build Team shall review provisions for utility access and evaluate roadside safety. It is the responsibility of the Design-Build Team to coordinate with the utility companies, confirm all potential conflicts, and to finalize a design that avoids additional conflicts during construction.

6.4.2 Traffic Management

Construction staging and traffic management for the widening of the County Road 4 is anticipated to be completed over a multi-year period. During construction, two lanes of traffic shall be maintained between the limits from north of 8th Line intersection to south of the 9th Line intersection with the exception of limited night-time closures and short-term traffic configuration combinations for separate turning movements.

Two-weeks prior to lane closures, the Design Build Contractor shall notify emergency service providers of the time and duration of the lane and road closures.

6.5 Project Changes

Should any project changes be required during further design and construction that are inconsistent with the Final Early Works Report, an addendum shall be prepared in accordance with Section 29 of Ontario Regulation 697/21.

6.6 Summary of Environmental Effects, Proposed Mitigation, and Commitments to Further Work

As outlined in Sections 5 and 6, the Project Team identified existing environmental conditions, identified potential environmental impacts and recommended mitigation measures to minimize potential impacts. The Early Works assessment provides a list of environmental concerns and commitments that the Design Build Contractor will need to be aware of and fulfil through further design and construction. The commitments will include but will not be limited to the permits, licences, authorizations, approvals and legislative requirements. Table 6-14 provides a summary of environmental concerns that shall be considered and commitments that shall be implemented through further design and construction.

Table 6-14: Summary of Environmental Concerns and Commitments Table

ID	Issues / Concerns / Potential Effects	Concerned Agencies	ID	Mitigation / Protection / Monitoring
Terrestrial Ecosystems				
TERR-1.00	Temporary loss of natural vegetation	MNRF, LSRCA, MECP	TERR-1.01	■ A clearing and grubbing plan will be developed and clearing will be kept to a minimum and limited to the disturbed ROW.
			TERR-1.02	■ OPSS -201: Construction Specification for Clearing, Close Cut Clearing, Grubbing and Removal of Surface and Piled Boulders
			TERR-1.03	■ OPSS-801: Construction Specification for the Protection of Trees
			TERR-1.04	■ OPSS.MUNI 804: Construction Specification for Seed and Cover
			TERR-1.05	■ A Landscaping and Ecological Restoration Plan shall be prepared and include invasive species management, as outlined in LAND-1.01 and LAND-1.02.
TERR-2.00	Permanent loss of natural vegetation	MNRF, LSRCA, MECP	TERR- 2.01	■ OPSS-803: Construction Specification for Vegetative Cover
			TERR- 2.02	■ OPSS -201: Construction Specification for Clearing, Close Cut Clearing, Grubbing and Removal of Surface and Piled Boulders
			TERR- 2.03	■ OPSS-801: Construction Specification for the Protection of Trees
			TERR- 2.04	■ OPSS.MUNI 804: Construction Specification for Seed and Cover
TERR-3.00	Potential for construction fill and sediment runoff to enter vegetation communities	MNRF, LSRCA, MECP	TERR- 3.01	■ OPSS-804: Construction Specification for Temporary Erosion Control
			TERR- 3.02	■ SSP-805: Construction Specification for Temporary Sediment Control
			TERR- 3.03	■ OPSS.MUNI 804: Construction Specification for Seed and Cover
			TERR- 3.04	■ OPSS-182: General Specification for Environmental Protection for Construction in Waterbodies and on Waterbody Banks
			TERR- 3.05	■ OPSS -201: Construction Specification for Clearing, Close Cut Clearing, Grubbing and Removal of Surface and Piled Boulders
TERR-4.00	Potential for oil, gasoline, grease and other materials from construction equipment, material storage and handling to enter adjacent vegetation communities	MNRF, LSRCA, MECP	TERR- 4.01	■ A Spills Management Plan should be prepared and shall include materials, instructions, education and emergency numbers. The plan shall be kept onsite at all times, communicated to work crews and be properly implemented in the event of accidental spills (OC – Spill Prevention and Response Contingency Plan as per OPSS 182);
			TERR- 4.02	■ Environmental Incident Management Under Legislation Protecting the Environment and Natural Resources in accordance with OPSS 100.
TERR-5.00	Potential impacts to migratory birds, species at risk birds and their habitat	MNRF, LSRCA, MECP	TERR- 5.01	■ Schedule vegetation removal to occur outside of the overall bird nesting period of April 1 st to August 31 st to avoid disturbance to breeding migratory birds including SAR and/or damage/destruction of their nest
			TERR- 5.02	■ Non-Standard Special Provision Operational Constraints (Environmental) - Migratory Bird Protection.
			TERR- 5.03	■ If vegetation removal must occur within this time period, active nest searches must be conducted prior to vegetation removal by a qualified biologist within 'simple habitats' (e.g., mown vegetation) or if minor vegetation clearing is required, to ensure that no active nests of breeding migratory birds or bird SAR are destroyed, in order to prevent contravention of the MBCA and/or the ESA
TERR-6.00	Removal of potential monarch habitat	MNRF, LSRCA, MECP	TERR-6.01	■ Limiting vegetation removal to outside of the monarch nesting period will help to protect monarch while they are present as eggs or larvae on milkweed plants (May 25th to August 15th).
			TERR- 6.02	■ Inclusion of milkweed in the species mix for the revegetation of temporary disturbed areas.
TERR-7.00	Potential impacts to woodlands	MNRF, LSRCA, MECP	TERR- 7.01	■ Should impacts to woodlands be confirmed through detail design, MECP should be consulted to determine permitting requirements. At a minimum conduct any tree removals outside of the bat roosting season (April 1 st to September 30 th), following MECP consultation
TERR-8.00	Potential sightings of Species at Risk during construction	MNRF, LSRCA, MECP	TERR- 8.01	■ Should additional SAR be encountered within the work area, construction activities will cease, and the contracting authority and MECP will be contacted for next steps.
			TERR- 8.02	■ All SAR observations should be reported to the contracting authority and MECP.
TERR-9.00	Potential to find wildlife within the work area during construction	MNRF, LSRCA, MECP	TERR- 9.01	■ If wildlife is found within the work area, the wildlife should be permitted to vacate the area
			TERR- 9.02	■ If necessary, wildlife can be relocated from within the work area to suitable habitat outside of the work area by a qualified ecologist or environmental inspector
Fish and Fish Habitat				

ID	Issues / Concerns / Potential Effects	Concerned Agencies	ID	Mitigation / Protection / Monitoring
FISH- 1.0	Potential for near and in-water work	MECP, LSRCA, DFO, MNRF	FISH 1.01	■ Access to waterbodies and banks should be limited to protect riparian vegetation and to minimize bank disturbance;
			FISH 1.02	■ Environmental Protection During Work in Watercourses and on Watercourse Banks in accordance with OPSS 182
			FISH 1.03	■ In-water work below the high water mark (HWM) and work on watercourse banks shall be carried out during the appropriate in-water timing window: Given the warmwater characterization of the Unnamed Tributary, a warmwater fisheries timing window is anticipated for any in-water work. Warmwater in-water timing windows for similar watercourses permit in-water work from July 15 – March 1 of any given year; however, this should be confirmed with NDMNRF during the detail design stage.
			FISH 1.04	■ Timing of in-water Work in accordance with SSP101F23
			FISH 1.05	■ Environmental Protection During Work in Watercourses and on Watercourse Banks in accordance with OPSS 182
			FISH 1.06	■ An in-water work area isolation plan should be designed and implemented to maintain clean flow around the work area at the Unnamed Tributary crossing where in-water work is proposed.
			FISH 1.07	■ Use only clean materials free of particle matter for temporary cofferdam
			FISH 1.08	■ Manage flow withdrawal and discharge to prevent erosion and the release of sediment to a waterbody
			FISH 1.09	■ Ensure work zones are stabilized against high flows at the end of each workday.
			FISH 1.10	■ Operate, store and maintain equipment and associated materials in a manner and at a distance that prevents the entry of any deleterious substance from entering a waterbody (as per OPSS 182). Any part of equipment entering the waterbody or operating from the bank shall be cleaned, free of fluid leaks and in good working condition
FISH-2.00	Temporary Alteration, Disruption, Destruction of fish habitat	MECP, LSRCA, DFO, MNRF	FISH-2.01	■ As the fish and fish habitat assessment was completed for the 30% detail design, further assessment shall be carried out and consultation with and review of the Early Works by Fisheries and Oceans Canada will be required to confirm the approval requirements under the <i>Fisheries Act</i> . It is anticipated that a Letter of Authorization may be issued as the potential impacts to fish and fish habitat occur in low sensitive habitat, and through implementation of design and construction mitigation measures, the potential impacts will be localized and temporary.
			FISH-2.02	■ Material Specification for Aggregates – Streambed Material with OPSS.PROV 1005.
			FISH-2.03	■ Re-stabilize any portion of the bed of a waterbody disturbed during construction to pre-construction conditions. This shall include substrates as per OPSS 182 and OPSS 1005. Based on the 30% detail design drawings, riprap is shown at the culvert inlet and outlet. It is recommended that riprap be replaced with suitably sized river stone to naturalize the area and provide scour protection.
			FISH-2.04	■ Re-stabilize the banks of a waterbody that have been disturbed during construction to pre-construction conditions or better (as per OPSS 182 and OPSS 804). This shall include riparian vegetation or stone material, temporary measures and the avoidance of hard engineering; Given the presence of dense invasive phragmites at the culvert outlet, a suitable native species should be planted in the area. Removal of phragmites shall be handled per FISH-5.00.
FISH-3.00	Potential barriers to fish movement	MECP, LSRCA, DFO, MNRF	FISH – 3.01	■ Design and install culvert extensions or replacement at the Unnamed Tributary crossing to prevent the creation of barriers to fish movement and maintain bankfull channel functions and habitat functions to the extent possible (D-C). Where permanent in-water structures are placed in fish habitat, naturalize these areas by placing river stone below the 2-year high water mark (as per OPSS 825 and 1005). Design and install in-stream cover to replace or re-instate fish cover removed, altered or disturbed during construction. The low flow channel should be designed according to requirements outlined in MTO Standard WC-12 of the Highway Drainage Design Standards (February 2008) for works to not limit fish passage.
FISH-4.00	Impacts to fish associated with dewatering during construction	MECP, LSRCA, DFO, MNRF	FISH-4.01	■ As per OPSS 182, any fish isolated in the work area should be transferred (using appropriate capture, handling and release techniques to prevent harm and minimize stress) downstream or away from the construction area. Fish screens shall be used to avoid entrainment of fish in pumps or hoses. erosion or the release of sediment-laden water to a waterbody (as per OPSS 805)
			FISH-4.02	■ Isolated in-water work areas must be cleared of fish prior to commencement of work. Fish must be released unharmed downstream. Intakes of pumps and hoses for de-watering of in-water work areas shall be screened to avoid impingement and/or entrainment of fish (as per OPSS 182).
			FISH-4.03	■ Construction Specification for Dewatering in accordance with OPSS 517

ID	Issues / Concerns / Potential Effects	Concerned Agencies	ID	Mitigation / Protection / Monitoring
FISH-5.00	Potential for oil, gasoline, grease and other materials from construction equipment, material storage and handling to enter adjacent watercourses	MECP, LSRCA, DFO, MNRF	FISH-5.01	<ul style="list-style-type: none"> A Spills Management Plan should be prepared and shall include materials, instructions, education and emergency numbers. The plan shall be kept onsite at all times, communicated to work crews and be properly implemented in the event of accidental spills (OC – Spill Prevention and Response Contingency Plan as per OPSS 182);
			FISH-5.02	<ul style="list-style-type: none"> Environmental Incident Management Under Legislation Protecting the Environment and Natural Resources in accordance with OPSS 100.
			FISH-5.03	<ul style="list-style-type: none"> Operate, store and maintain equipment and associated materials in a manner and at a distance that prevents the entry of any deleterious substance from entering a waterbody (as per OPSS 182). Any part of equipment entering the waterbody or operating from the bank shall be cleaned, free of fluid leaks and in good working condition
FISH-6.00	Potential for spread of invasive species.	MECP, LSRCA, DFO, MNRF	FISH-6.01	<ul style="list-style-type: none"> The Contractor shall implement best management practices to prevent the introduction/spread of invasive plants including proper soil management and equipment cleaning protocols. The Contractor shall follow the guidelines outlined in the Ontario Ministry of Natural Resources, Invasive Phragmites – Best Management Practices, Ontario Ministry of Natural Resources, Peterborough, Ontario. Version 2011. 15p.
			FISH-6.02	<ul style="list-style-type: none"> This construction site contains areas with invasive plant species. The Contractor shall remove and dispose of excess soil from areas identified as containing invasive species as per WEMM 3.06. No invasive species shall be in the topsoil.
			FISH-6.03	<ul style="list-style-type: none"> The Contractor shall be required to clean all vehicles and equipment exposed to invasive plants prior to every time leaving the construction site as per WEMM 3.06.
Groundwater and Hydrogeology				
GW-1.00	Potential temporary (short-term, non-recurring) construction dewatering will be required to remove water from the construction excavation(s)	MECP / Town of Bradford West Gwillimbury	GW-1.01	<ul style="list-style-type: none"> It is recommended that dewatering effluent be directed to the local Town sanitary or storm sewer. Any discharge of water would be subject to the terms and conditions of all required permits obtained by the Contractor based on the actual conditions encountered during construction. Sewer discharge requires by-law authorization from the Town. Due to the close proximity of the construction to agricultural drains, it is suggested that the discharge be directed away from the drains to reduce overland flow and promote infiltration.
			GW-1.02	<ul style="list-style-type: none"> If the groundwater pumped for dewatering purposes is to be directed to the natural environment, it is recommended that water quality testing for Provincial Water Quality Objectives be completed prior to dewatering. Given the geological material encountered, it is suggested that the dewatering contractor be prepared to potential deal with treatment for suspended solids prior to discharge to the sanitary sewer.
			GW-1.03	<ul style="list-style-type: none"> Ensure that any discharge to the local Region sewer system occurs in full compliance with the Town's Sewer Use By-Law (By-Law 2013-68). Ensure that all control measures implemented, and all materials collected or trapped by those measures are recovered and properly disposed of when they are no longer engaging in the activity or discharge to the sanitary sewer. Suggested treatment options for the dewatering discharge is sedimentation tanks and filtration.
			GW-1.04	<ul style="list-style-type: none"> Confirmation of local groundwater levels and groundwater quality is recommended to be completed by the Contractor prior to the outset of project construction activities.
			GW-1.05	<ul style="list-style-type: none"> Prior to discharging any dewatering effluent, ensure that all necessary discharge permits and/or agreements have been secured and that the water taking plan, discharge plan, a water treatment process and sampling plan has been designed and implemented in accordance with the terms and conditions of such permits and the contract documents.
			GW-1.06	<ul style="list-style-type: none"> Pre-treatment of dewatering at each dewatering location to achieve compliance with prior to any off-Site discharge occurring. Establishing treatment methodology (settling tank) is the responsibility of the Contractor and may be further informed by the raw (pumped) water quality and confirmatory sampling results obtained by the Contractor.
			GW-1.07	<ul style="list-style-type: none"> Pre-assessment sampling of the water that is planned to be discharged is to be completed by the Contractor and submitted to an accredited environmental analytical laboratory for quality testing against applicable parameter concentration limits (e.g., Sewer Use By-laws). The intent of this sampling is to confirm both the background (raw) and Contractor's treated water quality prior to the commencement of any dewatering discharge activities.
			GW-1.08	<ul style="list-style-type: none"> Regular sampling and testing of the discharge by the Contractor will be required during construction to verify that the effluent quality continues to comply with the Town's sewer use by-law limits and permits, as applicable: <ul style="list-style-type: none"> Regular sampling and testing of the discharge by the Contractor will be required during construction to verify that the effluent quality continues to comply with the Town's sewer use by-law limits and permits, as applicable.

