TRANSPORTATION ENVIRONMENTAL STUDY REPORT

Planning, Preliminary Design and Class Environmental Assessment
Highway 401 Nagle Road Interchange Study
G.W.P. 4059-17-00

Prepared for:
Town of Cobourg
and
Eastern Region
Ministry of Transportation

Prepared by:
Stantec Consulting Ltd.

January 2025

Sign-Off Sheet

This document entitled Highway 401 Nagle Road Interchange Study was prepared by Stantec Consulting Ltd. (“Stantec”) for the account of Ministry of Transportation – Eastern Region (the “Client”). Any reliance on this document by any third party is strictly prohibited. The material in it reflects Stantec’s professional judgment in light of the scope, schedule and other limitations stated in the document and in the contract between Stantec and the Client. The opinions in the document are based on conditions and information existing at the time the document was published and do not take into account any subsequent changes. In preparing the document, Stantec did not verify information supplied to it by others. Any use which a third party makes of this document is the responsibility of such third party. Such third party agrees that Stantec shall not be responsible for costs or damages of any kind, if any, suffered by it or any other third party as a result of decisions made or actions taken based on this document.

Prepared by _____
(signature)

Jenn Robinson
Environmental Planner
Stantec Consulting Ltd.

Prepared by _____
(signature)

Diana Addley
Senior Environmental Planner
Stantec Consulting Ltd.

Reviewed by _____
(signature)

Tim Belliveau, P.Eng.,
Managing Leader, Transportation
Stantec Consulting Ltd**.**

Reviewed by _____
(signature)

Gregg Cooke, P.Eng.,
Vice President, Regional Business Leader, Transportation
Stantec Consulting Ltd.

THE PUBLIC RECORD
ONTARIO MINISTRY OF TRANSPORTATION
HIGHWAY 401 NAGLE ROAD INTERCHANGE STUDY
(GWP 4059-17-00)
TRANSPORTATION ENVIRONMENTAL STUDY REPORT

This Transportation Environmental Study Report (TESR) is available for review from Monday, January 20, 2025, to Wednesday, February 19, 2025, on the study website (highway401cobourgcolborne.ca) and at the following location:

Town of Cobourg – Public Works Office
(south of Fire Hall on Boggs Road)
740 Division Street, Building #7, Northam Industrial Park
Cobourg, ON K9A 0H6
Tel: 905-372-9971
Mon – Fri: 8:30 AM to 4:30 PM

This project was carried out in accordance with the requirements of the 2000 *Class Environmental Assessment (EA) for Provincial Transportation Facilities*, a process that has been accepted and approved under Ontario's *Environmental Assessment Act*. This project is classified as a Group 'B' project, which includes major improvements to existing transportation facilities including highway improvements over land or water that provide a significant increase in traffic capacity or cause a significant widening of the "footprint" beyond the roadbed of an existing highway. The Class EA process is for projects of a defined scope and magnitude, where the impacts can be effectively determined and mitigated. This TESR fulfills the documentation requirements of the Class EA. In accordance with the requirements of the Class EA, this report is being submitted for a 30-day public comment period from Monday, January 20, 2025, to Wednesday, February 19, 2025.

Interested persons are encouraged to review this TESR and provide written comments to the study team by Wednesday, February 19, 2025. All comments and concerns should be sent directly to the study email address (comments@highway401cobourgcolborne.ca) or one of the following study team members:

Gregg Cooke, P.Eng.
Consultant Project Manager
Stantec Consulting Ltd.
200 – 835 Paramount Drive
Stoney Creek ON L8J 0B4
Tel: (905) 381-3227
Fax: (905) 385-3534
Call Collect: (905) 385-3234

Muhammad Waseem, P.Eng.
Area Manager Highway Engineering
Project Delivery East
Ministry of Transportation
1355 John Counter Boulevard,
Postal Bag 4000
Tel: (613) 449-2615
Toll-free: 1-800-267-0295 ext. 4701

Terry Hoekstra, C.E.T.
Deputy Director, Engineering
Public Works and Engineering Division
Town of Cobourg
740 Division Street, Building 7
Cobourg, ON K9A 0H6
Tel: (905) 372-9971 ext. 4371

In addition, a Section 16 Order request may be made to the Ministry of the Environment, Conservation and Parks (MECP) for an order requiring a higher level of study (i.e., requiring comprehensive environmental assessment approval before being able to proceed), or that conditions be imposed (e.g., requiring further studies), only on the grounds that the requested order may prevent, mitigate or remedy adverse impacts on constitutionally protected Indigenous and treaty rights. Requests on other grounds will not be considered. Requests should include the requester's contact information and full name, as well as the project and proponents' names.

Requests should specify what kind of order is being requested (request for conditions or a request for an individual/comprehensive environmental assessment), how an order may prevent, mitigate, or remedy potential adverse impacts on Indigenous and treaty rights, and any information in support of the statements in the request. This will ensure that the MECP is able to efficiently begin reviewing the request.

The request should be sent in writing or by email to the below MECP contacts, as well as copied to the Town of Cobourg and MTO:

Minister of the Environment, Conservation and Parks
Ministry of Environment, Conservation and Parks
777 Bay Street, 5th Floor
Toronto, ON M7A 2J3
Minister.mecp@ontario.ca

Director, Environment Assessment Branch
Ministry of Environment, Conservation and Parks
135 St. Clair Ave. W, 1st Floor
Toronto, ON M4V 1P5
EABDirector@ontario.ca

Upon reviewing comments received from the public, the Minister of Environment, Conservation and Parks may make a Section 16 Order on their own initiative within 30 days from the end of the comment period set out in the Notice of Completion. If no concerns or issues are outstanding within 60 days from the end of the comment period set out in the Notice of Completion, the project is considered to have met the requirements of the Class EA, and the Town of Cobourg and MTO may proceed to design stage, subject to the commitments documented in the TESR, and obtain any outstanding environmental approvals.

Table of Contents

LIST OF TABLES

LIST OF FIGURES

LIST OF APPENDICES

Executive Summary

General Description of Project

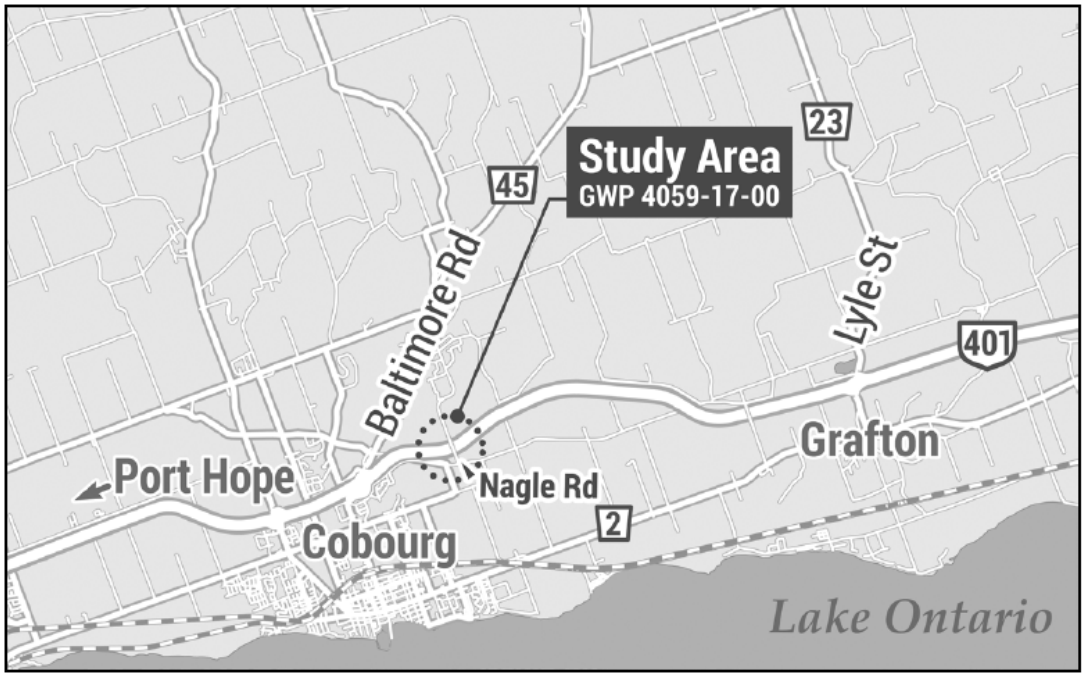
The Town of Cobourg and Ontario Ministry of Transportation (MTO) retained Stantec Consulting Ltd. (Stantec) to undertake a Planning, Preliminary Design and Class Environmental Assessment (Class EA) study for a new Highway 401 interchange near Nagle Road in the Town of Cobourg and the Township of Hamilton.

The existing Nagle Road bridge was constructed in 1959 and consists of a concrete structure that carries two lanes of traffic north and south over Highway 401. Due to its age, the bridge is approaching the end of its planned service life and will need to be rehabilitated or replaced.

Based on the population and employment projections outlined within the Town of Cobourg Official Plan, Transportation Master Plan (TMP), and Cobourg East Community Secondary Plan area, it is anticipated that the existing Highway 401 interchanges with Burnham Street and Division Street within the Town of Cobourg will not be able to support the anticipated travel demands associated with future growth and development. The Town initiated this study to develop a Recommended Plan for a new interchange to support the transportation objectives set forth in the Town of Cobourg's Official Plan and future growth within the Cobourg East Community Secondary Plan area.

The approximate location of the study area is shown within **Figure ES-1**.

Figure ES-1: Study Area Location Plan



This Transportation Environmental Study Report (TESR) documents the decision-making process, and includes a description of the project purpose; the existing technical, natural, social, economic, and cultural environmental factors; identification and evaluation of alternatives that were considered; consultation activities, including a record of the comments received and how they were considered; the Recommended Plan; anticipated environmental effects and proposed mitigation measures; and, commitments to future work and monitoring.

Environmental Assessment Process

This Preliminary Design and Class EA Study was carried out under the requirements of the 2000 MTO Class EA document for a “Group ‘B” undertaking, which includes major improvements to existing transportation facilities including highway improvements over land or water that provide a significant increase in traffic capacity or cause a significant widening of the “footprint” beyond the roadbed of an existing highway.

This TESR fulfills the documentation requirements of the Class EA and is filed for a 30-day comment period. If you have any questions and/or concerns regarding this study, please contact the following contacts:

Gregg Cooke, P.Eng.
Consultant Project Manager
Stantec Consulting Ltd.
200 – 835 Paramount Drive
Stoney Creek ON L8J 0B4
Tel: (905) 381-3227
Fax: (905) 385-3534
Call Collect: (905) 385-3234

Muhammad Waseem, P.Eng.
Area Manager Highway Engineering
Project Delivery East
Ministry of Transportation
1355 John Counter Boulevard,
Postal Bag 4000
Tel: (613) 449-2615
Toll-free: 1-800-267-0295 ext. 4701

Terry Hoekstra, C.E.T.
Deputy Director, Engineering
Public Works and Engineering Division
Town of Cobourg
740 Division Street, Building 7
Cobourg, ON K9A 0H6
Tel: (905) 372-9971 ext. 4371

In addition, a Section 16 Order request may be made to the Ministry of the Environment, Conservation and Parks (MECP) for an order requiring a higher level of study (i.e., requiring comprehensive environmental assessment approval before being able to proceed), or that conditions be imposed (e.g., requiring further studies), only on the grounds that the requested order may prevent, mitigate or remedy adverse impacts on constitutionally protected Indigenous and treaty rights. Requests on other grounds will not be considered. Requests should include the requester's contact information and full name, as well as the project and proponents' names.

Requests should specify what kind of order is being requested (request for conditions or a request for an individual/comprehensive environmental assessment), how an order may prevent, mitigate, or remedy potential adverse impacts on Indigenous and treaty rights, and any information in support of the statements in the request. This will ensure that the MECP is able to efficiently begin reviewing the request.

The request should be sent in writing or by email to the below MECP contacts, as well as copied to the Town of Cobourg and MTO:

Minister of the Environment, Conservation and Parks
Ministry of Environment, Conservation and Parks
777 Bay Street, 5th Floor
Toronto, ON M7A 2J3
Minister.mecp@ontario.ca

Director, Environment Assessment Branch
Ministry of Environment, Conservation and Parks
135 St. Clair Ave. W, 1st Floor
Toronto, ON M4V 1P5
EABDirector@ontario.ca

If a concern/objection is raised during the 30-day comment period, the Minister of Environment, Conservation and Parks will make a decision in regard to the objection. If no

concerns or issues are outstanding by the end of the 30-day comment period, the Minister of the Environment, Conservation and Parks has an additional 30 days from the end of the comment period set out in the Notice of Completion to review the project and make a Section 16 Order on their own initiative. If no concerns, the project is considered to have met the requirements of the Class EA, and the Town of Cobourg and MTO may proceed to detail design, subject to the commitments documented in the TESR, and obtain any outstanding environmental approvals.

Transportation Needs Assessment

The Transportation Needs Assessment process is part of the ongoing management and administration of the transportation systems by the province. Assessment of needs can result in a number of recommendations, including initiating a study, initiating major or minor improvements, initiating routine maintenance, monitoring a situation, or doing nothing. Given the range of potential outcomes, the transportation needs assessment process includes the following:

- Identifying transportation problems and opportunities;
- Evaluating and selecting reasonable alternatives, including 'do nothing';
- Developing potential transportation study objectives; and
- Initiating the study process.

Problems and Opportunities

The following problems and opportunities were identified for the study area:

Problems:

- The existing Nagle Road bridge is nearing the end of its service life and will need to be rehabilitated and/or replaced; and
- The existing Highway 401 interchanges with Burnham Street and Division Street within the Town of Cobourg will not be able to support the anticipated travel demands associated with growth and development within the Cobourg East Community Secondary Plan area.

Opportunities:

- Support the transportation objectives set forth within the Town of Cobourg Official Plan;
- Accommodate future transportation demands associated with growth and development within the Cobourg East Community Secondary Plan area; and
- Establish the ultimate interchange configuration near Nagle Road and Highway 401 envisioned as part of the Town of Cobourg OP, TMP and Township of Hamilton OP.

Evaluation of Alternatives

The Class EA process requires that 'reasonable alternatives' be considered in addressing the identified problems and/or opportunities. This involves two levels of analysis. The Alternatives to the Undertaking considers a broad range of alternatives that could address the project needs. Once the best alternative is selected, the Alternative Methods of Carrying out the Undertaking are studied in greater detail.

Alternatives to the Undertaking

The Alternatives to the Undertaking considered as part of this assignment consisted of: "Do Nothing" and New Interchange. Based on the findings of the assessment the New Interchange alternative was carried forward as it addresses the identified transportation problems and opportunities.

Alternative Methods of Carrying Out the Undertaking

A range of potential interchange alternatives that correspond to the Preferred Transportation Undertaking were developed and subjected to evaluation based on their potential to accommodate the future 8 lane footprint of Highway 401, the structural improvement needs of the Nagle Road underpass, and the transportation needs of future development within the Cobourg East Community Secondary Plan area, while minimizing environmental and community related impacts.

Eight (8) interchange alternatives were developed for the Long List of Interchange Alternatives for the Nagle Road interchange. Four (4) of the alternatives were carried forward to the Short List of Interchange Alternatives and presented at Public Information Centre (PIC) 1 for public review and comment.

Based on the feedback received at/following PIC 1, a hybrid interchange alternative was developed to minimize initial property impacts on the south side of the interchange, and to provide implementation flexibility to accommodate the timing of adjacent developments. This alternative was carried forward for more detailed evaluation

A detailed evaluation of the Short List of Interchange Alternatives was carried out to identify an improvement plan that is cost-effective, addresses the structural improvement needs of the Nagle Road underpass, the transportation and safety needs of the future development within the Cobourg East Community Secondary Plan, and the ultimate Highway 401 footprint, while minimizing effects on the natural, social and cultural environments.

A Technically Preferred Plan was identified following the evaluation of alternatives. Following consultation with the public, Indigenous Communities, agencies and community stakeholders, the Recommended Plan was confirmed.

Recommended Plan

The Recommended Plan, as displayed in **Figure ES-2** below, includes the following:

- The replacement of the existing two-lane Nagle Road bridge with a wider bridge to accommodate a 3.0 m centre left turn lane with 2.0 m divisional island, four, 3.5 m vehicular lanes (two lanes in each direction), a 1.6 m sidewalk and 1.5 m cycling lane on the west side, and a 1.5 m cycling lane, and 1.5 m shoulder on the east side of the new bridge.
- Construction of a new Highway 401 interchange at Nagle Road with a Parclo A2/Diamond configuration that provides access to and from Highway 401 in all directions.
- Widening of Nagle Road from two lanes to four lanes, from approximately 400 m south of Highway 401 to approximately 400 m north of Highway 401.

The Recommended Plan will be built in the following three phases:

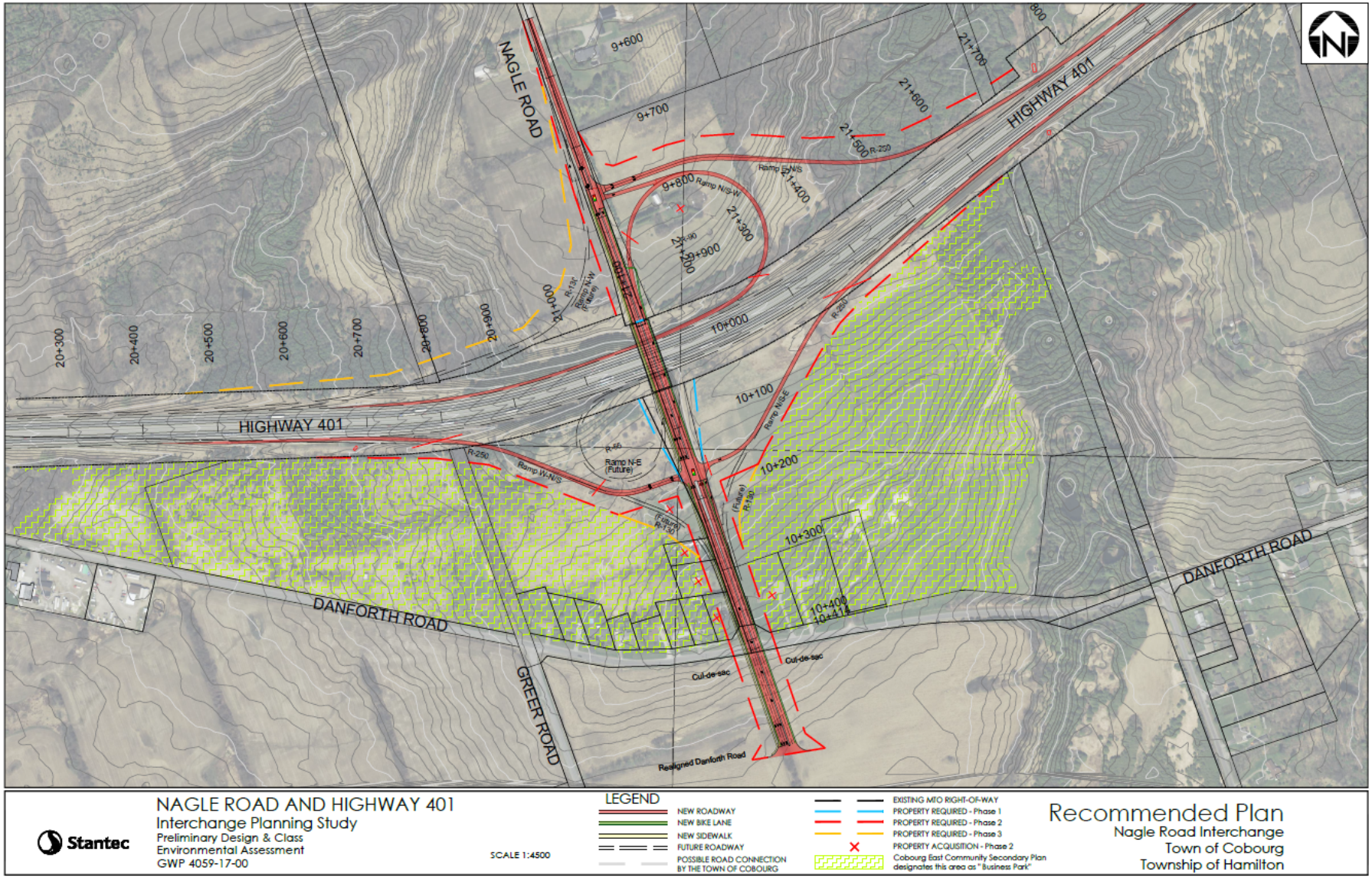
Phase 1: Replace the existing bridge with minor profile adjustments to connect the new bridge to the existing Nagle Road. The new bridge will be constructed as a 2-lane bridge only, with provision for future widening.

Phase 2: Widening the bridge to accommodate four, 3.5 m wide through lanes (2 lanes in each direction), a 3.0 m wide centre left-turn lane with a 2.0 m wide divisional island. Two new bridge pier columns will be required as part of this phase. In addition, Phase 2 will incorporate two, 1.5 m bike lanes on either side of the bridge, as well as a 1.6 m wide sidewalk along the west side, and a 1.5 m wide shoulder on the east side of the bridge.

Phase 3: Potential future construction of the Nagle Road interchange, including possible future ramps (Ramp N-W and Ramp N-E). The bridge will require further widening in the future to accommodate these ramps, if needed.

January 2025

Figure ES-2: Recommended Plan



Public Consultation

The main objective of consultation in the Class EA process is to ensure that project information is shared in a meaningful way, and that consideration is given to all aspects of the environment from the earliest stages of planning. To achieve this, a variety of communication strategies were used to engage the public, agencies, special interest groups, property owners and community members. Opportunities for input were provided at key points during the study process including two PICs and impacted property owner meetings. In addition, direct contact with the Project Team via mail, email and phone was encouraged throughout the study.

A project website (www.highway401cobourgcolborne.ca) was developed at the onset of the study to provide public with access to project information. The project website was maintained throughout the study process, including project updates, notifications of public events, project team member contact information, PIC materials and links to project specific information, PIC materials and links to project-specific documentation.

Indigenous Consultation

Indigenous Communities and/or organizations were notified of the study commencement, PICs 1 and 2, and the study completion. In addition, Indigenous Communities were invited to participate in the field surveys for the Stage 2 Archaeological Assessment (AA), and copies of the Stage 1 AA and Stage 2 AA reports were provided for Indigenous Community representatives for review and comment.

Potential Environmental Impacts, Proposed Mitigation and Commitments

A summary of the environmental effects and proposed mitigation measures, as identified during the course of this study, is provided in **Section 10.0**, and forms a comprehensive list of commitments to be adhered to during the subsequent design phase of the project.

1.0 Overview of the Undertaking

1.1 Introduction

The Town of Cobourg and Ontario Ministry of Transportation (MTO) retained Stantec Consulting Ltd. (Stantec) to undertake a Planning, Preliminary Design and Class Environmental Assessment (Class EA) study for a new Highway 401 interchange near Nagle Road in the Town of Cobourg and the Township of Hamilton. The Town initiated this study to develop a Recommended Plan for a new interchange to support the transportation objectives set forth in the Town of Cobourg's Official Plan and future growth within the Cobourg East Community Secondary Plan area.

The Nagle Road bridge was constructed in 1959 and consists of a concrete structure that carries two lanes of traffic over Highway 401. Due to its age, the bridge is approaching the end of its planned service life and will need to be rehabilitated or replaced. Ultimately, the bridge will need to accommodate the future eight (8) lane footprint of Highway 401.

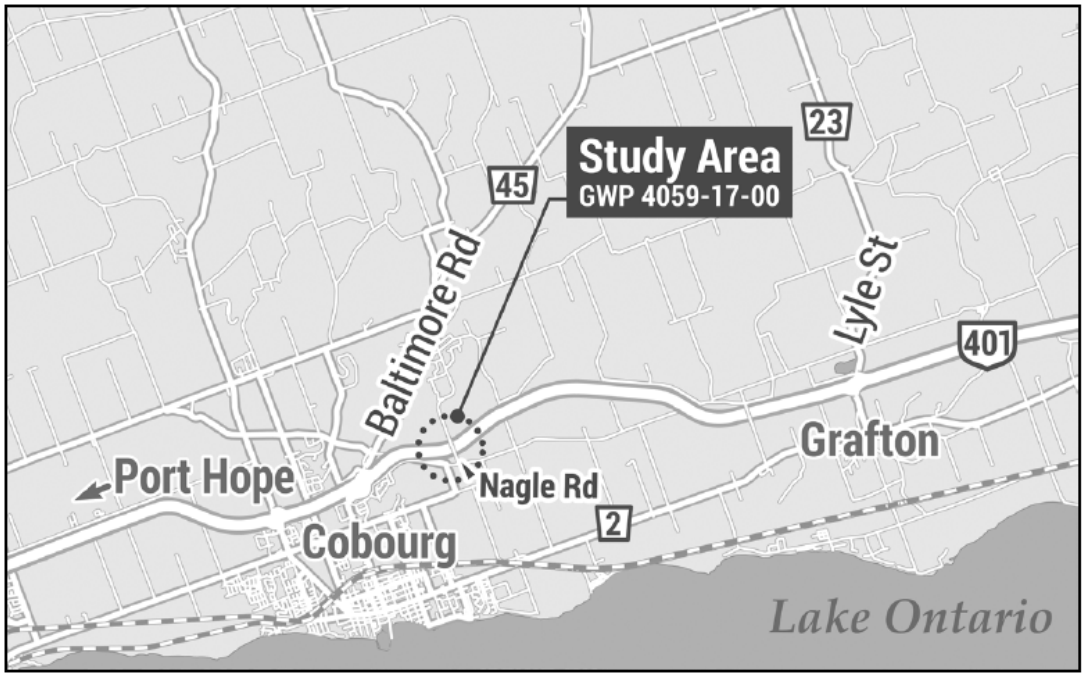
1.2 General Description of the Project

This study was carried out as a 'Group B' project under the MTO Class Environmental Assessment (EA) for Provincial Transportation Facilities (2000). As part of this Class EA, the study team has undertaken a review of existing conditions, environmental and engineering field investigations, developed and evaluated a range of reasonable alternatives to determine the most appropriate improvement plan, and has sought input from the public, local municipalities, external ministries/agencies, and Indigenous Communities. A Recommended Plan was selected and will be designated (protected) at the completion of the new interchange.

1.3 Study Area

The study area includes Highway 401, from 1.5 km east and west of Nagle Road, and 400 m north and south of the existing Nagle Road / Highway 401 underpass. The study area is situated within the Township of Hamilton north of Highway 401, and within the Town of Cobourg south of Highway 401. The approximate location of the study area is shown within **Figure 1**.

Figure 1: Study Area Location Plan



1.4 Project Background

1.4.1 Provincial Policy Statement, 2020

The 2020 Provincial Policy Statement (PPS) acts as the guiding document that provides overall policy directions on matters of provincial interest relating to land use planning and development in Ontario. Local Official Plans are the primary mechanism for implementing the policies of the PPS, and in accordance with the Planning Act, decisions affecting planning matters shall be “consistent with” the PPS.

The PPS includes additional policy direction for municipalities with respect to economic development and land supply. In the context of this study, additional policy guidance is provided to promote the integration of land use planning, growth management, intensification, and infrastructure planning to achieve cost-effective development patterns.

This Class EA study supports matters of provincial interests as it aims to safely facilitate the movement of people and goods. In addition, the study promotes economic development and competitiveness by ensuring necessary road infrastructure is provided to allow access to the planned growth area within the Town of Cobourg, which will assist in addressing the projected population and employments needs of the Town of Cobourg.

This proposed undertaking will support the policy direction within the PPS by supporting the development of, and coordination with, land uses, and transportation infrastructure improvements identified within the Town of Cobourg and Township of Hamilton Official Plans and Cobourg East Community Secondary Plan.

1.4.2 Growth Plan for the Greater Golden Horseshoe, 2020

The Growth Plan for the Greater Golden Horseshoe (the Growth Plan) was updated in 2020 to assist in the expansion of economic opportunities for the growing number of people expected to reside within the Greater Golden Horseshoe over the next 20 years to the year 2051.

It is the goal of the Growth Plan to develop an integrated transportation network that will allow users choices for easy travel both within and between urban centres throughout the region. As land development and transportation are interconnected, areas with high employment densities shall be planned to be better connected to transportation corridors and underutilized employment lands shall be used more effectively and efficiently.

Through the Growth Plan, a projected population of 122,000 people and 44,000 jobs was allocated to the County of Northumberland by 2051. A new interchange at Highway 401 and Nagle Road will support the objectives within the Growth Plan by supporting growth and development within the Town of Cobourg and facilitating travel by offering connections between transportation corridors and growth areas.

1.4.3 Town of Cobourg Official Plan

The Town of Cobourg Official Plan (OP) is a general policy document which sets a long-range blueprint to manage growth and guide land use development decisions within the Town of Cobourg to the year 2031. The Town of Cobourg OP was adopted by Cobourg Municipal Council in 2010 and approved by the Ministry of Municipal Affairs and Housing in 2011.

A new Highway 401 interchange at Nagle Road is identified within Schedule X2 (please refer to **Figure 4**) and Schedule X4 of the Town of Cobourg OP, and was recommended to support its transportation policies and objectives by facilitating the movement of people and goods to and from the Cobourg East Community Secondary Plan area, and to support active transportation .

1.4.4 Town of Cobourg Transportation Master Plan

The Town of Cobourg Transportation Master Plan (TMP) was completed in 2011 to guide the development of a long-term strategy that addresses existing transportation issues and future needs up to 2031. The TMP provides direction on transportation related policies, services, and infrastructure to establish a framework for an economically sustainable and environmentally respectful strategy that supports the growth objectives outlined within the Town of Cobourg OP.

The TMP projected a population increase within the Town of Cobourg of 57% from 18,210 to 28,500 people, and an employment increase of 27% from 12,060 to 15,300 jobs by 2031. As such, the TMP recommends additional network capacity to support planned growth and economic activity, including improving connectivity to Highway 401 by protecting for a future interchange at Nagle Road. In addition, Nagle Road and the underpass were identified as part of the long-term vision for active transportation facilities in the Town of Cobourg.

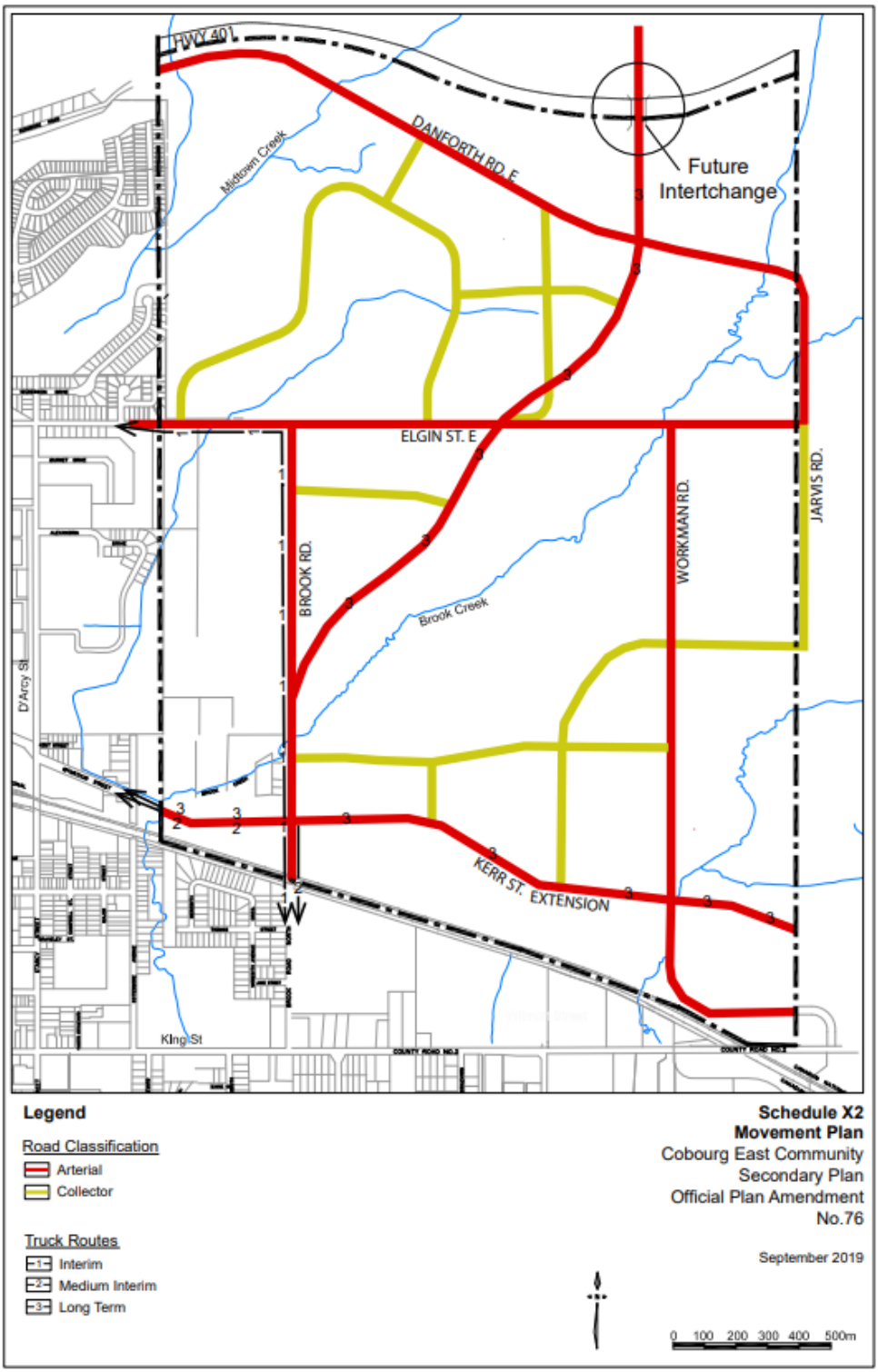
1.4.5 Cobourg East Community Secondary Plan

The Cobourg East Community Secondary Plan was approved by Town of Cobourg Council in 2005 and provides a strategic vision for approximately 570 ha of land within the northeast quadrant of the Town of Cobourg. These lands are envisaged to comprise a balanced mix of uses, the majority of which consist of residential uses (i.e., approximately 241 ha), that are anticipated to accommodate approximately 6,300 dwellings.