ID	Issues / Concerns / Potential Effects	Concerned Agencies	ID	Mitigation / Protection / Monitoring
				<ul style="list-style-type: none"> ▪ In the event that a sample is determined to be 'unacceptable' based on the applicable water quality standards, field turbidity and/or temperature monitoring activities, additional effluent samples must be obtained by the Contractor immediately upon receipt of the initial laboratory results for verification purposes. ▪ Where the verification sampling is confirmed, immediate action should be taken by the Contractor to assess and potentially modify their dewatering approach / methodology, rate / duration of pumping, and/or provide additional / alternative pre-treatment prior resuming any further discharge. Prior to resuming any effluent discharge, a confirmatory sample should be obtained by the Contractor confirming adherence with the applicable water quality standards. ▪ Where the verification sampling is determined to be anomalous, the confirmatory sampling program is recommended to resume at the staged sampling frequency.
		MECP / Town of Bradford West Gwillimbury	GW-1.09	<ul style="list-style-type: none"> ■ Potential ground settlement/subsidence related to existing pavements, sidewalks, buildings, and other structures / infrastructure within the possible dewatering radius of influence should be assessed by an experienced geotechnical engineer (P.Eng.) based on dewatering rate and magnitude of drawdown required to allow for construction of the planned construction elements within the Study Area.
		MECP / Town of Bradford West Gwillimbury	GW-1.10	<ul style="list-style-type: none"> ■ Utilities shall be identified through a subsurface utility engineering survey by a qualified Professional Engineer. All buried utilities, existing buildings/roads and other structures within the dewatering radius of influence that are planned to remain during and upon completion of construction be properly inspected / surveyed prior to the commencement of any construction activities (including construction dewatering operation) to establish a pre-construction baseline for the completion of post-construction condition survey or assessment.
		MECP / Town of Bradford West Gwillimbury	GW-1.11	<ul style="list-style-type: none"> ■ The dewatering system should be properly designed to prevent any ground loss during construction.
		MECP / Town of Bradford West Gwillimbury	GW-1.12	<ul style="list-style-type: none"> ■ Given the historical nature of the area (agricultural uses), it is suggested that dewatering discharge be directed to the natural environment to promote infiltration, assuming water quality samples meet Provincial Water Quality Objectives.
		MECP / Town of Bradford West Gwillimbury	GW-1.13	<ul style="list-style-type: none"> ■ Groundwater exclusion measures, such as the use of sheet pile walls as one example, shall be considered by the Contractor to minimize the groundwater inflow to the work zone and/or limiting the length of excavation trench open at any given time.
		MECP / Town of Bradford West Gwillimbury	GW-1.14	<ul style="list-style-type: none"> ■ A daily record of the timing, total volumes, and average rate of water-taking at each excavation location shall be maintained by the Contractor on a daily basis during completion of the Project. The flow meter(s) shall be calibrated prior to use and installed / operated in accordance with manufacturer specifications.
		MECP / Town of Bradford West Gwillimbury	GW-1.15	<ul style="list-style-type: none"> ■ Where the monitoring completed above identifies a significant amount of water level drawdown (i.e., in excess of 0.3 m at a monitored location more than 92 m [Ro] away from the dewatering area), immediate action should be taken by the Contractor to assess and potentially modify their dewatering approach / methodology, and/or rate / duration of pumping, so as to limit the dewatering Ro and alleviate the observed groundwater level impact.
		MECP / Town of Bradford West Gwillimbury	GW-1.16	<ul style="list-style-type: none"> ■ Adhere to the Early Works Groundwater Protection and Well Monitoring Plan in accordance with Ontario Regulation 697/21 Section 7.
		MECP	GW-1.17	<ul style="list-style-type: none"> ■ Construction Specification for Dewatering in accordance with Ontario Standard Special Provision 517;
		MECP	GW-1.18	<ul style="list-style-type: none"> ■ Obtain an Environmental Activity and Sector Registry to provide dry working conditions within the excavations.
		Simcoe Muskoka District Health	GW-1.19	<ul style="list-style-type: none"> ■ Inform Simcoe Muskoka District Health when construction begins and provide them with contact information for inquiries about the Project and potential for dewatering.
GW-2.00	Potential conflicts with monitoring wells	MECP	GW-2.01	<ul style="list-style-type: none"> ■ Should the location of any existing monitoring wells be in conflict with the location(s) of Project construction or damaged as a result of Project construction activities, it is recommended that an Ministry of the Environment, Conservation and Parks licenced water well contractor be retained by the Contractor to decommission those locations in accordance with Ontario Regulation 903 (Wells), as amended. It is further recommended that replacement well(s) be installed by a licenced environmental drilling contractor to replace any decommissioned monitoring wells and/or piezometers.

ID	Issues / Concerns / Potential Effects	Concerned Agencies	ID	Mitigation / Protection / Monitoring
GW-3.00	Potential impacts to private wells	MECP	GW-3.01	<ul style="list-style-type: none"> Prior to any construction dewatering occurring the four properties listed Door to Door Water Well Survey Report shall be contacted for monitoring and sampling of the residential well during and after construction to ensure that there is no effect on the water quality from the baseline assessed. The Door to Door Water Well Survey provides a baseline for the water wells prior to the proposed construction to determine existing water quality and quantity of each property. Additional mailing of letters to all properties within 500 m of the study limits is recommended to ensure all concerned homeowners are monitored during and after construction to capture and ensure potential well issues are addressed and monitored.
		MECP	GW-3.02	<ul style="list-style-type: none"> If any water well complaints are received, the response will follow Ministry of Environment, Conservation and Parks guidance and follow Permit to Take Water protocols and conditions.
		Simcoe Muskoka District Health	GW-3.03	<ul style="list-style-type: none"> Inform Simcoe Muskoka District Health when construction begins and provide them with contact information for inquiries about the Project and potential impacts to private wells.
Surface Water and Hydrology				
SWH-1.00	Potential impacts of water quantity and quality on the existing drainage system and natural environment associated with the Early Works.	MECP, LSRCA, DFO	SWH-1.01	<ul style="list-style-type: none"> Flat bottom grassed swales with flow check dams will be installed along roadside ditches where feasible.
		MECP, LSRCA, DFO	SWH-1.02	<ul style="list-style-type: none"> Flows to at culvert EX-CL-9 will be treated by the existing stormwater management pond. Flows along roadside ditches draining to this culvert can be treated with flat bottom swales with flow check dams.
		MECP, LSRCA, DFO	SWH-1.03	<ul style="list-style-type: none"> Flows to at culvert EX-CL-8 will not require treatment due to the natural area (forest) characteristics of its catchment area. However, flows along roadside ditches draining to this culvert can be treated with flat bottom swales with flow check dams.
		MECP, LSRCA, DFO	SWH-1.04	<ul style="list-style-type: none"> Regular maintenance and inspection of the proposed ditches and culverts constructed as part of the Early Works Project to ensure they are operating as designed.
		MECP, LSRCA, DFO	SWH-1.05	<ul style="list-style-type: none"> For the flat bottom grass swales with flow check dams proposed for the study area, five main operation and maintenance activities should be completed, which are explained below. <ul style="list-style-type: none"> Inspection: As mentioned above, regular inspection is essential to assess the condition of the site, provide clean up and maintenance solutions and set goals for the upcoming year. Grass cutting: For flat bottom grass swales, longer grass is more beneficial for quality control; however, the aesthetics of the property is usually of some concern to the nearby residence. Grass-cutting is provided mainly to keep the property looking neat and tidy but should be limited if at all possible. Minor landscaping: to restore seasonal vegetation loss, maintain desired planting densities along side slopes, remove undesirable plant species and improve aesthetics. Weed control: Weeds are referred to as unwanted vegetation species which could be invasive to adjacent areas if it is not controlled or have negative impacts on the stormwater management facility operation. Weed control may be required annually. Removal of accumulated sediment: Sediment removal for grassed swales is required when the aesthetic attributes of the swale indicate so. Discoloration of the soil or the buildup of a "crust" may indicate the need for sediment cleanout. The frequency of sediment removal depends on the drainage catchment area and level of imperviousness. The initial inspections should provide guidance on future removal schedules. The upstream side of flow check dams should be a focus of the inspections as this is likely where sediment buildup will occur. MECP sediment disposal requirements should be consulted for information pertaining to the exact parameters and acceptable levels for different disposal options. Trash removal: Trash removal is an integral part of the stormwater management facility maintenance. Generally, a "spring cleanup" is needed to remove trash and debris from all surface stormwater management ponds. Trash removal is then performed as required based on observations during regular inspections.
		MECP, LSRCA, DFO	SWH-1.06	<ul style="list-style-type: none"> Record all monitoring and maintenance activities in a logbook kept by the proponent, also including but not limited to, the name of the designated inspector and a record of all activities related to inspection, monitoring and maintenance
		MECP, LSRCA, DFO	SWH-1.07	<ul style="list-style-type: none"> Verify that the grading and vegetation are designed, and that stormwater will be conveyed where and how it was intended for the grassed swales proposed for the study area.
		MECP, LSRCA, DFO	SWH-1.08	<ul style="list-style-type: none"> Maintenance of Existing Drainage in accordance with Ministry of Transportation Non-Standard Special Provision;
		MECP, LSRCA, DFO	SWH-1.09	<ul style="list-style-type: none"> Adhere to the Early Works Stormwater Management Plan in accordance with Ontario Regulation 697/21 Section 7.
Erosion and Sediment Control				

ID	Issues / Concerns / Potential Effects	Concerned Agencies	ID	Mitigation / Protection / Monitoring
ESC-1.00	Erosion and sedimentation during construction	MECP, LSRCA, DFO	ESC-1.01	<ul style="list-style-type: none"> An Erosion and Sediment Control Plan should be designed and implemented to contain/isolate exposed soils, stockpiled materials, and unstable areas in the work zone and to prevent the release of sediment to all waterbodies and ensure the work site is stabilized prior to removal of ESC measures following construction (as per OPSS 805). Site-specific Erosion and Sediment Control plans should be developed for the Unnamed Tributary and stormwater management pond where work is proposed within 30 m of a watercourse/waterbody. While the stormwater management pond is not protected under the Federal <i>Fisheries Act</i> as described earlier, the contractor is still required to avoid causing harm or the death of fish within the pond. The Erosion and Sediment Control Plan shall include measure to: <ul style="list-style-type: none"> Minimize erosion potential by implementing effective measures, procedural Best Management Practices, water management Best Management Practices, Apply erosion and sediment control measures (Best Management Practices) to prevent mobilization of sediments, and Apply sediment control measures Best Management Practices to prevent off-site sediment release in the event of sediment mobilization. Provide the Erosion and Sediment Control Plan to Lake Simcoe Region Conservation Authority.
			ESC-1.02	<ul style="list-style-type: none"> Construction Specifications for Temporary Erosion Control (Ontario Standard Special Provision 804, April 2021);
			ESC-1.03	<ul style="list-style-type: none"> To ensure that the intent of the Erosion and Sedimentation Control Plan is maintained, and that erosion and sedimentation potential is minimized until the development area has been stabilized, the following requirements are proposed:
			ESC-1.04	<ul style="list-style-type: none"> The construction of the erosion control works should be carefully supervised,
			ESC-1.05	<ul style="list-style-type: none"> Control features that fail should be repaired and an evaluation should be completed to determine whether additional measures are required,
			ESC-1.06	<ul style="list-style-type: none"> Bi-weekly inspection reports prepared by the engineer responsible for the project should be submitted to the contract administrator during construction until the development area has been stabilized
			ESC-1.07	<ul style="list-style-type: none"> Inspection of proposed measures should be completed after periods of excessive precipitation (i.e., rainfall depths exceed 15 millimetres),
			ESC-1.08	<ul style="list-style-type: none"> Placement of Aggregates in Waterbodies in accordance with Ontario Standard Special Provision PROV 825;
			ESC-1.09	<ul style="list-style-type: none"> Material Specification for Aggregates – Streambed Material with Ontario Standard Special Provision PROV 1005.
			ESC-1.10	<ul style="list-style-type: none"> Prior to removal of controls, the contractor, and the engineer responsible for the project should conduct a joint inspection of the development area.
ESC-2.00	Potential for loss of topsoil	MECP, LSRCA, DFO	ESC-2.01	<ul style="list-style-type: none"> All areas not subject to active construction 30 days after area grading should be top soiled and seeded as per Special Provision 572S01 Oct. 2002 immediately after completion of such grading.
			ESC-2.02	<ul style="list-style-type: none"> Immediately following seed application, a straw erosion control blanket should be installed on any exposed slopes adjacent to sensitive features, as per OPSS 572.05.07, 572.05.08 and 572.07.04.05.
			ESC-2.03	<ul style="list-style-type: none"> Temporary Erosion Control in accordance with OPSS 804 and Temporary Sediment Control in accordance with OPSS 805.
			ESC-2.04	<ul style="list-style-type: none"> Trapped sediments and controls are to be removed only after the soils of the construction area have been stabilized and adequately re-vegetated, unless sediments have accumulated to a depth of 1/3 the height of the sediment control device.
ESC-3.00	Potential for erosion during culvert works	MECP, LSRCA, DFO	ESC-3.01	<ul style="list-style-type: none"> As construction proceeds, diversion swales should be graded where needed along the right-of-way boundaries to intercept drainage from external areas and direct it away from exposed surfaces.
			ESC-3.02	<ul style="list-style-type: none"> Temporary sedimentation traps should be sized based on 125 cubic metres per hectare of drainage area.
			ESC-3.03	<ul style="list-style-type: none"> All culvert work should be conducted “in the dry”.
			ESC-3.04	<ul style="list-style-type: none"> All dewatering for culvert installation should be directed to a sediment/dewatering trap.
			ESC-3.05	<ul style="list-style-type: none"> The locations of sediment/dewatering traps should be confirmed in the field by the on-site inspector and environmental inspector.
			ESC-3.06	<ul style="list-style-type: none"> Temporary silt fencing should be installed: <ul style="list-style-type: none"> Around sensitive vegetative features; and Approximately 2 metres from the final toe-of-slope for the roadway embankment widening areas.

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			ESC-3.07	<ul style="list-style-type: none"> Straw bale flow and rock checks dams should be provided in roadside ditches. Straw bales detain runoff and promote sedimentation, and to reduce channel flow velocities thereby reducing potential for channel erosion,
			ESC-3.08	<ul style="list-style-type: none"> Additional erosion control works may be required during the course of construction. These may consist of silt fences, swales, and/or diversion berms. The location and need for these works will need to be established in the field.
			ESC-3.09	<ul style="list-style-type: none"> Runoff from excavated areas or unvegetated soil will not be permitted to discharge off site or directly into active or temporary watercourses or any natural areas.
			ESC-3.10	<ul style="list-style-type: none"> The contractor should abide by the requirements set out in the Greater Golden Horseshoe Area Conservation Authorities Erosion and Sediment Guideline for Urban Construction (December 2006).
Land use and property				
LUP-1.00	Potential impacts to various residential, agricultural and commercial entrances of properties along County Road 4 as reconstruction of County Road 4 will result in a change in the roadway adjacent to these entrances.	MTO, Town of Bradford West Gwillimbury, County of Simcoe	LUP-1.01	<ul style="list-style-type: none"> Access to these entrances shall be maintained throughout construction. Reconstruction of County Road 4 will require modifications, relocations, reconstruction and/or property acquisition in consultation with property owners.
LUP-2.00	Impacts to agricultural lands may result in impacts to tile drains, outlets or fences.	MTO, Town of Bradford West Gwillimbury, County of Simcoe	LUP-2.01	<ul style="list-style-type: none"> Tile drains, outlets and fences damaged during constructions will be repaired in consultation with property owners. New and temporary fences will be constructed to retain livestock. Field accesses will be constructed, and construction activities will be coordinated to minimize impacts on farming.
Noise				
Noise-1.00	Potential temporary noise impacts during construction	MTO, MECP Town of Bradford West Gwillimbury,	Noise-1.01	<ul style="list-style-type: none"> Stipulate constraints on construction noise with respect to Town of Bradford West Gwillimbury's noise control By-laws as follows: <ul style="list-style-type: none"> Although the MTO does not require a noise by-law exemption, for works conducted: <ul style="list-style-type: none"> From 7:00 p.m. to 7:00 a.m. (to 9:00 a.m. on Saturdays) and at all times on Sundays and holidays in residential areas Submit a Notice of Works letter to the Town in advance of the works; which will allow the Town to notify area residents through the local councillor
		MTO, MECP Town of Bradford West Gwillimbury,	Noise-1.02	<ul style="list-style-type: none"> Equipment shall comply with the sound emission standards for construction equipment outlined in Ministry of Environment, Conservation and Parks (MECP) publications NPC-115 and NPC-118 (contractor to confirm latest version by contacting MECP), which are the following: <ul style="list-style-type: none"> NPC-115: Construction Equipment NPC-118: Motorized Conveyances
		MTO, MECP Town of Bradford West Gwillimbury,	Noise-1.03	<ul style="list-style-type: none"> Where feasible, equipment with broadband backup alarms instead of the tonal backup alarms/beepers shall be utilized.
		MTO, MECP Town of Bradford West Gwillimbury,	Noise-1.04	<ul style="list-style-type: none"> Equipment shall be maintained in an operating condition that prevents unnecessary noise, including but not limited to non-defective muffler systems, properly secured components, and the lubrication of moving parts.
		MTO, MECP Town of Bradford West Gwillimbury,	Noise-1.05	<ul style="list-style-type: none"> Idling of equipment shall be restricted to the minimum necessary to perform the specified work.
		MTO, MECP Town of Bradford West Gwillimbury,	Noise-1.06	<ul style="list-style-type: none"> Stationary equipment shall be located as far away from sensitive locations as feasible.
		MTO, MECP Town of Bradford West Gwillimbury,	Noise-1.07	<ul style="list-style-type: none"> Setup a noise complaint process in accordance with of the Ministry of Transportation's Environmental Guide for Noise.

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		MTO, MECP Town of Bradford West Gwillimbury,	Noise-1.08	<ul style="list-style-type: none"> Investigate and address noise complaints in accordance with the MTO Guide.
		MTO, MECP Town of Bradford West Gwillimbury,	Noise-1.09	<ul style="list-style-type: none"> Ensure that the construction contractor is in compliance with requirements of SP 199F31 and SP 199F33, and if not, require the necessary corrections to be implemented.
Air Quality				
AQ-1.00	Potential air quality impacts from dust during construction	MECP, MTO	AQ-1.01	<ul style="list-style-type: none"> Scheduling and staging
			AQ-1.02	<ul style="list-style-type: none"> Dust suppression and wind control <ul style="list-style-type: none"> Use of dust suppressants with the least potential for adverse environmental effects when conducting any project activity that may generate dust.
			AQ-1.03	<ul style="list-style-type: none"> Stockpile management: <ul style="list-style-type: none"> Covering or enclosing sources of granular materials stored in open containers within the Project Area.
			AQ-1.04	<ul style="list-style-type: none"> Material handling and general maintenance <ul style="list-style-type: none"> Not handling non-enclosed granular materials during sustained high wind conditions.
			AQ-1.05	<ul style="list-style-type: none"> Road surface management: <ul style="list-style-type: none"> Building and managing temporary and permanent roads and parking lots located within the Project Area to reduce fugitive dust emissions from dirt surfaces, including through paving and the removal of loose materials on road surfaces. Establishing speed limits of no more than 30 km/hour on temporary and permanent construction roads located within the Study Area and requiring that all persons abide by these speed limits.
AQ-2.00	Reducing Exhaust from Construction Equipment and Vehicle Exhaust	MECP, MTO	AQ-2.01	<ul style="list-style-type: none"> Construction equipment and vehicles are to comply with Canada engine emissions standards and diesel fuel shall comply with the maximum sulphur content allowed.
			AQ-2.02	<ul style="list-style-type: none"> SP 199S56 Control of Emissions During Structural Work
			AQ-2.03	<ul style="list-style-type: none"> All construction equipment and vehicles should be visually inspected before use, properly maintained and repaired to minimize exhaust emissions.
			AQ-2.04	<ul style="list-style-type: none"> Implement an anti-idling policy to limit idling to a maximum of three minutes when possible.
			AQ-2.05	<ul style="list-style-type: none"> Combustion equipment use should be limited if possible or replaced with the alternative-fueled or electric equipment, where feasible.
			AQ-2.06	<ul style="list-style-type: none"> On-site diesel generators should be used as a backup power supply only. Alternative power options such as solar panel to supply electricity on-site should be considered, where feasible.
			AQ-2.07	<ul style="list-style-type: none"> Where possible, ensure engine exhausts are oriented upwards.
			AQ-2.08	<ul style="list-style-type: none"> Increase separation distances between sensitive and critical receptors such as schools, residences, park or health care facilities and any vehicle exhausts.
			AQ-2.09	<ul style="list-style-type: none"> Minimize the number of vehicles and engines operating on site at any one time.
			AQ-2.10	<ul style="list-style-type: none"> When possible, limit operation of vehicles to times where winds are blowing away from closest sensitive and critical receptors.
Climate Change				
CC-1.00	Reduction of natural or agricultural land acting as a carbon sink and/or reservoir within the Project resulting in reduction in available carbon sink and reservoir capacity for removing carbon from the atmosphere.	MECP, MTO	CC-1.01	<ul style="list-style-type: none"> Limiting the requirement of naturalized land to only that which is required to construct the Project, including that which is required to appropriately stage the construction.
		MECP, MTO	CC-1.02	<ul style="list-style-type: none"> Re-naturalizing (e.g. re-sodding, vegetation and tree planting, etc.) of staging areas immediately following construction phase end.
CC-2.00	Emissions from diesel or gasoline powered vehicles and equipment cause an increase in greenhouse gas emissions during construction operations.	MECP, MTO	CC-2.01	<ul style="list-style-type: none"> Properly maintaining vehicles and other internal combustion engines used on site (pumps, generators, etc.) to ensure engines are operating as designed with optimal emissions.
		MECP, MTO	CC-2.02	<ul style="list-style-type: none"> Minimizing on-site vehicle idling during construction activities and implementing a vehicle maximum idling policy while on site.

ID	Issues / Concerns / Potential Effects	Concerned Agencies	ID	Mitigation / Protection / Monitoring
CC-3.00	Approach to paving on-site during construction has a direct impact on greenhouse gases released.	MECP, MTO	CC-3.01	<ul style="list-style-type: none"> Use of reclaimed materials in the roadway, aggregate for use in new hot mix asphalt and road base, subbase or shoulders
CC-4.00	Structural design and material component selection has an impact on both indirect upstream greenhouse gas emissions and embodied carbon of structural materials for the project.	MECP, MTO	CC-4.01	<ul style="list-style-type: none"> Use of prefabricated Bridge Elements to improve the efficiency and duration of construction is an option open to the Contractor.
		MECP, MTO	CC-4.02	<ul style="list-style-type: none"> Precast concrete pavement and rapid set concrete for concrete repairs to minimize congestion
		MECP, MTO	CC-4.03	<ul style="list-style-type: none"> Extended life-cycle materials (ASTM 1010 or Corrosion Resistant Steel) to minimize rehabilitation requirements
CC-5.00	Approaches for traffic management on road construction projects has an impact on the indirect emissions from vehicles passing through the construction zone.	MECP, MTO	CC-5.01	<ul style="list-style-type: none"> Design-Build Reference Concept design includes a construction detour to reduce congestion
CC-6.00	Approaches to earth management on-site during construction has an impact on direct emissions from vehicles operating onsite, and embodied carbon of the project infrastructure during its lifespan.	MECP, MTO	CC-6.01	<ul style="list-style-type: none"> Where property availability allows, using excess materials on site through slope flattening is an option that can be considered by the Design Build Contractor in order to minimize the need to truck excess materials away from the site.
		MECP, MTO	CC-6.02	<ul style="list-style-type: none"> Minimizing double handling of materials and the associated trucks required for hauling is typically desired by contractors to reduce costs, this also has the benefit of reducing fuel requirements and emissions.
		MECP, MTO	CC-6.03	<ul style="list-style-type: none"> Retained soil system (RSS) walls or mechanically stabilized earth (MSE) rather than concrete retaining walls
CC-7.00	Design of electrical systems for the project has the capacity to affect the indirect emissions of greenhouse gases related to energy production for the ongoing operation of the project infrastructure during its lifespan.	MECP, MTO	CC-7.01	<ul style="list-style-type: none"> LED Traffic Signal Heads and LED Lighting, at the intersection of County Road 4 and 8th Line, if specified by the Town of Bradford West Gwillimbury which has jurisdiction over this intersection.
CC-8.00	Increased vehicle kilometers travelled along the project corridor (projected through traffic modelling for the various project scenarios and/or alternatives) will increase greenhouse gas emissions from vehicle tailpipe exhaust. Anticipated improvement to vehicle emission efficiencies (via new manufacturer standards, low-carbon fuels and electric vehicles) can effectively decrease emissions from travelling vehicles within the study area; however, these efficiencies may be offset by traffic increases if significant enough.	MECP, MTO	CC-8.01	<ul style="list-style-type: none"> The Town of Bradford West Gwillimbury has jurisdiction over the signalized intersection at County Road 4 and 8th Line however, signal timing plans are typically designed to reduce overall vehicle delay either on at an individual intersection or network wide basis, this in turn leads to reduced idling time.
CC-9.00	Heavy rainfall event would pose a risk to the construction site. Waterlogging and flash floods may occur on the construction site due to heavy rain. This can compromise any materials contained there.	MECP, MTO	CC-9.01	<ul style="list-style-type: none"> Design the construction site drainage system to be able to withstand heavy rainfall
CC-10.00	Potential impacts to equipment and structures associated with changes in winds: <ul style="list-style-type: none"> Storms and heavy winds could damage fences and lighting poles. Construction could be delayed by such climate events. Risk to the safety of site workers and the surrounding environment Loss of materials 	MECP, MTO	CC-10.01	<ul style="list-style-type: none"> If any height work will be undertaken, the schedule of activities should be adjusted, and the wind speed reviewed beforehand.
		MECP, MTO	CC-10.02	<ul style="list-style-type: none"> Ensure all site fences and structures are properly secured
		MECP, MTO	CC-10.03	<ul style="list-style-type: none"> Cover spoil and material heaps during periods of high winds
		MECP, MTO	CC-10.04	<ul style="list-style-type: none"> Implement measures to control dust per AQ-1.00.