The Cobourg East Community Secondary Plan area is anticipated to support approximately 3,600 jobs and 17,000 people. The need for a new Highway 401 interchange at Nagle Road was identified within the Cobourg East Community Secondary Plan to support the increasing transportation needs associated with development within the plan area and the transportation objectives identified within Section 15.7 of the Town of Cobourg OP. The interchange would be located adjacent to approximately 96 hectares of employment land that are anticipated to attract prestige uses due to the high visibility Highway 401 affords.

The Cobourg East Community Secondary Plan was amended by Cobourg Council in July 2018 via Town of Cobourg OP Amendment No. 76 to reflect a modified land use plan and transportation network in the north portion of the planning area, including a future interchange at Nagle Road (please refer to **Figure 2**).

Figure 2: Town of Cobourg Official Plan, Amendment No. 76 – Schedule X2, Movement Plan

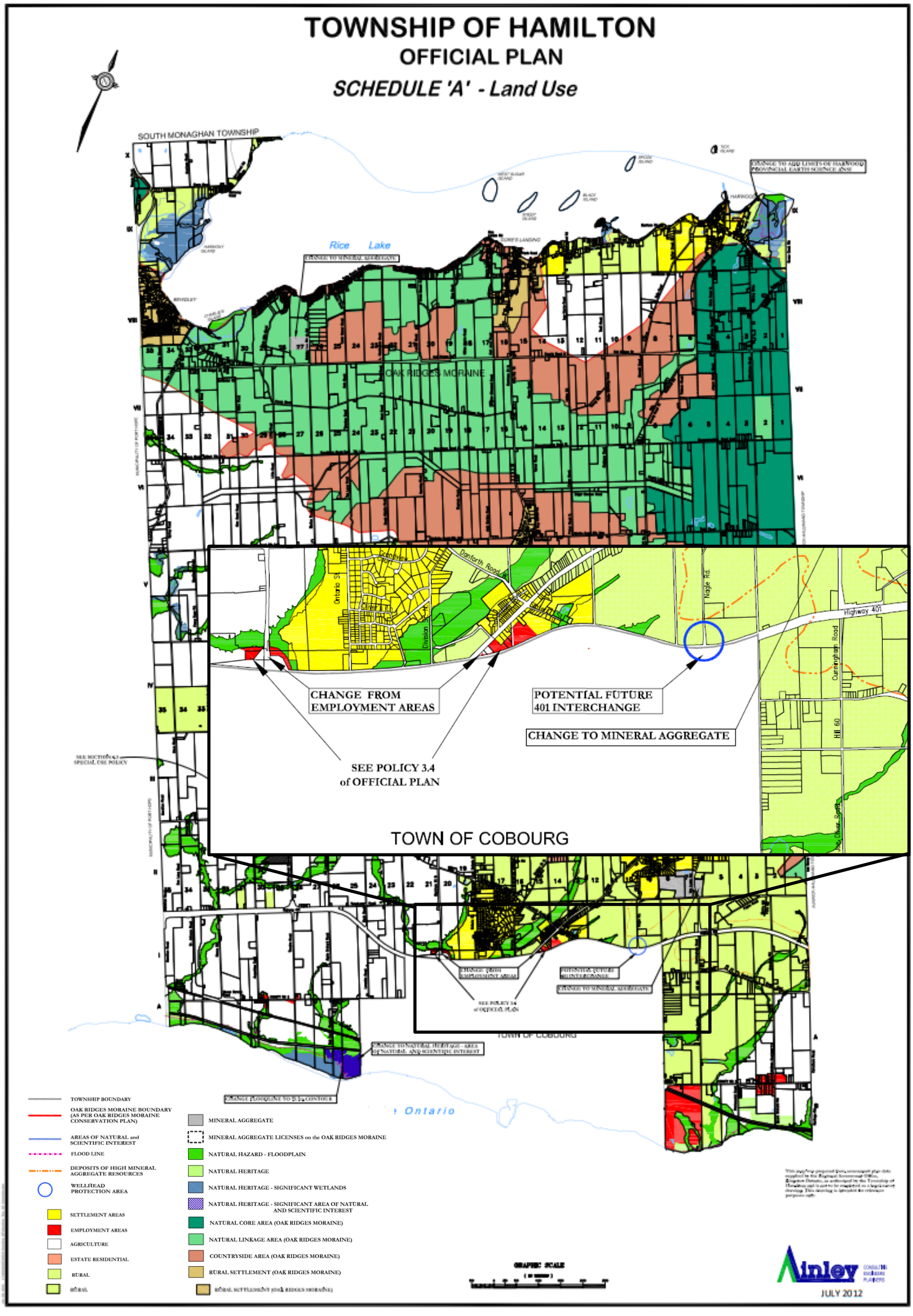


1.4.6 Township of Hamilton Official Plan

The Township of Hamilton OP provides the policy direction to guide long-term planning and decision-making for development and growth in the Township. The OP was adopted by Township of Hamilton Council on November 16, 2010, and further amended and approved by the Ministry of Municipal Affairs and Housing on August 28, 2012. In 2012, the population of the Township of Hamilton was 10,700 people and the Growth Plan provided a population forecast of 96,000 people in the County by the year 2031. The County and its member municipalities undertook a County-wide Growth Management Strategy (GMS) to allocate the forecasted growth to each of the lower-tier municipalities within the County. The GMS exercise resulted in a population forecast of 12,080 people within the Township of Hamilton by the year 2031. It should be noted that the Growth Plan was updated in 2020 to forecast a population of 122,000 people within the County by 2051.

A potential future Highway 401 interchange was identified at Nagle Road in Schedule ‘A’ – Land Use of the Township of Hamilton OP, as illustrated in **Figure 3** below.

Figure 3: Township of Hamilton Official Plan (2012), Schedule 'A' – Land Use



1.4.7 Nagle Road Bridge

The existing Nagle Road bridge was constructed in 1959 and consists of a concrete structure that carries two lanes of traffic north and south over Highway 401. Due to its age, the bridge is approaching the end of its planned service life and will need to be rehabilitated or replaced.

Based on the population and employment projections set forth within the Town of Cobourg Official Plan, TMP, and Cobourg East Community Secondary Plan Area, it is anticipated that the existing Highway 401 interchanges with Burnham Street and Division Street within the Town of Cobourg will not be able to support the anticipated travel demands associated with future growth and development.

1.5 Purpose of the Transportation Environmental Study Report

This Transportation Environmental Study Report (TESR) documents the decision-making process, and includes a description of the project purpose; the existing technical, natural, social, economic, and cultural environmental factors; identification and evaluation of alternatives that were considered; consultation activities, including a record of the comments received and how they were considered; the Recommended Plan; anticipated environmental effects and proposed mitigation measures; and commitments to future work and monitoring.

The TESR fulfills the documentation requirements of the Class EA process for a Group 'B' project and is filed for a 30-day public comment period. If you have any questions and/or concerns regarding this study, please contact the study team via email (comments@highway401cobourgcolborne.ca) or one of the following individuals:

Gregg Cooke, P.Eng.
Consultant Project Manager
Stantec Consulting Ltd.
200 – 835 Paramount Drive
Stoney Creek ON L8J 0B4
Tel: (905) 381-3227
Fax: (905) 385-3534
Call Collect: (905) 385-3234

Muhammad Waseem, P.Eng.
Area Manager Highway Engineering
Project Delivery East
Ministry of Transportation
1355 John Counter Boulevard,
Postal Bag 4000
Tel: (613) 449-2615
Toll-free: 1-800-267-0295 ext. 4701

Terry Hoekstra, C.E.T.
Deputy Director, Engineering
Public Works and Engineering Division
Town of Cobourg
740 Division Street, Building 7
Cobourg, ON K9A 0H6
Tel: (905) 372-9971 ext. 4371

Interested persons are encouraged to review the TESR and provide comments to the study team by **Wednesday, February 19, 2025.**

In addition, a Section 16 Order request may be made to the Ministry of the Environment, Conservation and Parks (MECP) for an order requiring a higher level of study (i.e., requiring comprehensive environmental assessment approval before being able to proceed), or that conditions be imposed (e.g., requiring further studies), only on the grounds that the requested order may prevent, mitigate or remedy adverse impacts on constitutionally protected Indigenous and treaty rights. Requests on other grounds will not be considered. Requests should include the requester's contact information and full name, as well as the project and proponents' names.

Requests should specify what kind of order is being requested (request for conditions or a request for an individual/comprehensive environmental assessment), how an order may prevent, mitigate, or remedy potential adverse impacts on Indigenous and treaty rights, and any information in support of the statements in the request. This will ensure that the MECP is able to efficiently begin reviewing the request.

The request should be sent in writing or by email to the below MECP contacts, as well as copied to the Town of Cobourg and MTO:

Minister of the Environment, Conservation and Parks
Ministry of Environment, Conservation and Parks
777 Bay Street, 5th Floor
Toronto, ON M7A 2J3
Minister.mecp@ontario.ca

Director, Environment Assessment Branch
Ministry of Environment, Conservation and Parks
135 St. Clair Ave. W, 1st Floor
Toronto, ON M4V 1P5
EABDirector@ontario.ca

If a concern/objection is raised during the 30-day comment period, the Minister of Environment, Conservation and Parks will make a decision in regard to the objection. If no concerns or issues are outstanding by the end of the 30-day comment period, the Minister of the Environment, Conservation and Parks has an additional 30 days from the end of the comment period set out in the Notice of Completion to review the project and make a Section 16 Order on their own initiative. If no concerns, the project is considered to have met the requirements of the Class EA, and the Town of Cobourg and MTO may proceed to detail design, subject to the commitments documented in the TESR, and obtain any outstanding environmental approvals.

The potential exists for final design plans completed during the next stage of planning and design to identify design modifications or refinements that may result in environmental benefits or impacts that were not anticipated or identified in this TESR. Any changes that result in design modifications will be discussed with affected external agencies, interested stakeholders and property owners during the next study phase and documented in a Design and Construction Report (DCR) that will be made available for public review. If significant changes are made to the project following the completion of the TESR and eligibility for Environmental Clearance, a TESR Addendum may be required to document the project changes.

1.6 Environmental Clearance

If there are no significant concerns following the public and/or the Minister of Environment, Conservation and Parks comment periods, or once the Minister of the Environment, Conservation and Parks has reviewed and considered any Section 16 Order requests, the project will be eligible for Environmental Clearance and continue to move forward, provided there are no outstanding concerns. This will permit the Town of Cobourg and/or MTO to:

- Negotiate temporary and permanent property acquisition, consistent with the project needs (including ROW designation);
- Relocate utilities; and
- Initiate subsequent stages for the Recommended Plan (i.e., detail design and contract preparation). Please refer to the responsibility matrix within **Table 19** for further details.

Although the timeline for implementing the results of this study is not confirmed, the Recommended Plan will assist the Town of Cobourg with future planning and development within the study area.

2.0 Class Environmental Assessment Process

2.1 Classification of Project

This Preliminary Design and Class EA Study was carried out under the requirements of the 2000 MTO Class EA document. Based on the nature and extent of the project, the MTO Class EA document specifies different groups under which projects may be planned, and the assessment process required for each. Provided that this process is followed, and its requirements are met for a project, the requirements of the Ontario *Environmental Assessment Act* (EAA) are considered to be met. This project was completed following the requirements of the Class EA as a Group 'B' project. Group 'B' projects include major improvements to existing transportation facilities including highway improvements over land or water that provide a significant increase in traffic capacity or cause a significant increase in the "footprint" beyond the roadbed of an existing highway.

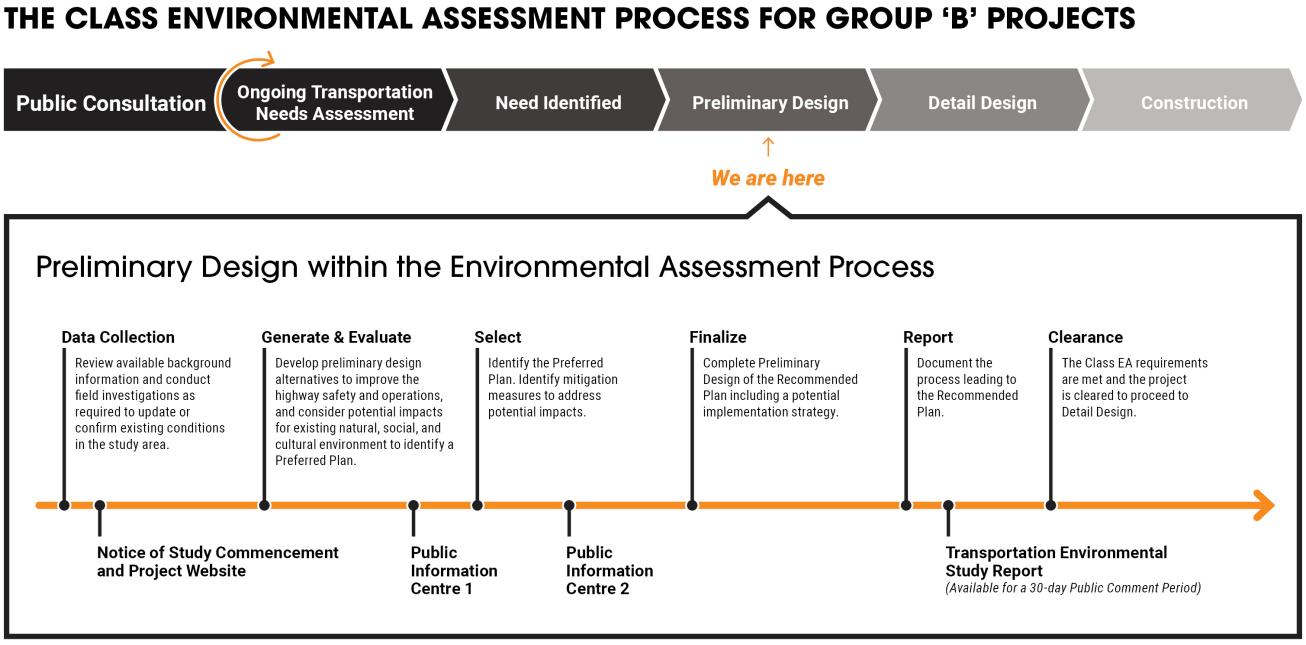
For additional information on the MTO Class EA process, the public may contact the MTO (contact information provided in **Section 1.5**). In addition, the following documents are available to assist with understanding the process:

- Class Environmental Assessment for Provincial Transportation Facilities, MTO, July 2000
- Environmental Reference for Highway Design, MTO, 2006, updated in June 2013
- Code of Practice for Preparing, Reviewing, and using Class Environmental Assessments in Ontario, MOE, January 2014

These publications are available from the MTO Research Library Online Catalogue (library.mto.gov.on.ca/) and from Publications Ontario (publications.gov.on.ca).

The study process for a Group 'B' undertaking, as applicable to this project, is illustrated in **Figure 4**.

Figure 4: Class Environmental Assessment Process



2.2 Environmental Assessment Approval Regulations

A Preliminary Design and Class EA Study of this type must be carried out in accordance with applicable environmental legislation and the current government policies and procedures. The policies and legislation that apply to this study are described below.

2.2.1 Ontario Environmental Assessment Act

The Ontario *Environmental Assessment Act* (EAA) governs the conduct of planning studies in the province of Ontario. The purpose of the EAA is to make sure that:

- A reasonable and traceable planning process is followed;
- The need for the project is demonstrated;
- The public has input into the process and investigations;
- The study includes a review of a full range of alternatives; and
- The selected alternative minimizes any environmental impacts or provides mitigation strategies to minimize impacts resulting from the improvements.

2.2.2 Canadian Impact Assessment Act

The *Canadian Impact Assessment Act*, 2019 (IAA 2019) and its regulations establish the legislative basis for the federal environmental assessment process. Under IAA 2019, an EA is

only required for projects included in the list of “designated projects”. These types of projects are likely to have significant adverse environmental effects and therefore may be subject to a federal EA.

A proponent is not required to complete the federal EA process if a project is not on this list. This project does not fall under the list of designated projects.

2.2.3 Permits and Approvals

Undertaking an EA also requires consideration of other approvals and review agencies, as outlined below:

Federal Review Agencies

- Department of Fisheries and Oceans (DFO) – MTO Fisheries Protocol, Fisheries Act (FA), Species at Risk Act (SARA) for aquatic species
- Environment and Climate Change Canada (ECCC) – Species at Risk Act (SARA), Migratory Birds Convention Act (MBCA)

Provincial Review/Policy Requirements

- Provincial Policy Statement (PPS 2020)
- Ministry of the Environment, Conservation and Parks (MECP) – EAA, Environmental Protection Act, Ontario Water Resources Act, Permits to Take Water, Endangered Species Act, 2009 (ESA)
- Ontario Access and Privacy Office – Freedom of Information and Protection of Privacy Act and Accessibility for Ontarians with Disabilities Act
- MTO Fisheries Protocol, Ontario Wetlands Policy
- Ministry of Citizenship and Multiculturalism (MCM)

Municipal Policy

While MTO is not required to obtain approvals or exemptions for municipal Official Plans, bylaw exemptions and/or or policies, municipal policies and plans are considered as part of the Class EA study process.

However, as the interchange is a Town of Cobourg initiative, the following municipal policies have been taken into consideration:

- Provincial Policy Statement (PPS 2020)
- The Growth Plan for the Greater Golden Horseshoe (Growth Plan 2020)
- Northumberland County Growth Management Strategy

- Northumberland County Official Plan (2016)
- Town of Cobourg Official Plan (2010)
- Town of Cobourg Transportation Master Plan (2011)
- Township of Hamilton Official Plan (2016)

2.2.4 Indigenous Rights

Ontario, as the Crown, has a legal obligation to consult with Indigenous peoples where it contemplates decisions or actions that may adversely impact asserted or established Aboriginal or treaty rights. Ontario is committed to meeting its duty to consult with First Nations and Métis communities.

The study area is situated within the traditional and treaty territories of the Michi Saagiig (Mississauga) and Chippewa Nations, collectively known as the Williams Treaties First Nations, which include: Curve Lake First Nation, Hiawatha First Nation, Alderville First Nation, Mississaugas of Scugog Island First Nation, Chippewas of Rama First Nation, Beausoleil First Nation, and Chippewas of Georgina Island First Nation. Under the Williams Treaties Settlement Agreement (2018), Ontario and Canada recognize the treaty harvesting rights to hunt, trap, fish and gather for food, social and ceremonial purposes, of the Williams Treaties First Nations, the Crawford Purchase, and the Gunshot Treat/Johnson-Butler Purchase, both within those treaties' territories and Lake Simcoe.

3.0 Transportation Needs Assessment

The Transportation Needs Assessment process is part of the ongoing management and administration of the transportation systems by the province. Assessment of needs can result in a number of recommendations, including initiating a study, initiating major or minor improvements, initiating routine maintenance, monitoring a situation, or doing nothing. Given the range of potential outcomes, the transportation needs assessment process includes the following:

- Identifying transportation problems and opportunities;
- Evaluating and selecting reasonable alternatives, including 'do nothing';
- Developing potential transportation study objectives; and
- Initiating the study process.

This section of the report provides an overview of the transportation problem and opportunity and assessment of Alternatives to the Undertaking that led to the initiation of this study.

3.1 Provincial and Municipal Responsibilities

MTO has a mandate to provide transportation services for the people of Ontario. This mandate is to:

- Preserve the safety and efficiency of Ontario's provincial highway network and the Ontario government's investment in highway infrastructure; and
- Provide a safe and efficient transportation system that is critical to Ontario's quality of life, a strong economy, and a clean and healthy environment.

MTO's actions are guided by the transportation policies found under both the Transportation Systems and Transportation and Infrastructure Corridors sections of the Ontario Provincial Policy Statement (PPS) 2020. These policies include, but are not limited to:

- Providing transportation systems that are safe, energy efficient, facilitate the movement of people and goods, and are appropriate to address projected needs;
- Making efficient use of existing and planned infrastructure;
- Maintain connectivity within and among transportation systems;
- Minimize the length and number of vehicle trips and support current and future use of transit and active transportation;
- Planning for and protecting corridors and rights-of-way for transportation, transit, and infrastructure facilities to meet current and projected needs; and
- Protect major goods movement facilities and corridors.

Local Official Plans are the primary mechanism for implementing the policies of the PPS, and in accordance with the Planning Act, decisions affecting planning matters “shall be consistent with” the PPS. The Town of Cobourg OP was developed to provide policy direction and guide land use planning decisions within the Town, and the Cobourg East Community Secondary Plan was developed as a strategic vision for land use and transportation planning within this portion of the Town.

In keeping with provincial policy direction, and to support future transportation needs within the Cobourg East Community Secondary Plan area, the need for a new Highway 401 interchange at Nagle Road was identified in the Town of Cobourg OP, Cobourg East Community Secondary Plan, and TMP. The Transportation Needs Assessment for this study was carried out within the context of the responsibilities of the Town of Cobourg and MTO, the requirements of the PPS, and to meet the requirements of the Class EA process.

3.2 Existing Conditions

The existing Nagle Road bridge was constructed in 1959 and consists of a concrete structure that carries two lanes of traffic north and south over Highway 401. Due to its age, the bridge is approaching the end of its planned service life and will need to be rehabilitated or replaced. Ultimately, the bridge will need to accommodate the future Highway 401 eight (8) lane footprint. The posted speed limit along this section of Nagle Road is 60 km/h.

Highway 401 is a 400-Series Controlled Access Highway that connects southwestern Ontario (Windsor) to Quebec, a total of 830 km. To the east and west of Nagle Road, Highway 401 connects the communities of the Town of Port Hope, Town of Cobourg, Township of Hamilton, and Grafton. The posted speed limit on Highway 401 is 100 km/h and the design speed is 120 km/h.

Based on the population and employment projections set forth within the Town of Cobourg Official Plan and Cobourg East Community Secondary Plan Area, it is anticipated that the existing Highway 401 interchanges with Burnham Street and Division Street within the Town of Cobourg will not be able to support the anticipated travel demands.

3.3 Problems and Opportunities

The following problems and opportunities were identified for the study area:

Problems:

- The existing Nagle Road bridge is nearing the end of its service life and will need to be rehabilitated and/or replaced; and
- The existing Highway 401 interchanges with Burnham Street and Division Street within the Town of Cobourg will not be able to support the anticipated travel demands associated with growth and development within the Cobourg East Community Secondary Plan area.

Opportunities:

- Support the transportation objectives set forth within the Town of Cobourg OP;
- Accommodate future transportation demands associated with growth and development within the Cobourg East Community Secondary Plan area; and
- Establish the ultimate interchange configuration near Nagle Road and Highway 401 envisioned as part of the Town of Cobourg OP, TMP and Township of Hamilton OP.

3.4 Alternatives to the Undertaking

The Class EA process requires that 'reasonable alternatives' be considered in addressing the identified problems and/or opportunities. This involves two levels of analysis. The Alternatives to the Undertaking considers a broad range of alternatives that could address the project needs. Once the best alternative is selected, the Alternative Methods of Carrying out the Undertaking are studied in greater detail.

The Alternatives to the Undertaking identified for this study are outlined below.

3.4.1 Do Nothing

Nagle Road continues to cross over Highway 401 on a bridge. No direct access to Highway 401 is provided.

3.4.2 New Interchange

Interchange ramps are constructed at or near Nagle Road to provide direct access between Highway 401 and the lands adjacent to Nagle Road within the Town of Cobourg and Township of Hamilton.

3.5 Preliminary Assessment of Alternatives to the Undertaking

A preliminary assessment of the alternatives to the undertaking was completed to identify the alternatives that best address the transportation problem and opportunities, as described in **Section 3.3**.

The alternatives are screened to select only the most reasonable alternatives to be carried forward for more detailed study. This process allows for the elimination of alternatives which do not meet the transportation problem and opportunities in advance of the detailed evaluation stage.

The preliminary assessment of the alternatives to the undertaking uses the following screening criteria:

- Does the option realistically address all the problems and opportunities?

- Does the option make a significant contribution towards realistically addressing all the problems and opportunities?

Only those alternatives that satisfy at least one of the above criteria were carried forward for further study.

3.5.1 Preferred Transportation Undertaking

The findings of the screening assessment indicated that a new interchange at Nagle Road is preferred. The results of the screening assessment of Alternatives to the Undertaking are summarized in **Table 1**.

Table 1: Screening Assessment of Alternatives to the Undertaking

Alternatives to the Undertaking	**Does it address the Transportation Problems?**	**Carried Forward?**
Do Nothing Nagle Road continues to cross over Highway 401 on a bridge. No direct access to Highway 401 is provided.	**No** – Bridge still requires rehabilitation and/or replacement. – Does not establish future Highway 401 footprints for eight lanes. – Existing interchanges cannot accommodate future traffic demands within the study area.	**No** The “Do Nothing” alternative does not address the identified transportation problems.
New Interchange Interchange ramps are constructed at or near Nagle Road to provide direct access between Highway 401 and the lands adjacent to Nagle Road within the Town of Cobourg and Township of Hamilton.	**Yes** – Establishes future Highway 401 footprint for eight lanes. – Ability to accommodate future traffic demands within the study area.	**Yes** The “New Interchange” alternative addresses the identified transportation problems.

4.0 Existing Conditions

Background studies and site-specific field investigations were carried out for archaeology, cultural heritage, contamination, air quality, erosion and sediment control, noise, fish and fish habitat, terrestrial resources, and land use. All work was carried out in accordance with the requirements of the Environmental Reference for Highway Design (2006), which provides standards for scope of work, evaluation of potential impacts and proposed mitigation measures for MTO undertakings.

The background reviews were initiated in the spring of 2018 to identify existing conditions within the study area. Significant environmental features identified as a result of the background studies were documented as constraints that were considered during the development and evaluation of alternatives.

4.1 Natural Environment

An inventory of natural environment features within the study area was undertaken based on a review of previous and relevant studies, field investigations and information received from external agencies and the public during the course of this study.

4.1.1 Physiography, Geology and Soils

The study area falls within the Iroquois Plain and South Slope physiographic region. The topography of the study area is generally flat or rolling along the length of the Highway 401 right-of-way (ROW). The physiographic regions are detailed below.

South Slope

The South Slope physiographic region is a gently sloping strip of land between the low-lying Iroquois Plain and the Oak Ridges Moraine. The surficial soil of the South Slope is composed predominantly of sandy till materials in the east clay rich materials in the west. The till is calcareous and contains a large portion of fine and silty material. Two regional till deposits have been identified in the South Slope: Halton Till, which is a sheet of silt till deposited by the last major glacial advance in the area, and Newmarket Till (also known as the Northern Till), which is a deposit of sandy silt till, interpreted to extend below the Oak Ridges Moraine, that is stratigraphically older than the Halton Till. The Newmarket Till is believed to be correlative with the till deposits north of the Oak Ridges Moraine.

The northwestern portion of the South Slope region consists of scattered, long and thin, drumlins that point directly toward the slopes of the Oak Rides Moraine. Streams flow directly and rapidly down the South Slope and erode sharp valleys into the tills. Numerous gullies have also been cut by intermittent drainage so that east-west side roads in the surrounding area cross a succession of valleys.

Iroquois Plain

The Iroquois Plain physiographic region is a plain of glaciolacustrine deposits situated south of the former Glacial Lake Iroquois shoreline. It lies between modern-day Lake Ontario and the South Slope region. In the shoreline area of the former Glacial Lake Iroquois, sand and gravel were deposited in beaches, bars, and spits due to wave action. The deposits grade into massive and laminated silts and clays to the south that define the lower lake plain area. In some areas of the southern Trent River watershed, the abandoned Lake Iroquois shoreline is well defined by cliffs and beach material, and in certain areas its position can be inferred from the presence of lacustrine materials and altitude.

Ontario Geological Survey (OGS) (2010) surficial geology mapping indicated that the soil within the study area is predominantly coarse-textured glaciolacustrine deposits, with area of silty to sandy loam. The overburden material of boreholes or wells that were previously advanced within 100 m of the study area were reported observed to consist of layer of topsoil, underlain by a layer of gravel sandy loam till, with occasional boulders. The depth of the overburden material within the study area ranges from 6.2 m below ground surface (m BGS) to 9.4 m BGS. According to OGS bedrock geology mapping, the bedrock within the study area is classified as the Shadow Lake Formation, and consists of limestone, dolostone, shale, arkose, and sandstone.

4.1.2 Surface Water, Groundwater and Source Water Protection

A desktop review was undertaken as part of this study to review existing hydrogeological conditions in the study area through a review of MECP water well records (WWRs), regional geological maps and groundwater studies, and source water protection information for the Trent Conservation Coalition Source Protection Region and the Ganaraska Source Protection Area.

Water sources are abundant within the study area and surrounding region. In addition to large primary water sources, such as Lake Ontario just south of the study area, there are other primary and secondary sources of potable water. The study area falls within the Ganaraska Region Conservation Authority which protects and manages development activities within its watersheds.

Drainage and Surface Water

Three surface water features having cold water regime were noted to intersect portions of the study area. Cold water thermal regimes indicate the potential for groundwater discharge that supports aquatic habitat.

Groundwater

Based on a review of MECP water well records (WWRs) for the study area, there are approximately 29 WWRs for water supply wells mapped within 100 m of the study area. While

depth records were only available for 19 of the 29 WWRs, none were identified as shallow wells (i.e., less than 12 m deep). The static water levels recorded in these wells reportedly ranged from 0.6 m to 21.3 m BGS.

Source Water Protection

The Town of Cobourg obtains its drinking water supply from a surface water intake in Lake Ontario. Township of Hamilton residents obtain their drinking water from private groundwater supply wells.

The study area lies within the Trent Conservation Coalition Source Protection Region (TCCSPR). In accordance with Clean Water Act (2006), the TCCSPR completed a source water protection assessment for the Ganaraska Source Protection Area (SPA). As part of the assessment process, vulnerable areas within the source water areas were defined.

Vulnerability is measured on a 10-point scale based on how quickly water can move from the ground surface to the aquifer. A high vulnerability area has a score of 8 to 10. The west portion of the study area is located in proximity to Intake Protection Zone 2 (IPZ-2) with a vulnerability score of 4 for the Cobourg surface water supply. The Creighton Heights Municipal Well Field is located approximately 2.7 km north, upgradient of the study area.

4.1.3 Potential Contaminated Property

A Contamination Overview Study (COS) was completed to identify areas and/or activities that have the potential to impact subsurface soil and/or groundwater conditions within the study area. The COS included a review of available historical records, data, mapping, etc. The study area and the surrounding areas were reviewed, and a windshield survey was completed on July 10, 2018.

Based on the findings of the COS, several potential sources of contaminating activities were identified, including records of historical spills, aggregate activities, and historic and current stockpiling, filling and bermed areas. In total, approximately 3 (three) properties were identified as having moderate or high potential for environmental concern within and/or in the vicinity of the study area. More detailed information is documented within the COS report, a copy of which is available within **Appendix A**.

4.1.4 Designated Areas

Designated Areas have special or unique value and are defined by government authorities and/or the public, and through legislation, policies, or approved management plans. These areas may have a variety of ecological, recreational, or aesthetic features and functions that are highly valued. Designated Areas include but are not limited to: Provincially Significant Areas of Natural and Scientific Interest (ANSI), Provincially Significant Wetlands (PSW), heritage rivers and national and provincial parks.

While there is a deer wintering area mapped by Ministry of Natural Resources (MNR) within the study area, there are no PSWs or other designated features within the study area. However, the White Cedar Swamp was identified as an unevaluated wetland by MNR within the study area.

4.1.5 Aquatic and Terrestrial Ecosystems

Aquatic and terrestrial ecosystem conditions were assessed as part of this study based on a review of existing/available information and field investigations undertaken in summer 2017. Background information was also obtained from the MNR and published resources. The findings of these investigations are documented within in the *Fish and Fish Habitat Existing Conditions Report* and *Terrestrial Ecosystems Existing Conditions Report*, a copy of which are provided in **Appendix B** and **Appendix C**, respectively. All field investigations were conducted according to the MTO *Environmental Reference for Highway Desig*n (2013) and the MTO *Environmental Guide for Fish and Fish Habitat* (2009), which were applicable at the time of the field investigations.

Fish and Fish Habitat

Lakes, rivers, streams, ponds, and many wetlands provide fish habitat. Intermittent and seasonally flooded areas can also provide important habitat for some fish species at certain times of the year. In-water structures such as logs, stumps and other woody debris, pools and riffle areas, riparian and aquatic vegetation, and groundwater recharge/discharge areas also provide fish habitat. Fish habitat includes watercourses that act as corridors that allow fish to move from one area to another.

The study area is located within the North Lake Ontario Shoreline watershed. The primary natural watercourses in the study area include three unnamed tributaries. None of the watercourses are constructed drains.

Based on species lists provided in background data sources and the findings of Stantec's field surveys, fish communities within the three (3) study area sites that directly provide fish habitat have a permanent flow regime. While no common fish species were captured during field surveys that were undertaken in 2017, based on background reviews the following most common fish species were known to be present; Brook Trout, Rainbow Trout, Mottled Sculpin and a diversity of baitfish species.

Additional details including photographic records of the surveys, field data sheets, and tabular summaries of existing conditions for fish and fish habitat are provided in the Fish and Fish Habitat Existing Conditions Report, a copy of which is available within **Appendix B**.

Aquatic Species at Risk

According to information provided by MNR and DFO in 2017, no aquatic Species at Risk (SAR) records were identified within the study area.

Terrestrial Ecosystems

Within the study area, existing land use is primarily open agricultural land and rural residential properties, and the lands have been heavily influenced by human activity including Highway 401, agricultural activities, residential and light industrial land use.

Vegetation Communities

The study area is situated within Ecoregion 6E (Lake Simcoe-Rideau Ecoregion), and more specifically the Ecodistrict of 6E-13 (Oshawa-Cobourg). Detailed vegetation community mapping and botanical inventories were conducted using the Ecological Land Classification (ELC) system for southern Ontario (Lee et al. 1998). Vegetation communities were delineated on aerial photographs and then verified in the field. Investigations were conducted from within the existing highway ROW and publicly accessible lands.