ID	Issues / Concerns / Potential Effects	Concerned Agencies	ID	Mitigation / Protection / Monitoring
	<ul style="list-style-type: none"> Increase in dust 			
CC-11.00	<p>Potential impacts to the surrounding natural environment as a result of increased precipitation:</p> <ul style="list-style-type: none"> During construction, heavy rainfall may result in soil erosion on surrounding agricultural lands and nearby residential subdivision. Heavy rainfall can also result in accidental spills of hydraulic oil or fuel into the Unnamed Tributary north of 8th Line that can damage terrestrial and aquatic ecosystems 	MECP, MTO	CC-11.01	<ul style="list-style-type: none"> To prevent the risk of erosion and the potential for runoff from the construction site into the Unnamed Tributary north of 8th Line, install sediment barriers and redirect water to a vegetated area.
Landscaping				
LAND-1.00	Landscape restoration on disturbed lands that fall within the Bradford Bypass 2002 Approved Environmental Assessment right-of-way	MTO, Town of Bradford West Gwillimbury, County of Simcoe	LAND-1.01	<ul style="list-style-type: none"> A Landscaping and Ecological Restoration Plan shall be prepared for disturbed areas that fall within the Bradford Bypass 2002 Approved Environmental Assessment right-of-way that builds upon the preliminary landscape design, terrestrial ecosystems impact assessment and fish and fish habitat impact assessment, including invasive species management.
			LAND-1.02	<ul style="list-style-type: none"> A combination of ground cover through seeding, livestock stakes for steep slopes and shrub plantings that range in size from small to large (in lieu of trees) would provide appropriate landscape rehabilitation effort, while anticipating the future development of the Bradford Bypass.
LAND-2.00	Landscape restoration for areas disturbed during construction that fall outside of the Bradford Bypass 2002 Approved Environmental Assessment right-of-way	MTO, Town of Bradford West Gwillimbury, County of Simcoe	LAND-2.01	<ul style="list-style-type: none"> A Landscaping and Ecological Restoration Plan shall be prepared for disturbed areas that fall outside of the Bradford Bypass 2002 Approved Environmental Assessment right-of-way that builds upon the preliminary landscape design, terrestrial ecosystems impact assessment and fish and fish habitat impact assessment, including invasive species management. .
			LAND-2.02	<ul style="list-style-type: none"> For areas outside of the Bradford Bypass Right-of-Way, the use of deciduous and coniferous trees with varying install sizes (such as seedlings, whips, and caliper sizes).
LAND-3.00	Potential impacts to private landscaping	MTO, Town of Bradford West Gwillimbury, County of Simcoe, Property Owners	LAND-3.01	<ul style="list-style-type: none"> Private landscaping impacted during construction shall be returned to existing conditions in consultation with the property owner
			LAND-3.02	<ul style="list-style-type: none"> OPSS-803: Construction Specification for Vegetative Cover
			LAND-3.03	<ul style="list-style-type: none"> OPSS.MUNI 804: Construction Specification for Seed and Cover
Waste and Excess Materials Management				
WEMM-1.00	Potential to encounter contaminated soils during construction	MECP, MTO, Town of Bradford West Gwillimbury, County of Simcoe	WEMM-1.01	<ul style="list-style-type: none"> If contaminated soils are encountered during construction, the Contractor must notify the Ministry of Transportation Environmental Monitor and the Project Leader. The suitability of re-using that soil must be determined before re-using it in accordance with Ontario Regulation 406/19.
		MECP, MTO, Town of Bradford West Gwillimbury, County of Simcoe	WEMM-1.02	<ul style="list-style-type: none"> If excavated soil is deemed unsuitable for backfill operations due to environmental conditions, the Contractor shall proceed to stockpile the material in the appropriate location assigned for unsuitable material on site. The Project Leader and the Ministry of Transportation's Environmental Monitor can direct the Contractor, whether the soil is required to leave the site or can remain on site with the additional approval of the Qualified Professional. No soil may be transported off-site without authorization from a designated Qualified Professional, the Project Leader and the Ministry of Transportation's Environmental Monitor during construction work.
WEMM-2.00	Soil excavation and salvage	MECP, MTO, Town of Bradford West Gwillimbury, County of Simcoe	WEMM-2.01	<ul style="list-style-type: none"> Topsoil will be stripped and stockpiled in accordance with the Grading Plan for all permanent and temporary construction areas after areas have been cleared of vegetation.

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		MECP, MTO, Town of Bradford West Gwillimbury, County of Simcoe	WEMM-2.02	<ul style="list-style-type: none"> Topsoil stripped during the site preparation program is not considered suitable for reuse in any application other than general landscaping on the site. The topsoil can be used for landscaping within diversion channel and swales, and the construction of landscaped berms.
		MECP, MTO, Town of Bradford West Gwillimbury, County of Simcoe	WEMM-2.03	<ul style="list-style-type: none"> Any topsoil to be salvaged will be stripped during dry periods to the greatest extent practical. Topsoil will be stored in accordance with the sediment and erosion control measures described in the Environmental Protection Plan and contract specifications, until it is required for site reclamation.
		MECP, MTO, Town of Bradford West Gwillimbury, County of Simcoe	WEMM-2.04	<ul style="list-style-type: none"> Topsoil piles shall be marked with appropriate signage to prevent accidental admixing. Topsoil shall not be imported to or exported from the site unless it satisfies the requirements of the <i>Aggregate Resources Act</i>.
		MECP, MTO, Town of Bradford West Gwillimbury, County of Simcoe	WEMM-2.05	<ul style="list-style-type: none"> Topsoil from the natural areas will be separated from other topsoil stockpiles so that it may be used for restoration of the areas from which it was removed, to the extent possible.
		MECP, MTO, Town of Bradford West Gwillimbury, County of Simcoe	WEMM-2.06	<ul style="list-style-type: none"> Replace topsoil as evenly as possible over areas of the construction area to be reclaimed where topsoil salvage was conducted. Postpone replacing topsoil during wet weather or high winds to prevent damaging soil structure or erosion of topsoil.
		MECP, MTO, Town of Bradford West Gwillimbury, County of Simcoe	WEMM-2.07	<ul style="list-style-type: none"> Subsoil will be stored separately from topsoil with a minimum of 1 m separation of the piles
		MECP, MTO, Town of Bradford West Gwillimbury, County of Simcoe	WEMM-2.08	<ul style="list-style-type: none"> Blade ruttled topsoil flat prior to topsoil replacement.
		MECP, MTO, Town of Bradford West Gwillimbury, County of Simcoe	WEMM-2.09	<ul style="list-style-type: none"> To prepare restoration areas for seeding, spread, loosen and fine grade topsoil. Topsoil shall be prepared for planting at a depth of 0.3 m unless otherwise specified.
WEMM-3.00	Handling and storage of on-site soil	MECP, MTO, Town of Bradford West Gwillimbury, County of Simcoe	WEMM-3.01	<ul style="list-style-type: none"> Determine the best strategy for the movement of soil across the Project. Double handling of soil is to be minimized to the extent possible.
		MECP, MTO, Town of Bradford West Gwillimbury, County of Simcoe	WEMM-3.02	<ul style="list-style-type: none"> Soil shall not be placed in locations where there is direct drainage to that location. The drainage at the laydown located need to be managed appropriately to avoid localized flooding and/ or erosion of these storage areas.
		MECP, MTO, Town of Bradford West Gwillimbury, County of Simcoe	WEMM-3.03	<p>Site access and movement will be based on, but not limited to, the following considerations and constraints:</p> <ul style="list-style-type: none"> The Contractor must keep within the designated construction limits and not travel from different areas of the Project using the public road network for movement of soil. The Contractor should limit the crossing of any watercourse to pre-determined locations to aid movement within the Project. Should other temporary crossings be required for any other fish-bearing watercourse, the Contractor shall develop a plan and submit to the Ministry of Transportation's Environmental Monitor for approval. Approval must be received before implementation. These temporary crossings of any watercourse will not be accessible once the realignment and restoration of the watercourse is complete. Work shall be undertaken in compliance with the <i>Fisheries</i>

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				Act and any permits or approvals. The Contractor shall move the soil within Construction Limits. The off-site soil storage and movement is outlined further below.
		MECP, MTO, Town of Bradford West Gwillimbury, County of Simcoe	WEMM-3.04	<ul style="list-style-type: none"> Stockpiles within the Project will either be re-used for engineered or for other purposes (e.g., topsoil/slope flattening). Some stockpiles may be required for a short period of time, but in some instances, it may be necessary to stockpile earth material for an extended period. Stockpile locations are to be limited to the Laydown Areas.
		MECP, MTO, Town of Bradford West Gwillimbury, County of Simcoe	WEMM-3.05	<p>Stockpile locations within the Laydown Areas will be based on, but not limited to, the following considerations and constraints.</p> <ul style="list-style-type: none"> Excavated earth that is not to be utilized immediately will be temporarily stockpiled in a manner that does not cause an adverse environmental effect or impair water quality. There will be minimal stockpiles of earth and granular material on-site in order to limit/ avoid double handling of material. A stockpiling location will generally be in proximity to where the material will be ultimately used. Earth will not be placed in locations where there is direct drainage to that location. Stockpiled materials near any watercourse will be stored and stabilized at least 30 m away from the watercourse. Soil must not be stored within 10 m of the construction limits unless any of the following apply: <ul style="list-style-type: none"> 500 m³ or less will be stored Soil storage will be less than 1 week There is a physical barrier between the excess soil and the Construction Limits.
		MECP, MTO, Town of Bradford West Gwillimbury, County of Simcoe	WEMM-3.06	<p>Stockpile management will be based on, but not limited to, the following considerations and constraints.</p> <ul style="list-style-type: none"> Implement measures, during construction, to avoid the introduction or spread of invasive vegetation with the Project Area, including from equipment brought on-site from other worksites and from imported fill. In doing so, take into account Ontario Invasive Plant Council's <i>Clean Equipment Protocol for Industry</i>. Stockpiles with invasive species may be tarped to facilitate the invasive species deterioration. Stockpiles shall be temporarily seeded to reduce erosion if left exposed or inactive for more than 30 days. Measures to prevent the mobilization of stockpiles will be employed using silt fences and other erosion control methods in accordance with the Erosion and Sediment Control Plans and approved by the Ministry of Transportation's Environmental Monitor. For stockpiles left on-site long-term (more than one month) and where erosion and sediment control measures are required to manage on-site runoff water, the Contractor shall maintain such measures to ensure their effectiveness. Silt fencing installed around soil stockpiles must maintain a minimum 1 m distance from the toe of the stockpile. Additional erosion and sediment control measures will be inspected on a weekly basis and after a major precipitation event. The Contractor is responsible to correct any identified deficiencies in a timely manner. The stockpiles should be monitored to ensure that stockpiles remain intact and that there are no environmental adverse effects, erosion issues, or other concerns. Soil stockpiles of any type must be stored with slopes 70 degrees or less from April 15 until July 15 (MNRF, 2017) to prevent Bank Swallows (<i>Riparia riparia</i>), a bird Species at Risk, from nesting in the stockpiles. If not permissible, the contractor shall implement exclusion techniques such as tarping of slopes. Soils shall be handled and stored during construction in a manner that protects soil quality for re-use.
		MECP, MTO, Town of Bradford West Gwillimbury, County of Simcoe	WEMM-3.07	<ul style="list-style-type: none"> Decisions on re-using stockpiled soil to backfill the excavations or for grading within the Project Area will be determined in accordance with the project specifications and will be based strictly on the suitability of soil for use in backfilling construction excavations or as structural fill. The Contractor is responsible for the re-use of soil within the Project Area to the extent possible.
WEMM-4.00	Handling and storage of excess soils (off-site)	MECP, MTO, Town of Bradford West Gwillimbury, County of Simcoe	WEMM-4.01	<ul style="list-style-type: none"> The Contractor shall re-use excess soil within the Project to the extent possible. Remaining excess soil shall be re-used or placed in the creation of berms at locations to be determined by the Qualified Professional, Project Leader and the Ministry of Transportation's Environmental Monitor. In some instances, on-site re-use of soil may not be possible. In these instances, with the consultation and approval of the Qualified Professional, Project Leader and Ministry of Transportation's Environmental Monitor the soil may be reused off-site.
		MECP, MTO, Town of Bradford West	WEMM-4.02	<ul style="list-style-type: none"> Stockpiles of excess soil deemed unsuitable for use in any application after all construction excavations have been backfilled and grading completed within the Project and as approved by the Qualified Professional, Project Leader and

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		Gwillimbury, County of Simcoe		<p>the Ministry of Transportation's Environmental Monitor, must be transported to an off-site disposal facility or approved off-site reuse receiver in accordance with the applicable regulations, including Ontario Regulation 406/19.</p> <ul style="list-style-type: none"> ▪ Transportation and reuse or disposal of excess soil should follow an Excess Soil Management Plan (developed by the Contractor and approved by the Ministry prior to transport of reuse or disposal of the soil. ▪ All documentation (bills of lading, waste manifests, waste characterization, etc.) are to be maintained on-site, and copies shall be provided to the Ministry and the Qualified Professional. ▪ When required, off-site reuse or disposal details should be included in the Excess Soil Management Plan by the contractor outlining specific procedures and protocols for soil sampling and disposal. ▪ No soil removed from the site may be disposed of off-site or re-used at any location other than the Project Area and/or off-site location permitted to accept the soil. ▪ Approval by the Qualified Professional is required prior to the removal of any soil from the site. ▪ Preference will be given to re-using soil instead of disposing of soil at a landfill, if the geotechnical quality of the soil is deemed appropriate for re-use. ▪ Large debris and solid waste material such as foundations, concrete, field stones, cobble stones, wood or metal shall be separated from the soil by mechanical means and salvaged for on-site/off-site re-use or disposed off-site separately as solid waste at a facility permitted to receive construction/ demolition debris.
		MECP, MTO, Town of Bradford West Gwillimbury, County of Simcoe	WEMM-4.03	<ul style="list-style-type: none"> ■ Any excess soil should be sampled according to a Sampling and Analysis Plan that is prepared by the Qualified Professional based on Ontario Regulation 406/19 and at a minimum, soil samples must be analyzed for the following parameters: Petroleum Hydrocarbons in Fractions F1 to F4, and metals (including lead), salinity (if there are any intended agricultural receiving sites), inorganics, pH and grain size. Additional analysis may also be required for leachate if any substances with published Leachate Screening Levels in the Soil Rules are identified as contaminants of concern within the Project.
		MECP, MTO, Town of Bradford West Gwillimbury, County of Simcoe	WEMM-4.04	<ul style="list-style-type: none"> ■ Assuming excess soil is stockpiled, appropriate bulk soil sample frequencies should comply with "Records of Site Condition - Part XV.1 of the Act, Ontario Regulation 153/04 as amended, Table 2 Minimum Stockpile Sampling Frequency". This is a requirement of Ontario Regulation 406/19.
		MECP, MTO, Town of Bradford West Gwillimbury, County of Simcoe	WEMM-4.05	<ul style="list-style-type: none"> ■ All sampling and decontamination procedures, laboratory analytical methods, and protocols and procedures will be consistent with those established by the Ministry of the Environment, Conservation and Parks, as documented in "Guidance on Sampling and Analytical Methods for Use at Contaminated Sites in Ontario, May 1996" (MOE 1996 Guidance Manual). Representative samples should be collected in containers supplied by a Canadian Association for Laboratory Accreditation (CALA) - accredited laboratory.
		MECP, MTO, Town of Bradford West Gwillimbury, County of Simcoe	WEMM-4.06	<ul style="list-style-type: none"> ■ Based on the results of the analytical testing of soils within the Project Area, excess materials should not be re-used off-site at a residential, commercial, or industrial property without further verification sampling or acceptance of that material according to the Excess Soil Management Plan for the receiver site that is completed by the Contractor and approved by the Ministry. <ul style="list-style-type: none"> ▪ It should be noted that the private receiver site may require additional testing to satisfy the Excess Soil Quality Standards published in the Soil Rules; which may require the collection and analysis of soil for select Synthetic Precipitation Leaching Procedure (SPLP) parameters to meet Ontario Regulation 406/19 before soil are exported and accepted. ▪ The Contractor will follow the proper screening and reuse or disposal requirements for excess soil if any is deemed to require off-site reuse or disposal. ▪ When soil suspected of being potentially contaminated are observed during construction, the contractor should inform the Qualified Professional. Additional testing should be conducted to further characterize the contamination based on the Qualified Professional's recommendation to determine suitability for re-use on-site or disposal off-site.
		MECP, MTO, Town of Bradford West Gwillimbury, County of Simcoe	WEMM-4.07	<ul style="list-style-type: none"> ■ Should on-site re-use not be possible, the Contractor shall make all reasonable attempts to locate a suitable off-site beneficial re-use receiver. Only as a last resort shall disposal of excess soil at landfill will be undertaken. Re-use at off-site beneficial re-use receivers shall be communicated to the Ministry and the Contractor shall verify and document that the receiver is operating under appropriate by-laws, permits and regulations and that the quality of material being re-used

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				is suitable for their operation. Copies of all agreements, hauling record, bills of lading, weigh bills, analytical results shall be forwarded to the Ministry and/or Contract Administrator. A copy of the hauling record must be retained on behalf of the Ministry and confirmation of receipt of the excess soil at the destination site must be obtained by the hauler with a copy of the final record to be retained by all parties for two years.
		MECP, MTO, Town of Bradford West Gwillimbury, County of Simcoe	WEMM-4.08	<ul style="list-style-type: none"> ■ Receiving sites identified for beneficial re-use of excess material will be screened in advance and will require approval by the Qualified Professional. As part of the screening process, the Qualified Professional will ensure that receiving site criteria, and legislative and regulatory requirements are withheld. If excess soil is to be transported off the right-of-way for beneficial re-use at a receiving site, each load should be accompanied by documentation from the Qualified Professional that summarized or provides (as a minimum): <ul style="list-style-type: none"> ▪ The sampling and segregating work done, ▪ The excess soil data pertaining to the suitability for the excess soil for re-use, ▪ The receiving site soil data pertaining to the suitability of the excess soil for re-use at the receiving site, ▪ A statement from the Qualified Professional that the soil should be used for beneficial re-use and is not likely to cause a negative effect on human health or the environment; and a statement from the QP confirming the land use of the receiving site matches the intended use/ suitability of the excess soil
		MECP, MTO, Town of Bradford West Gwillimbury, County of Simcoe	WEMM-4.09	<ul style="list-style-type: none"> ■ Before the soil has been shipped and received at the receiving site, the Ministry requires written documentation from the owner of the receiving site confirming acceptance of the soil and the owner's understanding of the soil quality and quantity. The following must be kept on file for future reference as out lined in Ontario Provincial Standard Specification. MUNI 100: <ul style="list-style-type: none"> ▪ A record of the exact location where the soil is deposited on the Receiving site; ▪ Landowner/ facility names and civic addresses; ▪ Date of disposition; ▪ Quantity (bill of lading); ▪ Soil sampling results; and, ▪ QPs confirmation of appropriateness of excess soil for Receiving Site.
		MECP, MTO, Town of Bradford West Gwillimbury, County of Simcoe	WEMM-4.10	<ul style="list-style-type: none"> ■ If potentially contaminated soil is encountered based on organic vapour monitor, odours, soil discoloration, buried containers or other materials contributing to a potential release, etc., the Contractor must inform the Ministry and the Qualified Professional. The following provides guidance with respect to contaminated soil management within the Project Area.
		MECP, MTO, Town of Bradford West Gwillimbury, County of Simcoe	WEMM-4.11	<ul style="list-style-type: none"> ■ A thorough understanding of the contaminants that may be encountered and appropriate means and measures for handling and managing excavated materials should be contemplated in advance of undertaking excavation activities of suspected contaminated soils. Contaminated soil is soil that exceeds the applicable Ministry of the Environment, Conservation and Parks Table 2 Site Condition Standard (MECP, 2011).
		MECP, MTO, Town of Bradford West Gwillimbury, County of Simcoe	WEMM-4.12	<ul style="list-style-type: none"> ■ A procedure for soil testing, if soil that is observed to be potentially contaminated is encountered during excavation shall be developed by the Qualified Professional, in accordance with the project specification. If potentially contaminated soil is encountered during excavation, the contractor shall notify the Ministry and the Qualified Professional and the above noted procedure shall be implemented by the Contractor.
			WEMM-4.13	<ul style="list-style-type: none"> ■ The Contractor shall stockpile all suspected contaminated soil in a designated Temporary Soil Storage Site in such a manner as to protect existing surface, materials and structures from contamination, runoff surface water and, as result, erosion. Intermediate staging of contaminated soils elsewhere within the Project Area is strictly prohibited. If the designated Temporary Soil Storage Site cannot be used for any reason, the Contractor must consult with the Qualified Professional to determine an alternative, if possible. The Qualified Professional should notify the Ministry of any changes. <ul style="list-style-type: none"> ▪ The Temporary Soil Storage Site should be designed by the Qualified Professional and constructed by the Contractor. Once designated, the surface soils (up to 1.5 m depth) of the Temporary Soil Storage Site will be sampled to establish a baseline of environmental conditions. Depending on the size of the Temporary Soil Storage Site, between three and eight samples will be collected and submitted for chemical analysis of PHCs in F1-F4, VOCs, PAHs, metals and inorganic parameters, including pH. Samples will be collected using either hand auger or by excavation of shallow test pits.

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				<ul style="list-style-type: none"> ▪ The design of the Temporary Soil Storage Site will include: a minimum of 10-mil (10 thousandth of an inch) nylon reinforced polyethylene sheeting serving as an impermeable/low permeable barrier to contain stockpiled potentially contaminated excess soils; a 0.5 to 1 m high berm of baled hay or clean fill with the 10-mil nylon reinforced polyethylene sheeting extended over the berm, reaching the exterior ground surface; and consider how the potentially contaminated soils will be transported and stockpiled without compromising the berms (controlling runoff/run-on) or causing potential cross contamination (e.g., migration of contaminants outside the Temporary Soil Storage Site). If more than one sheet of polyethylene is needed to line the ground beneath the Temporary Soil Storage Site, each section of sheeting must overlap by at least 1 m. ▪ As necessary, the Temporary Soil Storage Site will be designed with a sump pump to remove any accumulated water from the Temporary Soil Storage Site and temporary store it for proper discharge. In addition, should contaminated soil be encountered that the Qualified Professional or the Ministry consider a potential source of groundwater contamination, then these soils will either be: <ul style="list-style-type: none"> ▪ Placed in a separate cell in the Temporary Soil Storage Site, or; ▪ Placed directly into a lined roll-off and properly disposed of at a licensed landfill facility. ▪ Following the use of the Temporary Soil Storage Site, confirmatory surface soil samples (up to 1.5 m depth) will be collected and submitted for chemical analysis of PHCs, VOCs, PAHs, pH, metals and inorganic parameters to verify the quality of soil in this area. These sample results will be compared to the baseline samples to verify the area was not contaminated through the use of the Temporary Soil Storage Site. If needed, shallow remedial excavations can be completed to return the Temporary Soil Storage Site area back to original condition.
		MECP, MTO, Town of Bradford West Gwillimbury, County of Simcoe	WEMM-4.14	<ul style="list-style-type: none"> ■ If necessary, the excavation of contaminated soil, segregation and processing will be overseen by the Qualified Professional or a designate of the Qualified Professional, and any additional excavations/removal of impacted soil will require approvals from the Ministry, as well as a management plan and document for the additional work.
		MECP, MTO, Town of Bradford West Gwillimbury, County of Simcoe	WEMM-4.15	<ul style="list-style-type: none"> ■ When excavation and/or trenching are required at a suspected contaminated location, appropriate management of the contaminated solid or semi-solid material (such as soil or sludge) is required. Concerns for excavation and management of impacted soil relate to the potential for transfer of contaminants during materials handling and transportation activities. Transfer of contaminants may occur due to: <ul style="list-style-type: none"> ▪ Excavation, storage, sizing etc. and the potential for dust and volatile emissions from the contaminated media; ▪ High potential for fugitive dust emissions due to movement of equipment at the site; ▪ Leaching contaminants from contaminated soil to surface and groundwater water can occur from unlined and uncovered stockpiles and excavated pits; ▪ Migration of contaminants to uncontaminated areas may occur during transportation; ▪ Improper handling and disposal of contaminated soil may allow contaminants to migrate into and pollute uncontaminated areas.
		MECP, MTO, Town of Bradford West Gwillimbury, County of Simcoe	WEMM-4.16	<ul style="list-style-type: none"> ■ Excavation and trenching primarily involves equipment that is widely used in the construction or non-hazardous solid waste disposal industries, such as excavators, earth movers or backhoes, dump trucks, and containers of various shapes, sizes, and materials.
		MECP, MTO, Town of Bradford West Gwillimbury, County of Simcoe	WEMM-4.17	<ul style="list-style-type: none"> ■ General guidance and best practice measures to prevent potential transfer of contaminants during excavation, material handling and transport of contaminated material include the following: <ul style="list-style-type: none"> ▪ Entry to the active work area should be limited to avoid unnecessary exposure and related transfer of contaminants. ▪ Traffic should be minimized on contaminated soil. ▪ Surface drainage and subsurface utility systems should be identified. ▪ Any runoff should be prevented from entering and mixing with on-site contaminated media by building earthen berms or adopting similar other measures on the TSSS and on the site, where needed. ▪ Provisions should generally be made to capture surface water runoff by diverting it to a controlled depression-area or lined pit on the Temporary Soil Storage Site and on-site, where needed.

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				<ul style="list-style-type: none"> ▪ Fugitive dust emissions should be controlled during excavation both on the Temporary Soil Storage Site and on-site, where needed, by spraying water or other materials to keep the ground moist or covered. During wet weather or rainfall no water spraying would be needed. Materials for dust control must be approved by the Qualified Professional prior to use on the site. ▪ Appropriate personnel and equipment and decontamination procedures should be employed as required to keep the site-related contaminants within the Temporary Soil Storage Site and the Project. ▪ Covers and liners should be used at all times when contaminated materials are being stored at the Temporary Soil Storage Site. Covers should be used on trucks that are moving materials around and from the site. ▪ Any equipment that is involved in earthwork activities or that may have come into contact with waste or any potentially contaminated material must be decontaminated prior to being removed from the Site or Temporary Soil Storage Site.
		MECP, MTO, Town of Bradford West Gwillimbury, County of Simcoe	WEMM-4.18	<ul style="list-style-type: none"> ■ General guidance and best practice measures for the storage of contaminated soil include the following: <ul style="list-style-type: none"> ▪ For contaminated suspected soil, soil must be stored in a manner that prevents potential contaminants from leaching into the groundwater. ▪ Potentially contaminated soil will be protected to prevent the infiltration of precipitation and/or generation of runoff. ▪ If determined necessary by a Qualified Professional, soil from the Project that require sampling needs to be kept segregated from soil that has already been sampled.
		MECP, MTO, Town of Bradford West Gwillimbury, County of Simcoe	WEMM-4.19	<ul style="list-style-type: none"> ■ In the event that contaminated soil are encountered during construction, the suitability of reusing the soil should be determined before it's re-use. The contractor must consult with the Qualified Professional and the Ministry of Transportation's Environmental Monitor prior to re-using contaminated soil on-site. In general, contaminated soil may be re-used on-site for backfilling construction excavations/or as structural fill, as deemed appropriate by the Qualified Professional subject to approval from the Ministry the Project Leader and Ministry of Transportation's Environmental Monitor.
		MECP, MTO, Town of Bradford West Gwillimbury, County of Simcoe	WEMM-4.20	<ul style="list-style-type: none"> ■ Contaminated soil must be stockpiled as close as possible to the location from where it was excavated or placed in a separate cell in the Temporary Soil Storage Site to ensure it is isolated from stockpiled clean material and is clearly identifiable. Contaminated soil may only be re-used in areas that will be advised by the Qualified Professional with approval from the Project Leader and Ministry of Transportation's Environmental Monitor according to the provincial and local authority standards. The contractor shall maintain a log to document the final disposition of contaminated soil re-used on-site, if any.
		MECP, MTO, Town of Bradford West Gwillimbury, County of Simcoe	WEMM-4.21	<ul style="list-style-type: none"> ■ Contaminated soil will not be replaced beneath the groundwater table under any circumstance. In addition, if contaminated soil is encountered that the Qualified Professional, notify the Ministry immediately and then - consider a potential long-term source to groundwater contamination, then these contaminated soils may not be re-used in the Project Area in their current state. In the event contaminated soil is found below the water table, the contractor should contact the Ministry of Transportation first for potential remedial actions. This soil should be either: <ul style="list-style-type: none"> ▪ Placed in a separate cell in the Temporary Soil Storage Site; and ▪ Placed directly into a lined roll-off container.
		MECP, MTO, Town of Bradford West Gwillimbury, County of Simcoe	WEMM-4.22	<ul style="list-style-type: none"> ■ In the event that off-site disposal is required, with prior approval from the Qualified Professional, Project Leader and the Ministry, the Contractor shall dispose of soil not suitable for re-use according to proper disposal requirements, taking into account Ontario's <i>Management of Excess Soil- A Guide for Best Management Practices</i> (MECP, 2014) and Ontario Regulation 406/19, including the <i>Soil Rules</i>.
		MECP, MTO, Town of Bradford West Gwillimbury, County of Simcoe	WEMM-4.23	<ul style="list-style-type: none"> ■ It is important that transportation of contaminated soil/excess soil is carefully considered prior to the commencement of the Project. Transportation of Dangerous Goods, General Waste Management, and other environmental regulations apply to the off-Site transportation and disposal of waste materials.
		MECP, MTO, Town of Bradford West Gwillimbury, County of Simcoe	WEMM-4.24	<ul style="list-style-type: none"> ■ Contaminated soil not suitable for re-use within the Project Area shall be managed and disposed of in accordance with all applicable laws, industry standards and best management practices, this may include but not limited to: <ul style="list-style-type: none"> ▪ The <i>Environmental Protection Act</i>; ▪ Ontario Regulation 406/19, as amended;