The study area generally consists of agricultural lands, meadows, thickets, forests and developed areas. A detailed inventory of the vegetation communities observed within the study area at the time of the 2017 field investigations are discussed within the *Terrestrial Ecosystems Existing Conditions Report*, a copy of which is available within **Appendix C** .

Species of Conservation Concern

Significant species are considered at a number of levels, including globally, nationally, and provincially. In Ontario, significant species include species that are provincially rare (with a Provincial S rank of S1 to S3) or listed as Endangered, Threatened, or Special Concern on the Species at Risk in Ontario list (SARO) and/or Schedule 1 of the federal *Species at Risk Act* (SARA).

The Ontario *Endangered Species Act, 2007* prohibits harm or harassment to Threatened or Endangered species, and damage or disturbance to their habitat. The ESA applies on all private and Crown owned lands in Ontario. Habitat protection under the ESA typically includes all habitats that directly or indirectly support SAR.

Federally protected Endangered, Threatened and Special Concern species are listed in Schedule 1 of the *Species at Risk Act, 2002* and apply to federally owned lands and to aquatic species. Migratory bird species are protected under the *Migratory Birds Convention Act*, which are afforded protection on all lands.

Provincial ranks (S-ranks) are used by the NHIC to set protection priorities for rare species and vegetation communities. They are based on the number of occurrences in Ontario and are not legal designations. By comparing the global and provincial ranks, the status, rarity, and the urgency of conservation needs can be determined. Species with provincial ranks of S1 to S3, and those tracked by the MNR, are considered species of conservation concern. Provincial S-ranks are defined as follows:

- S1: Critically imperiled-usually fewer than 5 occurrences

- S2: Imperiled- usually fewer than 20 occurrences
- S3: Vulnerable- usually fewer than 100 occurrences
- S4: Apparently secure- uncommon but not rare, usually more than 100 occurrences
- S5: Secure- common, widespread, and abundant
- S-rank followed by a "?" indicates that the rank is uncertain

The probability that a Significant Species may be present within the study area was assessed by comparing preferred habitat types to existing conditions documented within the background review and during the August 2017 field investigations. Significant Species with preferred habitat in the study area were considered likely to be present. Significant Species with no preferred habitat in the study area were assumed to be absent.

Based on a review of the background databases and field investigations, 7 SAR and 2 SOCC may be present within the study area. The detailed findings of the background review are documented within the *Terrestrial Ecosystems Existing Conditions Report*, a copy of which is available within **Appendix C**.

Rare Vegetation

No rare vegetation, Butternut or other SAR flora were observed in the study area during the 2017 field investigations.

Wildlife and Wildlife Habitat

Various wildlife species were recorded within the study area. Most species that were observed were common species which were expected in their respective habitat types. No wildlife SAR and one SOCC were observed during field investigations.

Migratory Bird Nests

No migratory bird nests were observed at structures within the study area.

Significant Natural Areas

There were no significant natural areas identified within the study area.

Significant Wildlife Habitat

Significant Wildlife Habitat (SWH) is defined as habitat that is ecologically important in terms of features, functions, representation, or amount of contribution to the quality and diversity of an identifiable geographic area or Natural Heritage System and is protected under the *PPS* 2020.

SWH includes habitats that fall within any of the following four categories:

- Seasonal concentration areas, such as moose aquatic feeding and wintering areas, deer winter yards, colonial bird nesting sites, reptile hibernacula, and heronries.
- Rare vegetation communities and specialized habitats for wildlife, such as old-growth forest, areas known to support an unusually high diversity of species or vegetation communities, raptor nesting habitat, areas with concentrations of cavity trees, and moose or bear foraging areas.
- Habitats for species of conservation concern, such as special concern species or species ranked provincially S1-S3, excluding the habitats of endangered and threatened species.
- Animal movement corridors.

The following candidate SWH features were investigated in the study area:

- Seasonal Concentration Areas: Deer wintering congregation areas / deer yards and bat maternity colonies
- Rare Vegetation Communities: Absent
- Specialized Habitat for Wildlife: Absent
- Habitat for Species of Conservation Concern: Special Concern and provincially rare (S1-S3) wildlife
- Wildlife Movement Corridors: Absent

Seasonal Concentration Areas

Seasonal concentration areas are those sites where large numbers of a species gather at one time of the year, or where several species congregate. Such areas include, but are not limited to deer yards, snake and bat hibernacula, waterfowl staging and moulting areas, raptor roosts, bird nesting colonies, shorebird staging areas, and passerine migration concentrations. Only the best examples of these concentration areas are usually designated as SWH. Areas that support a SAR, or areas where a large proportion of the population may be lost if the habitat is destroyed, are examples of seasonal concentration areas which should be designated as significant.

The following candidate and confirmed habitat for seasonal concentration areas was identified within the study area during field investigations:

- Deer Wintering Area (Confirmed): deer wintering area (Stratum 2) confirmed within the study area.
- Bat Maternity Colonies (Candidate): species can be found in mixed and deciduous forests and swamps with large diameter dead or dying trees with cavities. Suitable woodland habitat is present in the study area.

Habitat for Species of Conservation Concern

Habitat for SOCC is a category of SWH, however these results are presented alongside habitat assessments for SAR. In addition to candidate habitat for SOCC, broad habitat types with the potential to support multiple SOCC may be considered SWF (i.e., marsh bird breeding habitat, open country bird breeding habitat). Candidate habitats found in the study area are:

- Special Concern and provincially rare (S1-S3) wildlife: potential suitable habitat for Eastern Wood-pewee, Wood Thrush, Eastern Milksnake and Monarch were observed within the study area.

Summary of Key Terrestrial and Aquatic Ecosystem Features

Detailed terrestrial and aquatic studies have been conducted as part of this study to confirm information gathered from secondary sources. In general, the study area consists of predominantly Rural Property, Dry-Fresh Mixed Meadow, Fresh-Moist Mixed Meadow, Dry Lowshrub Tallgrass, Open Agriculture (soybeans, hay, fallow, pasture), Coniferous Plantation, Fresh Deciduous Regeneration Thicket, Fresh Mixed Regeneration Thicket and Moist White Cedar Coniferous Forest. Other key ecological characteristics include:

- Iroquois Plain physiographic region
- Key hydrological features - unevaluated wetlands and watercourses
- Natural, coldwater watercourses - majority of watercourse crossings in study area drain southerly to Lake Ontario and provide Brook Trout, Rainbow Trout, Mottled Sculpin habitat
- SWH - seasonal concentration areas and habitat for SOCC
- Candidate habitat for SOCC – Monarch and Eastern Milksnake
- Potential or confirmed habitat for SAR - Barn Swallow, Bobolink, Eastern Meadowlark, Little Brown Myotis, Small-footed Myotis, Northern Myotis, Tri-Coloured Bat
- Migratory bird nests – No nests observed

4.2 Socio-Economic Environment

4.2.1 Land Uses

The study area is situated within the municipalities of the Township of Hamilton and Town of Cobourg, which are two of the seven lower-tier municipalities of Northumberland County. Existing land use within the study area is primarily agricultural and rural residential. The study area has been heavily influenced by human activity such as agricultural activities, light industrial activity, Highway 401 and Nagle Road, which acts as the north-south connective route between the Town of Cobourg and Township of Hamilton.

According to the Northumberland County Official Plan (2016), the north side of the study area, north of Highway 401 is situated within a designated Rural Area, and the south portion, south of Highway 401, is situated within a designated Urban Area.

The north portion of the study area (north of Highway 401) is located within the Township of Hamilton. The Township of Hamilton has a population of approximately 11,060 residents, and consists of 6 hamlets, including Baltimore which is located approximately 2 km north of the study area. The existing land use within this area is primarily open agricultural and rural residential. A future Highway 401 interchange is identified at Nagle Road in the Township of Hamilton Official Plan (2010).

The south portion of the study area (south of Highway 401) is located within the Town of Cobourg. The Town of Cobourg has the largest population within Northumberland County, of approximately 19,440 residents. While the Town of Cobourg is designated as an Urban Settlement Area, this portion of the study area consists of residential, residential rural and open agricultural lands, with light industrial activity to the immediate west of the study area. An Environmental Protection Area (EPA) is located at east limit of the study area. The lands within the south portion of the study area are designated as Employment Area through the Cobourg East Community Secondary Plan and zoned for business park development. A future Highway 401 interchange with Nagle Road is identified within the Cobourg East Community Secondary Plan and Town of Cobourg Official Plan (2010).

4.2.2 Student Transportation

The study area is located within two school boards, including the Kawartha Pine Ridge District School Board and the Peterborough Victoria Northumberland Clarington Catholic District School Board. Each school board is serviced by the Student Transportation Services of Central Ontario.

4.2.3 Emergency Services

Emergency Services consist of police, fire, and medical response providers. The following is a summary of emergency services within the study area:

Police service in the study area is provided by the Ontario Provincial Police (OPP) – Northumberland Detachment. The OPP Detachment office is located in Cobourg, with satellite offices located within the communities of Grafton and Brighton.

Fire services are provided by the Township of Hamilton Volunteer Fire Department (Baltimore Fire Station). Dispatching services are provided through the Peterborough Fire Service for all fire departments in Northumberland County. In addition, the Cobourg Fire Department provides 24-hour emergency services to the Town of Cobourg.

Emergency Medical Services are provided by the Northumberland Paramedics, with stations located in the surrounding areas of Port Hope, Cobourg, Roseneath, Colborne, Brighton and Campbellford.

There are no emergency service facilities with direct entrances to Highway 401 or Nagle Road within the study area.

4.2.4 Aggregates

There are no active developed or undeveloped aggregate sources present within the study area. However, the study area is within an area of deposits of high mineral aggregate resources as per the Township of Hamilton's Official Plan.

4.2.5 Agriculture

The study area is comprised of various rural and open agricultural properties, with wheat being the most popular of crops.

4.2.6 Mining

There are no operating mines or existing mining claims identified by the Ministry of Mines in the study area.

4.2.7 Recreation

There are no provincial parks, conservation areas or crown land located within or adjacent to the study area.

Cycling Routes

The County of Northumberland developed a Cycling Master Plan in July 2014 to establish a long-range plan for a County-wide cycling network. The master plan includes developing a network of on- and off-road cycling facilities, along with providing clear and consistent guidelines, standards and specifications for cycling facilities to be incorporated into capital and operational improvements over time. As part of the master plan, it is recognized that Highway 401 presents a challenge in terms of connecting portions of their north-south cycle routes and have compiled a list of suitable on road cycle routes over and beneath Highway 401. Within the study area the existing Nagle Road underpass is identified as recommended or acceptable cycling routes.

Snowmobile Trails

The study area is located within District 3 of the Ontario Federation of Snowmobile Clubs (OFSC). The Great Pine Ridge Snowmobile Association maintains the snowmobile trails

located approximately 15 km north of the study area; however, there are no designated trails within the study area.

4.2.8 Transit and Commuter Parking Facilities

There are no commuter lots present within the study area.

4.3 Cultural Heritage Environment

4.3.1 Archaeology

A Stage 1 Archaeological Assessment (AA) was carried out in 2019, in accordance with the Ministry of Citizenship and Multiculturalism (MCM) 2011 Standards and Guidelines for Consultant Archaeologists. The Stage 1 AA study involved background research and a property inspection.

Archaeological potential is established by determining the likelihood that archaeological resources may be present on a subject property. Archaeological potential criteria include proximity to previously identified archaeological sites, distance to various types of water sources, soil texture and drainage, glacial geomorphology, elevated topography and the general topographic variability of the area. Distance to modern or ancient water sources is generally accepted as the most important determinant of past human settlement patterns and considered alone, may result in a determination of archaeological potential. However, any combination of two or more other criteria, such as well-drained soils or topographic variability, may also indicate archaeological potential. Extensive land disturbance can eradicate archaeological potential.

Soil texture can be an important determinant of past settlement, usually in combination with other factors such as topography. A variety of soil types were identified within the study area; Bondhead loam and sandy loam, Brighton sandy loam, Granby sandy loam, and Trent fine sandy loam. These soil types display a variety of slope and drainage characteristics, with Bondhead and Brighton soils being good for agriculture, and Granby/Trent soils being poor for agriculture, but useful for pastures/livestock.

Water sources are abundant within the study area, and surrounding region. In addition to large primary water sources, such as Lake Ontario to the south of the study area, there are numerous other primary and secondary sources of potable water within the study area. Brook Creek crosses at the eastern end of the study area, and Midtown Creek is located approximately 300 m to the southwest of the study area.

An examination of the *Ontario Archaeological Site Database* indicated that one pre-registered site is located within the study area, and two registered archaeological sites are within a 200 m radius of the study area. As such, the background study indicated that the study area retained moderate to high potential for the recovery of pre-Contact, post-Contact, and Euro-Canadian

archaeological resources due to proximity to known archaeological sites, water sources, quality of soils, and distance to historic roadways.

A property visit confirmed that approximately 89% of the study area, beyond the existing Highway 401, retained archaeological potential as most of the study area is undeveloped wood lot, agricultural field, or scrubland. Areas identified as having no or low archaeological potential were limited to the footprints of existing roadways and buildings (11%).

The Stage 1 AA report was entered into the Ontario Public Register of Archaeological Reports on May 18, 2020. Additional details on the findings of the Stage 1 AA are documented within the Stage 1 AA report, a copy of which is available within **Appendix D**.

4.3.2 Cultural Heritage Resource Assessment

A Cultural Heritage Resource Assessment (CHRA) Report was completed in 2019 to identify all known and potential built heritage resources (BHRs) and cultural heritage landscapes (CHLs), located within and adjacent to the study area. It includes a preliminary impact assessment of the potential impacts form the project activities. The report also includes recommendations on project alternatives, mitigations and next steps to conserve known and potential BHRs and CHLs within the study area.

To help identify potential and known BHRs and/or CHLs, relevant staff representing the MCM, Ontario Heritage Trust, Township of Hamilton, and the Town of Cobourg were consulted. As a result of the consultation, three known BHRs and CHLs were identified in relation to the study area, none of which were directly situated within the study area limits. In addition, historical research was conducted and supplemented by material obtained through available online resources.

A vehicular windshield survey was also undertaken on July 18 and 19, 2018 from publicly accessible roadways to confirm existing study area conditions, identify potential BHRs and CHLs within and adjacent to the study area and confirm the presence of known BHRs and CHLs. Potential heritage resources were identified, inventoried, and screened according to Ontario Regulation (O. Reg.) 9/06, the criteria for determining cultural heritage value or interest (CHVI) (Government of Ontario 2006a).

Based on the findings of the above activities, three CHLs were identified within the study area (please refer to **Table 2**).

Table 2: Potential BHRs and CHLs within the Study Area

Feature Number and Feature Type	Location	Identified Attributes
CHL-1	2241 Nagle Road	Residence, barn and mature trees
CHL-2	9148 Danforth Road East	Residence, tree allée and wood fencing
CHL-3	9234 Danforth Road East	Undetermined

More detailed information is provided within the Cultural Heritage Resource Assessment report, a copy of which is available within **Appendix E**.

4.4 Transportation Conditions

4.4.1 Highway 401

Within the study area, Highway 401 runs east-west and is classified as a six-lane Rural Freeway Divided (RFD) highway. The posted speed limit on Highway 401 is 100 km/h and the design speed is 120 km/h.

Within the study limits, there are two existing horizontal curves on Highway 401. All existing curves exceed the minimum design standard radius.

There are 3 vertical curves on Highway 401 within the study limits, including 1 crest and 2 sag curves. All 3 vertical curves exceed the design requirement for the posted speed limit; however, the crest curve at the existing Nagle Road crossing is slightly deficient for a design speed of 120 km/h.

The cross-section characteristics of Highway 401 within the study limits vary from west to east with three distinct cross-section characteristics as summarized in **Table 3** below.

Table 3: Summary of Cross-Section Elements for Highway 401

Location	Cross-Section Element	Width (m)
Tangent section approximately 0.5 km west of Nagle Road	Lane Width	EBL 3 x 3.75 WBL 2 x 3.66, 1 x 3.75
	Median Width	10.20 (paved with Concrete Barrier)
	Median Shoulder Width	EB 4.65 WB 4.85
	Outside Shoulder Width	EB 2.75 WB 3.00
	ROW Width	91.4

Location	Cross-Section Element	Width (m)
At Nagle Road	Lane Width	EBL 2 x 3.75, 1 x 3.50 WBL 2 x 3.70, 1 x 3.50
	Median Width	4.20 (paved with Concrete Barrier)
	Median Shoulder Width	EB 0.87 WB 2.53
	Outside Shoulder Width	EB 2.06 WB 1.08
	ROW Width	91.4
Tangent section approximately 0.6 km east of Nagle Road	Lane Width	EBL 3 x 3.75 WBL 3 x 3.75
	Median Width	10.20 (paved with Concrete Barrier)
	Median Shoulder Width	EB 4.65 WB 4.75
	Outside Shoulder Width	EB 3.00 WB 2.65
	ROW Width	91.4

Traffic data and annual average growth factors from the year 2016 were obtained from the MTO. Data was obtained for the categories of annual average daily traffic (AADT), summer average daily traffic (SADT), average annual growth rate, percentage of commercial vehicles (% Comm.) and design hour volume (DHV), within the study area. The traffic data is summarized in **Table 4** below.

Table 4: Existing Traffic Volumes on Highway 401

Segment	AADT (2016)	SADT (2016)	Average Annual Growth Rate (2011-2016)	% Comm. (2013)	DHV (2013)
Division Street to Lyle Street	42,500 vpd	51,800 vpd	1.3%	24%	10.2%

The Level of Service (LOS) is a way to measure the free flow of traffic on a roadway and is used to determine how well a transportation facility is operating from a traveller's perspective. LOS is expressed in terms of traffic delays and is represented by letters A through F, whereby a LOS of A represents free-flow traffic conditions, and a Level of Service of F represents a breakdown in traffic flow with stop-and-go traffic conditions. Highway 401 within the study area currently operates at a LOS C based on the 2016 AADT.

4.4.2 Nagle Road

Within the study area, Nagle Road consists of a two-lane, rural and undivided local road. The posted speed limit on Nagle Road is 60 km/h and the design speed is 80 km/h.

There are no existing horizontal curves on Nagle Road within the study limits.

There are 3 vertical curves on Nagle Road within the study area limits, including 2 crest and 1 sag curves. Two of the vertical curves (1 crest and 1 sag) are deficient for a design speed of 80 km/h.

The maximum profile grade for a rural local road with a design speed of 80 km/h is 8%. The existing profile of Nagle Road within the study area is generally rolling, and grades range from 0.50% to a maximum grade of 6.9%.

The cross-section characteristics of Nagle Road within the study area limits are summarized in **Table 5** below.

Table 5: Summary of Cross-Section Elements for Nagle Road

Location	Cross-Section Element	Width (m)
Nagle Road	Lane Width	2 x 3.35
	Shoulder Width	1.00
	ROW Width	20.2

Within the study area limits, there are 5 existing entrances on Nagle Road (4 on the west side of the road and 1 on the east side of the road), all of which are residential entrances.

Traffic data from the year 2016 indicates the existing AADT on Nagle Road is approximately 775 vehicles per day.

4.4.3 Existing Structure

The existing Nagle Road underpass structure was constructed in 1959 and consists of a three-span cast-in-place voided concrete deck. The bridge spans are 21.2 m, 32.3 m, and 13.4 m in length. The deck contains five rectangular voids and the bridge has no skew. The roadway width is 8.5 m, and the structure width is 10.4 m.

4.4.4 Drainage

4.4.4.1 Highway 401 Centreline Culverts

The proposed Nagle Road underpass is located at a topographic high point on Highway 401. A field inspection of the 3 existing Highway 401 centreline culverts within the study area was completed in October 2018. The 3 culverts consist of 2 concrete box culverts and 1 Corrugated

Steel Pipe (CSP) plastic circular culvert. All 3 culverts are owned by the MTO and were in good condition at the time of the field inspection.

4.4.4.2 Nagle Road Drainage

Nagle Road slopes from north to south with localized high points located approximately 500 m north and 300 m south of Highway 401. Nagle Road acts as a drainage divide with highway runoff draining overland and via ditches on both sides of the roadway, to the adjacent culvert crossings.

4.4.5 Utilities

Utility companies with plants within the study area were requested to provide existing utility information, including the location and type of the existing utility plant. Hydro One, Lakefront Utilities Inc. and Bell Canada all have utilities within the study area.

5.0 Generation and Evaluation of Alternatives

The EAA requires that 'reasonable alternatives' be considered in addressing identified problems and/or opportunities. This involves two levels of analysis. The Long List of Interchange Alternatives considers a broad range of potential interchange and highway improvement alternatives that correspond to the Preferred Transportation Undertaking with the potential to address the structural replacement and transportation needs of the study area, and accommodate the future footprint of Highway 401, while minimizing environmental and community related impacts. As a result of this screening assessment, a Short List of Alternatives is developed to be evaluated in greater detail.

The screening assessment of the Long List of Interchange Alternatives, and detailed evaluation of the Short List of Interchange Alternatives is described herein.

5.1 Evaluation Process

A staged evaluation process was used to identify a preferred interchange design that can accommodate the future eight (8) lane footprint of Highway 401, the structural improvement needs of the Nagle Road underpass, and the transportation needs of future development within the Cobourg East Community Secondary Plan area, while minimizing environmental and community related impacts. The evaluation process consisted of the following stages.

Develop and Assess a Long List of Interchange Alternatives: Develop and assess new interchange alternatives for Nagle Road and identify a Short List of Interchange Alternatives to carry forward for more detailed evaluation. The preliminary screening assessment of the Long List of Interchange Alternatives is provided within **Table 6**.

Evaluation Criteria: Evaluation criteria were developed and grouped into engineering, community, and natural environment categories. The criteria are independent variables, each of which may contribute a positive or negative influence on the overall suitability of an Interchange Alternative based on the factors considered within each criterion. **Table 7** to **Table 9** set out the evaluation criteria for the Short List of Interchange Alternatives, including the factors considered for each criterion.

Evaluate a Short List of Interchange Alternatives: Subject the Short List of Interchange Alternatives to a comparative evaluation process in consideration of transportation benefits socio-economic and environmental effects for each alternative. The process includes; a) identifying evaluation criteria through input received during this study, the study team's experience in projects of this nature, provincial guidelines and existing study area conditions; b) applying a reasoned argument approach to the evaluation in consideration of the net environmental effects of each alternative (qualitative assessment); and c) identifying a Preferred Plan.

5.2 Develop and Assess a Long List of Interchange Alternatives

In establishing the future Nagle Road Interchange at Highway 401, a Long List of 8 Interchange Alternatives was developed and subjected to a screening assessment. The potential configuration of each interchange alternative is presented in **Figure 5** through **Figure 12** below. A copy of the interchange alternative design concepts is available following this report.

5.2.1 Preliminary Screening Assessment

A preliminary screening assessment was completed to assess the feasibility of the Long List of Interchange Alternatives, prior to carrying out a detailed evaluation of the Short List of Interchange Alternatives. Based on the findings of the screening exercise, Alternatives 1, 3 5 and 8 were screened out due to various engineering, environmental and community related reasons. The remaining interchange alternatives (Alternatives 2, 4, 6 and 7) were carried forward for more detailed evaluation.