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				<ul style="list-style-type: none"> ▪ Ontario Provincial Standard Specification PROV 180 General Specification for the Management of Excess Materials; ▪ Management of Excess Soil – A Guide for Best Management Practices (Ministry of Environment, Conservation and Parks [MECP], Updated: April 4, 2019, Published: April 5, 2016, as updated).
		MECP, MTO, Town of Bradford West Gwillimbury, County of Simcoe	WEMM-4.25	<ul style="list-style-type: none"> ■ The contractor will ensure that all shipments comply with applicable regulatory requirements, including Ontario Regulation 406/19, and all necessary documentation is provided to MTO in a timely manner.
		MECP, MTO, Town of Bradford West Gwillimbury, County of Simcoe	WEMM-4.26	<ul style="list-style-type: none"> ■ Only approved disposal facilities for contaminated soil (either non-hazardous or hazardous) will be permitted for use.
		MECP, MTO, Town of Bradford West Gwillimbury, County of Simcoe	WEMM-4.27	<ul style="list-style-type: none"> ■ Acceptance criteria must be met, including but not limited to provision of adequate soil quality data for bulk chemical analysis and Schedule 4 leachate criteria. The origin and volume of contaminated material being transferred to a disposal site and its final destination shall be tracked.
		MECP, MTO, Town of Bradford West Gwillimbury, County of Simcoe	WEMM-4.28	<ul style="list-style-type: none"> ■ The Contractor shall arrange for and pay for any additional testing required by the receiver site as a condition of acceptance of the material. The Contractor shall submit to the Ministry of Transportation a copy of the forms provided under Ontario Provincial Standard Specification PROV. 180, signed by the receiver site.
		MECP, MTO, Town of Bradford West Gwillimbury, County of Simcoe	WEMM-4.29	<ul style="list-style-type: none"> ■ Mitigation measures will be developed in consultation with the Qualified Professional and the Ministry of Transportation Environmental Monitor to mitigate the mobilization and transport of potential residual agricultural contaminants within the Project Area towards waterbodies during all phases of the Project, including measures to allow time for increased die-off of pathogenic organisms and volatilization of agricultural contaminants prior to soil disturbance and removal of nutrient compounds through plant harvesting.
		MECP, MTO, Town of Bradford West Gwillimbury, County of Simcoe	WEMM-4.30	<ul style="list-style-type: none"> ■ Prior to disposing of a subject waste (i.e., liquid industrial waste and hazardous waste, including hazardous soil), the contractor shall ensure that the subject waste be properly classified as per Ontario Regulation 347 and registered in the Ministry of the Environment, Conservation and Parks Hazardous Waste Information Network, and a valid waste subject waste generator registration number is obtained. The generator shall ensure that waste manifests are completed correctly for each subject waste transferred and all waste transfers are properly identified and tracked through the Hazardous Waste Information Network system.
		MECP, MTO, Town of Bradford West Gwillimbury, County of Simcoe	WEMM-4.31	<ul style="list-style-type: none"> ■ A waste tracking system governing all hazardous waste transfers in accordance with the federal <i>Transportation of Dangerous Goods Regulation</i> and provincial regulations should be implemented by the contractor.
		MECP, MTO, Town of Bradford West Gwillimbury, County of Simcoe	WEMM-4.32	<ul style="list-style-type: none"> ■ Soil/fill materials imported to the Project Area, including quantity, quality and the source of the imported materials, should also be tracked and documented during the construction activities in accordance with Ontario Regulation 406/19.
		MECP, MTO, Town of Bradford West Gwillimbury, County of Simcoe	WEMM-4.33	<ul style="list-style-type: none"> ■ For the purpose of any record-keeping mentioned in this document, it is recommended that records be retained for a minimum of 7 years after the completion of all excess soil management activities or the removal of all excess soil from a Temporary Soil Storage Site, as required by Ontario Regulation 406/19.
		MECP, MTO, Town of Bradford West Gwillimbury, County of Simcoe	WEMM-4.34	<ul style="list-style-type: none"> ■ The Contractor will be responsible for tracking and managing the quality and quantity of material excavated from or imported to the site using existing information and new information, as needed. Tracking will include quantifying and documenting locations for the beneficial on-site re-use of excavated materials. Management will include: <ul style="list-style-type: none"> ▪ Minimizing adverse effects to workers and sensitive receptors through Best Management Practices, worker health and safety provisions and ensuring that remedial/risk management options are considered during the construction planning process and appropriately incorporated into final designs.

ID	Issues / Concerns / Potential Effects	Concerned Agencies	ID	Mitigation / Protection / Monitoring
				<ul style="list-style-type: none"> ▪ Minimizing soil disturbance and retaining vegetation, including wildlife trees, within and around the Project Area in accordance with the setbacks / buffers identified on applicable design drawings, and in other areas to the extent that it is technically feasible or unless required to meet engineering requirements for safe and facility operation. The construction vehicle traffic will be minimized on contaminated soils. ▪ Manage soil in such a way as to prevent any adverse effects associated with receiving, processing, storage and movement of soil with respect to noise, dust, mud, tracking, leaching, runoff, erosion, outdoor air quality and odour. Monitoring will be completed in accordance with the Contractor's Air Quality Best Management Practices Plan to reduce the potential generation of dust (specifically PM10) and other fugitive air emissions during construction, including daily visual observations and on-site dust monitoring to inform the implementation of mitigation measures. ▪ Handle and store soil during construction in a manner that protects soil quality for re-use. In the event that contaminated soil are encountered during construction, the Contractor, Qualified Professional, with approval from the Ministry, shall determine the suitability of reusing the soil before reusing it. The Contractor shall (with Project Leader and the Ministry of Transportation's Environmental Monitor's permission) dispose of any soil not suitable for re-use according to proper screening and disposal requirements, taking into account <i>Ontario's Management of Excess Soil- a Guide for Best Management Practices</i> (MECP, 2014) and Ontario Regulation 406/19, including the <i>Soil Rules</i>. ▪ Encouraging re-use of soil where appropriate, balancing cut and fill, minimizing grading, and minimizing the need to transport additional soil to the Project Area where possible.
WEMM-5.00	Based on the age and materials used for buildings on properties and two culverts within the Project Area, there is potential for designated substances to be present. Should buildings be identified for demolition by MTO, a Designated Substance Survey (DSS) should be completed to ensure proper handling and disposal of materials.	MECP, MTO, Town of Bradford West Gwillimbury, County of Simcoe	WEMM-5.01	<ul style="list-style-type: none"> ■ The asphalt levelling course on County Road 4 may contain asbestos and prior to construction, asphalt core samples should be collected and tested for asbestos. If asbestos containing materials are found, an asbestos abatement plan should be implemented according to MTO standard special provision 101 F21 'Occupational Health and Safety Compliance - List of Designated Substances', that is included in the MTO construction tender documents in accordance with the <i>Occupational Health and Safety Act</i> of the presence of designated substances.
Built Heritage and Cultural Heritage Resources				
BHCH-1.00	Potential impacts to heritage properties as a result of changes to design	MHSTCI, MTO, Town of Bradford West Gwillimbury, County of Simcoe	BHCH-1.01	<ul style="list-style-type: none"> ■ If the boundaries of limits of work change, a review of potential built heritage and cultural heritage resources shall be undertaken to confirm potential impacts to built heritage or cultural heritage resources.
Archaeology				
ARC-1.00	Potential impacts to archaeological resources as a result of changes to design	MHSTCI, MTO	ARC-1.01 ARC-1.02 ARC-1.03 ARC-1.04 ARC-1.05	<ul style="list-style-type: none"> ■ If the boundaries of limits of work change, a review of archaeological potential shall be undertaken to confirm potential impacts to archaeological resources and the potential need for further mitigation. ■ The Design-Build Team shall comply with the recommendations of the Stage 2 Archaeological Assessment Report, and any subsequent Stage 3 or Stage 4 Archaeological Assessment Reports for the County Road 4 Early Works. ■ Archaeological sites recommended for further archaeological fieldwork or protection remain subject to section 48 (1) of the <i>Ontario Heritage Act</i> and may not be altered, or have artifacts removed from them, except by a person holding an archaeological license. ■ If any further archaeological assessments are required, assessment should be completed in consultation with Indigenous communities ■ Should changes be required to the design after the Statement of Completion of the Early Works Assessment process that are inconsistent with the Final Early Works Report, the process in Ontario Regulation 697/21, Section 29 shall be followed.
ARC-2.00	If the portion of the Wheatfield Site or its protective 10m buffer (BaGv-113) within the study area cannot be avoided by future development.	MHSTCI, MTO	ARC-2.01	<ul style="list-style-type: none"> ■ If the portion of the Wheatfield Site or its protective 10 m buffer (BaGv-113) within the study area cannot be avoided by future development, the following measures must be undertaken: <ul style="list-style-type: none"> ○ The site shall be subject to a Stage 4 assessment which should consist of hand excavation methodology as outlined in <i>Section 4.2 of the Standards and Guidelines for Consultant Archaeologists</i> (Ontario Government

ID	Issues / Concerns / Potential Effects	Concerned Agencies	ID	Mitigation / Protection / Monitoring
				<p>2011). The excavation should consist of one metre by one metre square test units laid out in a grid and should be excavated by hand to a depth of five centimetres into the subsoil;</p> <ul style="list-style-type: none"> ○ The Stage 4 excavation should be centered around the positive Stage 3 unit of 500N 300E, which was excavated overtop of the location of the first body sherd. Excavation is to continue until counts drop below 10 and there are no diagnostic artifacts, in keeping with Table 4.1 in the <i>Standards and Guidelines for Consultant Archaeologists</i> (Ontario Government 2011); ○ The study area does not extend into the remaining parts of the property and lawn. Should development go beyond the present study area, additional Stage 2 assessment will be required. The Stage 2 assessment should consist of pedestrian survey in keeping with Section 2.1 of the <i>Standards and Guidelines for Consultant Archaeologists</i> (Ontario Government 2011).
ARC-3.00	Potential discovery of undocumented archaeological resources or human remains	MHSTCI, MTO	ARC-3.01	<ul style="list-style-type: none"> ■ Should previously undocumented archaeological resources be discovered, they may be a new archaeological site and therefore subject to Section 48(1) of the <i>Ontario Heritage Act</i>. The proponent or person discovering the archaeological resources must cease alteration of the site immediately and engage a licensed consultant archaeologist to carry out archaeological fieldwork, in compliance with Section 48(1) of the <i>Ontario Heritage Act</i>.
			ARC-3.02	<ul style="list-style-type: none"> ■ The <i>Funeral, Burial and Cremation Services Act</i>, 2002, S.O. 2002, c.33 (when proclaimed in force in 2012) require that any person discovering human remains must notify the police or coroner and the Registrar of Burial Sites, War Graves, Abandoned Cemeteries, and Cemetery Closures.
Utilities				
UT-1.00	Construction disturbance resulting in impacts to Hydro One Distribution, Bell, Rogers and Zayo utilities	MTO, utility companies	UT-1.01	<ul style="list-style-type: none"> ■ Relocation of utilities that are impacted by construction.
			UT-1.02	<ul style="list-style-type: none"> ■ The Design-Build Team shall review provisions for utility access and evaluate roadside safety. It is the responsibility of the Design-Build Team to coordinate with the utility companies, confirm all potential conflicts, and to finalize a design that avoids additional conflicts during construction.
Traffic Management				
TM-1.00	Lane or road closures associated with construction staging	MTO, County of Simcoe, Town of Bradford West Gwillimbury, Emergency Services	TM-1.01	<ul style="list-style-type: none"> ■ Two-weeks prior to lane closures, the Design Build Contractor shall notify emergency service providers of the time and duration of the lane and road closures.
Project Changes				
PC-1.00	Changes to Limits of Work	MTO, MECP	PC-1.01	<ul style="list-style-type: none"> ■ Should changes be required to the design after the Statement of Completion of the Early Works Assessment process that are inconsistent with the Final Early Works Report, the process in Ontario Regulation 697/21, Section 29 shall be followed.

7 Permits and Approvals

The following sections provide a description of the federal, provincial, conservation authority and/or municipal permits that may be required for the County Road 4 Early Works. Permit and approval requirements will be confirmed as Early Works detail design progresses.

7.1 Federal

7.1.1 Fisheries Act

Based on the known background information and proposed works at this time, submission to Fisheries and Oceans Canada under a Request for Review is anticipated for the culvert extension or replacement work. The Federal *Fisheries Act* was amended on June 21, 2019 to restore protections to fish and fish habitat. Habitat protection provisions came into force on August 28, 2019 that prohibit the death of fish and the Harmful Alteration, Destruction, or Disruption of fish habitat. The 2019 amendments to the *Fisheries Act* no longer provide for a self-assessment process unless activities can follow the measures to protect fish and fish habitat as stipulated by Fisheries and Oceans Canada, or if works are occurring in a waterbody that is not protected under the *Fisheries Act*. There is currently no Ministry of Transportation Best Management Practice for culvert extensions or culvert replacements. Therefore, the proposed culvert extensions/replacement and in-water works that result in the permanent alteration of fish habitat in the Study Area should be reviewed by Fisheries and Oceans Canada through a Request for Review. The need for Fisheries and Oceans Canada submission will need to be further assessed during the detail design stage once the design plans are finalized. Once design plans are finalized, submission to Fisheries and Oceans Canada can be completed (if necessary).

7.2 Provincial

7.2.1 Ontario Water Resources Act, 1990

Where construction dewatering volumes between 50,000 and 400,000 L/day are expected, filing of the project on the Ministry of the Environment, Conservation and Parks' Environmental Activity and Sector Registry system is required in accordance with Ontario Regulation 63/16 (as amended). Where expected construction dewatering volumes exceed 400,000 L/day, a Permit to Take Water (Category 3) will be required from the Ministry of the Environment, Conservation and Parks in accordance with Section 34 of the *Ontario Water Resources Act* (RSO, 1990). Based on the dewatering estimates provided in Table 6-4, an Environmental Activity and Sector Registry is recommended to provide dry working conditions within the excavations even as the total dewatering is anticipated to be a maximum for an excavation at 394,896 L per day. It is assumed that the construction will occur in stages and dewatering volumes will stay well within the limits of an Environmental Activity and Sector Registry.

7.2.2 Environmental Protection Act, 1990

Environmental Compliance Approval(s) may be required from the Ministry of the Environment, Conservation and Parks for equipment held by contractors, owners and operators of that equipment in advance of construction, as required.

7.2.3 Endangered Species Act, 2007

Potentially suitable habitat for mammal Species at Risk: little brown myotis (*Myotis lucifugus*), eastern small-footed myotis (*Myotis leibii*), northern myotis (*Myotis septentrionalis*) and tri-coloured bat

(*Perimyotis subflavus*) may be present within the forested vegetation communities outside of the Limits of Work. As vegetation removal will be limited to the Limits of Work, destruction of mammal Species at Risk and / or their habitat is not expected within the forested communities found within the Study Area.

7.3 Further Consultation

7.3.1 Conservation Authority

The Ministry of Transportation will consult with Lake Simcoe Region Conservation Authority with respect to construction activities in regulated areas for the County Road 4 Early Works.

7.3.2 Municipal

The Ministry of Transportation, as a Ministry of the Province of Ontario, is exempt from certain municipal processes and requirements. In these instances, the Ministry of Transportation will engage with the County and the Town of Bradford West Gwillimbury to incorporate municipal requirements as a best practice, where practical, and may obtain associated permits and approvals.

The Ministry of Transportation will continue to communicate and engage with the County and the Town of Bradford West Gwillimbury during further design and construction to address municipal concerns.

8 Record of Issues and Resolutions

As outlined in Section 4.7, and in accordance with Section 11(4) of Ontario Regulation 697/21, the Ministry of Transportation established an issues resolution process to attempt to resolve any concerns raised by interested persons and Indigenous communities, in a way that does not cause unreasonable delay to the implementation of the Early Works. The issues resolution process included a review of comments received during the public review period, engagement of subject matter experts as required, and then preparation and final review of responses. Issues were considered on a case by case basis to determine if changes were required to the Project or if clarification on the Project or process was required. Further consultation with individual stakeholders took place, as required.

The Final Early Works Report has been updated to include:

- A description of the issues resolution process employed by the proponent in respect of any concerns raised by Indigenous communities and interested persons;
- A description of the concerns raised by Indigenous communities and interested persons in the issues resolution process and the outcome of the process, including what, if anything, the proponent did or will do in respect of the concerns raised, and
- A description of any changes to the Early Works as a result of addressing concerns raised through consultation under this section.

Table 8-1 provides a record of issues and resolutions in the form of feedback received and Project Team actions.

Correspondence received during the review of the Draft Early Works Report along with Project Team responses has been added to the Consultation Record available in Appendix B.

Table 8-1: Record of Issues and Resolutions for the County Road 4 Early Works

Comment Received From	Theme of Feedback	Feedback	Project Team Actions
Indigenous community – Curve Lake First Nation	Drinking water; fish and wild game; Aboriginal heritage and cultural values; endangered species; lands.	<ul style="list-style-type: none"> Request for project summary statement and general interest in the project. 	<ul style="list-style-type: none"> The Ministry of Transportation Project Manager replied with a letter providing a summary of the study findings and mitigation measures related to terrestrial ecosystems, fish and fish habitat, groundwater and hydrology, and archaeology. A meeting was offered to discuss the project if Curve Lake First Nation would like additional information.
Indigenous community – Chippewas of Rama First Nation	Contact with other Indigenous communities	<ul style="list-style-type: none"> Inquiry if the Project Team has been in contact with Chippewas of Georgina Island First Nation. 	<ul style="list-style-type: none"> Confirmation that the Project Team has been in contact with Chippewas of Georgina Island First Nation.
Indigenous community – Chippewas of Georgina Island First Nation	Meeting request	<ul style="list-style-type: none"> Request for a meeting with the Project Team. 	<ul style="list-style-type: none"> A meeting is being scheduled with Chippewas of Georgina Island First Nation
Public	Bradford Bypass highway signs	<ul style="list-style-type: none"> Request for the name “Bradford Bypass” to be used at entrances to the highway. 	<ul style="list-style-type: none"> This feedback is related to the overall Bradford Bypass and has been carried forward for consideration as part of the overall Bradford Bypass.
Public	Support for the Project	<ul style="list-style-type: none"> General support for the Project 	<ul style="list-style-type: none"> No action
Public	Environmental concerns relating to the overall Bradford Bypass	<ul style="list-style-type: none"> Comment regarding concerns for the Bradford Bypass over and through the Holland Marsh 	<ul style="list-style-type: none"> This feedback is related to the overall Bradford Bypass and has been carried forward for consideration as part of the overall Bradford Bypass.
Public	Tendering process	<ul style="list-style-type: none"> Comment regarding tendering process, including which bidders are participating in the bidding process and contract values. 	<ul style="list-style-type: none"> No action, once the contract is awarded, the system will be updated to include the short listed bidders and their tender amounts, and the awarded bidder and their tender amount.
Public	Availability of Draft Early Works Report on project website	<ul style="list-style-type: none"> Inquiry about the availability of the Draft Early Works Report on the project website. 	<ul style="list-style-type: none"> Confirmation that the report is on the project website.
Public	Bathurst Street Interchange	<ul style="list-style-type: none"> Comment regarding the lack of need for an interchange Bathurst Street. 	<ul style="list-style-type: none"> This feedback is related to the overall Bradford Bypass and has been carried forward for consideration as part of the overall Bradford Bypass.
Public	Highway alternatives	<ul style="list-style-type: none"> Concern that alternatives to the highway are not being considered Consideration of public transit as an alternative 	<ul style="list-style-type: none"> The planning process for the 2002 Approved EA narrowed down alternatives from a broad range of potential solutions to the concept, ultimately selected as the Technically Preferred Route to a Planning level of detail. The study required gathering relevant information with respect to the existing and future conditions in the analysis area so that the impacts (both positive and negative) of each alternative could be compared under different factors. To allow a satisfactory and comprehensive comparison to be made, information was gathered and grouped under five broad factors: Transportation, Natural Environment, Social Environment, Economic Environment, and Cultural Environment. As part of the current study, alternate corridor locations for the highway are not being considered as the Technically Preferred Route for the Bradford Bypass was approved through 2002 EA. This alignment is technically preferred for a freeway in terms of highway network expansion, ease of construction, relationship to provincial and municipal land use planning (Official and Transportation Master Plans, Places to Grow Act), as well as having fewer negative impacts to residential and natural areas when compared to other route options considered. The preliminary design phase will include refinements to the Technically Preferred Route within the Study Area based on various factors, including an updated traffic demand assessment and current environmental impact assessments. As part of PIC # 1, refinements and alternatives were developed and shown for the Bradford Bypass mainline, freeway-to-freeway interchanges, as well as arterial/crossing road interchanges. As part of the refinement process, the Project Team is actively engaged with local municipalities, regions, and transit agencies including Metrolinx for consultation on the design. The results of these consultations will be incorporated into the Ministry’s preliminary design study and presented to the public at key design stages.

Comment Received From	Theme of Feedback	Feedback	Project Team Actions
			<ul style="list-style-type: none"> ■ The County Road 4 Early Works is being driven by the County of Simcoe's widening of County Road 4 (2012 approved Municipal Class Environmental Assessment), to promote efficiencies between the County and the Ministry of Transportation. The Ministry will incorporate the widening of this section of County Road 4 including a 3.0 m wide multi-use path. ■ This feedback is related to the overall Bradford Bypass and has been carried forward for consideration as part of the overall Bradford Bypass.
Public	Early Works Process	<ul style="list-style-type: none"> ■ Concern with the early works approval process and proceeding in advance of Bradford Bypass study. 	<ul style="list-style-type: none"> ■ As outlined in Section 2.1 of the Early Works Report, Ontario Regulation 697/21 provides the opportunity for the Ministry of Transportation to prepare an Early Works Report for the assessment of a bridge at County Road 4 and the potential to proceed in advance of the Bradford Bypass. The Ministry is required to complete all regulatory requirements set forth in Ontario Regulation 697/21, such as carrying out consultation, and obtaining permits and approvals for the project. ■ The County Road 4 Early Works is being driven by the County of Simcoe's widening of County Road 4 (2012 approved Municipal Class Environmental Assessment), to promote efficiencies between the County and the Ministry of Transportation. The Ministry will incorporate the widening elements for this section of County Road 4 and include the construction of the multi-use path. ■ The Project Team will carry forward previous environmental commitments made during the 2002 Route Planning and Environmental Assessment Study as set out in the regulation, and the Simcoe County Road 4 Widening Environmental Assessment study as applicable
Public	Impacts to cultural heritage	<ul style="list-style-type: none"> ■ Concern with potential impacts to cultural heritage features and sites 	<ul style="list-style-type: none"> ■ Sections 5 and 6 of the Early Works Report outline the results of the environmental studies completed for this Project including Archaeological Assessments and a Cultural Heritage Evaluation Report. All works must remain in compliance with the <i>Ontario Heritage Act</i>.
Public	Impacts to terrestrial ecosystems	<ul style="list-style-type: none"> ■ Concern with potential impacts to species at risk ■ Concern with potential impacts to migratory birds and need for permits for nest removals 	<ul style="list-style-type: none"> ■ Sections 5 and 6 of the Early Works Report outline the results of the environmental studies completed for this Project including a Terrestrial Ecosystems Existing Conditions and Impact Assessment that included assessment of potential impacts to species at risk and migratory birds. All works must remain in compliance with the <i>Endangered Species Act</i>, <i>Species at Risk Act</i>, and <i>Migratory Bird Convention Act</i>.
Public	Impacts to fish and fish habitat	<ul style="list-style-type: none"> ■ Concern regarding lack of field investigations completed ■ Concern regarding removal of fish habitat ■ Concern regarding invasive species management ■ Concern regarding consultation with Fisheries and Oceans Canada ■ Concern regarding lack of permits, authorizations or approvals 	<ul style="list-style-type: none"> ■ Section 5.1.2.1.2 of the Early Works Report outlines the field investigations that were completed as part of the Early Works assessment process in September 2021. ■ All works must remain in compliance with the <i>Fisheries Act</i> and the Contractor is required to avoid causing harm or death of fish at all times. Mitigation measures have been prescribed in the Early Works Report in accordance with the <i>Ministry of Transportation / Fisheries and Oceans Canada / Ministry of Natural Resources and Forestry Protocol for Protecting Fish and Fish Habitat on Provincial Transportation Undertakings – Version 4, 2020</i>. ■ Fisheries and Oceans Canada has received study updates and has had the opportunity to review the Fish and Fish Habitat Technical Memorandum. Fisheries and Oceans Canada will continue to be engaged through the Design-Build phase of the Project. ■ Section 5.0 and 6.0 have been updated to clarify that the Design-Build Team will be required to finalize the design, update the impact assessments, consult with Fisheries and Oceans Canada and obtain permits, authorizations or approvals as required.
Public	Greenbelt Act and Lake Simcoe Protection Act	<ul style="list-style-type: none"> ■ Concern with potential impacts to lands protected under the Greenbelt Act and Lake Simcoe Protection Act 	<ul style="list-style-type: none"> ■ The Ministry has assessed impacts for the County Road 4 Early Works and will assess impacts for the overall Bradford Bypass with respect to the Lake Simcoe Protection Act and the Lake Simcoe Protection Plan through the consideration of water quality and quantity, stormwater management, groundwater management, landscaping and ecological restoration measures. Potential impacts to the watershed are assessed and mitigation measures are recommended to minimize those potential impacts in accordance with relevant provincial and federal regulatory requirements through all stages of construction

Comment Received From	Theme of Feedback	Feedback	Project Team Actions
			<ul style="list-style-type: none"> ■ Lake Simcoe Region Conservation Authority (LSCRA) and Nottawasaga Valley Conservation Authority (NVCA) are also being consulted throughout the overall Bradford Bypass to maintain alignment with currently policies and practices for the watershed. ■ The Ministry recognizes the importance of farmland and the Greenbelt's agricultural system for economic wellbeing, human health, and the quality of life of Ontarians. At the same time, there is a need to ensure that provincial transportation infrastructure keeps up with a growing population and helps build the economy. ■ The Greenbelt Plan permits infrastructure, including highways, where it supports the significant growth and economic development expected in southern Ontario beyond the Greenbelt by providing connections among urban centres. ■ Further assessment of potential impacts as part of the overall Bradford Bypass will be provided in the Environmental Impact Assessment Report once available.
Public	Supporting documents	<ul style="list-style-type: none"> ■ Request for supporting documents and studies prepared for the County Road 4 Early Works 	<ul style="list-style-type: none"> ■ The methodology, assessment and results of all studies completed as part of the County Road 4 Early Works were documented in the County Road 4 Early Works Report. Copies of supporting documents were provided.
Public	Property Impacts	<ul style="list-style-type: none"> ■ Inquiry about proximity of the Early Works to a private property. 	<ul style="list-style-type: none"> ■ Clarification provided to property owner about proximity of their property to the Early Works.
Public	Misrepresentation of highway benefits	<ul style="list-style-type: none"> ■ Comment that the highway benefits have been misrepresented to the public. 	<ul style="list-style-type: none"> ■ The highway benefits are based on various studies that have taken place leading up to the re-initiation of the Bradford Bypass in 2020. Significant population growth is projected for both Simcoe County and the Regional Municipality of York. The Bradford Bypass has been proposed as a response to this dramatic growth in population and travel demand in the area, including the forecasted increase in congestion on key east-west roadways linking Highway 400 to Highway 404. The proposed location for the Bradford Bypass was also identified in Place to Grow: Growth Plan for the greater Golden Horseshoe (2019).
Public	Duty to Consult	<ul style="list-style-type: none"> ■ Concern with the Project fulfilling its Duty to Consult with Indigenous peoples 	<ul style="list-style-type: none"> ■ The Project Team is consulting with Indigenous communities pursuant to Section 35 of the <i>Constitution Act</i>. Consultation with Indigenous communities has been ongoing through the Early Works assessment process and is outlined further in Section 4.6 of the Early Works Report.
Public	Statement of Qualification and Limitations	<ul style="list-style-type: none"> ■ Concern with the addition of the Statement of Qualification and Limitations in the AECOM report. 	<ul style="list-style-type: none"> ■ Inclusion of a Statement of Qualification and Limitations is standard practice for a report of this nature. The constraints and limitations that are applicable are set out in the document.
Public	Issues Resolution Process	<ul style="list-style-type: none"> ■ Comment that the Issues Resolution Process does not address how the issue will resolve and what will happen if an issue is not resolved 	<ul style="list-style-type: none"> ■ Section 4.7 and Section 8.0 of the Early Works Report outline the Issues Resolution Process and have been updated to provide further clarity. Issues will be considered on a case by case basis to determine if changes are required or if further clarification may be required.
Public	Permits and Approvals	<ul style="list-style-type: none"> ■ Concern regarding permits and approvals not being available prior to the award of the contract. 	<ul style="list-style-type: none"> ■ Sections 5.0 and 6.0 have been updated to clarify that the Design-Build Team will be required to finalize the design, update the impact assessments and obtain permits, authorizations or approvals as required.
Public	Provincial Policy Statement	<ul style="list-style-type: none"> ■ Comment that the Early Works is not consistent with the objectives of the Provincial Policy Statement 	<ul style="list-style-type: none"> ■ Clarification was provided on consistency with Provincial Policy Statement objectives.
Public	Meetings and presentations	<ul style="list-style-type: none"> ■ Request for minutes of meetings to be made publicly available. 	<ul style="list-style-type: none"> ■ Copies of meeting minutes with the County of Simcoe, Town of Bradford West Gwillimbury and emergency service providers has been added to Appendix B of the Early Works Report. ■ Minutes of the Environment, Community and Agriculture Committee Meeting from December 8, 2021 have been added to the Project Website under the Consultation tab.
Public	Noise impacts	<ul style="list-style-type: none"> ■ Concern regarding the County Road 4 Early Works being considered an existing condition for the noise assessment of the Bradford Bypass 	<ul style="list-style-type: none"> ■ Clarification was provided that the Noise Impact Assessment for the Bradford Bypass will look at the change in condition and recommend mitigation measures to reduce noise impacts on sensitive receivers if applicable. To determine a noise impact a comparison shall be made for the predicted future sound levels with and without the undertaking for the outdoor living area (OLA) of the noise sensitive areas. The forecasting of future traffic volumes of 10 years after the proposed construction year is used to determine the noise impacts.