Figure 5: Alternative 1 - Diamond

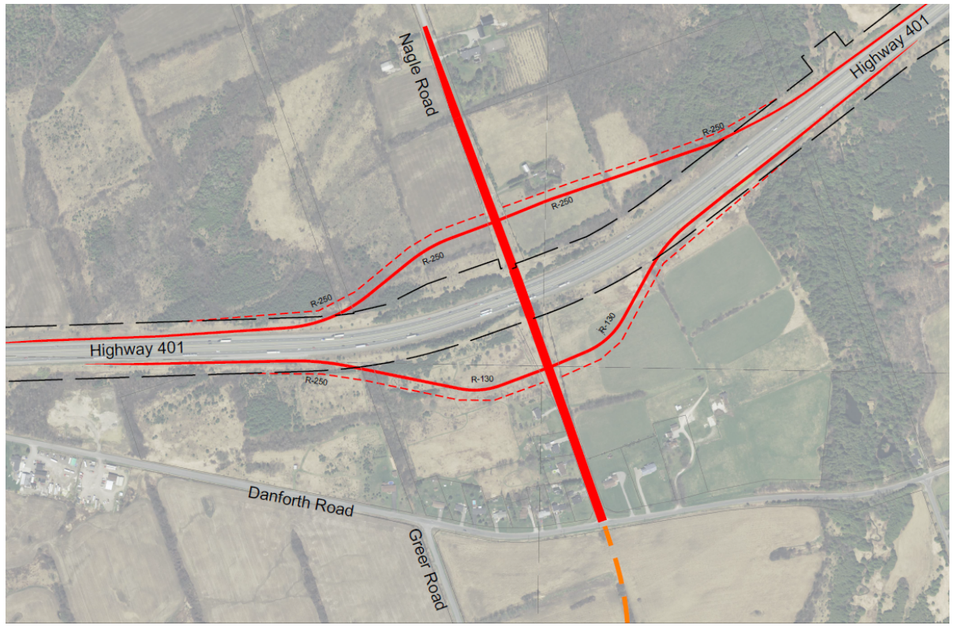


Figure 6: Alternative 2 – Parclo A4

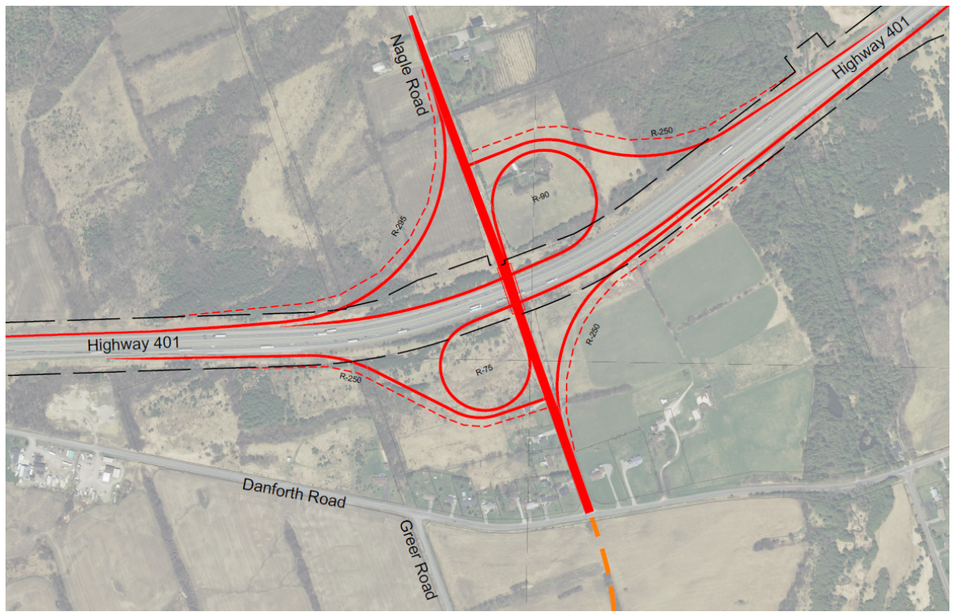


Figure 7: Alternative 3 – Parclo B4

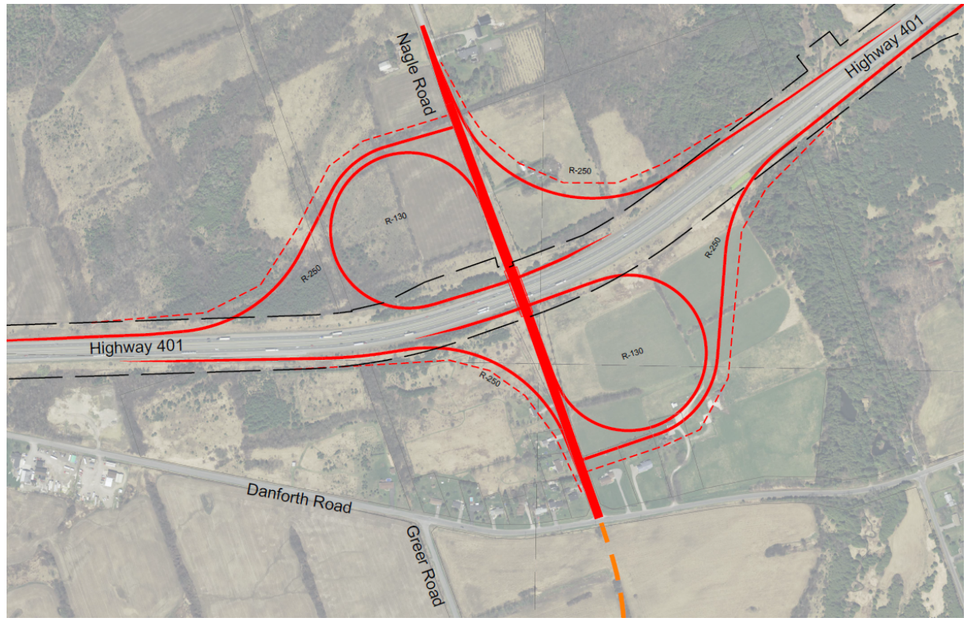


Figure 8: Alternative 4 – Parclo AB

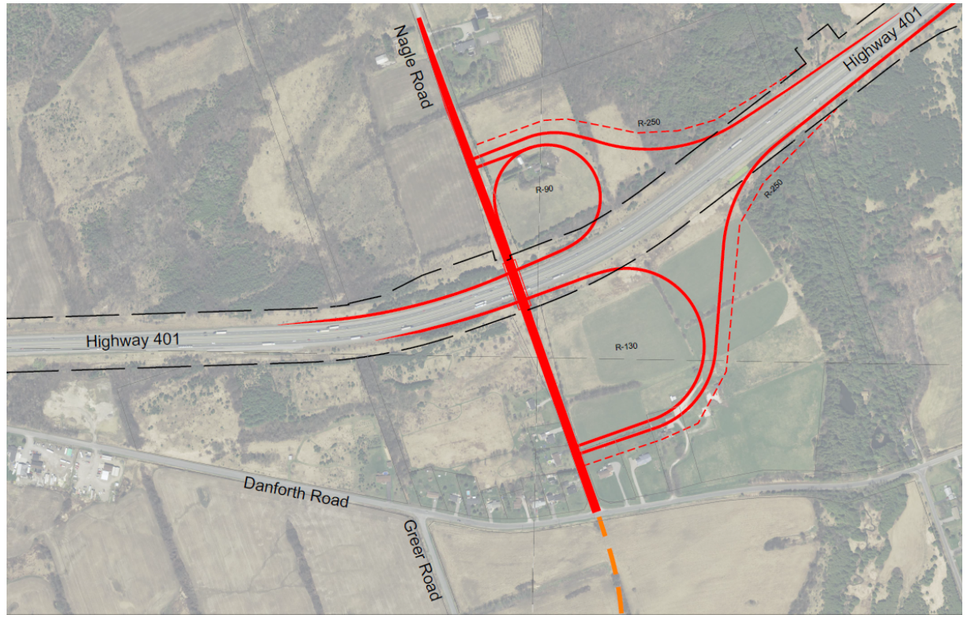


Figure 9: Alternative 5 – Diamond East

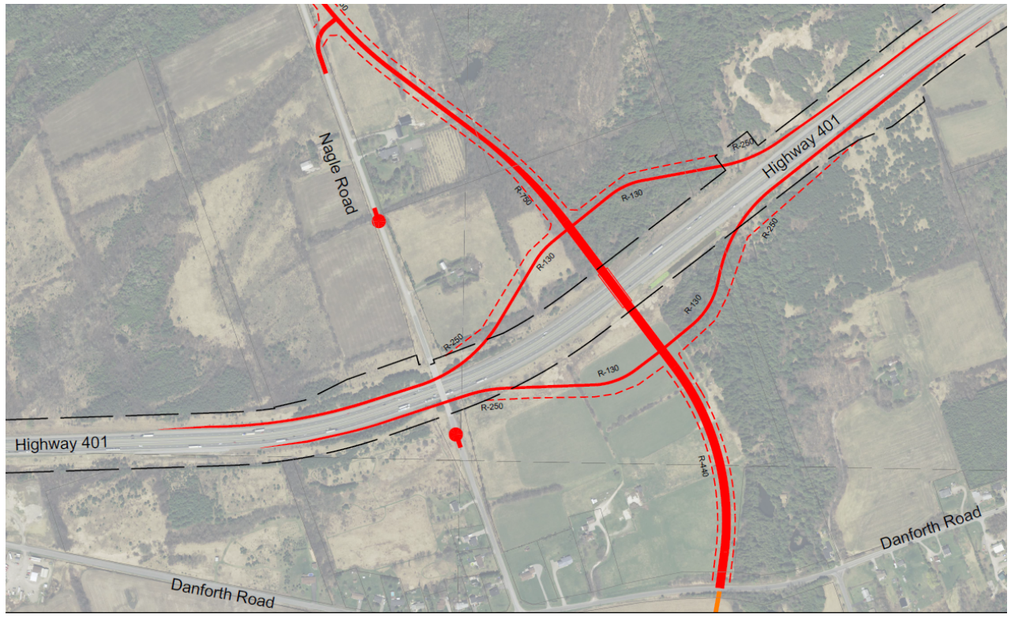


Figure 10: Alternative 6 – Parclo A4 East

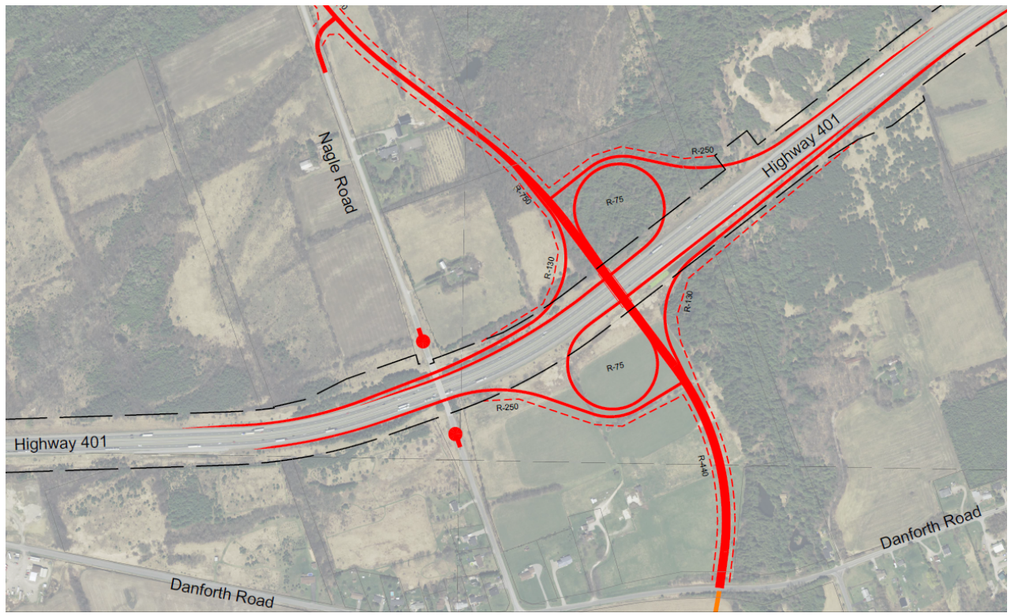


Figure 11: Alternative 7 - Parclo BA East

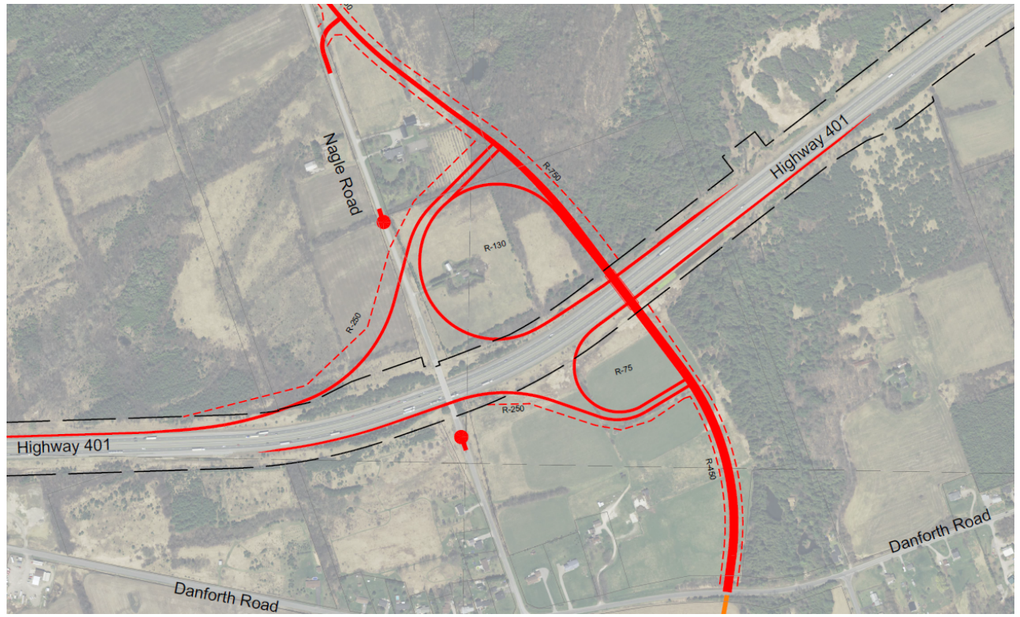


Figure 12: Alternative 8 – Parclo AB East

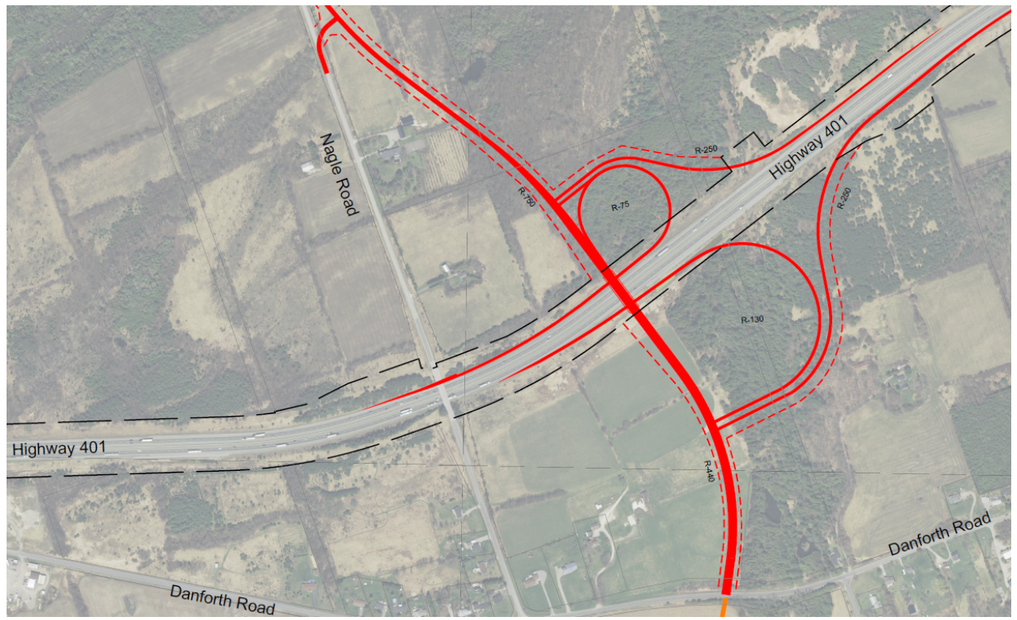


Table 6: Preliminary Screening Assessment of the Long List of Interchange Alternatives

Interchange Alternative	Advantages	Disadvantages	Preliminary Screening Assessment Results
Alternative 1 - Diamond	– Requires less property than Parclo interchange – Lower construction cost when compared to a Parclo interchange – Bridge can be replaced in advance of interchange construction, if required – Fewer environmental impacts when compared to interchange alternatives located east of Nagle Road (Alternatives 5, 6, 7 and 8)	– Lower traffic capacity than a Parclo interchange – Potential for “wrong way” movements from side road to exit ramps – Increased traffic conflicts at ramp intersections with Nagle Road – Requires closure of Nagle Road during construction – Distance between south ramp terminal and Danforth Road is 280 m and may require a bridge over Danforth Road, or closure of Danforth Road at Nagle Road to provide sufficient separation from the south ramp terminal – The distance between the Nagle Road interchange and Division Street interchange ramps is 915 m eastbound (EB) and 645 m westbound (WB)	Screened out from further consideration because interchange configuration cannot accommodate the anticipated traffic volumes.
Alternative 2 – Parclo A4	– Higher traffic capacity and minimal traffic conflicts when compared to other interchange alternatives – Interchange is a standard configuration with inherent safety features (i.e., minimal conflicts) – Fewer environmental impacts when compared to interchange alternatives located east of Nagle Road (Alternatives 5, 6, 7, and 8) – The bridge can be replaced in advance of the interchange construction if required	– Higher construction costs when compared to Diamond interchange – Requires more property than a Diamond interchange – The distance between the south ramp terminal and Danforth Road is 260 m, and may require a bridge over Danforth Road; or closure of Danforth Road at Nagle Road; to provide sufficient intersection separation from the south ramp terminal – The distance between the Nagle Road interchange and Division Street interchange ramps is 1010 m (EB) and 575 m (WB) – Requires closure of Nagle Road during construction	Carried forward in Short List of Alternatives for more detailed evaluation.
Alternative 3 – Parclo B4	– Higher traffic capacity and minimal traffic conflicts when compared to Diamond interchange – The bridge can be replaced in advance of the interchange construction if required – Fewer environmental impacts when compared to interchange alternatives located east of Nagle Road (Alternatives 5, 6, 7, and 8)	– Requires more property than other interchange alternatives – Loop ramp exits on freeways are less desirable than direct ramps – Typically higher construction costs than other interchange alternatives – Requires closure of Nagle Road during construction – The distance between the south ramp terminal and Danforth Road is 110 m, and may require a bridge over Danforth Road; or closure of Danforth Road at Nagle Road; to provide sufficient intersection separation from the south ramp terminal – The distance between the Nagle Road interchange and Division Street interchange ramps is 975 m (EB) and 470 m (WB)	Screened out from further consideration as it has significant property impacts in the NW and SE quadrants, and it is less desirable to have exit loop ramps on Highway 401.

Interchange Alternative	Advantages	Disadvantages	Preliminary Screening Assessment Results
Alternative 4 – Parclo AB	– Additional traffic capacity when compared to Diamond interchange – Fewer environmental impacts when compared to interchange alternatives located east of Nagle Road (Alternatives 5, 6, 7, and 8) – The distance between the Nagle Road interchange and Division Street interchange ramps is 1415 m (EB) and 1160 m (WB) – The bridge can be replaced in advance of the interchange construction if required	– Requires more property than a Diamond or Parclo A4 interchange – Reduced traffic capacity and safety when compared to a Parclo A interchange – Higher construction costs when compared to a Diamond interchange – Loop ramp exits on freeways are less desirable than direct ramps – The distance between the south ramp terminal and Danforth Road is 110 m, and may require a bridge over Danforth Road; or closure of Danforth Road at Nagle Road; to provide sufficient intersection separation from the south ramp terminal – Requires closure of Nagle Road during construction	Carried forward in Short List of Alternatives for more detailed evaluation.
Alternative 5 – Diamond East	– Requires less property than a Parclo interchange – Lower construction cost when compared to a Parclo interchange – Shifting Nagle Road to the east increases the separation between the Division Street interchange ramps (1350 m EB, and 1080 m WB) – Simpler construction staging when compared to alternatives on the existing alignment (Alternatives 1, 2, 3, and 4)	– Lower traffic capacity than a Parclo interchange – Potential for “wrong-way” movements from side road to exit ramps – Increased traffic conflicts at ramp intersections with Nagle Road – Minor impacts to Brook Creek Environmental Constraint Area – Requires approximately 1.15 km of realignment of Nagle Road – A new bridge must be constructed in conjunction with realigned Nagle Road, which could be in advance of the need for the interchange – The realigned Nagle Road has relatively steep grades through the interchange – The distance between the south ramp terminal and Danforth Road is 430 m, and may require a bridge over Danforth Road; or closure of Danforth Road at Nagle Road; to provide sufficient intersection separation from the south ramp terminal	Screened out from further consideration because the interchange configuration cannot accommodate the anticipated traffic volumes.

Interchange Alternative	Advantages	Disadvantages	Preliminary Screening Assessment Results
Alternative 6 – Parclo A4 East	– Higher traffic capacity and minimal traffic conflicts when compared to other interchange alternatives – Simpler construction staging when compared to alternatives on the existing alignment (Alternatives 1, 2, 3, and 4) – Shifting Nagle Road to the east increases the separation between the Division Street interchange ramps (1420 m EB, and 1125 m WB)	– Minor impacts to Brook Creek Environmental Constraint Area – Higher construction costs when compared to a Diamond interchange – Requires more property than a Diamond interchange but less property than other interchange alternatives – Requires approximately 1.15 km of realignment of Nagle Road – A new bridge must be constructed in conjunction with realigned Nagle Road, which could be in advance of the need of an interchange – The realigned Nagle Road has relatively steep grades through the interchange – The distance between the south ramp terminal and Danforth Road is 420 m, and may require a bridge over Danforth Road; or closure of Danforth Road at Nagle Road; to provide sufficient intersection separation from the south ramp terminal	Carried forward in Short List of Alternatives for more detailed evaluation.
Alternative 7 – Parclo BA East	– Higher traffic capacity and minimal traffic conflicts when compared to a Diamond interchange – Minimizes impacts to the Brook Creek Environmental Constraint Area – Shifting Nagle road to the east increases the separation between the Division Street interchange ramps (1420 m EB, and 650 m WB)	– Requires more property than other interchange alternatives – Lower traffic capacity and safety when compared to a Parclo A interchange – Typically higher construction costs than other interchange alternatives – Requires approximately 1.15 km of realignment of Nagle Road – A new bridge must be constructed in conjunction with realigned Nagle Road, which could be in advance of the need for the interchange – The realigned Nagle Road has relatively steep grades through the interchange – The distance between the south ramp terminal and Danforth Road is 420 m, and may require a bridge over Danforth Road; or closure of Danforth Road at Nagle Road; to provide sufficient intersection separation from the south ramp terminal – Loop ramp exits on freeways are less desirable than direct ramps	Carried forward in Short List of Alternatives for more detailed evaluation.

Interchange Alternative	Advantages	Disadvantages	Preliminary Screening Assessment Results
Alternative 8 – Parclo AB East	– Locating all ramps on the east side of the interchange increases the separation between the Division Street interchange ramps (1765 m EB, and 1430 m WB) – Additional traffic capacity when compared to a Diamond interchange	– Significant impacts to Brook Creek Environmental Constraint Area – Requires more property than a Diamond interchange or Parclo A4 interchange – Reduced traffic capacity and safety when compared to a Parclo A interchange – Higher construction costs when compared to a Diamond interchange – Requires approximately 1.15 km of realignment of Nagle Road – Loop ramp exits on freeways are less desirable than direct ramps – A new bridge must be constructed in conjunction with realigned Nagle Road, which could be in advance of the need for the interchange – The realigned Nagle Road has relatively steep grades through the interchange – The distance between the south ramp terminal and Danforth Road is 280 m, and may require a bridge over Danforth Road; or closure of Danforth Road at Nagle Road; to provide sufficient intersection separation from the south ramp terminal	Screened out from further consideration because it has significant environmental impacts in the NE and SE quadrants.

5.2.2 Short List of Interchange Alternatives

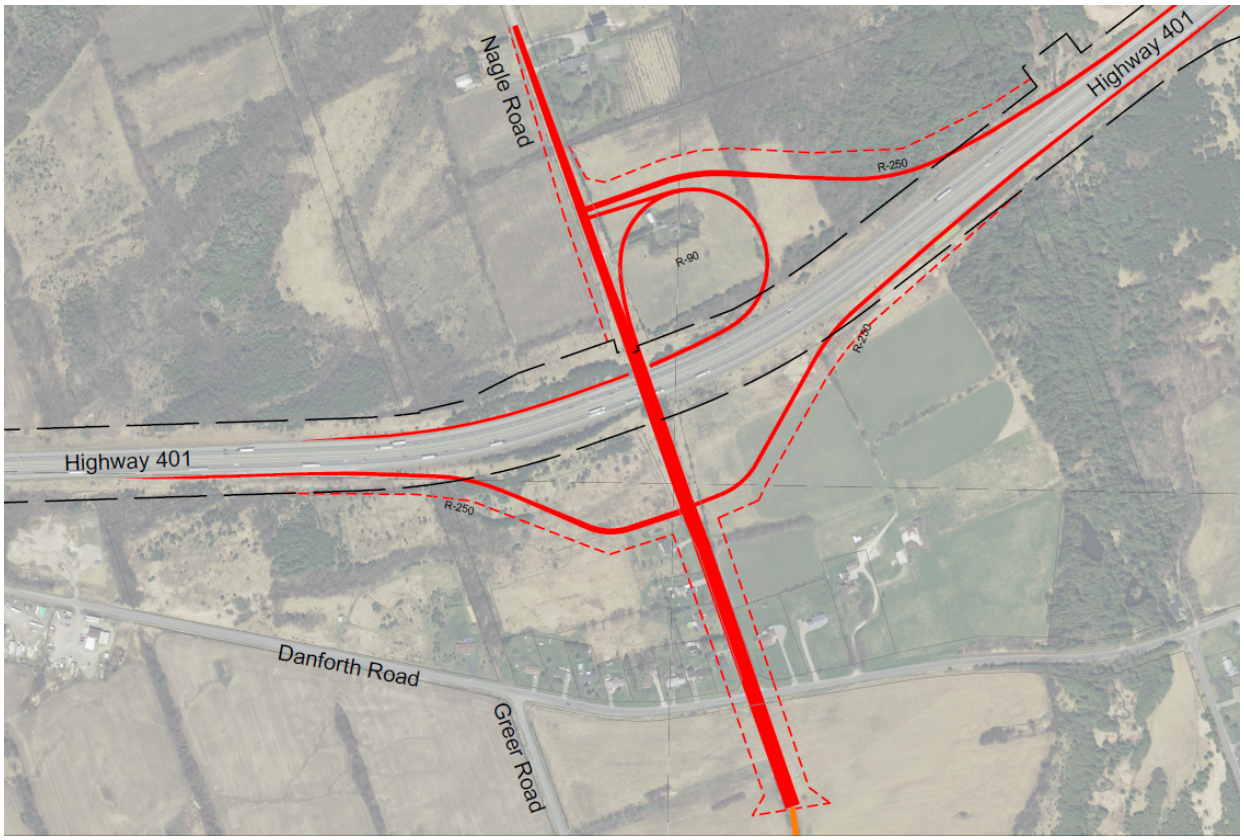
Based on the results of the preliminary screening assessment, the following Short List of Interchange Alternatives were carried forward for further evaluation:

- Alternative 2 – Parclo A4
- Alternative 4 – Parclo AB
- Alternative 6 – Parclo A4 East
- Alternative 7 – Parclo BA East

5.2.3 Refinement of Short List of Interchange Alternatives

Based on feedback from Public Information Centre 1 (PIC 1), a hybrid interchange alternative (Parclo A2 / Diamond) was developed to minimize initial property impacts on the south side of the interchange, and to provide implementation flexibility to accommodate the timing of adjacent developments, as illustrated through **Figure 13** below. This alternative was carried forward into the detailed evaluation of the Short List of Interchange Alternatives.

Figure 13: Alternative 9 – Parclo A2 / Diamond



5.3 Evaluation Criteria

Preliminary criteria were developed to evaluate the Short List of Interchange Alternatives in consideration of engineering, community, and environment factors. The criteria used to evaluate the Short List of Interchange Alternatives are provided within **Table 7** through **Table 9**.

The evaluation process includes identifying evaluation criteria through the input received during this study, the study team's experience in projects of this nature, municipal policy, provincial guidelines, and existing study area conditions. The evaluation criteria developed to evaluate the Short List of Interchange Alternatives in consideration of engineering, community, and environment factors, are provided within **Table 7** through **Table 9**.

Table 7: Engineering Evaluation Criteria

Engineering Factors	Criteria
Traffic Operations	– Consider projected future traffic from the Cobourg East Community Secondary Plan – Consider Level of Service (LOS) on Highway 401 – Consider traffic flow and operations, including local access and out-of-way travel
Geometrics & Safety	– Consider design standards for provincial highways and interchanges – Consider potential for collisions on Highway 401 – Consider pedestrian and cyclists accommodations
Constructability	– Consider construction techniques – Consider geotechnical and foundation conditions
Utilities	– Consider impacts to utilities
Cost	– Consider total cost including utility relocations and property acquisition

Table 8: Community Evaluation Criteria

Community Factors	Criteria
Property	– Consider impacts to private property
Noise & Air Quality	– Consider noise impacts at Noise Sensitive Areas (NSAs) – Consider impacts to air quality
Land Use	– Consider impacts to sensitive land uses – Consider existing and future development plans
Built & Cultural Heritage	– Consider impacts to existing cultural and built heritage features within the study area
Archaeology	– Consider impact on archaeological resources – Consider impacts on areas of archaeological potential
Contamination	– Consider impact on potentially contaminated land

Table 9: Environment Evaluation Criteria

Environment Factors	Criteria
Terrestrial Ecosystem	– Consider impacts on wildlife habitat – Consider impacts on significant trees or vegetation
Fish & Fish Habitat	– Consider impacts to creeks and water bodies

	– Consider impacts to fish and fish habitat
Species of Conservation Concern	– Consider impacts to Species-at-Risk (SAR) or habitat associated with SAR
Environmentally Sensitive Areas, Designated Areas	– Consider impacts to the Brook Creek Environmental Constraint Area – Consider impacts to Sourcewater Protection Areas

5.4 Evaluate the Short List of Interchange Alternatives

The detailed evaluation of the Short List of Interchange Alternatives was completed using a reasoned argument approach that considered each alternative's potential to impact the transportation, natural, cultural and socio-economic environment criteria outlined within **Table 7** to **Table 9**. Each Interchange Alternative received a ranking from least preferred to most preferred. The detailed evaluation of the Short List of Interchange Alternatives is provided within **Table 10**.

Table 10: Detailed Evaluation of Short List of Interchange Alternatives

Category	Criteria	Factors	Alternative				
			Alternative 2 Parclo A2/ Diamond (Existing)	**Alternative 4 Parclo A4 (Existing)**	**Alternative 6 Parclo AB (Existing)**	**Alternative 7 Parclo A4 (East)**	**Alternative 9 Parclo BA (East)**
Highway Engineering	**Traffic Operations**	• Level of Service (LOS)	– Interchange performs at a good Level of Service (i.e., minimal traffic delays) but inherently has less traffic capacity than the Parclo A4 – Intersection of Nagle Road and Danforth Road performs at a good Level of Service	– Interchange performs at a good Level of Service (i.e., minimal traffic delays) but inherently has more traffic capacity than the other alternatives – Intersection of Nagle Road and Danforth Road performs at a good Level of Service	– Interchange performs at an excellent Level of Service (i.e., minimal traffic delays) but inherently has less traffic capacity than the Parclo A4 – Intersection of Nagle Road and Danforth Road performs at a poor Level of Service	– Interchange performs at an excellent Level of Service (i.e., minimal traffic delays) but inherently has more traffic capacity than the other alternatives – Intersection of Nagle Road and Danforth Road performs at a good Level of Service	– Interchange performs at an excellent Level of Service (i.e., minimal traffic delays) but inherently has less traffic capacity than the Parclo A4 – Intersection of Nagle Road and Danforth Road performs at a poor Level of Service
	Geometrics & Safety	• Crossing road grade at ramp terminal	– Maintains desirable grades on Nagle Road through the interchange	– Maintains desirable grades on Nagle Road through the interchange	– Maintains desirable grades on Nagle Road through the interchange	– The realigned Nagle Road has relatively steep grades through the interchange which are undesirable	– The realigned Nagle Road has relatively steep grades through the interchange which are undesirable
		• Length of Horizontal Curves	– Maintains existing alignment of Nagle Road	– Maintains existing alignment of Nagle Road	– Maintains existing alignment of Nagle Road	– Requires alignment shift of Nagle Road with a horizontal curve of 570 m	– Requires alignment shift of Nagle Road with a horizontal curve of 570 m
		• Expected # of collisions	– Highest expected total number of collisions – Lower number of collisions at ramp terminals – Interchange design has the more conflict points between traffic movements when compared to the Parclo A4 option	– Lowest expected total number of collisions – Lowest number of collisions at ramp terminals – Interchange design has the least number of conflict points between traffic movements and provides free-flow operations for most of the movements	– Higher expected total number of collisions when compared to Parclo A4 – Highest number of collisions at ramp terminals – Interchange design has the more conflict points between traffic movements when compared to the Parclo A4 option	– Lowest expected total number of collisions – Lowest number of collisions at ramp terminals – Interchange design has the least number of conflict points between traffic movements and provides free-flow operations for most of the movements	– Higher expected total number of collisions when compared to Parclo A4 – Highest number of collisions at ramp terminals – Interchange design has the more conflict points between traffic movements when compared to the Parclo A4 option
		• Accommodates Long Combination Vehicles (LCVs)	– No significant difference between alternatives – LCVs are accommodated by each design alternative				
		• Number of entrances within 800 m	– 7 entrances within 800 m of ramp terminals	– 7 entrances within 800 m of ramp terminals	– 7 entrances within 800 m of ramp terminals	– No entrances within 800 m of ramp terminals	– No entrances within 800 m of ramp terminals

Category	Criteria	Factors	Alternative				
			Alternative 2 Parclo A2/ Diamond (Existing)	**Alternative 4 Parclo A4 (Existing)**	**Alternative 6 Parclo AB (Existing)**	**Alternative 7 Parclo A4 (East)**	**Alternative 9 Parclo BA (East)**
		• Distance between bullnose on Highway 401	– Distance between bullnose on Highway 401 is 1495 m (WB) and 1800 m (EB)	– Distance between bullnose on Highway 401 is 1495 m (WB) and 1800 m (EB)	– Distance between bullnose on Highway 401 is 2057 m (WB) and 2285 m (EB)	– Distance between bullnose on Highway 401 is 1757 m (WB) and 2187 m (EB)	– Distance between bullnose on Highway 401 is 2385 m (WB) and 2630 m (EB)
		• Distance from ramp terminal to Danforth	– Distance between south ramp terminal and Danforth Road is 210 m and may require bridge over Danforth Road or closure of Danforth Road	– Distance between south ramp terminal and Danforth Road is 210 m and may require bridge over Danforth Road or closure of Danforth Road	– Distance between south ramp terminal and Danforth Road is 100 m and may require bridge over Danforth Road or closure of Danforth Road	– Distance between south ramp terminal and Danforth Road is 366 m and may require bridge over Danforth Road or closure of Danforth Road	– Distance between south ramp terminal and Danforth Road is 366 m and may require bridge over Danforth Road or closure of Danforth Road
	Constructability	• Complexity of staging	– The bridge can be replaced in advance of the interchange construction, if required	– The bridge can be replaced in advance of the interchange construction, if required	– The bridge can be replaced in advance of the interchange construction, if required	– A new bridge must be constructed in conjunction with realigned Nagle Road, which could be in advance of the need of an interchange	– A new bridge must be constructed in conjunction with realigned Nagle Road, which could be in advance of the need of an interchange
	Utilities	• Length of impact	– No significant difference between alternatives – Impacts hydro distribution lines associated with each alternative				
	Total Cost	• Initial construction cost	– Initial construction cost of approximately $16,294,000	– Initial construction cost of approximately $20,927,000	– Initial construction cost of approximately $15,229,000	– Initial construction cost of approximately $23,222,000	– Initial construction cost of approximately $19,920,000
Highway Engineering Summary			**More Preferred**	**Most Preferred**	**Less Preferred**	**Less Preferred**	**Least Preferred**
Social & Cultural Environment	**Property**	• Area of impact to private property	– Potential to impact approximately 13.7 ha of private property	– Potential to impact approximately 13.6 ha of private property	– Potential to impact approximately 16.0 ha of private property	– Potential to impact approximately 11.9 ha of private property	– Potential to impact approximately 16.6 ha of private property
		• Number of private properties potentially impacted by construction activities	– Approximately 13 private properties potential impacted by construction activities – Impacts will be confirmed during detail design	– Approximately 13 private properties potential impacted by construction activities – Impacts will be confirmed during detail design	– Approximately 13 private properties potential impacted by construction activities – Impacts will be confirmed during detail design	– Approximately 9 private properties potential impacted by construction activities – Impacts will be confirmed during detail design	– Approximately 9 private properties potential impacted by construction activities – Impacts will be confirmed during detail design
	Air/Noise	• Number of Residential dwellings within 600 m of alternative	– Approximately 32 residential dwellings within 600 m of alternative	– Approximately 32 residential dwellings within 600 m of alternative	– Approximately 39 residential dwellings within 600 m of alternative	– Approximately 62 residential dwellings within 600 m of alternative	– Approximately 60 residential dwellings within 600 m of alternative

Category	Criteria	Factors	Alternative				
			Alternative 2 Parclo A2/ Diamond (Existing)	**Alternative 4 Parclo A4 (Existing)**	**Alternative 6 Parclo AB (Existing)**	**Alternative 7 Parclo A4 (East)**	**Alternative 9 Parclo BA (East)**
	Cultivated Lands	• Area impacts to agricultural land	– Impacts approximately 4.1 ha of active agricultural land	– Impacts approximately 4.3 ha of active agricultural land	– Impacts approximately 4.5 ha of active agricultural land	– Impacts approximately 4.8 ha of active agricultural land	– Impacts approximately 6.3 ha of active agricultural land
	Cultural Heritage	– Potential to affect Built Heritage Resources (BHRs) and Cultural Heritage Landscapes (CHLs)	– Potential to displace 1 property identified as a potential BHR – May impose temporary impacts to west portion of property identified as a CHL – Additional cultural heritage assessment activities would be required to confirm cultural heritage value/interest, as well as impacts and mitigation, where warranted	– Potential to displace 1 property identified as a potential BHR – May impose temporary impacts to west portion of property identified as a CHL – Additional cultural heritage assessment activities would be required to confirm cultural heritage value/interest, as well as impacts and mitigation, where warranted	– Displaces 1 property identified as a potential BHR – Traverses 1 property identified as a CHL – Additional cultural heritage assessment activities would be required to confirm cultural heritage value/interest, as well as impacts and mitigation, where warranted	– Displaces 1 property identified as a potential BHR – Displaces 1 property identified as CHL – Traverses 1 property identified as a CHL – Additional cultural heritage assessment activities would be required to confirm cultural heritage value/interest, as well as impacts and mitigation, where warranted	– Displaces 1 property identified as a potential BHR – Displaces 1 property identified as a CHL – May impose temporary impacts to west portion of property identified as a CHL – Additional cultural heritage assessment activities would be required to confirm cultural heritage value/interest, as well as impacts and mitigation, where warranted
	Archaeology	• Possible impacts to areas having archaeological potential	– Potential to impact an approximately 11.7 ha area having archaeological potential – Additional archaeological assessment (AA) activities would be completed to confirm impacts, if any	– Potential to impact an approximately 13.0 ha area having archaeological potential – Additional archaeological assessment (AA) activities required to confirm impacts, if any	– Potential to impact an approximately 15.9 ha area having archaeological potential – Additional archaeological assessment (AA) activities required to confirm impacts, if any	– Potential to impact an approximately 14.0 ha area having archaeological potential – Additional archaeological assessment (AA) activities required to confirm impacts, if any	– Potential to impact an approximately 16.7 ha area having archaeological potential – Additional archaeological assessment (AA) activities required to confirm impacts, if any
	Contamination	• Potential to encounter contaminated soils/groundwater	– May encroach onto 2 properties identified as having moderate potential for contamination – Additional environmental site assessment activities required to confirm on-site soil/groundwater contamination, if any	– May encroach onto 2 properties identified as having moderate potential for contamination – Additional environmental site assessment activities required to confirm on-site soil/groundwater contamination, if any	– May encroach onto 2 properties identified as having moderate potential for contamination – Additional environmental site assessment activities required to confirm on-site soil/groundwater contamination, if any	– May encroach onto 1 property identified as having moderate potential for contamination – Additional environmental site assessment activities required to confirm on-site soil/groundwater contamination, if any	– May encroach onto 1 property identified as having moderate potential for contamination – Additional environmental site assessment activities required to confirm on-site soil/groundwater contamination, if any

Category	Criteria	Factors	Alternative				
			Alternative 2 Parclo A2/ Diamond (Existing)	**Alternative 4 Parclo A4 (Existing)**	**Alternative 6 Parclo AB (Existing)**	**Alternative 7 Parclo A4 (East)**	**Alternative 9 Parclo BA (East)**
Social & Cultural Summary			**Most Preferred**	**More Preferred**	**Least Preferred**	**More Preferred**	**Least Preferred**
Natural Environment	**Terrestrial Ecosystem**	• Area of impact to wildlife habitat • Area of impacts to forest communities	– Impacts approximately 5.2 ha of wildlife habitat – Impacts approximately 1.1 ha of forest communities – Some impacts may be mitigated through restoration/design	– Impacts approximately 7.8 ha of wildlife habitat – Impacts approximately 1.1 ha of forest communities – Some impacts may be mitigated through restoration/design	– Impacts approximately 4.5 ha of wildlife habitat – Impacts approximately 1 ha of forest communities – Some impacts may be mitigated through restoration/design	– Impacts approximately 8.4 ha of wildlife habitat – Impacts approximately 4.6 ha of forest communities – Some impacts may be mitigated through restoration/design	– Impacts approximately 7.7 ha of wildlife habitat – Impacts approximately 2.4 ha of forest communities – Some impacts may be mitigated through restoration/design
	Species of Conservation Concern	• Area impacts to potential SAR habitat	– No significant difference between alternatives – No impacts to potential SAR habitat				
	Environmentally Sensitive Areas	• Impacts to Environmental Protection Area (Town of Cobourg Official Plan) and Ganaraska Region Source Water Protection (SWP) area	– No impacts to EPA identified – Avoids SWP area	– No impacts to EPA identified – Avoids SWP area	– Impacts an approximately 0.05 ha area of EPA – Encroaches onto Ganaraska Region SWP Area (Intake Protection Zone and Events Based Area)	– Impacts an approximately 0.66 ha area of EPA – Lies within the Ganaraska Region SWP Area (Intake Protection Zone and Events Based Area)	– Impacts an approximately 0.4 ha area of EPA – Lies within the Ganaraska Region SWP Area (Intake Protection Zone and Events Based Area)
	Fish & Fish Habitat	• Number of watercourse crossings • Impacts to fish habitat	– Requires1 watercourse crossing – Potential to impact permanent coldwater watercourse that supports fish and fish habitat – Impacts can be mitigated through restoration/design	– Requires 2 watercourse crossings – Potential to impact permanent coldwater watercourse that supports fish and fish habitat – Impacts can be mitigated through restoration/design	– Requires 3 watercourse crossings – Potential to impact permanent coldwater watercourse that supports fish and fish habitat – Impacts can be mitigated through restoration/design	– Requires 2 watercourse crossings – Potential to impact permanent coldwater watercourse that supports fish and fish habitat – Impacts can be mitigated through restoration/design	– Requires 4 watercourse crossings – Potential to impact permanent coldwater watercourse that supports fish and fish habitat – Impacts can be mitigated through restoration/design
Natural Environment Summary			**Most Preferred**	**More Preferred**	**More Preferred**	**Least Preferred**	**Less Preferred**
Overall Assessment			**Most Preferred**	**More Preferred**	**Less Preferred**	**Less Preferred**	**Least Preferred**

6.0 Recommended Plan

Based on the findings of the evaluation process, a Preferred Plan was identified and shared with the public, agencies and Indigenous Communities for review and feedback, prior to confirming the Recommended Plan.