Comment Received From	Theme of Feedback	Feedback	Project Team Actions
Public	Climate Change Adaptation	<ul style="list-style-type: none"> ■ Comment that the climate change assessment misses the point of climate change mitigation efforts. 	<ul style="list-style-type: none"> ■ Clarification was provided on the climate change adaptation assessment process. The Climate Change Adaptation sections helps to assess and evaluate the risk between Project components and climate variables to prevent significant adverse environmental impacts during construction. As per the Ministry of Environment, Conservation and Parks, considering impacts of climate change on a project are important as they help address any unintended risks or impacts to the environment when climate change impacts are added to the project's effects on the environment (MECP, 2017. <i>Considering climate change in the environmental assessment process</i>). ■ Further adaptation measures will be considered as part of the overall Bradford Bypass looking at construction and operations.
Public	Expropriation	<ul style="list-style-type: none"> ■ Concern regarding authority of the Ministry of Transportation to expropriate lands. 	<ul style="list-style-type: none"> ■ Clarification was provided on the expropriation process its relation to the completion of the Final EWR: <ul style="list-style-type: none"> ○ Property expropriation is a process that exists outside of Ontario Regulation 697/21 for the Bradford Bypass and County Road 4 Early Works, outside the Environmental Assessment process and outside Environmental Assessment approvals for projects where the Class Environmental Assessment applies. The ability to acquire property is not linked to Ontario Regulation 697/21 or the <i>Environmental Assessment Act</i>; ○ The test under the <i>Expropriations Act</i> is whether the need to acquire property is fair, sound and reasonably necessary; ○ There should be a significant level of technical justification for the property taking. ■ Clarification was provided on the land acquisition process for the County Road 4 Early Works: <ul style="list-style-type: none"> ○ As part of the County Road 4 Early Works, the Ministry has been meeting with individual landowners to discuss potential or expected impacts to individual properties, based on the previously approved Technically Preferred Route for the Bradford Bypass and project limits for the Early Works. The Ministry works with owners to understand their individual concerns and identify opportunities to mitigate impacts prior to advancing temporary limited interest (permission to enter and construct) or property acquisition. ○ The Ministry's preferred approach is to negotiate in good faith with owners as early as possible to reach amicable agreements for the acquisition of any properties needed to support important infrastructure improvements like this. Expropriation is only used when agreements cannot be reached within suitable project timeframes.
Public	Archaeology	<ul style="list-style-type: none"> ■ Inquiry about archaeological sites and Ministry of Heritage, Sport, Tourism and Culture Industries' review of reports. 	<ul style="list-style-type: none"> ■ Further details on the archaeological sites within the County Road 4 Limits of Work have been added to Section 5.3.2 and 6.3.2 of the Early Works Report. All archaeological reports are submitted to the Ministry of Heritage, Sport, Tourism and Culture Industries for review prior to sites being considered cleared of archaeological potential.
Utility – Hydro One Networks Inc.	Utility conflicts	<ul style="list-style-type: none"> ■ Comment regarding potential conflicts with Hydro One Networks Inc. infrastructure and that Hydro One Networks Inc. will continue to be consulted throughout design and construction. 	<ul style="list-style-type: none"> ■ Confirmation that Hydro One Networks Inc. has been consulted regarding utility conflicts and will continue to be consulted throughout design and construction.
Municipality – Bradford West Gwillimbury	Multi-use path, watermain placements and crossings, demolition permit, 8 th Line works	<ul style="list-style-type: none"> ■ Confirmation of standards of multi-use path offsetting from roadway ■ Request to discuss future watermain placement/crossings as part of the overall Bradford Bypass ■ Demolition permit for 2843 Yonge Street ■ Request for coordination of works at 8th Line with the Town of Bradford West Gwillimbury 	<ul style="list-style-type: none"> ■ The Project Team confirmed that the multi-use path was set per Ontario's Traffic Manual Book 18 (June 2021). ■ The commitment to discuss future watermain placement/crossings will be carried forward as part of the overall Bradford Bypass. ■ The abandoned house at 2835-2879 Yonge Street has been demolished by the property owner under a building permit obtained by the Town of Bradford West Gwillimbury. ■ Confirmation that the Design-Build Team will be required to coordinate the design and construction of the 8th Line intersection with the Town of Bradford West Gwillimbury.
Municipality – Town of East Gwillimbury	No comments on the County Road 4 Early Works	<ul style="list-style-type: none"> ■ The Town of East Gwillimbury confirmed that they have no comments on the County Road 4 Early Works. 	<ul style="list-style-type: none"> ■ No action required.

Comment Received From	Theme of Feedback	Feedback	Project Team Actions
Agency – York Region Public Health	Groundwater protection and well monitoring	<ul style="list-style-type: none"> Various requests for well monitoring and sharing of results with York Region Public Health during the overall Bradford Bypass. 	<ul style="list-style-type: none"> This feedback is related to the overall Bradford Bypass and has been carried forward for consideration as part of the overall Bradford Bypass.
Agency – Simcoe Muskoka District Public Health	Groundwater protection and well monitoring	<ul style="list-style-type: none"> Request to be kept informed of the start of construction and contact information for inquiries during construction about the Project and potential impacts to private wells. 	<ul style="list-style-type: none"> Addition of mitigation measures GW-1.19 and GW-3.02 to Table 6-14 indicating the requirement to keep Simcoe Muskoka District Public Health informed.
Agency – Lake Simcoe Region Conservation Authority	Natural Heritage and Stormwater Management	<ul style="list-style-type: none"> Comments regarding loss of wetland features and ecological offsetting Comments regarding species at risk bat surveys and avoidance windows Comment regarding replacement of the culvert EX-CL-8 and maintaining ephemeral flow for downstream fish habitat. Comment regarding the low flow channel demonstrating that proposed works will not limit fish passage. Comments regarding removal of invasive phragmites and invasive species management Comments regarding restoration planting and a detailed planting plan Comments regarding interim and ultimate drainage conditions 	<ul style="list-style-type: none"> Confirmation that the Bradford Bypass Project Team is consulting with Lake Simcoe Region Conservation Authority (LSRCA), Nottawasaga Valley Conservation Authority (NVCA), the Ministry of Environment, Conservation and Parks (MECP), Ministry of Northern Development, Mines, Natural Resources and Forestry (MNDMNR) and Fisheries and Oceans Canada (DFO) to discuss potential ecological impacts, mitigation and overall benefit / offsetting as part of legislative approvals for the overall Bradford Bypass. Confirmation that Species at Risk timing windows for vegetation clearing have been incorporated into the County Road 4 Early Works contract. The abandoned house and outbuildings at 2835-2879 Yonge Street has been demolished by the property owner under a building permit obtained by the Town of Bradford West Gwillimbury. Confirmation that the existing drainage pattern will be maintained and ephemeral flows will continue to be conveyed to the unnamed tributary as per the existing condition. Addition of a conceptual cross section of the low flow channel to the Early Works Stormwater Management Plan and addition of the mitigation measure to FISH-3.00 indicating that the low flow channel should be designed according to requirements outlined in Ministry of Transportation Standard WC-12 of the Highway Drainage Design Standards (February 2008). Addition of mitigation measures FISH-6.00 to Table 6-14 to further address invasive phragmites and invasive species management. Updates to mitigation measures LAND-1.01 and LAND 2-.01 in Table 6-14 to include invasive species management in the Landscaping and Ecological Restoration Plan. Clarification provided on drainage design and standards.
Agency – Ministry of Transportation Geomatics Office	Survey work	<ul style="list-style-type: none"> Comment that survey work should be completed in advance of grading so that elevation information is preserved for the Contractor. 	<ul style="list-style-type: none"> Confirmation that the Contractor is to notify MTO in advance of any construction works that may impact survey monuments which is standard of MTO contracts.
Agency – Ministry of Heritage, Sport, Tourism and Culture Industries	Impacts to cultural heritage	<ul style="list-style-type: none"> Request for copies of reports Request for various updates throughout the Archaeological and Cultural Heritage sections of the Early Works Report. Request to append the Cultural Heritage Resource Assessment Report and the Cultural Heritage Evaluation Report for 2835-2879 Yonge Street to the Early Works Report. Request to update Table 6-14 of the EWR to include specific recommendations from archaeological assessment reports prepared for this project. Comments on the Cultural Heritage Resource Assessment Report. 	<ul style="list-style-type: none"> Copies of requested reports were provided to the Ministry of Heritage, Sport, Tourism and Culture Industries. Updates were made to the following sections of the Early Works Report in response to comments received by the Ministry of Heritage, Sport, Tourism and Culture Industries: <ul style="list-style-type: none"> Section 5.3.1, updates from “cultural landscapes” to “cultural heritage landscapes” Section 5.3.1, clarification on the use of the Limits of Work to determine if there were potential built heritage resources or cultural heritage landscapes that may require further assessment. Section 5.3.1, addition of the stakeholders that were consulted as part of the preparation of the Cultural Heritage Evaluation Report. Section 5.3.1, addition that the house and outbuildings at 2835-2879 Yonge Street have since been demolished by the property owner under a building permit issued by the Town of Bradford West Gwillimbury. Section 5.3.1, addition that the Cultural Heritage Resource Assessment Report for Built Heritage Resources and Cultural Heritage (AECOM 2020a) and the Cultural Heritage Evaluation Report for 2835-2879 Yonge Street (AECOM 2021) are available upon request. Section 5.3.2, addition of details on the Stage 2 Archaeological Assessment Report and archaeological sites.

Comment Received From	Theme of Feedback	Feedback	Project Team Actions
			<ul style="list-style-type: none"> ○ Section 6.3.2.1, details on Stage 3 and Stage 4 archaeological assessments have been added. ○ Section 6.3.2.2, mitigation measures for the Wheatfield Site have been added ○ Section 6.3.2.2, redundant text removed regarding review by Ministry of Heritage, Sport, Tourism and Culture Industries. ○ Table 6-14, mitigation measures added to ARC-2.00 for the Wheatfield Site. ■ Comments on the Cultural Heritage Resource Assessment Report are related to the overall Bradford Bypass and have been carried forward for consideration as part of the overall Bradford Bypass.
Agency – Fisheries and Oceans Canada	Culverts	<ul style="list-style-type: none"> ■ Follow-up questions on proposed culvert replacement works including: <ul style="list-style-type: none"> ○ How the culverts will be embedded ○ How will the culvert works be completed in the dry ○ Applicable standards and codes of practices ○ Plans for fish relocations ○ Timeline for proposed works 	<ul style="list-style-type: none"> ■ Clarification that the Fish and Fish Habitat Technical Memorandum was prepared based on the Reference Concept Design which was prepared to approximately a 30% detail design level of completion. ■ Clarification that the Design-Build Team will be required to complete the detail design to design standards, as well as environmental protection, mitigation and monitoring measures prescribed in the Early Works Report and environmental reports prepared for the Project. The Design-Build Team will complete the final culvert design and at that time the impact assessment will need to be updated based on their final design. ■ Clarification that the Design-Build Team shall be responsible for consultation with Fisheries and Oceans Canada and submission of a Request for Review (if required). ■ Clarification that it is recommended that the work area is isolated and fish work is completed (as required). In-water work shall occur during the warmwater timing window (between July 15 to March 15). ■ Clarification that the Ontario Provincial Standards (OPSS) are included in the Early Works Report and Fish and Fish Habitat Assessment Memorandum, and applicable Standard Codes of Practice will be included in the revised Impact Assessment Report and Request for Review during the Design-Build phase of the Project. ■ Confirmation that the proposed culvert replacement includes requirements to embed the culvert by 10% and to design the culvert to follow the Highway Drainage Design Standards and sizing requirement for Fish and Fish habitat. ■ It is anticipated that construction take place over three construction seasons; however, the Design-Build Team may find efficiencies in other methods for construction staging and are not restricted to this recommendation.
Ministry of the Environment, Conservation and Parks	Early Works Groundwater Protection and Well Monitoring Plan	<ul style="list-style-type: none"> ■ Comment that the Early Works Groundwater Protection and Well Monitoring Plan shall adhere to the guidance for Environmental Activity and Sector Registries and standard conditions within Permits to Take Water. ■ Recommendation that monitoring wells be equipped with water level data loggers with regular manual checks to ensure loggers are working properly and location of monitoring wells. ■ Recommendation that the well interference protocol should follow Ministry of Environment, Conservation and Parks guidance and Permit to Take Water conditions. ■ Request for water level monitoring to start as soon as possible to determine seasonal water level fluctuations. 	<ul style="list-style-type: none"> ■ The Early Works Groundwater Protection and Well Monitoring Plan will be updated to ensure compliance with the Environmental Activity and Sector Registry water taking guide. ■ The well interference protocol will be adjusted to follow the Ministry of Environment, Conservation and Parks guidance and Permit to Take Water conditions. ■ Water level data loggers will be installed at the four monitoring wells already installed for the Project and monitoring will start as soon as possible to establish seasonal water levels.
Ministry of the Environment, Conservation and Parks	Early Works Stormwater Management Plan	<ul style="list-style-type: none"> ■ Comment regarding capacity of proposed grassed swales for water quality control and treatment and request for further clarification. ■ Request for further details on sampling requirements. 	<ul style="list-style-type: none"> ■ Clarification was provided on design guidelines that were used for the proposed grassed swales. ■ Recommendations will be incorporated in the Early Works Stormwater Management Plan to collect water samples at selected inlet and outlet points with the purpose of comparing water quality between these points.

Comment Received From	Theme of Feedback	Feedback	Project Team Actions
		<ul style="list-style-type: none"> ■ Request for the plan to include a clear map / figure showing each drainage area and its imperviousness that will discharge into the proposed flat-bottom grassed swales. ■ Request for the plan to indicate which stage of construction will involve the construction of the proposed flat-bottom grassed swales. ■ Clarification requested on the relationship between the proposed stormwater management for the early works and the ultimate drainage conditions of the Bradford Bypass. 	<ul style="list-style-type: none"> ■ The Early Works Stormwater Management Plan will be updated to include a clear map showing the drainage areas and its imperviousness that will discharge to the proposed flat-bottom grassed swales. ■ Section 5.2 of the Early Works Stormwater Management Plan will be updated to include information about the stages that include construction of proposed flat-bottom grass swales. ■ When the Bradford Bypass is constructed an effort will be made to maximize the drainage areas including impervious areas that will drain to the proposed stormwater management ponds. This may include areas from flat-bottom swales providing that the final grading and topography allows it.
<p>Ministry of the Environment, Conservation and Parks</p>	<p>Early Works Noise Report</p>	<ul style="list-style-type: none"> ■ Request for re-calculation of noise predictions using Traffic Noise Model (TNM) 3.0. ■ Comment that the Ministry of Environment, Conservation and Parks does not endorse construction nighttime eight-hour energy average level. 	<ul style="list-style-type: none"> ■ There is an Environmental Registry of Ontario posting regarding the replacement of the Noise Pollution Control Publication 206 (NPC-206) guideline with the NPC-306 which discusses the use of TNM 3.0, which was open for a consultation period from December 1, 2021 to January 15, 2022. As the decision has not been made for this posting and the replacement of NPC-206 with NPC-306 is still in the proposal phase, the use of TNM 2.5 is still the valid model to use. ■ The criteria and limits identified within the Early Works Noise Report provide a basis of assessment and a gauge of potential for complaints during nighttime construction, which informs the recommendations for noise control and mitigation measures.

9 References

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Appendix **A**

County Road 4 Early Works Recommended Plan



Appendix **B**

Consultation Record



Appendix **C**

Aquatic Effects Assessment Summary Table (Template D4)