The Recommended Plan (Alternative 9 – Parclo A2/Diamond) is presented in **Figure 14**, and includes the following features:

- The replacement of the existing two-lane Nagle Road bridge with a wider bridge to accommodate a 3.0 m centre left turn lane with 2.0 m divisional island, four, 3.5 m vehicular lanes (two lanes in each direction), a 1.6 m sidewalk and 1.5 m cycling lane on the west side, and a 1.5 m cycling lane, and 1.5 m shoulder on the east side of the new bridge.
- Construction of a new Highway 401 interchange at Nagle Road with a Parclo A2/Diamond configuration that provides access to and from Highway 401 in all directions
- Widening of Nagle Road from two lanes to four lanes, from approximately 400 m south of Highway 401 to approximately 400 m north of Highway 401

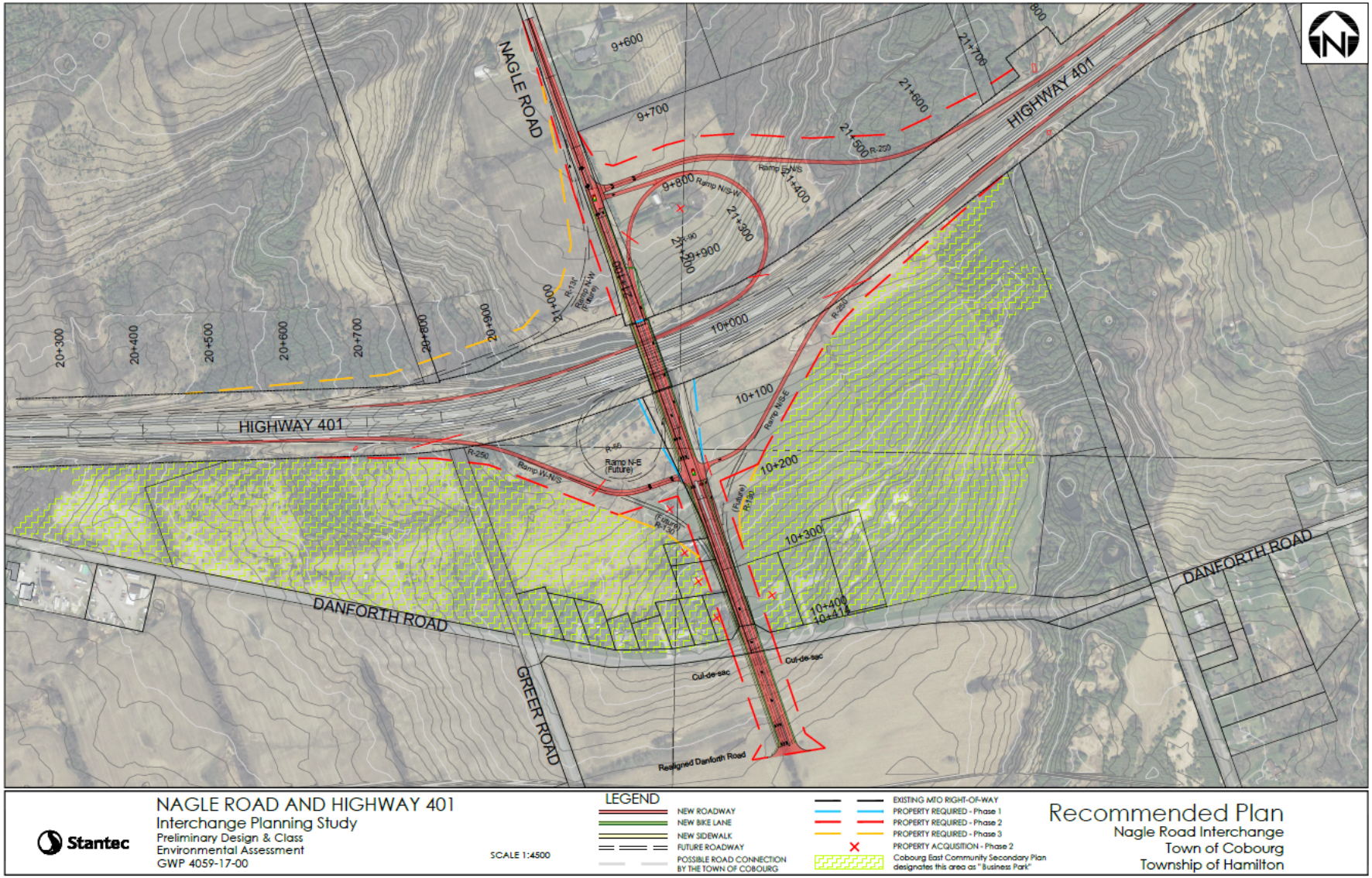
It should be noted that the Recommended Plan may be constructed in several phases to accommodate bridge replacement needs and development growth, as depicted within **Table 11** below. As such, the Nagle Road bridge improvements may occur independently from the implementation of the Nagle Road interchange. The following construction phases are anticipated at this time; however, timing of each phase is dependent on the bridge condition and the actual timing of development of the Cobourg East Community.

Table 11: Phasing of the Recommended Plan

Phase	Construction	Responsibility
1) Bridge Replacement Phase	Replace bridge only with minor profile adjustments to connect new bridge to existing Nagle Road. Bridge may be constructed as 2-lane bridge only, with provision for future widening	Ministry of Transportation (MTO)
2) Cobourg East Development Phase	Widen bridge, widen Nagle Road (including sidewalk and bicycle lane), construct interchange ramps (Parclo A2 on north side, Diamond on south side)	Town of Cobourg
3) Possible Future Construction Phase	Construct Ramp N-W and Ramp N-E (Parclo A4), modify Ramp N/S-E and Ramp N/S-W to single movements (S-E and S-W)	Future municipal initiative

Additional drawings and more detailed information regarding the Recommended Plan are available following this report.

Figure 14: Recommended Plan



6.1 Highway 401

6.1.1 Design Criteria

Highway 401 within the study area limits is classified as a six-lane Rural Freeway Divided (RFD) highway. The posted speed limit on this section of the highway is 100 km/h and the design speed is 120 km/h.

6.1.2 Horizontal Alignment

As the study did not include any changes to Highway 401, the Recommended Plan for the interchange has been designed to maintain the existing Highway 401 horizontal alignment. However, future modifications to the horizontal alignment of both the eastbound and westbound lanes have been considered as part of the bridge design, which would provide for a consistent Highway 401 median width of 10.2 m to match the median width east and west of the existing Nagle Road alignment. These lanes should be adjusted when the highway is widened to 8 lanes.

6.1.3 Vertical Alignment

The Recommended Plan for the interchange has been designed to maintain the existing Highway 401 vertical alignment.

6.1.4 Cross-Section

The Recommended Plan for the Highway 401 cross-section within the study area limits is to maintain the existing cross-section east and west of the existing Nagle Road alignment. However, the existing cross-section at Nagle Road has reduced shoulder widths, which result in a shift in the eastbound and westbound lanes to permit six-lanes through the existing Nagle Road structure.

Future expansion of Highway 401 to an eight-lane cross-section should include realigning the eastbound and westbound lanes to provide a consistent median width of 10.2 m (to match cross-sections east and west of Nagle Road) and outside shoulder widths that meet MTO standard of 3.0 m wide. The Recommended Plan has been designed assuming this cross-section; however, the future eight-lane Highway 401 cross-section will be confirmed during detail design.

The cross-section elements of Highway 401 within the study area limits are summarized in **Table 12** below.

Table 12: Recommended Highway 401 Cross-Section Elements

Cross-Section Element	Width (m)
Pavement Width	6 x 3.75 m (3 EBL, 3 WBL) [Existing] 8 x 3.75 m (4 EBL, 4 WBL) [Ultimate]
Shoulder Width	4.7 m (Lt) 3.0 m (Rt)
Shoulder Rounding	1.5 m
Median Width	10.2 m
ROW Width	91.44 m (minimum)

6.2 Nagle Road

6.2.1 Design Criteria

Within the study area limits, the existing Nagle Road is classified as a two-lane Rural Road in both the Town of Cobourg and Township of Hamilton. In consideration of the proposed future interchange at this location, and the Cobourg East Community Secondary Plan, Nagle Road will be upgraded to a two-lane Arterial Road within the study area limits. The existing posted speed limit of 60 km/h and design speed of 80 km/h will be maintained.

6.2.2 Horizontal Alignment

The Recommended Plan maintains the existing Nagle Road horizontal alignment.

6.2.3 Vertical Alignment

To provide desirable grades at the ramp terminal intersections on Nagle Road, a 3.0% profile grade across the Nagle Road bridge is required to the north and the south. The profile of Nagle Road will be raised by approximately 1 m at the bridge to provide the necessary clearance over Highway 401.

6.2.4 Roadway Cross-Section

The Recommended Plan includes improving the existing rural cross-section of Nagle Road to an urban design with a curb and gutter. The existing two-lane road will be widened to provide 4 through lanes (2 northbound and 2 southbound) and a centre left-turn lane with a raised divisional island. The recommended urban cross-section elements of Nagle Road are summarized in **Table 13** below.

Table 13: Recommended Nagle Road Cross-Section Elements

Cross-Section Element	Width (m)
Pavement Width	2 x 3.50 m (NBL – Thru Lane) 2 x 3.50 m (SBL – Thru Lane) 1 x 3.00 m (Centre Left-Turn Lane) 1 x 2.00 m (divisional island) 2 x 1.50 m (bike lanes NB & SB)
Shoulder Width	1.5 m (east side only)
Sidewalk Width	1.50 m (west side only)

6.2.5 Nagle Road Extension

The Recommended Plan includes the extension of Nagle Road and the realignment of existing Danforth Road to provide a minimum separation of 400 m between the interchange south ramp terminals and the new intersection. The final alignments and intersection type (i.e., a signalized intersection or roundabout) will be confirmed as part of future development within the Cobourg East Secondary Plan area.

6.2.6 Active Transportation

Two, 1.5 m wide bike lanes will be provided along either side of Nagle Road, from the Danforth Road intersection to the interchange north ramp terminals. A 1.5 m wide sidewalk will also be provided on the west side of Nagle Road, from the Danforth Road intersection to the north ramp terminal intersection.

6.2.7 Interchange Configuration

A Parclo A2 interchange configuration is recommended on the north side of Highway 401, and a Diamond interchange configuration is recommended on the south side. A larger than standard 90 m radius loop ramp is recommended in the northeast quadrant of the interchange to provide additional ramp length to achieve an acceptable entrance ramp profile grade from Nagle Road to Highway 401 westbound.

New interchange ramps will provide full access between Nagle Road and Highway 401 in all directions. All ramps will include a single, 4.75 m wide lane with 1.0 m left shoulder and 2.5 m right shoulder. All ramps will be designed to meet current MTO standards.

6.2.8 Structure

The Recommended Plan includes the replacement of the existing Nagle Road bridge over Highway 401. The recommended phasing for the structure replacement is described herein. These construction phases are also summarized in **Table 11**.

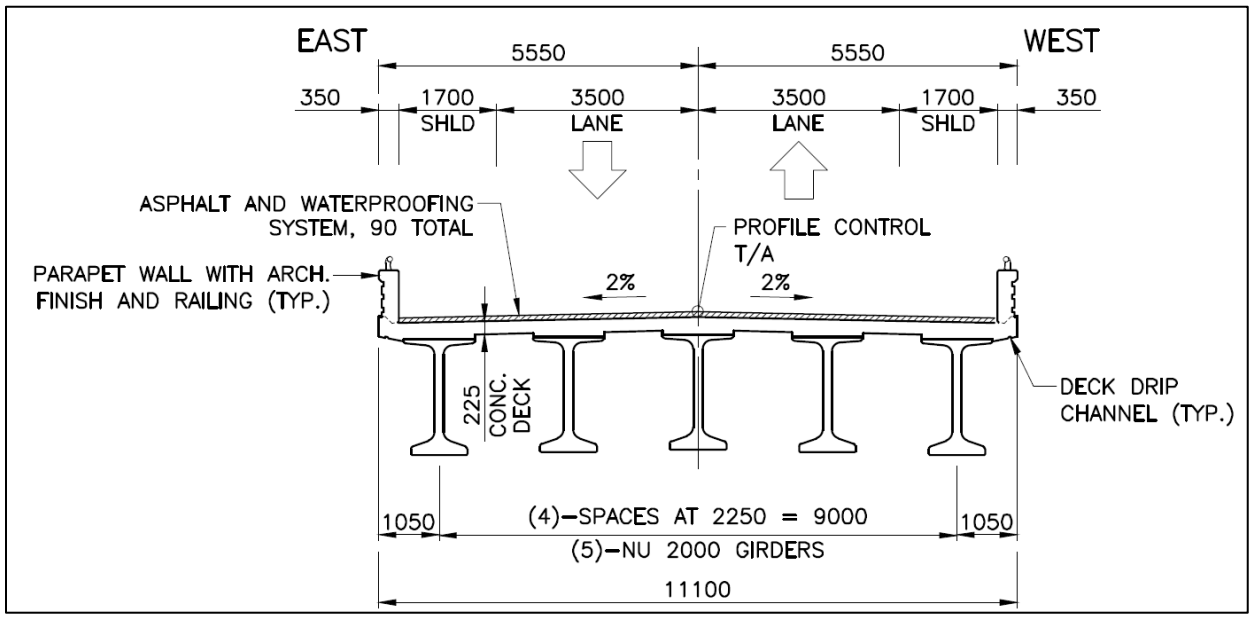
6.2.8.1 Phase 1 – Bridge Replacement

Phase 1 consists of the replacement of the existing Nagle Road bridge with a new, 2-lane bridge. The profile of the new bridge will be raised by approximately one metre to provide sufficient clearance over Highway 401, which will require minor profile adjustments at the bridge approaches to connect to the existing Nagle Road.

A two-span (42 m and 36 m), slab-on-girder bridge with integral abutment structure and precast NU-girders is recommended. These span lengths will allow the new bridge to accommodate a future eight-lane Highway 401 configuration, with a consistent 10.2 m wide median (consistent with median width to east and west of the structure), and a future interchange at Nagle Road with ramps beneath the structure.

An 11.1 m wide bridge is recommended to accommodate a 10.4 m roadway (i.e., two,3.5 m wide lanes (one lane in each direction), and 1.7 m wide shoulders. The bridge cross-section elements recommended as part of Phase 1 are illustrated within **Figure 15** below.

Figure 15: Phase 1 - Nagle Road Bridge Cross-Section



6.2.8.2 Phase 2 – Cobourg East Development

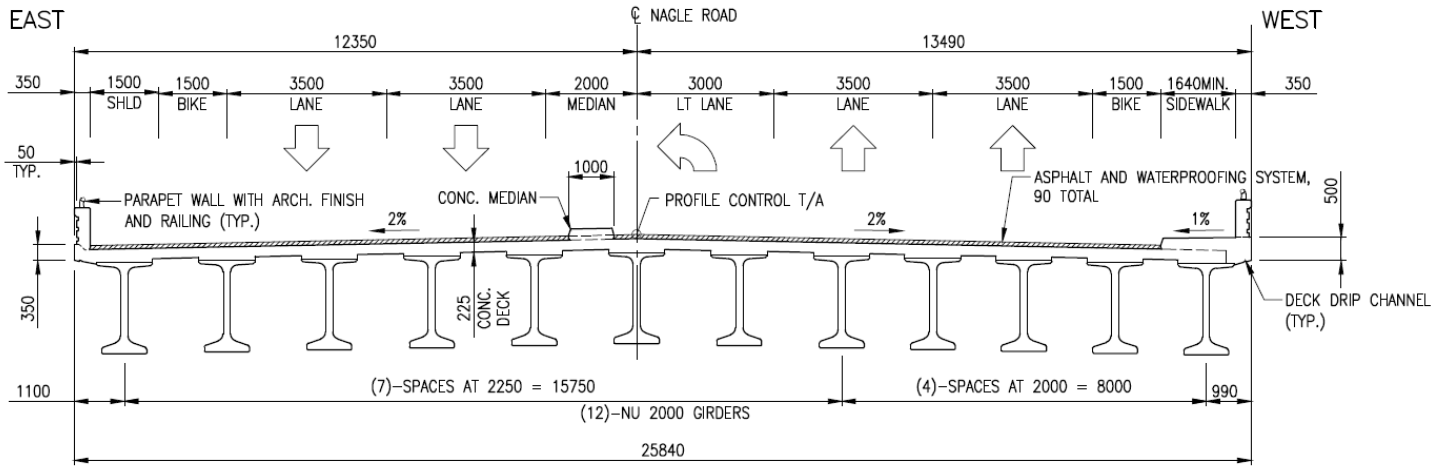
Phase 2 of the Recommend Plan includes widening the bridge to 25.8 m to accommodate four, 3.5 m wide through lanes (2 lanes in each direction), a 3.0 m wide centre left-turn lane with a 2.0 m wide divisional island. Two new bridge pier columns will be required as part of this phase.

Active Transportation

Two, 1.5 m bike lanes will be provided on either side of the bridge, as well as a 1.6 m wide sidewalk along the west side, and a 1.5 m wide shoulder on the east side of the bridge.

The Phase 2 bridge cross-section elements are illustrated within **Figure 16** below.

Figure 16: Phase 2 - Nagle Road Bridge Cross-Section



6.2.8.3 Phase 3 – Possible Future Construction

The Nagle Road interchange includes possible future ramps (Ramp N-W and Ramp N-E). The bridge will require further widening in the future to accommodate these ramps, if needed.

6.3 Drainage Engineering

6.3.1 Surface Drainage

As Nagle Road is located near a topographic high point of Highway 401, there are no external areas draining through the interchange, and catchment areas are relatively small with the largest areas (3 ha to 5 ha) representing the inner loops as they drain to the adjacent Highway 401 centreline culverts. The localized high points on Nagle Road direct runoff towards Highway 401 and along the ramps towards the adjacent Highway 401 centreline culverts. No drainage crosses Nagle Road or Highway 401 within the interchange.

There are no significant changes to the existing drainage patterns and flows associated with the Recommended Plan, and new culverts will facilitate drainage within the interchange. The minimum culvert diameter of 800 mm is sufficient to satisfy sizing requirements for interchange ramps on freeways. A north and south extension of the centreline culvert located on the east side of Nagle Road is required to accommodate the future interchange ramps.

6.3.2 Stormwater Management Strategy

6.3.2.1 Water Quantity

The Recommended Plan will result in approximately 2 ha of additional impervious area and overland flow to the existing outlets. Water quantity controls are not proposed as part of the Recommended Plan as a flow increase of less than 1% is anticipated due to the large upstream catchment areas. As such, the relative increase in flows and pollutants from the highway is negligible and no significant increase in flows or erosion to the downstream receivers are anticipated. The southwest quadrant of the new interchange is proposed to drain along the W-N/S Ramp towards Highway 401 and Midtown Creek.

6.3.2.2 Water Quality

Water quality control is required at all outlets, and vegetated ditches are anticipated to be sufficient given the rural nature of the area. Storm sewers should be designed to outlet a minimum of 100 m from the nearest watercourse to provide sufficient length of water quality control in the ditch, where possible. In addition, oil and grit separator units or other Low Impact Development (LID) features may also be used to provide water quality control, where feasible.

6.4 Foundations Engineering

Shallow and deep foundations are both possible at the abutments and piers of the new Nagle Road bridge, based on a design frost depth of 1.4 m at this location. Piled foundations driven to refusal are recommended at the abutments. Pile refusal would be achieved in the very dense till deposits and piles would develop most of their load carrying capacity from tip resistance/end-bearing.

A shallow foundation is recommended at each pier and should be founded on/within the dense to very dense portion of the till deposits. The use of caisson foundations at the piers should be investigated during the detail design stage.

6.5 Intersection Traffic Operations

The Recommended Plan includes a hybrid ramp terminal design comprising of a diamond configuration at the south ramp terminal and Parclo A2 configuration at the north ramp terminal. This configuration is expected to perform very well with exception of northbound lane and southbound lane movement at the Nagle Road and Danforth Road intersection, as the northbound lane movement at this intersection is expected to perform at a LOS E during the PM peak hours and the southbound lane movement’s maximum queue is expected to exceed the available storage length of 130 m. The southbound lane storage length is limited by the Highway 401 eastbound off ramp intersection to the north of the Nagle Road and Danforth Road intersection.

The north ramp terminal intersection is expected to perform at a LOS ranging from B to D and the south ramp terminal intersection is expected to perform at a LOS ranging from B to D with maximum queueing lengths of 150 m. The 401 eastbound off-ramp features a right-turn only lane and a shared right/left turn lane to accommodate the traffic going southbound on Nagle Road.

6.6 Illumination

To maintain existing lighting conditions, illumination will be provided at interchange decision points and ramp terminal intersections with sideroads in accordance with the *MTO Electrical Design Manual*. The electrical design will be completed during detail design.

6.6.1 Construction Closures and Detours

To implement the Recommended Plan, a full closure of Nagle Road across Highway 401 and detour route using the existing municipal road network will be required during construction. The duration of the road closure scenarios is summarized in **Table 14**.

Table 14: Potential Road Closure Durations

Category	Approximate Duration	Typical Scenario
Overnight closure	12-18 hours	Highway 401 closures related to bridge demolitions and girder placements for new bridges
Long-term closure	1-4 months	Nagle Road closure

The length of closures will be confirmed during detail design.

6.6.1.1 Overnight Closure and Detour

A single overnight closure of Highway 401 is anticipated to accommodate the demolition of the existing Nagle Road bridge and new girder placement for the new Nagle Road underpass structure, as summarized in **Table 15**.

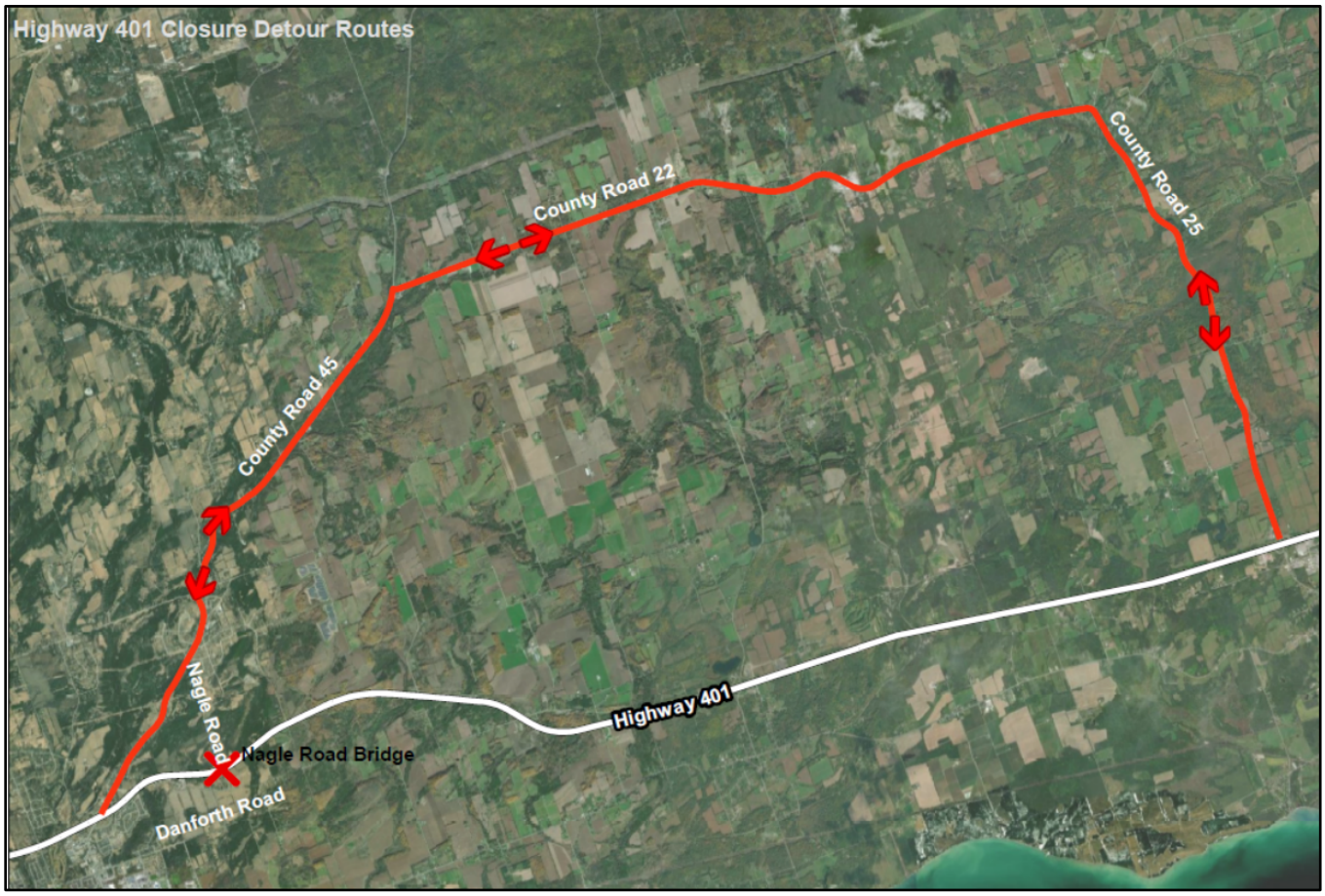
Table 15: Potential Overnight Closure

Structure	Closure Requirement	Construction Activity
Nagle Road Bridge	Highway 401 EB/WB between Division Street (County Road 45) and Lyle Street	Existing Nagle Road bridge demolition and potential girder placement for new bridge

The overnight closure of Highway 401 between Division Street and Lyle Street will require a detour route along the existing municipal road network. The anticipated detour route is to use the interchanges at Division Street (County Road 45) & Highway 401 and Lyle Street (County

Road 23) and travel north to County Road 22, which connects County Roads 45 & 25 (a designated Emergency Detour Route (EDR)). The anticipated detour route is shown in **Figure 17**. However, it should be noted that additional full closures may be required during the construction of the new bridge. The number and duration of those full closures will be confirmed during detail design.

Figure 17: Overnight Closure Detour Route



6.6.1.2 Long-Term Closures

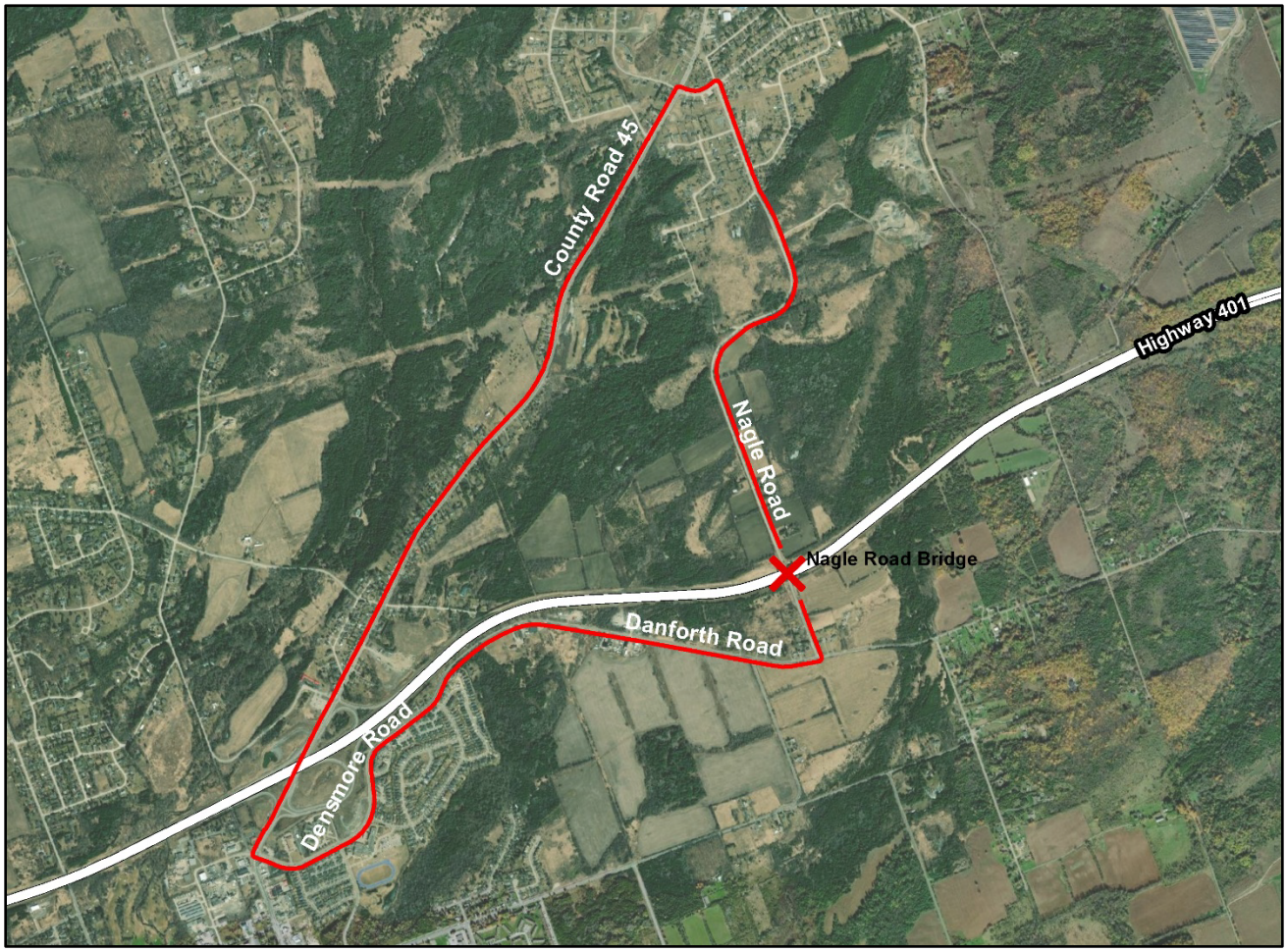
A long-term closure of Nagle Road will be required to accommodate the construction of the new underpass structure. The anticipated long-term road closure is summarized within **Table 16**.

Table 16: Long-Term Closures

Structure	Closure Requirement	Construction Activity
Nagle Road Bridge	Nagle Road	Construction of new bridge

The long-term closure of Nagle Road will require a detour route along the existing municipal road network. The anticipated detour route is to use County Road 45, Densmore Road and Danforth Road, as illustrated within **Figure 18** below.

Figure 18: Long-Term Closure Detour Route



6.7 Utilities

Utility relocations will be required to accommodate the Recommended Plan, associated with Phases 1 and 2 of construction independently. Utility crossings and potential conflicts have been identified (**Table 17** below); however, relocation plans for utilities will be confirmed during detail design.

Table 17: Utility Impacts

Approximate Location	Approximate Length	Utility Type	Recommendation
Phase 1			
Nagle Road (west side just south of Highway 401)	200 m	Overhead Hydro Underground Bell	1 or 2 hydro poles may require relocation. Consult Bell Canada for vertical clearances.
Phase 2			
Nagle Road (west side from Highway 401 to Danforth Road)	400 m	Overhead Hydro Underground Bell	Hydro poles will require relocation. Consult Bell Canada for vertical clearances.

No impacts to municipal services are anticipated as a result of the Recommended Plan.

6.8 Property

During Phase 1 of implementation of the Recommended Plan, impacts to 2 properties are expected, and impacts to approximately 11 properties are expected as part of Phase 2 of implementation. The anticipated property impacts associated with the Recommended Plan are summarized within **Table 18**; however, they will be confirmed during detail design in consultation with affected property owners.

Table 18: Summary of Property Impacts

	Phase 1		Phase 2		Phase 3	
Property Type	**Number**	**Area (ha)**	**Number**	**Area (ha)**	**Number**	**Area (ha)**
Private	2	0.24	9	13.28	5	2.34
Public	0	0.0	2	0.11	1	0.06
Total	2	0.24	11	13.39	6	2.40

Additional property acquisitions will be required as part of Phase 3, if required.

6.8.1 Responsibility Matrix

This project is being jointly undertaken by The Ministry of Transportation and the Town of Cobourg. The responsibilities of the Town of Cobourg and MTO in respect to the cost and construction of the Recommended Plan are defined within **Table 19**.

Table 19: Responsibility Matrix for Implementation of Recommended Plan

Potential Scenario	MTO Responsibility	Town Responsibility
Scenario 1: Bridge is replaced prior to interchange construction	– Utility relocations and property acquisitions required just for the bridge replacement. – Detail Design and construction of the new two-lane bridge with 3.5 m lanes and 1.7 m shoulders. – Design and construction oversight.	– Utility relocations and property acquisitions required for the bridge widening and interchange components. – Detail Design and construction of the widening of the bridge, cycling lanes, sidewalk, and interchange ramps and all cost associated with it. To be completed when the bridge widening, and interchange needs are triggered by development growth.
Scenario 2: Bridge is replaced in conjunction with the interchange	– Property acquisition just for the bridge component. – Cost of utility relocations required for bridge only. – Design and construction oversight. – Cost of the design and construction of the two-lane bridge (two 3.5 m lanes and 1.7 m shoulders).	– Cost of utility relocations for the interchange component. – Property acquisitions for the interchange. – Detail Design and construction of the bridge and interchange, including the cost of widening of the bridge, cycling lanes, sidewalk, and interchange ramps, etc.
Scenario 3: Future development driven interchange expansion	– Design and construction oversight	– All additional property acquisitions, utility relocations, design and construction costs related to future Ramp W-S and future Ramp S-E. – All additional property acquisitions, utility relocations, design and construction costs related to Ramp N-W and Ramp N-E would be the responsibility of the developer and/or

Potential Scenario	MTO Responsibility	Town Responsibility
		Township on the north side of Highway 401.

7.0 Environmental Impacts and Mitigation

7.1 Natural Environment

7.1.1 Erosion and Sediment Overview Risk Assessment

An Erosion and Sediment Overview Risk Assessment (ESORA) was completed as part of this study in accordance with the MTO Erosion and Sediment Control Guide to determine which Erosion and Sediment Control (ESC) approach is best suited for the anticipated construction works. Based on the findings of the ESORA, it is recommended that Approach 3: Two Part Erosion and Sediment Control Plan (ESCP) – Main and Supplemental be implemented for the site during detail design, in accordance with MTO Guidelines. This approach provides the contractor with the ability to adapt the ESCP should the site conditions found during construction differ than conditions assumed during design

A copy of the ESORA memorandum is available within **Appendix H**.

7.1.2 Drainage, Surface Water, Groundwater and Source Water Protection

Construction of the future interchange and widening of Nagle Road will increase flows and pollutant runoff from Highway 401. The estimated increase in impervious area for the future interchange is approximately 2 ha, with approximately 1 ha draining to the east and 1 ha draining to the west. Highway drainage generally exits the MTO ROW at centreline culverts and outlets to downstream receivers.

Increased pollutant runoff has the potential to affect water quality in the downstream system, including impacts to fish habitat, while increased flows have the potential to affect downstream flood risk and erosion. Highway sections that have a larger increase in impervious pavement area relative to the receiving watercourse (usually on smaller watersheds) generally have more significant downstream impacts.

The west portion of the interchange outlets to Midtown Creek (drainage area of 90 ha), which is located approximately 800 m west of Nagle Road. The east portion of the interchange outlets to Brook Creek West (drainage area of 800 ha), which is located approximately 600 m east of Nagle Road. As a result of the Recommended Plan, flows to these outlets will increase by approximately 1 ha (1% of the total drainage area). Due the size of the drainage areas, the relative increase in flows and pollutants is negligible.

In consideration of the study area groundwater elevations provided in the MECP WWR database, should deeper cuts be necessary, groundwater dewatering may be required. In addition, an Environmental Activity and Sector Registry (EASR) shall be obtained from the MECP for groundwater dewatering in excess of 50,000 L/day while a Permit to Take Water (PTTW) should be obtained from the MECP for groundwater dewatering in excess of 400,000 L/day. Detailed dewatering calculations and an assessment of site-specific conditions would

need to be completed during detail design to further evaluate whether an EASR or a PTTW would be required for the deep cuts. An EASR or groundwater PTTW would not be required for the shallow works and any localized dewatering in support of culvert installation would be detailed and included in a surface water PTTW, if required. The need for a private well monitoring program shall be reviewed during detail design, including in the vicinity of deeper cuts that may be identified as part of detail design.

The handling or storage of Dense Non-Aqueous Phase Liquid (DNAPL) (i.e., paint stripper, pharmaceuticals, aerosols, fats, oils, resins, etc.) of any quantity is a significant threat to groundwater areas, and under source water protection policies, no handling or storage of DNAPLs of any quantity are permitted within the groundwater areas. However, DNAPLs are not expected to be required for the proposed construction of the project; however, construction should avoid handling and storage of DNAPL. There are no other significant threats expected due to the construction of the project within the groundwater or highly vulnerable aquifer (HVA) areas; however, low to moderate threats may exist and this should be confirmed during detail design. During detail design, mitigation measures should be developed to minimize the risk of water quality impacts to the municipal production wells.

There is potential for impacts to surface water and groundwater as a result of construction activities and disturbance of contaminated soils, leaks and accidental spills during construction. Any construction activity in a vicinity of environmentally sensitive areas such as PSWs or cold-water thermal regime watercourses may require additional monitoring to minimize the risk of water quality and/or surface water or groundwater interaction impacts

Protection and mitigation measures for surface water and groundwater impacts will be confirmed during detail design, and once construction methods and activities are identified. In the interim, preliminary proposed protection and mitigation measures include:

- Complete drainage design to provide appropriate drainage capacity
- Direct runoff and overland flow away from working areas and areas of exposed soils
- Store all oils, lubricants and other chemicals in suitable containers and handle them in accordance with applicable regulations
- Do not permit refueling within 30 m of a watercourse
- During construction, identify best management practices for fuel management including secondary containment of temporary fuel storage
- Identify spill response plan for construction and clean up all spills immediately and dispose of contaminated materials in an approved manner. The MECP will be informed of reportable spills.

Protection and mitigation measures for surface water and groundwater impacts will be confirmed during detail design once construction methods and activities are identified.

7.1.3 Potential Contaminated Property

Approximately two locations were identified as having potential sources of contamination within the study area within the ROW at the intersections of Highway 401 with Nagle Road, and Nagle Road with Danforth Road. The following mitigation measures are recommended:

- If building demolition will be required, designated substance surveys will be completed for buildings or structures prior to demolition
- A Preliminary Site Screening (PSS), and Phase I ESA and Phase II ESA (if recommended as part of the PSS or Phase I ESA), should be completed for any property that will be acquired by MTO in accordance with the requirements of the MTO's Environmental Guide for Contaminated Property Identification and Management (MTO, 2006) and Environmental Reference for Highway Design (MTO, 2013).
- Soil and groundwater that will be disturbed during construction should be sampled and analyzed for metals and inorganics (including electrical conductivity and SAR), PAHs, PHCs and VOCs. The selection of soil for analysis should include consideration and observations of unusual odours, staining, or debris/waste in the recovered material.
- Excess soils will be managed in accordance with O. Reg. 406/19 (On-Site and Excess Soil Management) made under the Environmental Protection Act, R.S.O. 1990, c. E.19, as well as the MECP's standards.
- Should excess water be generated during construction, water quality analysis should be conducted to determine appropriate management methods. This work should be done by a Qualified Person.
- Should evidence of soil or water impacts be identified during construction, samples should be collected for laboratory analysis to confirm concentrations of potential contaminants to develop appropriate handing and health and safety guidelines.
- If pole-mounted transformers located within the site boundary need to be removed during construction, equipment should be managed in accordance with applicable regulations due to the potential to contain polychlorinated biphenyl.

7.1.4 Designated Areas

For MTO Class EA projects, the study process for Designated Areas includes identifying boundaries, understanding the feature and potential impacts of the project on the feature, attempting to avoid impacts, and mitigating any potential residual impacts. Where Designated Areas cannot be avoided as demonstrated by the Environmental Assessment approval process, transportation and highway design will be done in a manner that minimizes the extent of intrusion, minimizes visual impacts, maintains access to Designated Areas, and buffers adjacent to Designated Areas (*MTO Environmental Standards and Practices for Designated Areas*).

The Recommended Plan does not impact any designated areas.

7.1.5 Fish and Fish Habitat

The Recommended Plan is anticipated to directly impact one watercourse (i.e., Unnamed Tributary 0B / Brook Creek West). The watercourse crossing is a natural, coldwater regime which generally drains southerly to Lake Ontario. The watercourse is not a constructed drain and no aquatic SAR records were identified for this site.

No fish species were captured during the aquatic surveys undertaken in 2017, although cyprinids were observed. However, species lists from background data sources indicate that the fish communities include Brook Trout, Rainbow Trout, Mottled Sculpin and a diversity of baitfish species.

It should be noted that following the completion of field investigations undertaken in 2017 and reported within the *Fish and Fish Habitat Existing Conditions Report* prepared by Stantec in 2018 (please refer to Appendix B), changes to the federal *Fisheries Act* came into force in August 2019. The 2020 *MTO Protocol for the Protection of Fish and Fish Habitat on Provincial Undertakings* (the Protocol) and the 2020 *Environmental Guide for Fisheries* (the Fish Guide) were revised and updated in 2020.

Based on the Recommended Plan, aquatic effects assessments will be required for the proposed work at Unnamed Tributary 0B/Brook Creek West. Additional field investigations may be required, pending results of the culvert inspections and proposed work for the project (i.e., if additional culverts are identified that may support fish habitat, or if proposed work extends beyond the existing Highway 401 ROW).

A copy of the Fish and Fish Habitat Preliminary Impact Assessment Report is available within **Appendix F**.

Applicability of Best Management Practices and Self-Assessment

In consultation with DFO, MTO has developed the *Best Management Practices Manual for Fisheries*, dated 2020, and a table of Routine MTO Works for activities within the MTO ROW that are not within a waterbody (i.e., Table 2 of the Protocol). The Best Management Practices (BMPs) and Table 2 of the Protocol were developed for routine activities in or near water with minimal to no impacts to fish and fish habitat. If a project is located within 30 m of the high-water level of a waterbody and the activity is listed in Table 2 of the Protocol, it can proceed without a fisheries assessment (i.e., Step 1 of the Protocol). Mitigation measures must be implemented to reduce the risk of the death of fish and the harmful alteration, disruption or destruction (HADD) of fish habitat.

The BMPs streamline the regulatory review process for routine highway activities and provide mitigation measures to reduce the risk of the death of fish and HADD of fish habitat. A project can proceed without DFO review if the conditions and mitigation measures outlined in a BMP can be met (i.e., Step 3 of the Protocol). Where a BMP is used, an MTO Project Notification Form is completed and filed by MTO (i.e., Step 5 of the Protocol).

If a project cannot meet the conditions of a BMP at Step 3 of the Protocol, a fisheries assessment is conducted to determine the likelihood of the HADD of fish habitat (i.e., Step 4 of the Protocol). Projects proceed to Step 5 when there are no federally listed SAR and it is determined that HADD of fish habitat is not likely. Where HADD is likely and/or where federally listed SAR are present, the project proceeds to Step 6 of the Protocol, where a Request for Review Application Form is submitted to DFO for review under the *Fisheries Act*.

The applicability of Table 2 of the Protocol should be determined during the detail design phase of the project for work that occurs within 30 m of fish habitat. Where activities in Table 2 of the Protocol do not apply, the applicability of BMPs should be determined for work in or within 30 m of water crossings where fish habitat was identified in the study area and at additional water crossings where habitat is identified during detail design (if applicable). Based on the preliminary design of the Recommended Plan, and general arrangement drawings for structural culvert replacements, the following BMPs should be considered at Step 3 of the Protocol during detail design:

- **Ditch Maintenance within 30 m of a Waterbody** – the nature and extent of ditch maintenance is not known and should be assessed during detail design.
- **Temporary Water Crossing** – the need for temporary crossings has not been identified; however, this BMP may be applicable when construction access routes have been determined.

To be in compliance with the *Fisheries Act* and the Protocol, the design and construction of work in or near fish habitat must be undertaken in accordance with operational conditions, constraints and the protection measures provided in the BMPs.

Preliminary Aquatics Effects Assessment

An aquatics effects assessment will be required during detail design at Unnamed Tributary 0B / Brook Creek West (and at additional sites that may be identified during detail design, if any) to assess the risk of the project to result in the death of fish or HADD of fish habitat. At sites that provide fish habitat, the spatial extent of fish habitat directly affected by the project will need to be determined once culvert length, culvert dimensions, need for rock protection (areal extent, aggregate size) and channel realignments and the details of other activities that may affect fish and fish habitat have been confirmed.

If rock protection (waterbody material) is proposed within the bankfull channel, the extent (area) of rock protection to be added and the area that will directly affect fish habitat should be determined during detail design as part of the aquatic effects assessment. In addition, the rock protection (waterbody material) particle size should be determined using expected water velocities and selected from Table 3 or Table 4 of Ontario Provincial Standard Specification (OPSS) 1005. The addition of Granular B to the waterbody material should be considered to maintain wetted habitat to the extent possible by reducing water loss among the interstitial spaces in the rock protection.

Detail Design Considerations

Factors that shall be considered during detail design are summarized in **Table 20**. These shall be read in conjunction with Table 1 offered within the *Fish and Fish Habitat Preliminary Impact Assessment Report* which is available within **Appendix F**.

Table 20: Detail Design Considerations Summary

Factors to Consider	Design Considerations
In-water Works Timing Window	– The watercourses in the study area have coldwater thermal regime. – The timing window within which in-water work can occur is July 1 to September 30, inclusive.
Fish Passage	– Migratory fish species present (i.e., Rainbow Trout and Brook Trout) – The maintenance of fish passage must be considered during detail design (i.e., to determine changes to fish passage due to potential changes in water velocity and culvert length).
Significant Fish Habitat	– Brook Trout are present within the Unnamed Tributary 0B/Brook Creek West. Although specific spawning habitat was not identified, the final design and contract should consider reducing impacts to potential spawning areas by: – Avoiding the use of rock protection in the bed of the watercourse – Avoiding adding geotextile to the creek bed and banks
Constraints and Opportunities	– The protection of groundwater upwelling areas should be addressed through detail design
Other Constraints	– If fish habitat is identified at additional locations, design must consider fish passage, opportunities and constraints, as applicable.

In addition to the above, the following measures should be incorporated into the project design to reduce the risk of impacts to fish and fish habitat:

- Design project such that channel realignment is not required. If channel realignment is required, apply natural channel design principles in the design of the replacement watercourse in order to convey expected flows while maintaining or enhancing fish habitat and fish passage;
- Design drainage systems to reduce changes in drainage to watercourses that provide fish habitat;
- Design and plan activities and works such that loss of fish habitat or disturbance to fish habitat is reduced to the extent possible;

- Design stormwater management measures to reduce effects on watercourses that provide fish habitat to the extent possible;
- Design a rehabilitation/re-vegetation plan for long-term stability of the areas disturbed during construction and to provide or restore shade to watercourses; and
- Reduce the need for rock protection in the creek beds to the extent possible; particularly at locations identified as Significant Habitat (please refer to Table 1 of the *Fish and Fish Habitat Impact Assessment* report provided within **Appendix F**. Where rock protection is required below the normal high-water level, use appropriately sized material and install at a similar slope to the existing, maintain a uniform bank/shoreline, and maintain a natural bank/shoreline alignment such that it does not interfere with fish passage or alter the bankfull channel profile.

Construction Timing

Works in watercourses that provide fish habitat or have the potential to support fish habitat is restricted to timing windows to reduce the risk of construction related impacts to fish during their most sensitive / vulnerable life cycles (i.e., during reproduction and early development stages).

In water construction activities at locations that support fish and fish habitat are permitted from July 1 to September 30 inclusive (i.e., in-water work is not permitted from October 1 to June 30). The timing window does not apply to work above the ordinary high-water level.

Ontario Provincial Standard Specifications

The following OPSSs may be applicable to the project:

- OPSS.PROV 180 – General Specification for the Management of Excess Materials
- OPSS.PROV 182 – General Specification for Environmental Protection for Construction in and Around Waterbodies and on Waterbody Banks
- OPSS.PROV 517 – Construction Specification for Dewatering
- OPSS.PROV 803 – Construction Specification for Vegetative Cover (issued in April 2021 to replace the former OPSS.PROV 804)
- OPSS.PROV 804 – Construction Specification for Temporary Erosion Control (issued in April 2021 to replace the erosion control components of former OPSS.PROV 805)
- OPSS.PROV 805 – Construction Specification for Temporary Sediment Control (issued in November 2020 to replace the sediment control components of former OPSS.PROV 805)
- OPSS.PROV 825 – Construction Specification for Placement of Aggregates in Waterbodies
- OPSS.PROV 1005 – Material Specification for Aggregates – Waterbody

The following OPSSs are applicable to the following general activities:

- **Equipment Use** – Use of equipment shall be in accordance with OPSS 182.
- **Fish Salvage** – Fish salvage operations shall be conducted in accordance with OPSS.PROV 182.
- **Dewatering and the Use of Pumps** – Dewatering activities and the use of pumps shall be conducted in accordance with OPSS.PROV 517 and OPSS.PROV 182.
- **Preservation of Riparian Vegetation** – Removal of riparian vegetation shall be in accordance with OPSS.PROV 182.
- **Erosion and Sediment Control** – The installation, monitoring, maintenance, and removal of temporary erosion and sediment control measures shall be according to OPSS.PROV 182, OPSS.PROV 804, and OPSS.PROV 805.
- **Placement of Aggregates in Waterbodies** – Use of aggregate in waterbodies shall be according to OPSS.PROV 825 and OPSS.PROV 1005.
- **Restoration of Disturbed Areas** – Vegetation protection and rehabilitation shall be in accordance with OPSS.PROV 182, OPSS.PROV 803, and OPSS.PROV 804.
- **Management of Excess Materials** – All excess material shall be managed in accordance with OPSS.PROV 180 and Ontario Regulation 406/19.

Additional site-specific mitigation measures may be required pending final design details for the project.

7.1.6 Terrestrial Environment

A Terrestrial Ecosystems Preliminary Impact Assessment Report was completed as part of this study and is available within **Appendix G**.

7.1.6.1 Potential Impacts

The Recommended Plan improvements will occur within the existing ROW and disturbance to agricultural land, vegetation cover and terrestrial habitat is anticipated, including temporary loss of areas disturbed during construction. The Recommended Plan will require vegetation removal, earth clearing, and grading, and will result in the loss of approximately 21.7 ha of terrestrial habitat within the study area. Construction activities in some areas will extend beyond the existing ROW and require vegetation removal and earth grading, which will result in the loss of natural vegetation communities, mostly within meadow communities. There will also be a small loss of forested habitats, including a forested swamp identified as an unevaluated wetland. All of these impacts, except terrestrial habitat loss, are expected to be short term and localized to the study area during construction and lessened through the application of appropriate construction techniques and mitigation measures. Some terrestrial habitats will be permanently lost due to vegetation clearing for the construction of the new interchange and associated culverts and ramps.

Potential Disturbance to Wetlands

Approximately 0.8 ha of swamp communities are anticipated to be impacted by the construction activities.

Potential Disturbance to Vegetation and Terrestrial Habitat

It is anticipated that the proposed works will disturb approximately 21.7 ha of vegetation cover and terrestrial habitat during construction. There will be temporary and permanent loss or disturbance to native vegetation communities due to the clearing required to accommodate construction activities (i.e., excavation, demolition, staging). The approximate amount of terrestrial habitat impacted by the Recommended Plan is listed within **Table 21** below.

Table 21: Approximate Area of Impacted Terrestrial Habitat

Vegetation Community	Total Impacted Area (ha) by Vegetation Community
Meadow	8.0
Forest	1.5
Regeneration Thicket	0.8
Plantation	2.2
Swamp	0.8
Agriculture	8.3
Total Impacted:	**21.7**

The following indirect impacts may also occur as a result of construction activities:

- accidental damage or loss of trees and other vegetation features due to site alteration or construction activities
- temporary disturbance of noise, vibration, ang vegetation removal to terrestrial wildlife habitat
- erosion and sedimentation into adjacent vegetation communities
- permanent loss of native vegetation due to the spread of non-native and invasive vegetation species into disturbed areas after construction

Potential Interference with Migratory Birds

Although not present during field investigations, there is the potential for migratory birds to nest on structures within the study area.

Natural vegetation throughout the study area may also support nesting birds., Any work near active bird nests has the potential to disturb nesting behaviour or damage/destroy the nests,

particularly if vegetation clearing occurs during the active breeding bird window (i.e., April 1 to August 31).

Potential Disturbance to Significant Wildlife Habitat

Aside from Deer Wintering Areas, no significant wildlife habitat features were identified within the study area. It should be noted that the woodlands within the ROW may be of lower quality for deer wintering habitat due to their proximity to Highway 401, and general level of human disturbance. By reducing woodland clearing to the extent possible and with proper forest edge management, impacts to Deer Wintering Areas may be reduced.

Potential Disturbance to Species at Risk and Species of Conservation Concern

Suitable habitat for SAR and SOCC within the study area is primarily associated with deciduous forests, thickets and open meadow communities. SOCC and SAR that have the potential to be encountered or impacted in work zones are described below.

Species at Risk (SAR)

The following SAR have potential to be directly impacted during construction activities due to their behaviour, habitat preferences, and/or movement patterns:

- **Bobolink and Eastern Meadowlark** – Although not observed during the breeding bird surveys completed as part of this study, suitable habitat for grassland bird SAR is present within the study area and may be impacted by construction activities. They are particularly vulnerable during peak nesting periods (April 1 and August 31).
- **Bat SAR (Little Brown Myotis, Northern Myotis, Eastern Small-footed Myotis and Tri-colored Bat)** – Potential bat maternity roost habitat is present within forests, plantations, hedgerows, and individual trees within the study area and may be impacted by construction activities. Tree removal can result in direct mortality to bat SAR and loss of habitat.

Species of Conservation Concern (SOCC)

The following SOCC have potential to be directly impacted by construction activities due to their behaviour, habitat preferences, or movement patterns:

- **Monarch** – Primarily found in areas containing milkweed and wildflowers (including goldenrods, asters, and purple loosestrife). The larvae occur only where milkweed exists, whereas adults are more generalized, feeding on a variety of wildflower nectar. Monarch and its habitat were observed in roadside meadows, which will experience temporary and permanent disturbance during construction.
- **Eastern Milksnake** – Construction activities can result in direct mortality to snakes. Snakes may be vulnerable during emergence from a hibernaculum, re-entrance, and basking

periods, and may preferentially seek out construction materials to bask under. Peak activity for Eastern Milksnake is typically between late April and late June.

- **Barn Swallow** – Although not present during the 2021 field investigations, structures in the proposed area of impact may provide suitable habitat (i.e., vertical walls, ledges) and Barn Swallows may establish nests at new locations in future nesting seasons.

7.1.6.2 Mitigation Measures

The standard measures described herein are recommended for the protection and reduction of impacts to natural features, general wildlife and wildlife habitat, and to reduce the risk of potential impacts to SAR and SOCC.

Site-specific mitigation recommendations for natural features, SWH, or habitat of SAR/SOCC confirmed in the study area or assumed to be present, are also discussed below.

Standard Environmental Protection Measures

Erosion and Sedimentation Control

Mitigation measures associated with sedimentation, erosion, and dust control will be implemented to prevent sediment and dust from entering sensitive natural features. The primary principles associated with sediment and erosion protection measures are to:

- reduce the duration of soil exposure
- retain the existing vegetation, where feasible
- encourage re-vegetation
- divert runoff away from exposed soils
- keep runoff velocities low
- trap sediment as close to the source as possible

To address these principles, the following mitigation measures are recommended:

- Silt fencing and/or barriers are recommended along the work zone where there is the potential for sedimentation of watercourses or wetlands, or the encroachment of construction vehicles into natural areas of Significant Woodlands, wetlands, and watercourses.
- Avoid entering any natural areas beyond the barrier fencing with equipment and avoid excess vegetation removal.
- Stabilize exposed soil areas (using native seed mixes sourced local if possible) and re-vegetate through the placement of seed and mulching or seed and an erosion control blanket, promptly upon completion of construction activities. All disturbed substrates are recommended to be re-vegetated using seed mixes of species that are native to the site

and suitable for site conditions. Introduce seed to disturbed substrates as soon as feasible following construction, and sediment fencing is recommended to remain in place until vegetation cover is re-established.

- Re-fuel equipment 30 m away from watercourses to reduce potential impacts if an accidental spill occurs.
- In addition to any specified requirements, make additional silt fence available on site, prior to grading operations, to provide a contingency supply in the event of an emergency.
- Monitor all erosion and sedimentation controls regularly and properly maintain, as required. Remove controls only after the soils of the construction area have been stabilized and adequately protected or until cover is re-established.
- Monitor limits of construction adjacent to natural features during construction (along with erosion and sedimentation control measures) to ensure that the limits are maintained with respect to vehicular traffic and soil or equipment stockpiling.
- Avoid stockpiling excess materials on site within proximity of Significant Woodlands, wetlands, and watercourses.
- Restore any disturbed natural areas to pre-construction conditions.

Vegetation Protection

Precise limits of vegetation removal will be confirmed during detail design. Vegetation removal should be limited to the extent possible and undertaken outside the migratory bird nesting period (April 1 to August 31).

Sediment fencing will reduce the likelihood of release of sediments and other deleterious substances into adjacent areas of natural vegetation and should be used to clearly mark and separate work areas from sensitive natural features (i.e., significant woodlands, wetlands, and watercourses).

Topsoil and organic matter should be salvaged and reused in areas disturbed during construction, as appropriate. Replaced soils will contain native seed bank, which will help facilitate successful revegetation. Post-construction seeding of the disturbed ROW should be done with a suitable native seed mix and in consideration of Monarch habitat. Seed mixes should include fast-growing, short-lived perennial cover crop to stabilize soil and reduce competition from weedy exotics. Native cover crops are preferred. New seed should be introduced to disturbed substrates as soon as feasible following construction (within 15 days for areas less than 200 m from a watercourse, and 45 days for other areas), and sediment fencing should remain in place until vegetation cover is re-established. Seeded areas shall receive water either through precipitation or irrigation after every seven successive days without rainfall for the first two months after seeding.

A detailed landscape restoration plan should be developed for all areas disturbed during construction, as well as any proposed compensation areas, and incorporated into the detail

design package. The plan would include recommendations for use of native species in restoration planting as well as methods for management of invasive species.

Invasive Phragmites Management

The invasive common reed (Phragmites) is a 'restricted' plant species regulated by the Ontario *Invasive Species Act* (2015) and under the Act it is illegal to import, deposit, release, grow, buy, sell, lease, or trade this species. Phragmites are present throughout the existing ROW. If Phragmites control is required for this project, further field studies are recommended during the detail design phase, including site-specific mapping. A clean equipment protocol is required for machinery entering riparian areas to prevent the spread of invasive species into the feature.

Protection of Nesting Birds

Although no nests were observed under any structures at the time of field investigations, there is potential for such structures to support nests of migratory birds in subsequent seasons.

The MBCA protects nests of migratory birds from damage while they are active, including nests in vegetation and on structures. For all migratory birds, the core nesting period is identified as April 1 to August 31. Vegetation clearing during nesting periods in migratory bird breeding habitat can destroy active nests and contravene the MBCA. Vegetation clearing is recommended to occur outside the core nesting period to eliminate the need for migratory bird nest searches. If work must take place during the core nesting period and the area is small enough to be effectively searched for nesting birds (i.e., isolated trees or hedgerows), then a breeding bird survey can be completed by a Qualified Biologist.

The pre-construction breeding bird survey is recommended to occur at structures proposed for rehabilitation/removal within the work zone. The area where bird nests may be impacted must be searched within five days prior to the work commencing. If breeding pairs are located, then they will be protected with a buffer until the nest is no longer active.

If an active nest is observed during construction, a designated buffer will be delineated within which no activity will be allowed to occur while the nest is active (i.e., with eggs or young). The radius of the buffer will also be determined by a Qualified Biologist. Once the nest is determined to be inactive (i.e., the young have fledged the nest), clearing and other activities in the area may proceed.

Pileated Woodpecker

Pileated Woodpecker nests are protected year-round through the MBCA. Should a Pileated Woodpecker nest be identified and is determined to be empty of live birds and/or viable eggs, then the nest must be registered under ECCC's Abandoned Nest Registry, at which time the prescribed period of inactivity can begin to be counted (36 months) before any action can be taken towards the nest. Destruction of an unoccupied Pileated Woodpecker nesting cavity prior

to the 36-month waiting period will require a permit and may require additional mitigation measures.

Registration under the ECCC Abandoned Nest Registry for Pileated Woodpecker will be determined during detail design, following the completion of targeted species surveys to confirm habitat presence. However, long-term effects from the project are considered negligible with the implementation of the standard and site-specific environmental protection measures.

Wildlife Protection

The following environmental mitigation and protective measures for wildlife and wildlife habitat are recommended:

- construction equipment and vehicles are to yield to wildlife
- inform construction personnel not to threaten, harass or injure wildlife
- if wildlife is encountered during construction, personnel are required to move away from the animal and wait for the animal to move off the construction site. If slow-moving wildlife (i.e., turtles, snakes) are observed on the road and are in danger, and if safe to do so, they should be moved off the road by gently guiding the individual in the direction it was traveling. Handling of SAR is not permitted without an ESA authorization.

Site-Specific Protection Measures

Site-specific protection measures are required for sensitive species and/or habitats that may be present within the study area, and where standard mitigation measures alone do not provide sufficient protection.

Wetlands

Standard Sediment and Erosion Control measures are recommended where work will occur within 30 m of wetland communities.

Woodlands

Newly created edges that are cut along existing woodlands and significant woodlands should be addressed with restoration plantings to protect and mitigate for potential negative effects, such as increased sunlight penetration, susceptibility to windthrow, desiccation, and spread of invasive species. Restoration plans should use native species that are tolerant of the site conditions, including roadside stresses such as salt, pollution, and soil compaction. Restoration should include broadcast seeding to replace seed banks that are lost, as well as planting of woody shrubs and trees to create vertical structure. Monitoring plans should track survivorship and effectiveness of restoration plans and include recommendations to adapt management as appropriate.

Species at Risk and Species of Conservation Concern

The mitigation measures presented below follow general guidance for the protection of SAR/SOCC and are consistent with approved measures implemented on similar projects in Ontario. Species-specific measures are provided for species commonly encountered along roadways or in construction zones, however these are not project or site-specific. Further field investigations, including targeted surveys, shall be undertaken at detail design to confirm the presence of SAR or SOCC and their habitat. Authorization requirements, if any, for SAR will be determined at detail design.

The following mitigation provides recommendations to reduce the risk to SAR and SOCC through avoidance of habitat features, timing windows and observations of potential refuges.

General mitigation to reduce impacts to SAR or SOCC and their habitats include:

- Inform on-site personnel of the potential presence of the SAR/SOCC identified in the study area, obligations under the ESA (2007), and recommended actions in the event of an encounter.
- Species listed as endangered or threatened on the SARO list that are present in the study area must be protected from harm and harassment.
- Any SAR that is incidentally encountered in the study area must be allowed to leave of its own accord. Activities within 20 m should cease until the individual disperses. Construction machinery/equipment must maintain a minimum operating distance of 20 m from the individual until it disperses from the work zone of its own accord.
- Should on-site personnel be unable to allow an incidentally encountered SAR to disperse from the active construction area under its own ability, MECP must be contacted immediately for additional guidance.
- Any SAR that is encountered in the work zone should be reported to the MECP staff within 48 hours of the observation or the next working day, whichever comes first.
- If an injured or deceased SAR is found, the specimen must be placed in a non-airtight container that is maintained at an appropriate temperature and MECP must be contacted immediately for additional guidance.
- Temporary alterations to SAR habitat must be limited to the duration and spatial extent possible and be remediated upon completion of activity and monitored as necessary.

Reptiles and Amphibians

General mitigation measures may not provide sufficient protection for reptiles and amphibian. As such, avoidance of sensitive wildlife periods and temporary wildlife exclusion are recommended.

The peak active season for reptiles and amphibians is from approximately April 1 to October 31. Installation of wildlife exclusion fencing is recommended before May 15 or after September 15 (i.e., outside of key breeding period) to define work zones and restrict the movement of reptiles and amphibians into the working area. If construction must be initiated during the turtle nesting or snake gestation season (approximately June 1 to September 1), a qualified biologist will visually inspect the site for evidence of nesting or individual reptiles and direct installation of construction barrier fencing to avoid nests. If it is not possible to isolate a nest from construction, work will be delayed until it is determined that the nest no longer includes viable eggs (hatchlings have emerged, or eggs were predated).

Potential snake hibernation sites (rock outcroppings or stumps extending below-grade, or animal burrows) should not be disturbed during the hibernation period (November 1 to March 31). If removal of above-ground habitat features (rock slabs or piles, brush) is needed, these features will be retained outside the active work zone during construction and returned post-construction to the same or a nearby location.

During ditching and grading activities undertaken between April 1 and October 31, disturbance will be limited to the greatest extent possible to protect reptiles or amphibians that may be present. A spotter could be used to identify individuals present in the work area.

Bats

Trees > 10 cm diameter at breast height (DBH) are present and may be impacted by construction activities. These trees may be used by bat SAR as maternity habitat.

Trees that have the potential to be used as maternity habitat by bat SAR may be present within the areas proposed for vegetation removal. To identify potentially suitable bat SAR trees, follow-up surveys (during detail design) are recommended during leaf-off in areas where vegetation removal is proposed. Trees will be surveyed to identify trees that are >10 cm DBH, with cavities or loose, peeling bark and will be completed following the guidance outlined in MECP's survey protocol: *Treed Habitats – Maternity Roost Surveys* (2022), which references the *Bats and Bat Habitats: Guidelines for Wind Power Projects*. If potential bat trees are identified within the area proposed for removal, acoustic surveys or maternity exit surveys may be needed prior to tree removals.

In addition, to further reduce the likelihood of harm to bats, removal of trees > 10 cm DBH is recommended to take place outside the period when bats use trees for maternity roosts. Myotis species typically give birth in late-May to early-June, and females fly with newborn young until they become too heavy. Young begin to fly in mid-to late-June, at age three to four weeks. Rearing is completed in August when the bats move to hibernacula. Therefore, tree removal should not occur between May 1 to August 31. If tree clearing is required within this window, maternity exit surveys may be conducted prior to the tree removals, as mentioned above. Maternity exit surveys are conducted during the evening and should include visual and acoustic surveys using accepted protocols.

Consultation with MECP is recommended prior to any tree removals in order to receive up-to-date guidance on appropriate surveys and mitigation measures to remain compliant under the ESA.

Grassland Birds

Although grassland bird SAR were not observed during field investigations, suitable habitat is present. Breeding bird surveys are recommended at detail design. If these species are confirmed present, construction activities with the potential to harm habitat of grassland breeding birds should not be undertaken between April 1 and August 31. Work adjacent to confirmed breeding habitat should be limited during the breeding season as much as possible to avoid harassment to these species.

The limits of construction within grassland habitat should be reduced to the extent possible and delineated and flagged / staked in the field prior to construction to assist with the demarcation of the construction area. The delineated limits of construction should be reviewed by a qualified ecologist.

Grassland habitat disturbed temporarily should be remediated to pre-existing conditions as soon as possible before the beginning of the next nesting period.

Monarch

Construction activities with the potential to harm Monarch eggs, caterpillar, or pupae (i.e., vegetation clearing in meadow areas) should not be undertaken during the larval period which is approximately May 1 to September 30.

If vegetation clearing will proceed when Monarch larvae may be present (May 1 to September 30), inspection of milkweed plants is recommended to locate Monarch larvae. If larvae are present, they may be moved to a location that is suitable and safe under the direction of a qualified professional. Monarch caterpillars may be moved to other milkweed plants; for other larval stages (i.e., eggs and chrysalis), entire milkweed plants should be transplanted.

Milkweed and nectar producing plants should be included in seed mixes for areas restored to meadow to provide habitat for Monarch.

7.2 Socio-Economic Environment

7.2.1 Land Use

The Recommended Plan will impact existing rural residential and agricultural lands situated on the north and south sides of Highway 401. Within the Town of Cobourg, the Recommended Plan is generally consistent with future land uses envisioned as part of the Cobourg East Community Secondary Plan. The existing rural residential and agricultural lands uses located within the Township of Hamilton will be displaced by the Recommended Plan.

Property

The Recommended Plan is anticipated to impact approximately 14 properties. Four (4) properties will require full acquisition. **Table 22** summarizes property impacts associated with the Recommended Plan.

Table 22: Summary of Property Impacts

Property Type	Number of Properties	Area (ha)
Private	11	15.86
Public	3	0.17
Total	14	16.03

A preliminary Property Request Plan has been prepared for this study and is on file with MTO.

Agriculture

Existing active farm operations will be impacted in both the north and south portions of the study area. Access to some active farm operations may be impacted during construction or displaced through the implementation of the Recommended Plan. However, changes to access and associated mitigation measures will be confirmed through traffic management plans developed during detail design, in consultation with affected property owners and/or farm operators.

Commercial

The Recommended Plan is not anticipated to have any negative impacts to local businesses within or surrounding the study area, with the exception of local farming operations. Access to surrounding communities will be maintained during construction of the Recommended Plan.

7.2.2 Traffic Operations

As described within Section 6.0, closures of Highway 401 will be required to accommodate the demolition of the existing Nagle Road bridge, and the construction of the new underpass. These closures will require overnight detours using municipal/county roads. Preliminary detour plans were prepared as part of this study and presented to the MAC and local Council for review and feedback. These plans will be further reviewed and confirmed during the detail design phase of this project, in consultation with Northumberland County, Township of Hamilton, Town of Cobourg and local emergency service providers.

Emergency Services

A temporary closure of Highway 401 between Division Street (County Road 45) and Lyle Street (County Road 23) of approximately 14 to 18 hours will be required for the demolition of

the existing Nagle Road underpass as part of the Recommended Plan. As such, traffic would be directed along the existing Emergency Detour Routes (i.e., County Roads 45, 22 and 25). Additional full closures may be required during the construction of the new bridge. The duration of this closure will be confirmed during detail design. Delays are expected to be minor during construction of the Recommended Plan but construction staging plans will be confirmed during design, in consultation with emergency service providers.

Student Transportation

There may be temporary minor delays to student transportation services during construction. Delays are expected to be minor during construction, but construction staging plans will be confirmed during detail design, in consultation with affected student transportation services.

7.2.3 Recreation

The Recommended Plan supports regional tourism and recreational growth by replacing aging infrastructure and improving safety and traffic operations within the study area. In addition, the Recommended Plan includes new active transportation facilities that will improve connectivity for the existing and future cycling network; consistent with the Northumberland County Cycling Master Plan which envisions Nagle Road to serve as a potential north-south route over Highway 401.

7.2.4 Utilities

Utility relocations will be required to accommodate the structure replacement and new interchange at Highway 401 and Nagle Road. Relocation plans for utilities will be confirmed in Detail Design.

7.2.5 Air Quality and Greenhouse Gas Assessment

An Air Quality and Greenhouse Gas Assessment was undertaken to characterize existing air pollutant emissions and predict air quality changes within the study area following the implementation of the project to the year 2041. Predicted future emission with the project implementation (future build) and without the project (future no-build) to the year 2041 were compared against the existing conditions in 2016 (baseline), characterized from historical data obtained from the National Air Pollution Surveillance Network and MECP for stations located near the study area. The predicted ambient air quality results for each scenario were then compared against relevant Ambient Air Quality Criteria (AAQC) and Canadian Ambient Air Quality Standards (CCAQS).

The potential air quality impacts of the Recommended Plan, and associated mitigation measures for both operation and construction phases are described herein.

Operational Air Quality

The air contaminant emission sources expected from the project operation phase are mobile sources that emit combustion gases from burning fossil fuels (i.e., gasoline and diesel) and fugitive dust from road traffic. Combustion emissions depend on the combustion device (engine type), fuel composition, fuel consumption rate and operating time. Fugitive dust emissions are generated by road traffic during the movement of mobile sources (i.e., cars and trucks). The contaminants of potential concern (CoPCs) were based on the most relevant transportation-related contaminants listed within the MTO *Environmental Guide for Assessing and Mitigating the Air Quality Impacts and Greenhouse Gas Emissions of Provincial Transportation Projects (*MTO Guide), and include nitrogen dioxide (NO_2), carbon monoxide (CO), particulate matter with diameter less than 10 micrometres (PM_{10}), particulate matter with a diameter less than 2.5 micrometres ($PM_{2.5}$), acrolein, benzene, 1,3-butadiene, benzol(a)pyrene (B(a)P), acetaldehyde and formaldehyde. Greenhouse gas (GHG) emissions in the form of carbon dioxide equivalent (CO_2e) were also quantified.

Based on the results of the air quality assessment, the concentrations of CoPCs were below the applicable standard in both the current, future build and future no-build scenarios, with the exception of B(a)P and NO_2. However, ambient background levels are the major contributor to the cumulative exceedances. In addition, levels of B(a)P are expected to decrease in the future build and future no-build scenarios despite this exceedance, due to cleaner fuels and advanced technology which is anticipated to lower emissions.

Although the predicted cumulative concentrations of NO_2 exceed the 2025 1-hour CAAQS at two sensitive receptors for the future build scenario, they remain well below the provincial AAQC. However, mitigation measures could be used to minimize impacts of NO_2 emissions.

Releases of GHGs from traffic operations are expected to be insignificant in comparison to the 2020 Canada and Ontario totals and the 2030 emissions targets.

While the project contributions to exceedances are expected to be small, it is expected that with ongoing advancements in on-road vehicles to newer, lower emissions or electric vehicles, the quantities of air contaminants released to the atmosphere from transportation sources will be lower in the future. Implementation of the Recommended Plan is expected to improve the future traffic flow on the local road network with less congestion than the future no build scenario, which will, thereby minimize changes in air quality.

Other measures to minimize impacts of particulate matter and NOx emissions that could be considered include incorporating vegetative barriers in the landscaping design of the Project. The effectiveness of trees and plants as physical barriers for particulate matter (dust) or gaseous contaminants control depends on the density and height of the vegetation. In general, a vegetation barrier should be thick (approximately 6-metres or more) and have full leaf and branch coverage from the ground to the top of the canopy with no gaps in-between or underneath the vegetation. Typically, evergreen species are more effective than deciduous for

this objective and the barrier should be located close to the emissions sources (US EPA, 2015).

Air Quality During Construction

During construction of the project, particulate matter (dust) will be the primary CoPC. Other CoPCs such as NO_2 and VOCs will also be emitted from equipment used during construction. As the construction activities will be short-term and intermittent, emissions are expected to be minor provided adequate mitigation measures are implemented. For the construction phase, a construction dust management plan should be prepared and implemented. The Environment and Climate Change Canada (ECCC) guideline “Best Practices for the Reduction of Air Emissions from Construction and Demolition Activities” provides recommendations for mitigation measures to reduce construction emissions, including material wetting, use of chemical suppressants, wind barriers, and equipment washing. With the implementation of appropriate mitigation measures and purposeful management of construction dust and combustion gases, emissions from the construction phase and associated impacts to the local air quality can be minimized.

A copy of the Air Quality Impact Assessment report is available within **Appendix I**.

7.2.6 Noise Impact Assessment

7.2.6.1 Operational Noise

A noise impact assessment was prepared to assess the potential changes in traffic noise associated with the Recommended Plan at nearby noise sensitive areas (NSAs), and to investigate noise mitigation. To determine potential changes in traffic noise, predicted future noise levels were calculated for 2041, and were compared with the Project (i.e., Future Build) and without the Project (i.e., Future No-build). The assessment methods and criteria from the MTO Environmental Guide for Noise (MTO 2022) were adopted for this study since the interchange is associated with Highway 401 and the Town does not have noise guidelines applicable to road projects. Where predicted Future Build noise levels increase more than 5 decibels (dB) over Future No-build and/or exceed 65 dBA, noise mitigation was investigated for technical, economic and administrative feasibility.

Nine (9) receptors representing the outdoor living areas of existing noise sensitive areas (NSAs) were identified based on a review of aerial imagery, local land use zoning (Town of Cobourg and Township of Hamilton), the Town of Cobourg’s planning applications website (2022) and property required as part of the Recommended Plan. No approved developments of NSAs have been identified within the area of investigation. As such, only existing NSAs are considered in this noise study.

Based on the findings of the assessment, Future Build noise levels at four receptors are expected to experience a traffic noise level increase of 5 dB or more over the Future No-build

noise levels. In addition, and exceedance of 65 dBA was identified at one additional receptor. Therefore, noise mitigation was investigated for these five receptors.

Changes to the project horizontal alignment, vertical alignment and pavement were considered as a potential mitigation strategy; however, were ruled out as it was not a technically feasible option. Noise barriers were also considered as mitigation. Although some of the noise barriers considered met the criteria for technical feasibility, they did not meet the criteria for economic feasibility. As such, noise mitigation is not recommended for this project.

7.2.6.2 Construction Noise

Construction noise for the project was assessed in accordance with the applicable MECP Publication NPC-115 (MECP 1977) and NPC-118 (MECP 1982) for construction, and the Township of Hamilton By-Law (2014-36) and Town of Cobourg prohibited periods for construction activities. The typical sound levels for most of the construction equipment are within MECP and Township noise limits. However, there is potential for higher sound levels than the permissible limits for some equipment. Once equipment and construction schedules are finalized, the equipment noise data should be reviewed during detail design to confirm that noise emissions are within the limits. If the sound levels are higher than the limits, noise control options may be required. Methods to minimize construction noise impacts should be included in the Construction Code of Practice.

To minimize the potential for construction noise impacts, it is recommended that provisions be written into the contract documentation for the contractor, as outlined below.

- All equipment will be properly maintained to limit noise emissions. As such, all construction equipment will be operated with effective muffling devices that are in good working order.
- There should be explicit indication that Contractors are expected to comply with all applicable requirements of the contract and noise by-laws. Enforcement of noise control by-laws is the responsibility of the Municipality for all work done by Contractors.
- The Contract Documents should contain a provision that any initial noise complaint will trigger verification of construction noise and typical noise control measures.
- In the presence of persistent noise complaints, all construction equipment will be verified to comply with the MECP NPC-115 and NPC-118 guidelines.
- In the presence of persistent complaints and subject to the results of a field investigation, alternative noise control measures may be required, where reasonably available. In selecting appropriate noise control and mitigation measures, consideration should be given to the technical, administrative, and economic feasibility of the various alternatives.

A copy of the Noise Impact Assessment report is available within **Appendix J**.

7.3 Cultural Heritage Environment

7.3.1 Archaeology

The Recommended Plan does not directly impact any registered archaeological sites. However, the findings of the Stage 1 AA indicated that approximately 114 hectares (89%) of the study area retains a moderate to high potential for the identification and recovery of archaeological resources. As such, a Stage 2 archaeological assessment is required for these areas, in accordance with MCM *Standards and Guidelines for Consultant Archaeologists*.

The Stage 1 AA report was filed with the MCM for concurrence and endorsement through a Letter of Review and entry into the *Ontario Public Register of Archaeological Reports*.

A Stage 2 AA was undertaken for portions of the study area; however, due to property access limitations, additional Stage 2 AA activities will be required following the completion of this Class EA. The Stage 2 AA physical survey was conducted on May 31, 2023, and November 9 to 16, 2023. No archaeological resources were identified during the Stage 2 AA physical survey. The Stage 2 AA report has been filed with the MCM for concurrence and endorsement.

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* (Government of Ontario 1990b). 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* (Government of Ontario 1990b).

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 (Government of Ontario 2002) requires that any person discovering human remains must notify the police or coroner and the Registrar of Cemeteries at the Ministry of Government and Consumer Services.

A copy of the Stage 1 Archaeological Assessment report is available within **Appendix D**.

7.3.2 Built Heritage and Cultural Landscapes

The Recommended Plan avoids direct impacts to the Cultural Heritage Landscapes (CHLs) identified as part of this study. However, construction activities are anticipated to be undertaken within 50 m of some of the heritage attributes (i.e., existing trees and residence) of one CHL located on the east side of the north portion of the Recommended Plan. A 50 m buffer zone will be established around these resources during construction. In addition, other measures are recommended to help ensure the construction activities avoid this property,

including mapping the CHL and associated heritage attributes on construction maps, establishing temporary fencing, and ensuring that staging and laydown areas avoid the property.

In addition, given that the residence, a heritage attribute contributing to this CHL, is expected to be at least 40 m from future construction activities, vibration impacts are not anticipated; however, it is recommended that a building condition specialist or engineer familiar with vibration effects review construction activities, should they be expected to occur within 50 m of the residence. If recommended at the discretion of the specialist or engineer, strategies to mitigate possible indirect vibration effects, which may include building conditions surveys or vibration monitoring, may be required.

A copy of the Cultural Heritage Resources Assessment report is available within **Appendix E**.

7.3.3 Landscape Planting

There will be visual impacts to the existing landscape associated with the Recommended Plan, including temporary impacts such as those caused by vehicle lights, which will fluctuate based on usage; permanent impacts based on the crossing structure, and changes to site lighting; and views to/from the existing interchange, the surrounding area, features and points of interest.

The views to Lake Ontario from north of Highway 401 and views of Township of Alnwick/Haldimand portion of the Oak Ridges Moraine from the south of Highway 401 are not expected to be significantly interrupted. However, the construction of the new interchange is anticipated to displace more aesthetically pleasing rural landscape elements, such as residential properties, hedgerows, pasture lands, meadows, and woodlots.

Restoration and Compensation

Strategic coordination of the restoration of vegetation communities is encouraged for consideration in the detail design phase, such as focusing forest and woodlot compensation around watercourses to increase their benefit to cold water streams.

Visual Screening

Visual screening is recommended for the Recommended Plan, as visual impacts are expected for residents on both sides of Highway 401. Visual screening plantings should be carried out in coordination with the affected residents and maintain positive landscape viewsheds where possible. The possibility of saline soils and salt spray should be considered as an important species selection constraint during the design development of possible vegetative screens.

Highway of Heroes Tree Campaign

Collaboration with the Highway of Heroes Tree Campaign was undertaken to recommend where trees should be planted for visual screening or naturalization. The design of

commemoration sites with native species, wildlife habitat, and pollinator populations along Highway 401 and associated interchanges are goals of the completed campaign. Furthermore, the development of commemoration sites may develop cultural connections to the landscape in this area.

A copy of the Conceptual Landscape Plan is available within **Appendix K**.

8.0 Consultation

The main objective of consultation in the Class EA process is to ensure that project information is shared in a meaningful way, and that consideration is given to all aspects of the environment from the earliest stages of planning. Communication with potentially impacted and/or interested parties is key in the planning process and provides a mechanism for the proponent to define and respond to issues prior to key decisions being made. Recognizing this, the study team initiated a comprehensive program from the onset of the study, as described herein.

All interested parties were offered early and ongoing opportunities to review study information and provide input to the decision-making process. To achieve this, a variety of communication strategies were used to engage the public, agencies, private property and business owners, other stakeholders, and Indigenous Communities.

All input received was incorporated into the project findings and recommendations, as appropriate, and responses were provided to all input received.

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

A summary of feedback received from the public, and associated response and or action taken by the study team is provided within **Table 23**.

8.1 Public Consultation

Four study notifications have been prepared and issued as part of this study, including Ontario Government Notifications (OGNs), to notify the public, federal, provincial, and municipal agencies, Indigenous Communities, local community members and other interested persons of the study at key points in the Class EA process. With the exception of the Notice of Study Completion, all notices were posted within the hardcopy publication of the Northumberland News. However, following the Northumberland News, letter notice, along with a copy of the OGN, was also provided to the MPP, Northumberland-Peterborough South, agencies, key stakeholders, and Indigenous Communities, as described in the subsequent sections.

A copy of all OGNs and letter notifications to the MPP, Northumberland-Peterborough South, are provided in **Appendix L**. Notification materials issued as part of key consultation events are summarized in the sections below and provided in **Appendix L.1** through **Appendix L.4**. The corresponding comments and questions received from the public and the associated responses prepared and issued by the study team are also included as part of **Appendix L.1** through **Appendix L.4**.

8.1.1 Project Website

A project website (www.highway401cobourgcolborne.ca) was developed at the onset of the study to provide the public with easy access to project information, which was maintained throughout the study process, including background, study team member contact information, PIC materials links to project-specific documentation (i.e., study notifications, relevant legislation, TESR) and supplementary information.

8.1.2 Project Email Address

A dedicated study email address (comments@highway401cobourgcolborne.ca) was established at study onset and was provided on all public consultation materials (notifications, PIC displays, and the project website). The project website also featured an online comment form (secured with certified encryption) which allowed interested parties to contact the study team directly.

8.1.3 Notice of Study Commencement

The purpose of the Notice of Study Commencement was to introduce the study to the public, agencies, stakeholders and Indigenous Communities and gather initial feedback.

The notice provided the purpose of the study, a brief overview of the Class EA process, a map of the study area, and offered study team contact information to direct members of the public to provide comments and/or questions about the study.

The Notice of Study Commencement was carried out through newspaper advertisements in the *Northumberland News* and the *Brighton Independent* on February 14, 2019. A Canada Post marketing mailing (AdMail) was used to send a copy of the notice in flyer format to properties surrounding the study area and was delivered on February 4, 2019. In addition, individual cover letters were sent to Indigenous Communities with Indigenous or Treaty Rights within the study area on March 4, 2019. Email blasts with the notice attached were sent to external agencies, area businesses, as well as stakeholder groups expected to have an interest in the study, on February 6, 2019. However, the email blast to external agencies included a comment form requesting information concerning existing environmental features and/or constraints in the study area, and to seek their input on the project.

A total of 20 emails were received from the general public following the Notice of Study Commencement up to, and beyond the requested submission date of March 15, 2019. General comments included requests to be added to the project mailing list, the importance of active transportation, timing of construction, concerns associated with cost, safety and property impacts, and potential impacts to the natural environment.

A copy of the Notice of Study Commencement materials and the comments received from the public comments is provided in **Appendix L.2**.

8.1.4 Public Information Centre 1

Public Information Centre (PIC) 1 was held on Wednesday, September 18, 2019, from 4:00 PM to 8:00 PM, at the Cobourg Lions Community Centre, located at 157 Elgin Street East, Cobourg to present and solicit public feedback on the preliminary improvement alternatives and existing study area conditions. At the time of PIC 1, the Highway 401 Cobourg to Colborne Planning Study (GWP 4060-11-00) was being undertaken in parallel to this study. As such, PIC 1 was held in conjunction with GWP 4060-11-00.

External agencies and municipal staff were invited to attend an External Agency Drop-In Meeting from 3:00 PM to 4:00 PM, in advance of the public session. External agencies and stakeholders that were represented at the PIC included the Town of Cobourg, Ontario Provincial Police, Cramahe Township, Willow Beach Field Naturalists, Township of Hamilton, Cramahe Township Manager of Operations, and the Northumberland County Manager of Engineering.

The PIC was a ‘drop-in’ style session where representatives from the study team were available to discuss the study, answer questions, and receive input on the existing conditions in the study area.

The PIC was advertised in the *Northumberland News, and* the *Brighton Independent* on Thursday, September 5, 2019. The Notice was also posted on the project website in advance of the meeting.

In addition, notification letters were mailed to Indigenous Communities, external agencies, stakeholders, property owners and the general public on Tuesday, September 4, 2019. AdMail notification was delivered the week of September 4, 2019 to properties within and surrounding the study area. A copy of the PIC notice is included in **Appendix L.1**. In addition to the Notice of PIC 1, potentially impacted property owners were sent a separate letter on Thursday, September 4, 2019, noting that one or more of the Preliminary Improvement Alternatives may directly affect their property. Potentially impacted property owners were encouraged to attend the PIC to review the alternatives and potential impacts to their properties, as well as discuss any questions or concerns they may have directly with members of the study team.

In total, representatives from approximately 12 external agencies, and 42 members of the public signed into the PIC.

A total of 14 comment sheets, and emails were received at and following the PIC, by the requested submission date of October 18, 2019. General comments included requests to be added to the project mailing list, the importance of active transportation facilities on the underpass, safety and property impacts, and the potential for an increase in noise and traffic infiltration into the Township of Hamilton (specifically the Baltimore community). All names and addresses from the comment sheets and visitor register were added or updated on the project mailing list.

A copy of the PIC 1 Summary Report is provided in **Appendix L.3**.

8.1.5 Public Information Centre 2

A second PIC was held to present and solicit public feedback on the preliminary Preferred Plan and the preliminary assessment of the anticipated environmental impacts and mitigation measures. As the Town of Cobourg recognized the importance of providing an in-person forum for the community to participate in, the scheduling of PIC 2 was delayed due to the COVID-19 pandemic and associated physical distancing requirements. However, it should be noted that technical and environmental studies continued during this delay, to ensure as much information could be shared with the public at PIC 2, as possible. PIC 2 was held on Wednesday, January 18, 2023, from 4:00 PM to 8:00 PM, at the Cobourg Community Centre, located at 750 D'Arcy Street, Cobourg, Ontario.

External agencies and municipal staff were invited to attend an External Agency Drop-In Meeting from 3:00 PM to 4:00 PM, in advance of the public session. External agencies and stakeholders that were represented at the PIC included the Township of Hamilton, Northumberland County and the Bicycle Action Committee of Sustainable Cobourg.

The PIC was a 'drop-in' style session where representatives from the study team were available to discuss the study, answer questions, and receive input on the preliminary Preferred Plan and the preliminary assessment of the anticipated environmental impacts and mitigation measures.

Notification letters were mailed to external agencies and stakeholders on Wednesday, January 4, 2023. The notice was sent via standard direct mail and email (where available) to members of the general public and community stakeholders who had requested to be added to the project mailing list on January 4, 2023. In addition, AdMail notification was delivered the week of January 4, 2023 to properties within and surrounding the study area .

Individual notification letters were also sent via standard direct mail delivery to potentially impacted property owners on Wednesday, January 4, 2023. Each letter included an invitation to participate in a separate one-on-one meeting with members of the study team in advance of PIC 2, and to discuss the impacts to their respective property and any initial questions or concerns they may have.

The PIC was advertised in the *Northumberland News* on Thursday, January 5, 2023. The Notice was also posted on the project website in advance of the meeting. General comments included requests to be added to the project mailing list, positive feedback regarding the inclusion of active transportation facilities across the future underpass, concerns regarding safety, property impacts, the timing of construction, detour routes, and the potential for an increase in noise and traffic infiltration into the Baltimore community, as well as potential impacts to the natural environment and groundwater. Individual notification letters were also sent to Indigenous Communities on January 9, 2023, via mail and email. A copy of the notification materials is included in **Appendix L.1**.

In total, representatives from approximately 12 external agencies, and 83 members of the public signed into the PIC 2.

A total of 6 comment forms, and 6 emails were received at and/or following PIC 2, by the requested submission date of February 17, 2023. All names and addresses from the comment sheets and visitor register were added or updated on the project mailing list.

A copy of the PIC 2 Summary Report is provided in **Appendix L.4**.

8.1.6 Summary of Public Comments

Over the duration of the study, many comments were received from the public, some of which could be categorized into common themes, including active transportation, safety, traffic, property impacts, and the Preferred Plan. **Table 23** provides a summary of the main comments and themes and the associated response provided by the study team. A copy of public correspondence received beyond the key consultation events (i.e., PICs 1 and 2) is available within **Appendix L.5**.

Table 23: Summary of Public Comments and Associated Responses/Action Taken

Comment	Response Provided / Action Taken
Need/Justification for a New Interchange at Nagle Road	
The distance from the Highway 45 interchange is close-by. Why is a new interchange at Nagle Road needed?	Response Provided: The need for an interchange at Nagle Road with Highway 401 was identified in the Cobourg East Community Secondary Plan, which was approved by Cobourg Council in 2005. The proposed interchange supports the transportation objectives identified in Section 15.7 of the Town of Cobourg Official Plan (5 Year Review) which was adopted by Cobourg Council in 2010, approved by the Ministry of Municipal Affairs and Housing in 2011 and approved by the Ontario Municipal Board in 2017. The potential future Highway 401 interchange at Nagle Road is also identified in the Township of Hamilton Official Plan Schedule 'A' – Land Use (July 2012).
Highway Engineering	
Why can't the ramps on either side of Highway 401 mirror each other?	Response Provided: The loop ramp on the north side of Highway 401 provides a free-flow movement, which is required to accommodate the anticipated large volume of traffic from the south (Nagle Road) to the west (Highway 401). If the configuration on the south side was used on the north side, the intersection could not accommodate the significant left-turn movement from the south to the west.
Consultation Process	
Are neighbouring municipalities (i.e., Township of Hamilton) being consulted throughout this process?	Response Provided: A consultation program has been developed for this project that includes public meetings, agency meetings, Municipal Advisory Committee meetings, a dedicated joint project website, and extensive project notification via mail and newspaper advertisements. The consultation process will inform all interested parties of the project and provide an opportunity for input to the study and the decision-making process. The findings of each stage of work will be presented to the public, and ongoing discussions with various government agencies and ministries, local municipalities, non-government interest groups, and property owners will take place. Upon the completion of this interchange study, additional planning studies may be required by the Township of Hamilton and/or Northumberland County to determine if additional improvements are required to the municipal road network. The study team is actively consulting with the Town of Cobourg, Township of Hamilton, and Northumberland County to discuss coordination issues and potential future studies related to Nagle Road.
Active Transportation	
What accommodations are being made for cyclists to cross Highway 401 on the new bridge?	Response Provided: The Nagle Road is envisaged to include an allowance for two bicycle lanes through the interchange and on the bridge to accommodate cyclist travel over Highway 401.
Property Impacts	
Concern regarding property impacts and the property acquisition process.	Response Provided: Property owners who have the potential to be directly impacted (i.e., property acquisition required, in whole or in part) by the Preferred Plan have been contacted by letter to discuss the anticipated impacts to their property, and any questions or concerns they may have. While the timing of construction of the Nagle Road interchange is currently unknown, it is anticipated that the traffic demands associated with growth and development of the Cobourg East Community will necessitate a new interchange at Nagle Road. The pace at which this development will occur will be driven by market conditions and the property owners of the land within the Cobourg East Community, and full buildout may not be achieved until decades into the future. Until such time, residents can continue to enjoy their property in its current use.
Concern regarding indirect property impacts.	Response Provided: Various studies are being completed to identify potential impacts and mitigation. Potential impacts and mitigation associated with the project will be documented in a Transportation Environmental Study Report that will be available for a 30-day public comment period. Additional future studies may be required as development of the Cobourg East community progresses.

	Action Taken: The design of the Recommended Plan was further refined to avoid direct impacts to a rural residential property.
Traffic	
Concern regarding the ability of Nagle Road and Danforth Road to accommodate the increase of traffic as a result of the new interchange.	Response Provided: Your concern regarding the ability of Nagle Road and Danforth Road East to safely accommodate future travel has been noted by the study team. While the timing of construction of the Nagle Road interchange is currently unknown, it is anticipated that the existing Highway 401 interchanges within Cobourg will not support the traffic demands associated with development of the Cobourg East Secondary Plan area, at which time the need for an interchange at Nagle Road will be required. Additional transportation studies will be completed within the Town of Cobourg boundary in the future to confirm the need for additional roadway improvements, such as widening and/or reconstructing to support future traffic demands, as development of the Cobourg East Secondary Plan area progresses.
Concern regarding potential traffic impacts to the north of the interchange, within the community of Baltimore (Township of Hamilton).	Response Provided: Leading up to and following completion of the full buildout of the Cobourg East Community, it is anticipated that there will be an increase to vehicular traffic traveling on Nagle Road between Cobourg and Township of Hamilton, as a result of being adjacent to an urban growth area. Additional transportation studies will be completed within the Town of Cobourg boundary in the future to confirm the need for additional roadway improvements as development of the Cobourg East Community progresses. In order to be prepared for the potential future growth conditions outside of the Town of Cobourg boundary, the Township of Hamilton may also wish to complete long-range planning studies, including a transportation study, that would review the existing road network and include recommendations for road improvements such as road widenings and reconstruction.
Safety	
Turning lanes on/off interchange ramps should take cyclists and pedestrians into account.	Response Provided: Within the interchange footprint, Nagle Road will be designed according to Ministry of Transportation design standards.
Concern regarding the safety of pedestrians and cyclists along Nagle Road and Danforth Road as a result of increased traffic.	Response Provided: Additional transportation studies will be completed within the Town of Cobourg boundary in the future to confirm the need for additional roadway improvements, such as widening and/or reconstructing to support future traffic demands, as development of the Cobourg East Secondary Plan area progresses.
Natural Environment	
Concern regarding potential impacts to the natural environment.	Response Provided: As part of the study, a series of environmental investigations are being completed, including terrestrial, aquatic, migratory birds, species at risk, archaeology, built and cultural heritage, contamination, groundwater, air quality and noise. Existing conditions will be documented within these reports, along with an impact assessment for the Recommended Plan. A comprehensive evaluation process was undertaken to identify a Recommended Plan that best addresses the current and future transportation needs, while minimizing impacts to the community and natural environment. The evaluation process considered a broad range of criteria, including but not limited to traffic operations, constructability, geometrics and safety, as well as potential environmental impacts (i.e., natural, social and cultural), including potential to impact private property. Natural environment considerations included potential to impact wildlife and Species at Risk habitat, forest communities, environmentally sensitive areas and fish and fish habitat. As such, the proposed design was selected because it minimizes potential impacts to the environment while providing access to the planned Cobourg East Community in the Town of Cobourg.
Concern regarding potential impacts to groundwater quality within the community of Baltimore.	Response Provided: Please note that the study area is located outside the limits of source water protection areas, and due to the intervening distance of the project from Baltimore, impacts to the community's groundwater supply are not anticipated. However, impacts to groundwater within the vicinity of the project will be further reviewed during the detail design phase of the project.

Noise & Air Quality	
Concern regarding potential to increase noise and air pollution.	Response Provided: As part of the study, a series of environmental investigations are being completed, including terrestrial, aquatic, migratory birds, species at risk, archaeology, built and cultural heritage, contamination, groundwater, air quality and noise. Existing conditions will be documented within these reports, along with an impact assessment for the Recommended Plan.
Built and Cultural Heritage	
Concern regarding potential impacts to historic properties.	Response Provided: Regarding your concerns about your historical property, the Criteria for Evaluation Potential for Built Heritage Resources and Cultural Heritage Landscapes will be completed and included in final environmental documentation at the end of the studies. Built heritage and cultural heritage landscapes will be considered during the evaluation of alternatives and determination of the Recommended Plans. Efforts will be made to avoid/minimize the impacts to these resources, and mitigation measures for heritage resources will be recommended for the Recommended Plans. Cultural Heritage Assessment Reports (CHAR) have been completed as required by the Environmental Guide for Built Heritage and Cultural Heritage Landscapes. The CHARs identify potential built heritage resources and cultural heritage landscapes within the study areas for consideration during the development and evaluation of alternatives.
	Action Taken: The design of the Recommended Plan was further refined to avoid direct impacts to a Cultural Heritage Landscape.
Construction Timing	
What is the estimated timing of construction?	Response Provided: While the timing of construction for the Nagle Road interchange is currently unknown, the pace at which this development will occur will be driven by market conditions and the property owners of the land within the Cobourg East Community. However, it is expected that full buildout may not be achieved until decades into the future.

8.2 Property Owner Consultation

Approximately 17 potentially impacted property owners were provided with tailored notification letters prior to PIC 1 that offered a brief overview about the studies, information about PIC 1, and, given the location of their property in relation to the study area, the potential for their property to be impacted by the undertaking. The property owner letters, and appending Notice of PIC 1 were delivered via Canada Post standard mail on September 4, 2019.

As part of PIC 2, a tailored letter package was prepared and issued to 10 property owners that were expected to be directly impacted by the preliminary Preferred Plan on January 10, 2023. The letter package included a cover letter that provided a summary of the project, the purpose of PIC 2, and reference to an appending property impact plan that outlined the approximate area of their property that may be impacted by the Preferred Plan. For properties that were significantly impacted by the preliminary Preferred Plan, the letter proposed a virtual meeting to discuss potential impacts to their property and possible mitigation measures.

Based on correspondence with potentially impacted property owners, a summary of the concerns raised by property owners and associated response from and/or commitment made by the study team was prepared. For privacy reasons, the correspondence has not been included within this report; however, the key concerns raised by impacted property owners was the overall timing of construction and property acquisition process. The study team responded to these concerns noting that while the timing of construction of the Nagle Road interchange is currently unknown, it is anticipated that the traffic demands associated with growth and development of the Cobourg East Community will necessitate a new interchange at Nagle Road. The pace at which this development will occur will be driven by market conditions and the property owners of the land within the Cobourg East Community, and full buildout may not be achieved until decades into the future. Until such time, residents can continue to enjoy their property in its current use.

8.3 Agency Consultation

The following external agencies and stakeholders also received an agency comment sheet, requesting input by March 15, 2019:

Provincial Agencies

- Ministry of Natural Resources and Forestry, Peterborough District
- Infrastructure Ontario
- Ministry of Heritage, Sport, Tourism and Culture Industries
- Ministry of the Environment, Conservation and Parks (incl. Peterborough District)
- Ministry of Indigenous Affairs

Municipalities

- Town of Cobourg
- Township of Hamilton
- Northumberland County

Local Elected Representatives

- MPP – Northumberland-Peterborough South
- Mayor – Town of Cobourg
- Mayor – Township of Hamilton

Emergency Services

- Town of Cobourg Fire and Police Services
- Ontario Provincial Police, Northumberland Detachment (Cobourg)
- Northumberland Paramedics
- Township of Hamilton Fire Services

Conservation Authorities

- MPP – Northumberland-Peterborough South
- Mayor – Town of Cobourg
- Mayor – Township of Hamilton

Stakeholders and Utilities

- Kawartha Pine District School Board
- Peterborough Victoria Northumberland Clarington District School Board
- Conseil Scolaire Catholique MonAvenir
- Conseil Scolaire Viamonde
- Student Transportation Services of Central Ontario
- Ontario Federal Agriculture
- Cobourg Historic Society
- Pine Ridge Hiking Club
- Willow Beach Field Naturalists
- Northumberland Central Chamber of Commerce
- Northumberland County Economic Development
- Ontario Trucking Association
- Greyhound Canada Transportation Corp.
- Coach Canada
- Northumberland Federation of Agriculture
- Ganaraska Freewheelers Cycling Club
- Sustainable Cobourg
- Highway of Heroes Living Tribute

- Great Pine Ridge Snowmobile Association
- Zayo Canada Inc.
- Enbridge Gas Pipelines Inc.
- Rogers Communications
- Hydro One
- Cogeco Inc.
- Eastern Ontario Power
- Enbridge Gas Distribution
- Union Gas
- Bell Canada
- Utilities Kingston
- Lakefront Utilities Inc.

A copy of the agency contact list is available within **Appendix L.6**.

8.3.2 Municipal Advisory Committee

As part of the study, a Municipal Advisory Committee (MAC) was established at the onset of this study to provide project updates to key municipal staff members, obtain input on the study, design alternatives and the evaluation and selection of the Preferred Plan. In addition to municipalities, the MAC also included emergency service providers (i.e., police, fire rescue, paramedics), school boards and student transportation services, and local conservation authorities. Three MAC meetings were held as part of this project, as described herein.

MAC Meeting 1

The first MAC meeting was held on May 16, 2019, in conjunction with the Highway 401 Planning Study from Cobourg to Colborne (GWP 4060-00-00). The purpose of the meeting was to provide an overview of the studies, opportunity for discussion/municipal input, the consultation plan, and next steps in the study process.

MAC Meeting 2

A second MAC meeting was held on April 20, 2020, to review the study background, present and obtain input on the Preferred Plan, potential detour routes, potential impacts, and proposed mitigation measures, and to discuss any comments, questions, and/or concerns.

MAC Meeting 3

A third MAC meeting was held on December 6, 2022, to review study progress, and to present and obtain input on the Preferred Plan, potential detour routes, and the next steps in the study process.

A copy of the presentation materials and notes recorded during the MAC meetings are included in **Appendix L.7**.

8.3.3 Council Presentations

Presentations to municipal Councils were scheduled around PICs 1 and 2 to provide Council members with an update on study progress, to share the information being presented at each PIC event, and to gather feedback at key points in the study process. The Council presentations were scheduled as outlined herein.

Council Presentations (Round 1)

Presentations to Councils related to PIC 1 were held in joint with the Highway 401 Planning Study from Cobourg to Colborne (GWP 4060-00-00), and were held as follows:

- Town of Cobourg, September 9, 2019
- Township of Hamilton, September 10, 2019
- Township of Cramahe, September 17, 2019
- Northumberland County, September 18, 2019
- Township of Alnwick/Haldimand, September 19, 2019

Council Presentations (Round 2)

Presentations to Councils related to PIC 2 were held as follows:

- Town of Cobourg, January 16, 2023
- Township of Hamilton, January 17, 2023
- Northumberland County, February 27, 2023

A copy of the Council presentations is available within **Appendix L.8**.

8.3.4 MNR and MECP Meeting

A meeting with MNR and MECP was held on November 12, 2019, in conjunction with the Highway 401 Planning Study from Cobourg to Colborne (GWP 4060-00-00) to provide an overview of the studies and gather any initial feedback and/or recommendations. In general, MNR and MECP did not raise any concerns with the project.

A copy of the information shared at the meeting and meeting minutes are available within **Appendix L.9**.

8.3.5 Northumberland County Meeting

The study team held a meeting on May 4, 2023, with Northumberland County staff to discuss their letter (dated April 18, 2023), in regard to potential traffic impacts to County Roads, specifically within the Township of Hamilton, and the ability for existing County Emergency

Detour Routes to accommodate potential increases in traffic associated with the Highway 401 closures required during construction.

The Town of Cobourg explained during this meeting that the Town cannot complete transportation studies within another municipality, and that additional future studies would be undertaken at the discretion of the Township of Hamilton.

MTO confirmed that it is the Town of Cobourg's and Township of Hamilton's responsibilities to designate and maintain permanently signed detour routes to be used in the event of a closure on a major road, or 400-series highway.

A copy of the information shared at the meeting and meeting minutes are available within **Appendix L.9**.

8.3.6 Agency Correspondence

Correspondence with federal, provincial, and local agencies was carried out throughout the study to provide notification of public consultation events, provide updates on study progress, and to gather feedback. A copy of correspondence with all agencies, including the comments received and responses provided by the study team, is provided in **Appendix L.10**.

8.4 Indigenous Community Consultation

Consultation with Indigenous Communities included written communications with; Alderville First Nation, Curve Lake First Nation, Hiawatha First Nation, Mississaugas of Scugog Island, Chippewas of Rama First Nation, Chippewas of Georgina Island, Beausoleil First Nation, Mohawks of the Bay of Quinte, Métis Nation of Ontario and the Coordinator for the Williams Treaties First Nations, at key points in the study process (i.e., Notices of Study Commencement, PIC 1, PIC 2 and TESR). As indicated above, a cover letter was provided as part of each study notification. A summary of additional correspondence with Indigenous Communities is provided herein.

It should be noted that the Mississaugas of the Credit First Nation and Six Nations of the Grand River were also circulated on the Notices of Study Commencement and PIC 1. However, given that the study area lies beyond these respective traditional and/or treaty territories, and that these communities did not express and interest in this study, subsequent study notifications were not circulated to community representatives.

Curve Lake First Nation requested to be kept updated throughout all phases of the project and advised of Curve Lake First Nation's Archaeological Protocol, stating the Curve Lake First Nation must participate in all stages of the archaeological assessments conducted on their lands, including the Stage 1 assessment. If a Stage 2 archaeological assessment is required, a trained archaeological liaison is to be present on-site. As such, Curve Lake First Nation was invited to participate in the initial Stage 2 AA field surveys undertaken in 2023 and will be

invited to participate in the subsequent Stage 2 AA field surveys that will be undertaken following the completion of this study.

The Mississaugas of Scugog Island First Nation informed the study team this area is a treaty territory of the Mississauga Nation, also known as Williams Treaties – Clause 2 Lands. They requested to be kept on the mailing list and apprised of the archaeological assessment results.

The Mohawks of the Bay of Quinte also requested to be kept informed of the archaeological assessment results.

Engagement with Indigenous Communities will be carried out at the initiation of the detail design stage of this project.

A summary of correspondence with Indigenous Communities and organizations is available within **Appendix L.11**.

9.0 Notice of Study Completion

The Notice of Study Completion was published within the Northumberland News online news platform on Monday, January 13, 2025, when the Transportation Environmental Study Report (TESR) was made available for public review. The Notice was also made available on the project website and distributed to the MPP, property owners, agencies, stakeholders, Indigenous Communities, and members of the public that expressed an interest in this project during the course of this study.

9.1 Future Consultation

During the detail design stage of this undertaking, the external agencies, Indigenous Communities, and property owners will continue to be contacted and consulted regarding design/construction details and commitments to future work as outlined in this document, where appropriate and/or necessary.

9.2 Future Commitments

Future consultation will be required during the next phase of detail design to address outstanding issues, including permits and approvals from external agencies, consultation with Indigenous Communities and detailed environmental investigations regarding impacts and mitigation, and engineering investigations to confirm the final design.

Future consultation is expected to include notification of the start of next phase of design. A summary of proposed future consultation is in **Table 24**.

Table 24: Future Consultation with External Agencies

External Agency	Subject of Consultation
Fisheries and Oceans Canada	– Request for Review Form
Ministry of Natural Resources and Forestry	– Terrestrial Species and Habitat – Construction timing windows/restrictions
Ministry of the Environment, Conservation and Parks	– Terrestrial and/or aquatic Species at Risk species and/or habitat – Endangered Species Act authorization/permit
Indigenous Communities	- Decisions or actions that may adversely impact asserted or established Aboriginal or treaty rights. -
Township of Hamilton	- Traffic Management Plan - Construction timing - Detour Plan
Emergency service agencies (i.e., OPP, Fire, ambulance, Cobourg Police Services, etc.)	- Traffic Management Plan - Construction timing - Detour Plan
Utility companies	- Utility relocations - Construction timing

10.0 Summary of Environmental Effects, Proposed Mitigation and Commitments to Future Work

A summary of environmental effects, proposed mitigation, and commitments to future work, as identified during the course of this study, is provided in **Table 25**, and forms a comprehensive 'checklist' of outstanding issues identified at the end of Class EA and Preliminary Design and will serve as a starting point for the subsequent detail design phase of the project.

Table 25: Summary of Environmental Effects, Proposed Mitigation and Commitments for Future Work

Legend

DFO: Department of Fisheries and Oceans
MTO: Ministry of Transportation
MNR: Ministry of Natural Resources and Forestry
MUN: Local Municipalities
GRCA: Ganaraska Region Conservation Authority
PUB: General Public
EMS: Emergency Medical Services
RES/BUS: Local Residents/Business Owners
MECP: Ministry of Environment, Conservation and Parks
MTCS: Ministry of Tourism, Culture and Sport
STS: Student Transportation Services
UTL: Utilities

I.D. #	Environmental Issues/Concerns and Potential Effects	Concerned Parties	I.D. #	Mitigation/Protection/Monitoring/Commitments to Further Work
Natural Environment				
1.0	Surface Water • Potential impacts to surface water and groundwater from disturbance of contaminated soils, leaks, and accidental spills • Potential to introduce drinking water threats	MTO MECP GRCA Indigenous Communities	1.1	A drainage design plan shall be completed to provide appropriate drainage capacity
			1.2	Runoff and overland flow shall be directed away from working areas and areas of exposed soils
			1.3	All oils, lubricants and other chemicals shall be stored in suitable containers and handled in accordance with applicable regulations
			1.4	Refueling will not be permitted within 30 m of a watercourse
			1.5	At minimum, best management practices (BMPs) shall be applied for fuel management, including secondary containment of temporary fuel storage
			1.6	A spill response plan shall be prepared during detail design. All spills will be cleaned up immediately, and contaminated materials will be disposed of in an approved manner. The MECP will be informed immediately of all reportable spills
			1.7	Run-off from construction and stockpiles will be contained and discharged to prevent entry of sediment to water
			1.8	The handling and storage of DNAPL will be avoided to the extent possible
			1.9	The need for a private well monitoring program will be reviewed during detail design
			1.10	Additional monitoring will be undertaken during construction to minimize risk of water quality and/or surface water and groundwater interaction impacts
			1.11	Detailed dewatering calculations and assessment of site-specific conditions will be undertaken to further evaluate need for EASR or a PTTW
			1.12	Obtain draft Permit to Take Water (PTTW), if required
2.0	Fish and Fish Habitat • Design-related impacts: • Potential for habitat loss or alteration, potential for changes to fish passage, potential changes to water quality • Construction-related impacts: • Potential for sedimentation due to erosion, potential changes to water quality, potential fish mortalities, potential reduction in access to habitats during critical life stages.	MTO MECP MNR DFO Indigenous Communities	2.1	Aquatic effects assessments will be completed during detail design to assess risk of the project to result in death of fish or HADD of fish habitat
			2.2	Design project such that channel realignment is not required. If channel realignment is required, apply natural channel design principles in the design of the replacement watercourse in order to convey expected flows while maintaining or enhancing fish habitat and fish passage
			2.3	Design drainage systems to reduce changes in drainage to watercourses that provide fish habitat
			2.4	Design and plan activities and works such that loss of fish habitat or disturbance to fish habitat is reduced to the extent possible.
			2.5	Design stormwater management measures to reduce effects on watercourses that provide fish habitat to the extent possible
			2.6	Design a rehabilitation/re-vegetation plan for long-term stability of the areas disturbed during construction and to provide or restore shade to watercourses
			2.7	Reduce the need for rock penetration in the creek beds to the extent possible; particularly at locations identified as Significant Habitat in Table 1 of the Fish and Fish Habitat Preliminary Impact Assessment report. Where rock protection is required below the normal high-water level, use appropriately sized material and install at a similar slope to existing, maintain a uniform bank/shoreline, and maintain a natural bank/shoreline alignment such that it does not interfere with fish passage or alter the bankfull channel profile.
			2.8	In-water work restrictions will be applied. In-water construction activities are permitted from July 1 to September 30, inclusive (i.e., no work from October 1 to June 30)
			2.9	The following OPSSs shall be implemented as applicable during detail design: • Equipment Use – Use of equipment shall be in accordance with OPSS 182 • Fish Salvage – Fish salvage operations shall be conducted in accordance with OPSS.PROV 182. • Dewatering and the Use of Pumps – Dewatering activities and the use of pumps shall be conducted in accordance with OPSS.PROV 517 and OPSS.PROV 182 • Preservation of Riparian Vegetation – Removal of riparian vegetation shall be in accordance with OPSS.PROV 182

I.D. #	Environmental Issues/Concerns and Potential Effects	Concerned Parties	I.D. #	Mitigation/Protection/Monitoring/Commitments to Further Work
				• Erosion and Sediment Control – The installation, monitoring, maintenance, and removal of temporary erosion and sediment control measures shall be according to OPSS.PROV 182, OPSS.PROV 804, and OPSS.PROV 805 • Placement of Aggregates in Waterbodies – Use of aggregate in waterbodies shall be according to OPSS.PROV 825 and OPSS.PROV 1005 • Restoration of Disturbed Areas – Vegetation protection and rehabilitation shall be in accordance with OPSS.PROV 182, OPSS.PROV 803, and OPSS.PROV 804 • Management of Excess Materials – All excess material shall be managed in accordance with OPSS. PROV 180 and Ontario Regulation 406/19.
3.0	Vegetation • Potential for localized impacts to vegetation due to construction disturbance • Vegetation removal and earth grading will result in loss of natural vegetation communities, including meadow, forest, agriculture, and swamp.	MTO MECP MNR Indigenous Communities	3.1	Precise limits of vegetation removal will be confirmed during detail design and removal will be minimized to the extent possible. All clearing and grubbing activities will take place outside of the breeding bird window (April 1 to August 31 of any year), and comply with the Migratory Birds Convention Act (1994)
			3.2	Sediment fencing shall be used to clearly mark and separate work areas from sensitive natural features and minimize the release of sediments and other deleterious substances into adjacent areas of natural vegetation
			3.3	Topsoil and organic matter shall be salvaged and reused in areas disturbed during construction, as appropriate. Replaced soils will contain native seed bank, which will help facilitate successful revegetation. Post-construction seeding of the disturbed ROW will be done with a suitable native seed mix and in consideration of Monarch habitat. Seed mixes will include fast-growing, short-lived perennial cover crop to stabilize soil and reduce competition from weedy exotics. Native cover crops are preferred. New seed will be introduced to disturbed substrates as soon as feasible following construction (within 15 days for areas less than 200 m from a watercourse, and 45 days for other areas). Seeded areas shall receive water either through precipitation or irrigation after every 7 successive days without rainfall for the first 2 months during the growing season after seeding
			3.4	Sediment fencing will remain in place until vegetation cover is re-established
			3.5	A landscape restoration plan shall be developed during detail design for all disturbed and compensation areas. The plan shall include recommendations for use of native species in restoration planting as well as methods for management of invasive species
			3.6	If Phragmites control is required for this project, further field studies are recommended during detail design, including site-specific mapping. Clean equipment protocol is required for machinery entering riparian areas to prevent the spread of invasive species into the feature
4.0	Invasive Phragmites Management • Potential to introduce or spread invasive phragmite species	MTO MECP MNR	4.1	If Phragmites control is required for this project, further field studies are recommended during detail design, including site-specific mapping. Clean equipment protocol is required for machinery entering riparian areas to prevent the spread of invasive species into the feature
5.0	Terrestrial Species at Risk (SAR) or Species of Conservation Concern (SOCC) • Potential to impact SAR and associated habitat during construction	MTO MNR MECP Indigenous Communities	5.1	Further field investigations, including targeted surveys, shall be undertaken during detail design to confirm the presence of SAR or SOCC and their habitat
			5.2	Inform on-site personnel of potential presence of SAR/SOCC identified in the study area, obligations under the ESA (2007), and recommended actions in the event of an encounter.
			5.3	Species listed as endangered or threatened in the SARO list that are present in the study area must be protected from harm and harassment
			5.4	Any SAR that is incidentally encountered in the study area must be allowed to leave of its own accord. Activities within 20 m will cease until the individual disperses. Construction machinery/equipment must maintain a minimum operating distance of 20 m from the individual until it disperses from the work zone of its own accord.
			5.5	Should on-site personnel be unable to allow an incidentally encountered SAR to disperse from the active construction area under its own ability, MECP must be contacted immediately for additional guidance.
			5.6	Any SAR that is encountered in the work zone will be reported to the MECP staff within 48 hours of the observation or the next working day, whichever comes first.
			5.7	If an injured or deceased SAR is found, the specimen must be placed in a non-air tight container that is maintained at an appropriate temperature and MECP must be contacted immediately for additional guidance.
			5.8	Temporary alterations to SAR habitat must be limited to the duration and spatial extent possible and be remediated upon completion of activity and monitored as necessary.
	• Potential to harm bat maternity roost habitat		5.9	Habitat characterization and acoustic monitoring of suitable bat habitat, including candidate maternity roosting sites in trees and structures, and rocky areas suitable for Eastern Small-footed Myotis
			5.10	Removal of trees > 10 cm DBH or structures/rocky habitat providing suitable roosting habitat shall occur outside the period when bats occupy maternity roosts (May 1 to August 31)
			5.11	If removal of, or work on, potential maternity roost habitat is required between May 1 and August 31, maternity exit surveys shall be conducted prior to construction to confirm the presence/absence of bats. Maternity exit surveys are conducted during the evening and should include visual and acoustic surveys using accepted protocols

I.D. #	Environmental Issues/Concerns and Potential Effects	Concerned Parties	I.D. #	Mitigation/Protection/Monitoring/Commitments to Further Work
			5.12	Consultation with MECP shall be carried out during detail design to discuss potential impacts to SAR that may result from the project after mitigation, and to determine potential authorizations/permits
	• Potential to harm Monarch eggs, caterpillar, or pupae during construction		5.13	Vegetation clearing in meadow areas shall not be undertaken during the Monarch larval period (i.e., approximately May 1 to September 30)
			5.14	If vegetation clearing will proceed when Monarch larvae may be present, inspection of milkweed plants is recommended to locate larvae. If larvae are present, they may be moved to a location that is suitable and safe under the direction of a qualified professional. Monarch caterpillars may be moved to other milkweed plants; for other larval stages (i.e., eggs and chrysalis), entire milkweed plants should be transplanted
			5.15	Milkweed and nectar producing plants shall be included in seed mixes for areas restored to meadow to provide habitat for Monarch
	• Potential to harm Grassland Birds and habitat		5.16	If species are confirmed present during species-specific surveys recommended for detail design, construction activities with potential to harm habitat of grassland breeding birds will not be undertaken between April 1 and August 31. Work adjacent to confirmed breeding habitat will be limited during breeding season as much as possible to avoid harassment to these species.
			5.17	Limits of construction within grassland habitat will be reduced to extent possible and delineated and flagged/staked in the field prior to construction to assist with the demarcation of the construction area. The delineated limits of construction will be reviewed by a qualified ecologist.
			5.18	Grassland habitat disturbed temporarily will be remediated to pre-existing conditions as soon as possible before the beginning of the next nesting period.
6.0	Reptiles and Amphibians • Potential to impact reptile and/or amphibian species during construction • Peak active season for reptiles and amphibians (approx. April 1 to October 31) cannot be avoided during construction	MTO GRCA Indigenous Communities	6.1	Wildlife exclusion fencing shall be implemented before May 15 or after September 15 (i.e., outside of key breeding period) to define Work Zones and restrict the movement of reptiles and amphibians into the working area
			6.2	A qualified biologist shall visually inspect the site for evidence of nesting or individual reptiles and direct installation of construction barrier fencing to avoid nests If construction must be initiated during the turtle nesting or snake gestation season (approximately June 1 to September 1). If it is not possible to isolate a nest from construction, work shall be delayed until it is determined that the nest no longer includes viable eggs (hatchlings have emerged, or eggs were predated)
			6.3	Potential snake hibernation sites (rock outcroppings or stumps extending below-grade, or animal burrows) shall not be disturbed during the hibernation period (November 1 to March 31). If removal of above-ground habitat features (rock slabs or piles, brush) is needed, these features shall be retained outside the active work zone during construction and returned post-construction to the same or a nearby location
			6.4	During ditching and grading activities undertaken between April 1 and October 31, disturbance will be limited to the greatest extent possible to protect reptiles or amphibians that may be present. A spotter could be used to identify individuals present in the work area
7.0	Wildlife • Potential to impact wildlife/wildlife habitat during construction • Potential to accommodate wildlife crossings/ecopassages	MTO MECP MNR GRCA Indigenous Communities	7.1	Construction equipment and vehicles are to yield to wildlife
			7.2	Inform construction personnel to not threaten, harass or injure wildlife
			7.3	If wildlife are encountered during construction, personnel are required to move away from the animal and wait for the animal to move off the construction site. If slow-moving wildlife (e.g., turtles, snakes) are observed on the road and in danger, and if safe to do so, they should be moved off the road by gently guiding the individual in the direction it was travelling
8.0	Woodlands • New woodland edges increase potential for sunlight penetration, susceptibility to windthrow, desiccation and spread of invasive species	MTO GRCA Indigenous Communities	8.1	Newly created edges that are cut along existing woodlands will be addressed with restoration plantings to protect and mitigate potential negative effects such as increased sunlight penetration, susceptibility to windthrow, desiccation and spread of invasive species.
			8.2	Restoration plans shall use native species that are tolerant of the site conditions, including roadside stresses such as salt, pollution, and soil compaction, and shall include broadcast seeding to replace seed banks that are lost, as well as planting of woody shrubs and trees to create vertical structure
			8.3	Monitoring plans shall track survivorship and effectiveness of restoration plans and include recommendations to adapt management as appropriate
9.0	Wetlands • Potential for construction to directly impact wetland areas • Potential to disturb invasive phragmites • Potential for construction activities to displace native wetland vegetation with invasive phragmites	MTO MNR GRCA Indigenous Communities	9.1	Compensation for wetland area loss shall be determined during detail design, in consultation with MNR and GRCA
			9.2	Apply sedimentation and erosion control measures outlined in I.D. #10.0
10.0	Nesting Birds • Potential to disturb nesting behavior or damage/destroy nests	MTO MNR GRCA	10.1	Active nests (nests with eggs or young birds), and birds shall be protected under the *Migratory Birds Convention Act* (MBCA).
			10.2	Vegetation clearing shall not be undertaken within the restricted period (i.e., between April 1 to August 31)
			10.3	If a nest is located, a designated buffer shall be determined by a qualified professional and delineated. No activity shall be permitted within the buffer radius while the next is active.

I.D. #	Environmental Issues/Concerns and Potential Effects	Concerned Parties	I.D. #	Mitigation/Protection/Monitoring/Commitments to Further Work
	• Potential to disrupt nests/nesting birds on bridges during the Primary Nesting Period (PNP)	Indigenous Communities	10.4	If construction activities may disturb nesting bird on bridges during the PNP, exclusionary measures such as pre-tarping structure before April 1 shall be employed to deter birds from nesting on the bridges, following the MNR *Best Management Practices for Excluding Barn Swallows and Chimney Swifts from Buildings and Structures* (MNR 2017).
	• Potential to disturb Pileated Woodpecker nests	MTO	10.5	Targeted nest surveys will be completed for Pileated Woodpecker shall be completed during detail design. If a nest is identified and found to be empty of live birds or viable eggs, the nest must be registered under ECCC's Abandoned Nest Registry and the prescribed period of inactivity (36 months) shall begin before any action can be taken towards the nest.
11.0	Erosion and Sedimentation • Construction activities have potential to increase erosion, sedimentation and dust in wetlands, watercourses, and other natural areas	MTO	11.1	Complete a comprehensive Erosion and Sediment Control Plan (Approach 3: Two Part ESCP – Main and Supplemental) in accordance with the *Environmental Guide for Erosion and Sediment Control During Construction of Highway Project,* prior to construction.
			11.2	At minimum, the Best Management Practices set forth in the *Environmental Guide for Erosion and Sediment Control During Construction of Highway Project* will be followed
			11.3	The limits of construction (site boundaries) adjacent to all natural areas will be flagged and/or fenced prior to construction, and monitored during construction (along with erosion and sediment control measures)
			11.4	Impacts at approaches to watercourses, including installation of sediment control fencing or construction barrier, slope restoration and stabilization during construction, will be minimized to the extent possible
			11.5	Silt barriers shall be installed along work zones where there is potential for sedimentation of watercourses or wetlands, or inadvertent encroachment of construction vehicles into trees or natural areas.
			11.6	Sloped areas will be inspected regularly during construction to identify erosion problems and seepage areas and plan for appropriate temporary stabilization and drainage measures
			11.7	Depending on the proposed grading determined during design, rip rap may be required to protect the embankments
			11.8	No equipment will be permitted to enter any natural areas beyond the sediment fencing (site boundaries) during construction. Equipment arriving on-site will be inspected inside and out prior to entering the site for debris such as mud or accumulation of dirt, plant material or snow/ice. Special Provision No. ENR 0011 requires that equipment and vehicles be inspected as close to the site entrance as possible. Equipment will be cleaned in an area where risk of contamination is low, ideally on a mud free hard surface, at least 30 m away from drainage features, waterbodies, wetlands, or other natural areas. Where risk of runoff is high, cleaning stations will be contained by sediment fence as per standard erosion and sediment control specifications
			11.9	All materials requiring stockpiling (fill, topsoil, etc.) will be stabilized and kept a safe distance from any sensitive natural features
			11.10	All sediment and erosion controls shall be monitored daily, and properly maintain as required. Controls will be removed only after the soils of the construction area have been stabilized and adequately protected or until cover is re-established.
			11.11	All exposed soil areas will be stabilized and re-vegetated. Native seed and mulching, or seed and an erosion control blanket will be applied to disturbed sites promptly upon completion of construction activities
			11.12	In addition to any specified requirements, additional sediment fence will be available on site, prior to grading operations, to provide a contingency supply in the event of an emergency
			11.13	All sediment and erosion controls will be monitored regularly and properly maintained, as required. Controls will be removed only after the soils of the construction area have been stabilized and vegetation cover is re-established
			11.14	Any natural areas that are temporarily disturbed for access or construction will be restored to natural self-sustaining conditions
			11.15	Environmental controls will be monitored by an environmental inspector
			11.16	In addition to any specified requirements, additional silt fence shall be available on site, prior to grading operations, to provide a contingency supply in the event of an emergency.
			11.17	Limits of construction adjacent to natural features shall be monitored during construction (along with sediment and erosion control measures) to maintain limits with respect to vehicular traffic and soil or equipment stockpiling.
			11.18	Restore any disturbed natural areas to pre-construction conditions.
Social and Economic Environment				
12.0	Land Use and Property	MTO	12.1	Establish and confirm construction staging and laydown areas

I.D. #	Environmental Issues/Concerns and Potential Effects	Concerned Parties	I.D. #	Mitigation/Protection/Monitoring/Commitments to Further Work
	• Potential direct and indirect impacts to adjacent properties, including disruption during construction.	RES PUB UTL MUN	12.2	Engage with impacted property owners to review, discuss, and confirm impacts to property and associated mitigation measures
			12.3	Maintain access to private entrances and sideroads during construction
			12.4	Prepare detailed construction staging and traffic management plans. Maintain liaison/coordinate construction staging and traffic management plan with affected stakeholders (e.g., school boards/transportation providers, emergency service providers, local residents and business operators)
			12.5	Notify stakeholders of start of the next stage of design, construction staging, start of construction, etc. to minimize delay in emergency response times during and after construction
			12.6	Consult general public and directly affected/adjacent property owners at the start of the subsequent design process
			12.7	Hold public consultation event(s) during detail design to share and seek input on design, construction staging and traffic management plans
13.0	Management of Excess Materials • Excess materials may be encountered during construction at the sites and require proper management/disposal.	MTO MECP	13.1	Excess soils will be managed in accordance with O. Reg. 406/19 (On-Site and Excess Soil Management) made under the Environmental Protection Act, R.S.O. 1990, c. E.19, as well as the MECP's Rules for Soil Management and Excess Soil Quality Standard, dated 2020 and OPSS.PROV 180
14.0	Management of Potentially Contaminated Property and Hazardous Materials • Contaminated soils and/or surface water may be encountered during construction • Buildings and/or structures may have the potential to contain hazardous substances	MTO	14.1	A Designated Substances Survey shall be completed for buildings and/or structures, prior to demolition
			14.2	The selection of soil for analysis should include consideration and observations of unusual odours, staining, or debris/waste in the recovered material
			14.3	Should excess water be generated during construction, water quality analysis should be conducted to determine appropriate management methods. This work should be done by a Qualified Person
			14.4	Should evidence of soil or water impacts be identified during construction, samples should be collected for laboratory analysis to confirm concentrations of potential contaminants to develop appropriate handing and health and safety guidelines
15.0	Construction Noise • Potential noise increase during construction associated with equipment (e.g., boom trucks, pile drivers, dump trucks and paving machines).	MTO RES/BUS PUB	15.1	Once equipment and construction schedules are finalized, construction equipment sound levels will be reviewed to confirm that nose emissions are within the permissible limits. If higher than permissible limits, noise control options will be explored
			15.2	All equipment will be properly maintained to limit noise emissions. As such, all construction equipment will be operated with effective muffling devices that are in good working order
			15.3	The contractor will be required to adhere to standard noise restrictions (i.e., proper maintenance of equipment, no unnecessary idling)
			15.4	The Contract Documents will contain a provision that any initial noise complaint will trigger verification that the general noise control measures agreed to are in effect
			15.5	In the presence of persistent noise complaints, all construction equipment will be verified to comply with MECP NPC-115 guideline
			15.6	In the presence of persistent complaints and subject to the results of a field investigation, alternative noise control measured may be required, where reasonably available. In selecting appropriate noise control and mitigation measures, consideration will be given to the technical, administrative, and economic feasibility of the various alternatives
16.0	Air Quality • Potential for dust from construction activities to adversely affect nearby land uses and watercourses	MTO MECP RES/BUS PUB	16.1	The Environment and Climate Change Canada's Best Practices for the Reduction of Air Emissions from Construction and Demolition Activities will be followed. At minimum, best practices during construction will include material wetting or use of chemical suppressants to reduce dust, use of wind barriers and limiting exposed areas which may be a source of dust, and equipment washing.
			16.2	The incorporation of vegetative barriers in the landscaping design should be considered to minimize impacts of particulate matter in NOx emissions. The vegetation barrier should be thick (approximately 6 m or more) and have full leaf and branch coverage from the ground to the top of the canopy with no gaps in-between or underneath the vegetation. Evergreen species are more effective than deciduous for this objective and the barrier should be located close to the emission sources.

I.D. #	Environmental Issues/Concerns and Potential Effects	Concerned Parties	I.D. #	Mitigation/Protection/Monitoring/Commitments to Further Work
Cultural Heritage				
17.0	Archaeological Resources • Previously unknown/deeply buried artifacts/human remains could be uncovered during construction.	MTO MCM Indigenous Communities	17.1	A Stage 2 AA was undertaken for portions of the study area; however, Stage 2 Archaeological Assessment will be completed for any remaining areas potentially impacted by the Recommended Plan, including construction grading and laydown areas, prior to construction.
			17.2	The Williams Treaties First Nations and Mohawks of the Bay of Quinte will be notified of any subsequent archaeological assessment activities and invited to participate in archaeological field surveys, and to review any related reporting, prior to submission of the final reports to MCM.
			17.3	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 (Government of Ontario 1990b). 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 (Government of Ontario 1990b). The Williams Treaties First Nations and Mohawks of the Bay of Quinte shall also be engaged
			17.4	Any person discovering human remains must notify the police or coroner and the Registrar of Cemeteries at the Ministry of Government and Consumer Services under the Funeral, Burial and Cremation Services Act, 2002, S.O. 2002, c.33
			17.5	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. When all matters relating to archaeological sites within the project area of a development proposal have been addressed to the satisfaction of the MCM, 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. Until MCM clearance is obtained, no construction may occur on sites recommended for further archaeological fieldwork.
18.0	Cultural Heritage Resources • Potential impacts to identified Cultural Heritage Landscapes	MTO MCM RES	18.1	Cultural Heritage Landscapes identified within 50 m of the ultimate footprint of the Recommended Plan shall be avoided during construction, in accordance with MTO Environmental Guidelines including no removal, alteration or demolition of built heritage resources should occur; no destructive investigation procedures should be carried out in or near built heritage resources; no removal or changing of cultural heritage landscape resources should occur; and, no land-disturbing or vegetation-disturbing activities should be carried out in or near cultural heritage landscapes.
	• Potential impacts to heritage attributes of Cultural Heritage Landscapes	MTO MCM RES	18.2	Should construction activities be undertaken within 50 m of some of the heritage attributes (i.e., existing trees and residence) of a CHL, a 50 m buffer zone will be established around these resources during construction. In addition, the CHL and heritage attributes will be identified on construction maps, temporary fencing will be established around attributes ensure that staging and laydown areas avoid the property, and a building condition specialist or engineer familiar with vibration effects will review construction activities, should they be expected to occur within 50 m of the residence.
	Viewscapes • Impacts to existing views	MTO PUB	18.3	The Landscape Compositions Plan will be confirmed during detail design. Visual screening plantings shall be carried out in coordination with the affected residents, and positive landscape viewsheds shall be maintained, where possible. The possibility of saline soils and salt spray should be considered as an important species selection constraint during the design development of possible vegetative screens.
Technical				
19.0	Utilities • Impacts to existing utilities during construction	MTO UTL	19.1	Utilities will be contacted during next stage of planning and design to confirm the location of existing utilities, potential conflicts, and relocation requirements
	Traffic Operations • Impacts to traffic operations during construction • Temporary delay or disruption to EMS providers during construction.	MUN EMS STS	19.2	A detailed Traffic Management Plan will be developed, and detour routes will be confirmed in consultation with local municipalities, school transportation services, and emergency service providers

11.0 Monitoring

The planning and preliminary design phase of the project is now complete. Specific mitigation measures identified in this report will require confirmation during the next design phase and monitoring during construction.

Monitoring will be conducted by on-site construction supervisory staff to make sure that environmental protection measures, as outlined in this report and confirmed during subsequent design phases, and included in the contract package, are implemented. This includes making sure that the implementation of mitigating measures and key design features is consistent with commitments made to external agencies prior to construction.

For certain activities, monitoring by a qualified environmental specialist will be required.

In the event that protective measures do not address concerns identified or if major problems develop, the appropriate agency will be contacted to provide additional input.

In the event that the impacts of construction are different than anticipated, or that the method of construction is such that there are greater than anticipated impacts, the Contractor's method of operation will be modified to reduce those impacts.

The Town of Cobourg and MTO will continue to monitor the existing underpass and may implement certain components of the plan when needed to meet municipal and provincial transportation needs.

Preliminary Design Plans